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Mineral Assessment of the Delta River Mining District Area, East-central Alaska

Peter E. Bittenbender, Kirby W. Bean, Joseph M. Kurtak, and James Deininger Jr.

Alaska

Mission Statement

The Bureau of Land Management sustains the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations.

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Cover

BLM geologist Jeff Borhauer evaluates the placer potential on McCumber Creek in the Delta River Mining District study area (Photo by Joseph M. Kurtak).

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Abbreviations/Acronyms/Designations and Units of Measure

ppb	parts per billion
ppm	parts per million
Ma	million years
oz/cy	troy ounces per cubic yard
lcy	loose cubic yard
bcy	bank cubic yard
mm	millimeters
oz/ton	troy ounces per short ton

BLM	U.S. Department of the Interior, Bureau of Land Management
ADGGS	State of Alaska, Division of Geological and Geophysical Surveys
USGS	U.S. Department of the Interior, Geological Survey
DOD	U.S. Department of Defense
UAF	University of Alaska Fairbanks
AMIS	Alaska Mineral Information System – the BLM's Alaska minerals database
ORV	off-road vehicle
ATV	all-terrain vehicle
PGE	platinum group element(s)
PGM	platinum group mineral(s)
ACNC	American Copper and Nickel Company
ARDF	USGS Alaska Resource Data File
AMRAP	Alaska Mineral Resource Appraisal Program
GPS	Global Positioning System
$^{40}Ar/^{39}Ar$	isotopic age dating technique using isotopes of argon
K/Ar	potassium-argon method of isotopic age dating

Designation of grain sizes used in the gold placer descriptions:

Very coarse	> 2 mm
Coarse	1 - 2 mm
Fine	0.5 - 1 mm
Very fine	< 0.5 mm

All latitude and longitude measurements are presented using the North American Datum of 1927 Alaska (NAD27 Alaska). Most of the measurements were made with commercial, global positioning system instruments (GPS).

An **'Inferred Mineral Resource'** is that part of a Mineral Resource for which tonnage, grade and mineral content can be estimated with a low level of confidence. It is inferred from geological evidence and assumed but not verified geological and/or grade continuity. It is based on information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes which is limited or of uncertain quality and/or reliability. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource (Society for Mining, Metallurgy and Exploration, Inc., 1999).

An **'Indicated Mineral Resource'** is that part of a Mineral Resource for which tonnage, densities, shape, physical characteristics, grade and mineral content can be estimated with a reasonable level of confidence. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings, and drill holes. The locations are too widely or inappropriately spaced to confirm geological continuity and/or grade continuity but are spaced closely enough for continuity to be assumed. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource, but has a higher level of confidence than that applying to an Inferred Mineral Resource (Society for Mining, Metallurgy and Exploration, Inc., 1999).

Mineral Development Potential:

All mines, prospects and mineral occurrences are assigned a high, medium, or low mineral development potential classification. These rankings reflect the authors' opinions with regard to the likelihood of development for commodity production of each property. The rankings are based on the following criteria:

H High grades and probable continuity of mineralized rock exist. The property is likely to have economically mineable resources under current economic conditions. A high potential exists for developing tonnage or volume with reasonable geologic support for continuity of grade.

M Either a high grade or continuity of mineralized rock exists, but not both. Mineralized rock is confined by geology and/or structures, or grades are overall low. It could serve as a resource if economics were not a factor, but is presently uneconomic under existing conditions.

L The property exhibits uneconomic grades and/or little evidence of continuity of mineralized rock. There is little or no obvious potential for developing resources or is an insignificant source of interest.

Abstract

This report summarizes the Bureau of Land Management (BLM) mineral assessment of the Delta River Mining District study area in east-central Alaska. Between 2001 and 2005, the BLM examined mines, prospects, and mineral occurrences in the 2.9-million-acre study area. This investigation is part of the BLM's ongoing program of mineral assessments of mining districts in Alaska authorized by the Alaska National Interest Lands Conservation Act (ANILCA), 1980.

BLM investigators collected about 1,460 samples to evaluate 205 mineral occurrences and reconnaissance sites in the Delta River study area. A total of 252 mineral occurrences are recognized in the district by the BLM study. Of these, 205 were examined during the course of this study and about 110 are described in detail herein.

The main deposit types in the district are mafic and ultramafic-hosted nickel-copper-PGE deposits, skarns, volcanogenic massive sulfides, and placer gold deposits. Additional significant occurrences of varied deposit type are also present (e.g., basaltic copper, gold-quartz vein, porphyry, pegmatite-hosted). The only mineral production from the district is gold and minor platinum from placer gold deposits. Most of this production is from small-scale operations. Placer gold production began around the turn of the twentieth century and continues today. Millions of dollars annually are currently being spent by the international mineral industry to assess the mafic-ultramafic rocks in the southern part of the district for their potential nickel-copper-PGE deposits.

BLM investigators collaborated with other federal and state agencies to conduct the Delta River Mining District mineral assessment. A State of Alaska collaboration resulted in an airborne magnetics and resistivity survey that defines the mafic-ultramafic complexes in the southwestern part of the study area. A U. S. Geological Survey (USGS) collaboration resulted in a magnetotelluric and gravity investigation that allows modeling of the mafic-ultramafic complexes at depth, and suggests the presence of a dense, conductive body at the core of the largest complex in the area. Another USGS collaboration allows the BLM to present a modern stream sediment sample dataset from the southern part of the Mt. Hayes quadrangle that includes PGE analyses. The data suggest an eastward extension of the PGE potential in the study area.

Argon ($^{40}Ar/^{39}Ar$) isotopic age dating and petrographic analyses of mafic-ultramafic rocks from the southwestern part of the study area were compared to the southeastern part of the area where geochemistry suggests PGE potential, but where no lode occurrences are known. The dating indicates a Cretaceous mafic-ultramafic intrusive event in the southeast compared to a Triassic event in the southwest. Petrography suggests a possible sulfide association of PGE in the southwest and an oxide association in the southeast.

Introduction

This report summarizes the U.S. Department of the Interior, Bureau of Land Management (BLM) mineral assessment of the Delta River Mining District area in east-central Alaska. Between 2001 and 2005, personnel from the Division of Energy and Solid Minerals of the BLM's Alaska State Office examined mines, prospects, and mineral occurrences in the 2.9-million-acre study area. This investigation is part of the BLM's ongoing program of mineral assessments of mining districts in Alaska authorized by Section 1010 of the Alaska National Interest Lands Conservation Act (ANILCA), 1980, which mandates the Secretary of the Interior to assess the mineral potential of public lands in Alaska. In 1996 the BLM was assigned the responsibility for ANILCA mineral assessments in Alaska.

In addition to the ANILCA mandate, the BLM's mineral assessments aim to compile, analyze, and publicize mineral information to facilitate multiple-use land management. Mineral assessments include identifying the number, type, and distribution of mineral occurrences in a study area; evaluating occurrences for their exploration and development potential by surveying, mapping, and sampling the occurrences; determining resource estimates whenever possible; conducting economic prefeasibility studies of selected deposits; and identifying areas with elevated potential for hosting deposit types that may be explored or developed. This work also represent's the BLM's commitment to fulfilling requirements for resource evaluation defined in the Arctic Research Policy Act (ARPA), which, in part, calls for the establishment of a "national policy, priorities, and goals and to provide a Federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological and health sciences, and social and behavioral sciences…."

The Delta River Mining District study area extends across the eastern Alaska Range from about Delta Junction on the north to Paxson on the south. Most of the district is covered by the U.S. Geological Survey (USGS) 1:250,000-scale, Mt. Hayes quadrangle. It is accessible via the Richardson, Denali, and Alaska highways (Figure 1).

Most of the BLM mineral assessment studies are based on mining districts as defined by Ransome and Kerns (1954). The Delta River Mining District study area covered by this report is expanded relative to the Delta River Mining District proper of Ransome and Kerns (1954). The district, as studied, was expanded to the southwest to include the entire Tangle Lakes Archaeological District. It was also expanded to the east, in the southern part of the district, to include the Slate Creek area of the upper Chistochina Mining District of Ransome and Kerns (1954). The Ransome and Kerns (1954) mining district boundaries relative to the present study area are shown in Figure 1. The present study area is variably referred to as the "Delta River Mining District study area," "the Delta River study area," "the Delta River district," or simply as "the district." All of these terms refer to the Delta River Mining District study area as shown on Figure 1.

Figure 1. Location of the Delta River Mining District study area in East-central Alaska.

The USGS studied the mineral resources of the Mt. Hayes quadrangle as part of their Alaska Mineral Resource Appraisal Program (AMRAP) in the late 1970's and early 1980's. They produced several publications from this work (e.g., Curtin and others, 1989; Nokleberg and others, 1990, 1991, 1992), which are described more thoroughly in the Previous Studies section of this report. The USGS effort produced a good compilation of metallic mineral resources in the district and effectively conveys the mineral potential of various elements across various parts of the quadrangle. However, the USGS apparently did not fully recognize the importance of PGE associations with the mafic-ultramafic rocks in the area. They modeled gabbroic nickel-copper deposits and podiform chromium deposits, but did not evaluate PGE associations. In the 1980's, and even more in the 1990's and continuing today, the international mineral industry has focused exploration attention on the nickel-copper-PGE potential of the voluminous mafic and ultramafic rocks in the area. The BLM's mineral assessment effort in the district also concentrated on the nickel-copper-PGE potential in the mafic-ultramafic rocks.

Fieldwork for the Delta River study area mineral assessment was conducted from 2001 to 2004. In 2001 about 2 weeks was spent in the field assessing the logistics necessary to conduct the mineral assessment. From 2002 through 2004, two to four crews of two investigators spent about 5 to 6 weeks each year in the field investigating mineral occurrences. Most of the work was helicopter-supported and based out of the Tangle River Inn, a lodge in the Tangle Lakes area on the Denali Highway. Another base of operations was Delta Junction, from which helicopter-supported crews concentrated on evaluating mineral occurrences on the north side of the Alaska Range.

Preliminary results of the BLM's mineral investigations in the Delta River study area in 2001 and 2002 were published in 2003 (Bittenbender and others, 2003). A second interim report of work accomplished in 2003 was published in 2004 (Bean and others, 2004). An economic prefeasibility study of copper skarn, volcanic-hosted massive sulfide, Noril'sk-type copper-nickel-PGE, and placer gold deposit types in the district is currently in preparation (Coldwell and Pindell, in progress). Details of industrial mineral occurrences in the Delta River Mining District study area are presented in a separate report by Gensler (in progress).

In 2002 and 2003 the BLM supported and collaborated with USGS investigators in targeting the mafic-ultramafic rocks in the southwestern part of the district with gravity and magnetotelluric (MT) investigations. The aim of the geophysical surveys was to determine the structural and geologic setting of the mafic-ultramafic complexes and to better understand their geometry, extent, and distribution. Several publications resulted from this collaboration including Glen and others (2002a), Morin and Glen (2002, 2003), Sanger and others (2002), Schmidt and others (2002), Pellerin and others (2003a, 2003b), and Pellerin and Sampson (2003).

In 2002, the BLM conducted an airborne geophysical survey in the southwestern part of the study area, which primarily targeted mafic-ultramafic rocks because of their potential for hosting nickel-copper-PGE deposits. The survey, administered by the State of Alaska, Division of Geological and Geophysical Surveys (ADGGS), included collecting aeromagnetic and resistivity data across approximately 350 square miles. The project also incorporated approximately 250 square miles of aeromagnetic and resistivity data previously purchased by the BLM. The survey data package covering about 600 square miles was released to the public in March 2003 and is available from the ADGGS (Burns and Clautice, 2003; Burns and others, 2003). See the airborne geophysical survey section below for the location and a discussion of the survey.

BLM investigators collected about 860 samples to evaluate 205 mineral occurrences in the Delta River study area. The locations of these samples are presented on Plate 1, along with the locations of almost 600 samples that were collected during reconnaissance investigations. Samples collected from mines, prospects, and occurrences are marked on Plate 1 with red numbers, properties not sampled are marked with purple numbers, and reconnaissance sample localities are marked with green numbers.

A total of 252 mineral occurrences are recognized in the study area by the BLM and are included in the summary prospect table (Appendix Table A-1; Plate 1). Of the 252 recognized sites, 205 were examined during the course of this study. About 110 of these sites are described in detail in the main text of this report. These property summaries include a detailed description of the location of, and access to, the occurrence, a history of activity at the site, a geologic description, a description of BLM activities at the site, and an assessment of the mineral development potential of the occurrence. The individual property summaries are organized primarily on deposit type and then by map number from Plate 1, where map numbers are geographically arranged, generally from north to south and west to east. The main deposit types in the district, used to organize the summaries, are mafic and ultramafic-hosted nickel-copper-PGE deposits, skarns, volcanogenic massive sulfides, and placer gold deposits. A few additional, significant occurrences, of varied deposit type are also described in detail (e.g., basaltic copper, gold-quartz vein, porphyry, and pegmatite-hosted).

Each of the mineral occurrences, both in the body of this report and in the prospect table (Appendix Table A-1), are assigned a mineral development potential (MDP) classification of high, medium, or low. These rankings reflect the authors' opinions on the likelihood of the occurrence going into production. The rankings are based on criteria that have been used in previous BLM and U.S. Bureau of Mines mining district assessments and refer to the grade, tonnage, continuity, and economics of the occurrence. The specific criteria used for the high, medium, and low classifications are described at the beginning of Appendix Table A-1 and in the table of abbreviations at the beginning of this report (p. xv). The MDP described here is distinct from the mineral exploration potential (MEP) that is also included in the prospect table (A-1). The MEP reflects the authors' opinions on the likelihood that an occurrence will be of interest to future mineral exploration companies; whether the occurrence is likely to be explored in the future. The high, medium, and low classifications for MEP are also described in more detail at the beginning of Appendix Table A-1 and in the abbreviations table.

This report also includes analytical results derived from the reanalysis of 264 stream sediment samples that USGS investigators collected on the south side of the Alaska Range, in the Mt. Hayes quadrangle, in 1978 and 1979 (O'Leary and others, 1982; Appendix Table B-7; Plate 2). The aim of the reanalysis was to generate a broad baseline of geochemical data for the area using modern analytical techniques. The original, semi-quantitative USGS analysis (O'Leary and others, 1982) has been replaced by inductively coupled plasma-atomic emission spectroscopy (ICP-AES) for 40 elements. In addition, the BLM analyzed for platinum and palladium, which were missing from the original USGS data set. A small subset of the USGS stream sediment samples was also analyzed for the full suite of platinum group metals (Appendix Table B-7). The BLM selected 17 samples to be analyzed from those having the highest nickel values in the original USGS data set (O'Leary and others, 1982). The locations of the reanalyzed USGS samples are shown on Plate 2.

BLM investigators employed several avenues of investigation during the course of this study to better define the potential for nickel-copper-PGE mineralization in the mafic-ultramafic rocks of the Delta River study area. In addition to the traditional surveying and sampling, BLM investigators collected samples for petrologic analysis and $^{40}Ar/^{39}Ar$ age dating to characterize the rocks. The results of isotopic age dating are presented in a separate section of this report. Results of the petrologic study are included in various parts of the report.

The USGS recently published an Alaska Resource Data File (ARDF) for the Mt. Hayes quadrangle (Ellis and others, 2004). BLM investigators did not have access to these data until about midway through the final field season in 2004. The BLM was, however, provided with a draft list of mineralized sites that would potentially be included in the ARDF, but the list did not include geologic descriptions (Bill Ellis, written communication, 2002). So during the course of the BLM investigation, personnel investigated numerous sites on the draft list without the benefit of geologic descriptions or knowing specifically why the site was to be included in the ARDF. Therefore, the BLM's investigation does not include a thorough field check of all the ARDF occurrences.

Acknowledgments

Jeff Borhauer, one of our colleagues who contributed not only his geological skills, but also his unbounded enthusiasm and good cheer to the Delta River mineral assessment, passed away following the 2004 field season. Jeff focused his efforts in the Delta River area on the placer deposits (Figure 2), the evaluation of which we thank Joe Kurtak for taking over. We miss Jeff, and wish only the best for his family and many friends he left behind.

The authors of this report would like to thank those that participated in field investigations in the Delta River study area between 2001 and 2004. Jan Still, now retired from the BLM, aided in property and reconnaissance evaluations in 2001. During that year, field assistance was ably provided by Karinne Knutsen, Environmental Careers Organization (ECO). Several geologists from the BLM's State Office in Anchoragecontributed significantly to the field work in 2002 to 2004. These included Robert Klieforth, John Wandke, John Hoppe, Rob Ellefson, and Beth Maclean. Field assistance was ably provided by a BLM volunteer, Brian Hough, in 2003. Brian returned as an ECO paid assistant in 2004. Additional assistance in the field was provided by Amy Rodman and Kacey Cole (ECO). We thank each of these people for their unique contributions.

The authors thank Don Keill from the BLM's Fairbanks District Office for his analysis of the placer samples collected from the district.

Bill Ellis, Alaska Earth Sciences, Inc. provided invaluable insights into the geology of the area, particularly on the mafic-ultramafic complexes and their PGE potential. The BLM appreciates the expertise shared by other investigators, including Larry Hulbert of the Geological Survey of Canada. Many thanks are due to Rainer Newberry, Professor of Geology at the University of Alaska Fairbanks, for his contributions to the isotopic age dating and petrologic

Figure 2. Jeff Borhauer with gold.

examination of rocks in the Delta River study area. Geologists for Nevada Star Resources Inc., Alan Day and Jim Sanders, were also very helpful to BLM investigators by sharing historical and exploration data. The authors thank Dave Howland for his cooperation and hospitality during our evaluation of the Chistochina placer.

The authors are grateful to USGS investigators, Jeanine Schmidt, Jonathan Glen, Louise Pellerin, Jay Sampson, and Steve Nelson for sharing their expertise as well as their collaboration in the mineral assessment, collecting valuable gravity, magnetic, and magnetotelluric (MT) data across the southern part of the district.

The authors would like to thank the State of Alaska, Division of Geological and Geophysical Surveys, particularly Laurel Burns, for their work on contracting and publishing the BLM's airborne geophysical survey.

Jeff Foley, Calista Corporation, formerly with the U.S. Bureau of Mines, provided the BLM with insights to the geology of the district and field data based on his extensive prior experience there. He also provided a sample that was well suited for $^{40}Ar/^{39}Ar$ age dating. Paul Layer and Jeff Drake of the University of Alaska Fairbanks, dated the sample. We thank all of these contributors.

The authors would like to thank the staff of the Tangle River Inn for their gracious hospitality, particularly Nadine and Jack Johnson. Prism Helicopters provided excellent helicopter service from 2001 to 2003, as did Arne Johnson of Johnson Flying Service in 2004. Tundra Helicopters and Pathfinder Helicopters also provided able service during the field investigations.

Purpose of Program

Mineral assessment studies in Alaska expand the public's minerals-related knowledge and support U.S. Department of the Interior policies, which improves Federal stewardship and land-use planning on public lands. The studies provide important geoscience, mining engineering, and mineral economic information that become part of a comprehensive inventory of resources on Federal land. The total data set allows physical, biological, and economic sciences to be considered in Federal land planning and decision making. The information and the resulting policies are necessary to ensure the sound use of natural resources, while preserving and protecting environmental and cultural values. Information provided by these studies is also useful to legislators, other land-managing agencies, and mineral industry leaders in their efforts to make informed decisions affecting future mineral resource activities and their associated socioeconomic effects on the State of Alaska.

Mineral assessment studies improve the understanding of the mineral development potential of an area by creating an inventory of mineral resources, evaluating the likelihood that more resources may exist, and estimating the technical, environmental, and economic feasibility of mining certain mineral deposits. They also review land-use and environmental issues as these relate to potential mineral development scenarios. The mineral assessments address specific data and analysis requirements mandated by the National Environmental Policy Act (NEPA), the Federal Land Management and Policy Act (FLPMA), the National Forest Management Act, the Alaska National Interest Lands Conservation Act (ANILCA), and other statutes.

Area-wide mineral assessments of Alaska are conducted in coordination with several Federal agencies. Historically, these have included the U.S. Bureau of Mines, USGS, BLM, and the Forest Service. Early in 1996, the U.S. Bureau of Mines was closed as an agency and its functions, personnel, and mandates in Alaska were transferred to the BLM under Secretarial Order 3196, dated January 19, 1996.

Under the U.S. Bureau of Mines and BLM mineral assessment program, several mining districts (including Goodnews Bay, Juneau, Valdez Creek, Colville, Koyukuk, Ketchikan, Stikine, and Chichagof-Baranof), national forests (Tongass and Chugach), and BLM resource planning areas (Steese-White Mountains, Forty Mile, and Black River) have been investigated. Many of these studies have been conducted in coordination with State and nongovernmental organizations as well.

Authorities

In accordance with Section 1010 of the ANILCA (PL 96-487; 94 Stat. 2371) the Secretary of the Interior "...shall, to the full extent of his authority, assess the oil, gas, and other mineral potential on all public lands in the State of Alaska in order to expand the database with respect to the mineral potential of such lands." "To the maximum extent practicable, the Secretary shall consult and exchange information with the State of Alaska regarding the responsibilities of the Secretary under this section and similar programs undertaken by the State." The Wilderness Act, National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA) and Mining and Minerals Policy Act (MMPA) also require interdisciplinary resource assessments before a major Federal land-use decision is made on public lands.

Priorities

Mineral assessment study areas are chosen using a prioritization process that weighs several factors, including land status, mining history, current prospecting activity, geologic potential, accessibility, and conflicting land uses. Higher priority is given to areas where there is a concentration of federal land, particularly BLM land. In addition, the status of the BLM's land use planning schedule weighs heavily in the selection of areas considered for assessment. Higher priority is also given to areas where there is a significant amount of past or present mineral exploration and/or development activity. The extent and age of previous studies is taken into account. Input from other Federal agencies and the State of Alaska are also weighed in the process of prioritization.

Methodology

Mines, prospects, and mineral occurrences are selected for examination after considering information from several different sources. An initial list is compiled from the Alaska Minerals Information System (AMIS), a minerals database created by the BLM from a broader national minerals database maintained by the U.S. Bureau of Mines through 1995. The AMIS contains information on mines, prospects, and mineral occurrences throughout Alaska. Each site from the AMIS list is reviewed and prioritized after the completion of a thorough literature search. Properties with multiple references and evidence of past production or development are given high priority. Sites where recent work or claim staking has been performed are given moderate priority for field investigation. The literature may reveal that some sites represent claim staking only; consequently, locations and information are scarce. These sites are given a low priority. The literature search may also reveal properties that were not included in the AMIS database, but nonetheless merit investigation.

Previous studies by government agencies such as the USGS or ADGGS may contain geophysical or geochemical information on sites that warrant follow-up examination. Other factors that influence site selection include favorable regional geology and newly created access (e.g., logging roads, glacial retreat, etc.). Site examinations may also be recommended by area land managers, prospectors, and geologists.

Location, Access, and Physiography

Location

The Delta River Mining District study area encompasses 2.9 million acres in east-central Alaska (Figure 1). The district extends to both the north and south sides of the generally east-west-trending eastern Alaska Range. On the south side of the range, the district is generally in the upper Copper River valley, but more specifically, the Susitna and Delta rivers also have headwaters within the district. On the north side of the range, the district is part of the Tanana River drainage.

Access

The Delta River Mining District study area is easily accessed by several roads. The district is bisected north-south by the Richardson Highway, which extends from Paxson, in the southern part of the district, 80 miles to Delta Junction at the northern edge. From Delta Junction, the Richardson Highway extends for approximately 30 miles along the northwestern boundary of the district, and from there, another 60 miles to Fairbanks.

Delta Junction marks the intersection of the Richardson and Alaska highways. The Alaska Highway skirts the northeastern boundary of the district for about 40 miles. About 70 miles farther to the southeast the Alaska Highway connects to Tok, and from there on to Canada.

To the south the Richardson Highway connects to Glennallen and on to the port of Valdez. Glennallen is about 70 miles from Paxson and Valdez is another 115 miles southerly from Glennallen. From Glennallen to Anchorage, via the Glenn Highway, is about 175 miles. So Paxson is about 245 miles from Anchorage via the Glenn and Richardson highways.

The Trans Alaska Pipeline system lies parallel to the Richardson Highway from Valdez to Fairbanks and also bisects the Delta River Mining District study area. The pipeline corridor provides access for off-road vehicles in some parts of the district. In places there may be posted restrictions on access to the corridor.

The Denali Highway cuts across the southwestern part of the district. It runs westward from Paxson to Cantwell on the Parks Highway. The Denali Highway is paved for 20 miles westward from Paxson to the Tangle Lakes. From there to Cantwell, about 80 miles, the highway is gravel. From Cantwell to Anchorage, via the Parks Highway, is about 210 miles

There are all-terrain-vehicle (ATV) trails that cut various parts of the district. Most of these are maintained for tourist activities and extend north and south from the Denali Highway (Plate 1).

An ATV trail extends from the Richardson Highway, where Phelan Creek empties into the Delta River, westward to about Broxson Gulch (Plate 1). This trail was used historically to access the placer workings in Rainy Creek and Broxson Gulch. Access to the trail requires crossing the Delta River, either by boat or when frozen.

Figure 3. Junction of Alaska (to left) and Richardson highways at Delta Junction. (View approximately to south with the Alaska Range in distance.)

There are two population centers in the Delta River Mining District study area. The largest is in the Delta Junction area, along the Alaska and Richardson Highways (Figure 3). This area includes the incorporated city of Delta Junction, the U.S. Army's Fort Greely, and the unincorporated communities of Deltana and Big Delta. The city of Delta Junction has a population of approximately 1,047 (Alaska Department of Commerce, Community and Economic Development [DCCED] website, 2005 Cert. Pop.). The area as a whole has a population of approximately 3,620 (Alaska Department of Labor and Workforce Development, 2002). Recent increases in activity at Fort Greely, with the installation of missile defense systems, are likely to cause this population estimate to increase.

Delta Junction is served by numerous freight-hauling trucking services, both within Alaska, and between Alaska and Canada and the conterminous United States. Charter flight services, both fixed-wing and helicopter, are available in Delta Junction.

Figure 4. Paxson and the junction of Richardson (to right) and Denali highways. (View approximately to the north.)

The other population center in the district is the unincorporated community of Paxson, at the junction of the Richardson and Denali highways (Figure 4). The population of Paxson is estimated at 37 (Alaska DCCED website, 2005 Cert. Pop.). With its small population, few services are available at Paxson. Most services are available either from Delta Junction (see above) or from Glennallen, about 70 miles south of Paxson. Glennallen is an unincorporated city with a population of about 589 (Alaska DCCED website, 2005 Cert. Pop.).

Physiography

The Delta River Mining District study area spans several physiographic provinces and divisions as defined by Wahrhaftig (1965). From south to north the broader provinces include the northern edge of the Coastal Trough, the Alaska-Aleutian Province, and the eastern extremity of the Western Alaska Province. The more narrowly defined divisions include the Gulkana Upland, Clearwater Mountains, the eastern part of the Alaska Range, the Northern Foothills, and the Tanana-Kuskokwim Lowland (Wahrhaftig, 1965).

Within the Delta River Mining District study area, the southern flank of the Alaska Range is part of the Gulkana Upland. This area is bounded on the north by the eastern Alaska Range. The Amphitheater Mountains, in the southwestern part of the district, are part of the eastern extension of Wahrhaftig's Clearwater Mountains province. The northern flank of the Alaska Range is part of the Northern Foothills province, which is bounded on the north by the Tanana-Kuskokwim Lowland.

Drainages

The Delta River Mining District study area is drained by three major rivers, the Tanana River to the north, the Susitna River to the southwest, and the Copper River to the southeast. The Delta River is a tributary to the Tanana River, which drains into the Yukon River and subsequently to the Bering Sea. All the drainages on the northern flank of the Alaska Range, within the district, drain into the Tanana River. The Maclaren River, which marks the approximate southwestern edge of the district, drains into the Susitna River, which empties into Cook Inlet. In the southern and southeastern part of the district the Gulkana and Chistochina rivers drain generally southward. They are tributaries to the Copper River, which empties into the Gulf of Alaska near Cordova.

Elevations

Elevations in the district range from about 2,700 feet on the southern piedmont of the Alaska Range to about 14,000 feet at Mount Hayes. The lower elevations on the north side of the range are down to about 1,000 feet. Relief on the southern and northern flanks of the Alaska Range is subdued, but is very rugged within the range.

In the more subdued parts of the district, rock outcrops are rare. This is particularly true of the Tanana-Kuskokwim lowland in the northern part of the district. In the foothills, where most of the mines, prospects, and occurrences are located, outcrops may be found on ridge crests, on the steeper slopes, and where streams have cut through glacial overburden. In many places outcrops are covered by talus. At the higher elevations of the Alaska Range, outcrops are commonly covered by ice and snow. This part of the district is also nearly inaccessible due to the precipitous nature of the terrain.

Vegetation

Tree line in the district is at about 3,000 feet on the southern side of the Alaska Range, but is a little lower on the north side. Trees comprise mostly black and white spruce. Alder, willow, and buck brush are common in the district above tree line. Low brush may extend up to about 4,000 feet in places, particularly in sheltered areas. More exposed areas exhibit typical alpine tundra vegetation.

Glaciers

Much of the district is covered by alpine glaciers associated with the higher parts of the Alaska Range. The glaciers extend to elevations as low as about 4,000 feet, both on the north and south sides of the range.

Climate

Climatic conditions vary across the Delta River Mining District study area with the Alaska Range acting as a climatic barrier. The northern part of the district experiences more interior Alaska weather conditions, whereas the southern part of the district is more similar to south-central Alaska conditions.

At Delta Junction, north of the Alaska Range, the average maximum temperature in July is 69 degrees Fahrenheit (F). The average minimum for January is -11 degrees F. The average annual precipitation is about 12 inches, which includes about 37 inches of snow (http://www.wrcc.dri.edu/summary/climsmak.html).

South of the Alaska Range, Paxson, at an elevation of about 2,900 feet, witnesses average maximum temperatures in July of 65 degrees F and average minimums of -10 degrees F in January. Precipitation at Paxson averages about 21 inches per year, with about 106 inches of snowfall (http://www.wrcc.dri.edu/summary/climsmak.html).

Land Status

Much of the 2.9 million acres in the Delta River Mining District study area is managed by the State of Alaska. Other land holders in the district include the BLM, the Department of Defense (DOD), Native groups, and private citizens (Figure 4). Some of the land has been selected by Native groups and the State of Alaska, but has not yet been transferred to these entities ("Native selected," "State selected"). Much of the land held by the State and the BLM are open to mineral exploration and development; however there are parts of the State and Federal land holdings that have special restrictions, including an archaeological district and a wild and scenic river corridor. The Trans-Alaska Pipeline bisects the Delta River Mining District study area from north to south – this feature includes special land management regulations as well.

Most of the eastern part of the Delta River Mining District study area is managed by the State of Alaska (Figure 4). Except for the high mountains of the Alaska Range, much of the southeastern part of the district is also State land or has been selected by the State. A portion of the southwestern Delta River study area, north of the Denali Highway, is part of a larger land mass known as the 'Denali Block.' The Denali Block covers about 5 million acres between Paxson and Cantwell, at the western end of the Denali Highway. The eastern part of the Denali Block, 250,000 acres, was transferred to the State by the BLM in January, 2003, after the start of the BLM's mineral investigation of the district. The transferred land includes parts of the Tangle Lakes Archaeological District, which hosts historic cultural resources important to the Ahtna peoples of Eastern Alaska. The eastern Denali Block, particularly outside the archaeological district, includes many prospective nickel-copper-PGE occurrences that are of interest to, and are currently being explored by, the mineral industry.

BLM land in the district is found largely in the mountains of the Alaska Range and along the Richardson Highway through the mountains (Figure 4). The BLM also manages the land selected by State and Native groups, but is yet to be conveyed. In addition, the BLM manages land associated with special designations in the district. These include the Tangle Lakes Archaeological District in the southwestern part of the Delta River study area and the wild and scenic river corridor along the upper Delta River, from the Tangle Lakes, northward to the southern foothills of the Alaska Range.

The BLM also manages land along the Trans-Alaska Pipeline. An inner and outer corridor exists on either side of the pipeline. The corridors are typically from ½ to 1 mile wide on either side of the pipeline. Within the inner corridor, mineral entry is prohibited. The outer corridor is open to mineral entry for metalliferous minerals, but is closed for leasable minerals. These restrictions are specified in Public Land Order (PLO) 5150. The BLM's East Alaska Resource Management Plan is currently (early 2007) published, but the Record of Decision is unsigned pending resolution of the Governor's Consistency Review. The plan is not adopted until the Record of Decision is signed. The preferred alternative in this plan for the pipeline corridor is to keep the PLO 5150 mineral entry regulations in effect.

Figure 5. Land status map of the Delta River study area.

The BLM also manages land within the ‘wild and scenic’ corridor along the upper Delta River. The corridor includes three management distinctions: ‘wild,’ ‘scenic,’ and ‘recreational.’ Under the ‘wild’ designation, mineral entry is prohibited by the Alaska National Interest Lands Conservation Act (ANILCA, 1980). The ‘scenic’ parts of the corridor are currently open to locatable minerals, but are closed to leasable minerals, by PLO 5180. The ‘recreational’ parts of the corridor are closed to all mineral entry by PLO 5150; these would otherwise be open per ANILCA. In the preferred alternative of the East Alaska Resource Management Plan, all designations within the ‘wild and scenic’ river corridor would be closed to mineral entry.

The DOD operates Fort Greely, which includes a large part of the northern and northwestern sections of the Delta River Mining District study area. In addition to Fort Greely proper, the DOD also operates the Black Rapids training facility, which is adjacent to the east side of the Richardson Highway opposite the terminus of the Black Rapids Glacier. All of these military lands are closed to mineral entry.

None of the land in the Delta River Mining District study area is patented Native land or “interim conveyed” (IC); however, there are two blocks of land in the southern and southeastern parts of the district that have been selected by the Ahtna Regional Native Corporation. Native land is the same as private land holdings in the district, where mineral entry depends upon the wishes of the owners.

The largest block of private land in the Delta River study area is along the Richardson Highway, at the north end of Isabell Pass, on the east side of the Delta River. There are additional private holdings associated with the towns of Delta Junction, Paxson, and Summit Lake. Small private parcels, some of them original homesteads, are scattered across the district. These parcels are too small to show at the scale of Figure 4.

Patented mining claims are found mainly in the upper Chistochina area, in the southeastern part of the Delta River study area. These private property holdings are associated with the placer gold deposits that have been mined intermittently since the end of the nineteenth century (Mendenhall, 1903; Foley and Summers, 1990).

Previous Studies

The earliest geologic studies in the Delta River Mining District study area were conducted by the USGS. Their intent was to produce maps of the geology and topography to enable exploitation of the mineral resources of the region. The need for this information was spurred by the rush for gold to the Klondike following discoveries there in 1896 and 1897. Access to the area was greatly facilitated by the construction of the military trail from Valdez into the Copper River valley between 1899 and 1901. Construction of the telegraph line from Valdez to Eagle, Alaska, between 1900 and 1902, (which skirts to the southeast of the district) also contributed to the access to the area (Mendenhall and Schrader, 1903).

The first study was by W.C. Mendenhall in 1898 (Mendenhall, 1900) who accompanied a military expedition into the area. Mendenhall produced a limited topographic map along his route of travel and described geologic formations in general terms (Mendenhall, 1900). Some of Mendenhall's formation names are still used today (e.g., Chisna and Tetelna formations).

W.C. Mendenhall credits Lieutenant Henry T. Allen, who in 1885 crossed from the Copper River, down the Delta River, and on to the Tanana and Yukon rivers, with establishing the first useful maps for the area (Mendenhall, 1900). Russian traders apparently reached the headwaters of the Copper River prior to 1868, but no formal studies or maps were produced by them (Mendenhall, 1900). In 1891, C.W. Hayes of the USGS accompanied Lieutenant Schwatka from the Yukon to the Copper River. His work contributed to that of Mendenhall (1900).

In 1902, Mendenhall again studied the upper Copper River region. The results of this study were published in 1903 (Mendenhall, 1903; Mendenhall and Schrader, 1903) and 1905 (Mendenhall, 1905). Mendenhall's 1903 report is a brief description of the upper Chistochina area published in a USGS Bulletin for quick release of economic data to the public. Mendenhall and Schrader's report (1903) expands on the economic data in Mendenhall's (1903) report, and includes maps and photographs. It describes the gold occurrences in what is referred to as the "Chistochina Gold Field," or what this report refers to as the upper Chistochina area where the Delta River Mining District study area was expanded to the east to include the upper Chistochina Mining District. It also briefly mentions the Delta River District, which refers to the Rainy Creek/Eureka Creek area (Mendenhall and Schrader, 1903).

Mendenhall's later report (1905) includes more geologic and topographic data, with a map of the central Copper River region. The southeastern part of the Delta River Mining District study area is included in Mendenhall's geologic map (Figure 6). The economic geology data included in Mendenhall and Schrader's (1903) report are reproduced in Mendenhall's 1905 report (Mendenhall, 1905).

Figure 6. Map showing the locations of previous studies in the Delta River area.

The USGS began a series of annual reports in 1905 that summarized the progress of mining developments in the territory of Alaska, described transportation and labor conditions experienced in mining in the territory, and provided a listing of, and preliminary data on, territorial USGS investigations (Table 2). The reports are generally organized by commodity and by region of the territory. They include records and statistics on the production of various mineral commodities. Many of the reports describe mining activity at specific localities, particularly where production of commodities has occurred. In 1944, the responsibility for recording mineral production in Alaska was transferred from the USGS to the U.S. Bureau of Mines (Reed, 1946). A number of the annual USGS Alaska reports are authored by A.H. Brooks or P.S. Smith, who in many cases were the chiefs of the USGS Alaska Branch at the time of writing. The authors so listed may have compiled the annual reports, but information was contributed, and additional chapters written, by others.

Mining and exploration activity in the Delta River study area is included in mining-related statistics for the territory, if not specifically addressed in the annual USGS reports. Since placer gold and minor platinum are the only commodities that have been produced in the Delta River district, most of the specific references in the table below describe activity in the upper Chistochina area of the southeastern Delta River study area, where production was concentrated.

Table 2. List of annual USGS reports on the mineral industry of Alaska. Page numbers indicate a reference containing specific information on localities in the Delta River study area.

Year	Bulletin	Reference
1904	259 p. 31*	Brooks, 1905
1905	284	Brooks, 1906
1906	314 p. 45	Brooks, 1907/Martin, 1907
1907	345 p. 37	Brooks, 1908
1908	379 p. 157	Brooks, 1909/Moffit, 1909
1909	442	Brooks, 1910
1910	480 p. 10, 38, 112-127	Brooks, 1911/Moffit, 1911
1911	520 p. 37	Brooks, 1912
1912	542 p. 43	Brooks, 1913
1913	592 p. 62	Brooks, 1914
1914	622 p. 44-45, 75	Brooks, 1915
1915	642 p. 54	Brooks, 1916
1916	662, p. 21, 22, 43-44	Brooks, 1918
1917	692, p. 21, 23, 30-31	Martin, 1919
1918	712, p. 23, 24, 32, 44	Martin, 1920
1919	714 p. 38	Brooks, 1921
1919	714 p. 71, 76-77	Brooks and Martin, 1921
1920	722 p. 23, 39	Brooks, 1922
1921	739 p. 13, 23	Brooks, 1923
1922	755 p. 17, 26, 28	Brooks and Capps, 1924
1923	773 p. 30, 37	Brooks, 1925

Year	Bulletin	Reference
1924	783 p. 12, 25	Smith, 1926
1925	792 p. 33	Moffit, 1927
1926	797 p. 16, 40	Smith, 1929
1927	810 p. 22, 26, 53	Smith, 1930a
1928	813 p. 24, 60	Smith, 1930b
1929	824 p. 28, 34	Smith, 1932
1929	824 p. 115, 121-122	Moffit, 1932
1930	836 p. 28, 34	Smith, 1933
1931	844-A p. 28, 33	Smith, 1933
1932	857-A p. 26-27, 31	Smith, 1934
1933	864-A p. 30	Smith, 1934
1934	868-A p. 31	Smith, 1936
1935	880-A p. 35	Smith, 1937
1936	897-A p. 41	Smith, 1938
1937	910-A p. 39-40	Smith, 1939a
1938	917-A p. 38	Smith, 1939b
1939	926-A, p. 34, 78	Smith, 1941
1940	933-A, p. 33-34, 40, 50, 75	Smith, 1942a
1941-42	943-A	Smith, 1944

F.H. Moffit investigated the geology and mineral resources in the southern part of the Delta River Mining District study area over many years. His first report describes the status of mining activity in the Slate Creek area in 1908 (Moffit, 1909). In 1910, Moffit examined and mapped the area between the upper Gulkana River and Valdez Creek, to the west of the Delta River study area. He also examined the placer deposits in the Slate Creek area. Results of his examination are presented in reports published in 1911 and 1912 as well as in 1944 (Moffit, 1911, 1912, 1944). In 1954 Moffit published a comprehensive account of the geology and mineral resources of the eastern Alaska Range from the Delta River to the Canadian border, which includes the eastern half of the Delta River Mining District study area. This report reflects the work he had done across the area for many years (Moffit, 1954).

F.H. Moffit also conducted geological investigations on the north side of the Alaska Range within the Delta River Mining District study area. In 1939, Moffit spent about 80 days investigating and mapping the area between the Richardson Highway and the Johnson River, the northeastern part of the Delta River study area (Moffit, 1942). Moffit reports that Fitzgerald made a topographic map of the area from the Robertson River to the Delta River in 1936 (Moffit, 1954, p. 69). This is also in the northeastern part of the Delta River district.

Personnel from the Alaska Territorial Department of Mines and the State of Alaska, Division of Mining and ADGGS investigated various parts of, and deposits in, the Delta River Mining District study area over the years. One of the first investigations was by E.R. Pilgrim, a territorial mining engineer, in 1930 (Pilgrim, 1930). Pilgrim (1930) describes the location, access, geography, general geology, and selected mineral deposits of the district. Most of Pilgrim's geologic description is taken from previous USGS investigators.

Several investigations of mineral resources in Alaska were made during the early 1940's in response to strategic needs of the United States of America during World War II. Some of the investigations concentrated on single occurrences and others on the general location and tenor of Alaska deposits. Some of these studies include Joesting, 1942b; Van Alstine, 1942; U.S. Bureau of Mines, 1943;

Government agencies have reported on the occurrence of specific commodities in Alaska. Some of these reports, which include at least a listing of occurrences in the Delta River study area, are presented in Table 3.

Table 3. List of authors and agencies that reported on specific commodities in Alaska, which include occurrences in the Delta River study area.

Author / Agency	Commodity	Date
Smith / USGS	Molybdenum	1942
Joesting / Territory of Alaska	Strategic minerals	1942b
Ebbley and Wright / U.S. Bureau of Mines	Antimony	1948
Wedow and Matzko / USGS	Radioactive elements	1954
Eakins and others / State of Alaska	Uranium	1977
Cobb and St. Aubin / USGS	Strategic minerals	1982
Foley and others / State of Alaska	PGE	1989
Foley / USGS	PGE	1992

Various authors reported on examinations of individual mineral deposits in the Delta River Mining District study area. Most of the investigators were from government agencies, including the USGS, U.S. Bureau of Mines, and various territorial and state agencies. These reports are listed in Table 4.

Table 4. Government reports on individual occurrences in the Delta River study area.

Author / Agency	Occurrence	Date
Chapin / USGS	Placer platinum – Chistochina River	1919
Joesting / Territory	Ptarmigan Creek molybdenum occurrence	1942a
Van Alstine / USGS	Black Rapids antimony prospect	1942
U.S. Bureau of Mines	Ptarmigan molybdenum occurrence	1943
Saunders / Territory	Emerick	1957, 1961
Saunders / Territory	Emerick West Delta Nickel prospect	1962
Colp / UAF	Slate Creek	1981

From the 1930's to the 1960's, engineers and geologists from the Territorial Department of Mines made trips to various parts of the state to assess mining and prospecting activity. In some cases, the investigators made reports of their trips called "Itinerary Reports." Table 5 lists several of these reports that include information on the activity in the Delta River study area.

Table 5. Itinerary reports that include information on localities in the Delta River study area.

Author	Title	Date
Roehm, J.C.	Summary report of mining investigations in the Nizina, Bremner, Chisana, Tiekel, Nabesna, and Prince William Sound districts (Slate Creek, p. 5)	1938
Thomas, B.I.	Report of mining investigations along the Richardson, Nabesna, Edgerton, and Glen Allen Highways (Chistochina district, Slate Creek, Delta River-Miller Mine area?, p. 4-5)	1946
Jasper, M.W.	Trip to Copper River Valley and Nutzotin Mountains (Chitti Stain, p. 2; Chisna River, p. 4)	1953
Jasper, M.W.	Field trip to Lazy Mountain silver prospect, Houston gas-oil drilling, and Slate Creek operation (Ghezzi, Slate Creek, p. 4-5)	1956a
Jasper, M.W.	Trip to Copper River region and Slate Creek (Slate Creek, Mr. Ghezzi prospecting, p. 4-5)	1956b
Malone, K.	Trip report, yearly mineral industry survey (Slate Creek, Emerick, p. 2-3)	1962
Jasper, M.W.	Resume of 1963 field investigations and mining activity in third and fourth judicial districts (Slate Creek, Emerick, Paxson area, p. 9-10)	1964

During the 1960's and 1970's the State of Alaska published several reports on the geology and mineral occurrences on the southern flank of the Alaska Range within the Delta River study area. Some of these publications followed investigations of the area by State geologists and some resulted from Master's thesis investigations by students associated with the University of Alaska Fairbanks (Table 6).

Table 6. State of Alaska reports on the geology and mineral occurrences on the south flank of the Alaska Range in the Delta River study area.

Author / Report #	Title	Date
Hanson GR 2	Bedrock geology of the Rainbow Mountain Area, Alaska Range, Alaska	1963
Rose and Saunders GR 13	Geology and geochemical investigations near Paxson, Northern Copper River Basin, Alaska	1965
Rose GR 14	Geology and mineral deposits of the Rainy Creek area, Mt. Hayes quadrangle, Alaska	1965
Rose GR 19	Geology of part of the Amphitheatre mountains, Mt. Hayes quadrangle, Alaska	1966
Rose GR 20	Geological and geochemical investigations in the Eureka Creek and Rainy Creek areas Mt. Hayes quadrangle, Alaska	1966
Rose GR 28	Geology of the upper Chistochina river area, Mt. Hayes quadrangle, Alaska	1967

Author / Report #	Title	Date
Bond GR 45	Geology of the Rainbow Mountain - Gulkana Glacier area, eastern Alaska Range	1976
Stout GR 46	Geology of the Eureka Creek area, east-central Alaska Range	1976

USGS authors cataloged information on mineral occurrences in Alaska on several occasions. Most of the listings include information on location, commodity, and references for the occurrences, and group the sites by geographic area, quadrangle, or mining district (of Ransome and Kerns, 1954). The listings that refer to occurrences in the Delta River Mining District study area include: Cobb and Kachadoorian, 1961; Berg and Cobb, 1967; Cobb, 1972a, 1972b; Cobb, 1973; MacKevett and Holloway, 1977; Cobb, 1979.

The U.S. Bureau of Mines conducted several evaluations of mineral deposits in the Delta River Mining District study area. Many of the examinations were site-specific, but several others were more topical. Barker and others (1985) analyzed the sampling variance from selected platinum and palladium occurrences in Alaska. During the course of their investigation, they reported on occurrences in the Delta River Mining District study area (Barker and others, 1985). Barker (1988) later reported on four nickel-copper-PGE occurrences in the area (Ann Fork [Map no. 246], Ann Creek [Map no. 266], Emerick [Map no. 277], and Glacier Lake [Map no. 272]). Foley and Summers (1990) investigated the upper Chistochina area, including Slate Creek (Map no. 448) and Miller Gulch (Map no. 457), in the late 1980's and reported on the sources of placer gold and PGE.

The U.S. Bureau of Mines conducted a mineral assessment of the Valdez Creek Mining District, immediately to the west of the Delta River Mining District, in the late 1980's. This study included some of the mineral occurrences in the extreme southwestern part of the Delta River study area (Balen, 1990; Kurtak and others, 1992).

In the late 1970's and early 1980's the USGS conducted a thorough evaluation of the Mt. Hayes 1:250,000-scale quadrangle as part of their Alaska Mineral Resource Appraisal Program (AMRAP). Several products resulted from this investigation including geologic maps and maps depicting the distribution of geochemical anomalies and mineral occurrences. Some of the products from the AMRAP study are shown in Table 7.

Table 7. Selected products of the USGS AMRAP of the Mt. Hayes quadrangle.

Author	Product	Year
Nokleberg and others	Geologic map of southern Mt. Hayes quadrangle	1982
Curtain and others	Geochemical maps for stream sediment and heavy mineral concentrate samples	1989
Nokleberg and others	Series of maps showing areas of elevated potential for various deposit types	1990
Nokleberg and others	Table and map of mineral occurrences	1991

Author	Product	Year
Nokleberg and others	Map and tables of fossil and isotopic age data	1992a
Nokleberg and others	Geologic map of the Mt. Hayes quadrangle	1992b

In addition to the products shown in Table 7 above, the USGS published numerous short papers from their AMRAP program in the Mt. Hayes quadrangle through publications such as USGS Circulars that provided year to year USGS accomplishments in Alaska.

There were several geology-related studies done along the Trans-Alaska Pipeline corridor by various agencies. Most of these studies preceded pipeline construction. Since the pipeline bisects the Delta River study area, these reports include geologic information for a part of the district. Some of these reports are listed in Table 8.

Table 8. Geologic studies associated with the Trans-Alaska Pipeline.

Author / agency	Product	Year
Weber / USGS	Engineering geologic map	1971
Mulligan / U.S. Bureau of Mines	Listing of mineral occurrences	1974
Kreig and Reger / ADGGS	Soil properties from air photos	1982

The State of Alaska has produced various compilations of geologic data that include information on the Delta River study area. These include geophysical, geochemical, and geochronological data. Some of the State reports are listed in Table 9.

Table 9. State compilations of geologic data that include Delta River study area information.

Author	Product	Year
ADGGS	Airborne magnetic data	1973
Turner and others	Age data	1975
Stout	Geochemical data	1975

There have been several theses produced on geologic topics investigated by students in the Delta River study area. Most of the students have been associated with the University of Alaska Fairbanks. Some of the theses are presented in Table 10.

Table 10. Theses on geologic topics within the Delta River study area.

Author	Thesis Title	Year
Stout, J.H.	Bedrock geology between Rainy Creek and the Denali fault, eastern Alaska Range, Alaska	1965
Bond, G.C.	Bedrock geology of the Gulkana Glacier area, east-central Alaska Range, Alaska	1965
Bond, G.C.	Permian volcanics, volcaniclastics, and limestones in the Cordilleran eugeosyncline, east-central Alaska Range, Alaska	1969

Author	Thesis Title	Year
Gilbertson, R.L.	Biostratigraphy of the upper Paleozoic rocks in the Gulkana Glacier area, Alaska: M.S. thesis, Univ. of Wisconsin, Madison	1969
Kleist, J.R.	The Denali fault in the Canwell Glacier area, east-central Alaska Range	1971
Matteson, C.	Geology of the Slate Creek area, Mt. Hayes (A-2) quadrangle	1973
Foley, J.Y.	Alkaline igneous rocks in the eastern Alaska Range	1982
Belowich, M.A.	Stratigraphy, petrology, and depositional environments of the Jarvis Creek Coalfield, Alaska	1988
Athey, J.E.	Characterization of the DAT zone, eastern Alaska range, Alaska: a calcic Fe-Cu-Au skarn prospect	1999

The BLM has collected several private mineral industry reports on work accomplished in the various parts of the Delta River study area. Most of these reports are unpublished; however, some of the more recent reports have been made available through company websites. In some cases the reports fulfill the Canadian securities public instrument 43-101 requirement for public sale of company shares. The company reports used by the BLM to help compile mineral assessment data on the Delta River study area are listed in the table below.

Table 11. Private mineral industry reports on parts of the Delta River study area.

Author	Title	Year
Monroe, C.W.	Coppertone Claims, Slate Creek area, Alaska	1969
Hinderman, T.K.	Reconnaissance in the Slate Creek area, Alaska	1970
Bowes, W.A.	Geology of the Coppertone claim group, Slate Creek, Alaska	1971
Andrews, T.	Examination report, Coppertone mining claims, Alaska	1977
Andrews, T.	Proposed work plan, Coppertone claims, Alaska	1978
Coppertone Mining Co., Inc.	Report on Coppertone mining claims – Alaska	1978
Retherford, R., and others	Report of the geologic evaluation of annual assessment work for Coppertone claims, Slate Creek, Alaska	1978
Henkle, W.R., Jr.	Synopsis [of geological mapping, Slate Creek District, Alaska]	1978
Freeman, C.J.	Preliminary geologic report, Phelan Creek placer prospect, Alaska	1985
Freeman, C.J.	Fine gold transport at the Phelan Creek placer Au-Sn-PGE prospect, Alaska	1986
Hinderman, T.K.	Examination of the McCumber Creek placer property, Alaska	1986
Ringstad, C.A.	Report of geophysical studies at Chisna Mine	1986
Stevens, D.L.	Results of drilling on the lower Chisna River placer prospect	1987

Author	Title	Year
Alaska Earth Sciences	Slate Creek Gold Prospect Alaska Earth Sciences Consulting Report	1988
Hinderman, T.K.	Rainbow Project	1989
Halloran, J.	Mineral report on the Rainy Creek placer property	1993
Terry, D.A.	Results of the 1993-1994 exploration of the Slate Creek properties, Alaska	1995
Woolham, R.W.	Report on a combined helicopter-borne magnetic and electromagnetic survey, Nikolai Project area, Alaska, U.S.A., by Aerodat Inc. for American Copper and Nickel Company, Inc.	1995
Kratochvil, M., Coulson, S., Legault, J., and Williston, C.	Geophysical survey summary interpretation report – Regarding the ground magnetic and transient electromagnetic profiling surveys over the Forbes Nickel Project (PN 021-015), Mt. Hayes quadrangle #68, Alaska, USA	1997
Pritchard, R.A.	Dighem V survey for Falconbridge Exploration U.S., Inc., Mt. Hayes area, Alaska	1997
Wells, K.	Report on the 1997 work program for Falconbridge Exploration U.S., Inc. on the Forbes Nickel Project (PN 5-998) – Mt. Hayes quadrangle, Alaska	1998
Ellis, W.T.	MAN Ni-Cu-PGE project: Delta River Mining District Central Alaska Range: Report on 2002 exploration activities	2002a
Ellis, W.T.	Summary report for the Eureka Creek, Tangle Lakes Ni-Cu-PGE project: Delta River Mining District Central Alaska Range	2002b
Krasowski, D.J.	Lewis Elmer Trust, Slate Creek Property, Summary Report	2002
Freeman, C.J.	Forbes – Emerick, Prospect Submittal Summary by Avalon Development Corp.	2002
Freeman, C.J.	Geologic report MN04EXE1: Executive summary report for the MAN project, Delta River Mining District, Alaska	2004
Stone, W.E.	MAN copper-gold property: 2005 technical report	2005

Table 11 notes: These reports are available to the public from the BLM, Juneau. See Selected References section for full references.

A bibliography for the Mt. Hayes quadrangle was compiled by Zehner and others (1980), probably in association with the USGS AMRAP study of the quadrangle around the same time. This bibliography lists numerous references not included in the selected references of this report.

Mining History

The first recorded mineral exploration in the Delta River Mining District study area was in 1898 near Slate Creek, in the upper Chistochina area. Hazelet and Meals staked claims on their placer discoveries on the Chisna River, in the Slate Creek area, in 1899. By 1900 Hazelet and Meals were joined by other prospectors who discovered gold in placer deposits on Slate Creek and Miller Gulch (Mendenhall and Schrader, 1903; Mendenhall, 1905). (Note: The Slate Creek and upper Chistochina areas are actually part of the Chistochina Mining District of Ransom and Kerns (1954), but the Delta River study area was expanded to include this part of the adjacent mining district to the southeast. See explanation in introduction section of this report for further information.) This area was to see more mining activity than any other part of the Delta River study area for many years (Figure 7). Placer mining operations continue in the upper Chistochina area today.

Figure 7. Mining camp on Slate Creek in early 1900's. (Photographer: P.S. Hunt; Crary-Henderson Collection; Alaska Museum of History and Art, Library and Archives.)

A military trail was built from Valdez to Fairbanks between 1898 and 1905 (Mendenhall, 1905, Moffit, 1912), which accessed the Delta River Mining District. However, the route "came into use" sometime between 1907 and 1910 (Moffit, 1954, p. 82). The trail was expanded from a "foot and dog trail" (Pilgrim, 1930, p. 1) into a wagon road by 1910 (Moffit, 1911) and later into the Richardson Highway (Figure 8). A telegraph line, which extended from Valdez to Eagle, was routed parallel to part of the military trail and was completed between 1900 and 1902 (Mendenhall and Schrader, 1903). Another telegraph line, parallel to the trail, extended from Valdez to Fairbanks (Brooks, 1912). The lack of navigable rivers into the Copper River basin, and specifically to the Chistochina area, where the first mining occurred in the district, made the area very difficult to access (Mendenhall, 1903). The military trail afforded much easier access to the district than earlier and so the district saw increased mineral activity (Mendenhall and Schrader, 1903; Mendenhall, 1905).

Figure 8. Richardson Highway in 1923.
(Photographers: C.J. Blanchard and Ray B. Dame; AMHA. Alaska Railroad collection.)

The upper Chistochina placer district included several creeks or sites in the southeastern part of the district. These included Slate Creek, Miller Gulch, the Big Four claims, the lower Chisna River, Ruby Creek, and Lime (or Limestone) Creek, which is immediately to the east of the Delta River study area. Miller Gulch was the most profitable of the placers in the area and accounts for most of the gold production from the district. Intermittent production from the district has occurred to the present, but the greatest production came between 1901 and 1906 (Foley and Summers, 1990). Moffit (1912) reports that by 1910, more than $1,500,000 of gold production had occurred from the Chistochina district. Moffit later reports (1944) that according to USGS records, the Chistochina district produced about $3,000,000 worth of gold from 1900 to 1941, with $1,280,000 of gold produced prior to 1907. Significant production reportedly occurred until about 1926, and between 1979 and 1985 (Foley and Summers, 1990).

By 1910 a post office was established at Dempsey, on the Chistochina River near the mouth of the Chisna River in the upper Chistochina area. In 1910 about 40 to 50 people were mining in the Chistochina district, mostly on Slate Creek (Moffit, 1911, 1912). Two to three years earlier, Moffit (1909, 1912) reports that there were many more miners in the area.

1916 is the year first mentioned for the use of hydraulic mining techniques on Slate Creek (Brooks, 1918). In 1917 the M.E.W. Gold Mining Company used three giants to extract placer gold. Two giants cut the gold-bearing benches and fed the sluice, and one giant was used to stack the tailings (Chapin, 1919b). Hydraulic mining was reported in Slate Creek in 1924 and 1925 as well (Wimmler, 1925a). Hydraulic mining was also practiced at the mouth of Miller Gulch (Chapin, 1919b), on the Middle Fork Chistochina River (Wimmler, 1925a, 1925b; Moffit, 1944), and on the Chisna River claims near the mouth of the river in 1938 (Moffit, 1944).

Martin (1919, p. 30) reports that placer mining "continued on a large scale" on Slate Creek in 1917. Production is estimated at about $100,000 worth of gold and 15-20 ounces of platinum (Martin, 1919; Chapin, 1919b). Martin (1920) reports 14 mines and 50 men producing about $100,000 worth of gold in 1918 as well.

Little mining was done on the Chisna River between about 1910 and 1938. In 1941, the Acme Mining Company optioned claims on the Chisna River and intended to mine the area, but soon pulled out (Moffit, 1944, 1954). There had been no mining on Ruby Gulch in the years preceding 1954 (Moffit, 1954).

Placer mining in the Slate Creek area was a difficult endeavor due to several factors, including access to the area, lack of water, high altitude, short mining season, and frozen gravels. The greatest difficulty was access. The trails from the Copper River, to the south, crossed low, marshy ground, so that much of the mining equipment had to be hauled to the area during the winter (Moffit, 1944). High freight charges often challenged the profitability of the area's mining operations.

The richest grounds in the area were at Miller Gulch and on Slate Creek, immediately below Miller Gulch. Both of these areas suffered from lack of water for much of the year. In addition, the gradient of the creek was too low to easily move the tailings once they had been run through the sluice (Chapin, 1919b). Floods through the placer grounds also caused problems for the miners (Chapin, 1919b; Moffit, 1944; Jasper, 1956a). The Slate Creek area sits at an elevation of almost 4,000 feet, which is above the local tree line, so timber for mining and fuel had to be hauled in from a distance. The high altitude also meant a late thaw in the spring and an early freeze in the fall, making for a short mining season (Moffit, 1944). In 1917, for instance, the season extended from about mid June to September (Chapin, 1919b). At times the ground had to be thawed before placer mining could take place (Moffit, 1944, 1954).

Moffit (1909) reports that bench gravels in the Daisy Creek area, on the south side of the upper Chistochina area, were found to be frozen in 1908. He reports that equipment was intended to be installed for thawing the ground in 1909 (Moffit, 1909). Some of the gravels are also reported to be permanently frozen in the Slate Creek area (Moffit, 1911, 1954), where thawing equipment was being used in 1941 (Moffit, 1944). Moffit (1944) reports that a tunnel, presumably cut into frozen gravel, was driven a distance of 90 feet on the west side of Miller Gulch in 1941.

University of Alaska Anchorage. Archives & Manuscripts Dept.

Figure 9. Chistochina miners - probably around 1910.
(F. J. Date papers, photographs and archives; University of Alaska, Anchorage, Archives and Manuscripts Dept. "There was nearly $50,000 taken out by the party in the picture. The big black dog in the foreground had about $5,000 in dust on his back. It was 'freight' being taken out by the old man with whiskers".)

In 1900 prospectors moved from the Slate Creek area, west to the headwaters of the Delta River. Blix and Torgerson found placer gold on Rainy Creek. In 1901, about 200 to 250 people prospected the area and formed the "Eureka" mining district. By 1903, reports indicate that the results of placer mining in the area were unsatisfactory and that the area was abandoned (Mendenhall and Schrader, 1903; Mendenhall, 1905). Later reports indicate that a few of the prospectors remained in the area. Moffit (1911) reports five men working on Rainy Creek and two more on Eureka Creek in 1910 (Moffit, 1912). By 1930, Pilgrim (1930) reports that several thousand dollars worth of gold had been produced from placer deposits on Rainy Creek and that considerable prospecting had been done along Eureka Creek and its tributaries.

In 1916, the Rainy Creek area was being explored for copper. Although there is little information regarding the efforts in the area, samples examined by the USGS suggest skarn deposits were prospected (Brooks, 1918).

In 1930, a mining operation was prospecting gravel from a small eastern tributary to the Delta River, below the mouth of Phelan Creek (Pilgrim, 1930). This is the operation that came to be known the Miller Mine, and is shown on USGS topographic maps of the area.

Exploration for mineral occurrences on the north side of the district, north of the Alaska Range apparently progressed independently from that to the south. Access for early exploration of the north side of the district was from the Yukon and Tanana rivers, with a base for supplies in Fairbanks. Prospecting in the area followed the rush for gold in the Fairbanks area (1904), with most activity focused on placer gold (Capps, 1912; Moffit, 1942).

Much of the early mining activity on the north side of the Delta River Mining District study area was focused on Ober Creek and its tributaries, which flows into Jarvis Creek from the west. Little is known regarding the extent of mining or production from the area (Moffit, 1954). The lack of timber for fuel and the frozen ground are given as reasons for the paucity of mining in the area (Pilgrim, 1930). A few pits and trenches remain along Ober Creek, as well as an abandoned boiler, which was evidently used to thaw frozen gravels for mining. Most of the prospectors were searching for placer gold in the northeast part of the district, but due to limited success, by 1939, there was no mining and little prospecting occurring in this part of the district (Moffit, 1942). There was little lode gold prospecting on the north side of the district associated with the placers because most people thought the source of gold in the area was Tertiary gravels (Cobb, 1972b).

The first lode prospecting (excluding investigations of coal deposits) in the Delta River study area targeted a large quartz vein at the Gunnysack prospect on Gunnysack Creek, on the east side of the Delta River, approximately opposite the toe of Black Rapids Glacier. This exploration occurred sometime prior to 1912 at which time Capps reports the claims on the occurrence had been abandoned and that no work had been done on them “for some time” (Capps, 1912, p. 54). A stibnite-bearing quartz vein on Gunnysack Creek was prospected by driving an adit in 1916 (Joesting, 1942b). It is unclear whether the references to occurrences on Gunnysack Creek refer to the same lodes or not.

By 1930 Pilgrim (1930) reports that little lode exploration had occurred in the Delta River Mining District study area. What few lode discoveries had been made to date were apparently small, and little development had taken place. Pilgrim (1930) describes two lode occurrences that had been prospected by 1930, one on Phelan Creek and the other on Black Rapids Creek. Neither of these sites was found by the BLM’s field examination to resemble the descriptions given by prospectors to E.R. Pilgrim in 1930.

There has been interest in the coal resources of the Delta River Mining District study area over the years. The history and geology of the coal resources in the district are included in an accompanying report by the BLM (Gensler, in progress).

Prior to World War II the only lode mining reported by Cobb (1972b) from the Delta River Mining District study area was some molybdenum ore from the Ptarmigan prospect that was never shipped. This prospect was discovered in about 1912 (U.S. Bureau of Mines, 1943) and saw a good deal of prospecting activity till about 1918. Prospecting activity was again focused on the site from about 1937 to 1940 (Smith, 1942b). No other lode prospect in the district has seen as much development as the Ptarmigan molybdenum prospect.

Immediately following World War II and in the early 1950's, there was little recorded mining activity in the Delta River study area. Cobb (1972b, p. 68) writes that other than activity at a few placer mines, "No other mining in the Delta River [district] has been reported since World War II." The upper Chistochina area, outside the Delta River Mining District proper, continued to produce minor amounts of placer gold (Foley and Summers, 1990). Hobb Enterprises and Monte Cristo Mining Co., recovered "several hundred thousand dollars" worth of gold from the upper Chistochina area between 1956 and 1962 (Hinderman, 1970)

The widespread copper mineralization in the upper Chistochina area reported by Rose (1967) led to renewed lode exploration of the area in the 1970's and 1980's. The exploration model was mainly for a copper porphyry system, but also included potential lode sources for the historic placer gold production from the area. Numerous companies supported evaluations of the area including Northland Mines (Hinderman, 1970), Phelps Dodge (unpublished correspondence, 1970), Gulf Resources and Chemical Corp. (unpublished correspondence, 1975), Inspiration Mining Co. (Hinderman, 1970), Cominco American Exploration, Alpo Minerals, and Resource Associates of Alaska (Terry, 1995).

The discovery of the Emerick nickel-copper occurrence in the mid-1950's (Saunders, 1957; Alaska Kardex 068-14) initiated lode prospecting of the mafic-ultramafic rocks in the Delta River district. Additional discoveries followed, such as Glacier Lake (Forbes, 1962) and Ann Creek or Emerick West (Saunders, 1962). Several major and junior companies were involved in this exploration (e.g., Newmont Exploration Ltd., [Herbert, 1962] and Hanson, 1963). In the early 1980's the mafic-ultramafic rocks received renewed attention when interest in PGE was heightened. Much of this was due to the U.S. Bureau of Mines and their work on strategic and critical minerals (Barker and others, 1985; Barker, 1988; Foley and others, 1989).

The renewed attention on the mafic-ultramafic-hosted nickel-copper-PGE deposits began with Cominco in 1989 (Freeman, 2004). Since then, Falconbridge, American Copper and Nickel Company (ACNC), Fort Knox Gold Resources, Tullaree, MAN Resources, Nevada Star Resource Corp, and Anglo Exploration USA have been exploring in the area.

ACNC began investigating the nickel-copper-PGE potential of the area in 1992 (Freeman, 2004) and staked a large block of claims that included much of the Rainy complex in 1995 to 1996 (Ellis, 2002a; BLM claim staking records, 1996). In 1997, ACNC formed a joint venture with Fort Knox Gold Resources to explore the area (Ellis, 2002a). These companies conducted geologic mapping, rock-chip sampling, hand trenching, airborne and ground geophysics, and diamond drilling (Bill Ellis personal communication, 2002; Freeman, 2004). By 1999 Fort Knox acquired all of ACNC claims in the area. They subsequently dropped their claims by 2002. They did no significant work on the property between 1999 and 2002 (Ellis, 2002a).

MAN Resources Corp., Monty D. Moore and Associates, and Pacific Rainier Inc. began work in the area in 1995 to 1996 (Ellis, 2002a; Alan Day, personal communication, 2005). By 2000 Nevada Star Resource Corp (Nevada Star) acquired all the claims held by these companies. Following a 1-year joint venture with Fort Knox on the Canwell property in 2001, Nevada Star acquired all the claims held by Fort Knox in the area (FNX Mining website, accessed February, 2005; Alan Day, personal communication, 2005). Between 1997 and 2003 Nevada Star conducted airborne and ground geophysical surveys; geologic mapping; geochemical rock, soil, and stream sediment sampling; and diamond drilling (Ellis, 2002a; Freeman, 2004; Alan Day, personal communication, 2002-2005). In late 2003, Nevada Star entered into an option agreement with Anglo American Exploration USA, Inc. to explore Nevada Star's Fish Lake and Tangle complex claim holdings. By mid-2005, Anglo had conducted a soil sampling survey and ground geophysical surveys on the property (Nevada Star website: www.nevadastar.com/s/ MANProject.asp).

Prospecting for nickel-copper-PGE currently sees the largest expenditure of exploration dollars in the area. Current projects include those of Nevada Star and of Anglo American Exploration USA. During the BLM study the only mining activity in the district consisted of a gold placer operation on the Chistochina River (Map no. 439) and some suction dredging and placer prospecting on McCumber Creek (Map no. 67).

General Geology

The Delta River Mining District study area spans several distinct geologic domains on both the north and south sides of the Alaska Range. Developing from early Paleozoic time to the present, the geologic setting of the district comprises the ancestral margin of continental North America to the north, the accretion of the Wrangellia composite terrane to this margin, and the formation of the Alaska Range orogen along this accretionary boundary. The district includes several tectonostratigraphic terranes that reflect this geologic history (Figure 10).

Metasedimentary and metaigneous rocks of the Yukon-Tanana (Y-T) terrane dominate the Delta River Mining District study area north of the Denali fault (Coney and others, 1980; Jones and others, 1987). In the southern part of the Y-T terrane, several subterranes have been defined. These include, from north to south, the Lake George, Macomb, Jarvis Creek Glacier, and Hayes Glacier subterranes (Nokleberg and Aleinikoff, 1985). These subterranes are thought to represent successively shallower levels of a Devonian submarine igneous arc (Nokleberg and Aleinikoff, 1985; Foster and others, 1994). All the subterranes have been multiply deformed and metamorphosed, with metamorphic grade decreasing to the south (Nokleberg and Aleinikoff, 1985). It is in the Jarvis Creek Glacier and Hayes Glacier subterranes that the most significant mineral occurrences are found in the northern part of the district. These include gold placer deposits, along with VMS and pluton-hosted gold occurrences.

There are several fault-bounded slivers of distinct tectonostratigraphic terranes in the Delta River study area that are situated between the Y-T terrane to the north and the Wrangellia terrane to the south (see Figure 10). The terranes are separated from the Y-T terrane by the Hines Creek fault and from the Wrangellia terrane by the Broxson Gulch thrust fault (Jones and others, 1982; Nokleberg and others, 1992b). They occur on both sides of the Denali fault. Those on the north side of the fault include the Pingston, McKinley (Aurora Peak of Nokleberg and others, 1992b), and Windy terranes. These terranes are predominantly exposed in the relatively inaccessible, higher elevations of the Alaska Range. On the south side of the fault are the Maclaren and Clearwater terranes (Jones and others, 1982; Silberling and others, 1994). The Clearwater terrane is not exposed in the Delta River study area.

The Pingston terrane comprises penetratively deformed, weakly metamorphosed, predominantly marine, late Paleozoic and early Mesozoic sedimentary rocks (Nokleberg and others, 1984b; Silberling and others, 1994). Nokleberg and others (1984b) interpret the Pingston terrane as having been deposited in a submarine island arc environment. The Pingston terrane has been variably interpreted as the Hayes Glacier subterrane of the Y-T terrane (Aleinikoff and others, 1987; Nokleberg and others, 1992b).

Figure 10. Tectonostratigraphic terranes in the Delta River study area.

The McKinley and Windy terranes are predominantly sedimentary assemblages. The McKinley terrane is mostly a composite of Paleozoic and late Mesozoic flysch assemblages with a structurally included package of Paleozoic to early Mesozoic chert (Silberling and others, 1994). The Windy terrane comprises a sequence of late Mesozoic flysch that includes a chaotic assemblage of Devonian sedimentary rocks and undated igneous and metamorphic rocks (Silberling and others, 1994).

The Denali fault is a crustal scale feature that cuts approximately along the irregular suture between the ancestral margin of North America and the Wrangellia composite terrane to the south. It represents a fundamental geologic divide between terranes of continental affinity to the north and terranes generally of oceanic affinity to the south (Ridgway and others, 2002). It also divides the northern and southern parts of the Delta River Mining District study area, as well as the mines, prospects, and mineral occurrences found in the respective parts of the district.

The amount of offset across the Denali fault varies for different parts of the fault. In the Delta River study area, the offset is believed to be between about 125 and 250 miles in a dextral sense (Forbes and others, 1974; Jones and others, 1982; Nokleberg and others, 1985). Aleinikoff and others (1987) suggest the East Susitna Batholith in the Delta area and the Ruby Range Batholith in the Yukon, Canada, have identical lead isotopic signatures and, therefore, are correlative. They suggest this correlation means offset along this part of the Denali fault is closer to the 250-mile estimate (Aleinikoff and others, 1987). Movement along the Denali fault continues today, as is evidenced by the November, 2002, magnitude 7.9 earthquake that offset rocks along a 200- to 210-mile segment of the fault (Martirosyan and others, 2003; Eberhart-Phillips and others, 2003). The maximum offset of 29 (Fisher and others, 2003a) to 41 (Dreger and others, 2003) feet across the fault during this earthquake was just to the east of the Delta River study area – the epicenter was just to the west (Eberhart-Phillips and others, 2003).

The Denali fault in the Delta River study area is not the locus of terrane accretion. Although it now forms the boundaries of many of the terranes in the district, much of this has evolved via continental margin-parallel movement along the fault since terrane accretion. In the Delta River study area for instance, the northern boundary of the Wrangellia terrane in the west is not the Denali fault, but the Broxson Gulch thrust fault (Nokleberg and others, 1985).

South of the main strand of the Denali fault is the Maclaren terrane, which has been subdivided into the East Susitna batholith and the Maclaren Glacier metamorphic belt (Nokleberg and others, 1992b). Similar lead isotopic signatures (Aleinikoff and others, 1987), and intrusive and inheritance ages (Aleinikoff, 1984) for rocks from the Aurora Peak (McKinley) and East Susitna batholith indicate that they were derived from a common source area and suggest a common origin for a terrane now divided by the Denali fault and other tectonic fragments (Aleinikoff, 1984; Aleinikoff and others, 1987). Nokleberg and others (1985 [GSA Bull]) have suggested a correlation between the East Susitna batholith and the Ruby Range batholith in the Kluane Lake area of the Yukon Territory, Canada. Aleinikoff and others (1987) found identical lead isotopic compositions from the two terranes supporting this suggestion. Aleinikoff (1984) suggests the Aurora Peak (McKinley) and Maclaren terranes may be related to the Tracy Arm terrane of southeastern Alaska.

The Wrangellia terrane comprises most of the southern part of the Delta River Mining District study area and hosts most of the mines, prospects, and occurrences in the district. It is an extensive tectonostratigraphic terrane that extends from at least Vancouver Island, in southwestern British Columbia, Canada, for more than 1,250 miles to south-central Alaska (Jones and others, 1977; Monger and Berg, 1987; Jones and others, 1987). Paleomagnetic studies of Triassic igneous rocks of the terrane indicate they were deposited at low paleolatitudes – somewhere around 15 degrees of latitude from the equator (e.g., Hillhouse and Gromme, 1984). Wrangellia was subsequently accreted to the northwestern margin of North America in the late Mesozoic. Much of its broad extent is due to dismemberment and dextral translation along the northwestern continental margin of North America following accretion (Jones and others, 1977; Monger and others, 1982; Ridgway and others, 2002).

The Wrangellia terrane exhibits a broadly consistent stratigraphic sequence throughout its extent. The basement of the terrane is nowhere exposed (Nokleberg and others, 1985). In southwestern British Columbia, Canada, the lowest unit of the Wrangellia terrane is identified as the Sicker Group of Early Devonian to Permian age (Muller, 1980). In Alaska, some of the stratigraphically lowest sequences to be recognized are interpreted as upper Paleozoic, andesitic arc rocks, of oceanic affinity (Jones and others, 1977; Smith and MacKevett, 1970). Smith and MacKevett (1970) referred to these rocks as the Skolai Group. The Skolai magmatic arc has been recognized near the base of Wrangellia from south-central Alaska to southwestern British Columbia. These arc rocks lie on more penetratively deformed rocks whose affinities are apparently undetermined (Plafker and others, 1989). In the Delta River study area the upper Paleozoic arc rocks are part of the Tetelna and Slana Spur formations (Nokleberg and others, 1992b; Stout, 1976).

What distinguishes the Wrangellia terrane the most are its Triassic rocks. The Triassic sequence includes deep marine sedimentary rocks succeeded by shallower marine rocks indicating relatively rapid crustal uplift (Richards and others, 1991). The shallow marine rocks are overlain by a thick series of pillowed and subaerial, tholeiitic basalts – the Nikolai Greenstone of Alaska and the Yukon, Canada (Richter and Jones, 1973) and the Karmutsen Basalts of British Columbia, Canada (Barker and others, 1989). The basalt sequence is from 10 to 20 thousand feet thick (Richards and others, 1991) and was deposited rapidly, within about 5 to 10 million years in the late Middle to early Late Triassic (Jones and others, 1977; Richards and others, 1991). Overlying the basalts are shallow marine sedimentary rocks followed by deeper marine sediments (Richter and Jones, 1973).

The progression of depositional environments suggested by the Triassic strata of Wrangellia, from quiescent island arc to deep marine to subaerial to deep marine again, indicates a period of crustal subsidence, then uplift, followed by subsidence again. This is one of the pieces of evidence cited by Richards and others (1991) for the suggestion that the Wrangellia basalts are attributed to a mantle plume origin. Hulbert (1997) also suggests a mantle plume origin for the correlative Triassic basalts in the Yukon, Canada. Previous workers suggested rifting as a cause of the voluminous outpouring of Triassic basalts of Wrangellia (e.g., Jones and others, 1977; Nokleberg and others, 1985; Barker and others, 1989).

In the Delta River district the Late Triassic Nikolai Greenstone or Nikolai basalts are up to about 18,000 feet thick (Stout, 1976; Nokleberg and others, 1992b). The basalts lie unconformably on the marine volcanics and sediments of the Tangle Lakes Formation of Stout (1976) in the southwestern part of the district and on limestone of the Permian Eagle Creek Formation of Nokleberg and others (1992b) in the southeastern part of the district. The basalts at the bottom of the sequence are pillowed, indicating submarine deposition. Most of the overlying basalts show evidence of subaerial deposition, lacking pillows and including columnar jointing. The Nikolai basalts in the Delta River area host basaltic copper occurrences.

Underlying (in most cases) and intruding the Late Triassic basaltic sequence of Wrangellia in the Delta River area are sills, dikes, and plugs of mafic and ultramafic rocks ranging from dunite to gabbro. Most of the intrusives are large, layered, composite sill-form complexes that are unique within the Wrangellia terrane. The large size and layered, differentiated nature of the complexes make them particularly attractive for hosting nickel-copper-PGE occurrences. The mafic-ultramafic intrusives are thought to be comagmatic with the overlying Nikolai Greenstone and to represent feeder chambers to the overlying basalts (Nokleberg and others, 1985; Hulbert, 1997).

The most voluminous of these Wrangellian mafic-ultramafic intrusives are found in the Delta River area of south-central Alaska (Larry Hulbert, personal communication, 2003). Here the mafic-ultramafic sequence hosts nickel-copper-PGE occurrences that have been the focus of mineral exploration companies since the first discovery of nickel-copper in 1952 (Saunders, 1957, 1961). The exploration of these rocks for associated PGE accelerated in the 1990's and continues today. These occurrences were also a focus of the BLM's mineral assessment of the district. In addition to the nickel-copper-PGE occurrences, the mafic-ultramafic intrusions have given rise to copper-gold ± nickel skarn occurrences where they have intruded calcareous sedimentary rocks.

In the Kluane Ranges of the Yukon, Canada, rocks correlative to the mafic-ultramafic intrusives on the inboard side of Wrangellia have been prospected and mined for nickel, copper, and PGE (Hulbert, 1995, 1997). These rocks lie about 250 miles to the east-southeast of the Delta River study area. The Wellgreen deposit of Kluane was mined in 1971 and 1972, producing 168,940 tons of ore grading 2.23 percent nickel, 1.39 percent copper, 0.073 percent cobalt, and 2.15 ppm platinum and palladium (Hulbert, 1997). Hulbert (1997) reports that there were 658,575 tons of ore outlined at the deposit, but various problems caused a cessation of mining.

Overlying the Late Triassic Nikolai basalts of Wrangellia are successively deeper marine sediments. In south-central and southeastern Alaska a sequence of limestone immediately overlies the basalts. These are the Chitistone Limestone (MacKevett and others, 1997) and Whitestripe Marble (Loney and others, 1975) respectively. The Chitistone Limestone is the host of the world class Kennecott deposits of eastern south-central Alaska (MacKevett and others, 1997). In the Delta River study area the carbonate sequence expected above the Nikolai basalts is mostly missing. Nokleberg and others (1992b) describe occurrences of carbonate, conformably overlying Nikolai basalts, in narrow, fault-bounded, lenses and slivers. Uplift in the area apparently caused most of the carbonates to be removed by erosion.

A suite of Cretaceous, felsic to intermediate plutons occurs across the southern part of the Delta River Mining District study area. There are several deposit types found in the district that are likely related to these intrusives, including skarns, minor porphyry-style occurrences and gold-quartz veins. Broad areas of hydrothermal alteration with minor metal-sulfide mineralization may be associated with the Cretaceous intrusions, such as in the Red Rock Canyon area (e.g., Map nos. 279 to 282).

A series of Cretaceous plutonic rocks also occurs on the north side of the Alaska Range in the Delta River study area (Nokleberg and others, 1992b). They range from gabbros to granites. Several mineral occurrences are associated with these rocks including the molybdenum porphyry occurrence at Molybdenum Ridge (Ptarmigan prospect, Map no. 9), and the Hajdukovich Gold pluton-hosted gold prospect east of the Delta River (Map no. 88).

A suite of Cretaceous mafic-ultramafic rocks has been identified by this study in the southeastern part of the district. These rocks are mainly of tholeiitic, calc-alkaline origin and are associated with copper and PGE enrichments. These rocks are further described in the nickel-copper-PGE deposits section below.

Tertiary sedimentary and volcanic rocks are the youngest bedded rocks in the southern part of the Delta River district. The oldest of these rocks are volcanic dacites and andesites that underlie conglomerates and coal-bearing sandstones. The Tertiary rocks may be strongly hydrothermally altered (Nokleberg and others, 1992b), but there is little known associated mineralization of economic interest. The extent of the coal interbeds is very limited, so they have not attracted much exploration interest. Of economic interest are the gold-bearing Tertiary conglomerates found in the southeastern part of the district. These are at least one source of gold in the upper Chistochina area placer deposits (e.g., Mendenhall, 1905). The prominent landslide at locally known “Landslide Creek,” in the southwestern part of the district, has been mapped as a Tertiary conglomerate (Rose, 1965, 1966a; Nokleberg and others, 1992b). This conglomerate is made up predominantly of ultramafic rocks. Samples from the conglomerate are anomalous in PGE (Bill Ellis, personal communication, 2002; this study) and gold (Foley, 1992).

Quaternary deposits, particularly of glacial origin, cover much of the Delta River study area.

Isotopic Age Dating

BLM investigators employed argon ($^{40}Ar/^{39}Ar$) isotopic age dating on several suites of rocks to better determine their potential for hosting mineral occurrences (Figure 11). Most of the age dating work targeted the mafic-ultramafic rocks in the southern part of the Delta River study area, which host nickel-copper-PGE occurrences and have been the primary focus of mineral exploration company interest over the last 10 to 15 years. Most of the recent exploration has focused on the mafic-ultramafic rocks in the southwestern part of the district. Additional mafic-ultramafic rocks are mapped in the southeastern part of the district as well (Rose, 1967; Nokleberg and others, 1992b), but there have been few lode PGE occurrences found in the southeast. Alternatively, there have been PGE reported in placer production from the southeastern part of the district (Mendenhall, 1905; Martin, 1919; Foley and Summers, 1990). Additionally, strong PGE geochemical anomalies are found primarily in the southeast. A question for BLM investigators is what is the potential for the eastern rocks to host lode nickel-copper-PGE occurrences similar to those in the west? Additionally, what is the source of the PGE in the east?

The $^{40}Ar/^{39}Ar$ isotopic age dating was accomplished by the Geochronology Laboratory of the University of Alaska Fairbanks, under the direction of Dr. Paul Layer. The Geochronology lab produced the mineral separates from most of the samples submitted for dating. The mineral separates for 10 samples submitted by the BLM in 2005 were made by Jim Deininger of the BLM. The methodology for age dating employed by the Geochronology lab is presented at the end of Appendix C.

As a result of the isotopic age dating, along with other geochemical and petrologic investigations, the BLM found that the eastern rocks represent a younger, distinct, mafic-ultramafic intrusive event from that to the west. The BLM's investigations corroborate the suggestion by Nokleberg and others (1992b), that the rocks to the east are different from those to the west. However, Nokleberg and others (1992b) interpreted the eastern mafic-ultramafic rocks to be fault-emplaced and to represent a distinct terrane. They interpreted the Cretaceous ages associated with the rocks to be reset ages from an older protolith. The BLM interprets the eastern rocks to represent an Early Cretaceous magmatic event. Eleven of the samples returned ages that fall between approximately 119 and 125 Ma (Table 12). We interpret some of these to be reliable magmatic ages, and some to be more equivocal.

The western mafic-ultramafic rocks are dated as early Late Triassic, about 228 Ma, and are thought to represent the intrusive rocks that are comagmatic to the overlying Nikolai basalts (Nokleberg and others, 1985; 1992b; Ellis, 2002a). The western rocks comprise fractionated sequences of mafic-ultramafic rocks ranging from dunite to peridotite to gabbro.

This report compiles isotopic age data from 20 samples of mafic and ultramafic plutonic and mafic volcanic rocks from across the southern Delta River study area. The BLM sent an initial set of ten samples to the University of Alaska Fairbanks geochronology laboratory for $^{40}Ar/^{39}Ar$ analysis in 2004. Two of these samples, mineral separates (HB03-29 and HB03-53), were given to the BLM by Larry Hulbert of the Canadian Geological Survey. Another sample (AK25515) was given to the BLM in 2002 by Jeff Foley, who collected the sample while working in the area for the U.S. Bureau of Mines in the 1980's.

In 2005 the BLM followed up on these results by identifying an additional seven samples for isotopic analysis. Furthermore, two of the 2004 samples were reanalyzed, whose mineral separates were reprocessed for a better separation of hornblende. In choosing these additional samples in 2005, particular attention was paid to selecting samples distant from mapped Cretaceous and Tertiary granitic plutonic bodies that may cause reheating and resetting of the minerals analyzed. To this data collection effort, Jeanine Schmidt of the USGS, Anchorage, contributed age data on three mineral separates and whole rock samples of mafic-ultramafic rock she collected in 2003 (samples 03JS06B, 03JS07E, 03JS16A). Finally, K/Ar ages on hornblende and biotite from a hornblende pyroxenite (samples 72068 and 72069) from the upper Chistochina area reported by Matteson (1973) were recalculated using the constants of Steiger and Jaeger (1977).

A discussion of the analysis of individual samples and corresponding analytical data are presented in Appendix C of this report. The coordinates of each of the samples is also presented in Appendix C.

Magmatic Ages

The $^{40}Ar/^{39}Ar$ technique of isotopic age dating measures the ratio of argon produced by decay of potassium in potassium-bearing minerals (^{40}Ar) to the argon produced by irradiation of the mineral (^{39}Ar), which reflects the amount of potassium originally in the mineral. The accuracy of this method to determine a given geologic event depends on the ability of the sampled mineral to retain argon. This ability depends on the temperature to which the mineral is subjected, or closure temperature. Through experimentation, the closure temperature has been broadly determined for several common potassium-bearing minerals. Two of the minerals analyzed for this study are hornblende, with a closure temperature of about 500 to 600 degrees Celsius, and biotite, with a closure temperature of about 350 to 400 degrees Celsius. The closure temperatures are affected by things like size of the mineral grain, geometry of the grains, their radius, and the rate of cooling (Faure, 1986).

The first time a newly formed mineral passes through its closure temperature and begins to retain radiogenic argon from potassium decay is during crystallization of a magma, a magmatic age, for igneous minerals or during metamorphism for metamorphic minerals. Subsequent heating events and/or alteration may cause the mineral to lose radiogenic argon and effectively reset its argon clock. The ages we have aimed for in this study are magmatic ages. However, magmatic ages vary depending on the mineral analyzed, its distinct closure temperature, and the rate of magma cooling. For instance, a magmatic age from hornblende may be significantly older than a biotite age if the magma cooled slowly. In the case of volcanic rocks, which cool quickly, the age determined for a mineral generally dates the extrusive event.

Eight mineral separates from the samples selected for dating returned good plateau age spectra that define two discrete ages for mafic and ultramafic magmatism in the region. In the west two samples, HB03-29 (hornblende) and AK25515 (biotite), establish an early Late Triassic age (226 Ma and 228 Ma respectively) for mafic-ultramafic magmatism and mafic volcanism west of the Delta River (sites 1 and 2 on Figure 11; Appendix Table C-1).

In the east three samples, 11200 (biotite), 11048 (hornblende), and 10290 (hornblende), establish an Early Cretaceous age (121 to 123 Ma) for mafic-ultramafic magmatism (sites Appendix Table C-3). The eastern-most plateau age at Quartz Creek (sample 11200) agrees with recalculated K/Ar ages from Matteson (1973; 123 +/- 3.7 Ma on biotite and 126 +/- 3.8 Ma on hornblende) calculated on mineral separates from a hornblende pyroxenite. The remaining 3 samples in the east all support a 123 Ma age for mafic-ultramafic magmatism based on either isochron (10240), model (10910), or integrated (03JS16A) ages (Appendix Table C-3).

In the middle region, Rainbow Mountain to Cony Mountain (sites 4 to 6 on Figure 11), the age of mafic-ultramafic magmatism and mafic volcanism is not as firmly established due to pervasive alteration. None of the samples submitted for dating from this area produced unequivocal $^{40}Ar/^{39}Ar$ ages. Several of the samples from the Cony Mountain area point toward a Late Triassic age for mafic-ultramafic magmatism. This suggestion is supported by petrologic data that suggest the Cony Mountain rocks share similarities with the western, early Late Triassic, calcic suite of mafic-ultramafic rocks. A hornblende-biotite mixed mineral separate from an andesite porphyry (sample 03JS06B) returns a late Jurassic plateau age (141.4 +/-1.0 Ma) for mafic volcanism (Appendix Table C-2).

To the south, just east of Summit Lake, plateau ages on mineral separates from a diorite (biotite separate) and a hornblendite (hornblende separate) return Early Cretaceous plateau ages of 123 Ma (sites 15 and 16 on Figure 11; Appendix Table C-5). In this area the diorite outcrop is surrounded by mafic-ultramafic rocks that may represent an eastward extension of the early Late Triassic mafic ultramafic rocks to the west. This eastward extension is suggested by the magnetic expression of rocks evident in the airborne geophysical survey (see Figure 12). Alternatively, this intrusive complex may be a concentrically zoned primary intrusion. We interpret the biotite in diorite to represent a magmatic age. We also interpret the hornblende in hornblendite to be a primary magmatic mineral, based on the good plateau of age spectra, the consistent Ca/K ratios, the lack of alteration evident in the thin section, and the low alteration index calculated for the mineral. More data need to be acquired to confirm this interpretation, however.

Table 12. Summary of $^{40}Ar/^{39}Ar$ age dating results.

Fig 10 Map no.	Sample	Dated Material	Age Ma	Type Age	Confidence interpretation	Region of study area
1	**03JS23B** dunite	whole rock	**418.6+/-61.5**	Pseudo-plateau	**Imprecise plateau age**	West
1	**HB03-29** olivine basalt	hornblende	**225.7+/-2.0**	Plateau	**Age of mafic volcanism coincident magmatism**	West
1	**HB03-53** olivine basalt	amph bole	**219.3+/-4.5**	Pseudo-plateau	**Partial reset age of mafic volcanism/magmatism**	West
2	**AK25515** gabbro	biotite	**228.3+/-1.1**	Plateau	**Age of mafic volcanism coincident magmatism**	West
3	**03JS07E** Mafic Tuff (?)	whole rock	**145.5+/-1.0**	Integrated	**Alteration age?**	East-West
4	**03JS06B** hornblende andesite porphyry	hornblende	**141.4 +/-1.0**	Plateau	**Mixed age of** magmatism/volcanism	East-West
5	**10156** olivine pyroxenite	hornblende	**199.5 +/- 2.1**	Isochron	Some **alteration** phase contains excess Ar	East-West
5	**10825** Lherzolite	hornblende	**336.8+/- 7.1**	Isochron Saddle	Excess Ar gives age **older than true age**	East-West
6	**10830** olivine peridotite	hornblende	**222.5+/-6.5**	isochron	Impure separate **Maximum age for a reset event**	East-West
7	**10994** hornblende-biotite syenite	hornblende	**118.8 +/- 1.2**	Errorchron	**Alteration age**	East
8	**10913** hornblende pyroxenite	hornblende	**120.4+/-1.2**	Saddle	Age older than true **Reset age**	East
9	**11048** hornblendite	hornblende	**121.2 +/- 0.3**	Plateau	**Good plateau age**	East
9	**11324** hornblende clinopyroxenite	hornblende	**123.4 +/- 0.6**	Plateau	**Imprecise magmatic age**	East
10	**03JS16A** pyroxenite	biotite	**124.8+/-0.8**	Plateau	**An alteration age**	East
11	**10290** hornblende-magnetite pyroxenite	hornblende	**121.2 +/-0.3**	Plateau	Well defined plateau **Good magmatic age**	East
12	**10910** hornblende-biotite gabbronorite	biotite	**119.7+/-0.6**	Isochron age	**Minor alteration**, does not meet criteria for plateau age	East
13	**10240** olivine pyroxenite	biotite	**123.1+/-3.1**	pseudo-plateau	**Partial reset age only**	East
14	**11200** olivine-biotite-hornblende lherzolite	biotite	**123.1 +/- 0.6**	Plateau	**Good magmatic age**	East
15	**PB03-01** biotite diorite	biotite	**123.2+/-1.1**	Plateau	**Magmatic age**	Summit Lake area
16	**10810** pyroxene hornblendite	hornblende	**123.4+/-1.3**	plateau	**Magmatic event** or total reset of mafic plutonism Likely a total reset age	Summit Lake area

Figure 11. Location map of isotopic age date samples from the Delta River study area. (Map numbers correspond to samples as shown in Table 12.)

Alteration and excess argon ages

In the west an amphibole mineral separate (sample HB03-53) dates alteration of mafic volcanics at 219 Ma or Late Triassic (Appendix Table C-1). (The one additional date from this area, a whole rock age on a dunite (sample 03JS23B), returned an imprecise plateau age of 419 Ma and is not considered to be reliable.) The Late Triassic alteration age is somewhat similar to alteration ages of the rocks of the middle region (Rainbow Mountain) locations.

In the middle region, Rainbow Mountain to Cony Mountain, two samples returned Early Jurassic alteration ages of 200 Ma (isochron age on a hornblende separate from an olivine pyroxenite; sample 10156) and 222 Ma (hornblende dominate, but mix of minerals from an olivine peridotite; sample 10830; Appendix Table C-2). Sample 10825 had excess argon and an isochron age of 188 Ma. This sample was reprocessed and reanalyzed in an attempt to minimize the excess argon issue from its original analysis.

In the eastern area, east of Cony Mountain, mafic-ultramafic magmatic rocks have alteration ages of 119 Ma (sample 10994, on hornblende) and 125 Ma. (sample 03JS16A, on biotite; Appendix Table C-3). Sample 10913 is discounted for excess argon problems, but returns an isochron age of 120 Ma.

Airborne Geophysical Survey

In 2002, the BLM and ADGGS executed a cooperative agreement for an airborne geophysical survey to be flown in the southwestern part of the Delta River Mining District study area (Figure 12). The survey included the collection of aeromagnetic and three frequencies of resistivity data across approximately 350 square miles. The primary target of the survey was copper-nickel-PGE-bearing mafic and ultramafic rocks. The survey, released to the public in March 2003, also incorporates approximately 250 square miles of aeromagnetic and resistivity data previously purchased by the BLM. So the final product covers about 600 square miles of the southern part of the district. The survey data are available from the ADGGS (Burns and Clautice, 2003; Burns and others, 2003).

The airborne total field magnetics effectively portray the approximate location of the mafic-ultramafic complexes in the southern part of the Delta River study area. The complexes have a high magnetic susceptibility, primarily due to the content of magnetite formed during serpentinization of the mafic-ultramafic rocks. Some magnetite may also be of primary magmatic origin.

The airborne geophysical survey includes an interpretive report by the contractor who collected the data (Pritchard, 2003). This report defines conductive anomalies based on an interpretation of the various channels of resistivity data and the individual resistivity line profiles or responses. The anomalies are categorized based on the degree of conductivity and an interpretation of the most likely source. The anomalies are prioritized according to their likelihood of being associated with true bedrock conductors as opposed to conductive overburden, magnetite, the edge of a wide conductor, or cultural anomalies (Pritchard, 2003). Where the conductive anomalies correlate across multiple flight lines or correlate with magnetic anomalies, they are of greater interest for further investigation.

BLM investigators spent several days following up interpreted bedrock conductors that correlated with areas of high magnetic susceptibility. The simple model envisioned was areas of conductive sulfides within magnetic mafic-ultramafic rocks. In many cases the targeted conductive anomalies were covered by overburden or vegetation. In several other cases conductive anomalies can be attributed to graphitic sediments interlayered generally with basalts. The sediments and basalts in these cases are likely thin, because the conductors lie in areas with strongly elevated magnetic responses, suggesting underlying magnetite-rich mafic or ultramafic rocks. One conductive anomaly investigated by the BLM comprised a locally sulfide-mineralized sill or dike intruding shale and basalt. BLM personnel mapped and sampled the sill-dike and host rocks, but the samples contained only low precious and base metal values (Map no. 590; called “R7 Gabbro”). (Note: Most of the locations where BLM reconnaissance samples were collected while following up geophysical anomalies are prefaced with the letters GP in the names, e.g., “GP11f.” The GP refers to “geophysical,” whereas the number and letter refer to specific anomalies, commonly corresponding to Pritchard’s (2003) conductive zone numbers, e.g., R7, R11, etc.)

Figure 12. Location of the BLM airborne geophysical survey in the Delta River study area.

Deposit Types

The deposit types referred to in this report are similar to mineral deposit models (e.g., Cox and Singer, 1986), which group mineral occurrences that share common characteristics, both on a local scale and on a regional scale. The models include both descriptive and genetic attributes (Cox and Singer, 1986). Because of the paucity of geologic information on many of the mineral occurrences in the Delta River study area, the authors are unable to apply strict mineral deposit models to each occurrence. The deposit type associations used in this report are more generalized than those provided by Cox and Singer (1986).

There are several different deposit types present in the Delta River Mining District study area. Most of the recent exploration in the district has focused on the nickel, copper, PGE and gold potential in Triassic mafic and ultramafic rocks of the Wrangellia terrane, in the southern part of the district. Historic exploration activity has also focused on skarn deposits associated with the Triassic mafic-ultramafic intrusions as well as with more felsic Cretaceous intrusions. Early lode exploration also targeted basaltic copper occurrences in the Triassic Nikolai basalts. Early work also focused on precious and base-metal bearing quartz veins. The only production from the district has been from gulch and bench placer deposits. It was the placer deposits that originally brought miners to the region. The placers have produced mainly gold and silver, but there has been some PGE production from the placers as well.

The body of the report that follows is divided into descriptions of the various deposit types found in the district and individual descriptions of mines, prospects, and occurrences of each type. Deposit types are grouped into nickel-copper-PGE in mafic-ultramafic rocks, skarn, volcanogenic massive sulfide, placer, and “other” deposits. The “other” deposit types section includes the less numerous types of deposits found in the district. These are porphyry molybdenum and/or copper, basaltic copper, vein gold, polymetallic vein, replacement, and pegmatite type deposits. Within the deposit type sections, individual property descriptions are organized by map number as depicted on Plate 1. The map numbers on Plate 1 are generally organized from north to south and west to east in geographic continuity. Our intent on organizing the property descriptions by map number is to enable the reader to compare adjacent properties, which are commonly also geologically related.

Each property description is formatted similarly. It includes information on the location; access; history; reference names and numbers for BLM, State of Alaska, and USGS databases; geology; production; workings and facilities; and BLM work at the property. The descriptions also include subjective summary information, such as mineral development potential and conclusions of the authors. The classification criteria for mineral development potentials (MDP) of high, medium, and low are given in the table of abbreviations/acronyms/designations at the beginning of this report (p. xv) and in the introduction to Appendix Table A-1. Many of the sites described herein are assigned a low MDP. In many cases this is due to the lack of sufficient geologic information for the site. A medium to high MDP requires some knowledge of continuity and grade of the mineralized rock across three dimensions; this degree of knowledge is insufficient for many of the sites.

Mafic-ultramafic-hosted Ni-Cu-PGE deposits

PGE-bearing occurrences in the Delta River Mining District study area can be divided into placer and lode occurrences. The earliest references to PGE in the area refer to the gold placers with associated PGE, whereas the lode occurrences have attracted the most recent attention.

The earliest indication of PGE in the Delta River study area is from Mendenhall and Schrader (1903) who describe PGE-bearing minerals found in gold placer concentrates in the upper Chistochina area. Mendenhall and Schrader (1903) and Mendenhall (1905) describe osmiridium in placer concentrates from Miller Gulch. PGE are also reported from placer concentrates in Big Four Gulch, Slate Creek, and Ruby Gulch (Foley and Summers, 1990). By about 1919, reports from placer producers in the Slate Creek area of the Chistochina district indicate platinum production at about 1 percent of the volume of gold production (Martin, 1919; Chapin, 1919b).

The source of the PGE in the Chistochina district placers has not been unequivocally defined. Foley and Summers (1990) illustrate an igneous source for at least some of the PGE and Chapin (1919b) suggests a Tertiary conglomerate source. Chapin (1919b) thought the gold and platinum found in the Slate Creek placers come from the same source because they are always found together. The only mafic-ultramafic rocks known to Chapin in 1917 are dikes cutting platinum-bearing conglomerates (Chapin, 1919b). The platinum-bearing conglomerates (or Chapin's "red conglomerate") that occur on the north side of the mountains, north of Slate Creek, in fault contact with host rocks, and beneath Slate Creek in a graben, are thought by Chapin to be the same as the round wash at the head of Miller Gulch. The reason gold and platinum are found in the round wash and not in the red conglomerate, according to Chapin, is that the round wash base is exposed and the red conglomerate represents a higher part of the section. Gold and heavy minerals would be expected at the base of the conglomerate section (Chapin, 1919b).

Foley and Summers (1990) suggest one source for placer PGE in the Chistochina district to be the altered dikes that crosscut the upper reaches of Miller Gulch. They detected PGE-bearing minerals associated with some of the Cretaceous-Tertiary (?) dikes. They also suggest that the argillite host to the dikes may be another source of PGE. They report one grain of osmiridium from a heavy mineral concentrate panned from washed, crushed, and pulverized argillite talus (Foley and Summers, 1990).

There have been no placer deposits in the district that have been mined for PGE as the primary product. All the placer PGE production has come from placers with gold as the primary product. PGE placers have never been the focus of exploration efforts either. PGE exploration has targeted lode occurrences.

Figure 13. Mafic-ultramafic complexes in the southern Delta River study area.

The earliest lode PGE prospect in the Delta River Mining District study area comes with the discovery of the Emerick prospect (Map no. 277) by R. Emerick in the early 1950's (Hanson, 1963). This site was originally prospected for copper and nickel (Saunders, 1961; Hanson, 1963), with little reference to its PGE potential until it was examined by the U.S. Bureau of Mines in the early 1980's (Barker and others, 1985; Barker, 1988). The U.S. Bureau of Mines (Barker, 1988) also reported on several other prospects in the area that include PGE, namely Ann Fork (Map no. 246), Ann Creek (Map no. 266), Glacier Lake (Map no. 272), and Canwell (Map no. 300). Subsequent mineral exploration in the 1990's resulted in the discovery of numerous nickel, copper, and PGE occurrences in the area (Bill Ellis, personal communication, 2002; Ellis and others, 2004).

Recent exploration efforts targeting nickel-copper-PGE occurrences in the Delta River Mining District study area have focused on the Wrangellia terrane, in the southern part of the district. Most of the known nickel-copper-PGE occurrences are hosted in the Triassic sequence of mafic-ultramafic rocks in this terrane. This sequence of rocks correlates to the Triassic Kluane belt of mafic-ultramafic rocks in the Wrangellia terrane that produced nickel, copper, and PGE in the Yukon Territory, Canada, in the early 1970's (Hulbert, 1995; 1997).

The Wrangellia terrane is an extensive tectonostratigraphic terrane that extends from at least Vancouver Island, in southwestern British Columbia, Canada, for more than 1,250 miles to south-central Alaska (Jones and others, 1977; Monger and Berg, 1987; Jones and others, 1987). The terrane is distinguished particularly by its unique Triassic sequence of sedimentary and igneous lithologies (Jones and others, 1977). The dominant feature of the Triassic sequence is the Nikolai Greenstone in Alaska (Richter and Jones, 1973) and the Yukon, Canada, and the Karmutsen Basalts in British Columbia, Canada (Barker and others, 1989).

The Triassic sequence of Wrangellia was deposited on a late Paleozoic island arc, referred to as the Skolai Arc (Smith and MacKevett, 1970; Plafker and others, 1989). The Triassic sequence includes deep marine sedimentary rocks succeeded by shallower marine rocks indicating relatively rapid crustal uplift (Richards and others, 1991). The shallow marine rocks are overlain by a thick series of pillowed and sub-aerially deposited basalts – the Nikolai Greenstone/Karmutsen Basalts. The basalt sequence is from 10 to 20 thousand feet thick (Richards and others, 1991) and was deposited rapidly, within about 5 to 10 million years (Jones and others, 1977; Richards and others, 1991). Overlying the basalts are more shallow marine sediments followed by deeper marine sediments.

The progression of depositional environments suggested by the Late Paleozoic and Early Mesozoic strata of Wrangellia, from island arc to deep marine to subaerial to deep marine again, indicates a period of crustal subsidence, then uplift, followed by subsidence again. This is one of the pieces of evidence cited by Richards and others (1991) for the suggestion that the Wrangellia basalts are attributed to a mantle plume origin. Previous workers suggested rifting as a cause of the voluminous outpouring of Triassic basalts of Wrangellia (e.g., Jones and others, 1977; Nokleberg and others, 1985; Barker and others, 1989). The difference in origin of the basalts, mantle plume versus rifting, is important to the potential for the igneous province to host nickel-copper-PGE deposits. Magmas of a mantle plume are thought to originate deeper in the mantle than magmas associated with rifting, which may just tap the upper mantle. The deeper mantle origin suggests a higher degree of partial melting of the mantle, which is necessary for the dissolving of sulfur and associated nickel, copper, and especially PGE into the ascending magmas (Barnes and others, 1993; Keays, 1995; Li and others, 2001).

In the Delta River district the Triassic Nikolai basalts lie unconformably on Pennsylvanian to Permian marine volcanic and sedimentary rocks of the Tangle Lakes, Eagle Creek, Slana Spur, and Tetelna Volcanics formations (Nokleberg and others, 1992b; Stout, 1976). These formations host the nickel-copper-PGE-bearing mafic-ultramafic sills, dikes, and plugs that are comagmatic with the Triassic basalts and that are thought to represent magmatic feeder chambers for the overlying basalts (Nokleberg and others, 1985; Hulbert, 1997; Pellerin and others, 2003a, 2003b). Five mafic-ultramafic complexes have been defined in the southern Delta River study area (Figure 13; Bill Ellis, personal communication, 2002)

The mafic-ultramafic rocks range from dunite to gabbro and exhibit various magmatic characteristics from layering in a quiescent magma chamber to magmatic breccia indicating turbulent flow. In the larger Fish Lake complex several cycles of magmatic activity have been defined that are thought to represent crystal fractionation and settling, which has produced a layered igneous body transitional from dunite through peridotite and pyroxenite to gabbro. Up to four cycles have been defined in the Fish Lake complex (Bill Ellis, personal communication, 2002; Ellis and others, 2004). This type of magmatic setting holds the potential for reef type deposits, which are thought to be primarily PGE deposits with by-product nickel and copper (Li and others, 2001).

In other parts of the Triassic mafic-ultramafic complexes there is evidence of turbulent flow in the magma chambers. What have been interpreted as magmatic breccias are found particularly in parts of the Rainy Creek complex (see Figures 15 and 16). This more dynamic magmatic setting is what some investigators suggest is required to produce nickel-copper deposits with by-product PGE (Li and others, 2001). The dynamic system represents an open system where an untold amount of material with a relatively low concentration of metals can pass through and deposit a large quantity of nickel and copper in a physical and/or chemical trap (e.g., feeder zone and upper chamber deposits at Voisey’s Bay; Li and Naldrett, 1999).

The most voluminous of the Wrangellian mafic-ultramafic intrusives are found in the Delta River area of south-central Alaska, suggesting this may be the locus of the Triassic Wrangellian igneous activity (Sanger and others, 2002; Larry Hulbert, personal communication, 2002). Of the five mafic ultramafic complexes recognized in the Delta River study area (Figure 13) the Fish Lake complex presents the largest exposure. It is about 20 miles long and 2 miles wide. The Fish Lake complex, and Tangle complex to the south, represent a large sill-form body that forms a north-northwest plunging synform (Stout, 1976; Nokleberg and others, 1992b; Pellerin and others, 2003a, 2003b). The smaller, more dismembered, Eureka, Rainy, and Canwell complexes to the north may be extensions of the Fish Lake-Tangle sill-form that have been caught up in thrust and later high angle faulting. This faulting is likely associated with the accretion of the Wrangellia terrane and subsequent right-lateral movement along the North American continental margin. Fault offsets on faults that disrupt the mafic-ultramafic complexes are probably small – on the order of hundreds of feet to about 2 to 3 miles (Rose, 1965; Bond, 1973; Nokleberg and others, 1992b).

There seem to be two different episodes of mafic-ultramafic intrusion and related mineralization that have affected the Wrangellia terrane in the Delta River study area – one Triassic and the other Cretaceous. The Triassic mineralizing event is concentrated in the western part of the district and is related to mafic-ultramafic intrusions that are co-magmatic with overlying Triassic Nikolai basalts (Nokleberg and others, 1991; Bill Ellis, personal communication, 2002). Age dates from $^{40}Ar/^{39}Ar$ analyses of biotite and hornblende consistently return early Late Triassic ages for crystallization of the mafic-ultramafic magmas (See age dating section above and Appendix C; Bittenbender and others, 2003; Larry Hulbert, personal communication, 2002). This Triassic event is widespread in the terrane; it has been documented in the Kluane Ranges of the Yukon Territory, Canada, about 250 miles to the east (Hulbert, 1995; 1997) and further into northern British Columbia where mafic-ultramafic rocks are found in the Chilkat Complex (Hulbert, 1997).

BLM investigations in the Delta River Mining District study area have defined a Cretaceous mineralizing event associated with mafic-ultramafic rocks that are concentrated in the eastern part of the district. $^{40}Ar/^{39}Ar$ age dates from hornblende consistently return mid-Early Cretaceous ages for crystallization of the associated magmas. BLM investigators focused attention on the eastern mafic-ultramafic rocks because of the PGE produced in placer deposits from the upper Chistochina district. These are the only documented PGE in placers within the district (Mendenhall, 1905; Chapin, 1919b; Martin, 1919). BLM attention was also focused on the eastern rocks because of the highly anomalous PGE found in stream sediment samples from the area (Table B-6; Bittenbender and others, 2004).

There is a lithologic difference between the eastern and western mafic-ultramafic rocks in the district in addition to the indicated age difference. Whereas these similar looking plutonic igneous rocks like dunites, peridotites, pyroxenites, gabbros, and diorites occur across the area, the abundance of some rock types vary from east to west as does the major mineralogy. Dunites are common in the west and rare in the east. Modal orthorhombic pyroxene and clinopyroxene are common in the pyroxenites and peridotites of the west, but orthopyroxene is rare in the eastern equivalent rock types. Late magmatic modal hornblende is typical in the western rocks whereas modal biotite (phlogopite?) is the more typical late magmatic mineral phase in the east. Pyrrhotite-pentlandite is a common association of western suite mafic-ultramafic rocks, but pentlandite is generally missing in the east. Potassium feldspar is unusual in mafic rocks yet it occurs in a few eastern suite rocks, but is absent in western suite rocks. Petrologically these rocks vary from dunite to harzburgite to troctolite and olivine bearing gabbronorite.

The mafic-ultramafic rocks and associated nickel-copper-PGE occurrences in the western part of the district have been the focus for most of the recent exploration in the area. There has been some investigation of the eastern suite of rocks for lode nickel-copper-PGE occurrences (Bill Ellis, personal communication, 2002), but with little apparent success. The BLM's investigations of the eastern mafic-ultramafic rocks revealed anomalous concentrations of base and precious metals, but no discovery of significant occurrences.

There are several styles of mineralization associated with the mafic-ultramafic rocks in the western part of the Delta River Mining District study area. Barker (1988) describes four types of occurrences: 1) sparsely disseminated sulfides in serpentinized rocks, particularly peridotite;

2) disseminated sulfides in gabbronorite dikes and sills; 3) sulfides localized along contacts with younger intrusive bodies; and 4) massive sulfides of probable magmatic origin.

Sparsely disseminated sulfides in variably serpentinized rocks are the most common mode of occurrence found by the BLM. This type of occurrence is found in all five of the mafic-ultramafic complexes in the district.

The disseminated sulfides associated with gabbronorite and gabbro dikes and sills that cut the complexes are found in several places. Barker (1988) specifically points out a gabbronorite dike at the Emerick prospect (Map no. 277), but other investigators suggest the rock is fault emplaced (Hinderman, 1989; Wells, 1998). Dikes associated with sulfide mineralization are found at the Odie (Map no. 299) and Tres Equis (Map no. 564) occurrences along with other occurrences of less significance.

Barker (1988) points to the Glacier Lake prospect (Map no. 272) as an example of sulfides concentrated along the contact with younger intrusions. A similar setting may have occurred at the Bird's Beak occurrence (Map no. 118). The BLM's petrographic investigation of these occurrences, however, suggests that these settings may not be related to their genesis. Many of the textures preserved in the sulfides suggest a magmatic origin rather than a hydrothermal upgrading. One example is the exsolution texture between pyrrhotite and pentlandite found at the Glacier Lake prospect.

Massive sulfides are found only rarely in the mafic-ultramafic complexes of the study area, but they host the highest concentration of base and precious metals. Massive sulfides are found at the Emerick (Map no. 277) and Canwell (Map no. 300) prospects. At the Emerick prospect the massive sulfides occur in lenses only a few inches wide and a few feet long (Saunders, 1961). At the Canwell prospect a massive sulfide layer about 0.5 to 1 foot thick is poorly exposed. It is reportedly traceable for about 300 feet (Alan Day, personal communication, 2003). BLM investigators sampled the massive sulfide layer in two exposures about 300 feet apart.

In 2002 and 2003 the BLM supported and collaborated with USGS investigators in targeting the mafic-ultramafic rocks in the southwestern part of the district with gravity and magnetotelluric (MT) investigations. The aim of the geophysical surveys was to determine the structural and geologic setting of the mafic-ultramafic complexes and to better understand their geometry, extent, and distribution.

Results of the geophysical surveys suggest that the Fish Lake and Tangle complexes were intruded at approximately the same stratigraphic horizon, making them true sills, and that they are physically connected at depth, forming the Amphitheater synform. The synform is approximately 3 to 4 miles wide, more than 6 miles long (Pellerin and others, 2003b), and up to 5 miles or more in depth (Schmidt and others, 2002). It plunges to the west-northwest and dips asymmetrically to the south (Pellerin and others, 2003b). The synform includes a dense, magnetic root (Schmidt, 2002; Pellerin and others, 2003a; 2003b). To account for the strong conductivity indicated by MT responses, modeling suggests small bodies of conductive material, possibly sulfides, underlying the synform (Pellerin and others, 2003a; 2003b). Gravity and magnetic anomalies also suggest the presence of dense, magnetic, and possibly sulfide bearing bodies coincident with the MT responses that are at a depth of about 5,000 feet at the east end of the Amphitheater synform (Schmidt and others, 2002; Glen and others, 2002a).

To date there have been no economic nickel-copper-PGE deposits discovered in the Delta River Mining District study area. Numerous small occurrences have been discovered, some of very high grade (e.g., Emerick [Map no. 277], Canwell Glacier [Map no. 300]). Some larger low grade occurrences have also been discovered (parts of Fish Lake complex [Map no. 542]). Exploration for deposits continues in the area. A target deposit grade and tonnage sought by ACNC in their work in the area in the 1990's was about 10 million tons at a grade of 5 percent combined nickel-copper, and about 2 ppm combined PGE-gold (Bill Ellis, personal communication, 2002). Most of the samples collected by the BLM during their investigations in the area, even the higher grade samples, do not reach this target. However, the targeted mafic-ultramafic complexes in the area are extensive and more exploration may prove to be fruitful, both for large tonnage low grade deposits and for higher grade lower tonnage deposits.

BIRD'S BEAK

Alternate Name(s):	Bird Beak	Map No:	118
		MAS No:	0020680212
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 27, T18S, R07E
Meridian:	Fairbanks	Elevation:	6,000 feet
Latitude:	63.32048	Longitude:	-146.39190

Geographic: The Bird's Beak occurrence is situated at the crest of the generally north-south-trending ridge west of the toe of Eureka Glacier. Mineralized rock also apparently extends down the generally inaccessible, east-facing cliffs of the ridge (Figure 14).

Access: Access is by helicopter.

History: The U.S. Bureau of Mines examined and sampled mafic-ultramafic rocks in the Bird's Beak area during their investigation of the Valdez Creek Mining District in the late 1980's (Kurtak and others, 1992). The site was also investigated by mineral exploration companies in the 1990's (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Bird Beak / MH094 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Bird's Beak occurrence is part of what has been called the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003). The Eureka complex is the westernmost of several hypabyssal sill-form complexes that are exposed eastward at least as far as the lower Canwell Glacier. These complexes are thought to be genetically related to the overlying Triassic Nikolai basalts (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002) and have yielded early Late Triassic ages (Bittenbender and others, 2003; 2004).

The Eureka complex is northward-dipping (approximately 40 degrees), is approximately 1,000 to 2,000 feet thick, and extends about 6 to 8 miles in a generally east-west direction. It is comprised predominantly of peridotite, with lesser dunite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation and is cut in places by Late Jurassic to Cretaceous granodiorite (Nokleberg and others, 1992b).

The Bird's Foot occurrence (Map no. 121) lies to the northeast of the Bird's Beak site and is situated near the hanging wall of the Eureka complex. The complex is intruded by a Late Jurassic to Cretaceous granodiorite plug (Nokleberg and others, 1992b) that cuts off the complex from the west to northeast of the Bird's Beak and Bird's Foot occurrences.

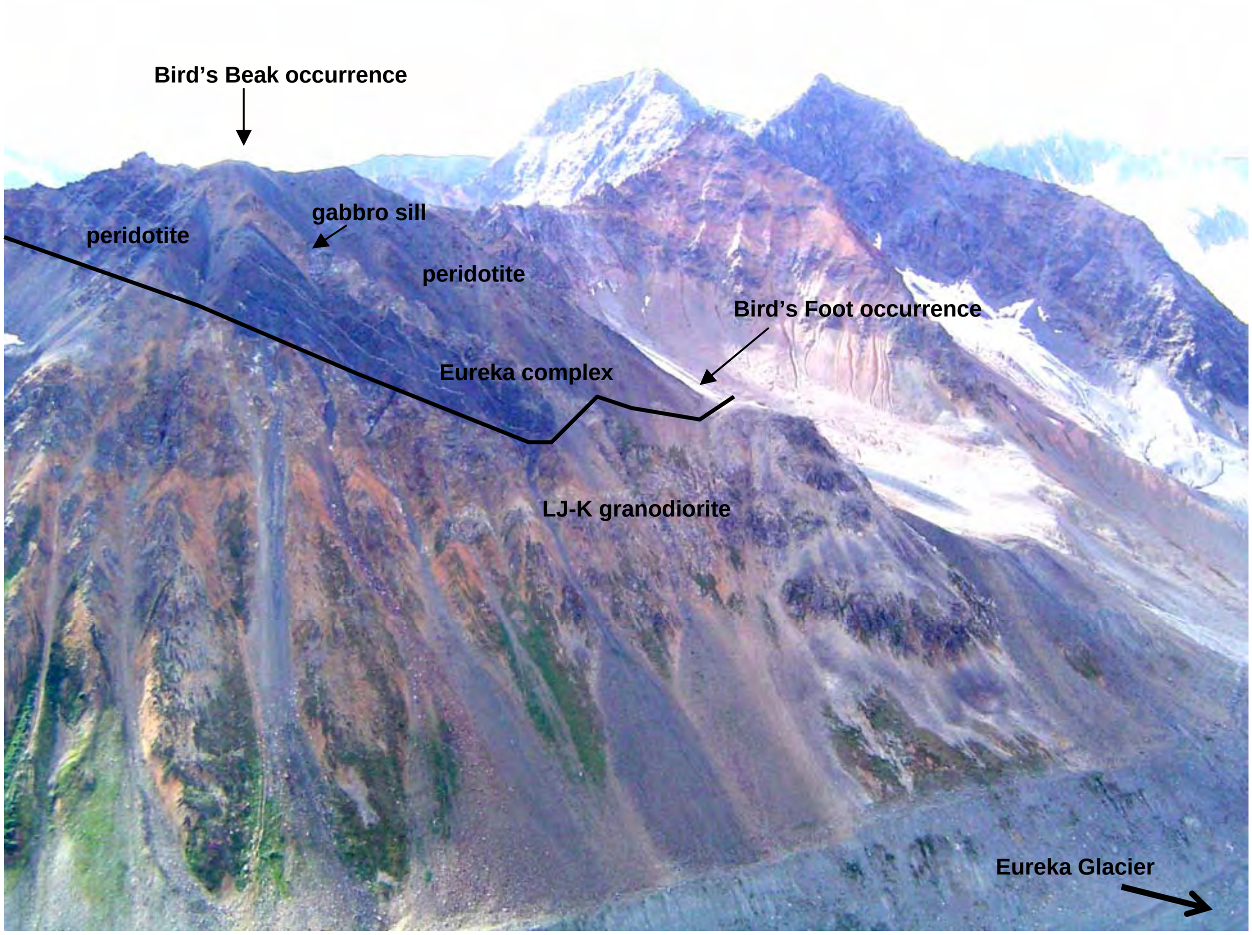


Figure 14. View to west-northwest of the Bird's Beak and Bird's Foot occurrences.

In the Bird's Beak area the Eureka mafic-ultramafic complex comprises mainly peridotite cut by a large gabbro sill. The peridotite is generally fine to medium grained and contains poikilitic pyroxene and minor amounts of pyrrhotite and chalcopyrite. In addition to the large gabbro sill that cuts the peridotite on a larger scale, the peridotite is commonly cut by 2- to 3-foot-thick gabbro dikes. The peridotite is weakly to moderately serpentinized. Pyroxenes are locally altered to hornblende.

Elevated base and precious metals at the Bird's Beak occurrence seem to be concentrated within or near the large gabbro sill. Whereas sulfide mineral content may be about 1 percent in the peridotite, in the gabbro and rocks adjacent to the sill, sulfide content may be up to 5 to 7 percent. Sulfide minerals include pyrrhotite, chalcopyrite, and pentlandite, which are commonly disseminated and in patches within the hosts.

Bureau Investigation: BLM investigators collected nine samples from the Bird's Beak occurrence in 2004. Three samples were collected across the peridotite over distances of about 20 to 30 feet (samples 11241, 11353-354). Each of these samples included parts of the small gabbro dikes that cut the peridotite. The samples contained generally low base and precious metal concentrations; the highest values were 12 ppb gold, 8 ppb platinum, 34 ppb palladium, 333 ppm copper, and 1,840 ppm nickel. Even a select sample of the peridotite, collected to concentrate visible sulfides was low in base and precious metals. This sample returned 8 ppb gold, 27 ppb platinum, 25 ppb palladium, 226 ppm copper, and 1,760 ppm nickel (sample 11240).

Higher concentrations of base and precious metals were found in the large gabbro sill that cuts the peridotite and near the contacts of the sill. A select sample of pyroxenite near the hanging wall of the gabbro sill adjacent to the peridotite returned 130 ppb gold, 647 ppb platinum, 403 ppb palladium, 2,030 ppm copper, and 4,550 ppm nickel (sample 11242). Two select samples from the gabbro contained up to 167 ppb gold, 462 ppb platinum, 385 ppb palladium, 1,820 ppm copper (sample 11242), and 4,540 ppm nickel (sample 11356). A more representative sample of the gabbro across about a 10- by 10-foot area contained 34 ppb gold, 105 ppb platinum, 94 ppb palladium, 592 ppm copper, and 1,815 ppm nickel (sample 11355). The highest value of cobalt from the occurrence was 127 ppm (sample 11242).

Mineral development potential: Low

Conclusions: The Bird's Beak occurrence is one of the furthest westward nickel-copper-PGE occurrences associated with the mafic and ultramafic rocks in the Delta River district. There are a significant amount of sulfides and relatively high base and precious metal concentrations associated with the occurrence. However, the occurrence is relatively small and is well exposed. The exposures make it unlikely that additional tonnages will be found at the occurrence with further exploration. Another potential development impediment is the precipitous nature of the terrain surrounding the occurrence.

BIRD'S FOOT

Alternate Name(s):	Bird Foot	Map No:	121
		MAS No:	0020680213
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 27, T19S, R07E
Meridian:	Fairbanks	Elevation:	5,500 feet
Latitude:	63.324226	Longitude:	-146.384263

Geographic: The Bird's Foot occurrence is situated on a ridge crest west of the Eureka Glacier. It is approximately 0.3 miles northeast of the 6,120-foot peak, west of the glacier (Figure 14).

Access: Access is by helicopter. There is room to land in a small saddle on the ridge.

History: The USGS reported chromium in ultramafic rocks in an inclusion in metagranodiorite near the Bird's Foot occurrence (Nokleberg and others, 1991, site number 38, p. 25).

Bill Ellis reported an occurrence of nickel, copper, PGE, and gold at the Bird's Foot site. The site was apparently discovered during exploration of the mafic-ultramafic complexes in the region in the 1990's by one of the various mineral exploration companies active in the region (Bill Ellis, personal communication, 2002).

ARDF Name/No: Unnamed (West of Eureka Glacier) / MH093
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The Bird's Foot occurrence of nickel, copper, PGE, and gold is part of the Eureka mafic-ultramafic complex defined at least in part by geologists for American Copper and Nickel Company in the 1990's (Bill Ellis, personal communication, 2002). Rose (1966a) mapped peridotite and mafic gabbro in a larger body of diorite to quartz diorite to gabbro at the Bird's Foot site. Subsequent work defines the mafic and ultramafic rocks to be Triassic inclusions in a younger, Cretaceous intrusive (Nokleberg and others, 1992b).

Mafic and ultramafic rocks in the Bird's Foot area include variably to completely serpentinized, coarse-grained peridotite. In places the peridotite is feldspathic and contains phlogopite, and may be considered mafic gabbro. It is cut by plugs of Cretaceous intrusive in some places. The peridotite is also cut by narrow,1 to 2-inch wide pegmatitic veins of peridotite(?). The pegmatitic veins are less serpentinized than the host peridotite.

The peridotite commonly contains well-distributed, medium-grained, disseminated chalcopyrite to about 0.5 percent. In places the concentration of sulfides increases to about 3 to 5 percent and includes pyrrhotite, chalcopyrite, and possibly pentlandite.

Bureau Investigation: Bureau personnel examined the Bird's Foot site in 2003 and collected four samples. Samples of the common peridotite in the area had low precious and base metal values (samples 10195-196). A sample of iron-stained, serpentinized peridotite in float, which contained a concentration of sulfides to 3 to 5 percent, returned 533 ppb platinum, 381 ppb palladium, 148 ppb gold, 2,190 ppm copper, and 2,970 ppm nickel (sample 10197).

Mineral Development Potential: Low.

Conclusions: Even though there are some anomalous concentrations of metals at the Bird's Foot occurrence, the apparent limited size of the mafic-ultramafic bodies in the area suggest an economic concentration of sulfides with associated metals is unlikely to be found.

BOS

Alternate Name(s):	BOS Saddle	Map No:	126
		MAS No:	0020680368
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 30, T18S, R08E
Meridian:	Fairbanks	Elevation:	5,650 feet
Latitude:	63.33179	Longitude:	-146.28868

Geographic: The BOS occurrence is at the northwest head of the Landslide Creek valley. It is about half a mile east-northeast of peak '6563' as marked on the USGS, Mt. Hayes, B-5, 1:63,360-scale topographic map, and about 1.5 miles east of the Eureka Glacier.

Access: Access is by helicopter. There are numerous landing sites for a light helicopter at the top of the icefield at the head of Landslide Creek and on the saddle to the northwest of the icefield.

History: American Copper and Nickel Company collected samples from the area in 1996. Subsequent investigations detected mineralized float at the location given by Ellis and others (2004) as the BOS occurrence. Nevada Star investigators subsequently found mineralized rock in outcrop, but to the east of the saddle above the float location of Ellis and others (2004; Alan Day, personal communication, 2004). This location, east of the saddle, is the location used in this report for the BOS occurrence.

ARDF Name / No.: BOS / MH101 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The BOS occurrence is part of the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003). The Eureka complex is the westernmost of several hypabyssal sill-form complexes that are exposed eastward at least as far as the lower Canwell Glacier. These complexes are thought to be genetically related to the overlying Triassic Nikolai basalts (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002) and have yielded early Late Triassic ages (Bittenbender and others, 2003; Bittenbender and others, 2004).

The Eureka complex is northward-dipping (approximately 40 degrees), is approximately 1,000 to 2,000 feet thick, and extends about 6 to 8 miles in a generally east-west direction. It is comprised predominantly of peridotite, with lesser dunite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation and is cut in places by Late Jurassic to Cretaceous granodiorite (Nokleberg and others, 1992b).

At the location used here to define the BOS occurrence, mafic-ultramafic rocks are exposed in a knob at the foot of a small ice field. Rocks exposed on the knob include variably serpentinized peridotite cut by a leucocratic intrusive, either a leucocratic gabbro or a granitoid. The peridotite is mineralized with minor chalcopyrite and pyrrhotite, commonly medium grained and disseminated.

To the north of the saddle, above and east of the BOS ARDF location, BLM investigators found a fault-dismembered gabbro dike containing minor chalcopyrite hosted in what appears to be andesite of the Slana Spur Formation. The andesite is variegated green to purple, generally fine grained, and locally plagioclase porphyritic. The dike is flat-lying, about 20 to 30 feet thick and extends for about 100 to 150 feet before being cut off by faulting. The faults appear to have a modest reverse offset, on the scale of a few feet. The reverse movement may be associated with the compressional regime of the Broxson Gulch thrust fault, which crops out within about a quarter of a mile to the north. The faults vary in orientation, but the most prominent is oriented 275 degrees and dips 50 degrees to the north, or approximately parallel to the expected orientation of the Broxson Gulch Thrust in the area.

The chalcopyrite is fine to medium grained, anhedral, and occurs in patches and seams. It is concentrated in the fault zones and gouge. Quartz and calcite accompanies the chalcopyrite in the fault zones. Chalcopyrite and pyrite are also found disseminated in the gabbro dike.

South of the saddle are exposed rocks of the Eureka complex, cut by a granitoid plug. Progressing southwestward, up the ridge from the saddle, are successive exposures of granitoid, gabbro, pyroxenite, peridotite, and finally dunite. Dunite is the predominant rock type on the northeast slope of the ridge. Near the crest of the ridge, at the ‘6563’ knob, successive layers of peridotite and gabbro are exposed (U.S. Bureau of Mines, unpublished field data). The gabbro and pyroxenite that are closest to the granitoid are cut by granitoid dikes. The ultramafic rocks are serpentinized. The peridotite is mineralized with pyrrhotite, whereas in the dunite, pyrrhotite is rare.

Bureau Investigation: BLM investigators could find no outcrop in the area referred to as the BOS occurrence by Ellis and others (2004) in the Mt. Hayes ARDF. Further communications (Bill Ellis, personal communication, 2004) led the BLM to the saddle above and to the east of the ARDF BOS location. Here BLM investigators found mafic-ultramafic rocks of the Eureka complex exposed on a southwestward-trending ridge, southwest of the saddle. Samples collected from this ridge revealed anomalous, but generally low base and precious metal concentrations (samples 11238-239, 11352). Analytical results from serpentinized dunite returned 31 ppb platinum, 31 ppb palladium, 166 ppm copper, and 2,710 ppm nickel (sample 11238) and from serpentinized peridotite 33 ppb platinum, 31 ppb palladium, 159 ppm copper, and 2,260 ppm nickel (sample 11239).

To the north of the saddle above the ARDF BOS location BLM investigators sampled chalcopyrite mineralized rock associated with the faulted gabbro dike that cuts Slana Spur volcanics. A sample across 2 feet of faulted gabbro returned 14 ppb gold and 0.61 percent copper (sample 11236). In places, similarly mineralized rock extends over widths of about 5 feet. A select sample from the mineralized rock returned 169 ppb gold and 1.04 percent copper (sample 11237).

Discussions with Nevada Star investigators lead the BLM to what this report refers to as the BOS occurrence (Alan Day, personal communication, 2004). It is situated at the base of an ice field in the drainage of Landslide Creek, east of the saddle that is above the ARDF BOS location. BLM investigators collected two samples from the BOS occurrence. A sample across 1 foot of peridotite with about 1 percent chalcopyrite and pyrrhotite returned 36 ppb gold, 106 ppb platinum, 86 ppb palladium, 594 ppm copper, and 2,030 ppm nickel (sample 11147). Another sample of serpentinite with medium-grained, disseminated sulfides returned 11 ppb gold, 292 ppb platinum, 308 ppb palladium, 1,145 ppm copper, and 3,710 ppm nickel (sample 11370).

Mineral Development Potential: Low

Conclusions: The BOS occurrence is situated immediately at the base of a small ice field at the head of Landslide Creek and may only recently have been exposed. With further melting of the ice, there may be further exposures of mineralized mafic-ultramafic rock for future prospecting. The site is worthy of further investigation because of the anomalously high precious and base metals present in BLM samples.

MINI U LANDSLIDE

Alternate Name(s):	Landslide Creek	**Map No:**	128
		MAS No:	0020680232
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 30, T18S, R08E
Meridian:	Fairbanks	Elevation:	5,030 feet
Latitude:	63.32241	Longitude:	-146.28212

Geographic: The Mini U Landslide occurrence is on an east-facing slope, west of the headwaters of Landslide Creek. It is situated approximately on the crest of the ridge that extends to the southeast from a peak marked '6563' on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access is by helicopter.

History: The Mini U Landslide occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Landslide Creek / MH106 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Mini U Landslide occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. This complex has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined an early to mid Triassic age (Bittenbender and others, 2003).

Rocks at the site of the Mini U Landslide occurrence are not in place, but may be subcrops. They appear, however, to have been piled up by recent glaciation. The rocks range from dunite to gabbro, but peridotite predominates. There are minor sulfide phases in the rocks, mainly pyrrhotite with traces of chalcopyrite. The mafic-ultramafic rocks are cut by, or in fault contact with, younger, presumably Cretaceous (Nokleberg and others, 1992b), quartz and plagioclase porphyritic granitoids.

About a quarter of a mile to the northeast, up the hill from the Mini U Landslide site, is more rubblecrop of mafic-ultramafic rocks. The rocks include peridotite, pyroxenite, and gabbro. They contain minor sulfides, but generally less than 1 percent.

Bureau Investigation: BLM investigators collected two samples from the Mini U Landslide site (10080, 10600) and two from the mafic-ultramafic rubblecrop to the northeast (10081, 10601). None of the samples were significantly anomalous in either base or precious metals. The highest values returned were 13 ppb gold (10601), 118 ppm cobalt (10600), 806 ppm copper (10601), 2,420 ppm nickel (10600), 45 ppb platinum, and 41 ppb palladium (10601).

Mineral Development Potential: Low

Conclusions: BLM investigators found no bedrock outcrops at the Mini U Landslide occurrence, so it is difficult to determine the site's significance. Given the low concentrations of precious and base metals, however, it is unlikely that the site will attract a lot of future exploration attention.

BOOT FLAP

Alternate Name(s):		Map No:	129
		MAS No:	0020680231
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 25, T18S, R07E
Meridian:	Fairbanks	Elevation:	5,200 feet
Latitude:	63.32337	Longitude:	-146.31967

Geographic: The Boot Flap occurrence is located east of Eureka Glacier, near its toe. It is about half a mile southwest of the peak marked '6563' on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map. It is located approximately on the crest of a ridge that extends to the southwest and west from the 6,563-foot peak. An extension of the Boot Flap occurrence is found approximately 2,000 feet east-southeast of the location described above.

Access: Access is by helicopter. Landing sites are available for a light helicopter above the western Boot Flap occurrence and below the eastern part of the occurrence.

History: The Boot Flap occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002). State claims cover the Boot Flap occurrence in 2004.

ARDF Name / No.: Boot Flap / MH102 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Boot Flap occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. The occurrence is in the western part of the complex, which has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined a mid-Triassic age (Bittenbender and others, 2003).

The mafic-ultramafic rock at the Boot Flap occurrence is hosted by light-colored, fine-grained, siliceous volcanic rock that has been mapped as andesite, dacite, and graywacke by Rose (1966a). This unit was correlated to the Pennsylvanian to Permian Slana Spur Formation by Nokleberg and others (1992b). Rose (1966a) suggests that the mafic-ultramafic rocks intrude granitic rocks in the area. However, Nokleberg and others (1992b) map most of the granitic rocks as Cretaceous, and they interpret these as being in fault contact with the mafic-ultramafic rocks.

The mafic-ultramafic sill examined by BLM investigators at the Boot Flap occurrence is about 200 feet thick. The structural hanging wall of the sill may be cut off by overthrust volcanic host rocks (unpublished U.S. Bureau of Mines data). Rose (1966a) mapped the sill as extending predominantly east-west for about 1.5 miles. It is covered to the west and east by quaternary deposits of the Eureka Glacier and Landslide Creek respectively (Rose, 1966a; Nokleberg and others, 1992b). Airborne magnetic data suggest the sill extends for at least 5 miles in a generally east-west direction. There are other ultramafic occurrences associated with the sill that are described elsewhere in this report (e.g., Mini U Landslide, West Crash, Crash, Notar, GR 20-3).

At the base of the northward dipping sill, in western part of the Boot Flap occurrence, in contact with underlying volcanic rock, is a section of serpentinite. The ultramafic rock here has been totally serpentinized. Thin section examination reveals no relict igneous minerals. Structurally above the serpentinite is a section of gabbro. The gabbro is about 75 feet thick and is cut by, or in fault contact with, a quartz porphyritic granitoid in its structural hanging wall.

Mineralized rock at the Boot Flap occurrence comprises disseminated sulfides in serpentinite and gossanous zones in gabbro. Patches of fine-grained, disseminated sulfides, mostly pyrrhotite, occur in parts of the serpentinite. The gossanous zones seem to be serpentinized, oxidized patches of peridotite within the gabbro. There are no evident sulfides remaining in the gossanous zones.

In the eastern part of the Boot Flap occurrence BLM investigators found the sill striking 310 degrees and dipping 35 degrees east. The exposed thickness is only about 50 to 75 feet and consists of interlayered iron-stained gabbro, gabbro, and peridotite. The gabbros, particularly the iron-stained gabbro, contain most of the sulfides in this part of the occurrence. Near the base of the sill iron-stained gabbro includes locally net-textured sulfides. The sulfides are mainly pyrrhotite with minor chalcopyrite. In places the pyrrhotite is very coarse grained with inclusions of chalcopyrite. In the mineralized parts of the sill the sulfides generally make up no more than 5 percent of the rock.

Bureau Investigation: BLM investigators collected four representative samples from the western part of the Boot Flap occurrence, two of serpentinite with disseminated sulfides (samples 10082, 10701), and two from gossanous zones in gabbro (samples 10602, 10700). The samples of serpentinite with patchy, disseminated sulfides returned 1,290 ppm chromium (sample 10082), 586 ppm copper, 2,260 ppm nickel, 52 ppb platinum, and 56 ppb palladium (sample 10701). The samples of gossanous zones in gabbro returned 711 ppm copper, 1,515 ppm nickel, 112 ppb platinum, and 83 ppb palladium (sample 10700).

The BLM collected five samples from the eastern part of the Boot Flap occurrence. Four of these were from the mafic-ultramafic rocks and one from the host volcanics. The host volcanic sample returned the highest copper value with 1,520 ppm (sample 11317). The samples of mafic-ultramafic rock revealed low base and precious metals. The highest returns were 17 ppb platinum (sample 11270 and 11271), 28 ppb palladium (sample 11271), 1,275 ppm nickel (sample 11319), and 430 ppm chromium (sample 11271).

Mineral Development Potential: Low

Conclusions: The Boot Flap occurrence represents minor accumulations of sulfide minerals with associated base and precious metals in the Eureka mafic-ultramafic complex. It is significant in that it represents one more of the numerous occurrences associated with the complex and shows the extent of those occurrences across the complex.

DUNITE DIATREME

Alternate Name(s):	Landslide Creek, UM Landslide	**Map No:**	135
		MAS No:	0020680206
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 31, T18S, R08E
Meridian:	Fairbanks	Elevation:	5,250 feet
Latitude:	63.305232	Longitude:	-146.282543

Geographic: The Dunite Diatreme occurrence is situated on the nose of a southeast-trending ridge, west of what is locally known as Landslide Creek. Landslide Creek is the major drainage between Eureka Glacier and Broxson Gulch, and flows south-southeastward into Eureka Creek. The occurrence is about a quarter of a mile southeast of the hill marked '5460' on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access is easiest by helicopter. ATV trails allow access within a few miles of the occurrence, but using the ATV trails requires crossing the Delta River and other smaller streams.

History: Several authors have noted what they refer to as conglomerate at the site of the Dunite Diatreme occurrence including Moffit (1912), Rose (1966a), and Stout (1976). None of these authors note any economic significance to the occurrence of the conglomerate.

The first reference to the Dunite Diatreme site associated with any economic significance is by Foley in 1992. This publication refers to "unpublished Bureau of Mines data" as the likely source of the information (Foley, 1992). Additional reference to the site's economic significance has been made by Bill Ellis (personal communication, 2002), who was been involved with mineral exploration industry activity in the area during the 1990's. Information on the site is published in the USGS ARDF and called the UM Landslide (Ellis and others, 2004).

ARDF Name / No.: UM Landslide / MH107 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: There is some controversy about the origin of the Dunite Diatreme occurrence. Original investigators suggested the rock to be a sedimentary conglomerate (Moffit, 1912; Rose, 1966a; Foley, 1992). Subsequent investigators have suggested the deposit may be a diatreme in origin (Bill Ellis, personal communication, 2002; Ellis and others, 2004). Much of the controversy stems from the fact that well over 90 percent of the clasts in the unit are mafic or ultramafic rocks, predominantly dunite. The occurrence is very prominent because of recent land slide or slump disruption of the rock, which has distributed blocks of conglomerate, up to 25 feet in diameter, down the eastern side of the ridge and across Landslide Creek to the east.

The conglomeratic-looking rocks at the occurrence unconformably overlie Permian volcanic rocks of the Tetelna Formation (Stout, 1976) or Permian to Pennsylvanian Slana Spur Formation (Nokleberg and others, 1992b). Several investigators have mapped mafic and ultramafic rocks to the north (Rose, 1966a; Nokleberg and others, 1992b) and to the south (Stout, 1976) of the occurrence, which may be source areas for the predominantly mafic to ultramafic clasts. The clasts range in size from sand to boulders and are poorly sorted. The matrix of the clasts varies. It is predominantly serpentinite, but includes hematite and in places is dunite supporting dunite clasts. Gold and PGE are found in grab samples of the conglomerate (Foley, 1992; Ellis and others, 2004).

Bureau Investigation: BLM investigators examined the Dunite Diatreme occurrence in 2002 and concluded the rocks represent a sedimentary conglomerate. Evidence includes the preferred orientation of flattened clasts, the apparent bedding in the conglomerate exposed on the crest of the ridge, and the rounded nature of many of the clasts. The bedding strikes to the northeast and dips at about 30 degrees to the southeast. Suggestions that the site represents a diatreme are based on the shiny, baked-looking rinds on some of the mafic-ultramafic clasts, and the almost exclusively mafic-ultramafic composition of the clasts.

BLM investigators collected several samples from the Dunite Diatreme occurrence with the intent to obtain rocks with different types of matrix. A sample of hematite matrix rock contained 3 ppb gold, 132 ppm copper, 1,730 ppm nickel, 23 ppb platinum, and 37 ppb palladium (sample 10072). A sample with serpentinite matrix contained 9 ppb gold, 177 ppb copper, 1,810 ppm nickel, 70 ppb platinum, and 52 ppb palladium (sample 10073). Other samples from the occurrence contained similar concentrations of base and precious metals (samples 10007, 10074).

Mineral Development Potential: Low

Conclusions: The Dunite Diatreme occurrence is unique in the nickel-copper-PGE occurrences in mafic-ultramafic rock in the Delta River district. Since elevated base and precious metals are associated with a conglomerate, the occurrence may be termed a placer type deposit. However, BLM geologists could not find evidence of a fluvial concentration of metals. Therefore, if the site were to be developed, it would likely be developed as a lode occurrence.

Previous investigators (Foley, 1992; Ellis and others, 2004) have detected gold and PGE associated with the conglomerate. The presence of low levels of metals was verified by BLM sampling. The concentration of these metals is too low to make the conglomerate an attractive exploration target. It may be of significance in deciphering the tectonic history of the local area.

LOWER CRASH

Alternate Name(s):		Map No:	140
		MAS No:	0020680367
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 32, T18S, R08E
Meridian:	Fairbanks	Elevation:	4,650 feet
Latitude:	63.31541	Longitude:	-146.25659

Geographic: The Lower Crash occurrence is located east of Landslide Creek, between Broxson Gulch and Eureka Glacier. It is on the lower, west-facing slopes of the '5540' peak marked on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access is by helicopter. A landing site for a light helicopter is accessible below, and to the northwest of, the occurrence.

History: The Lower Crash occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2001).

ARDF Name / No.: Lower Crash / MH108 **Alaska Kardex:** None

Production: None

Workings and Facilities: An elongate depression at the site of the Lower Crash occurrence may be a trench. If so, the trench is about 2 to 3 feet deep, about 50 feet long and trends 255 degrees. It is cut approximately along the crest of a westward-trending ridge. Alternatively, the depression may be a natural slump feature.

Geologic Setting: The Lower Crash occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. The occurrence is in the central part of the complex, which has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined a mid-Triassic age (Bittenbender and others, 2003).

The Lower Crash occurrence comprises sparsely mineralized peridotite, feldspathic peridotite, gabbro, and serpentinite. The peridotite contains up to about 5 percent sulfides, mainly pyrrhotite. There is also sparse chalcopyrite disseminated in the rock.

Below the Lower Crash are variably mineralized brecciated serpentinite, gabbro to feldspathic peridotite, pyroxenite, and peridotite hosted in metasediments and silicified andesite. The brecciated serpentinite seems to be the most mineralized. It occurs along the contact of the mafic-ultramafic rocks with the host rocks and trends about 335 degrees. Brittle fracturing followed serpentinization. Sulfides compose 1 to 2 percent of the rock, mainly pyrrhotite and minor chalcopyrite. Some copper staining is also evident.

Bureau Investigation: BLM personnel collected six rock chip samples from the Lower Crash occurrence and immediate area. Two samples collected from the occurrence itself contained low base and precious metal values (samples 10800-801). A select sample of peridotite with 3 to 5 percent sulfides, mainly pyrrhotite, contained 56 ppb gold, 93 ppb platinum, 91 ppb palladium, 1,385 ppm copper, and 2,590 ppm nickel (sample 10801). A sample across 45 feet had even lower metal values (sample 10800).

The BLM collected four samples from below the Lower Crash occurrence. One of these samples, from sparse float in the area, contained 2.59 percent copper (sample 10227). Compared to the other samples from the immediate area, this sample was also elevated in silver (11.6 ppm), arsenic (282 ppm), gold (150 ppb), cadmium (2.2 ppm), chromium (668 ppm), mercury (0.68 ppm), manganese (2,490 ppm), and palladium (115 ppb). The other samples had low base and precious metal values (samples 10198-199, 10228).

Mineral Development Potential: Low

Conclusions: Most of the samples collected by the BLM from the Lower Crash occurrence contained low base and precious metal concentrations. The one sample with particularly elevated metals (sample 10227) came from sparse float in the area. The BLM did not find high enough metal concentrations or extent of mineralized rock to suggest that the area will attract significant future exploration efforts.

WEST CRASH

Alternate Name(s):		Map No:	142
		MAS No:	0020680233
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NE1/4 Sec: 32, T18S, R08E
Meridian:	Fairbanks	Elevation:	5,350 feet
Latitude:	63.316603	Longitude:	-146.24554

Geographic: The West Crash occurrence is located in the headwaters area of Landslide Creek. It lies east of Landslide Creek and north of a prominent eastern tributary. It is about half a mile west of the mountain marked '5540' on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access is by helicopter. A light helicopter can easily land immediately above the occurrence.

History: The West Crash occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002).

ARDF Name/No: West Crash / MH110 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The West Crash occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. It is in the eastern part of what has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined an early to mid Triassic age (Bittenbender and others, 2003).

At the West Crash occurrence a differentiated pyroxenite-gabbro sill is about 100 feet thick and dips generally to the north at about 40 degrees. The footwall of the sill comprises a quartz-flooded(?) volcanic rock. It contains milky white, agate-looking bands in more translucent quartz. On the hanging wall are metasediments including argillite, slate, and graywacke.

Near the structural top of the pyroxenite-gabbro sill, at the base of the overlying metasediments, there is a 5-foot-thick layer of weather resistant rock that crops out in relief from the surrounding rubble. The layer is oriented 250 degrees, dipping 38 northwest and extends across the valley to the northeast for about half a mile. Immediately beneath this layer is a zone of variably serpentinized mafic-ultramafic rock with malachite and garnierite staining. The zone extends for over 200 feet across and down the southeast-facing slope to the east. This part of the sill was probably gabbroic in composition, but has been extensively altered. Plagioclase seems to be saussuritized and pyroxenes altered to actinolite. The zone includes patches of gossanous material.

Bureau Investigation: BLM investigators collected four samples from the West Crash occurrence to characterize the mineralized rock. Two samples of gossanous material from near the structural top of the pyroxenite-gabbro sill contained anomalous base and precious metals. Concentrations ranged up to 37 ppb gold, 399 ppm chromium (10604), 872 ppm copper, 4,020 ppm nickel (10083), 118 ppb platinum, and 168 ppb palladium (10604). Base and precious metals in the other two samples were not significantly anomalous.

Mineral Development Potential: Low

Conclusions: The West Crash occurrence is interesting in that the stratigraphic setting of the mineralized rock is discernable and so the extent of the mineralization can be determined. In addition, some of the samples returned significantly elevated metal values, particularly nickel, along with anomalous PGE. The site may attract further exploration interest if only to help determine the nature of base and precious metal mineralization in the mafic-ultramafic rocks in the area. In itself, the grade and extent of the mineralized rock is too low to attract significant interest.

CRASH

Alternate Name(s):		Map No:	143
		MAS No:	002068
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NE1/4 Sec: 33, T18S, R08E
Meridian:	Fairbanks	Elevation:	5,200 feet
Latitude:	63.316628	Longitude:	-146.221753

Geographic: The Crash occurrence is located on the east side of a saddle that divides two western tributaries to Broxson Gulch. The tributaries lie between the head of Landslide Creek and Broxson Gulch. The occurrence is about a quarter of a mile east of the peak marked ‘5540’ on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access is by helicopter.

History: The Crash occurrence was discovered in the 1990’s by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Crash / MH114 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Crash occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. It is on the eastern end of what has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined a middle Triassic age (Bittenbender and others, 2003).

The Crash occurrence includes a sequence of mafic and ultramafic rocks including dunite, peridotite, pyroxenite, and gabbro. Some of these rocks have been serpentinized. Peridotite, pyroxenite, and gabbro contain minor disseminated sulfides, predominantly pyrrhotite with minor chalcopyrite.

The units are poorly exposed across the top of a ridge for 100 to 150 feet and likely extend under cover to the west-northwest. They are hosted by metasedimentary rocks, silicified mudstone, andesite, and minor granitoid intrusive plugs.

Bureau Investigation: BLM investigators collected three samples from the Crash occurrence. Each of the samples was of ultramafic rock, mainly peridotite. A grab sample of iron-stained peridotite contained 1,315 ppm copper, 2,180 ppm nickel, 322 ppb platinum, 414 ppb palladium, and 85 ppb gold (sample 10542). The other two samples contained even lower base and precious metal values.

Mineral Development Potential: Low

Conclusions: The Crash occurrence is one of many small mineralized occurrences associated with the Eureka complex of mafic and ultramafic rocks. In itself, it may be of little significance, but with the other occurrences, it demonstrates the mineralized nature of the mafic-ultramafic rocks of the complex.

NOTAR

Alternate Name(s):		Map No:	150
		MAS No:	0020680235
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 34, T18S, R08E
Meridian:	Fairbanks	Elevation:	4,900 feet
Latitude:	63.317957	Longitude:	-146.201402

Geographic: The Notar occurrence is located on the nose of an eastward-trending ridge about 1 mile west of Broxson Gulch. It is about 2 miles east-northeast of Landslide Creek.

Access: Access is by helicopter.

History: The Notar occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Notar / MH112 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Notar occurrence is situated within an east-west-trending, northward dipping sill-like complex of mafic and ultramafic rocks. It is on the eastern end of what has been defined as the Eureka mafic-ultramafic complex (Bill Ellis, personal communication, 2001; Bittenbender and others, 2003). Rose (1966a) was the first to recognize and map these rocks as ultramafics and suggested a late Mesozoic age. Subsequent age dating of the mafic-ultramafic sill-form complexes in the area has determined a middle Triassic age (Bittenbender and others, 2003).

Rocks in the area of the Notar occurrence are predominantly dunite, but vary to peridotite and gabbro as well. The dunite is variably serpentinized, with some consisting of approximately 90 percent serpentinite and others with less than 10 percent. Sulfides are rare in the dunite, but are more abundant to the south of the occurrence in peridotite. Here, net textured pyrrhotite and chalcopyrite are evident.

Bureau Investigation: BLM investigators collected five samples from the Notar occurrence. None contained significant base or precious metals. The highest gold value was 17 ppb, the highest platinum was 88 ppb, and the highest palladium was 51 ppb (sample 10544). The highest concentration of base metals was 344 ppm copper, 822 ppm chromium (sample 10544) and 2,900 ppm nickel (sample 10547).

To the south of the occurrence a sample of peridotite with net textured pyrrhotite and chalcopyrite yielded 49 ppb gold, 27 ppm platinum, 22 ppb palladium, 653 ppm copper, and 1,540 ppm nickel (sample 10098).

Mineral Development Potential: Low

Conclusions: The metal concentrations in the BLM's samples are quite low. Only the nickel values would be considered anomalous, particularly given the fact that the BLM's sample preparations allow for only non-silicate-associated metals to be reported. The site represents another example of the low-level mineralized rock across the Eureka complex. The anomalous nickel values indicate a concentration of this metal – again, representative of the concentrations of various metals in various parts of the complex. The site, in itself, is not high grade or extensive enough to attract individual exploration attention.

EAST PEAK SOUTH RIDGE

Alternate Name(s):	Unnamed	**Map No:**	219
		MAS No:	0020680364
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 26, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,900 feet
Latitude:	63.325963	Longitude:	-145.979818

Geographic: The East Peak South Ridge occurrence is between the North Fork and West Fork of Rainy Creek. It is on the crest of a ridge extending to the south from the next peak east of the peak marked **'**6346**'** on the Mt. Hayes B-4, 1:63,360-scale, topographic map. It is about 1,000 feet south of this unmarked peak.

Access: Access is by helicopter. A landing site suitable for light helicopters is about 200 below, and southeast of, the occurrence. From here the occurrence is easily accessible on foot.

History: The East Peak occurrence was discovered in 1995 by American Copper and Nickel Company (Bill Ellis, personal communication, 2001). It is currently held under active claims by Nevada Star Resources Corporation.

ARDF Name / Number: Unnamed (east of peak 6346) / MH134
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The East Peak South Ridge occurrence is part of the Rainy Creek mafic-ultramafic complex (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003), which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts. The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends approximately 10 to 12 miles in a generally west-northwest-east-southeast direction and is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation (Nokleberg and others, 1992b).

The East Peak South Ridge occurrence sits near the footwall of the Rainy Creek complex. Rocks in the immediate area of the South Ridge occurrence are mainly mafic gabbro in contact with argillite. Most of the sulfide minerals at the occurrence seem to be associated with more mafic parts of the gabbro. A few pieces of the gabbro have chalcopyrite in them, but most of the gabbro is devoid of sulfides. Everywhere the gabbro is phlogopite-bearing.

Near the gabbro-argillite contact there is a small dike of very leucocratic, pegmatitic gabbro. The dike is exposed only as subcrop on the ridge crest and appears to be only about 1 foot thick. Some of this white-weathering gabbro contains chalcopyrite interstitial to the coarser grained minerals in the dike. Sample 10991 was collected from the dike.

To the south of the East Peak South Ridge occurrence, into the footwall of the Rainy Creek complex, is argillite, and silicified, fossiliferous limestone or chert. Apparent bedding in these sedimentary rocks strikes approximately east-west and dips steeply to the north. BLM investigators collected several bags of the silicified limestone or chert to be checked for the presence of radiolarians, from which potential age dates may be obtained. (Paleontologists from the Biostratigraphy labs, University of Nevada Reno examined the limestone/chert for radiolarians, but no microfossils were found and so no ages were determined [P. Noble, written communication, 2005].)

Bureau Investigation: BLM investigators collected three samples from the East Peak South Ridge occurrence. Two of the samples came from iron-stained gabbro (samples 10989-990) and one from a pegmatitic textured, leucocratic gabbro dike (sample 10991). A spaced chip sample across 14 feet of outcropping gabbro had low base and precious metal concentrations. This sample included gabbro with less than 1 percent sulfides (sample 10989). A select sample of gabbro with about 5 percent combined chalcopyrite and pyrrhotite contained 29 ppb gold, 75 ppb platinum, 236 ppb palladium, 1,690 ppm copper, and 1,045 ppm nickel (sample 10990). The sample from the leucocratic, pegmatitic-textured dike contained very low base and precious metal values.

Mineral Development Potential: Low

Conclusions: The East Peak South Ridge occurrence is anomalous, particularly with respect to palladium, and might be investigated to gain an understanding of the nickel-copper-PGE mineralization of mafic-ultramafic rocks in the district as a whole. However, the small size and low grade of the occurrence makes it unlikely to attract future mineral exploration interest on its own.

EAST PEAK

Alternate Name(s):		Map No:	220
		MAS No:	0020680260
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 27, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,900 feet
Latitude:	63.32904	Longitude:	-145.98654

Geographic: The East Peak occurrence is between the North Fork and West Fork of Rainy Creek. It is in the saddle, about 850 feet east of the peak marked **'**6346**'** on the Mt. Hayes B-4, 1:63,360-scale, topographic map.

Access: Access is by helicopter. There are numerous sites suitable for landing a light helicopter near the East Peak occurrence.

History: The East Peak occurrence was discovered in 1995 by American Copper and Nickel Company (Bill Ellis, personal communication, 2001). It is currently held under active claims by Nevada Star Resources Corporation.

ARDF Name / No.: East Peak / MH135 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The East Peak occurrence is part of the Rainy Creek mafic-ultramafic complex, which is one of several hypabyssal intrusions interpreted to be comagmatic with the nearby Triassic Nikolai basalts. These shallow intrusions are generally sill-form and thought to represent feeder systems for the overlying basalts (Bill Ellis, personal communication, 2002). The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends for approximately 10 to 12 miles in a generally west-northwest-east-southeast direction.

Rocks of the Rainy Creek complex in the area of the East Peak occurrence comprise mainly gabbro, peridotite, and minor dunite. Gabbros vary from feldspar-rich leucocratic gabbro to pyroxene-rich melanocratic gabbro. The feldspar content of the peridotite varies similarly. In general, the rocks are more mafic to the north, however, the minor dunite does not fit this mafic trend. Leucocratic gabbro seems to cut all other lithologies. In places the gabbro is iron-stained and contains several percent sulfides, mainly pyrrhotite with chalcopyrite. Magnetite is also common. The more mafic lithologies are variably serpentinized.

The East Peak occurrence itself includes sulfides in peridotite and in the hosting gabbro. The peridotite is fine grained, dark gray to black and contains fine-grained and patchy medium-grained pyrrhotite with minor chalcopyrite. It is surrounded by gabbro. The gabbro also contains pyrrhotite and more chalcopyrite than the peridotite, but the sulfides are patchy and sparsely distributed. Only about 10 percent of the gabbro in the area of the occurrence is mineralized and then only with a few percent sulfides.

The occurrence consists of subcropping rocks on the crest of a ridge. The peridotite extends for only about 10 feet by 10 feet. Mineralized gabbro extends up to about 30 feet away from the peridotite. Most of the gabbro in the area contains no evident sulfides.

Bureau Investigation: BLM investigators collected two samples from the East Peak occurrence and an additional five samples from the general area. The two samples from the occurrence contained 72 and 100 ppb platinum, 57 and 65 ppb palladium, 36 and 36 ppb gold, 2,010 and 1,295 ppm copper, and 1,175 and 783 ppm nickel in samples 10987 and 10988 respectively. Other samples from the area were lower in precious metals, but contained up to 2,590 ppm nickel (sample 10660), 1,080 ppm chromium (sample 10659), and 138 ppm cobalt (10660).

Mineral Development Potential: Low

Conclusions: The East Peak occurrence is too low grade and too limited in extent to attract much exploration attention. It represents on of the many occurrences in the Rainy complex and characterizes the low level mineralized nature of many parts of the complex.

EAST CANYON

Alternate Name(s):		**Map No:**	225
		MAS No:	0020680363
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 22, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,850 feet
Latitude:	63.341202	Longitude:	-145.997558

Geographic: The East Canyon occurrence is on a generally west-southwest-facing slope near the head of the east fork of Broxson Gulch. It is about 0.7 miles west-southwest of peak ‘6045’ on the Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access is easiest by helicopter. There is an airstrip on the east fork of Broxson Gulch, but the strip is over 3 miles walking distance to the southwest of the East Canyon occurrence. In addition, there is a crude trail that leads to the airstrip on the east fork of Broxson Gulch, but access to the trail requires fording the Delta River near the mouth of Phelan Creek. This trail is suitable primarily for ORV’s.

History: The East Canyon occurrence was discovered in the 1990’s by mineral exploration companies targeting the area primarily for nickel, copper, and PGE (Bill Ellis, personal communication, 2002).

ARDF Name / Number: East Canyon / MH131 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The East Canyon occurrence is situated within the Rainy Creek mafic-ultramafic complex, one of several mafic-ultramafic sill-form complexes in the area (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003). These complexes are thought to represent intrusive feeder chambers that are comagmatic with the overlying Triassic Nikolai basalts (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002). Isotopic age dates on hornblende and phlogopite from the Rainy complex have yielded early Late Triassic ages (Bittenbender and others, 2003; Bittenbender and others, 2004).

The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends approximately 10 to 12 miles in a generally west-northwest-east-southeast direction and is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation (Nokleberg and others, 1992b).

USGS investigators report anomalous nickel, platinum, and palladium in a sample collected by a mineral exploration company at the East Canyon occurrence. The sample reportedly carried pyrrhotite and pentlandite. The sample returned 108 ppb platinum, 282 ppb palladium, and 0.187 percent nickel (Ellis and others, 2004).

BLM investigators found mineralized rock in serpentinized peridotite in the East Canyon area. Native copper, along with copper alteration minerals, are associated with discontinuous, cross-cutting veinlets of serpentine, magnetite, and chrysotile/antigorite.

Bureau Investigation: BLM investigators collected two samples from the East Canyon area. Both samples were from serpentinized peridotite and both had low precious and base metal values. Sample 11007 was collected to analyze flecks of native copper and copper alteration minerals seen at the intersection of two veinlets of serpentinized peridotite. The sample returned 1,905 ppm copper (sample 11007).

Mineral Development Potential: Low

Conclusions: The East Canyon occurrence represents low concentrations of base and precious metals in the Rainy complex. It is unlikely to attract mineral exploration attention on its own, but is significant in representing the mineralized nature of the Rainy complex as a whole.

EAST BROXSON GOLD

Alternate Name(s):	East Broxson Au	Map No:	227
		MAS No:	0020680365
Deposit Type:	Ultramafic	Commodities:	Au, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4, B-5	TRS:	NW1/4 Sec: 22, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,400 feet
Latitude:	63.347473	Longitude:	-146.001208

Geographic: The East Broxson Gold occurrence is on a northeast-facing slope at the upper end of the east fork of Broxson Gulch. It is about 0.85 miles west-northwest of peak '6045' on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access is easiest by helicopter. There is an airstrip on the east fork of Broxson Gulch, but the strip is about 3 miles southwest of the East Broxson Gold occurrence. In addition, there is a crude trail that leads to the airstrip on the east fork of Broxson Gulch, but access to the trail requires fording the Delta River near the mouth of Phelan Creek. This trail is suitable primarily for ORV's.

History: The East Broxson Gold occurrence was discovered in the 1990's by mineral exploration companies targeting the area primarily for nickel, copper, and PGE (Bill Ellis, personal communication, 2002).

ARDF Name / Number: East Broxson Au / MH130 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The East Broxson Gold occurrence is situated within the Rainy Creek mafic-ultramafic complex, one of several mafic-ultramafic sill-form complexes in the area (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003). These complexes are thought to represent intrusive feeder chambers that are comagmatic with the overlying Triassic Nikolai basalts (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002). Isotopic age dates on hornblende and phlogopite from the Rainy complex have yielded early Late Triassic ages (Bittenbender and others, 2003; Bittenbender and others, 2004).

The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends approximately 10 to 12 miles in a generally west-northwest-east-southeast direction and is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation (Nokleberg and others, 1992b).

The slope investigated by BLM geologists in the area of the East Broxson Gold occurrence comprises predominantly dunite with layers(?) of peridotite. These ultramafic rocks are variable serpentinized and include veinlets of magnetite and serpentine. In the serpentinized peridotite is very fine-grained disseminated pyrrhotite, and pyrrhotite on fracture surfaces. No other sulfide minerals were detected.

USGS investigators report anomalous gold in a sample collected by a mineral exploration company at the East Broxson Gold occurrence. The sample reportedly carried chalcopyrite, pyrrhotite, and pentlandite. The sample returned 1,950 ppb gold along with 140 ppb platinum, 36 ppb palladium, 0.58 percent copper, and 0.05 percent nickel (Ellis and others, 2004).

Bureau Investigation: BLM geologists searched for the East Broxson Gold occurrence, but were unable to locate significant mineralized rock. They collected three samples to characterize various rock types in the area. None of the samples indicated significantly elevated base or precious metal concentrations. The highest returns from the three samples were 2 ppb gold, 12 ppb platinum, 7 ppb palladium, 239 ppm copper (sample 11362), 2,170 ppm nickel, 114 ppm cobalt (sample 11005), and 570 ppm chromium (sample 11362).

Mineral Development Potential: Low

Conclusions: Since BLM investigators could not verify the elevated concentrations of base and precious metals reported from the East Broxson Gold occurrence in their sampling, it is difficult to make a firm conclusion on the occurrence. If, however, the elevated concentrations reported by previous workers (Ellis and others, 2004) were widespread in the area, it is likely the BLM would have been able to find the mineralized rock and verify the reported results. Since this was not the case, it is likely that metals are only locally concentrated and the site would not attract a significant amount of future exploration attention on its own.

NORTH RAINY

Alternate Name(s):		Map No:	233
		MAS No:	0020680263
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE 1/4 Sec: 24, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,000 feet
Latitude:	63.34056	Longitude:	-145.93337

Geographic: The North Rainy occurrence is situated on the eastern slopes of North Fork Rainy Creek. It is 11/3 miles east of the peak marked '6045' on the USGS, Mt. Hayes B-4, 1:63,360-scale, topographic map, which is on the west side of North Fork Rainy Creek.

Access: Access is by helicopter. There is an extensive bench above the occurrence that is suitable for helicopter landings.

History: The North Rainy occurrence was discovered by American Copper and Nickel Company geologists in 1998 while following up a geophysical survey (Ellis and others, 2004).

ARDF Name / No.: North Rainy / MH153 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The North Rainy occurrence is part of the Rainy Creek mafic-ultramafic complex (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003), which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts. The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends approximately 10 to 12 miles in a generally west-northwest-east-southeast direction and is hosted by Pennsylvanian to Permian rocks of the Slana Spur Formation (Nokleberg and others, 1992b).

Rocks of the Rainy Creek complex in the area of the North Rainy occurrence comprise mainly peridotite and dunite that have been cut by gabbro dikes. The peridotite in the area weathers to a distinctive, hummocky to bumpy surface texture. This texture may be due to more resistant coarse-grained pyroxene crystals in finer grained olivine groundmass. The dunite weathers to a more smooth surface texture. The peridotite and dunite are variably serpentinized – parts are relatively fresh looking whereas others are almost completely serpentinized.

Figure 15. Ultramafic magmatic breccia at the North Rainy occurrence.

Near the contact between the mafic-ultramafic rocks and the host, hanging wall, sedimentary rocks there is an approximately 100-foot outcrop of what appears to be a magmatic breccia consisting of variably serpentinized, angular to rounded blocks of dunite in an apparent peridotite matrix (Figures 15 and 16). The breccia is about 50 feet thick. This rock type may be what Ellis and others (2004) refer to as a breccia at the contact of dunite and gabbro at the North Rainy occurrence. They describe angular dunite clasts in a fine-grained gabbro matrix. They also describe a large inclusion of country rock as a clast in the breccia (Ellis and others, 2004).

Figure 16. Ultramafic clasts in ultramafic matrix in the North Rainy breccia.

BLM geologists found the North Rainy occurrence approximately at the contact between the Rainy mafic-ultramafic complex and hornfelsed sedimentary rocks, probably argillite, of the Slana Spur Formation in the hanging wall. Mineralized rock in the mafic-ultramafic sequence includes sparse sulfides, including chalcopyrite and pyrrhotite, mainly in peridotite. There is also minor native copper. There are no evident sulfides in the dunite.

Within the altered sedimentary rocks are lenses of massive to semi-massive sulfide, mainly pyrite (or pyrrhotite?) with chalcopyrite. One subcrop of this sulfide-rich rock extends discontinuously across an area of about 10 feet by 15 feet (photo). This subcrop occurs within about 20 feet of the contact with the mafic-ultramafic rocks of the Rainy Creek complex.

The rocks in the area of the North Rainy occurrence have been cut by brittle faulting, which seems to have localized hydrothermal fluids and deposited quartz with several sulfide phases. The quartz occurs as veins, generally 1 to 2 inches thick, and as silicification of the hornfelsed sediments and mafic-ultramafic rock. Alteration halos around the veins are confined to 1 to 2 inches and include silicification and disseminated pyrite. Sulfide minerals include pyrite, pyrrhotite(?), chalcopyrite, galena, and possibly chalcocite and tetrahedrite.

Bureau Investigation: BLM geologists collected nine samples from the North Rainy area. Samples from the mafic-ultramafic rock were generally low in precious and base metals. The highest PGE returns came from a sample of relatively fresh-looking dunite, which had 74 ppb platinum, 62 ppb palladium, and 29 ppb gold (sample 11261). This sample also had the highest return of nickel from the area at 2,590 ppm.

Samples from the massive to semi-massive sulfide lenses hosted in hornfelsed sediments returned 158 ppb gold and 1.04 percent copper (sample 11264). Samples from the silica-flooded, brittle fault zones contained up to 445 ppb gold, 25 ppm silver (sample 11390), 2.08 percent copper, and 4,070 ppm lead (sample 11388).

Mineral Development Potential: Low

Conclusions: There are only small concentrations of base and precious metals in the mafic-ultramafic rocks at the North Rainy occurrence. These rocks are unlikely to attract much mineral exploration attention. The magmatic breccia at the occurrence is significant in that it indicates a dynamic magma system. Some authors (e.g., Li and others, 2001) suggest these dynamic systems are necessary to concentrate economic quantities of nickel and copper sulfides.

Some of the higher grade BLM samples from North Rainy came from the rocks hosting the mafic-ultramafic intrusions. The massive sulfides may be replacement deposits associated with the mafic-ultramafic intrusions. The quartz-flooded rocks and associated mineralization seem to be structure-related and are likely to be quite a bit younger. They may be associated with Cretaceous intrusions in the area. More work needs to be done to determine the extent and hence the potential of these mineralized bodies. Preliminary indications suggest they are small.

HAIL CREEK

Alternate Name(s):		Map No:	237
		MAS No:	0020680264
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 25, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,200 feet
Latitude:	63.32761	Longitude:	-145.93011

Geographic: The Hail Creek occurrence is located on a bench about 500 feet above the North Fork of Rainy Creek on its east side. It is about 1.1 miles west-northwest of the peak marked '5847' on the USGS, Mt. Hayes B-4, 1:63,360-scale, topographic map.

Access: Access is by helicopter. There are numerous landing sites for light helicopters at the occurrence.

History: The Hail Creek occurrence was discovered during nickel-copper-PGE exploration by American Copper and Nickel Company in 1998. The discovery was made during follow-up of geophysical survey data (Ellis and others, 2004).

ARDF Name / No.: Hail Creek / MH152 **Alaska Kardex:** None

Production: None

Workings and Facilities: Ellis and others (2004) report that one core hole was drilled at the Hail Creek occurrence. The 250-foot diamond drill hole was targeting a geophysical anomaly (Ellis and others, 2004).

Geologic Setting: The Hail Creek occurrence is part of the Rainy Creek mafic-ultramafic complex, which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts. The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002).

The Hail Creek occurrence is mainly defined by geophysical anomalies. In this area magnetic highs coincide with conductive anomalies. In addition, float samples from the area contain anomalous concentrations of base and precious metals. The core hole drilled by ACNC to test a buried conductive target reportedly failed to intersect significant mineralized rock (Ellis and others, 2004)

BLM investigators examined the Hail Creek occurrence area in 2002 and found minor mineralization situated near the contact between serpentinized dunite and gabbro. The mineralized rock occurs near gabbro dikes and plugs that intrude the dunite. The gabbro dikes are in sharp contact with the dunite, which appears to be hornfelsed. The gabbro is fine to very fine grained, particularly at dike margins. The dikes generally trend to the northeast and dip shallowly to moderately to the southeast. Some skarn minerals have formed near the gabbro-dunite contact as well, including garnet, vesuvianite, and epidote. A chlorite alteration overprints the gabbro and skarn.

Mineralization consists of bornite, chalcopyrite, and tennantite in patches and seams as well as on joint surfaces in the margins of gabbro dikes. Copper staining is evident within the adjacent serpentinized dunite, but no sulfides are visible.

Bureau Investigation: BLM personnel mapped and sampled the Hail Creek occurrence in 2002. They collected one sample from the contact zone between a gabbro dike and serpentinized dunite (sample 10033), and another from about 250 feet to the northeast, from dunite, near the contact with a gabbro body (sample 10034). The material sampled in 10033 contained copper sulfides and copper alteration minerals. Analysis of the sample revealed 2,430 ppm copper and 568 ppm zinc, but only 31 ppm chromium, 70 ppm nickel, 1.3 ppb platinum, and 2 ppb palladium. Sample 10034 of dunite had no evident copper minerals but analyses returned higher values for other typical ultramafic occurrence commodities: 455 ppm chromium and 1,910 ppm nickel. The sample contained only 21 ppb platinum and 19 ppb palladium.

Mineral Development Potential: Low

Conclusions: Results from the industry drilling of the Hail Creek occurrence are not available to the BLM. However, it is reported that the single hole did not penetrate significant mineralized rock (Ellis and others, 2004). The surface mineralization is not sufficiently high grade or extensive to attract much mineral exploration attention.

FOLEY'S

Alternate Name(s):		Map No:	238
		MAS No:	0020680265
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 36, T19S, R09E
Meridian:	Fairbanks	Elevation:	4,050 feet
Latitude:	63.316869	Longitude:	-145.921616

Geographic: The Foley's occurrence is located about half a mile northeast of the North Fork of Rainy Creek. It lies northeast of the mouth of the first major tributary to the North Fork from the west that is northwest of the West Fork of Rainy Creek.

Access: Access is most practical by helicopter. There are some ATV trails to the lower reaches of Rainy Creek, but access to the trails requires crossing the Delta River near the mouth of Phelan Creek.

History: The Foley's occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002). Claims covering the Foley's occurrence are currently (2005) held by Nevada Star Resources, Seattle, WA, USA.

ARDF Name / No.: Unnamed (east side of North Fork Rainy Creek / MH167
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The Foley's occurrence lies at the southern margin of the Rainy Creek mafic-ultramafic complex (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003), which is thought to represent one of several nickel-copper-PGE-bearing hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts (Nokleberg and others, 1992b). The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro, which occur particularly at its margins (Bill Ellis, personal communication, 2002). The Foley's occurrence lies near the base of the Rainy complex.

The immediate Foley's area has been mapped by Hulbert and Ellis (unpublished mapping, Bill Ellis, written communication, 2002) as an area of gabbroic intrusions along the footwall of the Rainy complex and adjacent to structurally lower Pennsylvanian to Permian rocks of the Slana Spur Formation (Nokleberg and others, 1992b). Rose (1966a) mapped the immediate area as a contact zone between a unit of gabbro and basalt of Rainy Creek. BLM investigators sampled olivine gabbros at the Foley's occurrence.

Bureau Investigation: BLM investigators collected two samples from what they believed to be the Foley's occurrence. Investigators were primarily focused on finding phlogopite in gabbro, believing that that is what was represented by the Foley's occurrence. They have since learned that the site represents a broader area of work done by the U.S. Bureau of Mines and reported by Foley (1992). Neither of the samples collected by the BLM contained significant base or precious metals.

Mineral Development Potential: Unknown

Conclusions: BLM investigators examined the Foley's area while following up on a report by B. Ellis (written communication, 2002) concerning mineralized locations associated with mafic-ultramafic rocks in the southwestern Delta River district. The Foley's location reported by Ellis apparently refers to work in the general North Fork Rainy Creek area by the U.S. Bureau of Mines and reported by Foley (1992). As such, the specific location for the 'occurrence' marked by Ellis should have been interpreted as a much more general location. Hence, BLM investigators did not find any significantly mineralized rock at the site.

WHITE BAND

Alternate Name(s):		**Map No:**	239
		MAS No:	0020680273
Deposit Type:	Ultramafic	**Commodities:**	PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 30, T18S, R10E
Meridian:	Fairbanks	Elevation:	5,100 feet
Latitude:	63.32089	Longitude:	-145.91035

Geographic: The White Band occurrence is located on the southwest-facing slope of a mountain whose peak elevation is marked as 5,847 feet on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map. The occurrence is east and northeast of the North Fork of Rainy Creek.

Access: Access is by helicopter. Light helicopter landing sites are available at the top of the slope on which the occurrence is found or farther down the slope. The upper and lower landing sites are about 300 to 400 vertical feet from the occurrence.

History: The White Band occurrence was discovered in the 1990's during nickel-copper-PGE exploration of the area, principally by American Copper and Nickel Company (Bill Ellis, personal communication, 2002). It is listed in the USGS ARDF of Ellis and others (2004).

ARDF Name / No.: White Band (east of upper North Fork Rainy Creek) / MH158
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The White Band occurrence is situated near the south side of the Rainy Creek ultramafic complex (Bill Ellis, personal communication, 2002), which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts. The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro, which occur particularly at its margins (Bill Ellis, personal communication, 2002).

At the White Band occurrence a gabbro dike cuts dunite of the Rainy Creek complex. The dike is approximately 30 to 40 feet thick and is oriented 120 degrees, dipping 40 degrees northeast. It is composed of fine- to medium-grained, dark gray gabbro with phenocrysts of anhedral plagioclase and smaller euhedral plagioclase crystals in a fine-grained dark gray matrix. The dunite host to the gabbro is generally fresh in the vicinity of the dike, but is serpentinized adjacent to the dike. Here it is black, massive and well indurated serpentinite.

Ellis and others (2004) seem to define the White Band occurrence differently from the BLM. They interpret the White Band occurrence of comprising an anorthositic gabbro layer near the footwall of the Rainy mafic-ultramafic complex. They report 2 to 3 percent disseminated sulfides of pyrite, pyrrhotite, and chalcopyrite in the gabbro (Ellis and others, 2004).

Bureau Investigation: BLM investigators collected five samples from the White Band occurrence in 2002. The samples had generally low precious and base metal concentrations. The highest values from the five samples were 16 ppb gold (sample 10041), 74 ppb platinum, 54 ppb palladium, 1.2 ppm silver, (sample 10331), 1,340 ppm copper (sample 10039), and 2,030 ppm nickel (samples 10041, 10331).

Ellis and others (2004) report significantly higher assay results from their samples from the White Band occurrence. They report 3,688 ppb gold, 95 ppb platinum, 210 ppb palladium, 2,700 ppb copper, and 1,100 ppm nickel from one or more samples from the site (Ellis and others, 2004).

BLM investigators found iron-, and copper-stained mafic-ultramafic float in the area specified by the ARDF (Ellis and others, 2004) for the location of the White Band occurrence; the prominent white gabbro dike was found about 300 vertical feet up the slope from the specified site. A BLM sample of melagabbro float from the ARDF location returned 1,070 ppb gold, 227 ppb platinum, 348 ppb palladium, 1,570 ppm copper, and 1,270 ppm nickel (sample 10332).

Mineral Development Potential: Low

Conclusions: There is disagreement between the BLM's location and interpretation of the White Band occurrence and the ARDF location (Ellis and others, 2004). Ellis and others (2004) suggest a white, feldspar-rich layer within the Rainy complex whereas the BLM interprets the site as a feldspar-rich gabbro dike. Sampling by Ellis and others (2004) returned strongly elevated precious metal values from the site, whereas BLM samples returned low precious metal values. To add to the confusion, the BLM found elevated precious metal values in float from the GPS location described by Ellis and others (2004) as the White Band occurrence, but where there is no prominent white rock band. Nonetheless, the high precious metal values reported by Ellis and others (2004) and those resulting from the BLM's sampling suggest further mineral investigations in the general area are warranted to further define the anomalies.

ANN FORK

Alternate Name(s):	E. Rainy Skarn Rainy Creek Rainy Creek Prospect	**Map No:**	246
		MAS No:	0020680268
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 29, T18S, R10E
Meridian:	Fairbanks	Elevation:	4,200 feet
Latitude:	63.32816	Longitude:	-145.86218

Geographic: The Ann Fork occurrence is on the southeast side of a small drainage that flows to the northeast and joins an eastward draining valley near the head of Ann Creek. The occurrence is located about 1 mile southeast of the peak of elevation 6,300 feet, which is marked on the USGS, Mt. Hayes, B-4, 1:63,300-scale, topographic map.

Access: Gentle, open terrain in the area allows for easy access by light helicopter.

History: The Ann Fork occurrence is mentioned by Barker in a report on PGE in the ultramafic rocks of the area (Barker, 1988), and was examined in the 1990's during nickel-copper-PGE exploration (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Unnamed / MH163

Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The Ann Fork occurrence is situated near the northern margin of the Rainy Creek ultramafic complex, which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts (Nokleberg and others, 1992b). The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro, which occur particularly at its margins (Bill Ellis, personal communication, 2002).

In the Ann Fork area, the Rainy Creek complex is intruded into Pennsylvanian to Permian volcanic and sedimentary rocks of the Tetelna Formation (Stout, 1976) or Slana Spur Formation (Nokleberg and others, 1992b). The contact here is oriented northwest-southeast. To the southwest of the mineralized sequence, the Rainy complex comprises dunite, and to the northeast the host formation comprises mainly andesite. Adjacent to the intrusive contact, the Rainy complex is mostly made up of gabbro, but includes peridotite within 10's of feet of the contact. The mafic and ultramafic rocks are most intensely serpentinized near the contact.

Mineralized rock at the Ann Fork occurrence comprises semi-massive, net-textured, and disseminated sulfides in gabbro, serpentinized peridotite and pyroxenite, and gossanous fault breccia. Lenses of semi-massive sulfide are generally associated with gabbro, which appear to be dikes hosted in variably serpentinized peridotite and pyroxenite. In places the semi-massive sulfides appear to make up about 80 percent of the rock across 1 to 2 feet. The peridotite includes patchy and disseminated sulfides. Most of the sulfides have apparently been leached out of the gossanous fault breccia. The breccia includes fragments of peridotite, gabbro, and other altered ultramafic rocks.

Metallic minerals at the occurrence consist of pyrrhotite, pentlandite, and chalcopyrite, along with traces of magnetite and ilmenite. The sulfides occur in wisps, bands, veinlets, and patches. Sulfide textures evident in reflected light microscopy suggest a magmatic assemblage that has been altered at low temperatures with the addition of water. Pyrrhotite is commonly altered to marcasite and limonite/goethite is common.

Bureau Investigation: BLM personnel collected four measured samples at the Ann Fork occurrence in 2002. Across 6.5 feet of peridotite and a little bit of gossanous fault breccia, a sample returned 38 ppb gold, 1,350 ppm copper, 761 ppm nickel, 19 ppb platinum, and 60 ppb palladium (sample 10056). Across 4 feet of gabbro with 5 to 10 percent sulfides, a sample returned 1.16 percent copper, 207 ppm nickel, 1 ppb platinum, and 3 ppb palladium (sample 10077). The highest grade sample of massive sulfides in gabbro returned 39 ppb gold, 2.15 percent copper, 1,820 ppm nickel, 72 ppb platinum, and 375 ppb palladium (sample 10057).

Analytical results reported by Barker (1988) from the Ann Fork occurrence are similar to those detected in BLM samples. The table below presents some of Barker's (1988) analytical results (Barker's Table III, p. 209).

Table 13. Analytical results from Barker (1988) sampling at Ann Fork.

Sample	Pt (ppb)	Pd (ppb)	Ni (ppm)	Cu (ppm)	Co (ppm)
2	22	25	26,500	13,500	206
4	27	30	1,170	590	110
5	130	450	1,085	8,135	208
6	18	20	1,575	845	212
7	110	75	2,035	4,180	730

Table 13 note: Precious metals analyzed by fire assay with an atomic absorption finish. Base metals were analyzed by "conventional atomic absorption procedures" (Barker, 1988, p. 202).

Mineral Development Potential: Low

Conclusions: The Ann Fork occurrence represents strong accumulations of sulfides, but the sulfides contain generally low or erratic base and precious metals. Barker (1988) suggests the sulfide accumulations are related to nearby diorite dikes and that the mineralization is remobilized. Remobilized mineralization would be restricted in extent and therefore less attractive for development. The BLM examination concludes some remobilized sulfides are associated with the breccias at the occurrence, but magmatic textures of other sulfides (e.g., exsolution of pentlandite in pyrrhotite) preclude hydrothermal remobilization as the sole source of sulfide accumulation. The presence of primary magmatic sulfides enhances the possibility that more mineralized rock may occur in the vicinity and makes the site more attractive for further exploration.

EAST RAINY

Alternate Name(s):		Map No:	248
		MAS No:	0020680267
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 29, T18S, R10E
Meridian:	Fairbanks	Elevation:	4,950 feet
Latitude:	63.33027	Longitude:	-145.88186

Geographic: The East Rainy prospect is located on the northern side of the floor of a large, east-west-trending, U-shaped valley between Ann Creek and North Fork Rainy Creek. The valley drainage flows to the east. It is about 1 mile south of the peak marked '6300' on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access is by helicopter. The area around the prospect is flat and open. making for easy light helicopter access.

History: The East Rainy prospect was discovered by American Copper and Nickel Company (ACNC) in 1995 or 1996 following an airborne resistivity and magnetic survey and follow-up reconnaissance mapping. In 1997 ACNC formed a joint venture partnership with Fort Knox Gold Resources (Fort Knox) to explore their holdings in the area. In 1998 the joint venture drilled one shallow hole (246 feet) on the East Rainy prospect (Ellis, 2002b).

Nevada Star Resources eventually acquired the claims of Fort Knox and ACNC and also staked additional claims in the East Rainy area. Nevada Star drilled 980 feet in seven holes at the prospect in 2003 (Freeman, 2004).

ARDF Name / No.: East Rainy / MH164 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The East Rainy prospect is situated near the northern margin of the Rainy ultramafic complex (Bill Ellis, personal communication, 2002), which is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts (Nokleberg and others, 1992b). The Rainy complex is shallowly northward-dipping (approximately 40 degrees), approximately 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro, which occur particularly at its margins (Bill Ellis, personal communication, 2002).

There appears to be a cycle of ultramafic to gabbroic rocks at the East Rainy prospect. From south to north there is porphyritic gabbro, exposed across a thickness of 15 feet that is covered to the south and may only be a dike. The porphyritic gabbro is in sharp contact (intrusive?)

with dunite to the north. Contacts further to the north are gradational with dunite grading into peridotite, with the first evidence of plagioclase and poikilitic pyroxene. The peridotite grades northward into feldspathic peridotite to melanocratic gabbro. Farthest to the north in the immediate vicinity is leucocratic gabbro, which is in sharp contact with the feldspathic peridotite/melagabbro (Figure 18). This generally gradational variation in rock types may be due to fractionation and crystal settling in the magma chamber. This fractionation is evident by magmatic layering on a small scale (Figure 17).

Figure 17. Magmatic layering in feldspathic peridotite at the East Rainy prospect. (Layering is caused by compositional variation, with lighter bands more plagioclase-rich.)

Mineralization at the East Rainy prospect is comprised of disseminated and, more rarely, net-textured sulfides of pyrrhotite, pentlandite, and chalcopyrite. In some places copper alteration minerals and garnierite are present along with common iron staining. The mineralization in general occurs in the feldspathic peridotite to melagabbro, near the leucogabbro contact.

Thin section inspection reveals minor serpentinization of the feldspathic peridotite/melagabbro. Serpentinization includes alteration mainly of olivine to serpentine, chrysotile, and magnetite. The serpentinization seems to be more concentrated in parts of the rock with sulfide minerals. Sulfides however appear to overprint the igneous textures and even the serpentinization in some places, suggesting the sulfides are secondary. They may represent a remobilization and enrichment of original sulfides, although evidence of the original sulfides was not determined.

At least two leucocratic gabbro dikes, one 5 feet thick and one only 8 inches thick, cut the mafic-ultramafic sequence of rocks. They trend to the east-northeast and are vertical to steeply northward dipping. Within the leucogabbro unit to the north one boulder includes a fine-grained, 6-inch thick, melagabbro dike cutting the leucogabbro.

Few results are available from Nevada Star drilling in the East Rainy area in 2003. Freeman (2004) reports that bad ground caused the loss of two holes and that others failed to intersect mineralized rock. The only results reported are for two 5-foot intercepts in hole ERC-3A (Figure 18) that returned 1,366 ppm nickel, 833 ppm copper, 150 ppb platinum, and 148 ppb palladium in feldspathic peridotite; and 2,488 ppm nickel, 1,443 ppm copper, 205 ppb platinum, and 215 ppb palladium in leucogabbro (Freeman, 2004, Table 7). The drill results suggest the mineralized horizon exposed at the surface is cut off in the shallow subsurface by a younger intrusive body (Freeman, 2004).

Bureau Investigation: BLM investigators mapped and sampled the East Rainy prospect in 2002. They collected five samples to characterize the mineralization. Every sample the investigators collected was anomalous in copper, nickel, platinum, palladium, and gold. Each sample was collected from iron-stained float or rubblecrop and represents the more mineralized parts of the prospect. The averages from the five samples were: 4,086 ppm copper, 4,516 ppm nickel, 679 ppb platinum, 774 ppb palladium, and 322 ppb gold (samples 10321-325). The highest platinum and palladium values (950 ppb and 898 ppb respectively) were associated with the highest nickel value (7,760 ppm; sample 10325; Bittenbender and others, 2003).

Mineral Development Potential: Medium

Conclusions: The East Rainy prospect represents one of the most consistently mineralized nickel-copper-PGE occurrences examined by the BLM in the Delta River study area. BLM sampling suggests elevated base and precious metal concentrations across relatively large extents. Additional mineralized rock may be present beyond the extent of BLM sampling, but overburden obscures potential extensions.

Little information is available from Nevada Star drilling at the East Rainy prospect; however, the scant details released to date suggest the strongly mineralized rock at the surface may be discontinuous at depth. This conclusion is based on a minor amount of drill information from the site (Freeman, 2004). Given the elevated base and precious metal concentrations, the relatively large extent of mineralized rock, and the lack of adequate drill information, the East Rainy site is likely to attract additional mineral exploration attention.

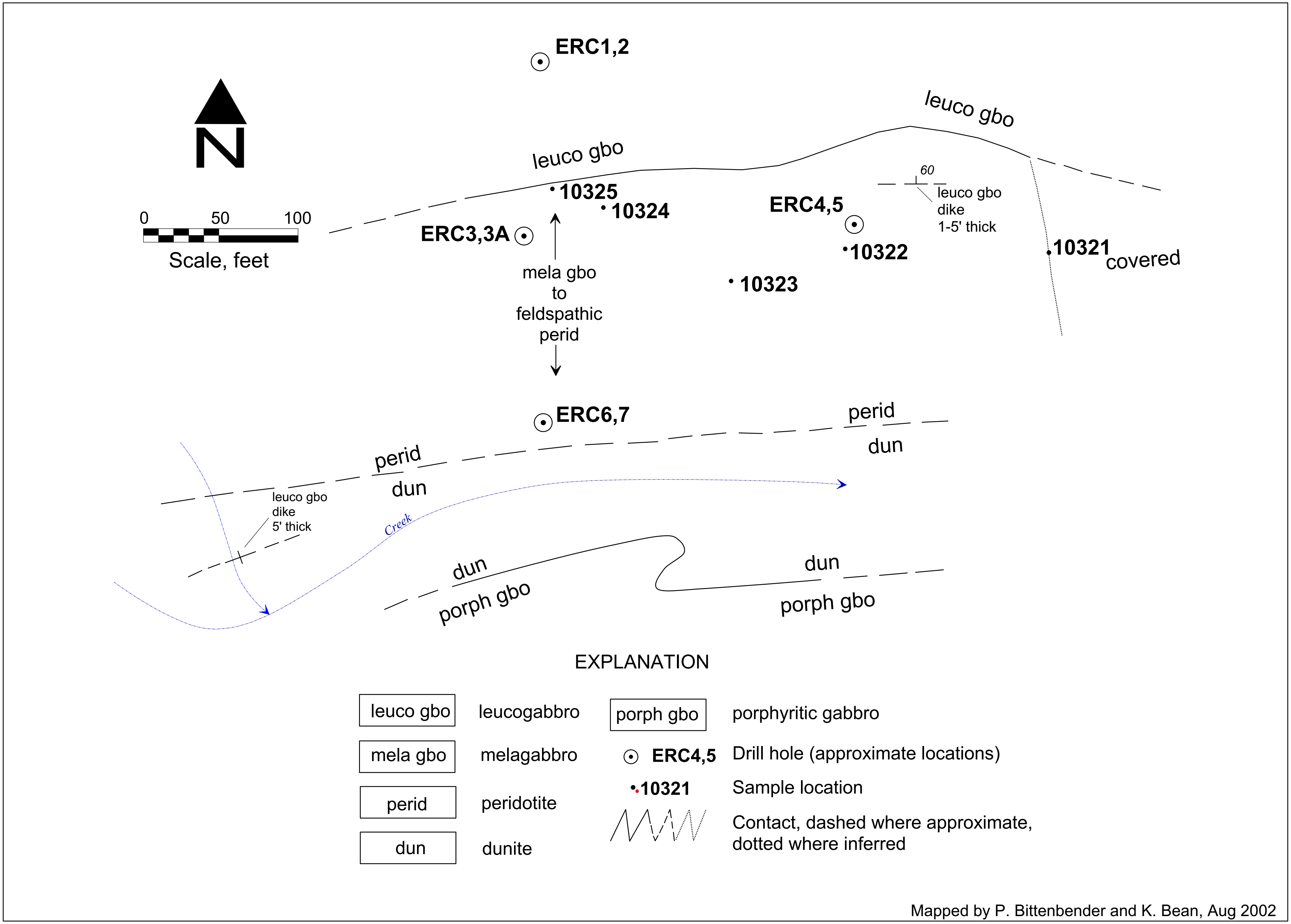


Figure 18. - Sketch map of the East Rainy prospect.

RAINY BRECCIA

Alternate Name(s):		Map No:	252
		MAS No:	0020680266
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 19, T18S, R10E
Meridian:	Fairbanks	Elevation:	5,750 feet
Latitude:	63.333632	Longitude:	-145.898317

Geographic: The Rainy Breccia occurrence is located on a ridge crest dividing the North Fork of Rainy Creek and upper Ann Creek. It is about two thirds of a mile north of the peak of 5,847 feet elevation marked on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access is by helicopter. Parts of the ridge on which the occurrence is located are flat and broad enough for a light helicopter to land.

History: The Rainy Breccia site came from Bill Ellis' pre-publication of mineral sites in the Mt. Hayes quadrangle for the USGS Alaska Resource Data File (ARDF) program. The site was apparently discovered during exploration of the mafic-ultramafic complexes in the area in the 1990's by one of the various mineral exploration companies active in the region (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Rainy Breccia / MH156 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Rainy Breccia occurrence is situated at the northern margin of the Rainy ultramafic complex (Bill Ellis, personal communication, 2002), which is one of several hypabyssal intrusions in the area thought to be comagmatic with the nearby Triassic Nikolai basalts (Nokleberg and others, 1992b). The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), up to 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro, which occur particularly at its margins (Bill Ellis, personal communication, 2002). The Rainy Breccia occurrence would be on the hanging wall margin of the complex if it is indeed northward dipping.

Ellis and others (2004) report a zone of breccia with mela-gabbronorite matrix and subrounded dunite clasts. They report up to 6 percent sulfides in the breccia that includes predominantly pyrrhotite with minor chalcopyrite and pentlandite. The zone of breccia reportedly strikes 295 degrees and dips 75 degrees to the north. It is 50 feet thick and several hundred feet long (Ellis and others, 2004).

BLM investigators found two occurrences of brecciated material in the general area indicated for the Rainy Breccia occurrence. A band of brecciated peridotite, about 5 to 10 feet thick, on the ridge crest north of the indicated Rainy Breccia site is bounded to the north by quartz-bearing gabbro or diorite and to the south by leucocratic gabbro.

At the approximate Rainy Breccia site, the BLM found what appears to be a magmatic breccia with a leucocratic gabbro matrix enclosing peridotite clasts. The peridotite is partially serpentinized.

Bureau Investigation: BLM investigators traversed ridge crests in the Rainy Breccia area looking for the occurrence. They found and sampled two occurrences of brecciated material, but both returned low base and precious metal values. At the ‘Rainy Breccia North’ location, the highest values from two samples were 135 ppm copper, 1,285 ppm nickel, 13.9 ppb platinum, and 16 ppb palladium (samples 10326-327). One of these samples was collected where an industry sample tag was located, suggesting this may have been the intended Rainy Breccia ARDF site. A sample of magmatic breccia from a site about 0.1 miles to the south, closer to the reported Rainy Breccia occurrence location, returned 5 ppm copper, 205 ppm nickel, 6.6 ppb platinum, and 3 ppb palladium (sample 10328).

Ellis and others (2004) report 1,500 ppm copper, 1,200 ppm nickel, 100 ppm cobalt, 25 ppb platinum, and 26 ppb palladium from a grab sample of sulfide-bearing breccia.

Mineral Development Potential: Low

Conclusions: BLM investigators found a breccia of leucogabbro with what appeared to be peridotite clasts near the reported Rainy Breccia occurrence location. The breccia examined by the BLM was only a few tens of feet thick. Whether this is the occurrence reported by Ellis and others (2004) is uncertain.

The base and precious metal values from the BLM’s samples are similar to those reported by Ellis and others (2004) – both are so low they might not be considered anomalous compared to much of the Rainy mafic-ultramafic complex itself. It is unlikely that these low grades would attract much future mineral exploration interest.

MARSHA

Alternate Name(s):		Map No:	257
		MAS No:	0020680269
Deposit Type:	Ultramafic	Commodities:	Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 21, T18S, R10E
Meridian:	Fairbanks	Elevation:	4,150 feet
Latitude:	63.34375	Longitude:	-145.84706

Geographic: The Marsha occurrence is located about 3.5 miles west of the Delta River on the south flank of the Alaska Range. It is in a small northern tributary, near the headwaters, to Ann Creek.

Access: Access to the Marsha occurrence is primarily by helicopter, followed by hiking a short distance from suitable landing sites down into the gully.

History: Since the late 1980's, various companies have held claims in the immediate vicinity of the Marsha occurrence. These companies include Teck Cominco American Inc. ("Joe" claims), Northeast Mining Company ("J & J" claims), MAN Resources Inc. ("ANN" claims), and Nevada Star Resource Corp. ("E", "SX", and "BAY" claims). The federal "ANN" mining claims held by MAN Resources Inc., just north of the Marsha, are the only claims in section 21 that are currently active (BLM claim records). Ultramafic rocks in the area were explored for their copper and nickel potential but more recently, exploration has shifted to platinum group metals.

ARDF Name / No.: Marsha/MH165 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Marsha occurrence lies south of the main Broxson Gulch thrust fault and between minor splays of the imbricated thrusts (Stout, 1976; Rose, 1966a). Host rocks for the Marsha are mostly serpentinized dunites and peridotites of Triassic age, which have been thrust over Permian to Pennsylvanian volcaniclastics of the Slana Spur Formation. The ultramafics have been interpreted as fault bounded remnants of the Wrangellia terrane (Nokleberg and others, 1992b).

Bureau Investigation: The BLM noted much evidence of faulting in the gully where the Marsha occurrence is found. Several slivers of dark ultramafic rocks outcrop in the gully and are juxtaposed against orange oxidized older volcaniclastics. Both the Triassic ultramafics and the Permian/Pennsylvanian volcaniclastics have been separately intruded by gabbro dikes, the relationships of which are not certain. At least three discontinuous lenses and nodules of oxidized, semi-massive to massive chalcopyrite and pyrrhotite/pentlandite (?) occur along the contact margins of a gabbro dike and serpentinized ultramafic rocks at the main Marsha occurrence. The gabbro dike is about 30 feet thick; the intrusive contact is exposed for about 100 feet; and the largest sulfide lens measures approximately 6 by 5 feet. Samples from sulfide lenses contained up to 6.25 percent copper (sample 10521), 1,540 ppm nickel (sample 10374), and 1,470 ppm zinc (sample 10521). Disseminated and small concentrations of sulfides can be found in and along smaller gabbro dikes up-gully, which separately intrude the volcanics (sample 10378) or ultramafics (sample 10376); however, mineral concentrations were typically low. Elevated chromium values, up to 2,840 ppm (sample 10524), were found in the serpentinite host rock.

Mineral Development Potential: Low

Conclusions: Development of the Marsha occurrence is very unlikely due to a lack of continuous mineralization over significant strike lengths or thicknesses.

Figure 19. Sampling a sulfide lens at the Marsha occurrence.

ANN CREEK

Alternate Name(s):	Bee Mining Company, Emerick West Delta Nickel	Map No:	266
		MAS No:	0020680164
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Ag, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TAS:	NW1/4 Sec: 23, T18S, R10E
Meridian:	Fairbanks	Elevation:	3,250 feet
Latitude:	63.34112	Longitude:	-145.77835

Geographic: The Ann Creek prospect extends over about 1 mile in a west-northwest-east-southeast direction, between elevations of about 2,600 to 3,850 feet on the west side of the Delta River near the mouth of Ann Creek. The exposures are on the north side of Ann Creek and extend westward from near the mouth along the north side of a small drainage that is the last tributary to Ann Creek from the north (Figure 20). The location given above is for a mineralized outcrop on the north side of the tributary drainage about half a mile northwest of its mouth.

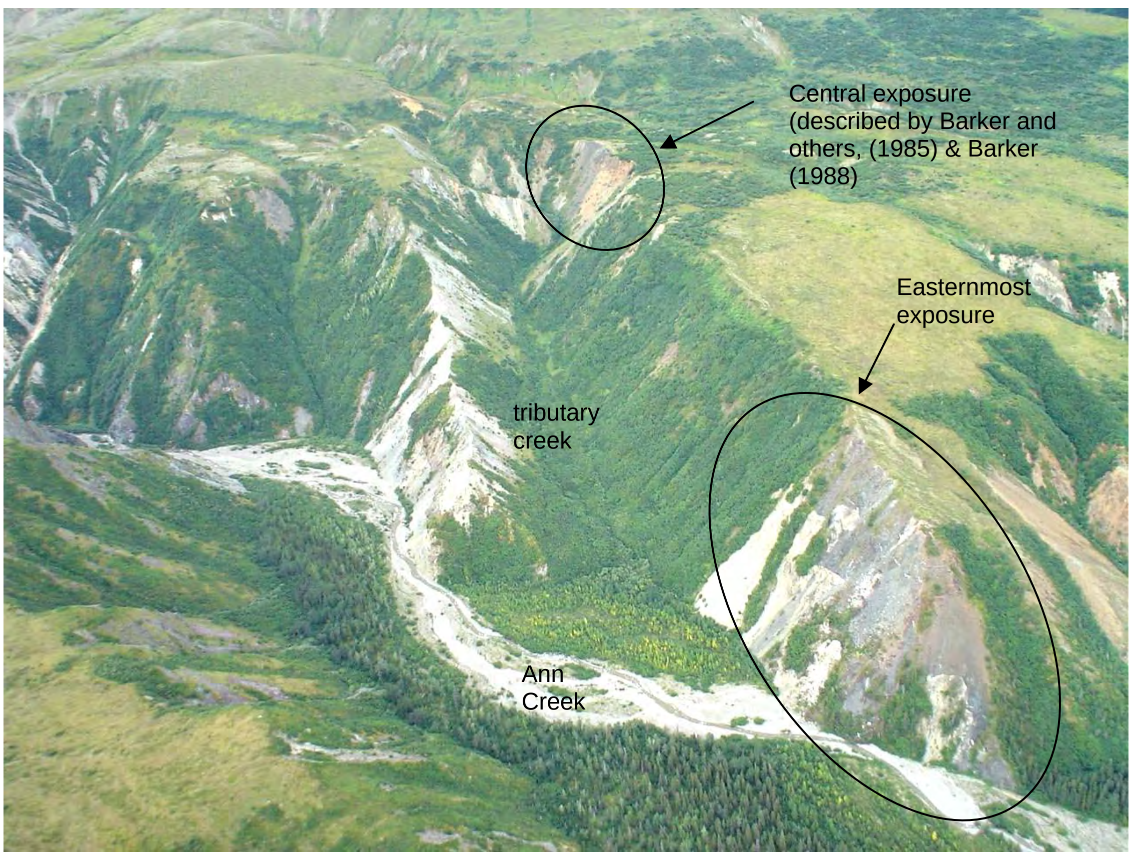


Figure 20. Aerial view to west-northwest of the Ann Creek prospect.

Access: Access to the Ann Creek prospect requires crossing the Delta River from the Alaska Highway and then proceeding on foot across the Delta River floodplain to the occurrence, a distance of about half a mile to the easternmost outcrops. BLM investigators accessed the property by helicopter.

History: The Ann Creek prospect was discovered and prospected by R. Emerick in the 1950's (Barker and others, 1985). The site was investigated and described by several authors including Saunders (1962), Hanson (1963), and Rose (1965). The site was examined by the U.S. Bureau of Mines during their PGE-related studies in the area between 1981 and 1984 (Barker and others, 1985; Barker, 1988).

In 1997 Falconbridge included the Ann Creek prospect in their examination of nickel-copper-PGE occurrences in the area (Wells, 1998). The prospect was covered by Falconbridge's airborne geophysical survey, which included total field magnetics and resistivity (Pritchard, 1997).

ARDF Name/Number: Ann Creek (Bee Mining) / MH166 **Alaska Kardex:** None

Production: None

Workings and Facilities: There are no discernible workings or facilities at the Ann Creek prospect. Previous investigators report trenching on various parts of the exposure, but the trenches were not discernible during the BLM's investigation in 2001 to 2004.

Geologic Setting: The Ann Creek prospect represents a mafic-ultramafic sill-form body that intrudes Permian to Pennsylvanian Slana Spur Formation volcanic and sedimentary rocks – the rocks to the north of the mineralized zone include more sedimentary units whereas the rocks to the south are more volcanic (Rose, 1965; Nokleberg and others, 1992b). Similar mafic-ultramafic rocks in the area are Triassic in age (Bittenbender and others, 2002[AMA abstract]) and are thought to be genetically related to the overlying Nikolai Greenstone, a thick basaltic flow sequence that marks the Triassic section of the Wrangellia terrane (Jones and others, 1977; Nokleberg and others, 1992b). Several mafic-ultramafic sill-form complexes are exposed in the southern Delta River study area that have been explored for nickel-copper-PGE deposits since the 1990's. The Ann Creek prospect lies between the Canwell Glacier mafic-ultramafic complex to the east and the Rainy Creek complex to the west.

The mineralized mafic-ultramafic rocks at the Ann Creek prospect are predominantly gabbronorite according to Barker (1988). Rose (1965) describes the mineralized rocks in general as mafic gabbro, but distinguishes variation across the exposures from dunite to peridotite to orthopyroxene-bearing gabbro. Both authors describe variable serpentinization and variable amounts of disseminated to massive sulfides (Rose, 1965; Barker, 1988).

The mineralized body is variably exposed across about 5,700 feet in a generally west-northwest-east-southeast direction (Saunders, 1962; Rose, 1965). The magnetic response on the BLM's airborne geophysical survey suggests a similar extent, however, the response also indicates three areas of stronger magnetic susceptibility within this extent (Burns and others, 2003). The location examined by Barker (1988) is the central part of the exposures. He describes a sill about 120 feet thick dipping about 70 degrees north and exposed for 250 feet. A magnetometer survey led Barker (1988) to suggest a further extension of 100 feet to the east that is covered by glacial overburden. He suggests the sill may extend further to the east, but that its magnetic response is diminished (Barker, 1988), either by deeper burial or by smaller dimensions. The sill is thought to be cut off by faulting to the west (Barker and others, 1985).

BLM investigators found a sill-form complex at the site examined by Barker (1988) and Barker and others (1985). The sill seems to be about 80 to 100 feet thick and thins toward the east where it is in likely fault contact with andesitic volcanics. The base of the north-dipping sill is more strongly serpentinized and includes pyroxenite. Above this is mainly gabbro, particularly mafic, olivine-bearing gabbronorite. The mafic gabbro is mineralized with sulfides varying up to about 10 percent. Sulfides include mainly pyrrhotite, chalcopyrite, and lesser pentlandite.

The BLM also examined the mafic-ultramafic exposure farther to the east-southeast, closer to Ann Creek. Here rocks varied from dunite to peridotite to gabbro. The peridotite is variably serpentinized and locally includes net-textured sulfides and massive sulfides about 1 foot thick adjacent to a shear. Locally, narrow gabbro dikes with up to 3 percent disseminated sulfides cut serpentinized peridotite.

The predominant sulfides are pyrrhotite, chalcopyrite, and pentlandite. Some authors also report pyrite at the prospect (Saunders, 1962; Barker and others, 1985). The sulfide content averages about 3 to 5 percent but varies across the sill-form body. The variation in sulfide content suggest a possible magmatic layering (Barker and others, 1985; Barker, 1988). A lens of massive sulfide reportedly occurs near the base of the sill-form body in the central part of the prospect. It is about 18 inches thick (Saunders, 1962; Barker, 1988). BLM investigators were unable to locate this sulfide lens during their investigation. However, a 1-foot-thick massive sulfide lens was found and sampled farther to the southeast from that reported above. This lens occurs in serpentinized peridotite adjacent to a small shear. Metallic minerals include pyrrhotite, pentlandite, hematite, and magnetite. Barker (1988) identified sperrylite, a platinum arsenide, at the Ann Creek prospect.

Bureau Investigation: Several different BLM investigators examined the Ann Creek prospect over five separate visits. During these examinations, 35 samples were collected from the area. Most of the samples are rock chips, but also include soil and pan concentrate samples.

The highest concentration of base and precious metals in the BLM samples came from the massive sulfide lens hosted in serpentinized peridotite (sample 11190). This sample, collected across the 1-foot-thick lens, returned 35 ppb gold, 483 ppb platinum, 825 ppb palladium, 7,890 ppm copper, 6.74 percent nickel, and 1,765 ppm cobalt. These represent the highest values for platinum, palladium, copper, nickel, and cobalt from the BLM's Ann Creek samples. Another sample returned a higher gold value of 136 ppb (sample 10092). This sample was a soil sample, but one dug close to bedrock, which included bedrock chips as well as soil. Rock chips in the sample suggest serpentinite with minor iron staining.

The BLM collected several measured samples across parts of the Ann Creek prospect exposures, particularly the mineralized sill described by Barker and others (1985) and Barker (1988), to get a sense of the average grades likely to be found at the prospect. Analytical results over an average sample length of about 40 feet returned about 30 ppb gold, 1 ppm silver, 100 ppm cobalt, 1,000 ppm copper, 1,800 ppm nickel, 105 ppb platinum, and 145 ppb palladium (samples 10607-611).

Mineral Development Potential: Low

Conclusions: The mineralized mafic-ultramafic rocks at the Ann Creek prospect extend for almost a mile, which may encourage further evaluation of the prospect. Higher grades of base and precious metals are evident, but they occur mainly in massive sulfide lenses that are rare at the prospect. The grades over broader exposures seem to be consistently anomalous. Given the broad extent and potential for higher grades, the prospect may attract further exploration in the future.

GLACIER LAKE

Alternate Name(s):	Forbes	Map No:	272
		MAS No:	0020680117
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE, Au, Co
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 16, T18S, R11E
Meridian:	Fairbanks	Elevation:	3,650 feet
Latitude:	63.352398	Longitude:	-145.65901

Geographic: The Glacier Lake prospect is located about a quarter of a mile southwest of the Canwell Glacier, near its terminus. It is situated on a north-northwest facing slope of a small draw that trends to the northwest (Figure 21).

Access: The Glacier Lake prospect is accessible off the Richardson Highway via a road to the east through what is locally called 'Red Rock Canyon.' The road meets the highway about 1 mile north of the mouth of Phelan Creek and winds through the canyon for about 2 miles. The road was extended in 2003 along the southwest side of the Canwell Glacier and passes within about a quarter mile of the Glacier Lake prospect. The prospect is accessible by foot from the road. Alternate access is by helicopter, with a landing site on the ridge top northeast of the prospect.

History: The Glacier Lake prospect was discovered by Robert Forbes, of the University of Alaska Fairbanks, during geologic mapping in the area in 1962 (Forbes, 1962). Following the discovery the site was prospected by limited trenching (Barker and others, 1985). This may have been done by the Newmont Mining Company which was evaluating the nearby Emerick prospect at the same time the Glacier Lake prospect was discovered (Forbes, 1962).

Over the years following discovery the Glacier Lake site was examined by various investigators. In 1963 the site was examined by M.A Kaufman of the Alaska Division of Mines and Minerals (Kaufman, 1963). The U.S. Bureau of Mines examined the Glacier Lake prospect as part of their strategic and critical minerals program between 1981 and 1984 (Barker, 1988).

W.J. Murray and D.H. Johnson acquired the Glacier Lake property sometime prior to 1997. In 1997 Murray and Johnson optioned the property to Falconbridge Exploration U.S., Inc. Falconbridge evaluated the prospect with geologic mapping, sampling, and airborne and ground geophysics (Wells, 1998).

Northridge Exploration of Fairbanks, Alaska, acquired the Glacier Lake prospect between 1997 and 2002. At least one of the primary figures of Northridge Exploration is D.H. Johnson, who formerly held claims on the property with W.J. Murray. The prospect was evaluated by Avalon Development Corp. for Pacific Northwest Capital Corp. in 2002 under an agreement with Northridge Exploration (Freeman, 2002).

ARDF Name / No.: Glacier Lake; Forbes / MH216 **Alaska Kardex:** None

Production: None

Figure 21. Glacier Lake prospect.
See also sketch map of prospect, Figure 22 (View approximately southwest.)

Workings and Facilities: Workings at the Glacier Lake prospect include a small pit and minor stripping.

Geologic Setting: The Glacier Lake prospect is part of the Canwell mafic-ultramafic complex, one of several similar complexes on the south flanks of the eastern Alaska Range (Bill Ellis, personal communication, 2002; Bittenbender and others, 2003). The Canwell complex includes the Canwell prospect, about 2.75 miles to the southeast of Glacier Lake and the Emerick prospect, about 1.25 miles to the west-northwest of Glacier Lake. Mafic and ultramafic rocks of the complex range from dunite to gabbronorite and host nickel-copper-PGE bearing sulfides as disseminations, patches, veinlets, and semi-massive to massive lenses. The complex is hosted in volcanic rocks of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b). It sits immediately south of the Denali fault and has been intruded by Cretaceous (Nokleberg and others, 1992b) quartz diorite to granodiorite.

The Glacier Lake prospect comprises sheared, serpentinized peridotite intruded by quartz diorite to granodiorite dikes. Mineralized rock includes disseminated to semi-massive sulfides in the peridotite and disseminated sulfides in the diorite. The mineralized zone is about 5 to 6 feet wide, extends for about 40 feet along a 050 degree strike and dips steeply to the southeast (Figure 22). Additional mineralized rock has been found scattered in talus and in small prospect pits, along strike and upslope, within a radius of about 120 feet of the main occurrence (Barker and others, 1985; Barker, 1988). Much of the area is covered by talus.

Following geologic mapping, sampling, and an airborne and ground geophysical survey, investigators from Falconbridge Exploration concluded that the mafic-ultramafic rocks at the Glacier Lake prospect represent a xenolith or raft within the intruding diorite. As such, they suggest that the potential for continuity of mineralized rock associated with the mafic-ultramafics is small (Wells, 1998).

Sulfides at the Glacier Lake prospect reported by Barker (1988) include pyrrhotite, pyrite, pentlandite, cubanite, chalcopyrite, and bornite. The mineralized zone contains up to 3 percent nickel and 2 percent copper. PGE average about 495 ppb palladium and 410 ppb platinum, along with up to 170 ppb iridium and up to about 100 ppb rhodium and ruthenium. Apparently no osmium was detected at the prospect (Barker, 1988).

Barker (1988) suggests the concentrated mineralization at the Glacier Lake prospect is mainly a result of the intrusion of quartz diorite into the serpentinized ultramafic rock. He implies an upgrading due to hydrothermal processes associated with the intrusion and hornfelsing of the host rock (Barker, 1988). An alternative process of mineralization would be a primary magmatic concentration of sulfides as suggested by Rose (1965), who thought the serpentinite at the prospect intruded the quartz diorite. The BLM's thin section examination of samples collected from the prospect indicates that many of the sulfides are of magmatic origin. These include pentlandite and pyrrhotite, which are found with exsolution textures relative to one another and in net textures in relation to the silicates. There also appears to have been some hydrothermal alteration as well. Pyrite has been introduced as a sulfide phase and magmatic plagioclase has been replaced by chlorite, epidote, and mica. The presence of anthophyllite in veinlets near the serpentinite-quartz diorite contact is another indicator of hydrothermal activity.

Bureau Investigation: BLM investigators collected three samples from the Glacier Lake prospect during a reconnaissance investigation of the area in 2001. The samples contained elevated concentrations of copper, nickel, cobalt, platinum, and palladium, with up to 1.87 percent copper (sample 1045), greater than 2 percent nickel (sample 1045), 591 ppm cobalt (sample 1045), 671 ppb platinum (sample 7000), and 1,381 ppb palladium (sample 7000).

BLM investigators returned to the prospect in 2004 and collected 11 additional measured and grab samples. Four samples were collected in sequence along the side of the prominent knob that exposes a diorite dike with massive to semi-massive mineralized rock in serpentinite and gabbro along its southern margin. Across a cumulative length of 24.5 feet the samples returned an average of 122 ppb gold, 450 ppb platinum, 658 ppb palladium, 560 ppm cobalt, 1.97 percent copper, and 2.59 percent nickel (samples 11314, 11380-382). These samples included

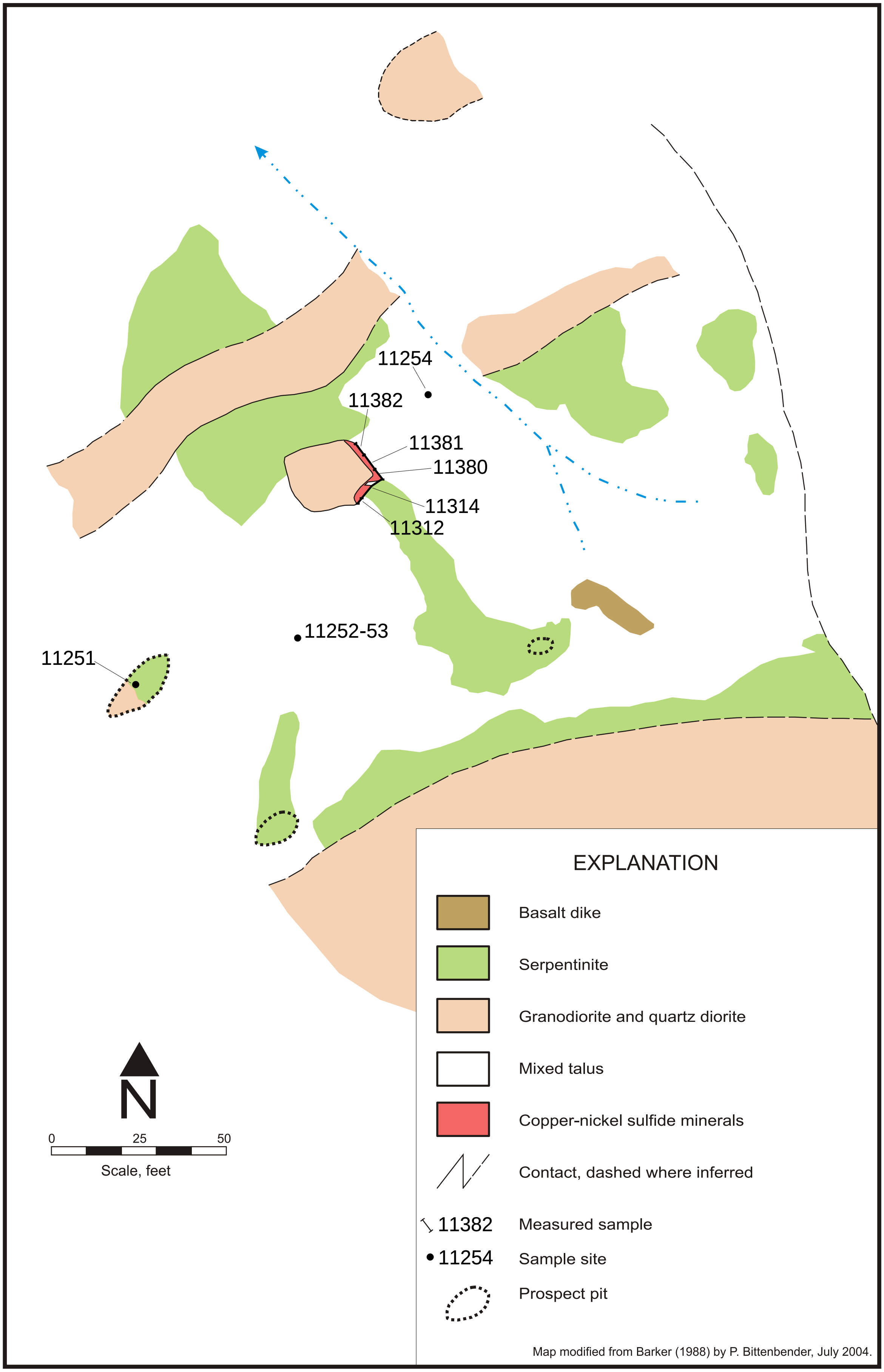


Figure 22. Sketch map of the Glacier Lake prospect.

the highest concentrations for any of the samples from the prospect in 2004 for gold (218 ppb, sample 11380), platinum (654 ppb, sample 11382), palladium (751 ppb, sample 11382), and copper (4.13 percent, sample 11380). The highest return for cobalt was 658 ppm (sample 11312), and for nickel was 2.98 percent (sample 11312).

Mineral Development Potential: Medium to Low

Conclusions: The high grades found at the Glacier Lake prospect suggest more exploratory work at the site may be justified. Further work might include a soil survey to determine the possible extent of mineralization beneath the extensive cover. Airborne magnetic data suggest the magnetic high at Glacier Lake, which presumably represents the serpentinite, extends to the east-southeast. Additional ground geophysical surveying may be able to show the continuity of the potentially mineralized body to the east-southeast.

Falconbridge is the only major mineral exploration company that is known to have evaluated the Glacier Lake prospect in detail. They mapped and sampled the prospect and did ground geophysics, but apparently did not drill at the site. Given the high grades and the regional airborne geophysical data that suggests a possible extension of magnetically susceptible rocks to the east-southeast, the prospect is likely to attract future mineral exploration interest.

EMERICK

Alternate Name(s):	Rainbow Rainbow Mtn	**Map No:**	277
		MAS No:	0020680052
Deposit Type:	Ultramafic	**Commodities:**	PGE, Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 17, T18S, R11E
Meridian:	Fairbanks	Elevation:	2,900 feet
Latitude:	63.35382	Longitude:	-145.70033

Geographic: The Emerick prospect is located about 1 mile east of the Richardson Highway just south of the Canwell Glacier along the west side of a valley known locally as 'Red Rock Canyon.'

Access: An access road at approximately Milepost 213 of the Richardson Highway provides good two-wheel-drive vehicle access to within 100 yards of the prospect. The road accesses a rock quarry, winds through a narrow canyon known locally as 'Red Rock Canyon,' and then terminates in a glacial-fill valley adjacent to the Canwell Glacier.

History: The early history of the Emerick prospect included claim staking, lease options, and examinations by various government agencies. The Red Rock Mining Co. (Rollie and Doris Emerick) staked claims covering the area in 1955. The Emerick prospect was examined by Robert H. Saunders, mining engineer for the Territory of Alaska Department of Mines in 1955 to 1956. In 1958, Charles Herbert leased the prospect from Rollie Emerick. He sampled the prospect and submitted samples to the U.S. Bureau of Mines for nickel recovery analysis and requested the Bureau of Mines conduct a mineral investigation. U.S. Bureau of Mines engineers Bruce I. Thomas and C.W. Merrill, Jr. examined the Emerick prospect in 1959. In 1961, additional sampling was completed by Mr. Herbert, the Alaska State Division of Mines (Robert H. Saunders), and the U.S. Bureau of Mines (Tom L. Pittman completed analyses in 1962)

In 1962, the claims were optioned to Newmont Exploration Limited. Newmont excavated a 1,600-foot road cut along the base of the hill on the west side of the valley, as well as just below the crest of the hill.

In 1971 James C. Barker (U.S. Bureau of Mines) re-examined the Emerick prospect. In 1981 the U.S. Bureau of Mines took 50- and 200- pound bulk samples from various parts of the prospect. These samples were analyzed for PGE (Barker and others, 1985).

Cominco Alaska re-staked the Emerick area with the "Rainbow claims" in the mid-1980's, mapped the Rainbow claims in 1987, and excavated long trenches with a bulldozer in 1988. The trenches were then mapped and sampled (Hinderman, 1989).

The Talnakh claims were staked by William J. Murray and David H. Johnson in 1990. In 1997, geologic mapping, airborne geophysics, ground geophysics (magnetic and TEM), and one diamond drill hole were completed by Falconbridge Exploration U.S., Inc. under an agreement with Murray and Johnson.

Avalon Development Corporation evaluated the prospect for Dave Johnson between 2000 and 2002. Additional trenching and re-excavation of existing trenches was completed in 2003 by Northridge Exploration (Dave Johnson, personal communication 2004).

Previous investigators have referred to the “Emerick” prospect as a cluster of small massive sulfide veins near the south end of the exposure, and the gabbronorite mineralization at the north end of the exposure as the “Rainbow” or “Rainbow Mountain” prospect (Hinderman, 1989; Barker and others, 1985; Wells, 1998). In this report, Emerick refers to mineralization found throughout the approximately 1,200-foot exposure of the ultramafic body. The reference to “Rainbow” in Table 14 refers to the gabbronorite mineralization at the north end of the exposure.

ARDF Name / No: Emerick / MH209 **Alaska Kardex:** 068-14, 80, 81

Production: None.

Workings and Facilities: Several thousand feet of road cut/trenching (Figure 23) and a single diamond drill hole exist on the property. Original trenching was completed in the early 1960’s as part of an exploration effort by Newmont. Cominco retrenched the prospect in the late 1980’s as part of their exploration effort. Falconbridge drilled a single diamond drill hole into the ultramafic body in 1997 and cut several miles of brush lines for TEM ground geophysics. The diamond drill hole (FB97-01) was drilled at an azimuth of 25 degrees, an inclination of -50 degrees, and a depth of 350.52 meters; the hole terminated in serpentinite. Falconbridge also flew 1,122 line kilometers of airborne geophysics over two blocks (Wells, 1998). Northridge Exploration used a bulldozer to re-expose outcrops along the trench/road cut in 2003.

Geologic Setting: Lying just south of the Denali fault, the Emerick prospect occurs in a small fault-bounded sliver of serpentinized peridotite and dunite of apparent Triassic age (Nokleberg and others, 1992b). The ultramafic body here is associated with a 190-kilometer-long belt of mafic to ultramafic rocks of the Wrangellia terrane that extend along the east-central Alaska Range (Foley, 1992). This sliver of ultramafic rocks is fault bounded to the north by Jurassic schists of the Maclaren terrane and to the south by Pennsylvanian to Permian volcaniclastics rocks of the Slana Spur Formation (Nokleberg and others, 1992b).

The Emerick prospect consists of several thin massive sulfide lenses exposed in several outcrops along the 1,200-foot exposure of ultramafics, as well as at least one mineralized block of gabbronorite sheared into the surrounding serpentinite near the northern contact of the ultramafics. Wells (1998) suggests that this body is not a dike as previously reported (Barker and others, 1985; Foley and others, 1989; Foley, 1992), but instead is a fault-bounded block within the ultramafics. There is no geophysical evidence for this block extending laterally or at depth (Wells, 1998). Along the southern contact of the ultramafic body, Wells (1998) reports inch-scale massive sulfide-filled fractures. Fractures are oriented approximately vertically and

Figure 23. Sketch map of the Emerick prospect.

parallel to shearing in the ultramafics. No sizeable conductors were observed in the area (Wells, 1998).

Bureau Investigation: The BLM found this site much as described by previous workers, although active slumping and vegetation covered much of the exposure. Twenty-nine rock chip samples were collected at outcrop exposures along the length of the ultramafic body. Samples of massive sulfide were collected from thin (2 to 8 inches), northwest-trending, steeply dipping shears near the south end of the ultramafic body. Hand samples indicate sulfides are primarily pyrrhotite and/or pentlandite with minor chalcopyrite and pyrite.

Samples yielded values as high as 6.31 percent nickel (sample 10303), 2.5 percent copper (sample 6964), 1.175 ppm platinum (sample 10132), and 2.28 ppm palladium (sample 10303). The gabbronorite "dike," also referred to as the "Rainbow dike," near the north end of the ultramafic body was sampled as well. Results from the gabbro indicate concentrations as high as 8,050 ppm copper (sample 10132), 1.38 percent nickel (sample 11372), 1.175 ppm platinum, and 1.33 ppm palladium (sample 10132). Thin margins of the dike contain chromium in excess of 2 percent. The BLM concurs with previous geologists' conclusions (Hinderman, 1989; Wells, 1998) that the gabbronorite has been emplaced in the serpentinite tectonically rather than by intrusion, and therefore it is not a true dike. Sample results are consistent with those of previous workers (See Table 13 below).

There are higher chromium levels at the Emerick prospect than anywhere else in the district. The highest chromium value of all samples collected from the Delta River study area in 2001 and 2002 came from the Emerick, where the BLM initially referred to it as massive chromite. Sample 6963 was the highest at 2,768 ppm chromium. Also, the drill core samples from Falconbridge's hole (Wells, 1998) consistently show chromium greater than 2,000 ppm.

Note: BLM <u>total</u> digestion rock samples had many results greater than 1,000 ppm for chromium; about 25 out of 80 samples. Falconbridge may have also used total digestion.

Mineral Development Potential: Low

Conclusions: The Emerick prospect has been closely studied by several major companies over the years, but the results were not encouraging enough for any to retain an interest in the property; however, there is current exploration for PGE minerals in similar rocks in the region, and given that this faulted sliver may have come from a nearby body, it may be worthy of further scrutiny. Also, recent excavations by the current claim owner have exposed new outcrops, some containing mineralization that may warrant additional investigation.

Table 14. Select analytical results from current and previous investigations of the Emerick prospect.

Prospect	Company	Sample no.	Pt (ppb)	Pd (ppb)	Au (ppb)	Ag (ppm)	Cu (ppm)	Ni (ppm)	Cr (ppm)
"Rainbow"	Cominco	205060	1100	1500	360	4.9			
"Rainbow"	Cominco	205203	760	880	230	4.4			
"Rainbow"	Cominco	206386	<50	<20	<20	<0.4	124	1710	
"Rainbow"	Cominco	400648	880	950	250				
"Rainbow"	Cominco	400649	1000	1100	280				
"Rainbow"	Barker and others, 1985	7 sample avg.	1039	998					
"Rainbow"	BLM	6962	895	987	271	3	6310	10291	536
"Rainbow"	BLM	6963	443	298	80	3.7	2547	5530	>20000
"Rainbow"	BLM	10131	5	8	1	0.3	149	957	2740
"Rainbow"	BLM	11372	1070	1205	314	4.9	8200	10390	180
"Rainbow"	BLM	11373	848	1045	280	4.2	8930	10600	204
Emerick	Cominco	400683	100	80			829	2960	
Emerick	Falconbridge	WB01515	478	1834	51	1.6	3862	>20000	
Emerick	Barker and others, 1985	5 sample avg.	460	850					
Emerick	BLM	6964	459	1038	53	2.9	22500	>20000	670
Emerick	BLM	10138	63	71	3	.3	201	2130	665
Emerick	BLM	10139	827	2090	269	2.9	8560	46700	248
Emerick	BLM	10140	294	674	62	1.4	3610	13100	696
Emerick	BLM	10303	462	2280	133	3.9	5730	63100	88
Emerick	BLM	11374	300	266	40	1	2650	5510	843

Table 14 note: BLM samples were analyzed for gold, platinum, and palladium by fire-assay with ICP finish. Silver, copper, nickel, and chromium were analyzed by ICP-AES with a partial digestion (aqua-regia) preparation. For a more complete description of these analytical techniques and associated detection limits see Appendix B. Barker and others (1985) used fire assay with an atomic absorption finish for their analyses. The analytical techniques used by Cominco and Falconbridge are unknown.

UPPER GLACIER

Alternate Name(s):		Map No:	298
		MAS No:	0020680304
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 22, T18S, R11E
Meridian:	Fairbanks	Elevation:	4,250 feet
Latitude:	63.33881	Longitude:	-145.61854

Geographic: The Upper Glacier occurrence sits on the northeast facing slope of a mountain southwest of the Canwell Glacier. It is about 2 miles north-northeast of Rainbow Mountain as marked on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access to the Upper Glacier occurrence is possible by vehicle and then by foot. A dirt road leads from the Richardson Highway, at approximately Mile 213.5, through what is locally known as Red Rock Canyon to the southern lateral moraine of the Canwell Glacier. From here a four-wheel-drive road or trail follows the southern lateral moraine to within about a quarter mile of the Upper Glacier occurrence. The prospect is accessible by walking up the northeast-facing slope of the mountain above the new road. Alternative access is by helicopter, with a landing site on a bench a few hundred feet below the occurrence

History: The Upper Glacier occurrence was discovered in 1995 by mineral explorers working for American Copper and Nickel Company (ACNC) and/or Fort Knox Gold Resources, Inc. (Ellis and others, 2004). The mineralized nature of the Canwell complex, which includes the Upper Glacier occurrence, was noted as early as 1963 by Hanson (1963) and was subsequently examined or reported on by several investigators before the discovery of the Upper Glacier occurrence (e.g., Barker, 1988; Foley and others, 1989; Nokleberg and others, 1990).

ACNC explored the Upper Glacier occurrence area with an airborne geophysical survey in 1997, but the data were not released to the public. The BLM purchased the airborne geophysical data from Fort Knox, who had acquired it from ACNC, and included it in a regional airborne geophysical data package released to the public in 2003 (Burns and others, 2003). The Upper Glacier area was also included in a Max-Min electromagnetic survey in 2004, conducted by Nevada Star Resources Corp. and was drilled in 2003(?) and 2004 (Alan Day, personal communication, 2004). Nevada Star currently (2006) holds active claims covering the prospect.

ARDF Name / No.: Upper Glacier / MH217 **Alaska Kardex:** None

Production: None **Workings and Facilities:** None

Geologic Setting: The Upper Glacier occurrence is included within the Canwell mafic-ultramafic complex. The Canwell complex is a Late Triassic sill-form complex that extends in a west-northwest-east-southeast direction for about 3.5 miles. It dips to the south at about 40 degrees, and in the Upper Glacier area, is about 2,000 to 3,000 feet thick (Bill Ellis, personal communication, 2002). The complex has been described as having a dunite core that grades outward into wehrlite, feldspathic peridotite, and melagabbro (Ellis and others, 2004). The complex has subsequently been intruded by a Cretaceous quartz diorite to granodiorite pluton (Barker, 1988; Nokleberg and others, 1992b; Hanson, 1963). The Canwell complex is one of several mafic-ultramafic intrusive complexes in the area interpreted to be comagmatic with overlying Nikolai basalts of the Wrangellia terrane (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002).

The rocks of the Canwell Complex in the area of the Upper Glacier occurrence comprise predominantly feldspathic peridotite along with leucocratic gabbro, peridotite, minor serpentinized dunite, serpentinite, and minor gabbro dikes. These rocks are variably mineralized with disseminated sulfides, mainly pyrrhotite with minor chalcopyrite and possibly pentlandite. Magnetite and chrysotile veining is common in the serpentinized rocks.

The mineralized rocks crop out for about 200 feet in a north-northwest direction and are about 75 feet thick. The rocks in the mineralized section are not equally mineralized however and no systematic orientation to the various rock types or the extent of mineralization in the rocks was determined. The most mineralized rock types detected are the feldspathic peridotite and peridotite with up to about 3 percent disseminated sulfides. The mineralized rocks are surrounded by dunite of the Canwell Complex, which is evident by ubiquitous rubble and possible subcrop.

Bureau Investigation: BLM investigators collected five samples from the Upper Glacier occurrence. A spaced chip sample across 21 feet of mineralized rock at the occurrence returned 35 ppb gold, 102 ppb platinum, 132 ppb palladium, 798 ppm copper, and 3,140 ppm nickel (sample 10708). The highest grade sample came from an outcrop of peridotite with about 3 to 5 percent, medium- to coarse-grained, disseminated to almost net-textured, sulfides. The concentrations from this sample were 144 ppb gold, 259 ppb platinum, 280 ppb palladium, 2,330 ppm copper, and 3,600 ppm nickel (sample 10086). These were the highest returns for each of these metals from the Upper Glacier occurrence.

Mineral Development Potential: Low

Conclusions: The extent of the mineralized rock at Upper Glacier is unknown, as the extensions examined by the BLM are covered by loose dunite cobbles and boulders. If the dunite is subcrop and not float, then the extent of the mineralized rock are as given above (approximately 200 feet along strike by 75 feet thick).

The analytical returns from the Upper Glacier occurrence indicate anomalous platinum and palladium concentrations over randomly selected parts of the mineralized outcrop. These concentrations are still too low to encourage development of the prospect. Even the highest returns are below the threshold likely to spur development.

ODIE

Alternate Name(s):		Map No:	299
		MAS No:	0020680303
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 22, T18S, R11E
Meridian:	Fairbanks	Elevation:	4,200 feet
Latitude:	63.33569	Longitude:	-145.61436

Geographic: The Odie prospect sits on the east-northeast facing slope of a mountain southwest of the Canwell Glacier. It is about 2 miles north-northeast of Rainbow Mountain as marked on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map. (Note: Ellis and others (2004) mark the Odie prospect about 0.2 miles to the south of the site drilled by Nevada Star Resources Corp. and from where anomalous samples were collected by the BLM in 2002 and 2004).

Access: Access to the Odie prospect is possible by vehicle and then by foot. A dirt road leads from the Richardson Highway, at approximately Mile 213.5, through what is locally known as Red Rock Canyon to the southern lateral moraine of the Canwell Glacier. From here a four-wheel-drive road or trail, follows the southern lateral moraine to within about a quarter of a mile of the Odie prospect. The prospect is accessible by walking up the east-northeast-facing slope of the mountain above the new road. Alternative access is possible by helicopter to a helipad constructed above the prospect.

History: The Odie prospect was discovered in 1995 by personnel working for American Copper and Nickel Company (ACNC) and/or Fort Knox Gold Resources, Inc. (Ellis and others, 2004). The mineralized nature of the Canwell complex, which includes the Odie prospect, was noted as early as 1963 by Hanson (1963) and was subsequently examined or reported on by several investigators before the discovery of the Odie prospect (e.g., Barker, 1988; Foley and others, 1989; Nokleberg and others, 1990).

ACNC explored the Odie prospect area with an airborne geophysical survey in 1997, but the data were not released to the public. The BLM purchased the airborne geophysical data from Fort Knox Gold Resources Inc., who had acquired it from ACNC, and included it in a regional airborne geophysical data package released to the public in 2003 (Burns and others, 2003). The Odie area was also included in a Max-Min electromagnetic survey in 2004, conducted by Nevada Star Resources Corp. (Alan Day, personal communication, 2004), which currently (2006) holds active claims covering the prospect. Nevada Star Resources drilled the prospect in 2002.

ARDF Name / No.: Odie / MH218 **Alaska Kardex:** None

Production: None

Workings and Facilities: There are a few small excavations or trenches at the Odie prospect. The site has been drilled.

Geologic Setting: The Odie prospect is included within the Canwell mafic-ultramafic complex. The Canwell complex is a Late Triassic sill-form complex that extends in a west-northwest-east-southeast direction for about 3.5 miles. It dips to the south at about 40 degrees, and in the Odie area, is about 2,000 to 3,000 feet thick (Bill Ellis, personal communication, 2002). The complex has been described as having a dunite core that grades outward into wehrlite, feldspathic peridotite, and melagabbro (Ellis and others, 2004). The complex has subsequently been intruded by a Cretaceous quartz diorite to granodiorite pluton (Barker, 1988; Nokleberg and others, 1992b; Hanson, 1963). The Canwell complex is one of several mafic-ultramafic intrusive complexes in the area interpreted to be comagmatic with overlying Nikolai basalts of the Wrangellia terrane (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002).

In the area of the Odie prospect, rocks of the Canwell complex are mostly dunite. The dunite is only slightly serpentinized. It has been intruded by a gabbro dike at the prospect. The dike is about 15 feet thick, trends northwest-southeast, and dips about 65 degrees southwest. It is exposed for about 100 feet on the slope of the mountain. Down slope from the prospect the dike is covered by debris in a small gully and may be cut off by a fault. The upper end pinches out, is cut off, or is covered; the gabbro is not exposed farther up the hill.

The dike is variably serpentinized. Parts of the dike are cut by discontinuous bands of serpentinite up to 1 foot across. Magnetite is common.

Medium-grained, anhedral crystals or clots of sulfide are found almost throughout the dike. The sulfides are mainly pyrrhotite, but chalcopyrite and presumably pentlandite, are also present. Sulfides are concentrated in parts of the dike as well. In these concentrations patches of gossan are present that show copper staining. Within the patches are knots of magnetite and sulfides. Samples from the concentrations of sulfides in the gossan patches return higher base and precious metal values than from the dike as a whole.

Bureau Investigation: BLM investigators collected five samples from the Odie prospect and vicinity. A spaced chip sample across 16 feet of the dike returned 14 ppb gold, 47 ppb platinum, 49 ppb palladium, 124 ppm cobalt, 262 ppm copper, and 1,725 ppm nickel (sample 10975). A select sample from one of the gossanous zones with a concentration of sulfides adjacent to the hanging wall of the dike returned 17 ppb gold, 2,840 ppb platinum, 1,500 ppb palladium, 209 ppm cobalt, 2,610 ppm copper, and 9,500 ppm nickel (sample 10976). Another sample from iron-stained, gossanous, serpentinized rocks in the immediate footwall of the dike contained 2,120 ppb gold, 2,780 ppb platinum, 5,250 ppb palladium, 338 ppm cobalt, 1.70 percent copper, and 1.70 percent nickel (sample 10284). Two other samples collected from the site and from approximately 200 feet below the site returned lower, but still anomalous values for PGE, copper, and nickel (samples 10305, 10460).

The public release of drill results from Nevada Star drilling at the Odie prospect on December 3, 2002 reported an intercept of 12 feet that returned 0.56 percent nickel, 0.15 percent copper, 106 ppb platinum, and 136 ppb palladium. This intercept came from about 400 feet down-hole (Nevada Star News Release, December 3, 2002).

Mineral Development Potential: Low

Conclusions: Samples from the Odie prospect show high concentrations of base and precious metals, including PGE. The elevated metal concentrations may be associated with the intrusion of the gabbro dike, which presumably scavenged metals from the surrounding ultramafic rock. As such, the elevated metal values are limited in extent. The drill hole intercepts reported by Nevada Star also suggest a lack of widespread mineralized rock.

CANWELL GLACIER

Alternate Name(s):	Upper Canwell, Lower Canwell, West Ridge	Map No:	300
		MAS No:	0020680165
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 26, T18S, R11E
Meridian:	Fairbanks	Elevation:	4,700 feet
Latitude:	63.32886	Longitude:	-145.58893

Geographic: The Canwell Glacier prospect is located on the southwest side of Canwell Glacier, about 5.5 miles up the glacier from the Richardson Highway. It is situated approximately on the crest of a northwest-trending ridge, 1.8 miles northeast of Rainbow Mountain. The site described here includes various smaller prospects and/or occurrences in the immediate area of the Canwell Glacier prospect.

Access: The Canwell Glacier prospect may be accessed by road from the Richardson Highway. A dirt road leads from the Richardson Highway, at approximately Mile 213.5, through what is locally known as Red Rock Canyon to the southern lateral moraine of the Canwell Glacier. From here, a new four-wheel-drive road or trail follows the southern lateral moraine to within about half a mile of the Canwell Glacier prospect, then the road crosses a north-facing valley and ascends the southwest side of the northwest-trending ridge that host the prospect. Alternative access is possible by helicopter.

History: The first report of mineralized rock in the Canwell prospect area is by Hanson (1963) who mapped the mafic-ultramafic complex there as questioned diorite-gabbro ("diorite-gabbro?"). He notes the diorite-gabbro? is mineralized with pyrrhotite in several places (Hanson, 1963).

The U.S. Bureau of Mines studied PGE occurrences in the Rainbow Mountain area between 1981 and 1984, but it is unclear as to whether they examined the Canwell prospect. It may have been during this time that J. Barker, formerly with the U.S. Bureau of Mines, mapped and sampled the prospect. In his 1988 report he includes a map and sample analyses from what he calls the Canwell Glacier prospect (Barker, 1988).

The modern mineral exploration activity at the Canwell prospect began in the mid 1990's. Active mineral claims have covered the property since that time. The modern activity began with the discovery of "…significant copper-nickel-PGE mineralization…" at the prospect by American Copper and Nickel Co. (ACNC) and/or Fort Knox Gold Resources (Freeman, 2004, p. 19). In 1995 the prospect was covered by an ACNC airborne geophysical survey that collected magnetic and resistivity data (Ellis, 2002b). In 1997 ACNC/Fort Knox conducted a VLF ground geophysical survey to define drill targets. Two holes were drilled by this group in 1997. ACNC/Fort Knox continued exploration in 1998 with more ground geophysical surveys and the drilling of five holes (Ellis, 2002b; Freeman, 2004).

Subsequent exploration activity at the Canwell prospect has been by Nevada Star Resources Corp., who began by obtaining an option on the property from Fort Knox in 2001 (Freeman, 2004). By 2002 Fort Knox had abandoned their claims on the property and it was staked by Nevada Star (Alan Day, personal communication, 2005). In 2002 Nevada Star drilled five holes on the property (Ellis, 2002a). In 2003 the company constructed a crude road to the property from the Red Rock Canyon road and brought in a backhoe for trenching. Nevada Star dug six backhoe trenches across 1,200 feet in 2003 and collected gridded soil samples (Freeman, 2004). Prior to reverse circulation drilling of 2,275 feet in six holes at the property in 2004, the company collected additional ground geophysical data and soil samples to help define drill targets (Nevada Star news release of August 23, 2004 and March 17, 2005).

ARDF Name / No.: Canwell Ridge, Upper Canwell, Lower Canwell / MH226-MH228
Alaska Kardex: None

Production: None

Workings and Facilities: There has been some trenching and diamond core drilling done at the Canwell Glacier prospect (see History section, above). A rough road has been built to the prospect that connects to the Richardson Highway, about half a mile downstream from the mouth of Phelan Creek.

Geologic Setting: The Canwell Glacier prospect is part of the Canwell mafic-ultramafic complex, which in turn is one of several similar sill-form complexes that are exposed in the eastern Alaska Range (Foley, 1992; Foley and others, 1997). The complexes are Triassic in age (Larry Hulbert, personal communication, 2002; Bittenbender and others, 2003; 2004) and are thought to be comagmatic with the Nikolai basalts of the eastern Wrangellia Terrane (Nokleberg and others, 1985; 1992b). The Canwell complex is the easternmost of the Triassic complexes in the district that crop out westward at least as far as the Maclaren Glacier, about 30 miles to the west.

The Canwell complex extends in a west-northwest-east-southeast direction for about 3.5 miles. It dips to the south at about 40 degrees and in the Canwell Glacier prospect area is about 1,000 feet thick (Bill Ellis, personal communication, 2002). The complex has been described as having a dunite core that grades outward into wehrlite, feldspathic peridotite, and melagabbro (Ellis and others, 2004). The complex has subsequently been intruded by a Cretaceous quartz diorite to granodiorite pluton (Barker, 1988; Nokleberg and others, 1992b; Hanson, 1963).

Mineralized rock at the Canwell Glacier prospect comprises disseminated to massive pyrrhotite, along with chalcopyrite and pentlandite hosted primarily in mafic gabbro near the base of the Canwell complex sill (Ellis and others, 2004). In places the mineralization seems to be upgraded by later gabbro dikes that cut the sill (Bill Ellis, personal communication, 2002). The most spectacular concentration comes from a layer of massive sulfide about a foot thick that strikes to the northwest and dips approximately parallel to the complex sill. This massive sulfide layer has been traced discontinuously for approximately 300 feet (Alan Day, personal communication, 2003).

Significant drill results from the Canwell Glacier prospect are presented by Freeman (2004). From drilling by ACNC in 1997 and 1998 the most significant intercept was 17 feet (from 193 to 210 feet) of 755 ppb platinum, 863 ppb palladium, 0.78 percent nickel, and 0.55 percent copper. This intercept was described as melagabbro with 3 to 5 percent sulfides. Four other mineralized intercepts are reported in a total of three holes. Typical intercepts were around 250 to 300 feet down hole, across 3 to 18 feet, and returned from 130 to 281 ppb platinum, 87 to 316 ppb palladium, 287 to 3,300 ppm copper, and 1,932 to 3,700 ppm nickel. Intercepts are described generally as melagabbro, sheared in places, with varying amounts of sulfides and as sheared serpentinite (Freeman, 2004, Table 2).

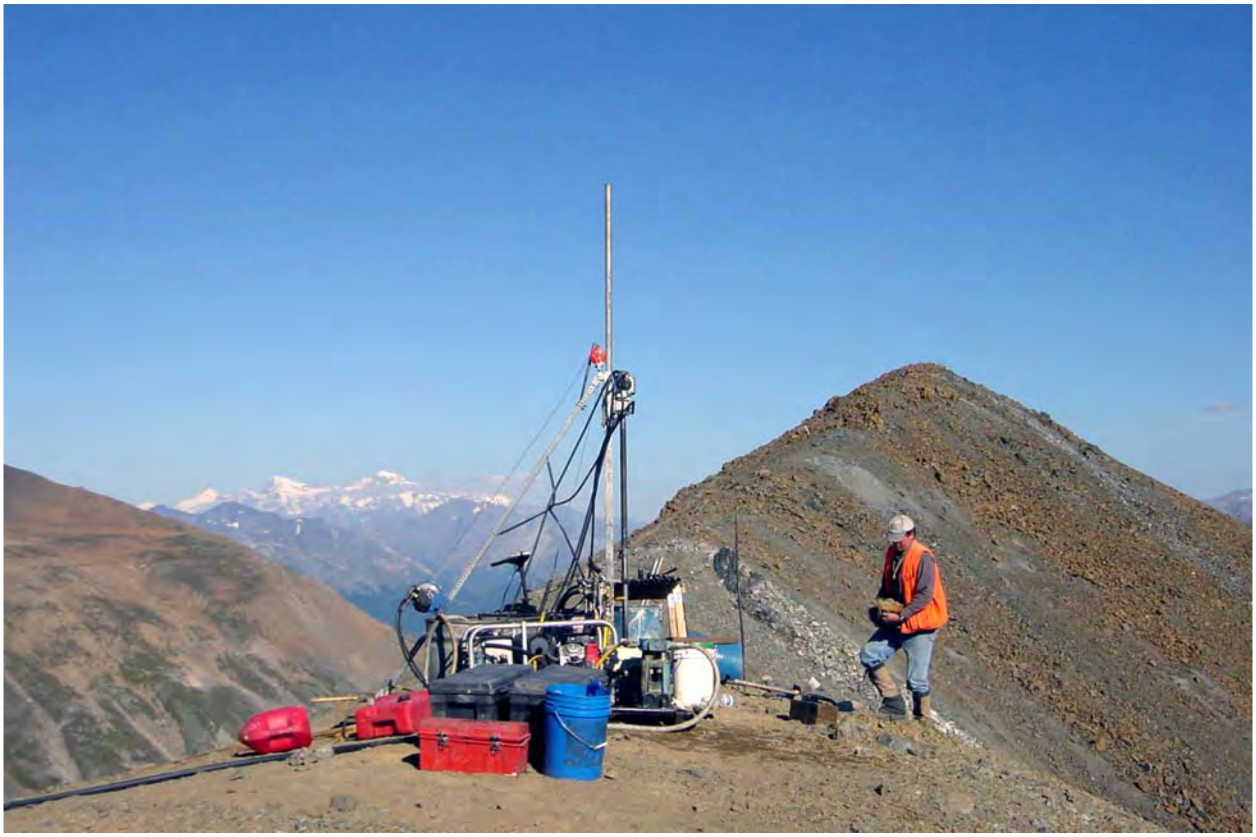


Figure 24. Nevada Star drilling at the Canwell prospect, 2002.

Drilling by Nevada Star in 2002 at the Canwell Glacier prospect suffered from broken ground, difficult clay layers, and a small drill, all of which hampered core recovery (Figure 24). Intercepts recorded from two holes reveal shallow mineralization, from 5 to 19 feet. An intercept across 12 feet with only 20 percent average core recovery returned 412 ppb platinum, 407 ppb palladium, 5,000 ppm copper, and 5,600 ppm nickel (Hole no. 02-01). A second intercept across 14 feet with about 35 percent core recovery returned 628 ppb platinum, 664 ppb palladium, 3,300 ppm copper, and 6,300 ppm nickel (Hole no. 02-03; Ellis, 2002a, Table 2).

Six diamond drill holes by Nevada Star in 2004 returned core with anomalous base and precious metals from the Canwell area. Copper values ranged from 8 to 1,795 ppm, whereas nickel values ranged from 9 to 6,220 ppm. Platinum and palladium values ranged from less than detection limits to highs of 174 and 128 ppb, respectively (Nevada Star news release, October 28, 2004). Intercepts included 550 feet of 0.02 percent copper, 0.27 percent nickel, 0.01 percent cobalt, and 0.15 percent PGE plus gold in altered dunite (ddh CAN0405). Other intercepts reported only nickel values. These include 0.26 percent over 90 feet (CAN0401), 0.20 percent over 120 feet (CAN0403), 0.21 percent over 335 feet (CAN0404), and 0.30 percent over 45 feet (CAN0406; Nevada Star news release, March 17, 2005).

In the Nevada Star drilling the PGE are reported to correlate well with elevated nickel values and are concentrated in the more ultramafic parts of the Canwell complex; the less ultramafic, more differentiated, parts of the complex contain background concentrations of PGE (Nevada Star news release, October 28, 2004). Petrographic studies by Nevada Star indicate up to 1 percent pyrrhotite and pentlandite intergrown with magnetite and chromite that occur within and at the margins of serpentinized olivine grains (Nevada Star news release, March 17, 2005).

Backhoe trenching by Nevada Star in 2003 exposed rock that was sampled by the company. Results of sampling announced in a press release were as high as 1.6 ppm platinum, 1.1 ppm palladium, 1.6 percent nickel, and 0.5 percent copper in a channel sample cut across 5 feet. The trenching reportedly verified a mineralized strike length of 1,100 feet with widths of up to 25 feet (Nevada Star news release of December, 2, 2003).

Bureau Investigation: BLM investigators collected only seven samples from the Canwell Glacier prospect. Because the site has been investigated so thoroughly by the exploration industry, including drilling, the BLM felt that little additional information could be gained from surface rock chip sampling.

Results from the rock chip samples collected indicate concentrated gold, PGE, copper, and nickel at the prospect. A sample from the 1-foot-thick massive sulfide layer returned 2.2 ppm gold, 12.85 ppm platinum, 12.65 ppm palladium, 4.31 percent copper, and 10.45 percent nickel (sample 10703). This was the highest grade PGE sample collected from anywhere in the district. Other samples were not so high grade, but still indicate elevated base and precious metal values. A sample across 6 feet of mineralized rock returned 296 ppb gold, 874 ppb platinum, 880 ppb palladium, 5,260 ppm copper, and 5,850 ppm nickel (sample 10705). The seven BLM samples were collected across the prospect over a distance of about 1,100 feet.

Mineral Development Potential: Medium

Conclusions: The Canwell prospect has been explored heavily relative to other prospects in the southern Delta River study area. The reason for this is likely the fact that the highest grade nickel, copper, and PGE samples come from this area. This is the case with the BLM's sampling. Although the concentrations of metals are high at the prospect, the size of the mineralized bodies discovered so far are too small to warrant development.

The Canwell prospect is adjacent to the crustal-scale Denali fault. Because of this setting, rocks at the prospect are considerably broken and have made drilling at the prospect difficult. Larger and more competent drills are needed to effectively evaluate the prospect. In all likelihood, this will be the case and mineral exploration will continue on the prospect until it is fully evaluated.

CONY MOUNTAIN

Alternate Name(s):	Cony	**Map No:**	331
		MAS No:	0020680198
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-3	TRS:	SE1/4 Sec: 03, T19S, R12E
Meridian:		Elevation:	5,900 feet
Latitude:	63.29033	Longitude:	-145.420996

Geographic: The Cony Mountain occurrence is located on the east side of a nunatak near the head of the Gulkana Glacier (Figures 25 and 26). The nunatak is about 0.6 miles southeast of Cony Mountain.

Access: Access to the area is easiest by helicopter. There are landing sites for light helicopters on the glacier below the occurrence.

History: The Cony Mountain occurrence was discovered by BLM geologists in 2001.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Nokleberg and others (1992b) have mapped the Cony Mountain occurrence area as undivided Late Triassic(?) gabbro, diabase, and metagabbro. In the same area, Ragan and Hawkins (1966) described a ‘polymetamorphic complex’ that comprises several cycles of metamorphism and tectonism. Although Ragan and Hawkins (1966) seem to be correct in their distinction of a metamorphic terrane in the area, the ages they assigned to the various units are improbable. They suggest the polymetamorphic complex represents Precambrian basement rocks and that the ultramafic rocks in the area have undergone granulite facies metamorphism. They also suggest a correlation with units immediately north of the Denali fault (Ragan and Hawkins, 1966). Plate reconstructions in subsequent years (e.g., Jones and others, 1987; Nokleberg and others, 1992b) make a correlation of this age across the Denali fault impossible.

BLM investigators found mafic and ultramafic dikes intruding penetratively deformed metamorphic rocks of indeterminate, but pre-Triassic, (and possibly pre-Pennsylvanian!) age at the Cony Mountain occurrence. Rocks as penetratively deformed as those in the Cony Mountain area have not been found by BLM geologists south of the Denali fault, except within the Maclaren metamorphic belt. This belt is part of a distinct tectonostratigraphic terrane (Jones and others, 1987; Nokleberg and others, 1992b) from the Wrangellia terrane, which predominates south of the Denali fault in the Delta River district. There are no known nickel-copper-PGE-bearing mafic-ultramafic dikes intruding penetratively deformed rocks in the Maclaren terrane.

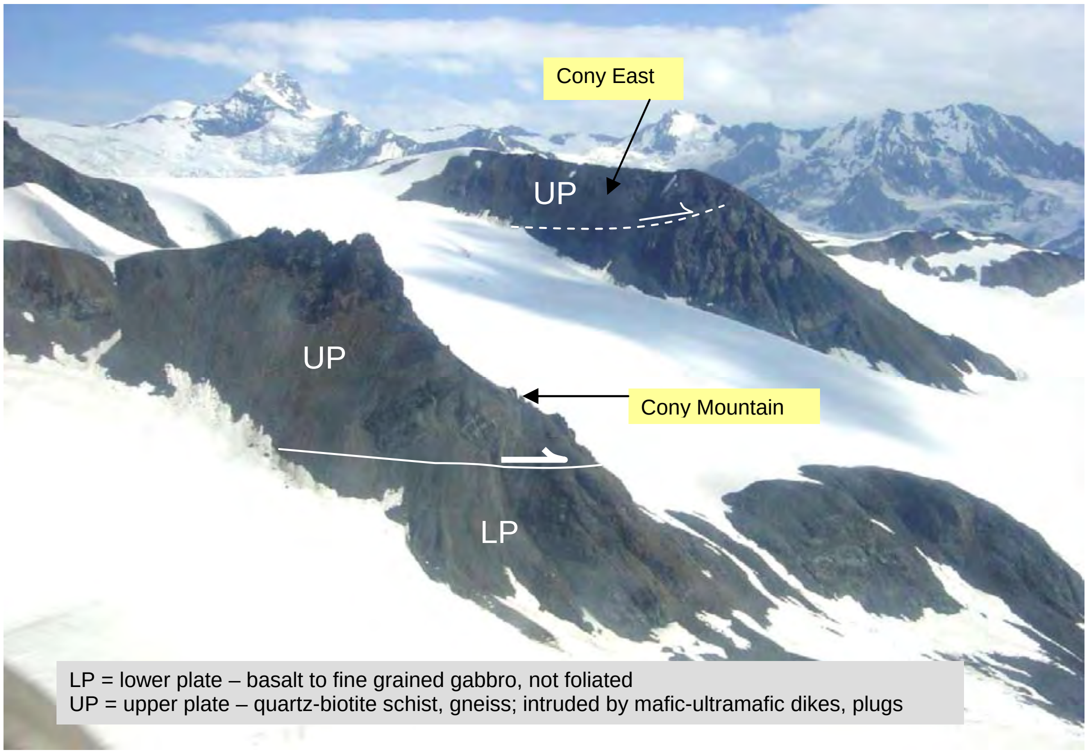


Figure 25. View to east - northeast of the Cony Mountain and Cony East occurrences.

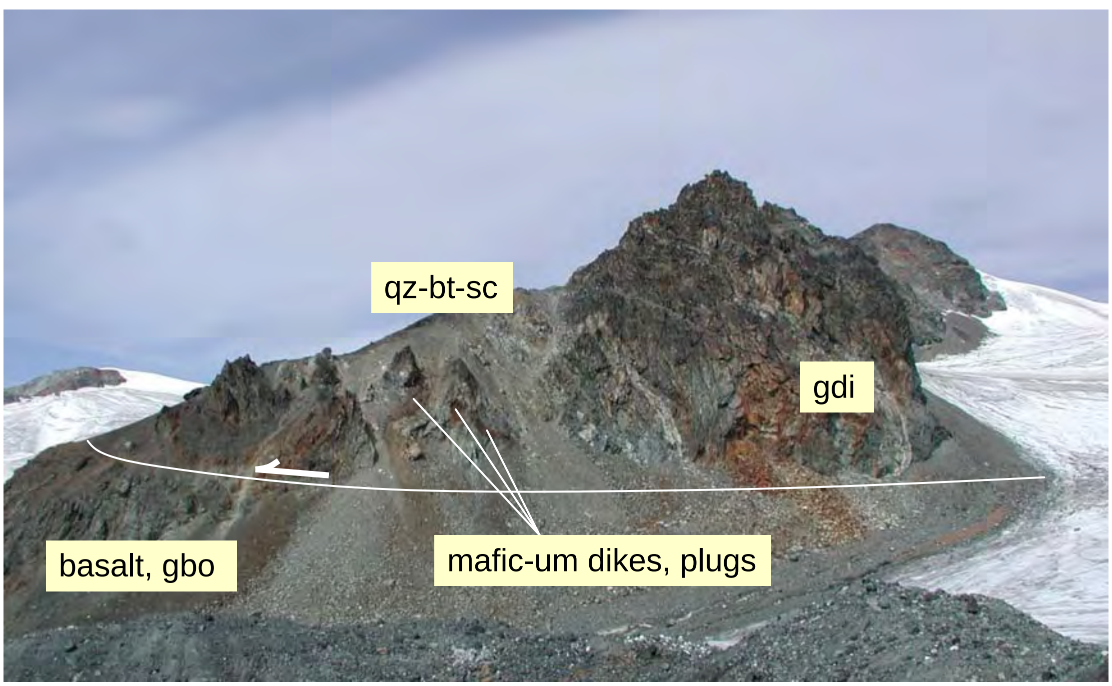


Figure 26. View to the west - northwest of the Cony Mountain occurrence.
(qz-bt-sc = quartz-biotite schist; gdi = granodiorite; gbo = gabbro; um = ultramafic)

The presence of nickel-copper-PGE-bearing mafic and ultramafic rocks at the Cony Mountain occurrence suggests that the host rocks are part of the Wrangellia terrane. The fact that they are so penetratively deformed suggests they are older and probably, originally, structurally deeper seated than the Slana Spur, Tetelna, and Tangle formations that elsewhere host the nickel-copper-PGE-bearing mafic and ultramafic rocks of the Wrangellia terrane. As such, the Cony Mountain occurrence may represent one of the most deeply emplaced nickel-copper-PGE occurrences determined to date in the district.

In the Cony Mountain occurrence area, dikes and plugs of gabbro to olivine peridotite, variably serpentinized, intrude biotite- and quartz-mica schist. Within 300 feet to the north, a granitoid intrusive (likely the ‘granodiorite of Rainbow Mountain’ of Nokleberg and other, 1992b, p. 20) crops out (Figure 26). To the south, in the southern part of the Cony Mountain occurrence nunatak, basalt to fine-grained gabbro crops out. This rock is not foliated, but structurally underlies the penetratively deformed metamorphic rocks that host the mafic and ultramafic intrusives. This structural setting implies the presence of a thrust fault between the deformed and undeformed rocks (Figures 25 and 26). Nokleberg and others (1992b) show a south-verging thrust fault to the south and east of the Cony nunatak and others further to the south. The Cony Mountain stratigraphy suggests additional thrust faults in the area.

BLM rock samples from the Cony Mountain occurrence include gabbro, pyroxenite, feldspathic peridotite, peridotite, and olivine peridotite. The olivine-rich rocks, with up to 60 percent olivine, have been partially serpentinized – approximately 20 percent serpentine plus magnetite. Other silicates in the rocks are also altered with clinopyroxene replaced by hornblende, biotite, and chlorite and plagioclase sericitized. Most of the samples contain at least some sulfides. Sulfides include chalcopyrite, pyrrhotite, and pentlandite (commonly altered to violarite). There may be other sulfide phases present as well, but are difficult to identify.

The BLM submitted three samples from the Cony Mountain area for $^{40}Ar/^{39}Ar$ age dating (samples 10156, 10825, 10830). Due to the strongly altered nature of the samples submitted, the ages resulting from these determinations are equivocal (see Isometric Age Dating section, page 45, and Appendix C for discussion of age data).

Bureau Investigation: BLM investigators examined the Cony Mountain occurrence briefly in 2001, 2002, and 2003 and collected six samples from the area (Figure 27). Analytical results of samples from the mafic and ultramafic rocks indicate elevated nickel, copper, PGE, and gold values. A sample collected across 7 feet returned 3,710 ppm nickel, 4,740 ppm copper, 385 ppb platinum, 827 ppb palladium, and 340 ppb gold (sample 10156). These were also the highest values for gold, copper, and platinum of the six samples collected. A sample collected in 2001 from another dike-like body in the immediate area returned 4,190 ppm nickel, 3,169 ppm copper, 244 ppb platinum, 945 ppb palladium, and 282 ppb gold (sample 9276).

On the opposite, eastern, side of the nunatak from the main Cony Mountain occurrence, BLM investigators found additional mafic-ultramafic rocks cropping out. Two samples from the area, one from outcrop and another from talus, returned low, but anomalous nickel, copper, and PGE values. The highest values came from a select sample from talus and ran 1,185 ppm nickel, 408 ppm copper, 44 ppb platinum, 43 ppb palladium, and 51 ppb gold (sample 10235).

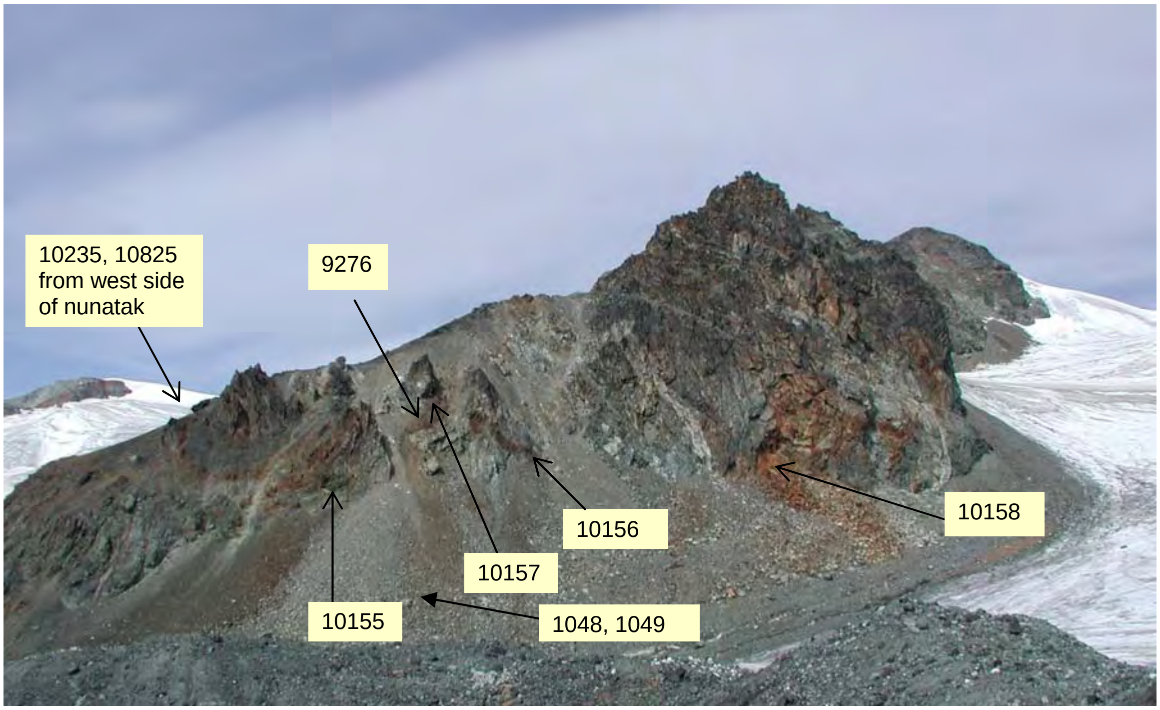


Figure 27. View to west - northwest of Cony Mountain occurrence.
(Figure shows localities of BLM samples from the occurrence.)

Mineral Development Potential: Low

Conclusions: The Cony Mountain occurrence represents one of the furthest east 'western suite,' nickel-copper-PGE occurrences in the Delta River study area. It also may represent one of the most deeply emplaced mafic-ultramafic occurrences in the study area. As such, it is interesting and worthy of further study. As presently known, however, the limited size of the occurrence makes its development potential low, even though it contains significantly anomalous concentrations of base and precious metals.

CONY EAST

Alternate Name(s):		Map No:	334
		MAS No:	0020680382
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE, Au
Location:			
Quadrangle:	Mt. Hayes, B-3	TRS:	SE1/4 Sec: 03, T19S, R12E
Meridian:	Fairbanks	Elevation:	6,400 feet
Latitude:	63.29688	Longitude:	-145.41145

Geographic: The Cony East occurrence is located mainly on the west side of a nunatak, approximately 0.9 miles east-northeast of Cony Mountain.

Access: Access is most practical by helicopter. There are landing sites for light helicopters on the glacier below the occurrence.

History: The Cony East occurrence was discovered by BLM geologists in 2003.

ARDF Name / No: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Nokleberg and others (1992b) mapped the Cony Mountain area as undivided Late Triassic(?) gabbro, diabase, and metagabbro. In the same area, Ragan and Hawkins (1966) described a 'polymetamorphic complex' that comprises several cycles of metamorphism and tectonism. Although Ragan and Hawkins (1966) seem to be correct in their distinction of a metamorphic terrane in the area, the ages they assigned to the various units are improbable. They suggest the polymetamorphic complex represents Precambrian basement rocks and that the ultramafic rocks in the area have undergone granulite facies metamorphism. They also correlate rocks from the area with ones to the north of the Denali fault (Ragan and Hawkins, 1966). Plate reconstructions in subsequent years (e.g., Jones and others, 1987; Nokleberg and others, 1992b) make a correlation of this age across the Denali fault impossible.

The nickel-copper-PGE-bearing mafic and ultramafic rocks at the Cony East occurrence intrude the penetratively deformed rocks of Ragan and Hawkins' (1966) polymetamorphic complex. They are in the upper plate of a probable thrust fault in the area that places penetratively deformed rocks of pre-Triassic and possibly pre-Pennsylvanian, age over relatively undeformed, probably Triassic age basalts and gabbro (Figure 25).

BLM investigators found a plug of mafic and ultramafic rocks cropping out at the Cony East occurrence site. The mafic-ultramafic rocks are hosted by gneissic, metamorphic rocks and overlie(?) siliceous, gray-green andesite(?) to the south. The mafic-ultramafic rocks are mostly peridotite, feldspathic peridotite, and mafic gabbro. The rocks have been variably serpentinized.

Bureau Investigation: BLM investigators collected four samples from the Cony East occurrence. Two samples from the northern part of the exposure were collected of copper-stained peridotite(?) (samples 10236-237). One of these samples returned 1,780 ppb gold and 4,500 ppm copper (sample 10237). A representative sample of peridotite to feldspathic peridotite from the southern part of the exposure contained 50 ppb platinum, 56 ppb palladium, 12 ppb gold, 330 ppm copper, and 1,500 ppm nickel (sample 10830). A high grade sample collected from iron-stained pieces of rubble across the middle of the exposure contained 409 ppb platinum, 414 ppb palladium, 117 ppb gold, 1,500 ppm copper, and 1,880 ppm nickel (sample 10829).

Mineral Development Potential: Low

Conclusions: BLM samples from the Cony East occurrence indicates that there are areas present with anomalous concentrations of base and precious metals. The mineralization, however, is discontinuous and there is much more unmineralized rock present than there is mineralized rock. There may be larger bodies of base and precious metal-bearing rock in the area, but they are not obvious as iron-stained mafic-ultramafic rocks.

The mineralized rock at the Cony East occurrence is hosted by penetratively deformed metamorphic rocks. The hosts seem to be of higher metamorphic grade than at almost all other mafic-ultramafic occurrences in the southern part of the Delta River study area. So the Cony East occurrence may represent one of the deepest emplaced mineralized mafic-ultramafic bodies in the district. Further study is necessary to determine what affect this might have on the mineral potential of these rocks.

JS

Alternate Name(s):	Ram Ridge	Map No:	374
		MAS No:	0020680397
Deposit Type:	Ultramafic	**Commodities:**	PGE, Cu
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NE 1/4 Sec: 32, T19S, R14E
Meridian:	Fairbanks	Elevation:	6,200 feet
Latitude:	63.22988	Longitude:	-145.09437

Geographic: The JS occurrence is near the northern end of a narrow, north-northeast-south-southwest-trending, ridge that has been called Ram Ridge by the present authors. The ridge lies between the Gakona and West Fork Chistochina River glaciers and is bounded on its northwest and southeast by icefields. The icefield to the northwest heads what Rose (1967, Figure 1) called Spire Creek and the icefield to the southeast heads Rose's (1967) Magnetite Creek. The Gakona Glacier is about 3 miles to the west of the JS occurrence.

Access: Access to the occurrence is most practical by helicopter. Although the ridge is narrow, a light helicopter can land on the ridge crest immediately above the occurrence.

History: The JS occurrence was discovered by Jeanine Schmidt, a USGS geologist working with the BLM mineral assessment team in 2003. Prior to this, Rose (1967) had mapped mafic and ultramafic rocks in the area and had identified one or two other mineralized zones within these rocks, but he did not analyze the mineralized rocks for their PGE content.

ARDF Name / No.: None

Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The JS occurrence is hosted by a unit mapped as mafic and ultramafic rocks by Rose (1967) that includes gabbro, mafic gabbro, pyroxenite, peridotite, and dunite. Nokleberg and others (1992b) include these rocks in their unit of "ultramafic and associated rocks" (p. 20) that they interpret to be a separate terrane of ultramafic rocks exposed within splays of the Denali fault on the inboard edge of the Wrangellia terrane. In the JS occurrence area, they believe the ultramafic rocks represent klippen, floored by subhorizontal thrust faults. The ultramafic rocks are thrust over a marine sequence of volcanic and sedimentary rocks of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b).

Nokleberg and others (1992b) report an Early Cretaceous (123 to 126 Ma) potassium-argon isotopic age from the "ultramafic and associated rocks" unit that they interpret to be an apparent age of regional metamorphism and penetrative deformation. They suggest the protolith of the dated metamorphosed rocks may be Paleozoic in age (Nokleberg and others, 1992b). The BLM's argon-argon isotopic age determinations from similar rocks in the area also produce Early Cretaceous ages. We interpret these ages from biotite and hornblende to be primary crystallization ages.

In the more immediate JS occurrence area Rose (1967) maps ultramafic rocks and gabbro interlayered with older mafic metamorphic rocks of what he calls the Permian Mankomen Formation. This is equivalent to Nokleberg and other's (1992b) Pennsylvanian to Permian Slana Spur Formation. BLM investigators found the mafic-ultramafic rocks in the area to grade from clinopyroxenites to hornblende gabbros. Rock types vary over relatively short distances along Ram Ridge.

At the JS occurrence BLM investigators found what in the field was described as fresh-looking dunite and olivine peridotite. The hand samples had abundant equigranular, subhedral, light green, translucent minerals thought to be olivine. Thin section examination of the samples revealed clinopyroxene, so the rock type should be defined as pyroxenite rather than dunite. Little olivine is evident in the thin sections. The rock commonly includes patches of coarse-grained biotite along with minor tremolite and calcite. Exposures at the JS occurrence are cut by inch-scale, pegmatitic-textured, gabbro dikes. Some of these dikes are extremely altered.

Sulfides in the mafic-ultramafic rock include chalcopyrite and bornite along with pyrrhotite and minor digenite, covellite, and pyrite. Magnetite is also a common accessory mineral. The chalcopyrite is locally intergrown with bornite in a cubic arrangement, suggesting a magmatic texture. The sulfides are generally disseminated and make up to 2 to 3 percent of the rock. This mineralized rock is exposed for only about 5 to 6 square feet at the JS occurrence – it is covered by talus and dirt beyond these dimensions.

Bureau Investigation: BLM investigators collected five samples from the JS occurrence and immediate area. Four of the samples were of clinopyroxenite to peridotite and one was from an altered pegmatitic-textured gabbro dike. Three of the ultramafic rock samples contained disseminated sulfides.

Analytical results from the samples reveal anomalous base and precious metal contents. The highest metal values were 29 ppb gold, 3.9 ppm silver, 363 ppb palladium, and 71 ppb platinum, and 7,570 ppm copper (sample 10869). A measured sample across 5.3 feet of exposed, sulfide-bearing ultramafic rock returned 17 ppb gold, 1.1 ppm silver, 258 ppb palladium, 68 ppb platinum, and 3,320 ppm copper (sample 10870).

Mineral Development Potential: Low

Conclusions: The JS occurrence represents one of only a few lode PGE occurrences in the southeastern part of the Delta River study area. The occurrence is at the head of a drainage that returned some of the highest PGE values in stream sediment samples from anywhere in the district. The JS occurrence may have contributed PGE to the stream sediment samples, but one would expect higher lode concentrations given the very high stream sediment concentrations. In all likelihood, the source of the stream sediment metals has still not been found.

GR 28-1

Alternate Name(s):	Unnamed Occurrence1	Map No:	375
		MAS No:	0020680137
Deposit Type:	Ultramafic	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NE1/4 Sec: 32, T19S, R14E
Meridian:	Fairbanks	Elevation:	6,400 feet
Latitude:	63.23206	Longitude:	-145.09329

Geographic: The GR 28-1 occurrence is located near the north end of a narrow ridge, locally called 'Ram Ridge' between the locally termed Magnetite Creek Cirque and Spire Creek Cirque (Creek names from Rose, 1967). It is about 3 miles east of the Gakona Glacier on the southward facing slopes of the Alaska Range.

Access: Access is by helicopter. Landings are possible on the narrow ridge between the ice-filled cirques on either side or at the head of the cirque to the east ('Magnetite Cirque').

History: The GR 28-1 occurrence was reported by Rose in 1967. He makes no mention of the site having received prior attention (Rose, 1967).

ARDF Name / No.: Unnamed (east of Gakona Glacier) / MH267
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The GR 28-1 occurrence is hosted in rocks that have been mapped by Rose (1967) as pyritic Mankomen Formation schists. His description of the mineralized rock at the site, however, refers to amphibolite, hornblendite, and hornblende-augite-plagioclase rock. Nokleberg and others (1992b) mapped ultramafic rocks in the area that they assign to a terrane of ultramafic and associated rocks, which they suggest is fault-bounded within splays of the Denali fault. They report potassium-argon ages of 123 and 126 Ma, which they interpret to be reset ages associated with regional metamorphism. They suggest protolith ages may be Paleozoic (Nokleberg and others, 1992b, p. 21).

BLM investigations in the area suggest the mafic and ultramafic rocks in the eastern part of the Delta River Mining District study area, which includes the GR 28-1 occurrence, are Cretaceous in age and are in intrusive contact with host rocks in the area. Preliminary argon-argon ages group around 124 Ma, similar the potassium-argon ages reported by Nokleberg and others (1992b), but we interpret these ages to be primary crystallization ages.

Rose (1967) describes disseminated pyrrhotite, pyrite, magnetite, and minor chalcopyrite at the GR 28-1 occurrence. BLM investigators found fine-grained, weakly foliated, biotite-hornblende gabbro and fine-grained altered peridotite; the clinopyroxene in the peridotite is altered to amphibole and the plagioclase has been saussuritized. Both rock types contain about 5 to 10 percent disseminated pyrite along with minor pyrrhotite and rare chalcopyrite. Some of the rocks contain up to about 10 percent magnetite. The pyritized mafic-ultramafic rock is exposed in patches that are hosted by black and white banded schist or gneiss. Foliation in the host rocks strike to the west-northwest and dip shallowly to the north. The iron-stained zones are found within about 30 to 50 feet of a contact with very coarse-grained to pegmatitic-textured hornblende gabbro, exposed to the south.

Numerous iron-stained zones, some inaccessible, are exposed in the area and range in size from about 4 by 10 feet to 20 by 75 feet. Rose (1967) describes an iron-stained zone about 50 feet wide and about 100 feet long.

Bureau Investigation: BLM investigators collected three samples from the GR 28-1 occurrence. None of the samples revealed significant concentrations of base or precious metals. All of the samples were slightly anomalous in copper, ranging from 385 to 740 ppm (samples 10243 and 10847 respectively). The highest gold value was 3 ppb and the highest PGE was 37 ppb palladium (sample 10846).

Mineral Development Potential: Low

Conclusions: The low metal concentrations in BLM samples indicate that the GR 28-1 occurrence itself is unlikely to attract much mineral exploration attention. The area in general might attract exploration because it is the source area for very anomalous PGE in stream sediment samples collected and analyzed be the BLM (see the discussion of Magnetite Cirque, Map no. 388).

MAGNETITE CIRQUE

Alternate Name(s):		Map No:	388
		MAS No:	0020680321
Deposit Type:	Ultramafic	**Commodities:**	PGE, Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NE 1/4 Sec: 04, T20S, R14E
Meridian:	Fairbanks	Elevation:	6,100 feet
Latitude:	63.21358	Longitude:	-145.07178

Geographic: The Magnetite Cirque occurrence comprises mineralized rock exposed on the southeast side of an ice-filled cirque at the head of locally named Magnetite Creek (see Rose, 1967, Figure 1). This creek is a tributary to the Gakona River from the east, near the terminus of the Gakona Glacier. The site is on the north or northwest side of a north-northeast-trending ridge, 2 miles north-northeast of VABM Ona, which is shown on the USGS, Mt. Hayes, A-3, 1:63,360-scale, topographic map.

Access: The only practical access to the Magnetite Cirque area is by helicopter. Helicopter landing sites are available on the ice and a small nunatak below the occurrence.

History: The Magnetite Cirque occurrence was discovered by BLM geologists during the course of this study. Rose (1967), and Nokleberg and others (1992b) mapped mafic and ultramafic rocks in the Magnetite Cirque area.

BLM investigators examined the area while following up anomalous stream sediment samples with high PGE from Magnetite Creek, which drains the cirque. The anomalous stream sediment samples resulted from the BLM's reanalysis of USGS stream sediment samples collected in the late 1970's (O'Leary and others, 1982; Bittenbender and others, 2003).

ARDF Name / No.: None **Alaska Kardex:** None

Production: None **Workings and Facilities:** None

Geologic Setting: Rose (1967) mapped the northwestern and southeastern edges of Magnetite Cirque as mafic and ultramafic rocks including gabbro, mafic gabbro, pyroxenite, peridotite, and dunite. Nokleberg and others (1992b) include these rocks in their unit of "ultramafic and associated rocks" (p. 20) that they interpret to be a separate terrane of ultramafic rocks exposed within splays of the Denali fault on the inboard edge of the Wrangellia terrane. In the Magnetite Cirque area, they believe the ultramafic rocks represent klippen, floored by subhorizontal thrust faults. The ultramafic rocks are thrust over a marine sequence of volcanic and sedimentary rocks of the Slana Spur Formation Pennsylvanian to Permian (Nokleberg and others, 1992b).

Nokleberg and others (1992b) report an Early Cretaceous (123 to 126 Ma) potassium-argon isotopic age from the "ultramafic and associated rocks" unit that they interpret to be an apparent age of regional metamorphism and penetrative deformation. They suggest the protolith of the dated metamorphosed rocks may be Paleozoic in age (Nokleberg and others, 1992b).

When USGS stream sediment samples from Magnetite Creek, that drains Magnetite Cirque, were reanalyzed by the BLM, they revealed strongly anomalous concentrations of PGE. Of the 263 samples reanalyzed from across the southern Mt. Hayes quadrangle, the highest palladium result (658 ppb) was from Magnetite Creek. The second highest platinum result (410 ppb) also came from this creek.

On the west side of Magnetite Cirque Rose (1967) maps ultramafic rocks and gabbro interlayered with older mafic metamorphic rocks of what he calls the Mankomen Formation. This is equivalent to Nokleberg and other's (1992b) Slana Spur Formation. At the Magnetite Cirque occurrence BLM investigators found mafic and ultramafic rocks in outcrop with variegated volcanic rocks, presumably correlative with those mapped by Rose (1967) and Nokleberg and others (1992b) on the west side of the cirque. The volcanic rocks are hornfelsed near the mafic-ultramafic intrusions.

BLM investigators described the rocks at the Magnetite Cirque occurrence as peridotite. However, most of the thin sections examined from the area reveal pyroxenite as the predominant rock type. The pyroxenite/peridotite commonly includes phlogopite and magnetite. It also includes persistent, but minor, amounts of chalcopyrite along with pyrrhotite and pyrite. Along one stretch of the Magnetite Cirque occurrence outcrop there were minor amounts of chalcopyrite in every rock inspected across about 160 feet.

Bureau Investigation: BLM geologists collected five samples from the Magnetite Cirque occurrence several of which contained anomalous quantities of base and precious metals. Two measured samples across 20 (sample 10290) and 36 (sample 11218) feet returned respectively 127 and 65 ppb palladium, 52 and 36 ppb platinum, 18 and 15 ppb gold, and 824 and 1,005 ppm copper. A sample selected to include sulfide minerals returned an assay of 144 ppb palladium, 104 ppb platinum, 34 ppb gold, and 1,055 ppm copper (sample 11219). This sample returned a nickel value of only 34 ppm.

Mineral Development Potential: Low

Conclusions: The BLM investigated about as many of the outcrops in the Magnetite Cirque area as were accessible. Except for the JS occurrence (Map no. 374) on the west side of the cirque, the Magnetite Cirque occurrence represents the highest concentrations of base and precious metals detected in samples from the area. The samples reveal anomalous concentrations, but are almost too low to be considered a mineral occurrence. The low grades at the Magnetite Cirque occurrence suggest that this site is probably not the source of metals found in the highly anomalous stream sediment samples from Magnetite Creek.

GR 28-20

Alternate Name(s):		Map No:	429
		MAS No:	0020680339
Deposit Type:	Ultramafic	**Commodities:**	Au, Cu
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 09, T20S, R15E
Meridian:	Fairbanks	Elevation:	4,850 feet
Latitude:	63.19545	Longitude:	-144.87656

Geographic: The GR 28-20 occurrence is located on the south side of a small pup on the southeast-facing slope of a mountain northwest of the Chistochina valley. It is across the Chistochina valley from Big Four Creek, and about 1.6 miles due north of the confluence of Slate Creek and the Chistochina River.

Access: Access is most practical by helicopter. A helicopter can land on a bench about a quarter of a mile to the southwest of the occurrence.

History: Rose (1967) apparently discovered the GR 28-20 occurrence during geologic investigation of the area in 1966. There is no other known published reference to the occurrence.

ARDF Name / No.: Unnamed (west of the terminus of Chistochina Glacier / MH287)
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1967) notes a "highly pyritized" area near the contact of what he maps as monzonite and gabbro, although he describes the mafic rock as peridotite. The mafic or ultramafic rocks are part of a suite of intrusives that extend for tens of miles along the south flank of the Alaska Range and which have been defined as a "terrane of ultramafic and associated rocks" by Nokleberg and others (1992b). The hosts to the intrusive rocks are mapped as Permian Mankomen Formation (Rose, 1967) or Eagle Creek Formation (Nokleberg and others, 1992b) and specifically as argillite in the area of the occurrence (Rose, 1967).

The GR 28-20 occurrence that BLM investigators examined in 2003 appears as a lens-shaped, iron-stained area about 100 feet across and 125 feet long. The iron-stained area is bounded to the east and west (down slope and upslope, respectively) by ultramafic rocks, predominantly pyroxenite and peridotite. To the north, the area is bounded by gabbro (Figure 28).

The iron-stained area comprises coarse-grained pyroxenite, fine- to coarse-grained gabbro, and small patches of dunite. In thin section the pyroxene in gabbro is seen to have been replaced by amphibole and the plagioclase saussuritized. In some cut rocks, compositional banding is prevalent. There are also segregations or knots of coarse-grained amphibole and magnetite. At least one lens of quartz is present.

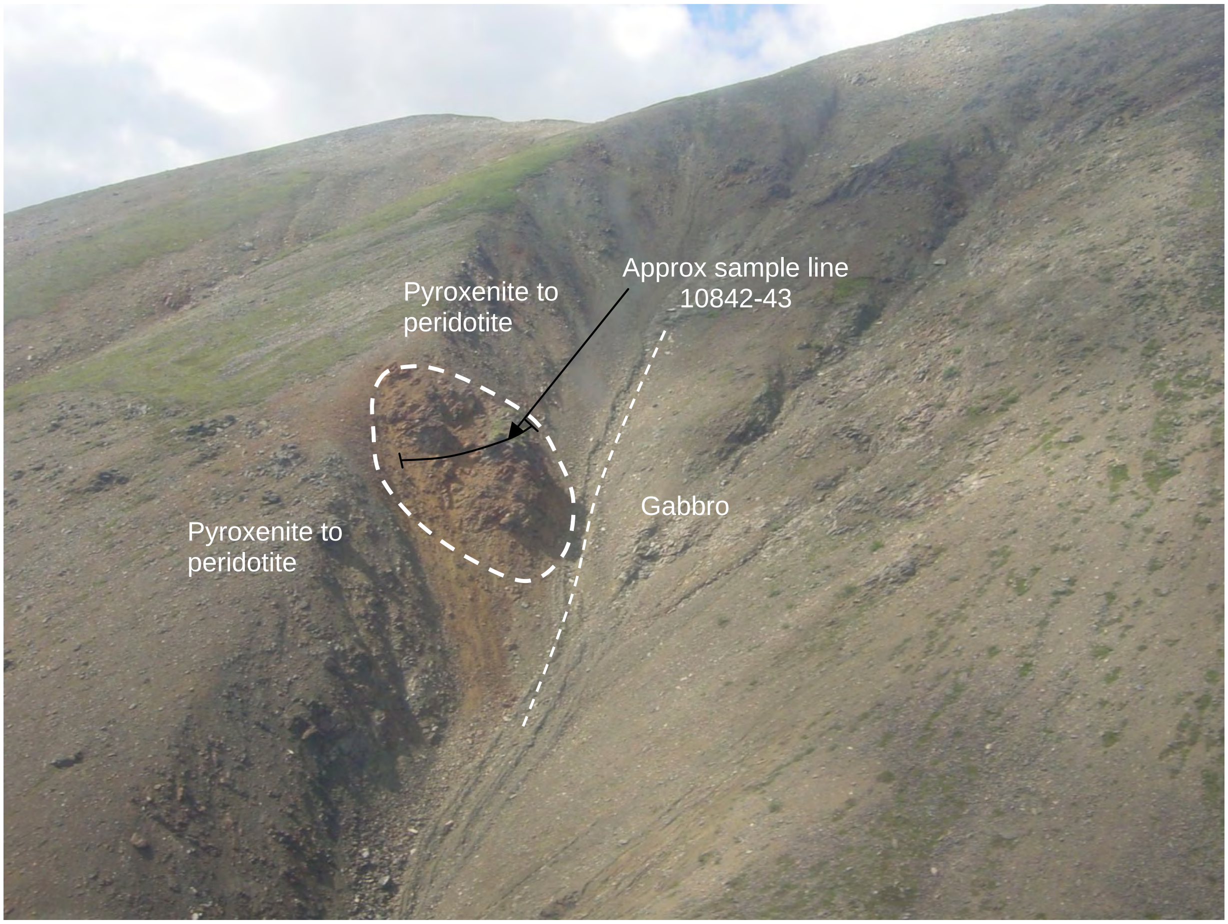


Figure 28. Arial view to west of the iron-stained lens at the GR 28-20 occurrence.

Metallic minerals include pyrite and magnetite, with minor pyrrhotite and chalcopyrite. The gabbro seems to be the most mineralized, with 5 to 10 percent sulfides, mainly fine grained and disseminated. Yellowish, soft, gossan is developed in some places, particularly in pyroxenite-rich areas.

Bureau Investigation: BLM investigators collected five samples from the GR 28-20 iron-stained area. Two spaced chip samples, end-to-end, were cut across the mineralized area, one for 36 feet (10842) and one for 54 feet (10843). Sample 10843 across 54 feet returned 2.7 ppm gold and 837 ppm copper. The next highest gold value of the five samples was only 0.032 ppm (sample 10241). A grab sample of pyroxenite and gabbro contained 1,900 ppm copper (sample 10241). The other samples had only minor precious and base metal values.

Mineral Development Potential: Low

Conclusions: A return of 2.7 ppm gold over 54 feet from BLM sampling of the GR 28-20 occurrence is noteworthy. However, the nature of the gold mineralization is unclear – most of the gold may have been concentrated in a small quantity of the sample and produced a nugget effect. In addition, other samples collected by the BLM had very low gold values. Nonetheless, the high gold value from the one BLM sample may encourage further mineral exploration of the area.

GR 28-19

Alternate Name(s):		Map No:	430
		MAS No:	0020680338
Deposit Type:	Ultramafic	Commodities:	Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE 1/4 Sec: 09, T20S, R15E
Meridian:	Fairbanks	Elevation:	5,700 feet
Latitude:	63.20009	Longitude:	-144.87624

Geographic: The GR 28-19 occurrence is on the crest of a northeast-trending ridge, bounding the northwest side of the main Chistochina River. It is across the Chistochina valley from Big Four Creek, and about 2 miles north-northwest of the confluence of Slate Creek and the Chistochina River.

Access: Access to the GR 28-19 occurrence is most practical by helicopter. Helicopter landing sites are available on the northeast-trending ridge crest near the occurrence. Alternative access is possible from a small dirt airstrip near the mouth of Slate Creek, but foot access from the strip would involve crossing the Chistochina River and climbing over 1,500 feet from the valley floor.

History: Ultramafic rocks with chrysotile are noted in the area by Rose in his report of 1967. He does not mention anomalous copper and PGE from the occurrence, however (Rose, 1967). These commodities were discovered during the BLM's investigation of Rose' chrysotile location.

ARDF Name / No.: Unnamed / MH286 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The GR 28-19 occurrence is hosted by a unit mapped as mafic and ultramafic rocks by Rose (1967) that includes gabbro, mafic gabbro, pyroxenite, peridotite, and dunite. Nokleberg and others (1992b) include these rocks in their unit of "ultramafic and associated rocks" (p. 20) that they interpret to be a separate terrane of ultramafic rocks exposed within splays of the Denali fault on the inboard edge of the Wrangellia terrane. In the GR 28-19 occurrence area, they believe the ultramafic rocks represent klippen, floored by subhorizontal thrust faults. The ultramafic rocks are thrust over a marine sequence of volcanic and sedimentary rocks of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b).

Nokleberg and others (1992b) report an Early Cretaceous (123 to 126 Ma) potassium-argon isotopic age from the "ultramafic and associated rocks" unit that they interpret to be an apparent age of regional metamorphism and penetrative deformation. They suggest the protolith of the dated metamorphosed rocks may be Paleozoic in age (Nokleberg and others, 1992b). The BLM's argon-argon isotopic age determinations from similar rocks in the area also produce Early Cretaceous ages. We interpret these ages from biotite and hornblende to be primary crystallization ages.

In the immediate GR 28-19 occurrence area Rose maps the ultramafic rocks as peridotite, but mentions dunite as hosting cross-fiber chrysotile asbestos at his occurrence. BLM investigators found mainly pyroxenite, variably serpentinized, locally copper-stained, that has been intruded by leucocratic gabbro dikes. Parts of the ultramafic rock are cut by discontinuous, inch-scale veinlets of magnetite. Thin section examination reveals the pyroxenite to be made up mostly of clinopyroxene (diopside) with small amounts of hornblende, tremolite, and olivine.

Rose (1967) noted a dunite boulder in glacial moraine from below the GR 28-19 occurrence that contained 0.75 percent copper and traces of gold, silver, platinum, and nickel. This occurrence is listed as GR 28-18 (Map no. 432) in the prospect summary table (Table A-1) of this report. The boulder could have come from the GR 28-19 area.

Bureau Investigation: BLM geologists collected four samples from the GR 28-19 occurrence. Three samples were collected from the host mafic-ultramafic rock and one from a cross-cutting gabbro dike. The highest returns came from a sample of serpentinized pyroxenite with minor chalcopyrite and copper staining collected adjacent to a gabbro dike. This sample returned 1.8 percent copper, 125 ppb palladium, 48 ppb platinum, and 58 ppb gold (sample 10841). A sample from the gabbro dike returned 4,600 ppm copper with only minor amounts of PGE and gold (sample 10840).

BLM geologists also sampled float to the north of, and below, the GR 28-19 occurrence where Rose (1967) noted mineralized dunite on a glacial moraine. One sample from that area returned 3,870 ppm copper, 462 ppb palladium, 326 ppb platinum, and 348 ppb gold (sample 10838).

Mineral Development Potential: Low

Conclusions: The GR 28-19 occurrence is one of the few lode occurrences of PGE in mafic-ultramafic rocks that the BLM found in the southeastern part of the Delta River study area. This despite the fact that some of the most highly anomalous PGE in stream sediment samples came from this part of the district. Rocks sampled below the GR 28-19 occurrence, which could have come from the occurrence, contained the highest PGE in all the BLM rock chip samples from the southeastern part of the district.

MILLER GULCH DIKES

Alternate Name(s):	Miller Gulch	**Map No:**	458
		MAS No:	0020680381
Deposit Type:	Mafic-Ultramafic	**Commodities:**	PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SW1/4 Sec: 14, T20S, R15E
Meridian:	Fairbanks	Elevation:	4,600 feet
Latitude:	63.17592	Longitude:	-144.82362

Geographic: The Miller Gulch Dikes are concentrated in the Miller Gulch area, north of Slate Creek, near the headwaters of the Chistochina River. Similar dikes are scattered to the northeast and east of Miller Gulch as well.

Access: Access to the Miller Gulch area is most easily accomplished by helicopter. A light helicopter can easily land on the ridge above Miller Gulch or on placer tailings near the mouth of the gulch.

Alternate access to the upper Chistochina area is possible via trail or winter road up the Chistochina River from the Glenn Highway, where the Chistochina River meets the Copper River, near Chistochina. This route is about 40 to 50 miles long.

There are at least two private airstrips in the upper Chistochina area that are suitable for light fixed wing aircraft. The land owners of the strips commonly put barrels on them to prevent unauthorized landings and thefts or vandalism. Prior permission is likely required before the landing strips can be used. The Miller Gulch area is accessible on foot from the airstrips, but requires a walk of 2 to 3 miles.

History: Placer gold, with byproduct platinum, mining began in the Miller Gulch area around 1898 (Mendenhall and Schrader, 1903; Mendenhall, 1905). Placer mining has continued in the area until the present (Moffit, 1912, 1944; Martin, 1919; Foley and Summers, 1990). There has never been any hard rock mining of gold or PGE from the Miller Creek area reported in published literature.

Several authors have speculated on the source of metals for the placers in the Miller Gulch area (e.g., Mendenhall, 1905; Chapin, 1919b; Rose, 1967; Foley and Summers, 1990). The only hard rock source specifically identified in the published literature was by Foley and Summers (1990). An unpublished report by Alaska Earth Sciences (1988) discusses exploration for lode deposits and the source of placer gold and PGE in the area.

Foley and Summers (1990) did a considerable amount of work investigating the Miller Gulch Dikes. Their publication includes unit descriptions, analytical results from sampling, a large-scale geologic map, and results of in-depth petrographic analyses.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Miller Gulch Dikes are hosted in what Matteson (1973) and Foley and Summers (1990) mapped as Upper Jurassic to Cretaceous argillite. These interpretations ostensibly follow the work of Richter (1967) in the Mentasta area farther to the east. Nokleberg and others (1992b) include these rocks in their unit of Late Jurassic to Early Cretaceous marine metasedimentary rocks of the Wrangellia terrane. Berg and others (1972) suggest these rocks correlate with the Gravina-Nutzotin belt that represents the overlap sequence of marine strata on the inboard side of the Wrangellia composite terrane before its amalgamation with the ancestral North American continental margin. Stratigraphically, these rocks unconformably overlie the Nikolai Greenstone and Triassic limestone of the Wrangellia terrane (Nokleberg and others, 1992b).

More locally, the host of the Miller Gulch Dikes is composed of black, graphitic, slaty, argillite with interlayers of calcareous sandstones (Matteson, 1973; Foley and Summers, 1990). A fossil age of Late Jurassic to Cretaceous is reported by Foley and Summers (1990) for the argillite. Matteson (1973) defined a minimum age about 120 Ma, early-Late Cretaceous, for the unit based on potassium-argon dating of the argillite-hosted, mafic-ultramafic intrusion at the head of Quartz Creek.

Matteson (1973) suggests that many of the dikes in the Miller Gulch area and further to the east are associated with a porphyritic intrusion that is called the "Slate Creek Granodiorite Porphyry" (Rose, 1967; Matteson, 1973). Matteson (1973) suggests the dikes predate the mafic-ultramafic body at the head of Quartz Creek that he dated at about 120 to 123 Ma.

Foley and Summers (1990) describe the Miller Gulch Dikes as differentiated dikes, sills, and plugs. They describe a variety of intermediated to ultramafic igneous rocks including gabbro, dunite, peridotite, hornblendite, and diorite. Crosscutting relations indicate several episodes of igneous activity (Foley and Summers, 1990).

Platinum group minerals (PGM) detected in the Miller Gulch Dikes and host argillite include tetraferroplatinum and osmiridium. These PGM, along with native gold, were found in both the dikes and in the host argillite (Foley and Summers, 1990). Native gold has also been found in the Tertiary conglomerate, called 'round wash' by the early miners (Mendenhall, 1905; Chapin, 1919b; Rose, 1967; Foley and Summers, 1990; this study). Foley and Summers (1990) believe that the platinum, gold, copper, mercury, and arsenic found in the placer deposits in the area come from the local country rock, including the differentiated dikes, host argillite, and Tertiary conglomerate.

Most of the mineralization associated with the Miller Gulch Dikes occurs at the margins of the dikes and within the argillite host rock adjacent to the dikes. The dikes and argillite are enriched particularly in gold, platinum, silver, mercury, and arsenic. They are depleted in nickel and palladium. Since both the igneous bodies and the host argillite are enriched in the same elements, they are likely to have been mineralized with similar fluids, probably magmatic fluids. Arsenic and mercury, however, since they are much more prevalent in argillites than igneous rocks, were probably contributed to the igneous rocks by assimilation during emplacement (Foley and Summers, 1990).

Bureau Investigation: Because of the extensive work recently done on the Miller Gulch Dikes by the U.S. Bureau of Mines (i.e., Foley and Summers, 1990) BLM investigators only spent about a day examining and sampling the dikes. BLM investigators collected 10 samples from the dikes in the Miller Gulch area. Each of the samples were collected and analyzed by methods traditionally used to evaluate lode occurrences in the area – about 2 to 7 pounds of rock chips are collected and sent for analysis. Gold and PGE are determined by fire-assay of a 30 gram split of crushed rock. The BLM samples failed to detect significant concentrations of gold and PGE in the dikes. BLM sample results revealed maximum concentrations of 7 ppb gold (sample 6978), 0.2 ppm silver (sample 10401), 479 ppm copper (sample 6976), 0.685 ppm mercury (sample 6978), 24 ppb palladium (sample 10817), and 19 ppb platinum (sample 6976).

These results should not be unexpected, however, since Foley and Summers' (1990) traditional samples also failed to detect significant precious metal concentrations, even though their petrographic techniques specifically identified native gold and PGM in the dikes and argillite. Foley and Summers (1990) suggest the precious metals are erratically distributed in the local rock and that conventional sampling and analysis may not work to effectively determine mineral concentrations. A better method for determining the presence of the metals is to analyze a heavy mineral concentrate of crushed rock (Foley and Summers, 1990).

Mineral Development Potential: Low

Conclusions: The work by Foley and Summers effectively identified sources for metals found in local placer deposits of the Miller Gulch area. Their conclusion that conventional sampling and analysis of rocks to locate lode sources in the area is likely ineffective was supported by the failure of the BLM's sampling and analysis to determine sources of precious metals.

QUARTZ CREEK HEAD

Alternate Name(s):		**Map No:**	481
		MAS No:	0020680349
Deposit Type:	Ultramafic	**Commodities:**	Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 20, T20S, R16E
Meridian:	Fairbanks	Elevation:	5,450 feet
Latitude:	63.16276	Longitude:	-144.7178

Geographic: Quartz Creek is a tributary to the east fork of the Chisna River in its headwaters area. The Chisna River is in the upper Chistochina area. The Quartz Creek Head occurrence is located on the saddle at the head of Quartz Creek. The saddle is immediately northeast of the peak marked ‘5613’ on the USGS, Mt. Hayes A-2, 1:63,360-scale, topographic map.

Access: Access to the Quartz Creek Head occurrence is most easily accomplished by helicopter. A light helicopter can easily land on the saddle where the occurrence is located.

Alternate access to the upper Chistochina area is possible via trail or winter road up the Chistochina River from the Glenn Highway, where the Chistochina River meets the Copper River, near Chistochina. This route is about 40 to 50 miles long.

There are at least two private airstrips in the upper Chistochina area that are suitable for light fixed wing aircraft. The land owners of the strips commonly put barrels on them to prevent unauthorized landings and thefts or vandalism. Prior permission is likely required before the landing strips can be used. One of the landing strips is about 2 to 3 miles from the Quartz Creek Head occurrence, which is accessible by foot from the strip.

History: C. Matteson mapped mafic to ultramafic rocks at the head of Quartz Creek during his thesis work in the early 1970’s (Matteson, 1973). The economic potential of these rocks was reported in an unpublished, Alaska Earth Sciences consulting report in 1988 (Alaska Earth Sciences, 1988). The U.S. Bureau of Mines also examined the head of Quartz Creek in about 1988 (Alaska Earth Sciences, 1988), but there are no published reports of their work at the site. Foley and Summers (1990) published a U.S. Bureau of Mines report on their work that focused in the Miller Gulch area, west of Quartz Creek. They mapped at the head of Quartz Creek and collected samples from the area (Foley and Summers, 1990), but did not make specific note of the Quartz Creek Head occurrence.

ARDF Name / No.: None

Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Nokleberg and others (1992b) include rocks at the head of Quartz Creek in their unit of Late Jurassic to Early Cretaceous marine metasedimentary rocks of the Wrangellia terrane. Stratigraphically, these rocks unconformably overlie the Nikolai Greenstone and Triassic limestone of the Wrangellia terrane (Nokleberg and others, 1992b). More locally, the unit is composed of black, graphitic, slaty, argillite with interlayers of calcareous sandstones (Matteson, 1973; Foley and Summers, 1990). A fossil age of Late Jurassic to Cretaceous is reported by Foley and Summers (1990) for the argillite. Matteson (1973) defined a minimum age about 120 Ma, early-Late Cretaceous, for the unit based on potassium-argon dating of the argillite-hosted, mafic-ultramafic intrusion at the head of Quartz Creek.

Matteson (1973) mapped the intrusion at the head of Quartz Creek as pyroxenite and gabbro, cut by dacite dikes. Foley and Summers (1990) did not concentrate on the Quartz Creek area, but nonetheless mapped the rocks in the area as Tertiary to Cretaceous gabbro. BLM investigators found that on a larger scale the mafic-ultramafic rocks at the head of Quartz Creek are even more varied. The BLM found phlogopite-bearing dunite to peridotite, pyroxenite, pegmatitic hornblende gabbro, and hornblendite. Gabbro predominates.

The mafic-ultramafic complex at the head of Quartz Creek seems to strike about 300 degrees and dip about 60 degrees to the northeast. It is about 700 feet thick along the crest of the saddle at the head of the creek. It is exposed along strike for only about 300 feet to the west-southwest, toward Quartz Creek. It is covered farther down the slope to the west and also to the east. Matteson (1973) mapped a dip-slip fault in this area and suggested that the mafic-ultramafic rocks may have intruded along the fault. Nokleberg and others (1992b) map a southeastward verging thrust fault at the basal contact of the mafic-ultramafic rocks with the argillite to the southeast.

At the structural base of the mafic-ultramafic body, adjacent to the host argillite, is a section of dunite to peridotite. Overlying this is variably textured hornblendite and hornblende peridotite followed by very coarse-grained gabbro and hornblendite. Still further up-section is more gabbro. The complex is cut by a prominent dike of what Matteson (1973) calls dacite, which is now strongly altered.

Minor pyrrhotite and chalcopyrite are disseminated in the dunite to peridotite. The gabbro locally includes up to 5 to 10 percent pyrite, which occurs in patches and seams, and also is disseminated. In places the pyrite shows euhedral crystals to half an inch across.

In 1988, Alaska Earth Sciences (unpublished, 1988) reported that they collected a single sample from dunite at the head of Quartz Creek. Fire assay of the sample returned 4.78 ppm gold, 4.37 ppm platinum, and 1.8 ppm palladium (Alaska Earth Sciences, 1988). Concentrations similar to this sample were not reproducible in subsequent sampling. Foley and Summers (1990) report a high of 230 ppb platinum, 4 ppb palladium, and below detection limits for gold, from four samples collected in the area. The highest platinum came from a sample described as serpentinite (Foley and Summers, 1990).

Bureau Investigation: BLM investigators collected eight samples from the occurrence at the head of Quartz Creek. One of the samples was from the argillite host rock to the east of the mafic-ultramafic rocks (sample 10999). The argillite sampled was iron-stained and contained up to 3 percent pyrite. Analytical results showed no anomalous concentration of base or precious metals.

The BLM collected seven additional samples of the mafic and ultramafic rocks. The highest values evident in the analytical results from these samples were 6 ppb gold (11205), 43 ppb platinum (11206), 25 ppb palladium (samples 11203, 11206), 1,960 ppm copper (sample 11205), and 628 ppm nickel (sample 11200).

Several of the BLM samples were collected for possible age dating. One of the samples (11200) contained relatively unaltered phlogopite in apparent equilibrium with olivine and pyroxene. An $^{40}Ar/^{39}Ar$ plateau age on the phlogopite from this sample yielded 123.1 $\pm$ 0.6 Ma. This age is very similar to the potassium-argon ages reported by Matteson (1973) of 120.2 $\pm$ 3.6 Ma on biotite and 122.9 $\pm$ 3.7 Ma on hornblende.

Mineral Development Potential: Low

Conclusions: Although the concentrations of base and precious metals are not very high in the samples collected by the BLM, the Quartz Creek Head occurrence is significant in other ways. It represents the farthest eastward occurrence of mafic-ultramafic rocks in the Delta River Mining District study area. It shows that there is anomalous PGE in some of the eastern mafic-ultramafic rocks and that the platinum seems to be more predominant than the palladium. This is also evident in the reports of historic platinum production from placers in the area.

The BLM's samples corroborate some of the earlier work in the area regarding geochemistry and age dating. The analytical results from the BLM's samples are similar to those of Foley and Summers (1990) that suggest there may have been some analytical error in the very high grades reported by Alaska Earth Sciences (1988) in their single dunite sample from 1988. An alternate possibility is that the occurrence of PGE in the area is very patchy and difficult to determine accurately with limited sampling. The BLM's argon-argon age date of about 123 Ma is very similar to the ages reported by Matteson (1973) from the same area. This age is similar to others the BLM has found for samples from the eastern suite of mafic-ultramafic rocks in the Delta River study area.

SUMMIT HILL

Alternate Name(s):	Circular Anomaly Summit Lake	Map No:	511
		MAS No:	0020680319
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	SE1/4 Sec: 32, T20S, R12E
Meridian:	Fairbanks	Elevation:	3,600 feet
Latitude:	63.13158	Longitude:	-145.47180

Geographic: The Summit Hill occurrence is about 1.3 miles southeast of Oxbow Lake, which is about 1 mile east of the small community on the east side of Summit Lake, near its northern end. The occurrence is on the south to southeast side of a small draw, which drains toward the east into Gunn Creek.

Access: Access to the occurrence is easy on foot from the Richardson Highway across a distance of about 1 mile. A small road intersects the Richardson Highway about half a mile south of the 'Mile 195' mark on the Mt. Hayes A4 quadrangle topographic map. This small road leads to the Trans Alaska Pipeline, from which the small draw leading to Gunn Creek may be accessed.

History: Investigators working for American Copper and Nickel Co. (ACNC) discovered the Summit Hill occurrence sometime around 1998 and staked claims over the occurrence (Bill Ellis, personal communication, 2002; Ellis and others, 2004). In 2003, the Summit Hill area was included in the BLM's airborne geophysical survey targeting the mafic-ultramafic complexes in the area (Burns and others, 2003). Nevada Star Resource Corporation staked claims over the occurrence following the release of the BLM airborne geophysical data; these claims are still active in 2005 (State of Alaska, Dept. of Natural Resources, land records/status plats).

ARDF Name / No: Unnamed (east of mile 195 on Richardson Highway) / MH241
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The Summit Hill occurrence is found in an area where the rocks have a strong magnetic susceptibility that is evident by a high total field magnetic response on airborne geophysical maps. The high magnetic area is circular in shape and is cored by an area with a low magnetic response (Burns and others, 2003). The core of the circular magnetic high is a biotite diorite with plagioclase (oligoclase), hornblende after clinopyroxene, chlorite after biotite, and accessory magnetite, pyrrhotite, and pyrite. The surrounding magnetic high corresponds to a pyroxene hornblendite. This rock is made up of hornblende, clinopyroxene, and sericitized plagioclase. It includes significant amounts of magnetite. At the intrusive contact of the two rock types potassium feldspar is common. Whether this is magmatic potassium feldspar or a potassic alteration is unknown.

Mineral industry samples from the Summit Hill occurrence are reported from coarse-grained to pegmatitic olivine gabbro with magnetite, chalcopyrite, pentlandite, and pyrrhotite. Mineralized rock from the site contained 1.07 percent copper, 1.58 percent nickel, 300 ppb platinum, 484 ppb palladium, and 110 ppb gold (Ellis and others, 2004).

BLM investigators collected samples from the diorite core and the surrounding mafic-ultramafic rock for $^{40}Ar/^{39}Ar$ age dating. The results of the dating indicate a plateau age of 123.2 $\pm$ 1.1 million years for the diorite and 123.4 $\pm$ 1.3 million years for the mafic-ultramafic rock. Both of these ages are mid-Early Cretaceous (Bittenbender and others, 2004).

Bureau Investigation: BLM investigators collected five samples from the Summit Hill occurrence area. Two of these samples were from mafic-ultramafic rocks with high magnetite content, at the site reported to be the ACNC discovery location (Bill Ellis, personal communication, 2002). The other three samples were from the immediate contact zone between the diorite and the surrounding mafic-ultramafic rocks and from the mafic-ultramafic rocks away from the contact or reported occurrence.

The two samples from the reported occurrence returned low precious and base metal values. These samples were of pyroxenite with about 20 to 30 percent magnetite (sample 10009) and peridotite with 15 to 20 percent magnetite and very minor chalcopyrite (sample 10809). The highest returns from the two samples were <5 ppb platinum, 29 ppb palladium (sample 10809), 195 ppm copper (sample 10009), and 55 ppm nickel (sample 10009). Another sample from the ultramafic rocks returned even lower precious and base metal values (sample 10810).

The three samples collected from the immediate contact were higher in gold and copper. Two were samples of diorite (sample 10808) or quartz-bearing gabbro (sample 10231) and one was of gabbro (sample 10232). The highest returns from these samples were 22 ppb gold (sample 10808) and 495 ppm copper (sample 10231).

Mineral Development Potential: Low

Conclusions: BLM sampling could not duplicate the precious and base metal concentrations reported by investigators that discovered the Summit Hill occurrence (Ellis and others, 2004). It is likely that the occurrence as discovered is very small or scattered in nature. The fact that the $^{40}Ar/^{39}Ar$ age dates from the rocks in the area are Early Cretaceous suggests the occurrence is related to the eastern suite of mafic-ultramafic rocks in the southern Delta River district rather than to the western suite as previously thought (Bill Ellis, personal communication, 2002). The eastern suite seems to hold a lower potential for hosting significant metal deposits than does the western suite.

ANTLER

Alternate Name(s):		Map No:	541
		MAS No:	0020680275
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	SW1/4 Sec: 06, T20S, R10E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.209562	Longitude:	-145.904764

Geographic: The Antler occurrence is located on the southeast end of a rounded knob, southeast of Fish Lake. It is about 2¼ miles northeast of the mouth of Wildhorse Creek where it flows into the Delta River.

Access: The Antler occurrence can be accessed most easily by helicopter. There is little underbrush in the area to limit helicopter access.

History: The Antler occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002). Blocks of claims have been staked and optioned by various companies that cover the Antler occurrence. The current claim holders are Nevada Star Resources.

ARDF Name / No.: Antler / MH179 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Antler occurrence is part of the Fish Lake mafic-ultramafic complex. This mafic-ultramafic complex is the largest and least deformed of the sill-form complexes in the area that are thought to represent feeders for the overlying Triassic Nikolai basalts of the Wrangellia terrane (Nokleberg and others, 1992b). The Fish Lake complex comprises the northeastern limb of the Amphitheater syncline, which plunges to the northwest (Stout, 1976). The complex extends for more than 20 miles northwest-southeast, and is up to about 2 miles wide. Numerous nickel-copper-PGE occurrences, similar to the Antler occurrence, have been found associated with the Fish Lake Complex.

In the Antler area the Fish Lake complex is comprised mainly of variably serpentinized peridotite cut by plugs of gabbro and rare diabase dikes. Rubble in frost heaves also indicates the presence of pyroxenite. There are spotty occurrences of sulfide minerals within the mafic and ultramafic rocks. Sulfide minerals include pyrrhotite, chalcopyrite, and apparently, pentlandite. The sulfides appear to be more evenly disseminated in the serpentinized peridotite, but patchier in the more variably serpentinized rock.

Bureau Investigation: BLM personnel mapped and sampled the Antler occurrence in 2002. Results of the sampling indicate low concentrations of precious and base metals. Personnel collected samples of variably serpentinized peridotite, gabbro, and a mix of gabbro and pyroxenite from a frost-heaved rubble pile. The highest platinum, palladium, and cobalt came from a 7-foot sample across variably serpentinized peridotite with disseminated and patchy pyrrhotite and chalcopyrite (platinum = 46 ppb, palladium = 101ppb, cobalt = 112 ppm; sample 10067). The highest nickel, 1,240 ppm, was also from peridotite (sample 10214). The highest copper, 1,015 ppm came from the sample of gabbro and pyroxenite rubble (sample 10216).

Mineral Development Potential: Low

Conclusions: The Antler occurrence, by itself, is not particularly significant. However, it is one of many similar mineral occurrences in the Fish Lake mafic-ultramafic complex. The complex is currently being explored by a large international mining company. The large size of the complex is significant because it takes a large quantity of magma to form an economic ore body, particularly if the original concentration of metals in the magma is low.

FISH LAKE

Alternate Name(s):	Nikolai	Map No:	542
		MAS No:	0020680167
Deposit Type:	Ultramafic	Commodities:	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-4, A-5, B-5	TRS:	
Meridian:	Fairbanks	Elevation:	about 3,500 to 4,000 feet
Latitude:		Longitude:	

Geographic: The Fish Lake mafic-ultramafic complex, as exposed, is about 24 miles long and about 2 miles wide. It lies to the west-northwest and east-southeast of Fish Lake, from which it gets its name, south of the Alaska Range and north of the Amphitheater Mountains. Eureka Creek flows approximately along the northern boundary of the Fish Lake Complex. (See Figure 13, mafic-ultramafic complexes in area, p. 57)

(Note: The Fish Lake complex, as defined here, includes several nickel-copper-PGE occurrences that are described elsewhere in this report. It is included here in a separate property description due to the familiarity many people have with the name "Fish Lake" and their association of the Fish Lake mineralized belt with nickel-copper-PGE occurrences in the Delta River district as a whole. The USGS ARDF marks a reported occurrence of chromium in mafic-ultramafic rocks of the Fish Lake complex as "Fish Lake" [ARDF #MH178].)

Access: Parts of the Fish Lake complex are accessible from the Delta River, which is commonly navigated by small water craft for recreation between the Lower Tangle Lakes, off the Denali Highway, and the Richardson Highway near the mouth of Phelan Creek. Other parts of the complex are also accessible by all-terrain-vehicle (ATV) trail from the Richardson Highway, but access to the trail requires crossing the Delta River near the mouth of Phelan Creek, which is very difficult for ATV's during most times of the year. The complex is most efficiently accessible by helicopter.

History: The first mention of mineralized rock associated with the Fish Lake complex is by Foley and others (1989) in 1989 in their report on PGE occurrences in Alaska. In their report, the authors reference unpublished data from the U.S. Bureau of Mines (Foley and others, 1989).

American Copper and Nickel Company (ACNC) began investigating the nickel-copper-PGE potential of the area in 1992 (Freeman, 2004) and staked a large block of claims that included much of the Fish Lake complex in 1995-1996 (BLM claim staking records, 1996). In 1997, ACNC formed a joint venture with Fort Knox Gold Resources to explore the area (Freeman, 2004). These companies conducted geologic mapping, rock-chip sampling, hand trenching, airborne and ground geophysics, and drilled eight holes on various parts of the Fish Lake complex (Ellis and others, 2004; Freeman, 2004). By 1999 Fort Knox acquired all of ACNC claims in the area. They subsequently dropped their claims by 2002; they did no significant work on the property during this time (Freeman, 2004).

MAN Resources Corp., Monty D. Moore and Associates, and Pacific Rainier Inc. began work in the area in 1996 to 1997 (Freeman, 2004; Alan Day, personal communication, 2005). By 2000 Nevada Star Resource Corp (Nevada Star) acquired all the claims held by these companies. Following a joint venture with Fort Knox on the Canwell property, Nevada Star acquired all the claims held by the former in the area by 2002 (Alan Day, personal communication, 2005). Between 1997 and 2003 Nevada Star conducted airborne and ground geophysical surveys; geologic mapping; geochemical rock, soil, and stream sediment sampling; and diamond drilling (Freeman, 2004; Alan Day, personal communication, 2002-2005).

In 2004 Nevada Star entered into an option agreement with Anglo American Exploration (USA) Inc. (Anglo American) to explore the Fish Lake property. By early 2005, Anglo American had conducted ground geophysical surveys and soil sampling surveys over the property (Nevada Star news release, 23 March, 2005) and announced plans to drill test coincident geological, geophysical, and geochemical anomalies generated by the earlier work (Nevada Star news release, 21 April, 2005).

ARDF Name / No.: None (see note in Geographic section, above)
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The Fish Lake complex is a southward dipping, mafic-ultramafic, layered, sill-form body of Triassic age that is from 3,000 to 7,000 feet thick and which extends for over 20 miles in a west-northwest/east-southeast direction (Ellis and others, 2004; Pellerin and others, 2003b). It is part of a belt of Triassic age mafic-ultramafic intrusions that extend along the southern flank of the Alaska Range for over 120 miles (Foley and others, 1997). These intrusions are thought to represent the underlying feeder systems to the voluminous Triassic Nikolai tholeiitic basalts that are a distinctive suite of rocks of the Wrangellia terrane (Nokleberg and others, 1985; 1992b; Bill Ellis, personal communication, 2002; Jones and others, 1977). The complex is comprised of at least four magmatic cycles, evident in layers that range from dunite to peridotite to gabbro (Ellis and others, 2004). The southward dipping Fish Lake body seems to be connected at depth to the north dipping Tangle sill-form complex to the south (Schmidt and others, 2002; Pellerin and others, 2003b). The two complexes, along with overlying, Triassic Nikolai basalts, form the west-northwestward plunging Amphitheater syncline (Stout, 1976).

The Fish Lake complex includes numerous magmatic concentrations of nickel, copper, and PGE. The base and precious metals are associated with sulfides, particularly pyrrhotite, chalcopyrite, and pentlandite. The sulfides are disseminated and net-textured within the variably serpentinized mafic and ultramafic rocks of the complex. In places, there may have been some upgrading of metal concentrations associated with dikes that crosscut the layering in the sill-form complex, e.g., Tres Equis prospect (Map no. 564).

Small scale magmatic layering in the Fish Lake complex is evident by compositional and textural differences across generally horizontal layers (Figure 29). This small-scale layering is thought to represent crystal fractionation and settling. It is evidence of a quiescent magma chamber and is associated with a magmatic setting for reef-type PGE deposits.

Figure 29. Layering defined by compositional variations in Fish Lake gabbro.

In spring 2005 Anglo American drilled eight diamond drill holes, over 7,330 feet, to test the mineralization in the Fish Lake complex. The highest grade intercepts reported included 0.97 percent nickel and 0.14 percent copper over 13.3 feet, including 3.22 percent nickel and 0.38 percent copper over 9 inches from about 500 feet depth. A 1 inch thick massive sulfide zone was also encountered in the hole that contained 12 percent nickel. Results from other holes include 0.27 percent nickel and 0.06 percent copper over 40 feet from 1,180 feet, including 0.39 percent nickel and 0.05 percent copper over 5 feet; and 0.31 percent nickel, 0.14 percent copper, and 0.2 ppm PGE over 109 feet from 340 feet depth, including 0.50 percent nickel, 0.23 percent copper and 0.4 ppm PGE over 7 feet (Nevada Star news release, September 20, 2005; Precise locations for the drill holes were not provided).

Bureau Investigation: BLM investigators examined numerous occurrences in the Fish Lake complex. The reader is referred to the individual site descriptions for details regarding the mineralogy, petrology, extent, and tenor of the occurrences. Some of the more minor occurrences in the complex are included in the prospect summary table (Appendix Table A-1), but are not described in individual site descriptions.

Table 15. Mineral occurrences in the Fish Lake complex.

Mineral occurrence	Map numbers
Antler	541
BM-75	559
Eb No. 4	556
LFF	555
Lucky 7	562
MF1996C-40	563
MF1996C-45	561
MF1996C-70	551
Tres Equis	564
Tv Bas	591
WEG	567
Wild One	550

Mineral Development Potential: Medium

Conclusions: The Fish Lake complex represents a large intrusive body that holds the potential for hosting significant concentrations of base and precious metals. There is a potential for large, low grade concentrations of commodities as well as for smaller, higher grade mineral occurrences. To date, no economic deposits have been discovered, but the complex is still being explored.

LFF

Alternate Name(s):		Map No:	555
		MAS No:	0020680219
Deposit Type:	Ultramafic	Commodities:	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4Sec: 23, T19S, R08E
Meridian:	Fairbanks	Elevation:	3,750 feet
Latitude:	63.25233	Longitude:	-146.16033

Geographic: The LFF prospect is located on the gently northward sloping, southern side of the Eureka Creek valley. It is about 1.5 miles south of the creek and southwest of the mouth of Broxson Gulch. It is approximately 6 miles west of Fish Lake.

Access: The LFF prospect is located on a gentle slope and is readily accessible by helicopter.

History: This area was explored by American Copper and Nickel Company (ACNC) geologists looking for copper, nickel, and PGE in the 1990's (Bill Ellis, personal communication, 2002). The prospect was drilled by Nevada Star Resources in 2003. The prospect is within a block of claims optioned by Anglo American Exploration (USA) Inc. from Nevada Star Resources.

ARDF Name / No.: LFF / MH172 **Alaska Kardex:** None

Production: None

Workings and Facilities: This prospect was drilled in 2003 by Nevada Star Resources.

Geologic Setting: The LFF prospect is part of the Fish Lake mafic-ultramafic complex on the south flank of the eastern Alaska Range. The Fish Lake complex is the largest of five similar complexes defined by mineral exploration companies targeting nickel-copper-PGE mineralization in the area in the 1990's (Bill Ellis, personal communication, 2002). The Fish Lake sill-form complex is thought to be a subvolcanic feeder for the voluminous, overlying, Triassic Nikolai flood basalts that characterize the Wrangellia terrane in the area (Nokleberg and others, 1992b). The rocks at the prospect are primarily peridotite.

Nevada Star Resources released information on their drilling of the LFF prospect in 2003. One hole was drilled north at -60 degrees and intersected copper, nickel, and PGE mineralization from 109 to 118 feet. The 9-foot interval averaged 1,175 ppb platinum, 1,022 ppb palladium, and 3,319 ppm nickel. A vertical hole at this same location did not intersect mineralization (Nevada Star news release, November 5, 2003).

Bureau Investigation: BLM geologists found that the LFF prospect consists of a small rubblecrop exposure approximate 5 feet by 5 feet in area. The rubblecrop consists of peridotite with disseminated to net textured pyrrhotite and pentlandite. Samples of the rubblecrop yielded anomalous copper at 1,820 ppm (sample 10343), nickel at 1.14 percent (sample 11195), and palladium at 1.47 ppm (sample 10343).

Mineral Development Potential: Low to Medium

Conclusions: The ultramafic intrusive rocks of the Wrangellia terrane are considered to have a high potential for hosting nickel-copper-PGE deposits. Localized, high-grade occurrences, such as LFF, suggest mineralizing processes existed at one time to concentrate metals. The presence of these occurrences encourages further exploration to find more significant metal concentrations.

EB NO. 4

Alternate Name(s):		Map No:	556
		MAS No:	0020680218
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 22, T9S, R08E
Meridian:	Fairbanks	Elevation:	3,900 feet
Latitude:	63.25293	Longitude:	-146.18378

Geographic: The Eb No. 4 occurrence is located south of the mouth of Landslide Creek, south of Eureka Creek. It is about half a mile east of the '4120' feet elevation site marked on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: Access to the Eb No. 4 occurrence is most practical by helicopter.

History: The Eb No. 4 occurrence was discovered in the 1990's by mineral exploration companies targeting the mafic-ultramafic rocks in the area for nickel-copper-PGE deposits (Bill Ellis, personal communication, 2002). Blocks of claims have been staked and optioned by various companies that cover the Eb No. 4 occurrence. The current claim holders are Nevada Star Resource Corp. Nevada Star drilled the EB No. 4 occurrence in 2003. Results of their drilling have not been made public. Anglo American Exploration (USA) Inc. optioned claims covering the Eb No. 4 occurrence from Nevada Star in early 2004 (News Release, March 15, 2004, by Nevada Star Resource Corp.) and released them in the fall of 2006 (News Release, September 18, 2006, by Nevada Star Resource Corp.).
(Note: "Eb" stands for Eberhart (sp?) who was a geophysicist for either ACNC or Cominco (Bill Ellis, personal communication, 2003); so this 'occurrence' may only be a geophysical anomaly.)

ARDF Name / No.: Eb No. 4 / MH170 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Eb No. 4 occurrence is part of the Fish Lake mafic-ultramafic complex on the south flank of the eastern Alaska Range. The Fish Lake complex is the largest of five similar complexes defined by mineral exploration companies targeting nickel-copper-PGE mineralization in the area in the 1990's (Bill Ellis, personal communication, 2002). The Fish Lake sill-form complex is thought to be a subvolcanic feeder for the voluminous, overlying, Triassic Nikolai flood basalts that characterize the Wrangellia terrane in the area (Nokleberg and others, 1992b).

About 0.4 miles southwest of the Eb No. 4 occurrence BLM investigators sampled iron-stained serpentinized dunite. The serpentinization appears to have variably affected dunitic rocks in the area, with some rocks completely serpentinized and others only partially serpentinized.

There are no rocks cropping out in the part of the Eb No. 4 occurrence drilled by Nevada Star in 2003. The closest outcrop is about 200 feet to the north-northeast where serpentinized peridotite crops out. Rubblecrop near the drill site comprises variably serpentinized peridotite and pyroxenite with up to about 7 percent sulfides in places. Much of the rubble is angular, suggesting it may be close to its place of origin. The rubble near the drill pad extends about 50 feet by 150 feet.

Bureau Investigation: BLM investigators collected three samples of serpentinized dunite in the area of the Eb No. 4 occurrence (samples 10341, 10835-836). Sample 10835 across 8 feet of exposed rock returned 103 ppb platinum, 1,605 ppm nickel, and 276 ppm copper. The other samples had even lower concentrations of base and precious metals.

The BLM collected two samples of rubblecrop from the Eb No. 4 site where Nevada Star drilled in 2003. The highest results from these samples were 631 ppm copper, 844 ppm nickel (sample 10854), 101 ppb palladium, and 85 ppb platinum (sample 10725). A sample of outcropping peridotite from about 200 feet northeast of the drill pad returned 285 ppm copper, 2,350 ppm nickel, 112 ppb palladium, and 49 ppb platinum (sample 10853)

Mineral Development Potential: Low

Conclusions: The Eb No. 4 occurrence is the site of diamond drilling by mineral exploration companies. The companies were apparently drilling a geophysical anomaly at the site. As such, the BLM's surface investigation does not adequately evaluate the mineral potential of the occurrence. Nevada Star Resource Corp., who drilled the site in 2003, released the results of their 2003 drilling from farther to the east, but did not include information from the Eb No. 4 drilling (News Release, November 5, 2003 by Nevada Star Resource Corp). It may be assumed that the results were not noteworthy from the site or they would probably have been released.

BM-75

Alternate Name(s):		**Map No:**	559
		MAS No:	0020680220
Deposit Type:	Ultramafic	**Commodities:**	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, A-5	TRS:	SE1/4 Sec: 21, T19S, R08E
Meridian:	Fairbanks	Elevation:	4,275 feet
Latitude:	63.24934	Longitude:	-146.20972

Geographic: The BM-75 site is on the northwest shoulder of a small hill, about 6 miles west-northwest of Fish Lake. It is about 1.5 miles south of Eureka Creek.

Access: Access to the site is easiest by helicopter. There are numerous landing sites for a light helicopter near the occurrence.

History: The BM-75 site came from Bill Ellis' pre-publication of mineral sites in the Mt. Hayes quadrangle for the USGS Alaska Data Resource File program. He reported an occurrence of nickel, copper, and PGE, at the BM-75 site (Bill Ellis, written communication, 2002).

Ellis and others (2004) reference Foley (1992) and Foley and others (1989) as having reported analytical results for samples collected from the BM-75 occurrence. They also cite unpublished data of the U.S. Bureau of Mines from 1985 (Ellis and others, 2004) indicating the occurrence was discovered around 1985.
(Note: The name "BM-75" apparently comes from Bureau of Mines site number 75, named "Fish Lake," in Foley and others, 1989.)

ARDF Name / No.: BM-75 / MH171 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The BM-75 site is hosted within the Fish Lake mafic-ultramafic complex. This mafic-ultramafic complex is the largest and least deformed of the sill-form complexes in the area that are thought to represent magmatic feeders for the overlying Triassic Nikolai basalts of the Wrangellia terrane (Nokleberg and others, 1992b). The Fish Lake complex comprises the northeastern limb of the Amphitheater syncline, which plunges to the northwest (Stout, 1976). The complex extends for more than 20 miles northwest-southeast, and is up to about 2 miles wide. Numerous nickel-copper-PGE occurrences have been identified in the Fish Lake complex.

Mafic and ultramafic rocks at the BM-75 site include leucogabbro, gabbro, feldspathic peridotite, and peridotite. A pod or vein of troctolite, exposed for approximately 3 feet by 1.5

feet, is also present. The BM-75 site is situated in a transition zone between peridotite to the east-southeast and gabbro to the west-northwest. This transition likely represents one of the four to five magmatic cycles defined in the Fish Lake complex (Bill Ellis, personal communication, 2002; Ellis and others, 2004). There is evidence of magmatic layering in outcrops in the area. The mafic and ultramafic rocks are variably serpentinized and contain finely disseminated pyrrhotite and very minor chalcopyrite.

Bureau Investigation: BLM personnel searched for the location of the BM-75 site in 2002 and 2003. They collected four samples of mafic and ultramafic rocks with minor sulfides from the area indicated as the occurrence. No distinctive concentrations of sulfides were found. Analytical results from the samples collected by the BLM indicate low base and precious metal values. The highest values were 12 ppb platinum (sample 10849), 21 ppb palladium (sample 10849), 4 ppb gold (sample 10850), 362 ppm copper (sample 10849), 1,240 ppm nickel (sample 10211), and 127 ppm cobalt (sample 10211).

Mineral Development Potential: Low

Conclusions: The BLM's investigation of the BM-75 site was based on limited information. Following the publication of the USGS Alaska Resource Data File for the Mt. Hayes quadrangle (Ellis and others, 2004) it becomes apparent that the site refers to unpublished U.S. Bureau of Mines analytical results from samples collected from the Fish Lake complex (Foley and others, 1989). The coordinates given for the anomalous samples reported by Foley and others (1989) are to the closest minute, i.e., plus or minus about 1.15 miles. The site examined and sampled by the BLM was probably not the site where anomalous samples were collected by the U.S. Bureau of Mines.

TRES EQUIS

Alternate Name(s):		Map No:	564
		MAS No:	0020680347
Deposit Type:	Ultramafic	Commodities:	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 12, T19S, R07E
Meridian:	Fairbanks	Elevation:	3,600 feet
Latitude:	63.27983	Longitude:	-146.30972

Geographic: The Tres Equis prospect is located southeast of the Eureka Glacier and is approximately 1,000 feet northwest of hill 3710. It is located on a bluff overlooking a small pond to the north.

Access: The prospect is easily accessed by helicopter.

History: This area was explored by American Copper and Nickel Company (ACNC) geologists looking for copper and nickel during the mid to late 1990's (Bill Ellis, personal communication; 2002). Claims currently (2006) covering the occurrence are held by Nevada Star Resources, Inc.

ARDF Name / No.: Tres Equis / MH104 **Alaska Kardex:** None

Production: None

Workings and Facilities: A trench was hydraulically washed in the side of a north-facing bluff in 1996 (Figure 30). Three holes were drilled to try to intercept the surface mineralization at depth. The first hole drilled was 627 feet deep and drilled in 1997; the second and third 200-foot holes were drilled in 1998 (Ellis and others, 2004). The drill holes are approximately 200 feet apart east, west, and south of the discovery and appear to triangulate on the discovery at depth. The east hole (63.27958, -146.30925) was drilled at an azimuth of 230 degrees and a dip of -60 degrees; the west hole (63.27975, -146.31057) was drilled at an azimuth of 90 degrees and a dip of -55 degrees; the south hole (63.27917,-146.30989) was drilled at an azimuth of 350 degrees and a dip of -60 degrees.

Geologic Setting: This prospect is located in a belt of mafic and ultramafic rocks belonging to the Late Triassic age Wrangellia terrane (Nokleberg and others, 1992b). The rocks at the prospect are primarily ultramafic peridotite which has been cut by gabbro.

Bureau Investigation: The BLM observed a shallow east dipping gabbro dike cutting ultramafic rocks. It is exposed for approximately 100 feet in the north slope of a small bluff overlooking a small ponded depression. The dike is approximately 20 feet wide near the base and approximately 2 feet wide at the top of the exposure. The BLM found evidence of sampling and hydraulic washing of the outcrop and located the three diamond drill holes. The holes were drilled in the late 1990's by ACNC but failed to find significant mineralization at depth (Ellis and others, 2004). Massive to semi-massive to net textured sulfides of pyrrhotite/pentlandite and chalcopyrite are found in clasts and brecciated margins of the dike and seem more prevalent in the hanging wall. Select samples indicate that the sulfides contain concentrations of nickel as high as 4.8 percent, cobalt as high as 3,020 ppm, copper to 7.29 percent (sample 11015), platinum to 259 ppb (sample 1044), and palladium to 1,005 ppb (sample 11015). This is comparable to results reported by Ellis and others (2004).

Mineral Development Potential: Medium

Conclusions: The ultramafic intrusive rocks of the Wrangellia terrane are considered to have a high potential for hosting Cu-Ni-PGE deposits. Hi-grade localized occurrences, such as Tres Equis, make inviting drill targets and demonstrate that the ultramafic complexes in the area contain high grade massive sulfides. Further exploration of the area with geophysics followed by drilling to the east and west of the occurrence on strike could define a larger area of mineralization.

Figure 30. View to the south of the Tres Equis occurrence. Arrow shows location of trench exposing gabbro dike.

WEG

Alternate Name(s):		Map No:	567
		MAS No:	0020680214
Deposit Type:	Ultramafic	Commodities:	Cu, Ni, Cr, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NE1/4 Sec: 10, T19 S, R07E
Meridian:	Fairbanks	Elevation:	3,700 feet
Latitude:	63.28948	Longitude:	-146.37008

Geographic: The WEG occurrence is located near the terminal moraines of the Eureka Glacier, on the west margin of the glacial valley. Here, outwash from the glacier has cut through sediments to bedrock.

Access: The site is accessible most easily by helicopter. The area is quite brushy, but a light helicopter can land within a few hundred feet of the occurrence.

History: The WEG occurrence was discovered during nickel-copper-PGE exploration in the 1990's (Bill Ellis, personal communication, 2002), probably by American Copper and Nickel Co. (ACNC) geologists.

ARDF Name / No.: Unnamed (west of the terminus of Eureka Glacier) / MH096
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The WEG occurrence lies near the northern margin of the relatively undisturbed sequence of rocks that host the Fish Lake and Tangle ultramafic complexes. Immediately to the north is a south-verging thrust fault (Rainy Creek Thrust/Eureka Creek fault of Nokleberg and others, 1992b) that places the more deformed ultramafic complexes to the north (Rainy and Eureka complexes) on top of the less deformed complexes to the south (Fish Lake and Tangle complexes).

The WEG occurrence is situated in an area where regional airborne magnetic data indicate a magnetic high in the subsurface (Burns and others, 2003). The magnetic high in this area is continuous from one farther to the east that represents the Fish Lake ultramafic complex, so the mafic-ultramafic rocks at the WEG occurrence are likely part of the Fish Lake complex.

There is a transition in rock types from south to north in the WEG area that goes from pegmatitic gabbro, through gabbro, pyroxenite/peridotite, peridotite, to dunite. The ultramafic parts of this sequence are variable serpentinized.

If the WEG occurrence is part of the Fish Lake complex as suggested above, the occurrence would be situated on the northern, south-dipping, limb of the Amphitheater Syncline (Stout, 1976). As such, the stratigraphic succession from south to north described above would represent progressively deeper parts of the sequence. This succession is typical of the multiple magmatic cycles defined in the relatively undisturbed Fish Lake complex by previous workers (Bill Ellis, personal communication, 2002).

Mineralized rock seems to be restricted mainly to the pyroxenite to peridotite layers. Here, disseminated sulfides occur, particularly chalcopyrite and likely pentlandite and pyrrhotite. Copper alteration minerals can be seen on joint surfaces.

Bureau Investigation: BLM personnel collected three samples from the WEG occurrence in 2002; two samples of mineralized pyroxenite to peridotite and one sample of iron-stained gabbro. The highest values came from the pyroxenite/peridotite, which returned 1,640 ppm copper, 1,295 ppm nickel, 1,130 ppm chromium, but only 60 ppb platinum and palladium (samples 10026-027). The highest gold value, 86 ppb, came from the sample of gabbro (sample 10025).

Mineral Development Potential: Low

Conclusions: The WEG occurrence is interesting because it is evidence of an undisturbed magmatic cycle within the Fish Lake sill-form complex. It illustrates the stratigraphic position within a magmatic cycle where mineralized rock might be expected. It also illustrates one of the types of nickel-copper-PGE deposits (i.e., reef-type deposit within a quiescent magma chamber) that might be targeted in the district. The grades evident in the BLM samples and the extent of the mineralized rock exposed at the occurrence make the occurrence itself economically unattractive.

NOREL

Alternate Name(s):		Map No:	619
		MAS No:	0020680279
Deposit Type:	Ultramafic	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NW1/4 Sec: 12, T21S, R10E
Meridian:	Fairbanks	Elevation:	3,400 feet
Latitude:	63.11436	Longitude:	-145.75381

Geographic: The Norel occurrence is located approximately 4 miles north of the Denali highway on the east rim of a steep gorge that drains Fourteenmile Lake.

Access: Access to the occurrence on foot involves a moderate hike north from the Denali highway over hilly and sometimes brushy terrain. There are suitable helicopter landing sites nearby if quicker access is required.

History: Nokleberg and others (1991) reported copper in mafic cumulate rocks at this site. Geologists working in the area over the last few years refer to this occurrence as Norel (Bill Ellis, oral comm., 2002). State claims covering the area are currently held by Nevada Star, Inc.

ARDF Name / No.: Norel / MH191 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Rocks at the Norel occurrence are mapped by Nokleberg and others (1992b) as gabbro, diabase, and metagabbro of Late Triassic (?) age and are considered part of the Wrangellia Terrane.

Bureau Investigation: The BLM observed a small side gully that exposes a 10- to 15-foot-thick, sub-horizontal gabbro dike or sill cutting across the surrounding ultramafic peridotite to melagabbro country rock at the Norel occurrence. Semi-massive to net textured pyrrhotite is present in discontinuous, small lenses along the oxidized contact margins of the gabbro intrusion. The gabbro body is exposed in the face of the gorge for a distance of about 400 feet. The BLM sampled the upper and lower margins of the peridotite, the upper margin of the gabbro, as well as across the width of the gabbro dike. The gabbro and peridotite margins appear to be mineralized, with high grade samples of the peridotite yielding 758 ppm copper (sample 10363). A sample across the width of the gabbro returned 491 ppm copper (sample 10903). Samples collected by the BLM were not able to duplicate the 3,200 ppm copper value in ultramafic rocks reported by Nokleberg and others (1991). Chromium and nickel appear to be more concentrated in the margins with values as high as 1,980 ppm (sample 10362) and 2,110 ppm (sample 10363) respectively. Interestingly, a 20-foot sample of peridotite, approximately 300 yards northeast of the occurrence contained only trace amounts of sulfide but had 1,480 ppm chromium and 1,205 ppm nickel (sample 10364).

Mineral Development Potential: Low

Conclusions: Exploration in the area most recently has placed greater emphasis on PGE minerals over copper and nickel. This site has very low concentrations of PGE and sub economic concentrations of copper and nickel. Mineralization at this occurrence is associated with narrow intrusive contact margins and, therefore, is unlikely to yield significant tonnages. Cumulate rocks are known to concentrate some minerals in layers. It may be worthwhile to explore more of the ultramafic rocks in the area to see if greater concentrations of copper, nickel, and PGE minerals can be found.

DUNITE HILL

Alternate Name(s):	Tangle complex Tangle ultramafic complex	Map No:	622
		MAS No:	0020680274
Deposit Type:	Ultramafic	**Commodities:**	Ni, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NE1/4 Sec: 25,T21S,R10E
Meridian:	Fairbanks	Elevation:	4,220 feet
Latitude:	63.06780	Longitude:	-145.74536

Geographic: The Dunite Hill occurrence is located within 1 mile north of the Denali Highway, west of Paxson Mountain. It is the hill of elevation 4,220 feet, marked on the USGS A-4, 1:63,360-scale, topographic map. It lies between Fourteenmile Lake to the northwest and Octopus Lake to the southeast.

Access: The paved Denali Highway passes within 1 mile to the south of the Dunite Hill occurrence. From the highway, access to the occurrence is easy on foot.

History: The Dunite Hill occurrence was discovered and defined as part of the Tangle ultramafic complex by mineral exploration companies searching for nickel-copper-PGE deposits associated with ultramafic rocks in the area in the 1990's (Bill Ellis, personal communication, 2002). Subsequent work by the USGS in conjunction with the BLM's mineral assessment studies in 2002 identified a buried conductive anomaly and associated gravity high beneath Dunite Hill (Schmidt and others, 2002; Pellerin and others, 2003b). The Dunite Hill area was the focus of ground geophysical investigations by Nevada Star Resources, the claim holders in the area, in early 2003 (Alan Day, personal communication, 2003). In March, 2004, Anglo American Exploration (USA), Inc. optioned parts of Nevada Star Resource Corp.'s "MAN" claims in the area including the Dunite Hill occurrence. They apparently began exploring the area in the spring of 2004 (News Release, March 15, 2004, by Nevada Star Resources Corp.), but specific results for Dunite Hill are not available.

ARDF Name / No.: Dunite Hill / MH194 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Dunite Hill occurrence is one of the southernmost nickel-copper-PGE occurrences in the Delta River district. It is part of the Tangle ultramafic complex (Figure 13. p. 57). As presently understood, the Dunite Hill occurrence is a buried, geophysical anomaly defined by coincident high conductivity, high magnetic susceptibility, and high density. It seems to be associated with the axis of the Amphitheater syncline, defined originally by Stout (1976). The Dunite Hill anomaly suggests a dense root of ultramafic rock that may represent the central feeder zone to a thick sequence of overlying Triassic Nikolai basalts. Smaller conductivity anomalies modeled within the host Tangle Formation are characteristic of sulfide bodies (Schmidt and others, 2002; Pellerin and others, 2003a; 2003b).

There is no surface expression of the Dunite Hill occurrence as defined. Dunite, variably serpentinized, and peridotite are exposed in the area.

Bureau Investigation: BLM investigators collected three rock chip samples from the Dunite Hill area (samples 10028, 10066, 10213). None of the samples contained significant concentrations of precious or base metals.

Mineral Development Potential: Medium

Conclusions: The Dunite Hill occurrence is ranked with a medium development potential based on the presence of a geophysical anomaly that is likely to attract further mineral exploration attention, possibly drilling. In addition, the site is part of the large Tangle mafic-ultramafic complex that is currently being investigated by a mineral exploration company. The large size of the Tangle complex is important because it requires a large quantity of magma from which to form an economic ore body, particularly if the concentration of metals in the magma is characteristically low.

AMPHI

Alternate Name(s):		Map No:	623
		MAS No:	0020680097
Deposit Type:	Ultramafic	Commodities:	Cu, Ni, PGE
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	SE 1/4 Sec: 25, T21S, R10E
Meridian:	Fairbanks	Elevation:	3,700 feet
Latitude:	63.05801	Longitude:	-145.74858

Geographic: The Amphi occurrence, as defined by the BLM, is situated north of the Denali Highway, near mile marker 13. The BLM's site likely marks claim number one of 55 claims originally staked as the Amphi group of claims. The other claims extend to the northwest of claim number one and lie generally to the east of Fourteenmile Lake.

Access: Access is easily accomplished by driving the Denali Highway and then by foot, within 10's of yards of the highway.

History: K.W. Stanley, of Anchorage, Alaska, staked 55 claims covering the Amphi occurrence and recorded the claims in the Chitina Recording District on February 16, 1971 (Book 8 Lode, Pg. 256). The only assessment work accomplished on the claims is recorded in 1972 (Alaska Kardex 68-139). There is no further evidence of activity on the claims.

The Amphi area is included in a large block of claims currently held by Nevada Star Resources.

ARDF Name / No.: Gravel Pit / MH163 **Alaska Kardex:** 68-139

Production: None

Workings and Facilities: None

Geologic Setting: The Amphi occurrence comprises mafic and ultramafic rocks cropping out in an area stripped for presumed sand and gravel resources. Mafic and ultramafic rocks include mainly gabbro to peridotite. The occurrence is situated near the nose, or southeast end, of the northwest plunging Amphitheater syncline of Stout (1976). Work by the USGS in conjunction with the BLM has defined a buried magnetotelluric (MT), conductive anomaly and concordant gravity anomaly at about 1 kilometer depth in the area of the Amphi occurrence (Glen and others, 2002a; Pellerin and others, 2003a, 2003b). The anomaly is coincident with the axis of the syncline and is evident on a second line of MT data approximately 10 miles to the northwest. Preliminary models suggest dense, conductive bodies, possibly accumulations of sulfides, in the host rocks underlying the axis of the syncline (Schmidt and others, 2002; Pellerin and others, 2003a, 2003b).

BLM personnel examined the mafic and ultramafic rocks that have been exposed by stripping at the Amphi occurrence. (The stripping seems to have been done in association with construction and/or maintenance of the nearby Denali Highway.) The predominant rock type is massive peridotite. In places the peridotite is iron-stained and contains fine-grained, disseminated pyrrhotite and chalcopyrite. In places the peridotite is partially serpentinized.

Bureau Investigation: BLM personnel collected three samples of exposed rock (samples 10064-065, 10212). The samples contained anomalous concentrations of copper and nickel and minor PGE. Sample 10064 of peridotite with less than 1 percent disseminated chalcopyrite contained 1,465 ppm copper, 2,850 ppm nickel, 69 ppb platinum, 69 ppb palladium, and 71 ppb gold.

Mineral Development Potential: Medium

Conclusions: The development potential of the Amphi area is considered to be medium. The current claim holders (Nevada Star Resources) have optioned their claims to a large international mining company that has been actively exploring the area (Monty Moore, Alan Day, personal communication, 2005). The Amphi occurrence is also close to the site where the USGS detected a large conductive body at depth that may represent a potential drill target.

Skarn Deposits

There are 22 recognized skarn occurrences in the Delta River Mining District study area; they are restricted to the south side of the Alaska Range within the Wrangellia terrane (Figure 31). Skarn occurrences in the study area stretch along the entire length of the district from the Maclaren Glacier Lode (Map no. 104) in the west to Chisna Ridge (Map no. 471) in the east. A map of skarn occurrences shows a concentration west of the Delta River between Ann Creek and Broxson Gulch, and a concentration of occurrences in the Slate Creek area in the east.

The skarn occurrences in the Delta River study area are generally hosted in limestones and calcareous volcaniclastic rocks of the Pennsylvanian to Permian age Slana Spur Formation (Nokleberg and others, 1992b). The skarn occurrences are generally high in copper and iron and low in gold, silver, and PGE minerals. Mafic to ultramafic intrusions of Triassic age are generally responsible for regional hornfelsing and contact metamorphism of calcareous rocks in the west whereas more felsic Late Paleozoic monzodiorite intrusions appear to be responsible for most of the skarn mineralization in the east (Athey, 1999).

Skarns associated with mafic intrusions, mostly in the west, are generally small and thin (a few inches to a few feet thick), discontinuous, and form in small lenses and pods at or near contact margins. Sulfide minerals are mostly pyrrhotite with lesser concentrations of chalcopyrite. Although metal values vary significantly between occurrences they are generally anomalous in copper, ranging from several hundred ppm to a few percent copper, and rich in iron, commonly double digit percent values. Gold and silver concentrations are generally low although the West Bowl (Map no. 229) and the Rainy Creek Skarn (Map no. 200) yield anomalous values in excess of 200 ppb gold. Nickel concentrations are also generally anomalous with values at the Green Wonder (Map no. 178) approaching 1 percent. The Green Wonder is the only skarn occurrence with platinum and palladium values in excess of 100 ppb. The West Bowl (Map no. 229) and the Green Wonder are anomalous in zinc. Gangue minerals are mostly garnet and epidote although less common minerals such as a chrome diopside are responsible for the intensely green colored outcrop at the Green Wonder.

In contrast to the western skarns, the eastern skarns are continuous over several tens of yards and are up to several yards thick. Beds of stratigraphically congruent hematite occur at the Northland Mines (Map no. 470) and West DAT (Map no. 468) occurrences. In comparison to western skarns, skarns associated with the diorites (Slate Creek area), tend to be high in copper (up to 6 percent) and iron (commonly greater than 10 percent), with chalcopyrite and hematite as primary metallic minerals. Gold and silver values appear to be higher on average than in the west with the high anomalies being 23.4 ppm gold and 53.9 ppm silver at the Chisna Ridge (Map no. 471) occurrence. Nickel values average in the single digit parts per million and are much lower in general than in the western skarn occurrences. Gangue minerals are commonly garnet, coarse calcite, epidote, and jasperoid.

Likely due to limited size potential and/or low grades, skarns in the Delta River study area have not received much exploration attention. The exception is the Chisna Ridge (Map no. 471) occurrence, which received intense exploration from the late 1980's through the mid 1990's. At least two companies drilled the occurrence hoping for a porphyry type discovery (Athey, 1999). Since research by Athey (1999) characterized the occurrence as skarn related, interest in the prospect has fallen.

Skarn occurrences in the Delta River Mining District study area are varied in size, distribution, and mineral endowment. In general, they are high in iron and anomalous in copper. They are generally too small or low grade to be considered for economic development. The exceptions are the Chisna Ridge (Map no. 471) and Northland Mines (Map no. 470) occurrences, which have high concentrations of copper and iron respectively and in more significant quantities than other skarns in the study area. They have also received the most exploration attention.

Figure 31. Skarn occurrences in the southern Delta River study area.

MACLAREN GLACIER LODE

Alternate Name(s):	GR 20-7	Map No:	104
		MAS No:	0020680175
Deposit Type:	Skarn	**Commodities:**	Fe, Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4Sec: 06, T19S, R07E
Meridian:	Fairbanks	Elevation:	3,900 feet
Latitude:	63.30179	Longitude:	-146.49166

Geographic: The Maclaren Glacier Lode occurrence is situated in a steep gully on the east side of the Maclaren Glacier. It is about 2.5 miles north of the mouth of East Fork Maclaren River.

Access: There is no road access to this occurrence. Helicopter access is limited to flatter areas above or below the gully approximately a quarter of a mile away.

History: The Maclaren Glacier Lode was first reported by Rose in 1966 (Rose, 1966a). It was examined by the U.S. Bureau of Mines during its Valdez Creek Mining District study in the late 1980's (Balen, 1990; Kurtak and others, 1992).

ARDF Name / No.: Maclaren Glacier lode / MH089 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Maclaren Glacier Lode is hosted in a package of Pennsylvanian to Permian limestone to argillite (Nokleberg and others, 1992b).

Rose (1966a) reports skarn mineralization where a diabase dike cuts limestone in a steep gully that drains into the Maclaren Glacier. Magnetite from 10 to 20 percent along with diopside and garnet is associated with the skarn. Skarn mineralization was noted over a distance of approximately half a mile. U.S. Bureau of Mines investigators sampled this occurrence during the late 1980's. Their samples contained up to 17 percent iron, 2.79 percent copper, 0.12 percent chromium, and 0.14 percent nickel (Balen, 1990; Kurtak and others, 1992).

Bureau Investigation: The BLM found this occurrence as described by Rose (1966a). Skarn mineralization can be found all along the white limey outcrops and rubblecrops along the gully over a distance of a approximately 0.3 miles. The width of the skarn alteration is up to several hundred feet. Commodity mineralization is restricted to localized areas of a few feet in length, and less in width, within the skarn. Commodity minerals include magnetite and/or traces of disseminated sulfides. Samples contained gold as high as 94 ppb, copper as high as 1,235 ppm (sample 1043), and iron as high as 22.8 percent (sample 10937).

Mineral Development Potential: Low

Conclusions: Base and precious metal values are too low to attract exploration interest to the Maclaren Glacier Lode occurrence. The iron values are also too low to encourage exploration and development.

GR 14-19

Alternate Name(s):	Broxson Ridge	**Map No:**	166
		MAS No:	0020680248
Deposit Type:	Unknown, skarn?	**Commodities:**	Cu, Co
Location:			
Quadrangle:	Mt. Hayes, B-5		NE1/4 Sec: 19, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,970 feet
Latitude:	63.34607	Longitude:	-146.08280

Geographic: The GR 14-19 occurrence is located on the northwest facing side of the ridge between the East and Middle forks of Broxson Gulch.

Access: Access is easiest by helicopter, although ATV and winter trails allow access to a camp on the East Fork of Broxson Gulch. The camp on Broxson Gulch also has an airstrip. From the camp the GR 14-19 occurrence is accessible on foot, about 1.5 miles to the north-northeast.

History: Rose (1965) discovered massive sulfide boulders at the GR 14-19 occurrence during mapping of the area in 1964. Besides Rose's references (1965; 1966a), there is no other known mention of the occurrence in published literature.

ARDF Name / No.: Unnamed (ridge between middle and east forks of Broxson Gulch) / MH121 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1965), who discovered the GR 14-19 occurrence, originally described the host rock as amphibole "serpentinite," but subsequently describes it as basalt (Rose, 1966a). The basalt is part of his Mississippian to Pennsylvanian Rainy Creek Basalt, which is thought to be at least 1,500 feet thick and represent flows with interbedded sediments (Rose, 1966a). Subsequent workers have suggested the basalts in the area are Triassic and associated with the Nikolai basalts (Nokleberg and others, 1992b; Larry Hulbert, personal communication, 2003). Rose (1965) maps the occurrence near the base of the overriding sheet of a south-directed thrust fault, which crops out about 500 feet down slope.

BLM investigators found boulders of massive sulfide, as described by Rose (1965), subcropping in an area about 10 by 10 feet. The largest boulders measured 1 foot by 1.5 feet. About 50 feet south of the subcropping boulders is an outcrop of strongly altered volcaniclastic rock, made up mostly of fine-grained amphibole and epidote, with relict plagioclase clasts. The volcanics also contain massive to semi-massive sulfides, but only in small pockets.

The sulfides at the GR 14-19 occurrence are massive to semi-massive, as well as disseminated in the host volcanics. They comprise mainly pyrrhotite, but also chalcopyrite and minor amounts of covellite and digenite. In places, there is a sharp contact between the semi-massive to massive sulfides and the host rock, giving a banded appearance.

U.S. Bureau of Mines geologists examined the GR 14-19 occurrence in 1982. They describe "…a persistently mineralized sulfide zone adjacent to the contact of hornblende gabbro with thermally metamorphosed limestone. The mineralization has a width of 15 to 20 feet and was traced intermittently along strike for approximately 600 feet. Further extensions of the zone are likely, but covered by skree (U.S. Bureau of Mines, unpublished field data, 1983)."

A sketch map accompanying the U.S. Bureau of Mines field data conflicts with the written information. It indicates basalt with minor limestone overlain by undifferentiated volcanics. The mineralized rock is found near the contact of the basalt and limestone as well as within the volcanics, structurally overlying the limestone. In turn, structurally above the volcanics is a mass of dunite (U.S. Bureau of Mines, unpublished field data, 1983).

Bureau Investigation: BLM investigators collected three samples from the GR 14-19 occurrence. Two of the samples were of massive sulfides in subcrop or rubble and one was from the outcrop with minor sulfides described above. The massive sulfide samples contained up to 4,800 ppm copper (sample 10866) and 633 ppm cobalt (sample 10868). Precious metal values from the samples were low. The highest return for gold is only 23 ppb (sample 10866). The highest PGE is 13 ppb platinum (sample 10866).

Unpublished U.S. Bureau of Mines data estimates copper values from the occurrence ranging from 0.1 to over 1 percent in high grade zones. The data also indicate cobalt values of about 0.2 to 0.4 percent (U.S. Bureau of Mines, unpublished field data, 1983).

Mineral Development Potential: Low

Conclusions: The mineralized zone at the GR 14-19 occurrence is poorly exposed. It is therefore difficult to determine the precise nature of the mineralization. From all accounts, however, the mineralized rock has generally low concentrations of base metals and very low precious metals. The interpretation of the occurrence being of skarn affinity adds to the unlikelihood of the site attracting significant mineral exploration attention.

GREEN WONDER

Alternate Name(s):		Map No:	179
		MAS No:	0020680002
Deposit Type:	Skarn	Commodities:	Ni, Cr, Zn
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 31, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,400 feet
Latitude:	63.30722	Longitude:	-146.07973

Geographic: The Green Wonder prospect is located about 1 mile east of Broxson Gulch at an elevation of about 4,400 feet. It is about 2.5 miles northeast of the confluence of Eureka Creek and the creek flowing from Broxson Gulch.

Figure 32. Geologist investigating the Green Wonder occurrence.

Access: A primitive claim-access road passes approximately a quarter of a mile west of the Green Wonder prospect. It is a short, steep hike from the road to the occurrence. Helicopters can land at the base of the hill on or near the road or, alternatively, on the ridge crest above the occurrence.

History: An exploration company, Moneta-Porcupine, held claims covering the occurrence in 1964, when they presumably made the discovery. Rose (1965) also sampled the occurrence around the same time. X-ray analyses by Rose (1965) identified percent levels of zinc, chromium, and nickel in the garnet-sphalerite rock.

ARDF Name / No.: Green Wonder / MH126 **Alaska Kardex:** None

Production: None

Workings and Facilities: Apparently Moneta-Porcupine did minor [hand?] trenching at this site (Rose, 1965).

Geologic Setting: Although the outcrop comprising the Green Wonder has been generally mapped as Early Permian to Middle Pennsylvanian Slana Spur Formation by Nokleberg and others (1992b), more detailed mapping by Rose (1965) puts the Green Wonder on a contact between volcanic sediments and graywackes to the north and the "Rainy Creek basalt" to the south. Both authors seem to agree that there has been quite a bit of faulting. Thrusts to the north and various small faults to the east and south have dismembered and deformed the rocks in the area. The Green Wonder prospect is a skarn, where rocks of ultramafic origin came into contact with limestone.

Figure 33. Polished hand sample from the Green Wonder occurrence. The olive green is garnet and the bright green is chrome diopside.

Bureau Investigation: The BLM found no evidence of trenching. The Green Wonder prospect occurs in a small outcrop approximately 6 by 2 feet in size on the south side of a small gully. The outcrop itself is mostly composed of ultramafic rocks that have been variably serpentinized and hornfelsed. Green marble was noted near the outcrop and marble rubblecrop underlies the outcrop. The mineralized rock is found in a zone of intense green staining approximately 2 feet square. Quartz and calcite veinlets, blebs of epidote, chrome diopside, uvarovite (chrome garnet), and trace sulfides (sphalerite) were noted.

Samples from the outcrop confirm high concentrations of nickel (9,980 ppm; sample 10313) and chromium (2,190 ppm; sample 11366) as well as elevated zinc (1,195 ppm; 10312). None of the metal values obtained by BLM analyses were as high as values reported by Rose (1965). It appears that much of the color anomaly occurs in marble where nickel has been leached from above and precipitated on the underlying carbonate in the form of garnierite. Other altered ultramafic outcrops in the district containing high nickel also have coatings of garnierite.

Mineral Development Potential: Low

Conclusions: The Green Wonder occurrence contains colorful rock with interesting mineralogy, perhaps making it of interest to rock collectors. It has a very limited extent with sub economic mineral grades, and, therefore, is not likely to be of additional exploration interest.

GR 14-12

Alternate Name(s):		Map No:	181
		MAS No:	0020680239
Deposit Type:	Skarn	Commodities:	Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, B-5		NE1/4 Sec: 06, T19S, R09E
Meridian:	Fairbanks	Elevation:	4,150 feet
Latitude:	63.30225	Longitude:	-146.08033

Geographic: The GR 14-12 occurrence is located on the east side of Broxson Gulch about 11 miles west of the Richardson Highway. It is about 2.3 miles northeast of the confluence of Eureka Creek and the creek flowing from Broxson Gulch.

Access: A primitive access road that crosses the Delta River runs near the occurrence; however, vehicles generally cannot cross the Delta River until freeze-up. Helicopter access is by far the most convenient.

History: Rose (1965) contains the first published reference to this site. His 'Locality 12' is reported as an altered limestone with copper staining in serpentinite (Rose, 1965). State claims covering the area are currently held by Nevada Star Resource Corp.

ARDF Name / No.: Unnamed (east of lower Broxson Gulch) / MH127
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The GR 14-12 occurrence lies within ultramafic intrusive rocks of Triassic age (Nokleberg and others, 1992b). Blocks of limey sediments to limestone appear to be rafts or roof pendants of what is mapped nearby as Pennsylvanian to Permian calcareous sediments and volcaniclastics (Nokleberg and others, 1992b).

Bureau Investigation: BLM geologists investigating this occurrence found bleached white limestone with epidote and garnet alteration cropping out at several locations along the east side of a gully. The gully bottom is mostly serpentinite containing several localized iron-stained zones. Sporadic mineralization occurs in small pods and lenses of semi-massive sulfide over a distance of 500 feet along a gully in the limestone, as well in the oxidized ultramafic rocks. Mineralization generally occurs close to the contact margins. Sulfide minerals are mostly pyrrhotite, chalcopyrite, and pyrite with occasional pentlandite. Sulfide exposures averaged about a square foot in size, although exposures in the steep gully side are limited. A 1 foot sample across one nodule yielded a copper value of 1.97 percent (sample 10356). Most samples, however, ran less than 0.5 percent copper. This skarn has low gold values, with the highest gold value at 27 ppb (sample 10356). Elevated nickel concentrations up to 2,180 ppm (sample 10194) were detected in samples, but are not typical of the deposit.

Mineral Development Potential: Low

Conclusions: This deposit comprises thin mineralized contacts in discontinuous and sporadic zones. The skarn mineralization here is also low in gold. With insignificant tonnage evident at this occurrence, it is unlikely that it will draw attention from developers. Skarn deposits often have spatially segregated zones of mineralization such that gold can be deposited further away and in apparently less mineralized rock than other metals. Additional sampling in the area might reveal associated elevated gold concentrations.

GR 14-8

Alternate Name(s):	Unnamed occurrence 10	**Map No:**	193
		MAS No:	0020680148
Deposit Type:	Skarn	**Commodities:**	Fe, Cu, Ni
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 03, T19S, R09E
Meridian:	Fairbanks	Elevation:	5,350 feet
Latitude:	63.30146	Longitude:	-145.99877

Geographic: The GR 14-8 occurrence is located on the south flanks of the Alaska Range, approximately 9 miles west of the Richardson Highway. The occurrence crops out of a talus covered slope at an elevation of approximately 5,350 feet and overlooks the West Fork of Rainy Creek to the east.

Access: Light helicopters can land at the base of the talus slope near the creek bottom below the occurrence, or on the top of the ridge above it. A short hike across steep talus will gain access to this occurrence. A primitive access road also runs less than 1 mile south of the occurrence; however, this road system can only be accessed during the winter, when the Delta River freezes over.

History: Rose (1965) described and sampled this occurrence. State of Alaska claims covering this occurrence are currently held by Nevada Star Resource Corp.

ARDF Name / No.: Unnamed (south of West Fork Rainy Creek) / MH144
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Nokleberg and others (1992b) mapped the rocks in the vicinity of the GR 14-8 occurrence as shallow-level Permian intrusives that occur just north of the Rainy Creek thrust fault. Triassic gabbros lay to the south, and Triassic greenstone to the north. Contrarily, the occurrence is in the unit mapped as Rainy Creek basalt by Rose (1965). Rose (1965) describes the occurrence as a lens of massive sulfides associated with altered rocks containing garnet, olivine(?), and pyroxene hosted in serpentinite.

Bureau Investigation: The BLM found the outcrop as described by Rose (1965). A horizontal lens of massive pyrrhotite, pyrite, and minor chalcopyrite crops out of a smooth talus slope. The lens is exposed over an area of approximately 3 by 10 feet. White, bleached marble with diopside and brown garnet structurally overlay the sulfide lens, which is underlain by gabbro. The general host rock appears to be gabbro.

A 2.5-foot sample across the sulfide zone yielded greater than 15 percent iron, 659 ppm copper, and 982 ppm nickel (sample 10483). Values of 0.03 oz/ton gold and 0.33 oz/ton silver reported by Rose (1965) were much higher than values present in the BLM sample, which yielded 0.009 ppm (0.0003 oz/ton) gold and 2.2 ppm (0.064 oz/ton) silver.

Mineral Development Potential: Low

Conclusions: The development potential for this small skarn is limited by the lack of grade and tonnage of potential ore.

MONETA PORCUPINE

Alternate Name(s):	GR 14-6	Map No:	198
		MAS No:	0020680257
Deposit Type:	Skarn	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 34 T18S, R09E
Meridian:	Fairbanks	Elevation:	5,100 feet
Latitude:	63.317058	Longitude:	-145.990386

Geographic: The Moneta Porcupine occurrence is located on a ridge just east of the West Fork of Rainy Creek, approximately 8.5 miles west of the Richardson Highway. The site is 0.8 miles south of peak '6346' as shown on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: A primitive access road runs along the south flank of the Alaska Range within about 1 mile of the occurrence, but the road is on the west side of the Delta River, which generally limits access to winter months when the river is frozen. Helicopter access is the most practical.

History: The occurrence is reported by Rose (1965) as having been staked by Mark Rogers for a company called Moneta Porcupine.

ARDF Name / No.: Moneta-Porcupine / MH149 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Moneta Porcupine, as mapped by Nokleberg and others (1992b), occurs in a block of Triassic metagabbros.

Bureau Investigation: The BLM found the site to be as described by Rose (1965). A small xenolith or pendant of light-colored, skarn-altered Pennsylvanian to Permian marble is hosted in dark serpentinized ultramafic rocks and crops out on the ridge crest. Blebs of bornite and copper staining were found in a few scattered spots in the skarn and hornfels. Bornite was also observed in a 1 foot wide zone in a small silicified gabbro dike several feet from the main outcrop. High-grade grab samples yielded copper values of up to 1.65 percent (sample 6983); however, a more representative sample taken across the dike had only 0.34 percent copper (sample 10482).

Mineral Development Potential: Low

Conclusions: There are no significant concentrations or quantity of commodity minerals at the Moneta Porcupine occurrence, and it has very little development potential.

Figure 34. Geologist sampling the Moneta Porcupine occurrence.

RAINY CREEK SKARN

Alternate Name(s):	GR 14-7, Copter Lode	Map No:	201
		MAS No:	0020680252
Deposit Type:	Skarn	Commodities:	Au, Cu, Ag
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 02, T19S, R09E
Meridian:	Fairbanks	Elevation:	4,150 feet
Latitude:	63.30403	Longitude:	-145.98202

Geographic: The Rainy Creek Skarn prospect is located on the west fork of Rainy Creek, which is on the south flank of the Alaska Range, about 10 miles west of the Richardson Highway. It is about 1.25 miles east-northeast of peak '5180' shown on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: A primitive, seasonal access road crosses the west fork of Rainy Creek approximately 1 mile downstream from the occurrence. Access to this road requires crossing the Delta River, which is generally only possible for vehicles after the river freezes. There are also suitable helicopter landing sites nearby.

History: Discovery of copper in Rainy Creek was reported as early as 1916 (Brooks, 1918, Martin, 1920). The nearby creek has placer workings, which have been under claim over the years. This small "tactite" occurrence was reported by Rose (1965), who noted evidence of minor trenching. State mining claims titled the "Viking" claims currently cover the occurrence.

ARDF Name / No.: Unnamed (west of North Fork Rainy Creek) / MH147
Alaska Kardex: None

Production: None

Workings and Facilities: The remnants of an old rusty barrel adjacent to small piles of massive sulfide indicate that the site has been previously explored.

Geologic Setting: The Rainy Creek Skarn is hosted in a package of Pennsylvanian to Permian limestone to limey sedimentary rocks (Ellis and others, 2004), which strike approximately 75 degrees and dip 68 degrees south (Rose, 1965). The sedimentary rocks are variably and locally hornfelsed and are truncated to the north and south (approximately upstream and downstream) by mafic to ultramafic gabbroic rocks of Triassic age.

Bureau Investigation: The BLM found this occurrence pretty much as described by Rose (1965). Skarn mineralization several yards thick has replaced limestone margins with epidote, pyroxene, garnet, and minor chalcopyrite. The skarn zone extends for approximately 200 feet on both stream banks. Adjacent to the skarn, the limestone is bleached white and somewhat silicified. Iron oxide staining is present along both the northern and southern contacts. Lenses of massive sulfide composed of pyrrhotite, pyrite, and chalcopyrite with gossan crop out near the stream at what appears to be the southern contact. A small pile of massive sulfide rubble is present about 150 feet downstream from the main occurrence, but its source is not immediately apparent. Samples of this rubble contained 2.49 ppm gold, 4,770 ppm copper, and 3.4 ppm silver (sample 10145), whereas measured samples of the gossan/massive sulfide contained as much as 0.275 ppm gold, 2.4 ppm silver (sample 10369), and 1,885 ppm copper (sample 10513).

Mineral Development Potential: Low

Conclusions: Such small quantities of ore minerals in skarn type deposits are unlikely to attract development interest. Hand-trenching in covered areas would be helpful to further characterize the deposit.

Figure 35. Examining the Rainy Creek Skarn.

WEST RAINY SKARN

Alternate Name(s):	Rainy Creek W. Fork Lode	Map No:	205
		MAS No:	0020680203
Deposit Type:	Skarn	Commodities:	Cu, Fe
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4Sec: 02, T19S, R09E
Meridian:	Fairbanks	Elevation:	4,000 feet
Latitude:	63.29444	Longitude:	-145.96462

Geographic: The West Rainy Skarn occurrence is located on the west fork of Rainy Creek, which is on the south flanks of the Alaska Range about 10 miles west of the Richardson Highway. It is about 1.8 miles east-southeast of peak '5180' shown on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: A primitive, seasonal access road crosses the west fork of Rainy Creek immediately west of the occurrence. There are also suitable helicopter landing sites nearby.

History: Discovery of copper in Rainy Creek was reported as early as 1916 (Brooks, 1918; Martin, 1920); however, there are no specific references to this occurrence in the published literature. The nearby creek has placer workings, which have been under various claims over the years. The occurrence is currently covered by State of Alaska claims, titled Viking 33.

ARDF Name / No.: West Fork Rainy Creek / MH143 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The sedimentary rocks that host the West Rainy Skarn are mapped as tuff and sediments by Rose (1965) and are described as being interbedded with mafic to ultramafic rocks of Triassic age (Nokleberg and others, 1992b). Tectonically, the occurrence lies south of the Broxson gulch thrust and north of the Eureka Creek fault (Nokleberg and others, 1992b).

Bureau Investigation: The BLM observed an iron-stained outcrop on the south side of a small gully that contained massive pyrrhotite, pyrite, and chalcopyrite over an area about 10 by 20 feet. The host appears to be altered gabbro. Samples from the oxidized sulfide zone contain as much as 7,040 ppm copper (sample 10360), 1,720 ppm nickel (sample 10381), 2.9 ppm silver, and 258 ppm zinc (sample 10224). Average grades are about a factor of ten lower and metals are spotty with the exception of copper.

Immediately across the small gully is a large (30 by 50 feet) xenolith of limestone containing garnet-epidote skarn alteration in a mass of gabbro. Further up the gully, hornfels, altered shale, and limestone layers strike northwest and dip 75 degrees to the north, into the hill. Additional skarn mineralization includes garnet and epidote with disseminated chalcopyrite to a few percent. The top of the hill is capped by mafic flows altered to greenstone.

Figure 36. Mineralized outcrop at the West Rainy Skarn occurrence.

Massive sulfides at this occurrence appear to be associated with a late-stage gabbro intrusion into the sedimentary country rock. Remobilization and concentration of copper may have occurred, as well as nickel from the gabbro. The regional contact metamorphism of the sediments further uphill is most likely related to early larger intrusions of mafics and/or extrusion of overlying basalts.

Mineral Development Potential: Low

Conclusions: The limited extent of massive sulfides and overall grade make it unlikely that this occurrence will attract additional exploration or development.

GR 14-4

Alternate Name(s):		**Map No:**	216
		MAS No:	0020680258
Deposit Type:	Skarn	**Commodities:**	Ni, Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 26, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,950 feet
Latitude:	63.32059	Longitude:	-145.96698

Geographic: The GR 14-4 occurrence is located on the west side of the north fork of Rainy Creek, about 7½ miles west of the Richardson Highway. It is about a mile southeast of peak '6346' shown on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: Access to the site is possible via a primitive road, but it requires crossing the Delta River, which is generally possible only after freeze-up. Helicopter access is most practical.

History: Rose (1965) makes the first published reference to this site.

ARDF Name / No.: Unnamed / MH150 **Alaska Kardex:** None

Production: None **Workings and Facilities:** None

Geologic Setting: The GR 14-4 occurrence lies within a package of hornfelsed limey sediments of Pennsylvanian to Permian age, which have been intruded by ultramafic dikes and sills of Triassic age (Nokleberg and others, 1992b). The occurrence lies just south of the Broxson Gulch thrust fault. Several sulfide lenses on the south side of a gully are reported at the GR 14-4 occurrence. They are hosted in hornfelsed sediments and consist mostly of pyrrhotite with traces of chalcopyrite (Rose, 1965).

Bureau Investigation: The BLM found several semi-massive sulfide lenses in silicified hornfelsed sediments, which have been intruded by gabbro dikes. Pyrrhotite-rich lenses were found over a distance of 700 feet along the gully. Analytical results were comparable to the results of Rose (1965), with copper as high as 344 ppm (sample 6981) and nickel as high as 283 ppm (sample 10389).

Mineral Development Potential: Low

Conclusions: This deposit displays discontinuous pods and lenses of sulfides with low concentrations of commodity minerals. The rocks occur in an area of regional hornfels, but appear to be associated with nearby gabbro dikes. The lack of minerals in economic concentrations and style of mineralization limit the potential deposit size and therefore the appeal for development.

GR 14-16

Alternate Name(s):		Map No:	223
		MAS No:	0020680250
Deposit Type:	Skarn	**Commodities:**	Fe, Cu
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 22, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,000 feet
Latitude:	63.33494	Longitude:	-146.00645

Geographic: The GR 14-16 occurrence is located near the headwaters of the east fork of Broxson Gulch at an elevation of 5,000 feet. It is about half a mile south of the elevation marked '5870' on the USGS, Mt. Hayes, B-5, 1:63,360-scale, topographic map.

Access: The GR 14-16 occurrence is accessible most practically by helicopter.

History: Rose (1965) describes a tactite containing chalcopyrite, magnetite, and pyrite. State claims covering the occurrence are currently held by Nevada Star Resources Corp.

ARDF Name / No.: Unnamed (southeast headwaters of the east fork in Broxson Gulch) / MH132
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The GR 14-16 occurrence is situated on a contact between Permian to Pennsylvanian sediments and volcaniclastics to the east and mafic Triassic greenstones to the west (Stout, 1976; Nokleberg and others, 1992b).

Bureau Investigation: The BLM observed limestone and limey sediments altered to skarn occurring along a contact with fine-grained mafic rocks. Iron staining highlighted mineralization over an area of approximately 5 by 20 feet. A 1 foot sample of the mineralized, iron-stained, calc-silicate rock contained mostly magnetite with traces of pyrite and chalcopyrite. Analyses showed that the sample contained greater than 15 percent iron and anomalous copper at 177 ppm, but negligible gold (sample 10392).

Mineral Development Potential: Low

Conclusions: The development potential for this small skarn is limited by the lack of grade and tonnage.

WEST BOWL

Alternate Name(s):		Map No:	229
		MAS No:	0020680261
Deposit Type:	Skarn	**Commodities:**	Cu, Ag, Au, Pd
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 23, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,200 feet
Latitude:	63.33881	Longitude:	-145.97432

Geographic: The West Bowl occurrence is located near the head of a southeast-facing cirque, west of the upper end of North Fork Rainy Creek. It is about 0.3 miles due south of the peak marked '6045' between the North Fork Rainy Creek and the head of the eastern drainage of Broxson Gulch.

Access: Access is most practical by helicopter. There are numerous landing sites in the area for a light helicopter.

History: MAN Resources discovered the West Bowl occurrence in 2000 (Ellis and others, 2004). MAN staked claims covering the property, which they subsequently transferred to Nevada Star Resources, who currently (2005) hold active claims in the area.

ARDF Name / No.: West Bowl (Rainy) / MH133 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Ellis and others (2004) describe two occurrences at West Bowl, one is a skarn zone in a carbonate inclusion in the Rainy Creek mafic-ultramafic complex and the other is skarn mineralization at the margins of the complex. The site described by the BLM here is at the margins of the complex.

The Rainy mafic-ultramafic complex is thought to represent one of several hypabyssal intrusions comagmatic with the nearby Triassic Nikolai basalts (Bill Ellis, personal communication, 2002). These shallow intrusions are generally sill-form and thought to represent feeder systems for the overlying basalts. The Rainy Creek complex is shallowly northward-dipping (approximately 40 degrees), about 1 mile thick, and is comprised predominantly of dunite, with lesser peridotite, pyroxenite, and gabbro (Bill Ellis, personal communication, 2002). The complex extends for approximately 10 to 12 miles in a generally west-northwest – east-southeast direction. Along with other Triassic mafic-ultramafic sill-form complexes they extend for at least 35 miles across the southwestern part of the Delta River study area and have been correlated with similar complexes in the Kluane Range of the Yukon, Canada, that were mined for nickel, copper, and PGE in the recent past (Hulbert, 1995; 1997).

Mafic-ultramafic rocks of the Rainy Creek complex intrude calcareous rocks of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b) at the West Bowl occurrence. Rose (1966a) maps a small sliver of carbonate rocks within a broader belt of volcaniclastic rocks, both of which are surrounded by mafic-ultramafic intrusives. Stout (1976) maps a similar relationship, but does not map the carbonates in the area. He reports basaltic to andesitic volcanic flows and volcanic-derived sediments with local bioclastic limestone (Stout, 1976).

The skarn mineralization at the West Bowl occurrence comprises locally euhedral vesuvianite and garnet in association with wollastonite, epidote, clinopyroxene, calcite, and minor plagioclase and actinolite. The predominant sulfides are bornite and chalcopyrite along with minor amounts of digenite, chalcocite, covellite, and pyrite.

Bureau Investigation: BLM investigators collected six samples from the West Bowl area. Three of the samples were collected to the southeast of the occurrence within the enclosing mafic-ultramafic rocks and do not represent the occurrence as such. Three samples were collected from the skarn mineralization. Of these, the highest return was for copper at 1.21 percent (sample 11068). Other maximum values for precious and base metals include 237 ppb gold (sample 10063), 19.7 ppm silver (sample 11068), and 57 ppb palladium (sample 11068).

Mineral Development Potential: Low

Conclusions: Precious and base metals are elevated at the West Bowl occurrence, but none are concentrated enough to encourage further exploration. All the BLM samples were selected from higher grade parts of the occurrence to see what elements might be present. Even the copper at the site occurs sporadically across the exposure.

PICRITE HILL SKARN

Alternate Name(s):		Map No:	243
		MAS No:	0020680373
Deposit Type:	Skarn	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 32, T18S, R10E
Meridian:	Fairbanks	Elevation:	5,250 feet
Latitude:	63.31809	Longitude:	-145.86908

Geographic: The Picrite Hill Skarn occurrence is on a steep slope (Figure 37), on the northeast side of a hill between the North Fork Rainy Creek and Ann Creek. The southern fork of Ann Creek heads immediately north of the hill where the Picrite Hill Skarn is situated. The occurrence is exposed on the northwest side of a north-northeast-trending, steep-sided ravine. Skarn minerals with no apparent sulfides are also exposed on the southeast side of the ravine.

Access: Access is easiest by helicopter. A light helicopter can easily land on the top of the hill, adjacent to the occurrence.

History: The Picrite Hill Skarn occurrence was discovered by BLM geologists in 2002.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1966a) maps the Picrite Hill Skarn area as Rainy Creek basalt or tuffs associated with the Rainy Creek basalt. Recent work in the area has identified olivine-rich basalts or picrites in the area where Rose mapped the Rainy Creek basalt. The picrites are believed to be contemporaneous with the Triassic Nikolai basalts and the subvolcanic mafic and ultramafic rocks that may be feeders to the basalts. The picrites may represent the earliest phase of eruptive rocks (Larry Hulbert, personal communication, 2003).

The Picrite Hill Skarn occurrence consists of a band of interfingered lenses of skarn and sulfide minerals exposed for 44 feet along strike and 5 to 11 feet across (Figure 37). It is oriented nearly vertically, with a strike of 095 degrees. The band is covered down slope. There are sharp contacts between the skarn band and the host rocks. The host rocks appear to be some type of felsic intrusive rock, now altered. A gabbro dike near the top of the skarn band may cut off the band.

The skarn band has been tectonized. It is fractured and cut by shear planes. Tectonic breccia can be found on some parts of the margins of the band.

The south side of the skarn band is about 5 to 6 feet wide and includes sulfides with the skarn minerals. Adjacent to this layer, to the north, is a layer of massive skarn minerals that is 2 to 6 feet wide. Skarn minerals are mainly fine- to medium-grained and massive garnet along with minor epidote and actinolite. There is also some quartz and calcite present. Sulfides are predominantly pyrite with about 30 percent chalcopyrite. There is magnetite associated with the sulfides as well. The sulfides are generally found interstitial to small euhedral garnet.

Figure 37. Iron-stained, sulfide-bearing rock of the Picrite Hill Skarn occurrence.
View is to the northwest.

Bureau Investigation: BLM personnel collected three samples across the bottom, middle, and top of the skarn band, which ranged from 5 to 6 feet. Results of analysis indicate low precious and base metal values. The highest gold value was only 37 ppb (sample 10061) and the highest copper value was 1,205 ppm over 6 feet (sample 10525). A high grade sample from a piece of float found nearby ran 2,750 ppm copper (sample 10527) (Bittenbender and others, 2003).

Mineral Development Potential: Low

Conclusions: The Picrite Hill Skarn occurrence is relatively small. In addition, analysis of BLM samples indicates low base and precious metal concentrations associated with the sulfides from the occurrence. Therefore, the site is unlikely to attract significant mineral exploration attention.

NORTH ANN CREEK

Alternate Name(s):		Map No:	254
		MAS No:	0020680272
Deposit Type:	Skarn	Commodities:	Cu, Au?
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 17, T18S, R10E
Meridian:	Fairbanks	Elevation:	4,300 feet
Latitude:	63.34889	Longitude:	-145.87521

Geographic: The North Ann Creek occurrence is located at the head of the north fork of Ann Creek at an elevation of 4,300 feet. It is located about three-quarters of a mile southwest of peak '6317' on the USGS, Mt. Hayes, B-4, 1:63,360-scale, topographic map.

Access: The site is only accessible by small, maneuverable helicopters or by hiking up Ann Creek from a lower elevation.

History: The North Ann Creek site is reported by Ellis and others (2004) as a gold and copper occurrence in hornfels.

ARDF Name / No.: Unnamed (head of the north fork Ann Creek / MH155
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The North Ann Creek occurrence is south of the main Broxson Gulch thrust fault and lies between minor splays of the imbricated thrust (Stout, 1976; Rose, 1966a). Host rocks of the occurrence are mostly hornfelsed sediments of the Pennsylvanian to Permian Slana Spur Formation that have been intruded by Triassic ultramafics of the Wrangellia terrane and subsequently thrust faulted (Nokleberg and others, 1992b).

Bureau Investigation: The BLM found faulted slivers of hornfelsed sediments in ultramafic rocks. Sulfide minerals were found disseminated in both the ultramafics and in the sedimentary rocks. No massive sulfide-bearing rocks were found with the percent copper and high gold reported by Ellis and others (2004). Nickel values of 1,675 ppm (sample 11126) were detected in one sample of ultramafic rock.

Mineral Development Potential: Low

Conclusions: Mineralization is spotty, discontinuous, and complicated by many small fault offsets. The lack of significant values over mining widths makes this a target with low mineral development potential.

GR 28-5

Alternate Name(s):		Map No:	392
		MAS No:	0020680322
Deposit Type:	Skarn	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NE1/4 Sec: 09, T20S, R14E
Meridian:	Fairbanks	Elevation:	5,000 feet
Latitude:	63.20336	Longitude:	-145.06464

Geographic: The GR 28-5 occurrence is located approximately 1.5 miles east of the Gakona Glacier at an elevation of approximately 5,000 feet. The site is on the west-facing slope of the drainage locally called 'Magnetite Creek' (Rose, 1967, Figure 1).

Access: Access to the GR 28-5 occurrence is by helicopter. Light helicopters can land on flat areas several hundred feet below the occurrence.

History: Rose (1967) reported traces of copper stain along a marble/diorite contact at the GR 28-5 occurrence.

ARDF Name / No.: Unnamed (east of toe of Gakona Glacier) / MH269
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1967) mapped the rocks in the area as an argillite unit with small diorite intrusions. Nokleberg and others (1992b) mapped the rocks as metasediments of Permian to Pennsylvanian age. The small diorite intrusions at this occurrence are not mapped individually by Nokleberg and others (1992b); however, they may be related to mafic gabbros mapped approximately half a mile north of the occurrence. BLM age dating suggests these gabbros are Cretaceous and not Triassic as proposed by Nokleberg and others (1992b).

Bureau Investigation: The BLM found prominent isolated outcrops of bleached white marble and skarn minerals in contact with iron-stained diorite. Copper oxide-stained diorite was sampled near the contact, and analyses yielded a value of 2,020 ppm copper and 18 ppb gold (sample 10711). Small thin veinlets of native copper were also observed in select pieces of diorite rubblecrop near the occurrence. Small amounts of copper stain were commonly observed near the marble/diorite contact.

Mineral Development Potential: Low

Conclusions: The presence of copper at this skarn occurrence is spotty and discontinuous and unlikely to be present in quantities sufficient to be developed further. Detailed mapping could fill in gaps in previous mapping efforts and also help determine the primary source of copper.

WEST DAT

Alternate Name(s):	Northland Mines, DAT Zone, Chisna	Map No:	468
		MAS No:	0020680343
Deposit Type:	Skarn	**Commodities:**	Cu, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 26, T20S, R15E
Meridian:	Fairbanks	Elevation:	5,500 feet
Latitude:	63.15111	Longitude:	-144.81317

Geographic: The West DAT prospect is located in the uplands between Slate Creek, Powell Gulch, Chisna Pass, and the Chisna River. The prospect is located on a sharp, north-south-trending ridge at approximately 5,500 feet elevation. It is about a quarter of a mile north of hill '5757' as shown on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: A small, private airstrip, about 1 mile to the north in the Miller Gulch area, is within hiking distance of the occurrence. Either end of the ridge that hosts the occurrence is suitable for landing by a light helicopter.

History: Charles W. Monroe is credited with the early prospecting of this area (Rose, 1967). He was active in the area between 1964 and at least 1973. Monroe represented Northland Mines and, with the exception of perhaps Zelma Monroe, appears to have been the sole representative. During those years they accumulated more than 142 lode claims (named the "Chisna" claims) covering most of the upland area (Chitina Recording District, Books 8 to 11). In 1971 the Chisna claims 1-78 were signed over to Weldon F. Appelt, followed by Chisna claims 79-108 in 1973 (Alaska Kardex 068-119).

P. Glavinovich held the "Boulder" claims in 1970, of which there were at least 36 (Alaska Kardex 068-136) that covered the northwest part of the property (Chitina Recording District, Book 8, p. 113). These claims appear to have been adjacent to the Chisna claims of Northland Mines.

Resource Associates of Alaska (RAA) staked and explored the area during the late 1970's and early 1980's. At least 116 claims (named the "POW" claims) covering the property was held by RAA in 1978 (Alaska Kardex 068-192). Reports indicate that they drilled three diamond drill holes approximately half a mile southeast of the prospect (Athey, 1999).

The BLM found flagging at the West DAT site marked "AMAX" and dated 1990. This suggests that the AMAX mineral exploration company was active in the area at that time.

Cominco Alaska Exploration sampled the property in 1993 and acquired the property in 1994. Some mapping and drilling was done as part of their evaluation (Athey, 1999).

During 1995 detailed mapping and sampling of rocks in the area, including this occurrence, were conducted by Jennifer Athey as part of her University of Alaska Fairbanks, M.S. thesis (Athey, 1999).

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: Scattered diamond drill holes have been used to prospect the West DAT site over the years (Athey, 1999).

Geologic Setting: Early geologic mapping by Rose (1967) did not extend to the West DAT occurrence, although he notes that sampling indicates mineralized rock appears to be replacing limestone.

Regional mapping by Nokleberg and others (1992b) shows that the West DAT occurrence lies immediately south of the Slate Creek fault in a unit of shallow-level Permian andesite to rhyolite stocks, dikes, and sills, which intrude the Permian to Pennsylvanian Slana Spur Formation.

Figure 38. Specular hematite in mineralized rock at the West DAT prospect.

Large-scale mapping by Athey (1999) reveals a complex series of high angle faults cutting marine volcanics, volcaniclastics, and thin limestone units. Dating of shears indicate that skarn mineralization in the area is likely related to a quartz monzodiorite intrusion to the northwest,

$^{40}Ar/^{39}Ar$ dated at 300.4 ± 1.4 Ma, rather than the basaltic dikes, which are 50 million years younger (Athey, 1999).

Bureau Investigation: The BLM observed jasper and epidote alteration along most of the length of the West DAT ridge. A thin limestone unit at the prospect hosts a skarn that consists of hematite, calcite, jasper, epidote, garnet, and chalcopyrite replacing the carbonate. The area of alteration is approximately 50 feet wide by 200 feet long. Select surface samples of skarn zone mineralization contained silver as high as 50.5 ppm and copper as high as at 6.43 percent (sample 11183).

Mineral Development Potential: Low

Conclusions: The area of most intense mineralization is associated with relatively thin limestone units, which limits the potential size of the deposit. The potential for porphyry deposits in the area has attracted a fair amount of interest from the mineral exploration community over the years, but this occurrence has been unable to sustain interest. The most recent interpretations have concluded that mineralization is skarn related (Athey, 1999), and that porphyry potential is low.

NORTHLAND MINES

Alternate Name(s):	DAT Zone, Chisna Ridge, Chisna Pass, Slate Creek LL	**Map No:**	470
		MAS No:	0020680029
Deposit Type:	Skarn	**Commodities:**	Fe, Cu, Au
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 35, T20S, R15E
Meridian:	Fairbanks	Elevation:	5,050 feet
Latitude:	63.81423	Longitude:	-144.81423

Geographic: The Northland Mines property historically refers to a small section of uplands between Slate Creek, Powell Gulch, Chisna Pass, and the Chisna River. This prospect specifically identifies a mineralized zone east of Powell Gulch on a very steep hill slope at an elevation of just over 5,000 feet. The mineralization is specifically located by Rose (1965) and was investigated by the BLM, although a much wider area has been generally staked and explored at various times.

Access: The most practical way to access the Northland Mines prospect is by helicopter. A small bench just south of the prospect provides a place to land for a light helicopter. An alternative is to land on the ridge above and walk down to the prospect. A primitive road runs through Powell Gulch connecting nearby airstrips with a winter access route up the Chistochina River from Chistochina, on the Glenn Highway. The Northland Mines site is within hiking distance of this road.

History: Charles W. Monroe is credited with the early prospecting of this area (Rose, 1967). He was active in the area between 1964 and at least 1973. Monroe represented Northland Mines and, with the exception of perhaps Zelma Monroe, appears to have been the sole representative. During those years they accumulated more than 142 lode claims (named the “Chisna” claims) covering most of the upland area (Chitina Recording District, Books 8 to 11).

P. Glavinovich held the “Boulder” claims in 1970, of which there were 36, (Alaska Kardex 068-136) and which covered the northwest part of the property (Chitina Recording District, Book 8, p. 113). These claims appear to have been adjacent to the Chisna claims of Northland Mines.

Resource Associates of Alaska (RAA) staked and explored the area during the late 1970’s and early 1980’s. At least 116 claims (named “POW” claims) covering the property were held by RAA in 1978 (Alaska Kardex 068-192). Reports indicate that they drilled three diamond drill holes just northeast of the currently located prospect (Athey, 1999).

Cominco Alaska Exploration sampled the property in 1993 and acquired the property in 1994. Some mapping and drilling was done as part of their evaluation (Athey, 1999).

During 1995 detailed mapping and sampling of rocks in the area was conducted by Jennifer Athey as part of her University of Alaska Fairbanks, M.S. thesis (Athey, 1999).

ARDF Name / No.: Northland Mines / MH300 **Alaska Kardex:** None

Production: None

Workings and Facilities: Three diamond drill holes and trenching are known to have occurred near this prospect (Athey, 1999).

Geologic Setting: Early geologic mapping by Rose (1967) does not extend to the prospect, although he notes that samples indicated mineralized rock appeared to be replacing limestone. Regional mapping by Nokleberg and others (1992b) shows that the Northland Mines prospect lies immediately south of the Slate Creek fault in a package of shallow-level, Permian andesite to rhyolite stocks, dikes, and sills, which intrude the Permian to Pennsylvanian Slana Spur Formation.

Large scale mapping by Athey (1999) reveals a complex series of high angle faults cutting marine volcanics, volcaniclastics, and thin limestone units. Dating of shears indicate that skarn mineralization in the area is likely related to a quartz monzodiorite intrusion to the northwest, $^{40}Ar/^{39}Ar$ dated at 300.4 ± 1.4 Ma, rather than the basaltic dikes, which are 50 Ma younger (Athey 1999).

Figure 39. Sampling at the Northland Mines prospect.

Bureau Investigation: The BLM collected seven samples at the site and noted a steep, south-dipping, northwest-trending zone of semi-massive to massive specular hematite with disseminated chalcopyrite. The unit is underlain by limestone and overlain by volcanic metasediments. In places, copper has leached from the hematite zone and precipitated on the limestone as large patchy coatings of malachite. The outcrop(s) is exposed in a gully for about 200 feet and is up to 30 feet thick. Similar mineralization can be traced along strike for at least 500 feet, where it is covered by talus. Smaller outcrops with calc silicate, epidote, garnet, hematite, and minor sulfide mineralization are also present at higher elevations. A 5-foot measured sample from the exposure yielded copper grades as high as 2.89 percent (sample 10128), 776 ppm zinc (sample 10127), and greater than 15 percent iron (sample 10128). The highest gold values, however, are only 22 ppb (sample 10128). A measured 20-foot sample across the thick hematite band averages just 3,770 ppm copper, 11.7 percent iron, and 428 ppm zinc (sample 10489).

Mineral Development Potential: Medium

Recommendations: Sampling results of commodity minerals from this study suggest this prospect is unlikely to be economic. It has been classified as a calcic iron skarn by Athey (1999). These deposit types are typically low to non-existent gold producers; however samples as high as 0.72 oz/ton gold and greater than 11 percent copper were reported by Athey (1999). It is interesting to note that the nearest exposure of monzodiorite (the likely source of magmatic fluids) is more than 1.2 miles away. Given this, and the typically erratic mineralization pattern attributed to skarns, it is possible that higher grades and tonnages of mineralized rock exist at depth. Extensive drilling may prove that additional higher grade/tonnage mineralization occurs in the area at depth.

CHISNA RIDGE

Alternate Name(s):	Northland Mines, Chisna Pass, DAT Zone	**Map No:**	471
		MAS No:	0020680083
Deposit Type:	Skarn	**Commodities:**	Fe, Cu, Au
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 35, T20S, R15E
Meridian:	Fairbanks	Elevation:	5,600 feet
Latitude:	63.14581	Longitude:	-144.80005

Geographic: The Northland Mines property (including the Chisna Ridge prospect) historically refers to a small section of uplands between Slate Creek, Powell Gulch, Chisna Pass, and the Chisna River. The Chisna Ridge prospect specifically identifies a mineralized zone just east of Powell Gulch on a very steep hill slope at an elevation just over 5,600 feet. This mineralized zone, which was located by Rose (1967), was investigated by the BLM, but a much wider area has been generally staked and explored at various times.

Access: The most practical way to access this site is by helicopter. A small bench just south of the prospect provides a place to land a light helicopter. A primitive road runs through Powell Gulch connecting nearby airstrips with a winter access route up the Chistochina River from Chistochina, on the Glenn Highway. The Chisna Ridge site is within hiking distance of the road.

History: Charles W. Monroe is credited with the early prospecting of this area (Rose, 1967). He was active in the area between 1964 and at least 1973. Monroe represented Northland Mines and, with the exception of perhaps Zelma Monroe, appears to have been the sole representative. During those years they accumulated more than 142 lode claims (named the "Chisna" claims) covering most of the upland area (Chitina Recording District, Books 8 to 11). In 1971 Chisna claims 1-78 were signed over to Weldon F. Appelt, followed by Chisna claims 79-108 in 1973 (Alaska Kardex 068-119).

P. Glavinovich held the "Boulder" claims in 1970, of which there were at least 36, (Alaska Kardex 068-136) covering the northwest part of the property (Chitina Recording District, Book 8, p. 113). These claims appear to have been adjacent to the Chisna claims of Northland Mines.

Resource Associates of Alaska (RAA) staked and explored the area during the late 1970's and early 1980's. At least 116 claims (named the "POW" claims) covering the property were held by RAA in 1978 (Alaska Kardex 068-192). Reports indicate that they drilled three diamond drill holes just northeast of the currently located prospect (Athey, 1999).

The BLM found flagging at the site which was marked AMAX and dated 1990, suggesting that they were active in the area at that time. Cominco Alaska Exploration sampled the property in

1993 and acquired it in 1994. Some mapping and drilling was done as part of their evaluation (Athey, 1999).

During 1995 detailed mapping and sampling of rocks in the area was conducted by Jennifer Athey as part of her University of Alaska Fairbanks, M.S. thesis (Athey, 1999).

ARDF Name / No.: Unnamed / MH299 **Alaska Kardex:** 068-90, 136, 192

Production: None

Workings and Facilities: Three diamond drill holes and trenching are known to have been completed at the Chisna Ridge prospect (Athey, 1999). The BLM located evidence of one vertical BQ drill hole in a small trench (30 by 6 by 3 feet). Two larger drill holes, which apparently targeted the structure under the trench, were also found, as well as a larger (apparently later) drill hole of NQ diameter trending 065 degrees and dipping -60 degrees.

Geologic Setting: Rose (1967) did not include the area of this prospect in his early geologic mapping, although he noted that samples indicated mineralization appeared to be replacing limestone.

Regional mapping by Nokleberg and others (1992b) shows that the Northland Mines prospect lies immediately south of the Slate Creek fault in a package of shallow-level Permian andesite to rhyolite stocks, dikes, and sills which intrude the Permian to Pennsylvanian Slana Spur Formation.

Large scale mapping by Athey (1999) reveals a complex series of high angle faults cutting marine volcanics, volcaniclastics, and thin limestone units. Dating of shears indicates that skarn mineralization in the area is likely related to a quartz monzodiorite intrusion to the northwest, $^{40}Ar/^{39}Ar$ dated at 300.4 ± 1.4Ma (Athey, 1999), rather than to the basaltic dikes, which are 50 million years younger.

Bureau Investigation: The BLM located and sampled the trench, which exposes highly oxidized volcanic rocks, and sampled the exposed mineralization in several small pits. Surface high-grade samples contained gold as high as 23.4 ppm (sample 10668), silver at 53.9 ppm (sample 10668), and copper at 3.2 percent (sample 11168). The highest values were found in the trench, but this level of concentration does not appear to extend along strike.

Mineral Development Potential: Medium

Conclusions: Sampling results of commodity minerals from this study suggest that this prospect has some potential to be economic, as indicated by previous exploration efforts. Athey (1999) classifies this prospect as a calcic iron skarn, which are typically low to non-existent gold producers; however, samples as high as 0.72oz/ton gold and greater than 11 percent copper were reported by Athey (1999). It is interesting to note that the nearest exposure of monzodiorite (the likely source of magmatic fluids) is more than 1.2 miles away. Given this distance and the typically erratic mineralization pattern attributed to skarns, there is potential for higher grades and tonnages of mineralized rock at depth.

Volcanogenic Massive Sulfide Deposits

Volcanogenic massive sulfide (VMS) deposits are found in the northern part of the Delta River Mining District study area. These deposits are part of a broader belt of VMS deposits that extends at least from the Bonnifield district in the northwest to the Delta district in the southeast, a distance of over 110 miles (Nauman and Duke, 1986; Lange and others, 1993). Some investigators also include occurrences in the Kantishna Mining District, even farther to the west-northwest than the Bonnifield district, in this belt of VMS occurrences (Newberry and others, 1997). Both the Bonnifield and Delta VMS districts are outside the Delta River Mining District study area as defined in this report.

Stratiform mineral occurrences were known to exist in the Bonnifield district (e.g., Liberty Belle deposit) as early as 1930 (Moffit, 1933). It wasn't until 1975, however, that these occurrences were interpreted to be VMS in origin and compared to Kuroko-style deposits by Hawley (1976). Hawley's interpretation may have led to the subsequent discovery of VMS deposits elsewhere in the belt of volcanic rocks on the north side of the Alaska Range.

The first actual discovery of VMS deposits on the north side of the range was in the Delta VMS district, in the Tok Mining District, in 1976 by Resource Associates of Alaska (RAA; Dashevsky and others, 2003). Since that time, various mineral exploration companies and consultants have conducted geologic mapping, sampling, ground and airborne geophysics, and core drilling. This work has resulted in the definition of 49 massive sulfide occurrences in what has been called the Delta mineral belt by Dashevsky and others (2003). An inferred resource of the largest contiguous sulfide bodies in the area is estimated at 17.3 million tons averaging 0.6 percent copper, 2.0 percent lead, 4.7 percent zinc, 73 ppm silver, and 1.9 ppm gold (www.grayd.com [5/12/05]). Most of the data generated by the exploration efforts in the Delta mineral belt are currently held by Grayd Resource Corporation and Northern Associates Incorporated (Dashevsky and others, 2003).

VMS occurrences in the Delta River Mining District study area were first discovered by the USGS while conducting geologic and mineral resource assessments of the Mt. Hayes quadrangle in 1983 (Lange and Nokleberg, 1984; Nokleberg and Lange, 1985). These occurrences are limited in grade and extent compared to those of the Delta mineral belt and have thus received less exploration attention. The only exploration industry attention was that of American Copper and Nickel Company who mapped and sampled the Miyaoka (Map no. 19) occurrence in 1993 (Ellis and others, 2004). Extensive geologic research has been focused on the occurrences by the USGS and others, particularly in the 1980's, which included detailed host rock descriptions, deciphering the tectonic setting, limited rock chip sampling, U-Pb dating, and lead isotope work (Nokleberg and Lange, 1985; Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985; Nokleberg and others, 1991; Lange and others, 1990; Lange and others, 1993).

The VMS deposits are hosted in Devonian metavolcanic and metasedimentary rocks of the Jarvis Creek Glacier subterrane, along the southern margin of the Yukon-Tanana terrane

(Lange and others, 1993, Dusel-Bacon and others, 2004). The Yukon-Tanana terrane is a composite terrane likely formed near the Paleozoic margin of North America (Coney and others, 1980; Dusel-Bacon and others, 2004). Dusel-Bacon and others (2004) define a bimodal suite of Late Devonian to Early Mississippian volcanic rocks in the southern Yukon-Tanana terrane and assign a continental signature to associated sedimentary rocks. They interpret the setting for the volcanism and VMS deposit formation as extension of continental margin crust (Dusel-Bacon and others, 2004).

VMS occurrences in the Delta River study area, from west to east, include the Miyaoka (Map no. 19), West Hayes Glacier (Map no. 25), East Hayes Glacier (Map no. 27), Sherpa (Map no. 28), Roberts No. 1 (Map no. 33), Roberts No. 2 (Map no. 42), North McGinnis Glacier (Map no. 44), and McGinnis Glacier (Map no. 45). Several of these 'occurrences' represent claim blocks that were apparently only active for 1 year and for which there is little available information (e.g. Sherpa, North McGinnis Glacier, McGinnis Glacier). BLM investigators describe the other occurrences in the property summary section of this report.

The VMS deposits in the Delta River study area are found mainly in the Hayes and McGinnis glacier areas (Nokleberg and Lange, 1985). In these two areas the Jarvis Creek Glacier subterrane includes more volcanic than sedimentary rocks, as it does in the Bonnifield and Delta VMS districts to the northwest and southeast of the Delta River study area respectively. The small number and restricted extent of VMS deposits in the study area is likely due to the overall lack of volcanic rocks of the Jarvis Creek Glacier subterrane (Nokleberg and others, 1992b).

The VMS deposits in the district and their host rocks have been penetratively deformed and metamorphosed. Previous workers define at least two episodes of deformation and metamorphism affecting the deposits and host rocks (Lange and Nokleberg, 1984), an amphibolite facies event in the Early Cretaceous and a lower greenschist event in the mid-Cretaceous (Lange and others, 1993). The deformation has dismembered what is assumed to have been originally bedded sulfide horizons resulting in discrete lenses and pods of massive to semi-massive sulfides separated by unmineralized host rock. Isoclinal folding of sulfide layers with thickened hinges and thinned limbs is commonly evident. Fold- and fault-repeated stratigraphic sequences are probably present although they are difficult to distinguish due to the intense deformation and limited bedrock exposure.

The VMS occurrences in the Delta River Mining District study area are widespread, but are penetratively deformed and dismembered. Analytical results from sampling indicate low or sporadic higher grades of precious and base metals. It seems unlikely that a large contiguous low grade ore body is likely to be present and, to date, no small, high grade occurrences have been discovered. It is unlikely that the occurrences will receive more than cursory exploration efforts in the foreseeable future.

MIYAOKA

Alternate Name(s):	Miyaoka West Hayes Glacier	Map No:	19
		MAS No:	0020680161
Deposit Type:	VMS	**Commodities:**	Cu, Au
Location:			
Quadrangle:	Mt. Hayes, C-6	TRS:	SE1/4 Sec: 10, T14S, R05E
Meridian:	Fairbanks	Elevation:	5,050 feet
Latitude:	63.71299	Longitude:	-146.73918

Geographic: The Miyaoka occurrence is located in the northern foothills of the eastern Alaska Range, west of the terminus of the Hayes Glacier. It is located in the headwaters area of the eastern tributary to Whistler Creek.

Access: Access is most practical by helicopter.

History: The Miyaoka occurrence was discovered by USGS investigators in 1983 (Nokleberg and Lange, 1985). USGS investigators continued their studies of the occurrence through at least the mid-1980's (Nokleberg and Aleinikoff, 1985; Aleinikoff and Nokleberg, 1985; Nokleberg and others, 1991; Lange and others, 1993). American Copper and Nickel Company (ACNC) mapped and sampled the occurrence in 1993 (Ellis and others, 2004).

ARDF Name / No.: Miyaoka / MH006 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Miyaoka occurrence is one of several VMS deposits and occurrences in a belt that stretches for over 110 miles along the north side of the Alaska Range (Lange and others, 1993; Newberry and others, 1997). These include the Bonnifield district (Dusel-Bacon and others, 2004), about 40 miles to the northwest of the Hayes district to the Delta district (Dashevsky and others, 2003) about 70 miles to the southeast. All of the occurrences are hosted in volcanic rocks of the Jarvis Creek Glacier subterrane of the Yukon-Tanana terrane (Coney and others, 1980; Nokleberg and others, 1991). The volcanic rocks are thought to have been derived from an igneous arc that formed on the continental margin of North America in Devonian time (Lange and others, 1990; Dusel-Bacon and others, 2004). The rocks have been penetratively deformed, including dismemberment of bedding, multiple episodes of folding, and formation of a through-going schistosity.

The Miyaoka occurrence consists of rounded lenses of massive to semi-massive sulfides with limestone and 'greenstone' hosted in chlorite-mica-quartz schist. The 'greenstone' is medium to dark green, fine grained, hard, massive, and appears to be silicified. Sulfide minerals are disseminated in the 'greenstone' as well as in bands and lenses within the 'greenstone.'

Sulfides are also found disseminated in the limestone, which is generally fine grained, massive, very light greenish tan. Massive lenses of sulfide are generally structureless, but in places exhibit crude layering that trends generally to the west-northwest and dips moderately to the south.

The iron-stained lenses that are so prominent at the Miyaoka occurrence seem to occur in two horizons (Figure 40; Lange and others, 1993). Lange and others (1990) describe these horizons as chlorite-muscovite-quartz schist hosting pods or lenses of chlorite-actinolite schist, limestone, and massive to semi-massive sulfides. The sulfide-bearing pods or lenses (e.g., Figure 41) make up only about 10 percent of the mineralized horizons over an area of about 1,000 feet by 200 feet.

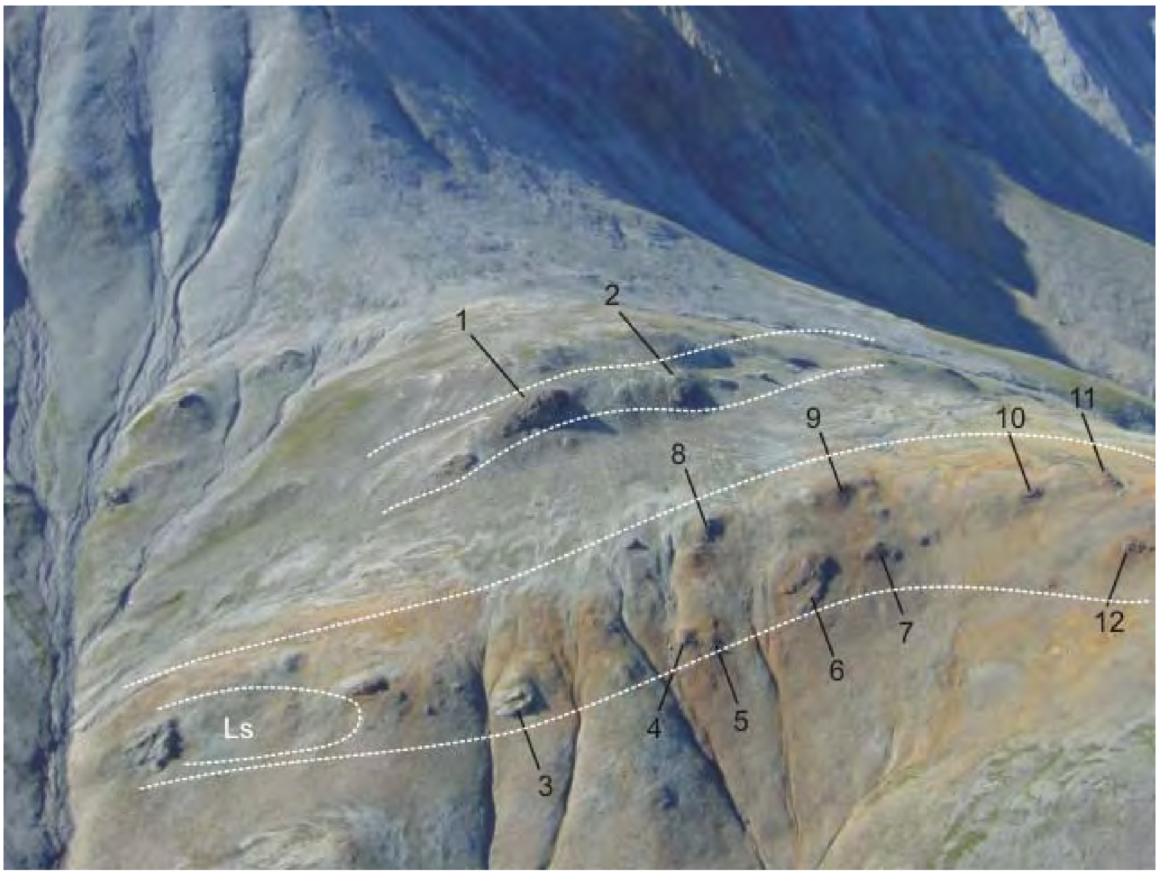


Figure 40. Aerial view of the main Miyaoka occurrence.
(Approximately fits the extents of Lange and others (1993) map. Two mineralized horizons are evident with pods or lenses of greenstone, limestone, and massive to semi-massive sulfides hosted in chlorite-mica-quartz schist. Numbers refer to massive sulfide lenses/outcrops as mapped and sampled by BLM geologists. View generally to the south.)

Sulfide minerals at the Miyaoka occurrence are predominantly pyrrhotite and pyrite with minor amounts of chalcopyrite. Sphalerite, galena, and arsenopyrite have also been reported

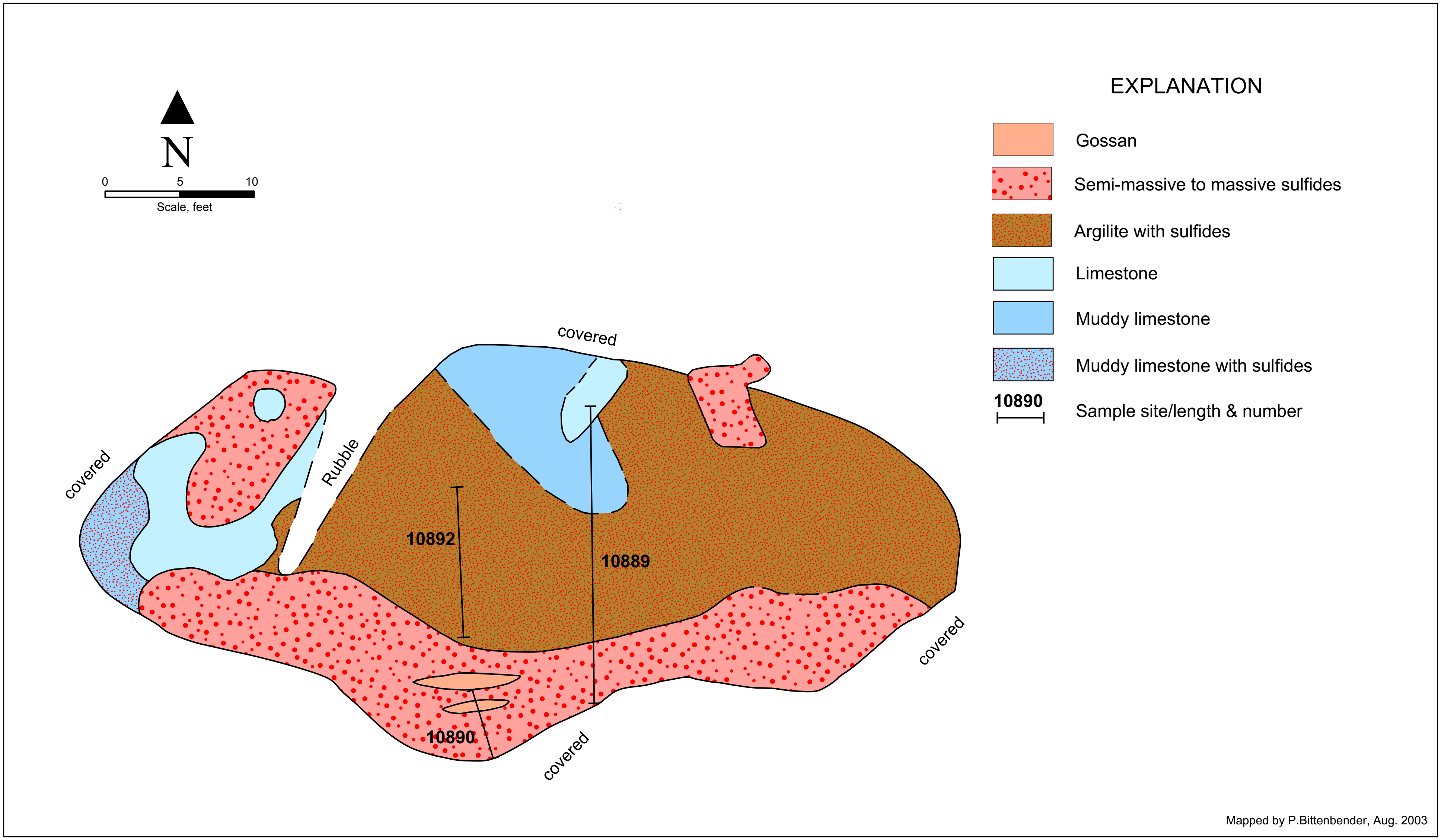


Figure 41. - Sketch map of "outcrop #6" at the Miyaoka prospect.

(Nokleberg and Lange, 1985; Lange and others, 1993), but were found only rarely by BLM investigators.

Bureau Investigation: The USGS and others have done extensive work on evaluating the timing, nature, and tectonic setting of the VMS occurrences of the southern Yukon-Tanana terrane (see references above). This work includes the Miyaoka occurrence. One thing lacking in previous studies at Miyaoka was a thorough evaluation of the grade of the occurrence with regard to a potential resource. Therefore, BLM investigators concentrated on collecting measured samples from the sulfide exposures.

BLM investigators collected 45 samples from the Miyaoka area. Of these, 22 samples were collected from the area portrayed by Lange and others (1993) as the main Miyaoka occurrence. The other samples were collected from similar iron-stained exposures about 0.3 miles to the west and 1 mile to the northwest of the Miyaoka occurrence and from about 0.5 miles to the east. Additional samples were collected from iron-stained rocks exposed about a half to three-quarters of a mile south-southwest of the occurrence.

From the Miyaoka occurrence itself, 17 of the 22 samples collected by the BLM were measured samples. The samples varied in length from 4 to 30 feet, with an average extent of about 12.5 feet. Averages for analytical results from the 17 samples were 0.096 ppm gold, 0.2 ppm silver, 784 ppm copper, 8.3 ppm lead, 54 ppm zinc, and 3.4 ppm arsenic. The highest grade samples were 1.2 ppm gold over 27 feet (sample 10893), 0.50 ppm silver over 6.2 feet (sample 10885), 2,750 ppm copper over 4.9 feet (sample 10890), 52 ppm lead over 6.2 feet (sample 10885), 117 ppm zinc over 8.0 feet (sample 10582), and 14 ppm arsenic over 11 feet (sample 10580).

Samples collected east, northwest, west, and south of the Miyaoka occurrence were similar in grade to those collected from the main occurrence described above, however, there was one notable exception. A sample collected across 3 feet of a 6-foot lens of massive pyrrhotite in chlorite schist to the west of the main Miyaoka occurrence returned 7.1 ppm silver, 985 ppm lead, and 2,290 ppm zinc (sample 10736). These were the highest silver, lead, and zinc samples collected from the Miyaoka area. Two of the samples collected from west and northwest of the main occurrence also returned higher arsenic values than seen elsewhere; the returns were 275 ppm (sample 10973) and 124 ppm (sample 10740) arsenic when the average from the main occurrence was only 14 ppm.

Mineral Development Potential: Low

Conclusions: The grades indicated by the BLM's measured samples of the Miyaoka sulfide lenses are quite low. In addition, the sulfide bodies make up only about 10 percent of the rock within the two mineralized layers indicated in the photo (Figure 40) and the map by Lange and others (1993). Although mineralized rock is found over a large distance to the east, west, and south of the occurrence, there seems to be little likelihood that a contiguous ore body is present given the high degree of deformation and associated dismemberment of original bedding.

WEST HAYES GLACIER

Alternate Name(s):	Landslide Creek	**Map No:**	25
		MAS No:	0020680376
Deposit Type:	VMS	**Commodities:**	Au, Ag, Cu, Pb, Zn
Location:			
Quadrangle:	Mt. Hayes, C-6	TRS:	NW1/4 Sec: 19, T14S, R06E
Meridian:	Fairbanks	Elevation:	5,150 feet
Latitude:	63.69027	Longitude:	-146.65686

Geographic: The West Hayes Glacier occurrence is located in the northern foothills of the Alaska Range, between two tributaries of the Hayes Glacier, and approximately 24 miles west of the Richardson Highway.

Access: Access is by helicopter.

History: Alaska Kardex records indicate that Resource Associates of Alaska (RAA) was active in the area during the late 1970's. They deeded most of their claims to CIRI in 1980 (Alaska Kardex 068-176, 180, 196). Nokleberg and others (1991) sampled the occurrence which was followed by a more detailed study of VMS deposits in the area by Lange and others (1993). American Copper and Nickel Company geologists also investigated the property in 1993 (Ellis and others, 2004).

ARDF Name / No.: Hayes Glacier West / MH007 **Alaska Kardex:** 068-176, 180, 196

Production: None

Workings and Facilities: None

Geologic Setting:
The rocks at the East Hayes Glacier consist of penetratively deformed chlorite to talc schist of volcanogenic origin. U-Pb age dates indicate they are of Devonian age (Nokleberg and others, 1991; 1992b).

Bureau Investigation: The BLM found structurally controlled, thin, massive sulfide pods, lenses, and stringers in several stratigraphic horizons between elevations of 4,900 and 5,300 feet. The massive sulfides are hosted in tightly folded quartz-mica to quartz-chlorite schists. The mineralization is on trend with the Miyaoka occurrence to the west and the East Hayes Glacier to the east and is best exposed in a north-south ridge (Figure 42). The zones generally trend east/west and dip to the south. In general, sulfide zones were less than a foot thick but occasionally structurally thickened to up to 2 feet and extended for 3 to 4 feet in length. Massive sulfides were primarily pyrrhotite with small amounts of chalcopyrite, pyrite, and galena. BLM samples contained gold to 685 ppb (sample 10324), silver to 13.7 ppm (sample 10921), copper to 4,660 ppm (sample 10923), lead to 1,335 ppm (sample 10921), and zinc to 1,035 ppm sample (10924).

Mineral Development Potential: Low

Conclusions: The VMS deposits at the West Hayes Glacier occurrence are thin and generally poor in economic minerals. They do verify the existence of VMS deposits in this part of the Alaska Range, connecting the known VMS districts to the east and west. Ground geophysics and drilling could identify lateral changes in the deposit.

Figure 42. Photo of rusty outcrops (arrows) at the West Hayes Glacier occurrence. View is to the east.

EAST HAYES GLACIER

Alternate Name(s):		Map No:	27
		MAS No:	0020680375
Deposit Type:	VMS	**Commodities:**	Au, Ag, Cu, Pb, Zn
Location:			
Quadrangle:	Mt. Hayes, C-6	TRS:	SE1/4 Sec: 22, T14S, R06E
Meridian:	Fairbanks	Elevation:	4,900 feet
Latitude:	63.68634	Longitude:	-146.55312

Geographic: The East Hayes Glacier occurrence is located in the northern foothills of the Alaska Range, east of the Hayes Glacier, and approximately 20 miles west of the Richardson Highway.

Access: The only practical access to this site is by helicopter.

History: Alaska Kardex records indicate that Resource Associates of Alaska (RAA) was active in the area during the late 1970's. They deeded most of their claims to CIRI in 1980 (Alaska Kardex 068-176, 180, 196). Nokleberg and others (1991) sampled the occurrence, which was followed by a more detailed study of VMS deposits in the area by Lange and others (1993). American Copper and Nickel Company geologists also investigated the property in 1993 (Ellis and others, 2004).

ARDF Name / No.: Hayes Glacier East / MH008 **Alaska Kardex:** 068-176, 180, 196

Production: None

Workings and Facilities: None

Geologic Setting: The rocks at the East Hayes Glacier occurrence consist of penetratively deformed chlorite to talc schist of volcanogenic origin. U-Pb age dates indicate they are of Devonian age (Nokleberg and others, 1991).

Bureau Investigation: The BLM found structurally controlled thin massive sulfide lenses and stringers in several stratigraphic horizons between elevations of 4,700 and 4,950 feet. The mineralization can be traced over a distance of 0.75 miles and is best exposed in three north-south ridges termed the West, Middle, and East ridges. Lange and others (1993) identified three (North, Central, and South) zones which the BLM also found and sampled. The zones generally trend east/west and dip approximately 60 degrees to the south. In general, sulfide zones are less than a foot thick, but occasionally structurally thicken to up to 1.5 feet. Massive sulfides are primarily pyrrhotite with small amounts of chalcopyrite, pyrite, and galena.

Sampling indicates that high concentrations of economic minerals are generally confined to the South (upper) zone, with samples at the West ridge containing 22.4 ppm silver, 2.4 ppm gold, 3,470 ppm lead, 638 ppm copper, and 1,140 ppm zinc (sample 10270). A sample from the same zone on the Middle ridge contained 29.4 ppm silver, 0.207 ppm gold, 1.94 percent copper, 1,115 ppm lead, and 958 ppm zinc (sample 10930).

Mineral Development Potential: Low

Conclusions: The VMS deposits at the East Hayes Glacier occurrence are thin and generally poor in economic minerals. They do verify the existence of VMS deposits in this part of the Alaska Range, connecting with the known VMS districts to the east and west. The occurrence here has a low development potential, but lateral changes in the deposit are possible and could be confirmed with ground geophysics and drilling.

ROBERTS NO. 1

Alternate Name(s):	West McGinnis Glacier	**Map No:**	33
		MAS No:	0020680378
Deposit Type:	VMS	**Commodities:**	Cu, Zn
Location:			
Quadrangle:	Mt. Hayes, C-5	TRS:	SE1/4 Sec: 19, T15S, R08E
Meridian:	Fairbanks	Elevation:	7,500 feet
Latitude:	63.59760	Longitude:	-146.26387

Geographic: The Roberts No. 1 occurrence is near the top edge of an east-facing cirque northwest of McGinnis Glacier (Figure 43). The cirque is directly west of the northernmost extent of McGinnis Glacier and is 3.9 miles north-northwest of McGinnis Peak.

Access: Access to the area is most practical by helicopter. A light helicopter may land in the cirque below, and to the east of the occurrence. Access to the occurrence requires climbing to the western head of the cirque, almost 1,500 feet above the cirque floor.

History: USGS investigators discovered the Roberts No. 1 occurrence during geologic investigations in the Mt. Hayes quadrangle in the 1980's. They collected several samples and described the mineralization and host rocks (Nokleberg and Lange, 1985; Nokleberg and others 1991; Lange and others 1993).

ARDF Name / No.: Roberts No. 1 / MH009 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Roberts No. 1 occurrence is one of several VMS deposits and occurrences in a belt that stretches for over 110 miles along the north side of the Alaska Range (Lange and others, 1993; Newberry and others, 1997). These include the Bonnifield district (Dusel-Bacon and others, 2004), about 40 miles to the northwest of the Hayes district to the Delta district (Dashevsky and others, 2003) about 70 miles to the southeast. All of the occurrences are hosted in volcanic rocks of the Jarvis Creek Glacier subterrane of the Yukon-Tanana terrane (Coney and others, 1980; Nokleberg and others, 1991). The volcanic rocks are thought to have been derived from an igneous arc that formed on the continental margin of North America in Devonian time (Aleinikoff and Nokleberg, 1985; Lange and others, 1990; Dusel-Bacon and others, 2004).

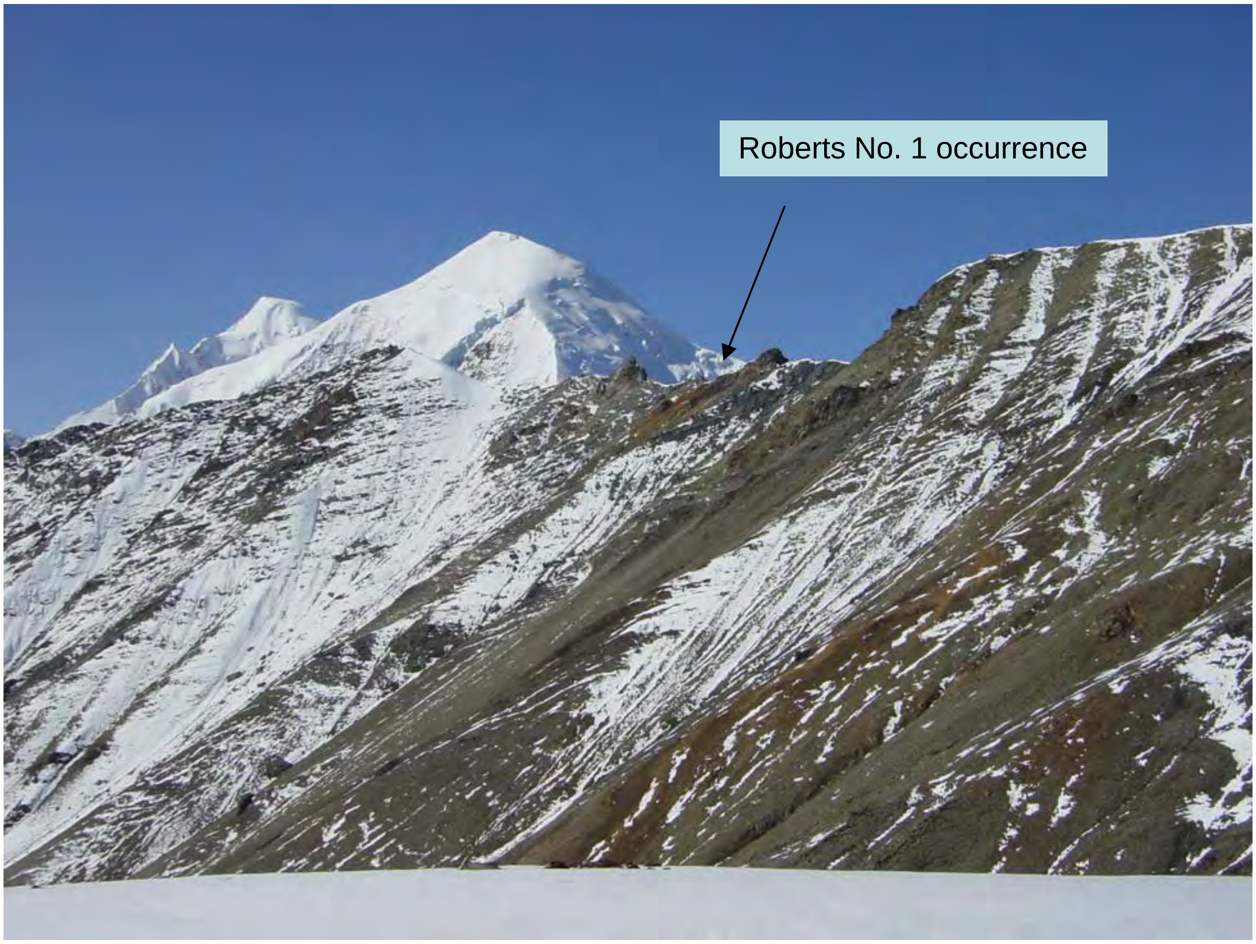


Figure 43. View to south-southwest of the Roberts No. 1 occurrence.

The VMS occurrences and host rocks have been penetratively deformed, including dismemberment of bedding, multiple episodes of folding that includes open to isoclinal folding with thickening of hinges and thinning of limbs (Figure 44), and formation of a through-going schistosity that is generally parallel to compositional layering. Lange and others (1993) report an amphibolite facies event in the Early Cretaceous and a lower greenschist facies event in mid-Cretaceous (see also Nokleberg and Aleinikoff, 1985).

Mineralized rock at the Roberts No. 1 occurrence includes semi-massive to massive pyrrhotite and/or pyrite with minor chalcopyrite and sphalerite in layers of calcareous quartz-chlorite schist. There are several layers of mineralized rock at the occurrence. The largest is about 6 feet thick and in places has been fold-repeated on isoclinal folds. Another layer of semi-massive sulfides is in the structural footwall of the thickest layer, and it is hosted by quartz-chlorite schist. Still another mineralized layer, about 0.6 feet thick, lies in the immediate structural footwall of a bedded limestone layer and is underlain by quartz-chlorite schist.

The thickest mineralized layer at the occurrence extends for about 60 feet along strike. It is covered to the southeast by talus and seems to pinch out to the northwest. Iron-stained outcrops farther to the northwest of the area sampled may indicate additional mineralized

Figure 44. Tightly folded massive sulfide layer at the Robert's No. 1 occurrence.

rock along strike. The layers strike southeast-northwest and dip moderately to gently to the southwest. The axis of one of the tight folds trends 290 degrees, and plunges 20 degrees (Figure 44).

The mineralized schist at the occurrence is interbedded with layered to laminated limestone. In places the limestone includes boudins of massive sulfide, schist, and argillite.

Bureau Investigation: BLM investigators collected four samples from the outcrop of the Roberts No. 1 occurrence high on the western cirque wall of the McGinnis Glacier area occurrences. Additional float samples were collected within the cirque to the east of the Roberts No. 1 occurrence and also from the valley to the west of the cirque. The presence of float to the west of the cirque indicates that the occurrence extends farther along strike to the northwest than sampled by BLM or described by previous investigators (e.g., Nokleberg and Lange, 1985; Lange and others, 1993).

A measured sample across 3.2 feet of mineralized rock outcrop returned 102 ppb gold, 1.3 ppm silver, 970 ppm copper, 94 ppm lead, and 1.58 percent zinc (sample 10953). These returns represent the highest values from the outcrop sampling except for copper where sample 10955 returned 4,960 ppm copper.

Samples collected from float to the east of the occurrence within the cirque returned up to 97 ppb gold (sample 6969), 30.1 ppm silver (sample 6967), 1.63 percent copper (sample 9757), 2.56 percent lead (sample 9757), and 7.49 percent zinc (sample 9757). Samples collected from float on the west side of the occurrence cirque returned up to 48 ppb gold (sample 11275), 12.9 ppm silver (sample 11026), 6,970 ppm copper (sample 11027), 3,010 ppm lead (sample 11026), and 4,820 ppm zinc (sample 11026).

Mineral Development Potential: Low

Conclusions: Samples collected from the Roberts No. 1 occurrence indicate the presence of moderate base metal concentrations, but low concentrations of associated precious metals. Measured samples from the outcrop of the occurrence suggest that even the moderate base metal concentrations may be erratically distributed. As with the other occurrences in the VMS belt within the Delta River Mining District study area, the Roberts No. 1 occurrence has been penetratively deformed and dismembered, which diminishes the likelihood of discovering a contiguous ore body. Finally, the precipitous nature of the terrain in the vicinity of the occurrence makes exploration in the area difficult.

ROBERTS NO. 2

Alternate Name(s):	McGinnis Glacier	**Map No:**	42
		MAS No:	0020680379
Deposit Type:	VMS	**Commodities:**	Cu, Pb, Zn
Location:			
Quadrangle:	Mt. Hayes, C-5	TRS:	NW1/4 Sec: 29, T15S, R08E
Meridian:	Fairbanks	Elevation:	6,800 feet
Latitude:	63.59293	Longitude:	-146.24654

Geographic: The Roberts No. 2 occurrence is located near the top of an east-trending ridge that protrudes from a mountain northwest of McGinnis Glacier. The mountain is west of the northernmost extent of the glacier.

Access: Access to the area is by helicopter. It may be possible to land on the ridge top where the occurrence is located, however, BLM investigators landed on a lateral moraine northwest of McGinnis Glacier and climbed to the ridge top.

History: USGS investigators discovered the Roberts No. 2 occurrence during geologic investigations in the Mt. Hayes quadrangle in the 1980's. They collected several samples and described the mineralization and host rocks (Nokleberg and Lange, 1985; Nokleberg and others 1991; Lange and others 1993). American Copper and Nickel Company geologists also investigated the occurrence (Ellis and others, 2004).

ARDF Name / No.: Roberts No. 2; McGinnis Glacier / MH010 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The Roberts No. 2 occurrence is one of several VMS deposits and occurrences in a belt that stretches for over 110 miles along the north side of the Alaska Range (Lange and others, 1993; Newberry and others, 1997). These include the Bonnifield district (Dusel-Bacon and others, 2004), about 40 miles to the northwest of the Hayes district to the Delta district (Dashevsky and others, 2003) about 70 miles to the southeast. All of the occurrences are hosted in volcanic rocks of the Jarvis Creek Glacier subterrane of the Yukon-Tanana terrane (Coney and others, 1980; Nokleberg and others, 1991). The volcanic rocks are thought to have been derived from an igneous arc that formed on the continental margin of North America in Devonian time (Aleinikoff and Nokleberg, 1985; Lange and others, 1990; Dusel-Bacon and others, 2004).

The VMS occurrences and host rocks have been penetratively deformed, including dismemberment of bedding, multiple episodes of folding (Figure 45) that includes open to isoclinal folding with thickening of hinges and thinning of limbs, and formation of a through-going schistosity that is generally parallel to compositional layering.

Figure 45. Folded fold at the Roberts No. 2 occurrence.

Lange and others (1993) report an amphibolite facies event in the Early Cretaceous and a lower greenschist facies event in mid-Cretaceous (see also Nokleberg and Aleinikoff, 1985).

The Roberts No. 2 occurrence comprises massive and semi-massive sulfides hosted in carbonaceous, calcareous, and chloritic schist or phyllite (Figure 46). The carbonaceous schists may represent metasediments whereas the other schists may represent an interlayered episode of volcanic activity. The mica schist in the immediate footwall of the sulfide layer is light green and may represent a more felsic volcanic composition than the structurally overlying chloritic and calcareous schists that host more of the sulfide phases. This could indicate a bimodal volcanic suite associated with the sulfide mineralization.

The sulfides form a layer up to about 30 feet thick and about 200 feet long that is parallel to the compositional variation and metamorphic foliation of the host rocks. The layer strikes about 110 to 125 degrees and dips moderately to steeply to the southwest. The layer seems to pinch out to the northwest and is covered by talus to the southeast. Both the sulfide layers and host rocks have been penetratively deformed. Isoclinal folds with local evidence of thickened hinges and thinned limbs are evident. The fold hinges are parallel to the foliation in the host rocks as well. Subsequent brittle deformation is evident by faults, with minimal offset, that cut the sulfide layer.

The sulfides present are mainly pyrrhotite with variable amounts of pyrite and chalcopyrite. Minor amounts of sphalerite and galena are also present. Locally the pyrrhotite is altered to marcasite. The sulfides commonly occur in lenses that may represent tectonically dismembered originally bedded layers. Calcareous schists commonly occur within the massive and semi-massive sulfide layer. The layer also includes segregations of quartz that locally form siliceous layers with pyrite. Sulfides are also found in lenses in chloritic schist in the structural hanging wall of the sulfide layer.

Bureau Investigation: BLM investigators mapped and sampled the Roberts No. 2 occurrence and analyzed 12 samples from the area. The samples indicate that the massive sulfides at the occurrence are predominantly iron sulfides, pyrrhotite, pyrite, and marcasite. There is a small amount of copper with lesser zinc and lead in the sulfides as well.

One of the higher grade measured sample returned 44 ppb gold, 1.0 ppm silver, and 2,470 ppm copper over 18 feet (sample 11277). Another sample returned 30 ppb gold, 0.8 ppm silver, 423 ppm copper, 215 ppm lead, and 3,560 ppm zinc over 16 feet (sample 11033). This sample had the highest concentrations of lead and zinc of the measured samples. It also contained over 1 percent manganese. The highest zinc concentration from the occurrence came from a piece of float collected on the slope below the occurrence outcrop. This sample returned 1.17 percent zinc from a possible meta-exhalite of carbonate, quartz, and chlorite, which contained pyrrhotite/marcasite, sphalerite, and minor chalcopyrite (sample 11280).

Mineral Development Potential: Low

Conclusions: Analytical results from samples collected at the Roberts No. 2 occurrence indicate low concentrations of precious and base metals associated with the sulfides at the site. In addition, due to the intense deformation, the sulfide bodies are dismembered and discontinuous. There seems to be little likelihood that a contiguous body of ore is present at the site. Rock outcrop in the area is relatively good, although down slope from the occurrence, outcrop is obscured by talus, which might hide on-strike extensions to the mineralized layer.

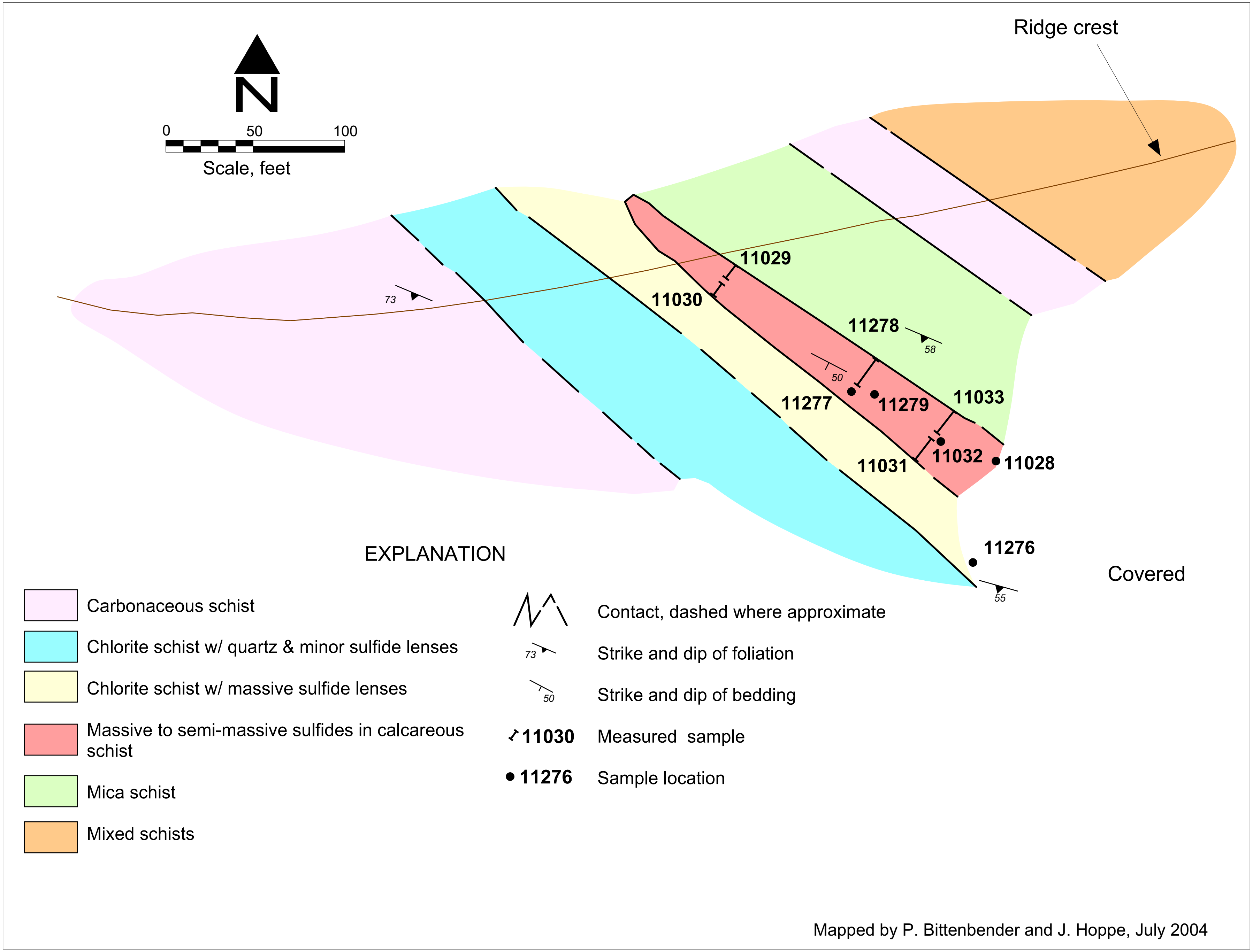


Figure 46. - Sketch map of the Roberts No. 2 occurrence.

Placer Deposits

Placer gold with silver and minor platinum group elements (PGE) constitute the only mineral production from the Delta River Mining District study area. Production totals approximately 182,074 troy ounces gold, greater than 17,000 troy ounces silver, and 83 troy ounces of platinum (Szumigala and Hughes, 2005; Foley and Summers, 1990). The majority of this production comes from Miller Gulch - Slate Creek area (Map nos. 457 and 448) on the upper Chistochina River (Cobb, 1973; Figure 48). During the BLM study active mining operations in the district included a placer mine on the upper Chistochina River (Map no. 439) and a minor operation on McCumber Creek (Map no. 75). The gold in the richest deposits has been mostly reworked from Tertiary conglomerate and glacial deposits to form gulch and bench placers. Inferred and indicated resources of gulch, alluvial, and bench placers total 6.2 million cubic yards. BLM samples of these resources contain from 0.0018 to 0.083 oz/cubic yard gold. Tertiary gravels make up an additional inferred resource of 2.6 million cubic yards with BLM samples averaging 0.007 oz/cubic yard gold.

Early mining operations used hand methods to work the shallow placer deposits (Figure 47). Hydraulic methods were later used to remove overburden from the more deeply buried bench placers. Water supplies were difficult to obtain as the season progressed, especially for the high bench deposits. Ditches were constructed to bring additional water into gold-bearing drainages and to provide the water pressure required for hydraulic operations. Most of the placer deposits in the district are unfrozen except for some frozen gravel on Miller and Slate creeks (Moffit, 1912). As a result underground drifting methods were not commonly used by miners. Recent operations have utilized bulldozers and large earth-moving equipment to transport gravel to large washing plants engineered to recover fine gold. Large motorized pumps have been used to bring water to mine sites. These operations mined gravels 80 to 90 feet thick (Colp, 1981).

Known grades range from 0.016 to 0.035 ounces per cubic yard gold (Yeend, 1981). Nuggets weighing up to 4 ounces have been reported from Miller Gulch (Map no. 457) and 1 ounce nuggets were not rare (Moffit, 1912). The coarsest gold lies near the stream headwaters and becomes finer down stream. Placer gold from Slate Creek ranges from 857 to 887.75 fine, whereas that from Rainy Creek averages 876 fine and the middle fork of the Chistochina is 862 fine (Smith, 1941).

PGE including osmiridium and iridium (with traces of palladium, rhodium, and ruthenium) have been recovered from Big Four Gulch, Slate Creek, Miller Gulch, Ruby Creek, and the head of the Middle Fork Chistochina River. Cobb (1973) reports platinum in the ratio to gold of 1:100 was recovered from placer concentrates. Foley and Summers (1990) state that production records, however, do not confirm that estimate.

The PGE is thought to be derived from ultramafic bodies occurring in the area as well as in the argillite host rocks (Foley and Summers, 1990). In addition, concentrates from the Chistochina River area contain magnetite, pyrite, chromite, native copper, silver, galena, cinnabar, and garnet. Scheelite is reported in concentrates from the upper Chistochina River (Cobb, 1973; Foley and Summers, 1990).

Glacial ice has had considerable influence over distribution of the placer deposits in the district. Ice has dammed various drainages at times, resulting in drainage reversals such as in the Slate Creek valley (Mendenhall, 1905). In addition lobes of glacier ice probably spilled over drainage divides, depositing gold-bearing drift in adjacent basins. This is probably the case in upper Specimen Creek (Map nos. 184, 188). Gold distributed throughout the glacial drift material was reworked by Pleistocene and Holocene streams cutting across the drift deposits. This action concentrated the gold in the active stream bed resulting in the formation of economic placers (Yeend, 1981).

In the upper Chistochina area, the local source for the majority of the gold is believed to be the Tertiary conglomerate unit, called “round wash” by miners (Yeend, 1981). However, it is also believed that at least some gold and PGE comes from hydrothermally altered argillites (Mendenhall, 1905; Foley and Summers, 1990). Several theories as to the ultimate source for the majority of the gold and PGE have been advanced. Rose (1967) concluded that the most probable source was undiscovered lodes, north of the Denali fault, and possibly near Mount Kimball.

Figure 47. Miners using sluice boxes to recover gold from shallow gulch placers on Slate Creek in the early 1900’s.
(Photo courtesy of Cook Inlet Historical Society.)

Figure 48. Placer occurrences in the Delta River study area.

Gulch (Active Stream) Placers

Some of the first discoveries in the Delta River study area were gulch placers. These deposits were also some of the easiest to exploit. Consequently, most were worked out within a few years. These deposits form in the active stream bed in upper, narrow, steep-walled parts of drainages such as Miller Gulch (Figure 49; Map no. 457) and Ruby Gulch (Map no. 480). Here gold was mostly concentrated on bedrock and the lower few feet of overlying gravel. A considerable amount of loose colluvial material made up the steep canyon walls and commingled with the stream-washed gravel. Overburden was shallow and the gold could be recovered using hand methods, requiring a minimum of equipment. In the upper Chistochina area, overburden ranged from 4 to 10 feet in depth with gold reported to be evenly distributed across the gulches down to 20 feet in width. Action by glacial ice has resulted in irregularities in depth of bedrock, formation of potholes, which occasionally exist in the stream bed, and changes in drainage patterns. Though relatively small, these placers were some of the richest sources of placer gold and PGE in the district. Approximately 9,700 ounces of gold was taken from Miller Gulch in the first few years after discovery (Mendenhall, 1905).

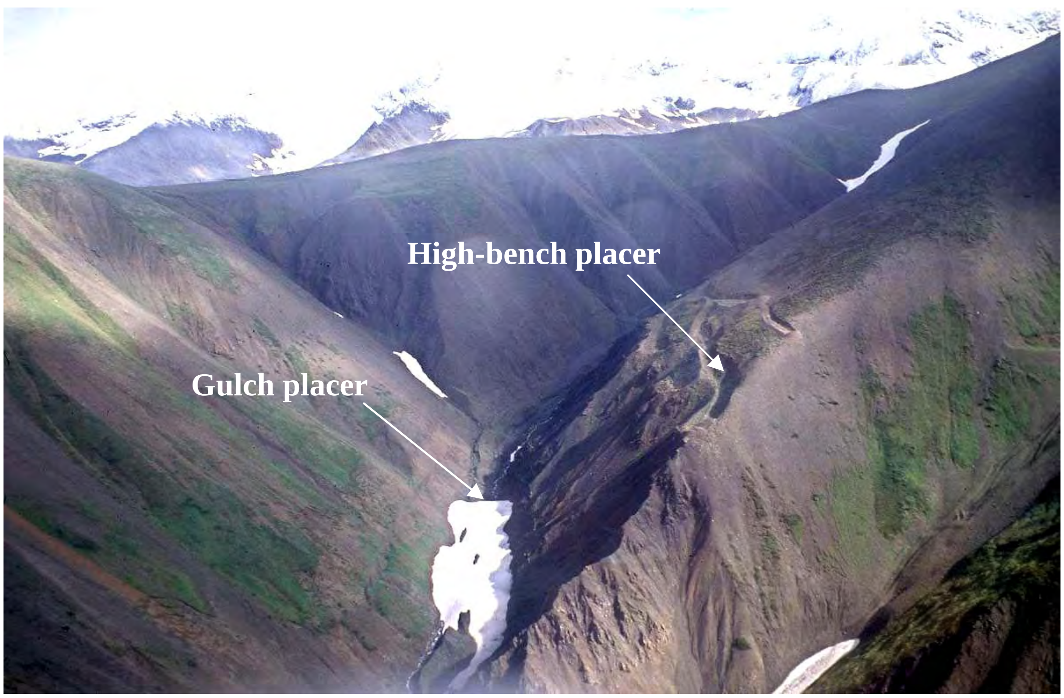


Figure 49. Gulch and high-bench placer deposits in Miller Gulch. (View to North)

Alluvial Placers

Placer deposits occur within some of the alluvial fans formed where creeks exit steep, narrow valleys onto lower gradient terrain. Within the fan at the mouth of Ruby Gulch a clay layer only a few inches thick, forms false bedrock that catches gold. The gravels beneath are barren (Moffit, 1912). The alluvial deposits at the mouth of Quartz Creek contain gold-bearing boulder zones on false bedrock (Map no. 482). Mining also took place in the alluvial fan at the mouth of Miller Gulch (Moffit, 1912; Yeend, 1981; Foley and Summers, 1990).

The outwash plain, near the toe of the Chistochina Glacier is nearly a mile wide and cut by a braided system of stream channels (Figure 50). The channels are cut into poorly consolidated cobble through boulder gravel, containing sandy and clayey layers up to several feet thick. Placer gold and PGE was previously reported in the outwash gravels a few feet above the present stream bed (Rose, 1967; Foley, 1992). Placer gold occurs disseminated throughout much of the outwash gravel, but recent mining efforts and testing by the BLM show gold to be associated with concentrations of large boulders and false-bedrock clay layers in the gravel. In some cases the clay layers are well exposed across the full width of a channel bed. In other cases clay-rich gravels are poorly exposed in channel walls. Placer samples collected by the BLM contained up to 0.035 oz/cy gold. This was the main placer deposit type being exploited during the BLM study. There is potential for similar placer deposits in the outwash plains of the West Fork Chistochina and Gakona glaciers.

Figure 50. Placer mining operations in the outwash plain of the Chistochina Glacier. (View to South West).

Bench Placers

Bench placers in the Delta River study area are remnants of gravel deposits formed during earlier stages of stream development. These deposits were left behind as the streams cut downward to accommodate changes in base level. The erosional history of ancestral streams that formed the bench placers is probably related to uplift of the south flank of the Alaska Range along the Denali and related faults. Periods of uplift and rapid down cutting were followed by the formation of meanders as the streams adjusted to lower base levels. The valleys widened as meandering streams cut benches into the bedrock, depositing placer gold in the process. Gold was concentrated mostly on bedrock and the lower few feet of overlying gravel. Subsequent drops in base level resulted in phases of rapid down cutting that left the previously-formed benches perched on valley walls. Changes in base level and down cutting were also influenced by the advance and retreat of glacier ice.

Some drainages contain both “high” and “low” benches. These can range from only a few feet above the present stream, as on Upper Specimen Creek (Map no. 188), to over 200 feet up the east side of Miller Gulch (Map no. 457). A narrow bench 10-15 feet above the present channel of Slate Creek, opposite the mouth of Miller Gulch, was one of the first areas in the district to be worked (Mendenhall, 1905). During the BLM study, low bench gravels were being mined on McCumber Creek (Map no. 67).

Figure 51. Placer mine site in low-bench gravels (arrows) on the Chisna River. (View to Northeast.)

High bench placers have been mined to a limited extent on Miller Gulch (Figure 49), upper Slate Creek, and Big Four Creek (Map no. 461). Moffit (1912) indicated that where the high-bench gravels are known to carry gold, attention should be given to streams that cut channels through them or undermine their banks as these drainages may rework the gold into economic gulch placers. Low-bench placers have been mined on the lower Chisna River (Map no. 496; Figure 51). Gravel on benches mined on Big Four and Limestone creeks (Map no. 489) are believed to be glacial in origin (Moffit, 1915). These benches probably formed where gravel piled up against the margins of glacial ice (Yeend, 1981).

Bench placers represent some of the largest and richest undeveloped mineral resources known to exist in the district. A sample from the Miller Gulch high benches contained 0.28 oz/cy gold. The full extent of this resource is unknown. Many of the bench placers may be uneconomic due to excessive overburden, difficulty in getting water to potential mine sites, and low grades.

Tertiary Gravel Placers

A coarse Tertiary conglomerate unit is mostly concentrated on ridge tops in the Miller Gulch-Big Four Creek area with additional exposures on the ridges between Slate and Quartz creeks (Figure 52). The unit is up to several hundred feet thick, dips gently to the northwest, and unconformably overlies argillite. It is described as a poorly consolidated unit containing well-rounded boulders up to 1 foot in diameter of quartz and granite. Smaller schist and gabbro cobbles, however, make up almost 50 percent of the clasts. The boulders are more resistant to weathering than the more mafic constituents. Thus they make up a residual detritus in areas where the conglomerate has been weathered and form a colluvial mantle, especially on ridge tops (Chapin, 1919b; Foley and Summers, 1990)

The firmly cemented conglomerate is exposed in only a few places. The matrix is commonly coarse grained and in places resembles a "salt and pepper" sandstone with abundant quartz. This unit has historically been called "round wash" by miners. Gold can be panned from the conglomerate at numerous locations and gold flakes up to 3.5 mm across have been observed. Samples collected by previous workers contained up to 0.01 oz/cy gold (Mendenhall, 1905; Chapin, 1919b; Rose, 1967; Yeend, 1981; Foley and Summers, 1990). Samples collected by the BLM during this study averaged 0.007 oz/cy gold. The gold ranged from subangular to angular with some quartz attached. The majority of the gold in the samples was +35 mesh in size.

The conglomerate also occurs within fault blocks along Slate Creek, but is not known there to be gold-bearing. It is believed that this material represents a higher part of the section, whereas the ridge-capping conglomerate represents the base of the section where heavy minerals like gold would concentrate. The source of the round wash is thought to be a red conglomerate, which is exposed in a number of places in the area (Chapin, 1919).

There is general agreement that the conglomerate is one source of the placer gold in the modern stream beds in the upper Chistochina area and probably in some of the bench placers. It has also been postulated that at least some of the gold, along with PGE, mercury, copper, and lead, comes from a local source through erosion of the altered argillites and igneous rocks underlying Miller Gulch (Mendenhall, 1905; Foley and Summers, 1990). The original sources of the gold and PGE has been speculated by some as metamorphosed and ultramafic rocks north of the Denali fault (Mendenhall, 1905; Martin, 1919).

Figure 52. Sampling gold-bearing Tertiary "round wash" gravels capping ridge tops near the headwaters of Miller Gulch.
(Note well-rounded boulders characteristic of this formation.)

Inferred resources of Tertiary gravels in the Miller Gulch-Big Four Gulch areas total 2.6 million cubic yards. An additional 4.6 million-cubic yard resource of untested gravel also exists on the ridges between Slate and Quartz creeks. This resource has not been exploited due to sub-economic gold grades and the difficulty involved with getting washing water to the ridge top placer sites.

Table 16. Summary information on placer occurrences in the Delta River study area.

Map no.	AMIS No.	Name	Commodity	Production (troy oz gold)	Resource Estimate	Mineral Development potential
506	20680394	Alder Creek	Au, Ag	Unknown	10,600 cy. Sample contained 0.0018 oz/cy gold	Low
488	20680352	Bedrock Creek	Au, Ag	Unknown	Inferred: 3,250 cy	Medium
461	20680074	Big Four Creek	Au, Ag, PGE	Unknown	7,500 cy. Sample contained 0.005 oz/cy gold	Medium
583	20680042	Boulder Creek	Au, Ag	None	Unknown	Low
168	20680388	Broxson Gulch	Au, Ag	Unknown	Unknown	Low
183	20680384	Broxson Gulch (Lower East Fork)	Au, Ag	Unknown	Unknown	Low
170	20680385	Broxson Gulch (Upper East Fork)	Au, Ag	Unknown	Unknown	Low
497	20680072	Chisna River	Au, Ag, PGE	Unknown	Inferred: 400,000 cy. Sample contained 0.012 oz/cy gold	Medium
496	20680071	Chisna River (Lower)	Au, Ag, PGE	Unknown	Inferred: 3.0 million cy containing 0.044 - 0.056 oz/cy gold	Low
492	20680351	Chisna River (Middle)	Au, Ag, PGE	Unknown	Unknown	Low
439	20680130	Chistochina Glacier	Au, Ag	Minimum 254	Inferred: 14,900 cy. Samples averaged 0.025 oz/cy gold	Medium
504	20680387	Chistochina River East Tributary	Au, Ag	Unknown	Unknown	Low
411	20680078	Chistochina River, West Fork	Au, Ag	Unknown	Unknown	Low
500	20680073	Daisy Creek	Au, Ag	Unknown	Unknown	Low
515	20680062	Dan Creek	Au, Ag	None	Unknown	Low
539	20680049	Delta River	Au, Ag	Unknown	Unknown	Low
540	20680393	Delta River - Garrett Creek	Au, Ag	None	Unknown	Low
498	20680076	Dempsey	Au, Ag	None	Unknown	Low

Map no.	AMIS No.	Name	Commodity	Production (troy oz gold)	Resource Estimate	Mineral Development potential
538	20680383	Eureka Creek	Au, Ag	Unknown	Unknown	Low
398	20680094	Gakona Glacier	Au, Ag, PGE	None	Unknown	Low(?)
582	20680064	Gulkana River East Tributary	Au, Ag	Unknown	Unknown	Low
510	20680066	Gunn Creek	Au, Ag, W	Unknown	Unknown	Low
92	20680102	Gunnysack Creek	Au, Ag	None	Unknown	Low
490	20680353	Kraemer Creek	Au, Ag	Unknown	Unknown	Unknown
489	20680079	Limestone Creek	Au, Ag,	580	Unknown	Unknown
505	20680324	Little Daisy – Weldon Creek	Au, Ag	Unknown	Unknown	Low
572	20680169	Maclaren River (East Fork)	Au, Ag	None	Unknown	Low
67	20680019	McCumber Creek	Au, Ag	Unknown	Inferred: 580,000 cy averaging 0.006 oz/cy gold	Medium
66	20680389	McCumber Creek Tributary	Au, Ag	Unknown	Inferred: 3,700 cy. Sample contained 0.008 oz/cy gold	Low
457	20680069	Miller Gulch	Au, Ag, PGE	50,000 Au 15 PGE	Inferred: 950 cy. Sample contained 0.083oz/cy gold	Medium to High
265	20680155	Miller Mine	Au, Ag	Unknown	Unknown	Low
68	20680116	Morningstar Creek	Au, Ag	Unknown	Inferred: 150,000 cy averaging 0.02 oz/cy gold	Low
171	20680045	No Name Creek	Au, Ag	Unknown	Inferred: 7,200 cy. Samples contain up to 0.0054 oz/cy gold	Medium
64	20680016	Ober Creek	Au, Ag	Unknown	None	Low
636	20680099	One-Mile Creek	Au, Ag	None	Unknown	Low
86	20680014	Pegmatite Creek	Au, Ag	None	Unknown	Low
263	20680059	Phelan Creek (Lower)	Au, Ag	Unknown	Unknown	Low
530	20680063	Phelan Creek (Upper)	Au, Ag	Unknown	Unknown	Low
52	20680024	Pillsbury	Au, Ag	None	Unknown	Low

Map no.	AMIS No.	Name	Commodity	Production (troy oz gold)	Resource Estimate	Mineral Development potential
8	20680080	Ptarmigan Creek	Au, Ag	Unknown	Unknown	Low
482	20680205	Quartz Creek	Au, Ag	Unknown	Inferred: 784,800 cy as of 1979	Low
210	20680180	Rainy Creek	Au, Ag	3,717	Inferred: 28,960 cy. Values range from 0.016 to 0.127 oz/cy gold	Medium
196	20680047	Rainy Creek (West Fork)	Au, Ag	Unknown	Unknown	Low
503	20680091	Red Bear	Au, Ag	None	Unknown	Low
459	20680390	Round Wash	Au, Ag, PGE	Unknown	Inferred: 2.6 million cy. Three samples averaged 0.007 oz/cy gold	Low
480	20680070	Ruby Gulch	Au, Ag, PGE	Unknown	Inferred: 300,980 cy averaging 0.0239 oz/cy gold	Low
65	20680199	Savage Creek Tributaries	Au, Ag	Unknown	Unknown	Low
448	20680068	Slate Creek	Au, Ag, PGE	64,427	Indicated: 722,000 cy averaging 0.0116 oz/cy gold	Medium
184	20680114	Specimen Creek (Lower)	Au, Ag	None	Inferred: 154,000 cy. Sample contained 0.059 oz/cy gold.	Medium
188	20680241	Specimen Creek (Upper)	Au, Ag	Unknown	Inferred: 130 cy. Sample contained 0.016 oz/cy gold	Medium
438	20680138	Treasure Gulch	Au, Ag, PGE	18	Unknown	Low
70	20680399	McCumber Creek (Upper)	Au, Ag	None	Unknown	Low

PTARMIGAN CREEK

Alternate Name(s):	Conradt Placer	**Map No:**	9
		MAS No:	0020680080
Deposit Type:	Placer	**Commodities:**	
Location:			
Quadrangle:	Mt. Hayes, D-6	TRS:	NE1/4 Sec: 12, T13S, R06E
Meridian:	Fairbanks	Elevation:	2,600 feet
Latitude:	63.80749	Longitude:	-146.50874

Geographic: Ptarmigan Creek is a tributary of Dry Delta Creek on the northern slope of Mt. Hayes, approximately 90 miles southeast of Fairbanks. The prospect is approximately 25 miles west of Donnelly's Roadhouse on the Richardson Highway.

Access: A 1,200-foot by 100-foot airstrip was built by A. Conradt, circa 1940, along the left limit of Dry Delta Creek just above the mouth of Ptarmigan Creek (U.S. Bureau of Mines, 1943).

History: The discovery claims were staked at Ptarmigan Creek in 1937 by A. W. Conradt and J. Hajdukovich. These two owned the claims in 1941, along with Frank Gillespie, who built a cabin at the site in the 1920's (U.S. Bureau of Mines, 1943). In 1954, the owner is reported as Grady S. Rollins, but in 1961, it was again owned by J. Hajdukovich (Alaska Kardex 068-20).

ARDF Name / No.: None **Alaska Kardex:** 068-20

Production: Unknown

Workings and Facilities: There is a circa 1920 cabin located upstream from the Ptarmigan placer, reportedly built by Frank Gillespie, and occupied by Hajdukovich and Conradt on their Home claim. It sits at the lower end of the canyon on Ptarmigan Creek. The Home claim was associated with a block of 19 lode claims of the Ptarmigan molybdenum prospect (Map no. 9) located to the southwest on Ptarmigan Creek.

Geologic Setting: The vicinity of Ptarmigan Creek is underlain by schist and slate members that correlate to the pre-Cambrian Birch Creek Schist. Along the southern contact, the Birch Creek Schist is intruded and overlain along a low angle contact by granodiorite of Mesozoic age. The granodiorite is locally overlain by thick accumulations of Tertiary shale, sandstone, and conglomerates. Tertiary coal beds can be found at the mouth of Ptarmigan Creek, and are covered by a thin unconsolidated Quaternary glaciofluvial cover that extends over the lowlands (Joesting, 1942a). Within Ptarmigan Creek, boulders up to 15 feet in diameter are common. The first bench has abundant boulders up to 8 feet in diameter. The second bench consists of few boulders, abundant cobbles, and grades to coarse silt. Assay values obtained from quartz-molybdenite veins contained up to $10.15 per ton gold (calculated at a gold price of $35 per troy ounce; U.S. Bureau of Mines, 1943).

Bureau Investigation: The BLM took a series of test pans from the second bench of Ptarmigan Creek along the right limit (sample 10274). Trace magnetite, minor biotite, but no gold colors were found in the pan concentrate. Analysis showed the sample to contain 96 ppb gold.

Mineral Development Potential: Low

Conclusions: The low gold values observed make this site insufficient for a profitable small or medium-scale mining operation. In addition, the site is now within the Department of Defense's Fort Greely.

PILLSBURY

Alternate Name(s):		Map No:	52
		MAS No:	0020680024
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	SE1/4 Sec: 35, T15S, R09E
Meridian:	Fairbanks	Elevation:	2,346 feet
Latitude:	63.22358	Longitude:	-145.93824

Geographic: Pillsbury Creek is located to the east of Pillsbury Mountain and west of the Delta River, in the heart of the Alaska Range. It flows into the Delta River at a point approximately 1.5 miles west of Richardson Highway mile marker 231.

Access: The site can be accessed by hiking Pillsbury Creek up stream approximately 1 mile from the Delta River. The Delta River must be crossed to reach Pillsbury Creek from the Richardson Highway. The most practical access is by helicopter.

History: Don B. Davis filed the initial discovery claims at this site in 1978 (Alaska Kardex 068-185).

ARDF Name / No.: None **Alaska Kardex:** 068-185

Production: None

Workings and Facilities: None

Geologic Setting: Nokleberg and others (1992b) mapped the rocks in this area as "Fine-grained, poly-deformed metasedimentary rocks" of Devonian and older age. K-Ar analyses of white mica give ages of 106 to 118 Ma. Capps (1912) calls the unit the Birch Creek Schist. The metasedimentary rocks are covered by a thin unconsolidated Quaternary glaciofluvial cover that extends over the lowlands.

Bureau Investigation: The BLM took a series of test pans from both the left and right limits within the second bench of Pillsbury Creek (sample 10273). A trace of magnetite and one very fine grain of gold were found in the pan concentrate.

Mineral Development Potential: Low

Conclusions: The low gold values observed make this site insufficient for a profitable small- or medium-scale mining operation.

OBER CREEK

Alternate Name(s):	Oberg, Savage Creek	**Map No:**	64
		MAS No:	0020680016
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	NE1/4 Sec: 10, T14S, R10E
Meridian:	Fairbanks	Elevation:	2,600 feet
Latitude:	63.71972	Longitude:	-145.77077

Geographic: Ober Creek is a 13 mile-long tributary to Jarvis Creek. The placer site is about 4.3 miles south-southeast of Donnelly Dome, where locally named Savage Creek joins Ober Creek. Savage Creek is the largest tributary to Ober Creek.

Access: Ober Creek can be accessed via locally named "Coal Mine Road," which joins the Richardson Highway near Mile 243. A narrow ATV trail heading east branches off of Coal Mine Road and crosses Ober Creek where it is joined by Savage Creek.

History: Ober Creek was first staked in 1929 by Charles Miller (Alaska Kardex 068-50). Placer prospecting on Ober Creek and adjacent Savage Creek has continued intermittently from the 1950's into the 1990's (Alaska Kardex 068-50, 54).

ARDF Name / No.: Savage Creek / MH013 **Alaska Kardex:** 068-50, 54, 125, 188

Production: Unknown

Workings and Facilities: Pilgrim (1930) reports shafts sunk on upper Ober Creek and several bedrock drains and open cuts put in with small automatic dams. A series of at least four bulldozer trenches and the remains of a campsite are located near the junction of Ober and Savage creeks, an eastern tributary, 7.8 miles upstream from Jarvis Creek. Two of the trenches are about 12 by 30 feet and located on Savage Creek, about 150 feet upstream from its confluence with Ober Creek. A third trench is located to the west across Ober Creek. The remains of a small hand placer operation, including riveted metal pipe and wood planks, are located on an eastern tributary of Savage Creek, just upstream from Ober Creek.

The decaying remains of a cabin, metal scraps, a wagon wheel, and a boiler(?) can all be found in the same area as the trenches. Moffit (1954) mentions several shafts with corresponding dumps and a boiler used for thawing the frozen gravel on the forks of upper Ober Creek.

Geologic Setting: Ober Creek drains a series of low sloping hills, which are primarily composed of Quaternary glacial deposits and coal-bearing Tertiary sediments. A zone of morainal topography dotted with kettle lakes and bogs extends northward along the edge of the Delta River valley. This area defines the western boundary of the Ober Creek drainage, whereas a string of rounded ridgelines cut at one point by Sargent Creek makes up the eastern boundary.

Devonian metavolcanic and metasedimentary pelitic schists typically form areas of greater relief. Mylonitic gneiss and schistose diorite, granodiorite, and granite of Devonian age make up portions of the benchmark Ober ridge, which divides lower Ober Creek from Jarvis Creek to the east (Nokleberg and others, 1992b). The dominance of metamorphic rocks in this area is reflected in the gravels of Ober Creek, which are almost entirely schist, gneiss, and quartz.

Several of the eastern tributaries of Ober Creek are reported to be gold-bearing. These steep gulches cut terraces capped by outwash gravels, possibly correlative with the late Tertiary Nenana Gravel. The gravels are reported to pan gold throughout and are probably the source of the placer gold in Savage and Ober creeks. The terrace gravel is reported to be 6 to 12 feet thick with very little muck. The gravels of Savage Creek are from 6 to 25 feet thick with a few feet of muck (Pilgrim, 1930). Moffit (1942) reported that several holes, sunk in gravel, yielded fair prospects.

Pans taken from modern stream gravels along Ober Creek are reported to contain a few fine gold colors. As of 1930, no holes had been sunk to bedrock on Ober Creek. Concentrates from bedrock gravels along Savage Creek and side gulches show considerable magnetite and red garnet. The gold was rounded and well worn and sold for $17.00 per ounce (822 fine). The gravel underlying Ober Creek, near the mouth of Savage Creek, is estimated to be not over 40 feet thick and to be frozen. Boulders up to 5 feet in diameter were reported (Pilgrim, 1930). Panned concentrates from Ober Creek are reported to contain monazite and up to 0.011 percent equivalent uranium (Wedow, 1954; Overstreet, 1967).

Bureau Investigation: The BLM took a series of test pans from gravel piles in the dozer trenches located near the junctions of Ober and Savage creeks. Two test pans from a 12- by 30-foot water-filled trench just east of the junction of Savage and Ober creeks, contained four very fine gold flakes along with garnet and minor black sand (samples 10052-053). Bedrock was not exposed in any of the trenches. Three pans taken from the modern stream bed produced a total of one very fine gold flake (sample 10051). A test pan from a trench 0.1 miles downstream from the junction and on the west side of Ober Creek contained one very fine gold flake (sample 10645). Test pans from a large water-filled trench, on the east side of Ober Creek, 0.35 miles downstream from Savage Creek, did not contain gold. In addition, test pans from the modern stream nearby did not contain gold (samples not collected).

An investigation was made of the Golden Eagle claims, which cover a 2.5-mile-long stretch of upper Ober Creek, mostly south of the trail connecting the Richardson Highway with Jarvis Creek. An aerial reconnaissance revealed no evidence of sampling or mining within the claim block. The active creek bed contains numerous large gneissic boulders up to 3 feet in diameter. Test pans were taken at a point where the creek flows up against terrace gravels on the west bank. Pans from around boulders in the active stream bed and from low bench gravel on the east side did not contain visible gold. A test pan taken from terrace gravel, 10 feet above the active stream level, contained one very fine gold flake (sample 10686).

Mineral Development Potential: Low

Conclusions: The low gold values observed make this site insufficient for a profitable small- or medium-scale mining operation.

SAVAGE CREEK TRIBUTARIES

Alternate Name(s):	Mineral Gulch Harding Gulch Snow Gulch	**Map No:**	65
		MAS No:	0020680199
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	NW1/4 Sec: 11, T14S, R10E
Meridian:	Fairbanks	Elevation:	2,550 feet
Latitude	63.71564	Longitude:	-145.76588

Geographic: According to Pilgrim (1930), Savage Gulch is a 3-mile-long drainage and eastern tributary of Ober Creek. Pilgrim's description indicates that the junction of the two streams is located in the NE 1/4 of Section 10, T14S, R10E. Mineral Gulch, Snow Gulch, and Harding Gulch are ephemeral streams approximately 0.3 miles in length that flow west into Savage Creek from a point varying from 0.3 miles to 1 mile from the confluence of Savage Creek and Ober creeks.

Access: Access to the site is easiest by helicopter. Savage Creek tributaries can, however, be accessed via Coal Mine Road, which joins the Richardson Highway near Mile 243. A narrow, ATV trail heading east branches off of Coal Mine Road and crosses Ober Creek where it is joined by Savage Creek, its largest tributary. Mineral Gulch is a distance of 0.3 miles east-southeast from this point. Traveling south a distance of 1 mile along Savage Creek is Harding Gulch, the last of the ephemeral streams feeding Savage Creek.

History: Pilgrim (1930) reported observing prospecting on Savage Creek in 1927. Between 1959 and 1973, prospecting, trenching, and road maintenance was being done by C. DeWitt and D. Smith. C. DeWitt was working Mineral Creek, a Savage Creek tributary, in 1969 (Alaska Kardex 068-54).

ARDF Name / No.: Savage Creek / MH012 **Alaska Kardex:** 068-54

Production: Unknown

Workings and Facilities: Remains of a wooden sluice box are located in the northern most eastern tributary to Savage Creek. According to Pilgrim (1930) this drainage is Mineral Gulch.

Geologic Setting: Savage Creek and tributaries drain a series of low sloping hills that are primarily composed of Quaternary glacial deposits and coal-bearing Tertiary sediments. A zone of morainal topography dotted with kettle lakes and bogs, extends northward along the edge of the Delta River valley. This area defines the western boundary of the Ober Creek drainage. A string of rounded ridgelines, cut at one point by Sargent Creek, makes up the eastern boundary.

Devonian metavolcanic and metasedimentary rocks occurring as pelitic schists typically form areas of greater relief. Mylonitic gneiss and schistose diorite, granodiorite, and granite of Devonian age make up portions of the ridge that divides Savage and Ober creeks from Jarvis Creek to the east (Nokleberg and others, 1992b). The dominance of metamorphic rocks in this area is reflected in the stream gravels of Ober Creek, which are almost entirely schist, gneiss, and quartz.

Several of the eastern tributaries of Savage Creek are reported to be gold-bearing. These steep gulches cut terraces capped by outwash gravels, possibly correlative with the late Tertiary Nenana Gravel. The gravels are reported to pan gold throughout and are probably the source of the placer gold in Savage and Ober creeks. The terrace gravel is reported to be 6 to 12 feet thick with very little muck. The gravels of Savage Creek are from 6 to 25 feet in depth with a few feet of muck (Pilgrim, 1930). Moffit (1942) reported that several holes, sunk in gravel, yielded fair prospects.

The gravel underlying Ober Creek, near the mouth of Savage Creek, is estimated to be not over 40 feet thick and to be frozen. Boulders up to 5 feet in diameter were reported (Pilgrim, 1930). Panned concentrates from Ober Creek are reported to contain monazite and up to 0.011 percent equivalent uranium (Wedow, 1954; Overstreet, 1967).

Bureau Investigation: The BLM took test pans from Mineral Gulch(?) a northwest-flowing tributary to Savage Creek, just upstream from Ober Creek. This creek drains benches capped with outwash gravels and contains evidence of old hand mining. A total of three pans taken from fractured bedrock just upstream from where the creek exits a steep-walled gully contained five very fine gold flakes. A pan concentrate (sample 10264) contained 17 ppm gold. A placer sample taken on this creek, just upstream from Savage Creek, did not contain recoverable gold (sample 10649). None of the pan concentrate samples collected on Savage Creek were anomalous in uranium.

Mineral Development Potential: Low

Conclusions: There is little potential for interest in this site due to low gold values.

MCCUMBER CREEK TRIBUTARY

Alternate Name(s):		Map No:	66
		MAS No:	0020680389
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	SE1/4 Sec: 04, T14S, R11E
Meridian:	Fairbanks	Elevation:	2,550 feet
Latitude:	63.72884	Longitude:	-145.61799

Geographic: The creek is a 3.5-mile-long, northeast-flowing tributary of McCumber Creek. Its junction with McCumber Creek is 1.7 miles upstream from Jarvis Creek.

Access: Access is via a 6-mile all terrain vehicle (ATV) trail off the Richardson Highway.

History: The BLM found no information about the history of the site. In 2005, J. Ragsdale was the owner of the claims (BLM claim records).

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: There is evidence of mining on the lower 0.2 miles of the creek. Near the mouth, hand methods were used, while upstream, there is evidence of mechanized mining, diversion ditches, sluice boxes, and a boom(?) dam. Near the upper end of the mined area, bench gravels within a meander bend on the west side of the creek were mined. A cabin is located on the east side of the creek, 0.1 miles upstream from McCumber Creek. The lower part of the creek was being worked with a suction dredge in 2004 (Figure 53).

Geologic Setting: This tributary of McCumber Creek cuts through a mantle of Quaternary glacial-fluvial, cobble-boulder gravel that overlies bedrock, poorly exposed on the creek margins, 0.1 miles upstream from McCumber Creek. Bedrock consists of Devonian and older metasedimentary rocks composed of pelitic schist and quartzite with lesser calc-schist, quartz feldspar schist, and marble. These rocks are probably the source of the abundant garnet found in placer concentrates from the McCumber Creek basin (Nokleberg and others, 1991). Placer gold occurs in the modern streambed as well as in low benches inside a meander bend, 0.15 miles upstream from McCumber Creek.

Bureau Investigation: The BLM took numerous test pans from low bench gravels along the lower 0.2 miles of the creek which contained very fine gold flakes (samples 10577, 10642, 10916). A placer sample (10644) collected from 5-foot-thick bench gravels on the east side of the creek, 0.15 miles upstream from McCumber Creek, contained 0.008 oz/cy gold. The gold was frosted, subrounded, and pieces had quartz and rock fragments attached. The bench gravels ranged from 5 to 25 feet thick, extended for up to 50 feet on either side of the stream, and up to 200 feet along it. A pan from a test pit in unmined low bench gravel, a few hundred feet upstream from the placer sample site, contained one very fine gold flake.

Mineral Development Potential: Low

Conclusions: Although an inferred resource of 3,700 cubic yards of low bench gravel remains, a placer sample contained sub-economic gold values.

Figure 53. Suction dredging on McCumber Creek Tributary.

McCumber Creek

Alternate Name(s):		Map No:	67
		MAS No:	0020680019
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	W1/2 Sec: 14, T14S, R11E
Meridian:	Fairbanks	Elevation:	2,800 feet
Latitude:	63.69980	Longitude:	-145.55704

Geographic: McCumber Creek is an 11-mile-long, northwest-flowing, drainage; the mouth of which is located 5 miles southeast of Donnelly Dome.

Access: Access is via a 9-mile-long all terrain vehicle (ATV) trail off the Richardson Highway. Two airstrips have been constructed in the vicinity that may be suitable for light aircraft.

History: Brooks (1913) reported that gold had been mined at McCumber Creek for several years prior to 1912. Smith (1932) reported prospecting and a little gold production in 1929 and again in 1930 (Smith, 1933). Moffit (1942) reported that no commercial deposits had been found. McCumber Creek was reported to be one of the promising placer gold streams in the area (Wedow and Killeen, 1954). J. Hajdukovich has owned claims on the creek since 1954 (Alaska Kardex 068-17). H. Sager did considerable work on McCumber Creek between 1968 and 1982 (Alaska Kardex 068-100). D. Jensen has owned claims on McCumber Creek since 1978 (Alaska Kardex 068-183, 184). He worked the area in 1993 (Bundtzen and others, 1994) and from 1998 through 2002 (Swainbank and others, 2000, 2002; Szumigala and others, 2001, 2003). Suction dredging was reported at the site in 1986 (Hinderman, 1986). W. Miller was listed as owner in 2005 (State of Alaska).

ARDF Name / No.: Lower McCumber Creek / MH016
Alaska Kardex: 068-17, 100, 125, 183, 184, 286

Production: Unknown

Workings and Facilities: A 1.1-mile-long stretch of McCumber Creek, downstream from Morningstar Creek, has been mined extensively. A campsite with buildings and mining equipment is located on the west side of the creek, just downstream from Morningstar Creek. Some suction dredging is reported to have taken place in areas of shallow bedrock (Hinderman, 1986). The current operator was setting up a wash plant on the creek with a1-inch vibrating grizzly and 30-foot sluices, 1.3 miles downstream from Morningstar Creek. They reported finding evidence of old underground drifts (Dan Jensen, personal communication, 2003).

An airstrip has been built on McCumber Creek, between Morningstar and Old Channel creeks. Another strip is located on a ridge on the west side of McCumber Creek, 2.2 miles upstream from Jarvis Creek. Both strips are suitable for light aircraft, but are marginal for larger aircraft.

Geologic Setting: The upper and lower parts of McCumber Creek have broad flood plains up to several hundred feet wide. A short center section, which flows through a gorge about 3 miles upstream from Jarvis Creek, is known locally as the "falls." Bedrock underlying the creek consists of Devonian and older metasedimentary rocks composed of pelitic schist and quartzite, with lesser calc-schist, quartz feldspar schist, and marble (Nokleberg and others, 1992b). These rocks are probably the source of the abundant garnet found in placer concentrates from McCumber Creek. Bedrock exposures of these rocks are most evident on the east side of the creek, whereas to the west, bedrock is mostly covered by a mantle of Quaternary glacial-fluvial outwash gravel. The outwash gravel locally contains large boulders up to 6 feet in size.

Late Tertiary Nenana Gravel, which underlies the outwash deposits, is exposed in the upper parts of the McCumber Creek canyon and on lower Morningstar Creek. This unit is characterized by reddish-weathering poorly consolidated cobble gravel, containing resistant lenses of conglomeratic sandstone (Nokleberg and others, 1991; Hinderman, 1986).

The alluvium in the modern stream bed averages about 8 feet in depth. It rests on schist in the lower part of the creek and on Nenana Gravel upstream, especially in the vicinity of Morningstar Creek. Bedrock is often overlain by a 1-foot-thick layer of bluish or reddish clay. Ice of seasonal(?) origin was encountered in some drill holes in the alluvium (Hinderman, 1986).

Most of the gold occurs as very flat flakes with about 90 percent in the minus 10 mesh fraction. Gold-quartz nuggets weighing up to 0.75 ounces have been recovered. The gold on the upper part of the creek has visible inclusions of native silver. The gold has been assumed to be 800 fine. Heavy sands, consisting mostly of garnet with some magnetite, accompany the gold. The current operator recovered a native copper nugget during mining operations on the creek and noted galena in sluice concentrates (Dan Jensen, personal communication, 2003). The source of the gold has not been determined, but the drop off in gold content upstream from exposures of Nenana Gravel, make it a likely candidate. The overlying outwash gravels do not contain concentrations of heavy minerals, and samples contained only trace amounts of gold (Hinderman, 1986; Dan Jensen, personal communication, 2003).

Bureau Investigation: During the BLM examination, an operator (D. Jensen) was preparing ground for mining at a point 1.3 miles downstream from Morningstar Creek. Low bench gravels on the inside of a meander on the west side of the creek were being stripped in preparation for mining. An 8-foot-deep test pit had not reached bedrock. A total of six test pans from the pit yielded three coarse, one fine, and one very fine gold flakes. Garnets up to about half an inch in size were also recovered. A sluice concentrate sample (10263) collected from material previously mined near this site, did not contain anomalous amounts of any elements of economic interest. A placer sample (10653) collected from a pre-stripped surface at this site, contained 0.004 oz/cy gold. Analysis showed the sample to contain 562 ppb platinum.

Bench gravels occur on both sides of McCumber Creek, just upstream from Jarvis Creek (Figure 54). A 200- by 400-foot area on the north side of the stream has been stripped of overburden, exposing the upper part of a 15- to 20-foot-thick bench gravel. There is no evidence indicating that the site has been mined. A total of two test pans taken 6 feet below the top of the bench at a point 0.2 miles upstream from Jarvis Creek, contained one fine and four very fine gold flakes (sample 11310). Similar stripping has been done on the south side of the creek, but no mining done. A test pit from a trench in this area produced one very fine gold flake. These gravels do not contain the massive boulders that have plagued some mining operations upstream.

McCumber Creek runs through a quarter of a mile long, steep-walled, bedrock gorge, the center of which is located about 1.3 miles upstream from Jarvis Creek. There are numerous large boulders and exposures of schist bedrock along this stretch of creek. Placer gold occurs sporadically within cleavage fractures in the schist. At this site, a 2-pan sample produced a total of 1 coarse, 5 fine, and 15 very fine gold flakes (sample 10272). Another set of 3 pans, collected at the same site, produced 2 coarse, 7 fine, and 11 very fine gold flakes (sample 10687). At another site 1.8 miles upstream from Jarvis Creek and just below a southwest tributary (Map no. 66), a 3-pan sample contained 3 coarse, 7 fine, and 10 very fine gold flakes (sample 10643).

Small exposures of chlorite schist bedrock are located on upper McCumber Creek, 0.9 miles upstream from Morningstar Creek. Three pans of broken up bedrock and associated fines contained one fine and one very fine gold flakes (sample 10262). Bedrock cleavage at this site runs parallel to the stream flow. There were indications of suction dredging at the site. Schist bedrock is exposed on the southwest side of the creek, 1.5 miles upstream from Morningstar Creek. A one pan sample of fractured bedrock at this site contained one very coarse (3 mm) and two coarse flakes of nuggety, rounded gold (sample 11399). Test pans taken from a bulldozer trench on the east side of McCumber Creek, 1.9 miles upstream from Morningstar Creek, did not contain gold. Test pans taken from fractured bedrock nearby did not contain gold (sample 11398).

Mineral Development Potential: Medium

Conclusions: All these sites contain small sporadic resources, but may be workable with a suction dredge during periods of low water. The low bench gravels on McCumber Creek should to be more adequately tested (Hinderman, 1986).

An inferred resource of 580,000 cubic yards averaging $2.06 (0.006 oz/cy) gold has been outlined along a 7,000-foot length of McCumber Creek, from 1.7 miles to 3.0 miles upstream from Jarvis Creek. It appears that this resource has never been mined (Hinderman, 1986).

A second 12,000-foot stretch of creek running from 3.0 miles to 5.3 miles upstream from Jarvis Creek contains a resource of 1.2 million cubic yards of gravel. Values for this block were very low, averaging $1.18/cy (0.004 oz/cy) gold. It appears that at least the upper part of this block has been mined, and the current operator was mining near the lower end (Hinderman, 1986).

The mouth of McCumber Creek contains an inferred resource of 22,400 cubic yards of gravel.

Figure 54. Low bench gravels (arrows) near the mouth of McCumber Creek. View to southeast.

MORNINGSTAR CREEK

Alternate Name(s):		Map No:	68
		MAS No:	0020680116
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	SE1/4 Sec: 14, T14S, R11E
Meridian:	Fairbanks	Elevation:	3,000 feet
Latitude:	63.69556	Longitude:	-145.54812

Geographic: Morningstar Creek is a 7-mile-long, northwest-flowing tributary of McCumber Creek. The mouth of Morningstar Creek is located 4.6 miles up McCumber Creek from Jarvis Creek.

Access: Access is via a 9-mile-long, all terrain vehicle (ATV) trail off the Richardson Highway. There are two airstrips in the vicinity that may be suitable for light aircraft.

History: Smith (1932 and 1933) reported prospecting and minor production from Morningstar Creek between 1929 and 1932. J. Hajdukovich held claims on the site in 1954 and 1959 (Alaska Kardex 068-17). H. Sager's claims on McCumber Creek also included claims on Morningstar creek. His claims were active from 1968 to at least 1982 (Alaska Kardex 068-100). D. Jensen's work in the area began around 1978 and included claims on Morningstar Creek (Alaska Kardex 068-183). The Hawley Resource Group evaluated the site in the mid-1980's (Hinderman, 1986). D. Jensen was the owner in 2004.

ARDF Name / No.: Morningstar Creek / MH018 **Alaska Kardex:** 068-17, 100, 183

Production: Unknown

Workings and Facilities: The lower 0.9 miles of Morningstar Creek contains numerous test pits and the modern streambed along the lower 0.46 miles has been extensively mined.

Geologic Setting: The lower 1.9 miles of Morningstar Creek cuts through a thick sequence of late Tertiary Nenana Gravel (Figure 55). This unit is commonly characterized by reddish-weathering, poorly consolidated cobble gravel, containing resistant lenses of conglomeratic sandstone. The Nenana Gravel is capped by a layer of clay and overlain by Quaternary outwash gravels, containing boulders up to 6 feet or more is size. The younger gravel laps onto schistose rocks exposed near the drainage headwaters. Depth to conglomeratic sandstone bedrock averages about 5.5 feet (Nokleberg and others, 1991; Hinderman, 1986).

Lack of mining on McCumber Creek, above Morningstar Creek, would indicate that the latter drainage is probably a major source of the placer gold found in McCumber Creek. In addition, gold values on Morningstar Creek drop off upstream of exposures of Nenana Gravel, indicating that it may be a major source of the gold found on Morningstar Creek as well as McCumber Creek (see McCumber Creek – Map no. 67; Hinderman, 1986).

The Hawley Resource Group evaluated the placer deposits on Morningstar Creek with a series of test pits. Most of the samples were taken from conglomeratic bedrock. The lower 3,000 feet of the stream was estimated to contain an inferred resource of 150,000 cubic yards, averaging 0.02 oz/cy. This excludes the highest value of gold (0.22 oz/cy) collected from alluvium above bedrock (Hinderman, 1986). Field investigations by the BLM indicate that this block was subsequently mined.

Figure 55. Junction of McCumber and Morningstar creeks. Both streams cut through a thick sequence of Late Tertiary Nenana Gravel. View to northwest.

An inferred resource totaling 28,000 cubic yards was outlined on the lower 1,000 feet of the west fork of Morningstar Creek. A single sample from this block of ground contained 0.02 oz/cy gold.

The Morningstar Creek resources were considered to be only marginally economically recoverable (Hinderman, 1986); however, field investigations by the BLM indicate that these resources were subsequently mined.

Bureau Investigation: The BLM investigated the lower 0.9 miles of Morningstar Creek. Out of at least eight pans taken from test pits along this stretch of creek, only one contained visible gold. Pans taken off conglomeratic sandstone bedrock contained coarse garnet, but no visible gold (sample 10641). The lower 0.5 miles of the creek has been extensively mined and subsequently reclaimed.

Mineral Development Potential: Low

Conclusions: The lower 0.5 miles of Morningstar Creek has been extensively mined. Inferred resource: 150,000 cubic yards averaging 0.02 oz/cy on Morningstar Creek with an additional resource of 28,000 cubic yards on the west fork (Hinderman, 1986).

MCCUMBER CREEK (UPPER)

Alternate Name(s):		Map No:	70
		MAS No:	0020680399
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	NE 1/4 Sec: 24, T14S, R11E
Meridian:	Fairbanks	Elevation:	3,000 feet
Latitude:	63.68919	Longitude:	-145.51584

Geographic: The McCumber Creek (Upper) site lies along a 1.9-mile stretch of McCumber Creek, upstream from Morning Star Creek.

Access: Access to the McCumber Creek (Upper) site is most practical by helicopter.

History: Suction dredging was reported downstream of the site in 1986 (Hinderman, 1986). It is likely that the test pit located at the site was also excavated at the same time. There are no records indicating any earlier activity at the site.

ARDF Name / No.: Upper McCumber Creek / MH017 **Alaska Kardex:** None

Production: None

Workings and Facilities: There is a 20- by 30-foot test pit located at the McCumber Creek (Upper) prospect, 1.9 miles upstream from Morning Star Creek.

Geologic Setting: The upper part of McCumber Creek has a broad flood plain up to several hundred feet wide (Figure 56). Bedrock underlying the creek consists of Devonian and older metasedimentary rocks composed of pelitic schist and quartzite with lesser calc-schist, quartz feldspar schist, and marble. These rocks are probably the source of the abundant garnet found in placer concentrates from McCumber Creek. These rocks are mostly covered by a thick mantle of Quaternary glacial-fluvial outwash gravel. The outwash gravel locally contains large boulders up to 6 feet in size (Nokleberg and others, 1992b).

Placer gold occurs sporadically in fractured schist bedrock, where exposed in the creek bed. The low gold values may be due to the fact that the gold-bearing late Tertiary Nenana Gravel is not exposed along this part of McCumber Creek.

Bureau Investigation: The BLM observed small exposures of chlorite schist bedrock located on upper McCumber Creek, 0.9 miles upstream from Morningstar Creek. Three pans of broken up bedrock and associated fines contained one fine and one very fine gold flakes (sample 10262). Bedrock cleavage at this site runs parallel to the stream flow. There were indications of suction dredging at the site. Schist bedrock is exposed on the southwest side of the creek, 1.5 miles upstream from Morningstar Creek. A one pan sample off fractured bedrock at this site contained one very course (3 mm) and two coarse flakes of nuggety, rounded gold (sample 11399).

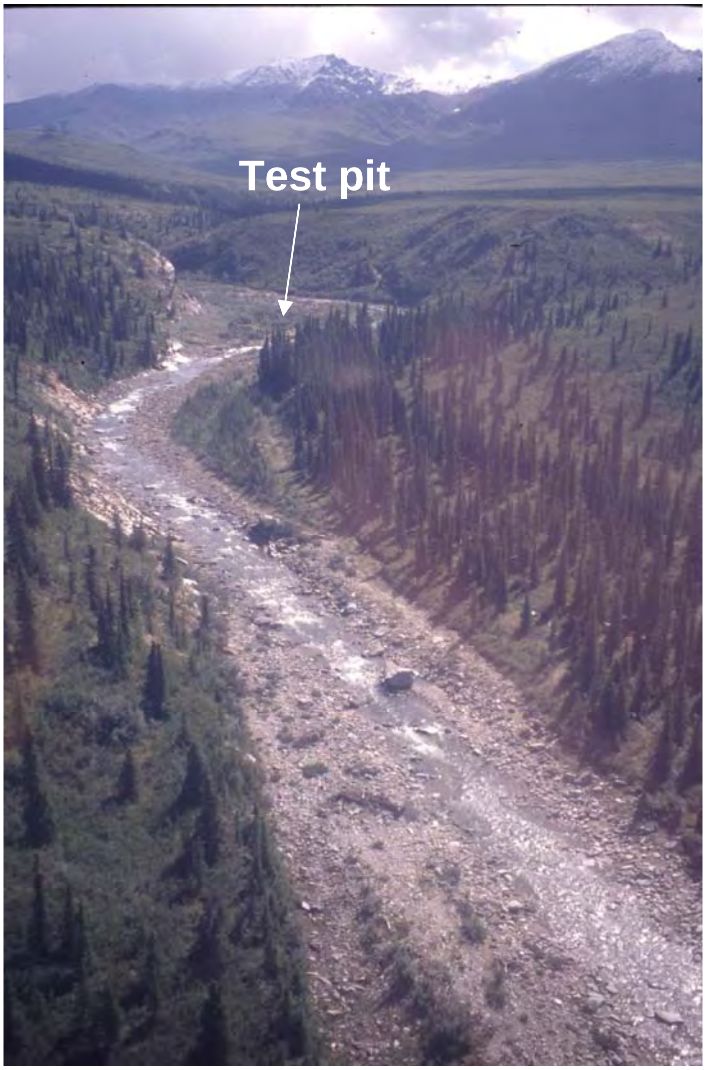


Figure 56. Upper McCumber Creek. View to southeast.

Test pans taken from a bulldozer trench on the east side of McCumber Creek, 1.9 miles upstream from Morningstar Creek, did not contain gold. Test pans taken from fractured bedrock nearby did not contain gold (sample 11398).

Mineral Development Potential: Low

Conclusions: There is little potential for large-scale placer mining at the McCumber Creek (Upper) prospect. Some additional gold production is possible from suction dredging in fractured bedrock. More test trenching and sampling may identify additional concentrations of gold.

PEGMATITE CREEK

Alternate Name(s):	Little Gerstle River	**Map No:**	86
		MAS No:	0020680014
Deposit Type:	Placer	**Commodities:**	
Location:			
Quadrangle:	Mt. Hayes, C-2	TRS:	NE1/4 Sec: 24, T15S, R14E
Meridian:	Fairbanks	Elevation:	3,100 feet
Latitude:	63.59653	Longitude:	-144.95601

Geographic: Pegmatite Creek is a tributary of the Gerstle River. It is located in the northeastern part of the Delta River study area, about 40 miles southeast of Delta Junction.

Access: Access to the Pegmatite Creek site is most practical by helicopter. Ground access is via a trail from a point where Gerstle River intersects the Alaska Highway. The trail starts along the eastern bank of the Gerstle River and crosses the river several times, a distance of approximately 15 miles to three cabins known as the Hajdukovich's hunting lodge (Moffit, 1942); the occurrence is approximately 1.5 miles further southeast along Pegmatite Creek.

History: Moffit (1942) describes reports of a little gold on Pegmatite Creek in 1939. Geologic U.S., Inc. was listed as owner of the claims on Pegmatite Creek in 2003 (BLM records).

ARDF Name / No.: Pegmatite Creek / MH020 **Alaska Kardex:** 068-57

Production: None **Workings and Facilities:** None

Geologic Setting: Bedrock underlying the creek consists of Devonian and older metasedimentary rocks composed of pelitic schist and quartzite with lesser calc-schist, quartz feldspar schist, and marble. These rocks are overlaid by late Tertiary Nenana Gravel, which is in turn covered by a thin unconsolidated Quaternary glaciofluvial deposit that extends over the lowlands (Nokleberg and others, 1992b). Moffit (1942) considered gold values in the stream to be too low for commercial operations.

Bureau Investigation: The BLM took test pans from the second bench on the left and right limits of Pegmatite Creek. One test location, with no bedrock present in the creek bottom, contained approximately 1 percent magnetite, but no gold was observed (sample 10651). At this point, Pegmatite Creek contained sub-rounded boulders of granite and schist up to 36 inches across. The first bank terrace measured 70 feet across to the second flood bench at this point. A second test pan set was obtained upstream a distance of 1.1 miles from the first sample site. Here bedrock joint sets form a natural sediment trap. A sample from the test pans contained minor magnetite, but again, no gold was observed (sample 10652).

Mineral Development Potential: Low

Conclusions: Gold grades appear to be insufficient for a profitable small- or medium-scale mining operation on Pegmatite Creek. This reiterates the conclusion of Moffit (1942).

GUNNYSACK CREEK

Alternate Name(s):		**Map No:**	92
		MAS No:	0020680102
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	SE1/4 Sec 17: T16S, R10E
Meridian:	Fairbanks	Elevation:	2,300 feet
Latitude:	63.52588	Longitude:	-145.84276

Geographic: Gunnysack Creek is located in the heart of the Alaska Range, east of the Black Rapids Glacier. The creek flows westward and is crossed by the Richardson Highway just before the creek joins the Delta River.

Access: The site is easily accessed by foot from the Richardson Highway. Exposures of bedrock in the stream bed can be found about a quarter mile upstream from the highway.

History: Although there was interest in a gold-antimony quartz vein further upstream at the turn of the 19th century (Gunnysack prospect, Map no. 91), interest in placer gold on this creek is not mentioned or recorded in the literature until 1978 (Alaska Kardex 068-191). Claims on the creek were also held in 1985 by B. Probert (Alaska Kardex 068-279).

ARDF Name / No.: None **Alaska Kardex:** 068-191, 279

Production: None

Workings and Facilities: Evidence of recreational panning exists at the site. Small holes dug in bench gravels above bedrock, a bucket, and digging tools were observed near a bedrock exposure in the creek.

Geologic Setting: Nokleberg and others (1992b) mapped the rocks in this area as fine-grained metasedimentary rocks of Devonian and older age. K-Ar analyses of white mica give ages of 106 to 118 Ma. Capps (1912) calls the unit the Birch Creek Schist. Abundant fuchsite (chromium-rich mica) schist occurs in this drainage. The apple green schist has been utilized by rock shops in the Anchorage area as an ornamental stone.

Bureau Investigation: The BLM took a pan concentrate sample of sediments under a large boulder near the bedrock exposure where there was evidence of prior panning. The pan yielded one fine and three very fine flakes of gold. Analysis of the pan concentrate sample contained 280 ppb gold and 2,180 ppm arsenic (sample 10050).

Mineral Development Potential: Low

Conclusions: Although gold is present in the stream sediments, the gold concentration and sediment volume is too small to be anything other than attractive as an easily accessed recreational panning site.

BROXSON GULCH

Alternate Name(s):		Map No:	168
		MAS No:	0020680388
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 08, T18S, R08E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.32824	Longitude:	-146.13433

Geographic: The Broxson Gulch occurrence is located near the middle of the many arms of Broxson Gulch. It is 0.6 miles west-northwest of peak '4080' shown on the USGS, Mt. Hayes B-5, 1:63,360-scale, topographic map. The site is about 3.5 miles upstream from Eureka Creek.

Access: Access to the Broxson Gulch site is most practical by helicopter. It is also accessible via a 16-mile bulldozer trail off the Richardson Highway. A 1,800-foot airstrip and mining camp, are located 1.2 miles to the east.

History: Mining in Broxson Gulch was begun in 1993 by Glacier Six Enterprises (Monte Moore, personal communication, 2002; Bundtzen and others, 1994). It appears that a section of the creek containing gold was mined out in one season. The operators did not return, indicating that the good ground was mined out or the returns obtained did not warrant further mining on the creek.

ARDF Name / No.: Middle fork of Broxson Gulch / MH118 **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A 75- by 1,000-foot area of reclaimed placer tailings is located along a narrow, gorge-like part of the creek. The full width of the modern steam was apparently mined. A trommel-type wash plant with centrifugal gold concentrators, now located on the east fork of Broxson Gulch, was used to process the gravel.

Geologic Setting: Bedrock consists of Tertiary conglomerate composed of rounded pebbles and cobbles in clayey, dark-colored matrix. The bedrock is overlain by glacial outwash deposits consisting of pebble gravels. Many large boulders were observed in the placer tailings. It appears that the creek cuts through bench deposits composed of the glacial outwash that are probably the source of the placer gold, which has been concentrated in the modern stream bed. Ellis and others (2004) report that along with gold, abundant gray nuggets were recovered. It was thought the nuggets might be platinum, but they turned out to be galena.

Bureau Investigation: The BLM collected numerous pans of weathered conglomerate bedrock and overlying outwash gravel on the north side of the creek. No gold and only minor black sand was observed. Two pans of cobble gravel collected from the modern stream, midway through the tailings, contained one fine and four very fine gold flakes. A pan from the modern stream at the lower end of the tailings contained three very fine gold flakes (sample 10421). Analysis showed the sample to contain 4.1 ppm gold and 163 ppm lead. Another pan collected from the active streambed, 200 feet upstream, contained four fine gold flakes (sample 10519). Analysis showed the sample to contain 8.14 ppm gold and 149 ppm lead.

Mineral Development Potential: Low

Conclusions: It appears that a section of the creek containing gold was mined out in one season. The operators did not return, indicating that the good ground was mined out or the returns obtained did not warrant further mining on the creek. Given this previous mining, as well as the results from test panning, there is little development potential at the site. Additional resources may be located by searching for bedrock and taking test pans from bank-run gravel upstream of where the dozer trail enters the east fork of Broxson Gulch. Prospecting upstream of the existing tailings may identify placer gold on bedrock.

BROXSON GULCH (UPPER EAST FORK)

Alternate Name(s):		**Map No:**	170
		MAS No:	0020680385
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 25, T18S, R08E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.32528	Longitude:	-146.10214

Geographic: The site is located in a short 0.3-mile gulch draining into the east fork of Broxson Gulch. It is 0.3 miles east of peak '4080' shown on the USGS, Mt. Hayes B-5, 1:63,360-scale, topographic map.

Access: Access to the Broxson Gulch site is most practical by helicopter. The site is also accessible via a 13-mile bulldozer trail off the Richardson Highway. A camp with Atco-type buildings and a 1,800-foot airstrip are located 2.5 miles further up the east fork of Broxson Gulch.

History: Glacier Six Enterprises operated the mine from 1993 to 2002. INCA is listed as the current owner (BLM records).

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A dozer trail leads from the east fork of Broxson Gulch west to a mine site on Broxson Gulch, then runs up the pup.

Geologic Setting: Bedrock is not exposed in the gulch, but underlying rocks have been mapped as the Triassic Upper Tetelna Complex by Stout (1976). These consist of interbedded pyroclastics and volcaniclastic sediments, interlayered with andesitic to basaltic flows. Nokleberg and others (1991) listed this sequence as the Early Permian to Middle Pennsylvanian Slana Spur Formation.

The gulch cuts a patch of gold-bearing bench gravels, exposed for about 500 feet along the west side of the east fork of Broxson Gulch. These benches are 100 to 150 feet above the creek level and are up to 200 feet wide. They are composed mostly of clayey cobble outwash gravel and are probably related to ancestral glacial activity on the east fork. A sample of unknown composition collected at this site contained 0.02 oz/ton gold (L. Hulbert, personnel communication, 2002)

Bureau Investigation: The BLM took a test pan from the top of one of the benches, but it did not contain gold. A pan taken from bench gravel, 30 feet above and on the north side of the pup, contained one very fine gold flake. A pan collected at an equivalent level from bench gravel on the south side of the pup did not contain gold. A pan collected from active stream gravel in the pup contained two fine, flat gold flakes (sample 10444). Analysis showed the sample to contain 674 ppb gold and 58 ppb platinum. It appears that the fine gold disseminated in the bench gravels is being concentrated somewhat by the active stream.

Mineral Development Potential: Low

Conclusions: Only a few cubic yards of shallow gravel remain in the active stream bed. The BLM's investigation revealed low gold concentrations in the adjacent benches.

NO NAME CREEK

Alternate Name(s):	East Fork of Broxson Gulch	Map No:	171
		MAS No:	0020680045
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NE1/4 Sec: 19, T18S, R09E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.32764	Longitude:	-146.08956

Geographic: No Name Creek is a 1.5-mile-long eastern tributary to the east fork of Broxson Gulch. It is 0.7 miles northeast of peak **'**4080**'** shown on the USGS, Mt. Hayes B-5, 1:63,360-scale, topographic map.

Access: Access to the No Name Creek site is most practical by helicopter. Ground access is available via a 16-mile dozer trail off the Richardson Highway. This trail is mainly suitable for ATV's. A 1,800-foot-long airstrip is located adjacent to a nearby mining camp.

History: Rose (1965) reported that Archie Broxson mined this site between 1940 and 1949. Claims were held at the site by H. Swenson and G. Porter from 1953 to 1957 and by Standard Mining Company from 1957 to 1968 (Alaska Kardex 068-94). In 1998, the property was owned and operated by Monty D. Moore and Vic Justice, operating as Glacier Six Enterprises (BLM records). J. Johnson has operated on No Name Creek in recent years (Jack. Johnson, personal communication, 2002), but no mining occurred during the BLM's mineral assessment in the area between 2002 and 2004.

ARDF Name / No.: East Fork of Broxson Gulch / MH123 **Alaska Kardex:** 068-94

Production: Production is unknown. J. Johnson (personal communication, 2002) reported recovering 16 ounces of gold from 38 cubic yards of gravel while mining on the creek. That is equivalent to 0.42 oz/cy gold.

Workings and Facilities: The lower 0.6 miles of the modern stream bed has been mined using dozers. An old hydraulic cut is located just above the mouth and on the north side of the creek (Figure 57). Water for mining was brought to the site by a series of ditches; the longest being a 1.2-mile ditch from upstream on the east fork of Broxson Gulch. A small wash plant and other abandoned mining equipment are located near the stream mouth. A larger wash plant is located in the creek bed, 0.4 miles upstream from the creek mouth. A camp, including several Atco-type buildings, is located on the east fork of Broxson Gulch, 0.5 miles downstream of the creek mouth.

Geologic Setting: Bedrock underlying the lower part of No Name Creek consists of volcaniclastic rocks and conglomerate of the Early Permian to Middle Pennsylvanian Slana Spur Formation. The east-west-trending Airstrip fault cuts across the headwaters of the creek

(Rose, 1965). This fault places a narrow zone of locally serpentinized dunite in contact with the Slana Spur Formation (Nokleberg and others, 1992b). In the lower part of the creek, bedrock is overlain by glacial drift deposits 30 to 40 feet thick. These consist of poorly sorted cobble gravels containing some large boulders. A series of terraces have been cut into these deposits by streams related to ancestral glaciers in the east fork valley. Placer gold disseminated throughout these gravels has probably been concentrated on bedrock by recent crosscutting streams such as No Name Creek. Several other streams in the area cut through these same deposits, but apparently do not contain sufficient amounts of gold to make mining worthwhile. Rose (1965) reported that panned samples collected within 1 to 2 feet of the surface in the creek contained four to seven colors per pan along with considerable magnetite, pink garnet, and epidote. He postulated that the gold was coming from the glacial outwash, but that the ultimate source was probably pyritized rocks in the area. There are two reported lode occurrences near the headwaters of the creek (Map nos. 173 & 174; sites MH124 & MH136 of Ellis and others, 2004).

Bureau Investigation: The BLM investigated the lower 0.6 miles of No Name Creek and took numerous test pans. Test pans taken from the hydraulic cut near the mouth of the creek contained little gold (sample 10160). A placer sample (11012) collected from mixed glacial outwash near the mouth of the creek contained 0.0054 oz/cy gold.

Test pans taken from dozer cuts in the gravel bench extending 0.1 miles upstream on the north side of the creek contained only small amounts of fine placer gold. Bedrock was not exposed in the cuts.

Bedrock was encountered on the north side of the stream, 0.2 miles above the mouth. Two test pans of gravel on quartzite(?) bedrock at this site contained two coarse, eight fine, and three very fine gold flakes (sample 10438). One of the coarse pieces was nuggety. The bedrock is overlain by 5 feet of gravel that make up a stream-cut bench up to 50 feet wide and extending for up to 500 feet along the north side of the stream. Gravel overburden at this site was 30 to 40 feet thick.

At 0.6 miles above the stream mouth and 50 feet above the highest placer workings, two pans taken from gravel on a gray pebble conglomerate bedrock contained two coarse, six fine, and two very fine gold flakes (sample 10439). These pans were taken at the base of an average 10-foot- wide bench that runs for about 250 feet along the north side of the stream. At this site, the stream bed is only about 10 feet wide.

A sluice concentrate sample (10415) was obtained from Jack Johnson, who had previously mined gold on No Name Creek. Analysis of the magnetic fraction (sample 10468) showed it to contain 94.2 ppm palladium and 37.0 ppm platinum. Prior to analysis, examination of the sample with binocular microscope revealed small fragments of what may have been PGE (Don Keill, written communication, 2002). Unfortunately this identification could not be confirmed as the sample was consumed in chemical analysis. However the extremely high platinum and palladium values would indicate that the sample could have contained visible flakes of native PGE or other platinum group mineral.

Mineral Development Potential: Low to Medium

Conclusions: No Name Creek seems to be mostly mined out except for a short stretch, starting about 0.6 miles upstream from Broxson Gulch. More sampling may identify additional resources at this site. Several benches on the north side of the modern stream, 0.6 miles upstream from Broxson Gulch, contain significant placer gold with relatively thin overburden. The exposed resources are small and would probably not interest a medium size operator. Inferred gravel resources at two sites total 7,200 cubic yards containing an unknown gold value; however, test pan results were encouraging.

Figure 57. Junction of No Name Creek with Broxson Gulch.
No Name Creek has downcut through gold-bearing side-glacial deposits, reconcentrating the gold in the active stream bed. View to south-southwest.

BROXSON GULCH (LOWER EAST FORK)

Alternate Name(s):	Middle Fork of Broxson Gulch	Map No:	183
		MAS No:	0020680384
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 07, T19S, R09E
Meridian:	Fairbanks	Elevation:	3,300 feet
Latitude:	63.28789	Longitude:	-146.10588

Geographic: The Broxson Gulch (Lower East Fork) placer mine is located on the lower part of the east fork of Broxson Gulch. It is 0.8 miles upstream from the main branch of Broxson Gulch and about 1.4 miles upstream from Eureka Creek.

Access: Access to the Broxson Gulch site is most practical by helicopter. It is also accessible via a 13-mile bulldozer trail off the Richardson Highway. The trail is most suitable for ATV's and requires crossing the Delta River.

History: Mining on the lower east fork of Broxson Gulch was begun in 1993 by Glacier Six Enterprises (Monte Moore, personal communication, 2002; Bundtzen, and others, 1994). Mining ceased by 1995, but in 1999 and 2002 Glacier Six Enterprises filed mining plans that included drilling (State of Alaska, Annual Placer Mining Application, 2002). It is unknown whether any drilling was accomplished.

ARDF Name / No.: Middle Fork of Broxson Gulch / MH118 **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A camp with Atco-type buildings and a 1,800-foot airstrip is located 2.5 miles further up the east fork of Broxson Gulch. A track-mounted, trommel-type wash plant, that used centrifuges to concentrate fine gold, resides at the site. A large grizzly and conveyor system for loading the wash plant are also there. The stream was diverted, and nearly the full 300-foot-wide braided east fork valley was mined for approximately 2,000 feet.

Geologic Setting: The base of the bedrock underlying the lower part of the east fork of Broxson Gulch consists of reddish olivine basalt. Overlying this unit is poorly sorted Tertiary sandstone and pebble to cobble conglomerate. This unit commonly occurs as fault-bounded lenses in branches of the Broxson Gulch Thrust, Rainy Creek Thrust, and Eureka Creek fault (Nokleberg and others, 1991; Stout, 1976). Overlying the conglomerate are poorly sorted outwash gravels related to glaciation. A series of north-south-trending terraces have been cut into these gravels, which are between 3 and 60 feet thick. These gravels contain variable amounts of fine placer gold.

Bureau Investigation: The BLM collected a sample of sluice concentrates (10435), containing abundant fine gold and magnetite, from the centrifuges in the wash plant. The magnetic fraction of the sample (10471) contained 585 ppb platinum and 195 ppb palladium. A series of test pans taken from bank run gravel on the east side of the creek, between where the dozer trail enters the creek and the trommel, contained only trace amounts of gold. A pan concentrate sample collected from a low (3-foot-thick) bench, located 230 feet downstream from where the dozer trail enters the creek, contained two very fine gold flakes. Analysis showed the sample to contain 521 ppb gold and 51 ppb platinum (sample 10443).

Mineral Development Potential: Low

Conclusions: Due to previous extensive mining, as well as the results from test panning, there is little development potential at the lower east fork of Broxson Gulch site. Additional resources may be located by searching for bedrock and taking test pans from bank-run gravel upstream of where the dozer trail enters the east fork.

SPECIMEN CREEK (LOWER)

Alternate Name(s):		Map No:	184
		MAS No:	0020680114
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	E1/2 Sec: 08, T19S, R09E
Meridian:	Fairbanks	Elevation:	3,400 feet
Latitude:	63.28283	Longitude:	-146.04932

Geographic: The site consists of the lower 1.4 miles of Specimen Creek, a northern tributary to Eureka Creek. The mouth of Specimen Creek is about 2 miles east of Broxson Gulch.

Access: Access is easiest by helicopter. A 13-mile dozer trail from the Richardson Highway crosses Specimen Creek 1.5 miles above its mouth. A branch off this trail follows the creek bed down to Eureka Creek. The dozer trail is most suitable for ATV's and requires crossing the Delta River.

History: The initial discovery along Lower Specimen Creek was in 1993 by E.J. Young (State of Alaska, APMA-F979415). On-Line Exploration Services, Inc. was operating at the site between 1993 and 1995 (State of Alaska, APMA-F999415).

ARDF Name / No.: Lower Specimen Creek / MH140 **Alaska Kardex:** None

Production: None

Workings and Facilities: There are numerous filled-in test pits along the lower stretch of Specimen Creek.

Geologic Setting: Bedrock in Specimen Creek downstream from the Broxson Gulch dozer trail is composed of late to middle Tertiary, poorly sorted sandstone with locally interbedded siltstone and pebble conglomerate. Sparse white layers of rhyodacite ash occur locally (Nokleberg and others, 1991).

Overlying this unit are poorly sorted Quaternary outwash cobble to boulder gravels up to 100 feet thick, which locally contain placer gold. A series of east-west-trending terraces, related to ancestral glaciation in the Eureka Creek drainage, have been cut into these deposits. The outwash gravels are probably the source of the placer gold in the active stream bed. Testing on the creek resulted in gold values ranging from $7 to $10 per cubic yard (0.018 to 0.026 oz/cy at $380/oz gold; K. Adler, personal communication, 2002). The original source of the gold is unknown, but probably somewhere near the headwaters of the Broxson Gulch drainage basin.

Bureau Investigation: The BLM took test pans from a 0.4-mile stretch of creek upstream from where the bulldozer trail crosses Specimen Creek that did not contain gold. Gold was found along a 0.85-mile stretch of creek, starting at the dozer trail crossing and running downstream.

Two pans taken from active stream gravel, 0.25 miles downstream from the bulldozer trail, contained five very flat, fine gold flakes (includes sample 10503). At a point 0.3 miles downstream from the dozer trail a test pan taken from cobble gravel on the east side of, and 20 feet above, the active streambed contained two coarse, one fine, and one very fine gold flakes. One piece of gold was wire-like. Here, the stream valley averages about 75 feet in width. This gravel lies along the north wall of a short east-west-trending tributary to Specimen Creek. On the east side of the canyon, 0.4 miles downstream from the dozer trail, a test pan from around cobble gravel, taken 40 feet up the canyon wall, contained two coarse and one fine, nuggety pieces of gold.

At a point 0.72 miles below the dozer trail, one pan taken from gravel on fossiliferous bedrock, contained two fine and two very fine gold flakes (sample 10426). A placer sample (10436), collected from a low bench containing a 7-foot-thickness of clay-rich gravel on top of an ash layer, contained 0.059 oz/lcy gold. The larger pieces of gold were nuggety with some quartz attached. One flake of platinum/palladium(?) was noted. The magnetic fraction of the placer concentrate (sample 10472) contained 69 ppb platinum, 1,110 ppm nickel, and 1.42 ppm mercury. The placer gold appears to be concentrated around the boulders and on clay and rhyodacite ash layers within the outwash.

Mineral Development Potential: Low to Medium

Conclusions: There is an inferred resource of 29,000 cubic yards of bench gravels and 125,000 cubic yards from the active stream gravel along Lower Specimen Creek. Large boulders, which could hinder mining efforts, occur locally in the streambed. Further sampling of both bench and active stream gravels could identify additional resources.

SPECIMEN CREEK (UPPER)

Alternate Name(s):		**Map No:**	188
		MAS No:	0020680241
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, B-5		NE1/4 Sec: 32, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,298 feet
Latitude:	63.31669	Longitude:	-144.83848

Geographic: The mining site is located on upper Specimen Creek, approximately 0.7 miles northeast of peak 5304 shown on the USGS, Mt. Hayes B-5, 1:63,360-scale, topographic map. The mine site is 0.4 miles southeast of the divide between Specimen Creek and Noname creeks (unofficial name).

Access: Access is easiest by helicopter. A 13-mile dozer trail from the Richardson Highway crosses Specimen Creek 1.5 miles above its mouth. The dozer trail is suitable mainly for ATV's and requires crossing the Delta River.

History: Rose (1965) mentions remnants of placer mining operations on upper Specimen Creek.
In 2005, Nevada Star Resource Corp. owned the claims (BLM claim records).

ARDF Name / No.: Specimen Creek / MH139 **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: Placer tailings occur along a 250-foot stretch of creek, 400 feet up the northwest branch from a fork in Specimen Creek. Test pits are located at the mouth of the northeast fork.

Geologic Setting: Bedrock underlying the upper part of Specimen Creek consists of mafic volcaniclastic rocks interlayered with andesitic to basaltic flows of the Permian upper Tetelna Complex of Stout (1976). Nokleberg and others (1992b) map Triassic gabbro and basalt along with Pennsylvanian to Permian volcaniclastic rocks of the Slana Spur Formation in the area. These units are overlain by up to 100 feet of outwash gravel, through which a series of at least three levels of stream terraces have been cut. These gravels were probably deposited by streams that flowed off the ancestral Broxson Glacier and through the divide between Broxson Gulch and Specimen Creek.

Where upper Specimen Creek cuts through the terrace gravels, gold occurs in the active stream bed. This would indicate that these deposits are probably the source of the gold in the upper part of the drainage. The terraces probably formed when a lobe of ice from the Broxson Gulch Glacier , crossed the divide and deposited gold-bearing outwash gravel in upper Specimen Creek. The original source of the gold is unknown, but is probably somewhere near the head of the Broxson Gulch drainage. Rose (1965) indicated likely original sources of the gold to be either pyritized or ultramafic rocks occurring in Specimen Creek.

Bureau Investigation: The BLM collected 10 test pans from the mined area on the northwest fork of upper Specimen Creek, which contained a total of two fine and six very fine gold flakes (includes sample 10432). A test pan from gravel on bedrock, just beyond the south end of the tailings on the west side of the creek, contained one fine gold flake. It would seem that the shallow gravel along this stretch of creek has been mostly mined out; however, there may be gold-bearing gravel on the stream margins that is covered by colluvium.

On the northeast fork, pans taken from low bench gravels on the margins of the active stream contained up to one coarse, two fine, and four very fine gold flakes (sample 10433). A 0.1 cubic yard placer sample (10437) collected from an old test pit on bedrock, on the southeast side of the creek, contained 0.016 oz/cy gold (Figure 58). Visual inspection showed five gold flakes greater than 5 millimeters in size. A test pan from a gravel terrace 30 feet above the active stream level and on the east side of the creek contained one very fine gold flake. Pans from two higher terraces did not contain gold.

Mineral Development Potential: Medium

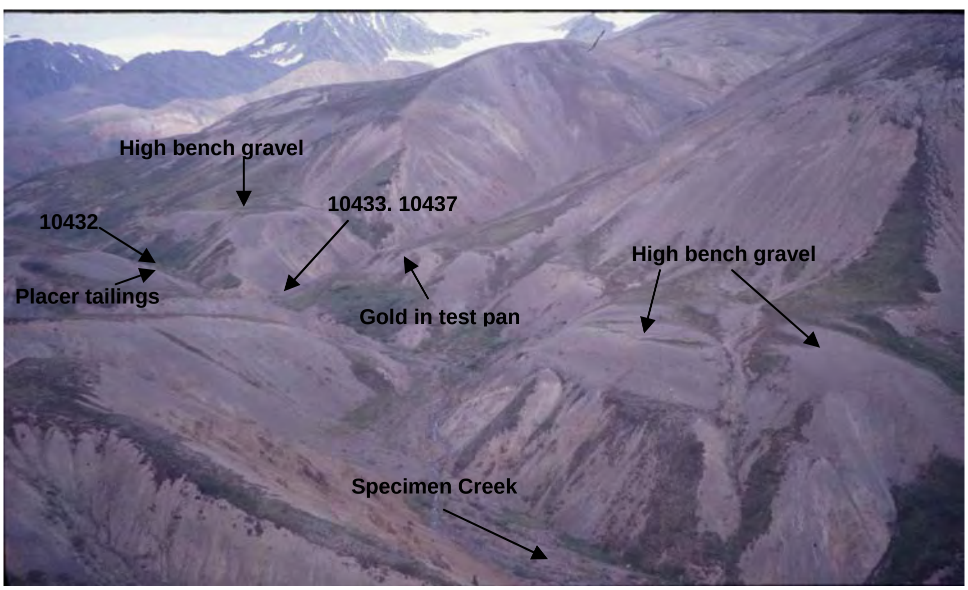


Figure 58. Upper Specimen Creek placer site. View to north.

Conclusions: There is an inferred resource of 130 cubic yards of low bench gravel at the site of sample 10437. There is some potential on the northeast fork of Specimen Creek for a small placer operation, including suction dredging. Further sampling at the junction of the northwest and northeast forks of Specimen Creek could identify additional resources.

RAINY CREEK (WEST FORK)

Alternate Name(s):		**Map No:**	196
		MAS No:	0020680047
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 02, T19S, R09E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.30223	Longitude:	-145.97764

Geographic: The site of reported placer tailings is approximately 3.3 miles up the west fork of Rainy Creek, a 9-mile-long, south-southeast flowing tributary of the Delta River. The creek branches into north and west forks about 3.2 miles upstream from the Delta River.

Access: Access to the site is easiest by helicopter. Ground access to the site is gained via an 8-mile-long trail off the Richardson Highway that requires crossing the Delta River. This trail continues up the west fork of Rainy Creek and over to Broxson Gulch. It is suitable mainly for ATV's.

History: Rose (1965) reported placer tailings in the upper west fork of Rainy Creek. Earl Vegoren was the owner in 2005 (BLM records).

ARDF Name / No.: West Fork Rainy Creek / MH143 **Alaska Kardex:** 068-33

Production: Unknown

Workings and Facilities: Rose (1965) noted indications of placer workings in the upper part of the west fork of Rainy Creek.

Geologic Setting: Bedrock underlying the upper west fork of Rainy Creek consists mostly of basalt and silicic volcanics and sediments (Rose, 1965; 1966). Terrace gravels ranging from 50 to 100 feet thick occur on the canyon margins. These terraces are probably glacial outwash deposits, related to glacial ice that extended down the west fork of Rainy Creek. Fine gold disseminated through the terrace gravels has probably been reconcentrated in the active streambed of Rainy Creek. Placer gold was found in terrace gravels near the mouth of the west fork of Rainy Creek (see Map no. 210).

Bureau Investigation: The BLM investigated the lower 4.0 miles of the west fork of Rainy Creek. No indications of placer mining were observed. Test pans taken along the creek did not contain visible gold. A pan concentrate sample (10441) was taken from a natural riffle, created where a mafic dike crosses the creek about 3.7 miles up the west fork. No visible gold was observed, but the sample contained abundant coarse magnetite. Analysis showed the sample to contain 155 ppb gold. A test pan was taken from the active stream near gabbro(?) rubblecrop on the south side of the creek at a point 1.4 miles up the west fork. The pan contained one very fine gold flake.

Mineral Development Potential: Low

Conclusions: Very little gold was observed in one test pan. The reported placer tailings were not found.

RAINY CREEK

Alternate Name(s):	Victory Mines, Marchuk Mine	Map No:	210
		MAS No:	0020680048
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	S1/2 Sec: 09, T19S, R10E
Meridian:	Fairbanks	Elevation:	2,700 feet
Latitude:	63.28133	Longitude:	-145.84897

Geographic: Rainy Creek is a 9-mile-long, south-southeast flowing tributary of the Delta River. The creek branches into north and west forks about 3.2 miles upstream from the Delta River.

Access: Access to the site is easiest by helicopter. Ground access to the site may be gained via an 8-mile-long trail off the Richardson Highway that requires crossing the Delta River. This trail continues up the west fork of Rainy Creek and over to Broxson Gulch.

History: Mendenhall (1905) reported fair prospects on Rainy Creek in 1900. Moffit (1912) reported five men were mining on Rainy Creek in 1910. Placer gold mining and prospecting were reported in 1918 (Martin, 1920) and in 1929 (Smith, 1932). E. Vegoren first staked claims on Rainy Creek in 1971, and D. Jensen mined on Rainy Creek between 1982 and 1985 (Halloran, 1993). Halloran (1993) also reported a permitted mining operation on Rainy Creek in 1991. Victory Mines worked on Rainy Creek in 1994 (Swainbank and others, 1995). In 1997, N. Marchuk was mining on the creek (State of Alaska, APMA F009196, 1997). There was no activity in 2000 (State of Alaska, APMA F009196, 2000) or in 2001 (State of Alaska, APMA F009196, 2001).

ARDF Name / No.: Rainy Creek / MH159 **Alaska Kardex:** 068-109, 164

Production: A minimum of 3,717 ounces of gold has been produced from Rainy Creek (Earl Vegoren, personal communication, 1995; Halloran, 1993). From 1918 to 1921, a total of 64 ounces of gold bullion were produced with an average grade of 0.042 oz/cy gold (unpublished U.S. Bureau of Mines records). A total of 12 grains (0.02496 oz) of platinum were reported as incidental to gold production in 1920 (unpublished U.S. Bureau of Mines records).

Workings and Facilities: Placer mining has taken place intermittently over a 3.5-mile stretch of Rainy Creek (Figure 59). An approximately 0.5-mile stretch, beginning about 1.5 miles upstream from the Delta River, has been mined extensively. There is a campsite with cabins and some mining equipment located 2 miles upstream from the Delta River.

Most recent mining has taken place in a 500- by 550-foot area located at the junction of the north and west forks of Rainy Creek. The site includes a mined area, several settling ponds, tailings piles, a 12- by 16-foot cabin, a tool shed, several fuel tanks, a trommel wash plant, a backhoe, and a bulldozer. It appears that the mining activity has been progressing from south to north, moving towards the base of the ridge, which separates the two forks of the creek. The west fork of Rainy Creek has been diverted to the north of the mining area and runs along the base of a steep bluff before it joins the main fork. The road up Rainy Creek to the mine site continues up the west fork and eventually to Broxson Gulch. There is no evidence of placer mining on the north fork, upstream from the junction with the west fork.

**Figure 59. Reclaimed placer tailings on Rainy Creek.
View to west.**

Geologic Setting: The Rainy Creek area is part of the Slana River subterrane of the Wrangellia terrane. The Slana River subterrane is bounded by the Broxson Gulch thrust fault to the north and the Eureka Creek fault to the south. This subterrane is characterized by a variety of different rocks ranging from Paleozoic island arc deposits to the upper Triassic Nikolai Greenstone, to Mesozoic flysch and Tertiary continental sediments. The Rainy Creek thrust cuts through the area and defines the drainage for the section of Rainy Creek downstream from the Marchuk Mine, as well as the lower half of the west fork (Nokleberg and others, 1990; Rose, 1965, 1966a).

Bedrock was not found to be exposed along the lower 3.2 miles of the active stream bed of Rainy Creek. The surrounding canyon walls are composed of thick Quaternary glacial deposits. The glacial deposits consist of sub-rounded, pebble to boulder-sized clasts, supported by a sand and clay matrix. The upper part of the active stream bed contains numerous large boulders, which could prove a hindrance to mining. In the creek bed, the depth of the glacial material is thought to be at least 20 feet deep (Rose, 1965), and on the sides of the drainages, steep slopes of the same material rise up to several hundred feet high. Gold is present in the glacial deposits and is thought to be derived from copper-iron sulfide deposits or pyritized rocks (Rose, 1965).

Pilgrim (1930) reported the gravels on Rainy Creek to average 12 feet in depth, ranging from 20 feet on the lower end of the creek to only a few feet on the upper end. He reported the gravels on the lower end to be mostly fine, containing a few boulders 18 inches in diameter. Upstream, the boulders increased in size and quantity, some being as large as 6 feet in diameter. There was considerable clay sediment in the gravels, which were said to wash easily. There was no muck overburden above the gravels, which were all thawed. The gold was well worn and distributed throughout the gravels from the surface down. The gold was reported to have a value of $17.00 per ounce (822 fine; Pilgrim, 1930). Smith (1941) reports Rainy Creek gold to be 876 fine.

The action of the creek cutting down through the glacial material has concentrated gold in bench gravels, as well as the active stream bed of Rainy Creek. Halloran (1993) suggests that some of the gold may have been transported into the Rainy Creek drainage by glaciers crossing the divide from Broxson Gulch; however, the lack of placer gold on the upper west fork of Rainy Creek does not support this idea. In addition, the ancestral bed of Rainy Creek may have run a different course. Thus, it is possible that there are old gold-bearing stream channels that are buried under more recent gravel deposits. In addition, soil creep, resulting from thawing of south-facing slopes, could be covering old gold-bearing stream channels (Halloran, 1993).

The majority of the gold occurs downstream from the forks. Placer gold occurs for a short distance up the west fork, but does not appear to occur in the north fork. The north fork of the creek extends for 5.5 miles to the north, beyond the site of the Marchuk Mine and approaches the Broxson Gulch thrust fault. The peaks that form the headwaters of the North Fork belong to the Maclaren metamorphic belt and are separated from the Slana River subterrane by the Broxson Gulch thrust. Schist, amphibolite, phyllite, argillite and metagraywacke characterize this metamorphic belt. The bed load of the north fork upstream from the junction with the west fork is representative of this metamorphic unit (Nokleberg and others, 1990).

The gold varies from coarse to fine in wiry crystalline to flattened flakes, suggesting more than one source. Magnetite is a common constituent of concentrates, along with native copper nuggets. Testing with a gold pan indicated gold values per cubic yard ranging from $8.00 (0.0267 oz/cy) to $38.00 (0.127 oz/cy) gold. Gold from the bench gravels tends to be coarser. A 51,300 bcy bulk sample of gravel produced 2,667 ounces of gold. This is the equivalent of $15.60 (0.052 oz/cy gold) and should be considered a minimum grade due to inefficiencies in recovery. Samples from "hot spots" contained up to 5.4 oz/cy gold. Digging with an excavator found bedrock to be from 20 to 23 feet deep (Halloran, 1993).

Placer concentrates contain abundant black sand. Foley and others (1989) a placer concentrate sample, collected by the U.S. Bureau of Mines from Rainy Creek, contained 7.324 oz/st gold, 0.060 oz/st platinum, and 0.207 oz/st palladium.

Bureau Investigation: The BLM investigated the recent workings at the Marchuk Mine, located at the junction of the west and north forks of Rainy Creek. The north wall of the recent mine pit makes up the edge of an undisturbed 50- by 150- foot area of alluvial material. The gravel is poorly sorted, sub-rounded, and is composed of pebble to boulder-sized clasts supported by sand and clay with intermittent, 2- to 4-inch sand layers. The depth of this alluvium is estimated at 10 feet. It appears that mining was stopped short of removing this remaining section of material due to the need for another creek diversion. A placer sample (10514) was collected from a 7-foot vertical cut in undisturbed gravel on the north wall of the pit. The sample contained 0.016 oz/cy gold. Visual inspection showed approximately 80 fine through coarse flakes of gold with one 3-millemeter flake. The gold was rough to subrounded with some shotty pieces.

The magnetic fraction from a sample of sluice concentrates from the mine site (sample 10467) contained 985 ppb platinum and 209 ppb palladium.

Terrace gravels, located 0.2 miles up the west fork, along the road to Broxson Gulch, were examined. The terrace rises about 100 feet above the streambed, though the section exposed by the road-cut, is 25 feet in height. The poorly sorted alluvium in this terrace consists of sub-rounded, pebble to large boulder-sized clasts supported mostly by silt and clay. The sediments are more clay rich than those downstream at the Marchuk Mine site. A placer sample (10515) was taken from a vertical cut running 6 feet above the road level. The sample included material from a 2-foot-thick clay and boulder-rich zone near the west end of the terrace. The sample contained 0.007 oz/cy gold, including one very coarse and six coarse flakes. The magnetic portion of the concentrates (sample 10477) contained 444 ppb platinum.

A pan concentrate sample (10516) taken from under boulders in the creek bed below the road-cut sample location, contained six very fine gold flakes. A 3- by 4-foot exposure of friable conglomerate, near the road-cut sample site, could be part of the Tertiary continental sedimentary unit that is mapped in this area; however, it was difficult to determine if this exposure is in place or if it is float. A test pan taken from this exposure contained no gold colors.

A 4-mile stretch of the west fork of Rainy Creek, above the site of samples 10515 and 10516 was examined. Test pans were taken from active stream and bench gravels along this stretch. Bench gravels ranged from 50 to 100 feet thick – bedrock was not exposed in the creek bed. At a point 1.4 miles upstream from the north fork, a test pan of gravel overlying gabbro rubblecrop(?) contained one very fine gold flake. No other gold was found in test pans taken upstream of sample site 10515.

Two test pans (10517) were taken from underneath boulders in the bed of the north fork, 200 feet upstream from the Marchuk Mine. These pans showed no visible gold although abundant black sand and garnet was observed. Analysis showed the sample to contain 121 ppb gold.

A placer sample (10728) was collected from a 3-foot vertical cut at the base of an 8-foot-high road cut on the southwest side of Rainy Creek, 0.4 miles below the west fork-north fork junction. The sample contained 0.029 oz/cy gold, including 24 coarse, nuggety colors. The gravel at this site contains numerous boulders and moderate amounts of clay.

Large scale mining has taken place along a 0.5 miles stretch of the active streambed of Rainy Creek, beginning 1.5 miles downstream from the west fork. A sample of sluice concentrates (10729) was collected near the upper end of the mined area. The magnetic fraction (10281) contained 6,990 ppm nickel, 128 ppb palladium, and 2,060 ppb vanadium. At a point 0.1 miles further upstream, five fine and two very fine gold flakes were obtained from three test pans taken from bench gravels on the south side of the creek (includes sample 10730). The gravel was mostly cobble-sized with moderate clay. A single pan from the active streambed, just below this site, contained two coarse, nuggety gold flakes. This area does not appear to have been mined.

Mineral Development Potential: Medium

Conclusions: There are inferred resources of 11,733 cubic yards from the west fork site, 2,778 cubic yards in the forks confluence area, 3,450 cubic yards at the site 0.4 miles below the west fork, and 11,000 cubic yards at a point 1.5 miles downstream from the west fork. There is some potential for placer gold in bench gravels from 0.3 to 0.5 miles downstream of the west fork of Rainy Creek. Placer samples contained significant gold and were collected from undisturbed ground. Bench gravels on both sides of the creek at about 1.6 miles upstream from the Delta River contain placer gold and could be sampled in more detail. Bench gravels on both sides of the creek, at about 1.6 miles upstream from the Delta River, contain placer gold and could also be sampled in more detail.

PHELAN CREEK (LOWER)

Alternate Name(s):		Map No:	263
		MAS No:	0020680059
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	E1/2 Sec: 25, T18S, R10E
Meridian:	Fairbanks	Elevation:	2,500 feet
Latitude:	63.32655	Longitude:	-145.73411

Geographic: Phelan Creek is a 17-mile-long tributary to the Delta River. The placer site is reported to be 0.75 miles upstream from the confluence of Phelan Creek and the Delta River.

Access: Phelan Creek can be accessed from the Richardson Highway.

History: Hoyt Moss filed the initial discovery claims on lower Phelan Creek in 1968 (Alaska Kardex 068-112). H. Lund and T. Carlton were operating on the creek in 1974 (Alaska Kardex 068-145).

ARDF Name / No.: None **Alaska Kardex:** 068-112, 145

Production: Unknown

Workings and Facilities: None

Geologic Setting: Phelan Creek is fed by the Gulkana Glacier and flows over an outwash plain for about 4 miles before it turns west to flow along the Richardson Highway. The outwash is 0.4 miles wide near the glacier and widens to a mile closer to the highway. Some of the most common rock types found in the outwash include diorite, basalt, limestone, and ultramafic rocks, particularly amphibolite and peridotite. Placer samples collected in the past from this section of Phelan Creek contained gold and up to 760 ppb platinum (Foley and others, 1989).

A belt of quartz diorite and granodiorite intrusives cuts across the area near the toe of the Gulkana Glacier, which probably accounts for the abundance of granitic rocks in the streambed. Late Triassic clinopyroxene-hornblende gabbro, diabase, and gabbronorite dikes are exposed near the headwall of the glacier, whereas limestone, volcaniclastics, dacite, and andesite of the Permian to Pennsylvanian Slana Spur Formation dominate below the toe of the glacier. A small section of the Permian Eagle Creek Formation exists west of the Hoodoos as steeply dipping beds of conglomerate, sandstone, and shale (Nokleberg and others, 1992b).

In the vicinity of the reported occurrence, lower Phelan Creek runs along the base of a bedrock bluff composed of Permian to Pennsylvanian volcaniclastic(?) rocks.

Bureau Investigation: The BLM took test pans on lower Phelan Creek, from 0.5 to 1.5 miles south of the junction with the Delta River (samples 10117-118, 10446). The samples did not contain visible gold. Sample 10118 contained 67 ppb gold.

Mineral Development Potential: Low

Conclusions: No visible gold suggests a low mineral development potential.

MILLER MINE

Alternate Name(s):	Casey's Cache, Borealis 318 Claims, Yukon Corp, Mount Si Project Camp, Last Chance Creek	**Map No:**	265
		MAS No:	0020680155
Deposit Type:	Placer / Other	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 24, T18S, R10E
Meridian:		Elevation:	2,600 feet
Latitude:	63.33811	Longitude:	-145.73133

Geographic: The Miller Mine is located adjacent to the Richardson Highway on its east side, approximately a quarter to a half mile downstream (north) of the confluence of Phelan Creek with Delta River on a ½-mile-long, intermittent eastern tributary of the Delta River. Indications of mining are located 0.1 miles west of the Richardson Highway. (The location described here is for the site of the mining camp shown on USGS topographic maps. The site of most mining activity is uncertain.)

Access: The Miller Mine is accessible by vehicle from the Richardson Highway on a 0.1-mile dirt road to the Mt. Si Project facilities.

History: In 1929 Charles Miller discovered a placer gold occurrence at the mouth of the creek near the site defined as the Miller Mine above and prospected the site using a small automatic splash dam (Pilgrim, 1930). The site of Miller's original mine was on a small creek entering the east side of the Delta River, about half a mile below the mouth of Phelan Creek (Pilgrim, 1930). This site may now have been obliterated by the Richardson Highway. Pilgrim (1930) called the creek that Miller mined Last Chance Creek. He also refers to the site as Casey's Cache (Pilgrim, 1930). Reardon (2003) mentions Casey's Cache as the place where the Phelan Creek and Delta River converge. In 1922, there were no buildings or other improvements reported at Casey's Cache (Reardon, 2003).

The Yukon Corporation mined Delta River bench gravels at the site of the Miller Mine in 1946 and was still active in the 1950's (Cobb, 1979; Wedow and others, 1954). Another report says that by 1948 mining at the Miller Mine site had ceased (Cobb, 1973). Between 1962 and 1995, the Mount Si Project held the claims in the area and based operations out of a camp at the mouth of the stream (Alaska Kardex 068-109, 121, 142).

ARDF Name / No.: Yukon Corporation; Miller Mine / MH207
Alaska Kardex: 068-109, 121, 142

Production: Unknown

Workings and Facilities: The original discovery site may now be covered by the Richardson Highway. Remains of placer mining equipment, including screens and a sluice box are located in a placer cut, which is overgrown with alders. Several abandoned buildings related to the Mount Si Project are located nearby just west of the placer site. These contain several types of elaborate placer processing equipment. It could not be determined whether this equipment was ever used at the nearby placer site.

Geologic Setting: Bedrock underlying the creek is composed of the Early Permian to Middle Pennsylvanian Slana Spur Formation, consisting of calcareous volcaniclastic rocks and lesser volcanic sandstone, conglomerate, tuff, volcanic breccias and flows, and limestone (Nokleberg and others, 1992b). The Miller Mine area has been mapped by Bond (1976) as comprised of volcanic and sedimentary rocks of the Pennsylvanian to Permian Tetelna Volcanic complex.

Pilgrim (1930) describes the gravel in the creek to be 5 feet deep with not much overburden. At 200 feet upstream on the creek, the gravel was 4 feet deep with 2 feet of vegetation muck. The gravels were generally coarse, with boulders as large as 4 feet in diameter. A considerable amount of blue clay was found in the lower part of the gravels, which Pilgrim believed to be of glacial origin.

Placer concentrates collected at the site of the Yukon Corporation workings at Phelan Creek, a quarter of a mile downstream on the Delta River contained less than 0.001 percent equivalent uranium (Wedow, 1954).

Bureau Investigation: There is little information available on the Miller Mine. It was the site of placer mining activity in the mid 1940's (Wedow and others, 1954), but since then the site has been shrouded in mystery. Local knowledge informs investigators that a secretive organization acquired the property. The name of the organization was the Mt. Si Project. From mining location and Alaska Kardex records, it seems the organization held up to several hundred claims at one time that covered numerous creeks in the area (Alaska Kardex 068-109). Unpublished claim maps indicate claims covered the Miller Mine site and extended to the west to include Ann Creek, upper North Fork Rainy Creek, and about 3 miles of the Delta River, from about 1 mile north of the Miller Mine to at least 2 miles south of it. Alaska Kardex records indicate claim staking activity and assessment work began around 1962 and continued till about 1995. Most activity seems to have occurred between about 1968 and 1988. Descriptions of annual assessment work on the claims suggest that most were placer claims, but lode claims may also have been staked (Alaska Kardex 068-109, 121, 142).

Dave Johnson (personal communication, 2002) suggested that there is a granitic intrusion to the east of the Miller Mine camp that may represent a pluton-hosted gold occurrence. He indicated that people from the camp sluiced "quite a bit of material," presumably from the intrusion. BLM investigators examined the area east of the camp and discovered evidence of land disturbance, digging, and stripping. The rock exposed is iron-stained, coarse-grained sandstone or breccia. A sample of this rock returned very low precious and base metal values (sample 10048). Two additional samples from the area, one of granite with quartz veining and one of siliceous greenstone host rock, also had very low precious and base metal concentrations (samples 10109-110).

The area described by Wedow and others (1954) as the site of placer operations in the 1940's, today has only minor bench gravels and little placer potential. A sample of bench gravels from the site, collected and analyzed by Wedow and others (1954), returned less than 0.001 percent equivalent uranium in radioactivity tests.

The BLM examined what appears to be a placer cut, located 0.1 miles east of the Richardson Highway. The cut is approximately 100 feet wide and cut 10 feet deep into pebble-cobble gravel that appears grus-like in places. This material appears to make up an alluvial fan near the mouth of the stream. A 2-pan sample from the head of the cut contained one very fine gold flake and trace magnetite (10678). Analysis showed the sample was not anomalous in gold.

Mineral Development Potential: Low

Conclusions: There was some minor historic mining that occurred at the Miller Mine. But even though the site was relatively accessible, located on the Valdez to Fairbanks trail (Richardson Highway), little activity was reported. Except for the screens and sluice box, BLM investigators could find no evidence of placer mining at the Miller Mine site or on creeks entering the Delta River from the east for about 1 mile downstream from the confluence of Phelan Creek.

BLM samples from the Miller Mine area contained very low gold values. The geology at this site does not match that given by Pilgrim (1930). It may be that the site he described was closer to the Delta River and has been covered by construction of the Richardson Highway.

Little information is publicly available regarding the Mt. Si Project. Most of the BLM's information comes from mining claim records, but these do not reflect the degree of success, or lack thereof, of the mining efforts. Local knowledge garnered by BLM investigators suggests the project was more of a social experiment than a mining effort.

GAKONA GLACIER

Alternate Name(s):		**Map No:**	398
		MAS No:	0020680094
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	S1/2 Sec: 18, T20S, R14E
Meridian:	Fairbanks	Elevation:	3,900 feet
Latitude:	63.17781	Longitude:	-145.13745

Geographic: The Gakona Glacier site is located in the bottom of an unnamed, south-flowing creek that flows just east of and parallel to the Gakona Glacier, approximately 1.2 miles northeast of Devils Lake. In addition to active stream-bed gravels, the channel widens downstream, and the east bank of the creek for approximately 1 mile has bench gravels that may be up to 500 feet wide and 300 feet thick.

Access: Access to this site is most practical by helicopter.

History: The earliest reference to the site indicates that Clyde Wetherell, acting as agent for Brex & Co., filed 71 locations at the site in 1971 (Alaska Kardex 068-138).

ARDF Name / No.: None **Alaska Kardex:** 068-138

Production: None

Workings and Facilities: None

Geologic Setting: The unnamed creek at this site drains an area that Rose (1967) mapped as an argillite unit with small diorite intrusions. Nokleberg and others (1992b) map the rocks as metasediments of Permian to Pennsylvanian age.

Bureau Investigation: The BLM did not visit the site and could not locate any records.

Mineral Development Potential: Unknown.

Conclusions: Although no records could be located indicting any gold values for the site, there is a potential for a resource at the site, given the volume of gravel present in the benches.

CHISTOCHINA RIVER, WEST FORK

Alternate Name(s):	Chena 1-4 Bonanza	**Map No:**	411
		MAS No:	0020680078
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 36, T20S, R14E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.17450	Longitude:	-145.00016

Geographic: The Chistochina River, West Fork prospect is located on the inside of a meander formed by a stream cut deep into bedrock on the east side of the West Fork of the Chistochina River. The site is about 1.3 miles northwest of peak '5581', marked on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: Access to the Chistochina River, West Fork site is most practical by helicopter. A dozer trail leads to the site from a cabin and airstrip 0.4 miles to the west-southwest.

History: There is some uncertainty regarding the Chistochina River, West Fork placer history. The first recorded indication of placer activity in the area may have been by Northland Mines whose representatives staked claims "at the headwaters of the West Fork, tributary of Chistochina River" (Chena 1-4 claims; Alaska Kardex 068-89). A more precise location for their claims is unknown. Additional placer claims were filed near the mouth of the West Fork (Daisy claims; Rose, 1967, location 30) – these may have been the Northland Claims.

BLM investigators found evidence of placer activity at the site that is much more recent than the 1960's. This activity may be associated with the current (2006) claim group that State of Alaska records indicate to be the Bonanza claims, held by Monty or Jim Lawler (e.g., Case Id: ADL 358665).

ARDF Name / No.: Unnamed (near terminus of glacier at head of West Fork Chistochina River) / MH273
Alaska Kardex: 068-89

Production: Unknown

Workings and Facilities: A 400- by 500-foot area of overburden has been removed down to bedrock on the inside of a meander bend in the creek.

Geologic Setting: The creek containing the placer occurrence is deeply incised into bedrock at the site. The drainage probably formed as a side glacial stream on the eastern margin of the glacier ice that once filled the valley. The creek has cut down through exposures of the Early Permian to Middle Pennsylvanian Slana Spur Formation, which is composed of a thick sequence of marine volcaniclastic rocks and lesser volcanic sandstone, conglomerate, tuff, volcanic breccia and flows, and limestone. The volcanic rocks are generally dacite and lesser andesite, rhyodacite, and basalt (Nokleberg and others, 1991).

Placer mining concentrated on a sloping, 400- by 500-foot irregular bedrock surface on the inside of a meander bend. Up to 5 to 10 feet of glacial drift overburden was apparently stripped off by hydraulic methods. Overburden in surrounding areas is up to 50 feet thick. Scheelite was reported in pan concentrates taken on the West Fork of the Chistochina River (Rose, 1967). The rhyodacite(?) is locally iron stained due to disseminated pyrite and contains stringer zones of chalcopyrite up to several inches wide. Rose (1967) describes a lode occurrence site in the near vicinity.

Bureau Investigation: The BLM took two test pans at the base of the drift overlying bedrock at the upper end of the cut. Neither pan contained gold. A test pan taken from the base of a 50-foot-thick sequence of glacial drift overlying bedrock to the north of the meander did not contain gold. Test pans taken from around boulders downstream from the hydraulic cut did not contain visible gold and analysis showed a sample to not be anomalous in gold (sample 10510). A sample of sluice concentrates (10511) was collected near the cabin and airstrip, 0.3 miles west of the placer site. The magnetic fraction of the sample contained 49 ppb palladium and 1,670 ppm vanadium (sample 10475).

The rhyodacite is locally iron stained due to disseminated pyrite and contains stringer zones of chalcopyrite up to several inches wide. The BLM collected two samples (10508-09) from these rocks. The latter sample contained 2.12 percent copper.

Mineral Development Potential: Low

Conclusions: None of the samples taken by the BLM contained gold. As such, there is little development potential for this site.

TREASURE GULCH

Alternate Name(s):	Jackpot Creek, Treasure Creek, Hidden Treasure Creek	**Map No:**	438
		MAS No:	0020680138
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 03, T20S, R15E
Meridian:	Fairbanks	Elevation:	4,200 feet
Latitude:	63.21055	Longitude:	-144.83848

Geographic: Hidden Treasure Creek enters the Chistochina River headwaters from the north approximately 2.5 miles upstream from the confluence of Slate Creek and Chistochina River. The site is about 0.6 miles east-northeast of peak '5685', shown on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: Access to the site is easiest by helicopter. Ground access is via a 45-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 25-mile winter trail, which crosses more rugged terrain to the property from Paxson Lake on the Richardson Highway.

History: Brooks (1915) reported the preparation for the installation of a hydraulic plant in 1914 on Hidden Treasure Creek. Although Brooks (1915) does not identify Hidden Treasure Creek, it is assumed to be the same as Treasure Gulch as no other creeks in the area share the name "Treasure." Smith (1942a) reports that a small quantity of gold and minor platinum was recovered through placer prospecting in the Treasure Gulch valley in 1940.

ARDF Name / No.: Treasure Gulch / MH297 **Alaska Kardex:** 068-59

Production: There was a total of 18 troy ounces of actual production from this area from 1941 through 1943 (unpublished BLM records).

Workings and Facilities: None observed

Geologic Setting: The site is located along Treasure Gulch, approximately 540 feet south of the surface trace of the Denali fault, and near the upper end of the outwash plain off the toe of the Chistochina Glacier. Small ephemeral tributaries of Treasure Gulch are fed from a snowfield to the north. Bedrock consists of alkaline gabbro to diorite and lamprophyre and meta-sediments. To the south, bedrock consists of subaerial to marine basalts, and basaltic to andesitic tuffs. Hidden Treasure Creek flows over Quaternary glacial deposits (Nokleberg and others, 1990).

Bureau Investigation: The BLM collected a series of stream sediment samples (2927-2929) along the tributaries of Treasure Gulch. None of the samples contained anomalous amounts of gold. Two pan concentrate samples (10569 and 10637) were collected near the BLM's location of Treasure Gulch. The latter sample contained 180 ppb gold (sample 10637).

Mineral Development Potential: Low

Conclusions: The grades of gold detected in BLM samples suggest insufficient quantities are present for a profitable small- or medium-scale mining operation.

CHISTOCHINA GLACIER

Alternate Name(s):		Map No:	439
		MAS No:	0020680130
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 15, T20S, R15E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.18631	Longitude:	-144.85451

Geographic: The Chistochina Glacier mine site is located in the outwash plain below the Chistochina Glacier. It is about 5 miles upstream from the junction with the West Fork Chistochina River and about 1 mile upstream from the mouth of Slate Creek.

Access: Access to the Chistochina Glacier site is most practical by helicopter. A dozer trail leads to the site from an airstrip near the mouth of Slate Creek. Ground access is via a 49-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 26-mile winter trail, which crosses more rugged terrain, from Paxson Lake on the Richardson Highway.

History: In 1967, L. Elmer held 12 placer claims in the area and reported gold in gravel a few feet above the level of the present river (Rose, 1967). Pat and Bette Cunningham staked the Bette claim in 1974 and recorded activity on the claim through 1985 (Alaska Kardex 068-179). Active mining has continued at the site to the present and is detailed in the geologic setting section. D. Howland was the owner of claims at the site from at least 2003 to 2005.

ARDF Name / No.: Chistochina Glacier / MH288 **Alaska Kardex:** 068-179

Production: A minimum of 254 ounces of gold has been produced from this site (Dave Howland, personal communication, 2003-2004).

Workings and Facilities: The wash plant uses a spray bar, issuing high pressure water, to break up the clay-rich gravel. A vibrating punch plate then screens the gravel to minus 3/4 inch. This fraction is run through a 2.5-foot by 20-foot-long sluice box which is lined with Astroturf covered by expanded metal. Clean-up is done on the upper 12 feet of the box, with most of the gold being caught in the upper 4 feet. A dozer is used to push gravel to the wash plant, where it is loaded into the hopper by an excavator. The numerous large boulders in the channel bottom add to the difficulty of transporting the gravel. A camp consisting of several wannigans is located nearby.

A site with evidence of old hand mining is located on the west side of channel No.1 and 0.3 miles downstream from the area currently being mined. About 2,200 cubic yards of low bench gravels were processed with unknown results.

Geologic Setting: The placer mine site is located on the outwash plain, near the toe of the Chistochina Glacier. At this point, the valley is nearly 1 mile wide and contains a braided system of stream channels, many of which are abandoned (Figure 60). The channels are cut into poorly consolidated cobble through boulder gravel, containing sandy and clayey layers up to several feet thick.

Placer gold and PGE had been previously reported in the outwash gravels a few feet above the present stream bed (Rose, 1967; Foley, 1992). Placer gold occurs disseminated throughout much of the outwash gravel, but recent mining efforts and testing by the BLM show the highest concentrations are associated with concentrations of large boulders and false-bedrock clay layers in the gravel. In some instances the clay layers are well exposed across the full width of a channel bed. In other cases clay-rich gravels are poorly exposed in channel walls.

There are three main channels crossing the floodplain that have been found to be gold-bearing. Gravels within and adjacent to the furthest east (No.1) channel, are currently being mined. This channel averages 50 feet wide and is a minimum of 2,400 feet long. Most of the pay has been found in a 2-foot-thick, clay-rich, boulder gravel layer in the channel bottom, with some additional pay associated with clay layers in the channel walls. Overburden ranges from 4 to 7 feet thick. The clay layers have probably acted as false bedrock, catching gold being transported by streams running off the Chistochina Glacier. The ultimate source of the gold could be a combination of bedrock sources to the north and nearby "round wash" gravels known to contain fine placer gold. It is possible that buried, gold-bearing clay layers occur in the terraces between channels, constituting a potentially large resource of gold-bearing gravels.

In 2002, a 450-foot section of the clay-rich bed of channel No.1 was mined, resulting in an average grade of 0.045 oz/cy. The channel was mined to a depth of 4 to 5 feet, with gold being found in the gravel beneath the clay layer. Pieces of gold up to a quarter of an inch in size were recovered. In 2003, a length of the same channel was mined just downstream, resulting in an average grade of 0.027 oz/cy gold. Nearly 70 percent of the gold recovered is in the +20 mesh fraction. Gold occurs as flat, equidimensional flakes and shotty pieces. Nuggets weighing up to 0.2 ounces have been recovered. In 2004, an attempt was made to mine the terrace deposits, but returns were apparently not as good as those obtained from the channel bottoms (Dave Howland, personal communication, 2004).

Mining of channel No.1 in 2002-03 resulted in the recovery of at least 221 ounces of gold. In 2004, a 33-ounce cleanup was obtained from 425 cubic yards of gravel mined out of channel No. 1 (0.078 oz/cy gold; Dave Howland, personal communication, 2003).

In 2003, the operator was beginning to mine at the south end of the cut made the previous year. A test pan from behind a boulder, just downstream from the present operation, contained one very fine gold flake. Three test pans taken from a 15-foot-high bank on the east side of the channel next to the mine site contained a total of three coarse, 17 fine, and three very fine gold flakes. The highest gold values were obtained from a 3-foot-thick, cobble-boulder, gravel unit underlying 4 feet of overburden. The operator subsequently tested the same ground with similar results. He also sampled the gravel underlying the clay layer in the channel bottom. Samples taken up to 15 feet beneath the surface contained gold (Dave Howland, personal communication, 2003). BLM tests of the bank run material on the west side of the channel showed it to contain gold in similar amounts.

Bureau Investigation: The BLM collected a 0.13 cubic yard placer sample (10409) from the bottom of a 2-foot-deep dozer trench cut near the upper end of channel No.1 (Figure 60). The cobble gravel had a high clay content. The BLM observed 12 coarse and 12 very fine, flat, gold flakes in the concentrates. The sample contained 0.035 oz/cy gold. The gold was of two types: equidimensional flakes and bright-colored shotty flakes with striated faces. Some quartz was found attached to the gold (Don Keill, personal communication, 2002). A sample of the magnetic fraction of the leftover concentrates (10463) contained 418 ppb platinum and 1,565 ppm vanadium.

In 2004, a placer sample was collected from clay-rich cobble gravel, of unknown thickness, in the bottom of a fresh bulldozer cut in the bed of channel No. 2. This channel is roughly parallel to, and located approximately 400 feet west of, channel No. 1. The sample contained 0.015 oz/cy gold (sample 11302). This channel is a minimum of 400 feet long.

Gold was found to occur within gravels making up a 10- to 12-foot-high terrace gravel on the west side of channel No.1 and 0.3 miles downstream from the active mining operation. A 2-foot-thick, clay-rich, cobble-boulder gravel layer underlying 5 feet of overburden contained the highest values. Two test pans taken from this material contained 1 very coarse (2 mm), 5 fine, and 10 very fine gold flakes (sample 11320). In this area the channel bed is composed of clay-rich gravel containing numerous boulders. A test pan from around the boulders, 350 feet downstream from the previous sample site, contained one fine and two very fine gold flakes.

Test pans taken in channel No. 3, located 1 mile southwest of the present mine site, produced favorable results. A placer sample taken from a 5-foot-thick gravel bench on the east side of the channel contained 0.00051 oz/cy gold (sample 10745, Map no. 442).

A sample of sluice concentrates from the present operation (10811) contained 2.1 ppm palladium, 2.9 ppm platinum, 1,330 ppm tungsten, and 814 ppm copper.

Mineral Development Potential: Medium

Conclusions: There is some potential for an economic placer gold deposit in braided channels below the Chistochina Glacier, near the headwaters of the Chistochina River. In addition, there is potential for placer gold in a large area of terrace gravels cut by the channels. Gold seems to concentrate in and above clay-rich, cobble-boulder gravel layers. A systematic evaluation of clay and boulder-rich layers in channel bottoms and terrace gravels could quantify the amount of gold present. This could be accomplished by taking numerous test pans, followed by bulk placer samples in areas of highest gold concentration. Potential for more resources of the gold-bearing gravels, currently being mined in channel No. 1, exists in both channel Nos. 2 and 3. The possibility also exists for potentially large resources of gold-bearing gravels in the terraces separating the channels. Careful prospecting will be needed to outline areas of highest gold concentration. A minimum inferred resource totaling 10,400 cubic yards exists along the bottom of channel No.1, downstream from the current mining operation. A minimum inferred resource totaling 4,500 cubic yards exists in channel No. 2. Some of the pay layers contain large boulders, which could make mining difficult. More sampling will be needed to determine whether economic concentrations exist in channel No. 3.

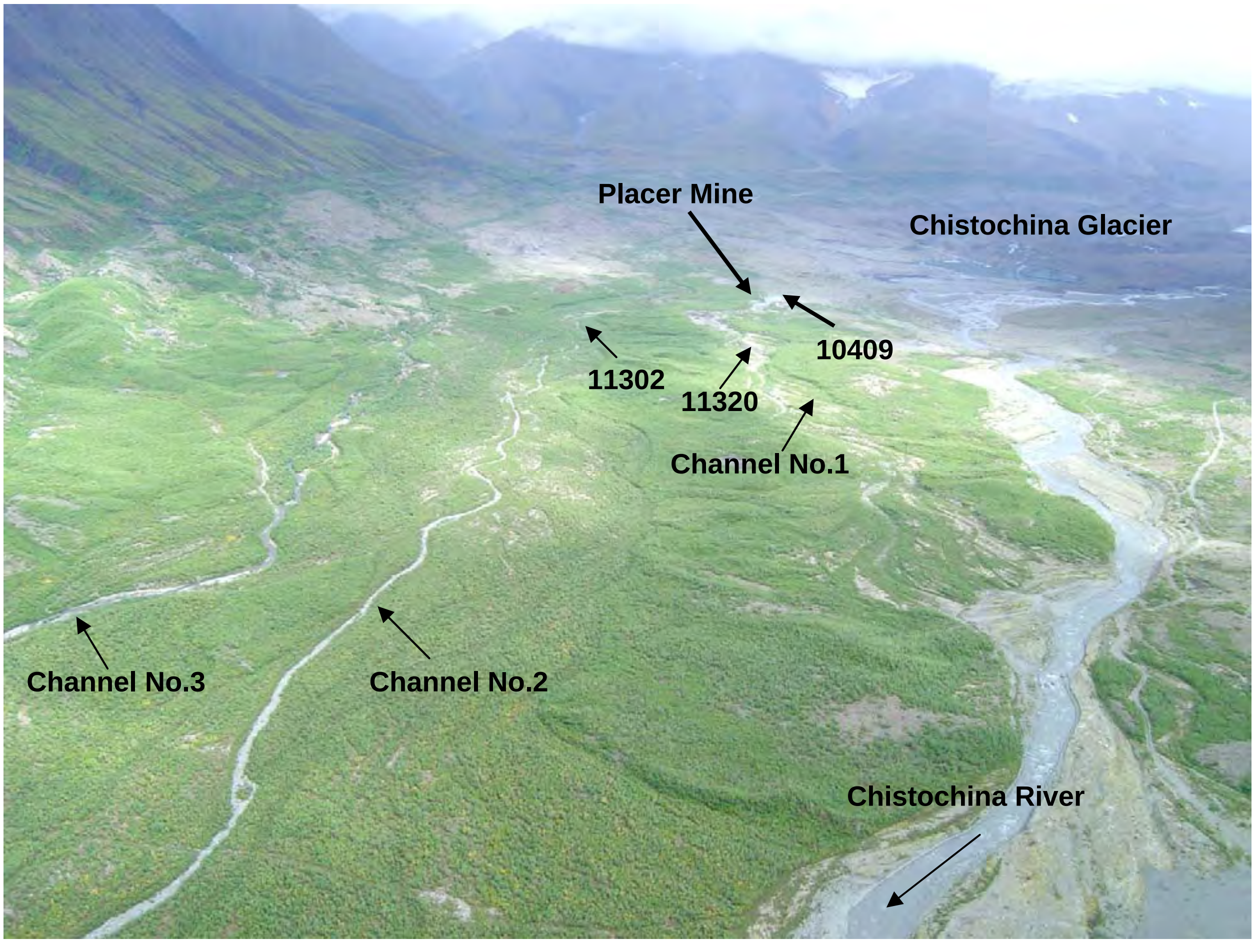


Figure 60. Chistochina Glacier placer site showing channels and sample locations. View to northeast.

SLATE CREEK

Alternate Name(s):	Jacobson Placer	**Map No:**	448 (see also Map no. 467)
		MAS No:	0020680068
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	N1/2 Sec: 22, T20S, R15E
Meridian:	Fairbanks	Elevation:	3,900 feet
Latitude:	63.16983	Longitude:	-144.84273

Geographic: Slate Creek is a 4-mile-long eastern tributary of the Chistochina River, 24 miles northeast of Paxson. It is the first major tributary from the east, south of the foot of the Chistochina Glacier.
Note: Map no. 448 marks the location of most past prodiction from Slate Creek. Map no. 467 marks the loction of a single BLM sample from Slate Creek.

Access: Access to the site is easiest via helicopter. Ground access is via a 45-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 27-mile winter trail, which crosses more rugged terrain, from Paxson Lake on the Richardson Highway. There are private landing strips situated along Slate Creek, but access to the strips requires prior approval from private land owners in the area.

Table 17. History of exploration at Slate Creek.

Description
1900 - Gold discovered on Slate Creek (Mendenhall, and Schrader, 1903).
1902 - Gold production from Slate Creek worth about $30,000 (1,450 fine oz) (Mendenhall, 1903).
1908 - Placer mining activity (Moffit, 1909).
1909 - Placer mining activity (Brooks, 1910).
1911 - Placer mining activity (Brooks, 1912).
1912 - Preparations for large-scale placer mining (Brooks, 1913).
1914 - Placer mining activity (Brooks, 1915).
1915 - Placer mining activity (Brooks, 1916).
1916 - Mining with platinum recovered. A reported $9,000 (499 oz) taken out (Smith, 1917).
1917 - Platinum recovered. District production to 1917 estimated at $100,000 (5,549 oz at $18.02/oz) (Martin, 1919).
1918 - Platinum recovered (Martin, 1920).
1919 - Platinum recovered (Brooks, 1921).
1920 - Gold and platinum produced (Brooks, 1922).
1921 - Gold and platinum recovered (Brooks, 1923).
1922 - Hydraulic plant operated on creek (Brooks, and Capps, 1924). D.R. Englar acquires patent to 4 claim blocks covering 723 acres (Krasowski, 2002)
1923 - Gold and platinum recovered (Brooks, 1925).

Description
1924 - Gold and platinum recovered (Smith, 1926).
1925 - Platinum recovered with 15 men employed (Moffit, 1927). Hydraulic operation managed by J.M. Elmer (Wimmler, 1925a, 1925b; Moffit, 1927).
1926 - Placer gold produced (Smith, 1929).
1927 - Placer mining activity (Smith, 1930a).
1928 - Placer mining activity (Smith, 1930b).
1929 - Placer mining activity (Smith, 1932).
1930 - Placer mining activity (Smith, 1933).
1931 - Placer mining activity (Smith, 1933).
1932 - Placer mining activity (Smith, 1934).
1933 - Placer mining activity (Smith, 1934).
1934 - Workings all washed out or buried by a flood in August (Smith, 1936).
1935 - 13 men working Slate Creek for A. Sundt (Moffit, 1937).
1936 - Placer mining activity (Smith, 1938).
1937 - Placer mining activity (Smith, 1939a).
1938 - Placer mining and preparatory work (Smith, 1939b).
1939 - Placer mining activity (Smith, 1941). Patented claims acquired by the Slate Creek Mining Co. in about 1939 (Krasowski, 2002)
1940 - A little placer mining and extensive prospecting (Smith, 1942a).
1941 - Placer mining activity (Moffit, 1944).
1956 to 1957 - Mining by Hobb Enterprises (Jasper, 1957).
1958 to 1962 - Mining by Monte Cristo Mining Co. (Jasper, 1957; Rose, 1967).
1962 - Elmer family acquires 723 acres in 4 patented claims at Slate Creek (Krasowski, 2002)
1974 to 1979 - Rancher's Exploration and Development Corp. evaluates property (Alaska Earth Sciences, 1988).
1979 - Rancher's Exploration begins placer mining (Alaska Earth Sciences, 1988).
1982 - Rancher's Exploration operating successful mine on Slate Creek. Pay zones locally exceed 100 feet in thickness (Eakins, and others, 1983).
1983 - Rancher's Exploration is one of the largest placer producers in south-central Alaska (Bundtzen, and others, 1984).
1984 - Rancher's Exploration acquired by Hecla Mining Corporation (Alaska Earth Sciences, 1988). Only minimal, sporadic production after 1984 (Krasowski, 2002)
1985 - Hecla Mining sells Slate Creek operation to Alaska Mineral Resources Co. (Alaska Earth Sciences, 1988).
1986 - Elmer family receives a royalty payment (suggesting gold production) from Hecla Mining (Krasowski, 2002). Alaska Mineral Resources Co. along with joint venture partners Harrison Western Corp. and Northern Minerals Co. spends about 2.5 million dollars on mining operations on Slate and Ruby creeks (Bundtzen and others, 1986).
1990 to 1991 - D. Livermore acquires mining lease on Slate Creek from Elmer Trust (Krasowski, 2002).
2002 - The owner of patented claims on Slate Creek is listed as the Lewis Elmer Trust of Boise, Idaho (State of Alaska, Dept. of Natural Resources, Div. of Mining records, 2002).

ARDF Name / No.: Lower Slate Creek / MH295 **Alaska Kardex:** 068-12, 31, 64, 87

Production: There are conflicting reports on the amount of gold production that has come from Slate Creek over the years. Some of the confusion likely arises from mixing records of production from Slate Creek with that from other creeks in the area. It has been estimated that Slate Creek has produced at least 50,000 ounces of gold (Ellis and others, 2004). From 1906 to 1941 a total of 43,168 fine ounces gold and 1,819 fine ounces silver were recovered from Slate Creek (unpublished U.S. Bureau of Mines records). From 1979 to 1983 Rancher's Exploration recovered 19,999 ounces of gold at an average grade of 0.0177 oz/cy from the upper part of the creek. In 1984 Rancher’s produced 1,260 ounces of gold from an operation on lower Slate Creek (Foley, 1992). Krasowski (2002) indicates that at least 15,000 ounces of gold have been produced from operations on Slate Creek between 1979 and 1984.

Workings and Facilities: Operations on Slate Creek have been some of the largest in the upper Chistochina area. Early mining used hydraulic and sluice box techniques. More recently, heavy equipment, large sluice boxes, jigs, and gravity concentration tables were used to recover the creek's fine gold. There is evidence of extensive mining along the lower 2.3 miles of the creek (Figure 61). A shop, gold recovery plant, earth moving equipment, and housing are located a short distance west of Chisna Pass. In addition, there are buildings, mining equipment, and an airstrip located where Slate Creek drains into the Chistochina River valley.

Geologic Setting: The lower part of the Slate Creek valley lies within a graben formed along the Slate Creek fault zone. The valley bottom is underlain by shale, sandstone, and conglomerate of the Eocene Gakona Formation. The fault on the north side of the graben is mostly buried by Pleistocene gravel. The hills to the south of the southern fault consist of andesite and dacite agglomerate, tuff, and flows of the Pennsylvanian to Permian(?) Chisna Formation (Rose, 1967). Recent glaciation has disturbed Slate Creek and modified the channel considerably. Ice advance along the Chistochina Glacier may have at one time forced Slate Creek to drain east over the Chisna Pass divide (Mendenhall, 1905).

The placer gold on Slate Creek has been described as occurring in three modes: 1) shallow gulch placers in the present stream channel; 2) in high benches on both sides of the creek, formed through erosion by ancestral streams; and 3) through erosion of the "red conglomerate," which represents a cemented gold- and platinum-bearing gravel. The bench gravels occur on both sides of the creek, where extensive testing and mining have been done using hydraulic methods. The gold and platinum occur together and appear to have the same source. There are no basic rocks nearby other than some small dikes, from which the platinum is likely to have been derived (Chapin, 1919b). Foley and Summers (1990) also suggest PGE may have been derived from the local argillite.

A narrow bench, 10 to 15 feet above the level of Slate Creek, opposite the mouth of Miller Gulch, was one of the first areas to be mined in the Chistochina District. The richest ground on the creek was located just downstream from Miller Gulch (Map no. 457). This site probably represents a section of the old Miller Gulch alluvial fan. On the upper and lower parts of the creek, values were erratic, yielding little more than wages. In the upper part of the creek, gravels were from 4 to 10 feet in depth. A 21-foot-deep hole near the south side of the gravel floodplain, at the mouth of the creek, did not reach bedrock. In the early years, mining on the lower creek was confined mostly to the south side of the stream. Here, a glacial deposit, consisting of glacial clay "blue mud" and boulders, was found to be gold bearing. It was overlain by a 5- to 25-foot-thick colluvial layer (Mendenhall, 1905; Moffit, 1912).

Figure 61. Placer tailings on lower Slate Creek. View to west.

The Slate Creek gold is similar in form to that of Miller Gulch, but not quite as coarse (Moffit, 1912). The gold is described as smooth and rarely has any quartz or argillite adhering to it. Most of the gold is coarse dust and small nuggets, with the largest nugget weighing 4 ounces. The gold ranges in fineness from 857 to 888 (Smith, 1941). Nuggets are equidimensional, and rounded with battered edges. Approximately 85 percent of the gold passes a 20 mesh screen. Concentrates contain abundant black sand, which presents a problem with separating the fine gold (Yeend, 1981). The amount of platinum accompanying the gold was estimated to be a little over 1 percent of the gold volume (Chapin, 1919b).

The source of the placer gold and PGE is a topic of speculation. The unconsolidated Tertiary gravel capping the ridges ("round wash") has been proven to contain gold, and there is general agreement that it is one source (see Map no. 459). A consolidated conglomerate unit called the "red conglomerate" is also reported to contain gold, and is thought by some to be the source of the material in the unconsolidated gravels. The original source of this gold and PGE has been speculated as coming from metamorphosed and ultramafic rocks north of the Denali fault (Mendenhall, 1905; Martin, 1919). It has also been postulated that at least some of the gold, along with PGE, mercury, copper, and lead, comes from a local source through erosion of the altered argillites and igneous rocks underlying Miller Gulch (Mendenhall, 1905; Chapin, 1919b; Rose, 1967; Foley and Summers, 1990).

Bureau Investigation: The BLM examined the upper part of Slate Creek, above Miller Gulch. There has been extensive mining of both the modern stream and bench gravels along a 0.5-mile stretch of creek upstream from Chisna Pass. This includes a 1,000-foot stretch of bench gravel, 100 feet above and on the east side of the creek that has been mined using large mechanized equipment. Two reconnaissance test pans taken from the base of gravel, resting on argillite bedrock at this site, produced four fine gold flakes (sample 10406). There appears to be a few patches of the bench gravel that have yet to be mined. No signs of mining were observed upstream from this point. Two pans taken adjacent to bedrock in the creek bottom, 0.5 miles upstream of the workings, did not contain visible gold.

Mineral Development Potential: Low to Medium

Conclusions: Resources consist of 20,000 ounces of gold in the drill calculated (indicated resource) category, with an additional 75,000 to 100,000 ounces in the drill-inferred (inferred resource) category. At the beginning of 1984 that part of Slate Creek east of Miller Gulch was estimated to contain drill-indicated reserves of 722,000 cubic yards averaging 0.0116 oz/cy gold (Krasowski, 2002).

Rose (1967) inferred that a former channel of Slate Creek, covered for a distance of a quarter to a third of a mile upstream from the mouth, could be gold bearing. These gravels are covered by considerable overburden and apparently have not been tested.

Slate Creek has an extensive history of mining, of which few records exist. It is, therefore, difficult to determine whether resources still exist in the drainage.

Miller Gulch

Alternate Name(s):		Map No:	457
		MAS No:	0020680069
Deposit Type:	Placer	Commodities:	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NW1/4 Sec: 23, T20S, R15E
Meridian:	Fairbanks	Elevation:	4,500 feet
Latitude:	63.16985	Longitude:	-145.82499

Geographic: Miller Gulch is a 1-mile-long northern tributary of Slate Creek, which is an eastern tributary of the Chistochina River, 24 miles northeast of Paxson.

Access: Ground access is via a 46-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 26-mile winter trail, which crosses more rugged terrain, from Paxson Lake on the Richardson Highway. There are private airstrips situated along Slate Creek, near Miller gulch, but access to the strips requires prior approval from private land owners in the area. The lower part of Miller Gulch is covered by patented mining claims.

History: Gold was discovered in Miller Gulch in 1900 (Mendenhall, 1905). Original operators were Coles, Jacobson, Kramer, and Levell. In 1927 the operators were J. Elmer, F. Walker, R. Watkins, and W. Wheeler. In 1940 they were W. Ackerman, G. Todd, and G. Ahlgren. Howard Hayes and D. Fleek staked the Snow Claims Nos. 1-3 in 1953 in the Miller Gulch area. Between 1956 and 1962, Hobb Enterprises and Monte Cristo Mining operated on Miller Gulch (Jasper, 1957).

ARDF Name / No.: Miller Gulch / MH296 **Alaska Kardex:** 068-18, 22, 29, 63

Production: Production through 1905 was estimated at $175,000 or 9,600 ounces gold (at $18.23/oz; Mendenhall, 1905). From 1906 to 1939, production totaling 2,350 fine ounces gold and 211 fine ounces silver was reported (unpublished U.S. Bureau of Mines records). Ellis and others (2004) report that Miller Gulch has produced at least 50,000 ounces of gold. From 1973 to 1984 an estimated 15 ounces of PGE were reported to have been recovered from Miller Gulch (Foley and Summers, 1990).

Workings and Facilities: Miller Gulch is considered to be the most productive drainage in the Delta River study area. Extensive tailings piles from both hand and mechanized mining operations occur along nearly the entire length of the creek. The mechanized operations appear to have been concentrated along the lower 0.5 miles of the present drainage. High benches up to 200 feet above the present stream have been mined. The limiting factor affecting the exploitation of these bench deposits seems to have been the availability of water. Spring runoff from snow melt near the gulch headwaters was apparently transported onto the benches with canvas pipes. This water supply was short term, thus limiting the extent of the mining season and the extent of placer mining at these elevations. The gradient about midway up the gulch is

15 percent. A cabin and small trailer sit on a bench underlain by bedrock, 0.2 miles upstream from Slate Creek.

Geologic Setting: The hills containing Miller Gulch lie between the east-west Slate Creek fault zone on the south and the Denali fault zone to the north. Bedrock underlying the gulch consists mostly of an upper Jurassic through Cretaceous turbidite sequence consisting of rhythmic bedded argillite, locally containing small limestone lenses. In the upper part of the gulch, the argillite has been hornfelsed(?), losing the rhythmic texture, and contains disseminated pyrite, pyrrhotite, and chalcopyrite. It is cut by calcite and quartz veinlets. The argillite is also cut by numerous Cretaceous through Tertiary(?) randomly oriented dikes, ranging in composition from diorite to hornblendite and containing accessory pyrite, pentlandite, pyrrhotite, chalcopyrite, hematite, and cinnabar. The dikes locally contain calcite and quartz veinlets. Cretaceous through Tertiary(?) gabbro underlies the ridge on the west side of the gulch. The gabbro contains abundant disseminated pyrite, pyrrhotite, and chalcopyrite and is cut by quartz and calcite veins (Foley and Summers, 1990; Nokleberg and others, 1991).

Unconsolidated Tertiary conglomerate caps the ridges surrounding the headwaters of Miller Gulch. It contains well-rounded cobbles and boulders of greenstone, granite, and diorite along with flat schist pebbles and cobbles. The matrix consists of mixed sand and clay. This unit has historically been called "round wash" by local miners and is probably the source of at least some of the placer gold in Miller Gulch (see Map no. 459; Mendenhall, 1905; Foley and Summers, 1990). Chapin (1919b) mentions a consolidated "red conglomerate" that occurs locally in the vicinity of Miller Gulch. He indicated that this conglomerate could be the source of the material in the overlying unconsolidated conglomerate mentioned above, and that it is known to contain placer gold.

Placer gold on Miller Gulch appears to occur to in three modes: 1) shallow gulch placers in the present stream, 2) in benches formed through erosion by ancestral streams, and 3) disseminated through the Tertiary conglomerate which caps the ridge tops (Figure 62). Only the first two types have proven to be economic. The gulch placers, which are mostly mined out, contained gold concentrated on bedrock with 4 to 8 feet of overburden. The gold was reported to be evenly distributed across the gulch without definite pay streaks. It was usually flat and smooth and rarely found attached to quartz or country rock. The gold occurred as "coarse dust" and small nuggets weighing up to 4 ounces (Smith, 1941). Nuggets weighing up to 1 ounce were reported as "not rare." The gold increased in coarseness towards the head of the gulch. Due to shallowness and accessibility to water, the gulch placers were extensively exploited and are responsible for the majority of the creek's production. Small copper nuggets, cinnabar, abundant magnetite, and occasionally silver-white fragments of osmiridium were found associated with the gold in sluice boxes (Mendenhall, 1905). The PGE content is reported to be a little over 1 percent of the volume of gold (Martin, 1919). Gold fineness ranges from 870 to 895 (Mendenhall, 1905).

The erosional history of ancestral streams that formed the bench placers in Miller Gulch is probably related to uplift of the south flank of the Alaska Range along the Denali and Slate Creek faults. Periods of uplift and rapid down cutting were probably followed by the formation of meanders, as the streams adjusted to a lowered base level. Meander development widened the stream valleys by cutting benches into the argillite bedrock. Placer gold was deposited on these benches and subsequently covered by unconsolidated material, including the "round wash" streaming down from the ridge tops above. Subsequent uplift, followed by down cutting, has left the benches perched on the gulch walls. Most of the headwaters area of the Chistochina River has at one time or another been ice covered. It is difficult to determine whether ice also filled Miller Gulch. The high placer gold content of Miller Gulch may indicate that the drainage was ice free at some point during the Pleistocene, allowing gold to concentrate.

Attempts at mining the bench placers are mostly confined to the east side of Miller Gulch. Gold-bearing bench gravels occur at elevations up to 5,000 feet, and nearly 200 feet above the present stream. Mining of these benches is limited by the seasonal availability of water. Otherwise water for washing has to be pumped up from the lower part of Miller Gulch.

The source of the placer gold and PGE is a topic of speculation. The unconsolidated Tertiary gravel capping the ridges, "round wash," has been shown to contain gold and there is general agreement that it is one source. A consolidated conglomerate unit called the "red conglomerate" is also reported to contain gold and is thought by some to be the source of the material in the unconsolidated gravels. The original sources of this gold and PGE has been speculated as coming from metamorphosed and ultramafic rocks north of the Denali fault (Mendenhall,1905; Martin, 1919). It has also been postulated that at least some of the gold along with PGE, mercury, copper, and lead, comes from a local source through erosion of the altered argillite and igneous rocks underlying Miller Gulch (Mendenhall, 1905; Foley and Summers, 1990).

Bureau Investigation: The BLM investigated nearly the entire length of Miller Gulch. Test pans were taken where bedrock could be located. The best pans were obtained from the base of gravel overlying bedrock on the east side of a narrow gulch cut by the stream, 1,100 feet upstream from Slate Creek. A placer sample (10400) taken from the lower 2 feet of this material contained 0.083 oz/cy gold. The gold was mostly flat flakes with occasional nuggety pieces. Flakes up to 4 millimeters in size were noted, as well as abundant magnetite along with minor cinnabar and malachite. Some of the gold appeared to have fine beads of mercury attached. The associated black sands contained greater than 100 ppm mercury and 764 ppm copper (sample 10461). At the sample site, gravel deposits up to 40 feet thick overlie bedrock. It is clay-rich cobble gravel containing sporadic boulders up to 2 feet in size. This ground underlies a campsite containing a cabin and trailer, which may be the reason that it hasn't been mined. Test pans from bedrock, 0.44 miles up the gulch from Slate Creek did not contain gold. Test pans taken from bedrock, 0.65 miles upstream contained minor cinnabar, but no gold. Test panning above this point was inhibited by lack of water.

Evidence of mining on bench placers is mostly confined to the east side of Miller Gulch. A bench at an elevation of almost 5,000 feet, and nearly 200 feet above the present stream, has been mined for a length of about 1,000 feet by hand methods. Removal of colluvium by miners has exposed a bench ranging from 20 to 25 feet wide. A placer sample from one bench (10258) contained 0.28 oz/cy gold (Figure 62). The sample contained equal amounts of flakey and nuggety gold with some quartz attached to the rough pieces. The nuggety gold is probably locally derived from quartz veins cutting the hornfelsed argillite bedrock. The flake gold has no doubt traveled a longer distance, probably being concentrated out of the "round wash,” which caps the ridges around Miller Gulch, and is known to be gold bearing (Map no. 459). In addition, the sample contained 44 ppm mercury and 93 ppb platinum (sample 10258). There is potential for the bench to extend further into the hillside, under the colluvium. It is also possible that multiple gold-bearing benches may exist on the east side of the gulch, only a few of which have been exploited. Mining of these benches is limited by the seasonal availability of water in the upper part of Miller Gulch. Otherwise, water for washing would have to be pumped up from the lower part of Miller Gulch.

Mineral Development Potential: Low to Medium

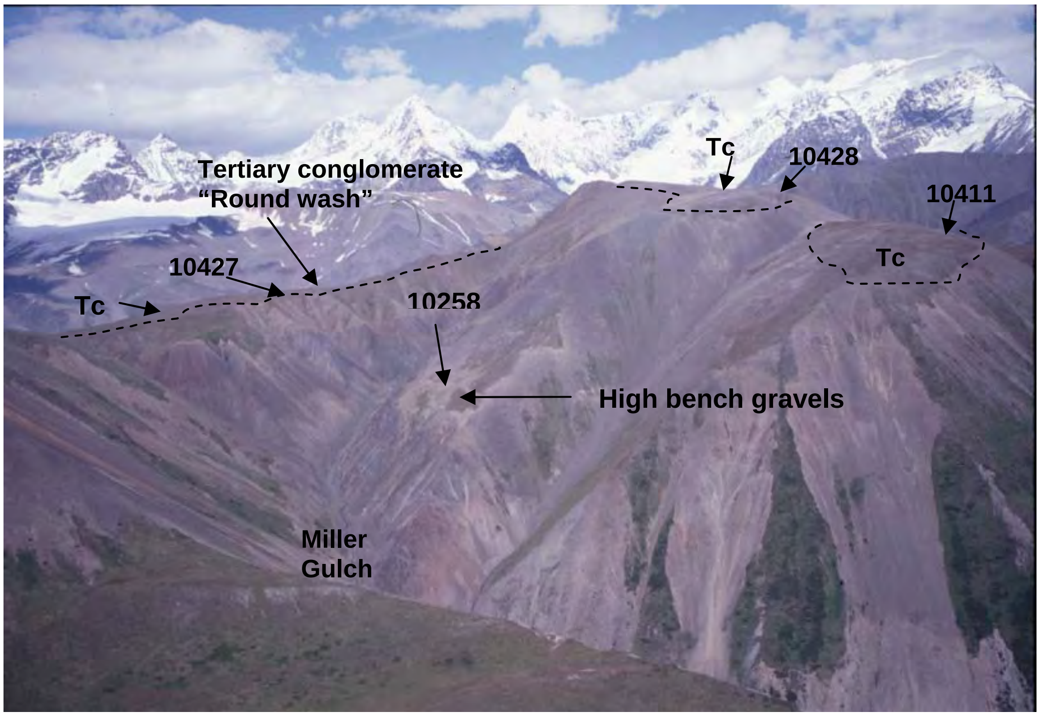


Figure 62. Headwaters of Miller Gulch showing extent of Tertiary Conglomerate (Tc) and sample sites. View to northeast.

Conclusions

Most gulch placers have been mined out. Some resources remain in the bench placers; however, water availability is a major factor. Little exploration has been done on the high benches at 5,000 feet on the east side of Miller Gulch. There is an inferred resource of 950 cubic yards of gravel near the mouth of the Miller Gulch. The pay streak may be overlain by up to 40 feet of gravel. A single placer sample from the base of this gravel contained 0.083 oz/cy gold. The resource underlies a campsite containing a cabin and trailer. This may be the reason it hasn't been mined. There is also an unknown resource in the high bench gravels on the east side of the gulch.

ROUND WASH

Alternate Name(s):		Map No:	459
		MAS No:	0020680390
Deposit Type:	Placer	Commodities:	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	S1/2 Sec: 14, T20S, R15E
Meridian:	Fairbanks	Elevation:	3,300 feet
Latitude:	63.17554	Longitude:	-144.81025

Geographic: The Round Wash placer is in poorly consolidated Tertiary gravel capping the ridge tops surrounding Miller Gulch and adjacent streams. Peak '5576' (shown on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map) is 0.25 miles north of the BLM's sample site with highest gold values.

Access: Access to the Round Wash site is most practical by helicopter. Numerous light helicopter landing sites can be found on the gently sloping ridge crests where the Round Wash is found.

History: Between 1956 and 1962, Hobb Enterprises and Monte Cristo Mining were operating in Miller Gulch (Alaska Kardex 068-63) and were likely responsible for staking claims and digging the test pits noted at the site.

ARDF Name / No.: None **Alaska Kardex:** 068-63

Production: Unknown

Workings and Facilities: A few hand-dug test pits and old claim posts were noted on the ridge tops above Miller Gulch.

Geologic Setting: The hills cut by Miller Gulch lie between the east-west-trending Slate Creek fault zone on the south and the Denali fault zone to the north. Bedrock underlying the gulch consists mostly of an upper Jurassic through Cretaceous turbidite sequence consisting of rhythmic bedded argillite, locally containing small limestone lenses. Intruding these rocks are Cretaceous-Tertiary(?) gabbro and hypabyssal dikes. The argillite is locally rich in very fine-grained pyrite and is cut by clay gouge-filled, small-scale faults. Cutting these rocks are abundant fine calcite stockworks with less abundant quartz veins (Foley and Summers, 1990).

Coarse Tertiary conglomerate caps the ridges surrounding the headwaters of Miller Gulch (Figures 52 & 62). Additional exposures occur in the Big Four and upper Slate Creek drainages. The conglomerate is up to several hundred feet thick, dips gently to the northwest, and unconformably overlies the argillite. It is a poorly consolidated coarse conglomerate, containing well-rounded boulders of quartz and granite up to 1 foot in diameter; however, smaller schist and gabbro cobbles make up almost 50 percent of the clasts. The boulders are more resistant to weathering than the more mafic constituents. Thus, they make up a residual detritus in areas where the conglomerate has been weathered and forms a colluvial mantle, especially on ridge tops.

The firmly cemented conglomerate is exposed in only a few places. The matrix is commonly coarse grained and in places resembles a "salt and pepper" sandstone with abundant quartz. This unit has historically been called "round wash" by local miners. It is probably one source of the placer gold found in Miller Gulch and adjacent creeks. Gold can be panned from the conglomerate at numerous locations, and gold flakes up to 3.5 mm across have been observed (Mendenhall, 1905; Chapin, 1919b; Rose, 1967; Yeend, 1981; Foley and Summers, 1990). A "red conglomerate" unit of similar composition is not gold bearing and thought by local miners to be of a different formation than the "round wash." It does contain a little sandstone and shale that locally carries thin seams of coal. These rocks may represent a higher part of the same section containing the round wash, which lies at the base of the unit, where placer gold would concentrate. Red conglomerate, occurring in down dropped fault blocks, is reported to occur in the bottom of Slate Creek (Chapin, 1919b).

The Tertiary conglomerate, capping the ridge tops above Miller Gulch, has been proven to contain gold (Yeend, 1981; Foley and Summers, 1990). A four-pan sample collected from the conglomerate in the vicinity of Miller Gulch, contained 0.01 oz/cy gold (Yeend, 1981). There is general agreement that it is one source of the placer gold in the modern stream beds and probably in some of the bench placers. The original sources of the gold and PGE has been speculated by some as metamorphosed and ultramafic rocks north of the Denali fault (Mendenhall,1905; Martin, 1919). It has also been postulated that at least some of the gold, along with PGE, mercury, copper, and lead, comes from erosion of the local altered argillites and igneous rocks underlying Miller Gulch (Mendenhall,1905; Foley and Summers, 1990).

The round wash conglomerate is exposed on the ridges surrounding Miller Gulch, Big Four Gulch, Slate Creek, and Ruby Gulch. The aerial extent of the conglomerate as mapped by Foley and Summers (1990), combined with an estimated average pay zone thickness of 5 feet, produces an inferred resource totaling 2.6 million cubic yards. Three placer samples from this area averaged 0.007 oz/cy gold. An additional 4.6 million cubic yards of untested conglomerate occurs in the Big Four and Ruby Gulch areas.

Bureau Investigation: The BLM collected three placer samples from what was determined to be the base of the unconsolidated conglomerate (samples 10411, 10427-428). The conglomerate was loaded into buckets, flown down to the nearest stream, and processed using an hydraulic concentrator. Two of the samples contained 0.013 oz/cy gold (samples 10411, 10427) and the third contained 0.004 oz/cy (sample 10427); the average being 0.007 oz/cy gold. The gold ranged from subangular to angular with some quartz attached. The majority of the gold was +35 mesh in size.

Mineral Development Potential: Low

Conclusions: Tertiary conglomerate is exposed on the ridges surrounding Miller Gulch, Big Four Gulch, Slate Creek, and Ruby Gulch. An inferred resource for the conglomerate totals 2.6 million cubic yards. Three placer samples from this area averaged 0.007 oz/cy gold. An additional 4.6 million cubic yards of untested conglomerate occurs in the Big Four and Ruby Gulch areas, but the low gold content and difficulty in getting water to the site make future development unlikely.

BIG FOUR CREEK

Alternate Name(s):	Big Four Mine, Big Four Gulch	**Map No:**	461
		MAS No:	0020680074
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 14, T20S, R15E
Meridian:	Fairbanks	Elevation:	4,501 feet
Latitude:	63.18476	Longitude:	-144.81664

Geographic: Big Four Creek is a steep 0.8 mile-long southeast tributary of the Chistochina River, near the Chistochina Glacier. It is the northwesterly drainage off peak '5576,' marked on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: Access to the Big Four Creek site is most practical by helicopter. Ground access to Big Four Creek is via a 46-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 26-mile winter trail from Paxson Lake on the Richardson Highway. There is a private airstrip about 2 miles southwest of Big Four Creek.

History: The Big Four Creek placer was first discovered in 1902. Mendenhall (1905) noted that placer claims existed on Big Four Creek in 1902 through 1905. Mining activity between 1940 and 1944 was reported by Moffit (1944). In 1954, W. Beerman acquired the claims and did yearly assessment work through 1972 (Alaska Kardex 068-07).

ARDF Name / No.: Big Four Creek / MH293 **Alaska Kardex:** 068-07

Production: Unknown amount of gold produced.

Workings and Facilities: Early mining on Big Four Creek concentrated on gulch placers occurring along a 0.30-mile stretch of the stream. The stream bed is cut in gabbro bedrock and averages about 50 feet wide. The stream gradient at this site is 15 percent. Recent operations have focused on a 500-foot stretch of bench gravels underlying the southwest side of the creek (Figure 63). Mining was discontinued on this bench due to the extreme height and resulting unsafe condition of the high wall in the placer cut (Dave Howland, personal communication, 2002).

A large dozer and some small buildings sit at a campsite at 4,340 feet elevation. An upper campsite at 4,600 feet includes several small buildings, a vibrating screen wash plant, and a settling pond. This campsite is situated on a lateral moraine left by the Chistochina Glacier. A 2-mile dozer trail leads to the mine site from an airstrip near the mouth of Slate Creek.

Geologic Setting: Big Four Creek lies just south of the Denali fault zone (Nokleberg and others, 1992b). Bedrock underlying the lower part of Big Four Creek consists of Cretaceous through Tertiary(?) gabbro. It contains abundant disseminated pyrite, pyrrhotite, and chalcopyrite and is cut by quartz and calcite veins (Foley and Summers, 1990). The upper part of the creek is underlain by a Jurassic through Cretaceous turbidite sequence consisting of rhythmically bedded argillite, locally containing small limestone lenses. The argillite is cut by Cretaceous through Tertiary(?) randomly oriented dikes, ranging in composition from diorite to hornblendite and containing accessory pyrite, pentlandite, pyrrhotite, chalcopyrite, hematite, and cinnabar. The dikes locally contain calcite and quartz veinlets (Foley and Summers, 1990; Nokleberg and others, 1992b).

Poorly lithified Tertiary gravel caps the ridges surrounding the creek basin. It contains well-rounded cobbles and boulders of greenstone, granite, and diorite, along with flat schist pebbles and cobbles. The matrix consists of mixed sand and clay. This unit has historically been called "round wash" by local miners and is probably the main source of placer gold in Big Four Creek (see Map no. 459; Mendenhall, 1905; Foley and Summers, 1990).

Martin (1919) mentions a consolidated "red conglomerate" that occurs locally in the vicinity of Miller Gulch and Big Four Creek. He indicates that this conglomerate could be the source of the material in the overlying, poorly lithified conglomerate called “round wash” above and that it is known to contain placer gold.

Placer gold appears to occur to in three modes: 1) shallow gulch placers in the present stream, 2) in benches formed through erosion by ancestral streams, and 3) disseminated through the Tertiary conglomerate that caps the ridge tops. Only the first two types have proven to be economic. The gulch portion appears to be mined out, and bench gravels on the southwest side of the creek have been mined to a certain extent. The gulch placers were reported to contain much finer gold than that taken from Miller Gulch and yielded not more than 10 to 20 dollars (0.5-1.0 oz) per man per day (Mendenhall, 1905).

The bench placers occur on at least two levels above the present stream: a lower bench cut in bedrock at the 4,600-foot level and another about 150 vertical feet above, cut into the Tertiary conglomerate itself. These were probably formed by the ancestral Big Four Creek when it flowed at higher base levels than at present, no doubt influenced by the advance and retreat of the nearby Chistochina Glacier. Subsequent down cutting by the stream during inter- or post-glacial periods left the benches perched on the gulch walls. These benches could be as much as 50 feet wide, the full width being partially covered with up to 50 feet of colluvium. The property lies at the upper limit of the lateral moraine left by the most recent advance of the Chistochina Glacier ice. Clayey layers or false bedrocks in the bench gravels may have helped concentrate the gold. Attempts at mining these benches appear to be confined to the southwest side of the gulch.

Yeend (1981) reports the gravel to be almost exclusively derived from the "round wash" conglomerate capping the ridges at the headwaters of the gully. The gravel is poorly sorted with a few boulders up to 1 foot in diameter. Panned concentrates from the creek contain gold with adhering quartz along with 65 to 70 percent magnetite, 30 percent ilmenite, and lesser percentages of garnet, zircon, epidote, and pyrite (Yeend, 1981). Recovered gold is flattened with rounded edges and contains nuggets up to 8 mm in diameter. The gold is generally oxide-coated (Yeend, 1981). Nuggets weighing up to 0.75 ounces have been recovered (Dave Howland, personal communication, 2002).

The source of the majority of the placer gold is probably the Tertiary gravel or "round wash" capping the ridges surrounding the Big Four Creek basin. Erosion of this gravel by crosscutting streams has consolidated the gold in the gulch and bench placers. A consolidated conglomerate unit called the "red conglomerate" is also reported to contain gold and is thought by some to be the source of the material in the unconsolidated gravels. The original source of this gold may be metamorphosed rocks north of the Denali fault (Mendenhall, 1905; Martin, 1919; Yeend, 1981).

It has also been postulated that at least some of the gold comes from a local source through erosion of the altered argillites and igneous rocks underlying Miller Gulch (Foley and Summers, 1990). Iron-platinum alloy with 83 percent platinum and 17 percent iron with minor chromite was identified in placer concentrates from Big Four Creek (Foley and others, 1989)

Bureau Investigation: Because the active stream bed of Big Four Creek appears to be mostly mined out, the BLM focused their examination on bench placers on the southwest side of the creek. A 400-foot stretch at the southern end of the lower bench has been mined. A placer sample (10410) of cobble gravel with sand and clay layers, collected in the pit wall on this bench contained 0.005 oz/cy gold (Figure 63). The sample contained 6 coarse and 12 very fine flat gold flakes. An extension of this bench, represented by a slight break in slope, could be traced along the hillside further to the north. A bench at approximately the same elevation can be traced for about 200 feet on the northeast side of the creek. Two test pans taken from gravel resting on bedrock on this bench contained one coarse, one fine, and two very fine gold flakes. Signs of hand-dug test pits were observed along the bench. Test pans taken at the base of the gravel on this bench over a distance of 700 feet contained fine gold (samples 12404-405). A test pan taken at a fork in the creek 0.2 miles upstream from the upper workings contained very fine gold.

The nonmagnetic fraction of a sample of sluice concentrates from the mine site (sample 10403) contained 76 ppb platinum and 6,670 ppm copper. The magnetic fraction (sample 10462) contained 2,250 ppm chromite.

A 0.05-cubic yard placer sample (10427), collected from the Tertiary gravel capping the divide between Big Four Creek and Miller Gulch, contained 0.010 oz/cy gold with flat gold flakes up to 3.5 mm in size.

Mineral Development Potential: Medium

Conclusions: There is an inferred resource of 7,500 cubic yards of bench gravels. There is medium potential for fine placer gold on benches on the southwest and northeast sides of the creek above the 4,600-foot level. Lack of water, thick overburden and high pit walls may make mining difficult. Sampling of the upper bench gravel on the southwest side of the creek at about 4,750 feet, and investigation of a bedrock bench on the northeast side of the creek at 4,600 feet may identify additional resources.

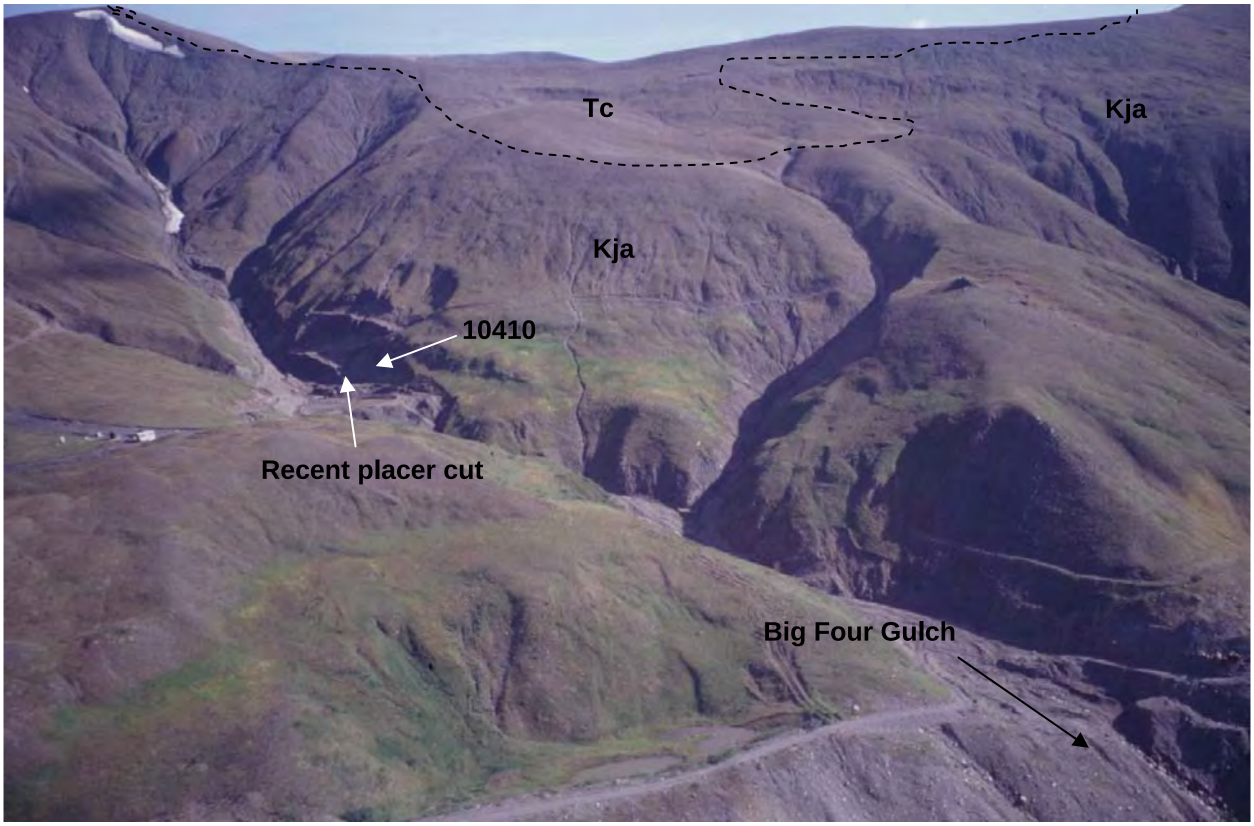


Figure 63. Big Four Gulch area showing extent of Tertiary Conglomerate (Tc) and argillite (Kja).
View to south.

RUBY GULCH

Alternate Name(s):	Jackpot	**Map No:**	480
		MAS No:	0020680070
Deposit Type:	Placer	**Commodities:**	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NW1/4 Sec: 30, T20S, R16E
Meridian:	Fairbanks	Elevation:	4,250 feet
Latitude:	63.15904	Longitude:	-144.76807

Geographic: Ruby Gulch is a 1.3-mile-long, southwest flowing tributary of the Chisna River 25 miles northeast of Paxson. It is between the Middle Fork Chistochina River and the main Chistochina River, near the headwaters of the Chisna River.

Access: Access to this site is easiest by helicopter. Ground access is via a 46-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 28-mile winter trail, which crosses more rugged terrain, from Paxson Lake on the Richardson Highway. A private airstrip is located about half a mile west of Ruby Gulch. The lower end of Ruby Gulch is covered by patented mining claims (MS 916).

History: Mendenhall (1905) reported mining on Ruby Gulch in 1902. In 1910, John Hazelet was the owner. Ruby Gulch was reported to be the third most important gold producer in the district after Slate Creek (Map no. 448) and Miller Gulch (Map no. 457; Moffit, 1912). In 1915 J. Hazelet was issued a patent for land near the mouth of Ruby Gulch. In 1950 Mrs. Ruth A. Branson is listed as the owner of the patented claims (MS 916; Alaska Kardex 068-08).

In 1985 the property was leased by Richard Hazlet Osborne, who apparently leased the property from R. Branson, to Harrison Western Corporation and to Alaska Mineral Resources Co. Alaska Mineral Resources Co. along with joint venture partners Harrison Western Corp. and Northern Minerals Co. spent about 2.5 million dollars on mining operations on Slate and Ruby creeks in 1986 (Bundtzen and others, 1986). Rich Osborne and Russ Hoffman were claim owners in 2003 (BLM claim records).

ARDF Name / No.: Ruby Gulch; Jackpot / MH305 **Alaska Kardex:** 068-08

Production: In 1985, Alaska Minerals Resources Co. produced 4,911 ounces of fine gold from Ruby Gulch at an average grade of 0.0232 oz/cy.

Workings and Facilities: The lower 0.25 miles of Ruby Gulch has been mined extensively in recent years. A camp, processing plant, and mining equipment are located near the mouth of the creek. An airstrip is located about 0.5 miles northwest of the camp.

Geologic Setting: Ruby Gulch cuts argillite of the Pennsylvanian to Early Permian Slana Spur Formation (Nokleberg and others, 1991). Near the head of the creek, a section of Tertiary conglomerate "round wash" has been down faulted into the Slana Spur Formation (Chapin, 1919b). The creek flows through a narrow steep-walled valley before exiting the mountain front onto a broad alluvial fan. The gravels are mostly shale fragments along with some granite and greenstone boulders. Gold-bearing gravels have been mined in the gulch, at the head of the fan, and below it. Most of the gold was concentrated on a thin clay bed only a few inches thick (Moffit, 1912). In the upper part of the gulch, known as the Jackpot claim, the stream is confined to a narrow shallow canyon with gravels 2 to 4 feet deep (Mendenhall, 1905). Average values in this area ranged from 0.16 to 0.21 oz/cy gold. Overburden ranged from 6 to 9 feet in depth (J. Rodgers, written communication, 1910). Recent mining has concentrated on the alluvial fan formed where Ruby Gulch exits the steep mountain front (Russ Hoffman, personal communication, 2002).

The gold is reported to be bright yellow, smooth, and flat and only occasionally rough or in rounded pellets. Nuggets weighing up to 0.7 ounces have been found. Gold fineness ranges from 870 to 895 (Mendenhall, 1905).

Bureau Investigation: As per the claim owner's request, the BLM did not evaluate the site.

Mineral Development Potential: Low

Conclusions: R. Shaffer (written communication, 1985) defined an indicated resource in Ruby Gulch of 300,980 cubic yards averaging 0.0266 oz/cy gold. It is possible that at least some of this resource has since been mined.

QUARTZ CREEK

Alternate Name(s):	No. 74 Fraction, Yankee Girl Placer	**Map No:**	482
		MAS No:	0020680205
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 30, T20S, R16E
Meridian:	Fairbanks	Elevation:	4,100 feet
Latitude:	63.15099	Longitude:	-144.75228

Geographic: Quartz Creek is a 1-mile-long, northeasterly flowing tributary of the East Fork of the Chisna River, 25 miles northeast of Paxson. It is the drainage immediately east of peak '5575' shown on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: The Quartz Creek placer is most easily accessible by helicopter. Ground access is via a 43-mile winter trail up the Chistochina River from Chistochina on the Glenn Highway. An alternative route follows a 28-mile winter trail, which crosses more rugged terrain, from Paxson Lake on the Richardson Highway. There are private airstrips in the valley of the Chisna River, within a few miles of Quartz Creek.

History: Moffit (1911) reported prospecting along Quartz Creek in 1910. John Hazelet was listed as the owner in 1915, when he was given patent to land near the mouth of Quartz Creek (Alaska Kardex 068-08; MS 917, BLM Master Title Plat). In 1950 Mrs. Ruth A. Branson is listed as the owner of the patented claims (Alaska Kardex 068-08).

Yeend (1981) reported placer mining in the fan of Quartz Creek in 1979. Russ Hoffman was owner of the claims from 1995 through 2004 (BLM records).

ARDF Name / No.: None **Alaska Kardex:** 068-08

Production: Unknown

Workings and Facilities: There are numerous placer cuts and test pits at the site. A wash plant sits at the base of the alluvial fan, just west of where Quartz Creek meets the Chisna River.

Geologic Setting: Bedrock underlying the Quartz Creek drainage is composed of Early Cretaceous and Late Jurassic interlayered argillite, siltstone, graywacke, pebble conglomerate, and andesite. Where Late Triassic limestone underlies the drainage, it creates a small bedrock gorge upstream of the alluvial fan formed near the mouth of the creek (Nokleberg and others, 1992b).

Alluvial material on the fan consists of poorly sorted boulder and cobble gravel with boulders up to 1 foot in diameter. The best pay was reported to occur in boulder zones on false bedrock, which may be a "…slate-granule bed" (Yeend, 1981, p. 77). Pay was also reported to be generally good on bedrock. The gold was very flattened and commonly 1 millimeter or less in size, with rare pieces greater than three millimeters. The gold occurred in two varieties: bright yellow and orange-brown. The latter color is thought to be due to adhering impurities. The largest nugget found was a 1.5- by 7-millemeter piece containing quartz and iron oxide coatings. A pan concentrate taken near the fan mouth contained 0.0001 ounces gold. Heavy minerals in the concentrates include magnetite, amphibole, pyrite, chlorite, epidote, garnet, zircon, and ilmenite (Yeend, 1981).

Bureau Investigation: The BLM took test pans near the upper end of a small bedrock gorge on Quartz Creek, 0.2 miles upstream from the Chisna River. Pans contained moderate amounts of magnetite, but no visible gold; however, a pan concentrate (sample 10640) taken at the same site contained 1.79 ppm gold.

The BLM also examined the alluvial fan near the mouth of Quartz Creek and noted numerous test pits and signs of extensive mining, especially near the Chisna River. Recent mining focused on a 300- by 500-foot area of low bench gravels on the west side of the fan. At the lower end of the fan, argillite bedrock, cut by altered mafic(?) dikes, is covered by approximately 5 feet of overburden. Test pans taken from exposed bedrock in trenches at several locations on the fan did not contain visible gold. A pan concentrate sample collected at the toe of the fan contained 275 ppb gold (sample 10744).

Mineral Development Potential: Low

Conclusions: In 1979, Yeend (1981) estimated that the alluvial fan contained an inferred(?) resource of 784,800 cubic yards of gravel. Overburden was estimated to be 33 to 50 feet thick (Yeend, 1981). The known gold-bearing gravels have mostly been mined out.

BEDROCK CREEK

Alternate Name(s):		**Map No:**	488
		MAS No:	0020680352
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	S1/2 Sec: 35, T16N, R16E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.13858	Longitude:	-144.63281

Geographic: Bedrock Creek is a 1 mile-long, west branch of the Middle Fork of the Chistochina River. Placer workings are located 0.30 miles upstream from the river.

Access: Access to the Bedrock Creek site is most practical by helicopter. The site can also be accessed by a 7-mile-long road from an airstrip at the mouth of Slate Creek. Ground access is via a 40-mile winter trail, starting at Chistochina on the Glenn Highway, following the Main Fork, and eventually the Middle Fork of the Chistochina River.

History: Wimmler (1925a, 1925b) reports hydraulic mining on the Middle Fork of the Chistochina River in 1924 and 1925 by the Alaska Middle Fork Mining Co. Whether this occurred specifically at Bedrock Creek, is unknown, but reports by later authors mention a similar mining company name (see below).

A ditch bringing water from Limestone Creek was built to the site, and a hydraulic plant installed between 1941 and 1944 by the Middle Fork Mining Company (Moffit, 1944). Moffit (1954) reported evidence of continued mining between 1944 and 1954.

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A 300-foot-long hydraulic cut is located on the south side of the creek, 0.75 miles upstream from the Middle Fork of the Chistochina River. A ditch brought water from Limestone Creek to the site. Approximately 28,000 cubic yards were removed during mining.

Geologic Setting: Bedrock Creek cuts through a broad, low, outwash gravel bench that slopes gently eastward from the mountains that form the west wall of the middle fork of the Chistochina River valley. The bench is up to 1 mile wide with the poorly sorted gravels being up to 70 feet thick, with an average of 30 to 40 feet. It is believed that the creek was a discharge channel for melt water from the Middle Fork Glacier. Bedrock underlying the gravel consists of argillite and limestone of the Early Permian Eagle Creek Formation and basalts of the Late Triassic Nikolai Greenstone. A part of the bench was drilled systematically. No definite paystreak was outlined, but a zone of fairly high-grade gravel seems to have a southeasterly trend across the bench (Moffit, 1954; Nokleberg and others, 1991).

The gold recovered was taken from bench gravels and not the active stream channel. The gold is reported to be flattened and in small, but heavy, particles. A nugget valued at $2.50 (0.12 ounces at $20.67 gold price) was recovered (Moffit, 1944, pp. 36-37). Principle heavy minerals in descending order of abundance are magnetite, pyrite, chromite, garnet, occasional grains of galena, and a heavy gray-green sand (olivine?). Native copper is common, generally ranging in size from small particles to pieces weighing half an ounce, but occasionally in pieces weighing as much as 2 to 3 pounds. Appreciable amounts of platinum were reported to be present, mostly as small grains. Occasional small particles of silver were also reported (Moffit, 1944). Gold-bearing gravels appear to be concentrated along the lower part of the creek. Overburden varies from 4 to 50 feet in thickness.

Bureau Investigation: The BLM took a 2-pan sample from the placer cut on the south side of the creek, which contained one very fine gold flake (sample 11321). A 2-pan sample (11322) collected on bedrock, underlying 4 feet of gravel on the north side of the creek, contained one very coarse, four coarse, and six very fine gold flakes. In addition, the sample contained 40 ppb platinum.

Upstream from this site, the creek flows through a quarter-mile-long bedrock gorge. A large area of bedrock is exposed above the gorge. Test pans taken from gravel-filled fractures in the bedrock did not contain gold, indicating that the exploited placers were probably formed by concentration of placer gold originally deposited in side-glacial gravels cut by the lower part of the creek.

Mineral Development Potential: Medium

Conclusions: There is an inferred resource of 3,250 cubic yards of gravel. There is medium development potential for placer gold; however, the existing resource is quite small. Further testing of the gravel on the north side of the Bedrock Mine could identify additional resources.

LIMESTONE CREEK

Alternate Name(s):	Chistochina River (Middle Fork), Cleveland Property, Lake Creek, Lime Creek	**Map No:**	489
		MAS No:	0020680079
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 34, T20S, R16E
Meridian:	Fairbanks	Elevation:	3,700 feet
Latitude:	63.13614	Longitude:	-144.64443

Geographic: Limestone Creek is a 5.2-mile-long western tributary to the Middle Fork of the Chistochina River. The mine site is located 6 miles southeast of Miller Gulch and the Upper Slate Creek area.

Access: The site can be accessed by a 7-mile-long road from an airstrip at the mouth of Slate Creek. Ground access is via a 40-mile winter trail, starting at Chistochina on the Glenn Highway, follows the Main Fork and eventually the Middle Fork of the Chistochina River.

History: The Limestone Creek placer was discovered in 1907 by H. E. Cleveland. In 1941, the operator was M. W. Jasper (Moffit, 1944). J. Nelson was the operator from 1957 through 1959 (Alaska Kardex 068-62) and in 1977 and 1978. J.P. Maloney held claims in the area in 1974 (Alaska Kardex 068-62). The current owner, Russ Hoffman, acquired the property in 2002.

ARDF Name / No.: None **Alaska Kardex:** 068-62

Production: A minimum of 580 ounces of gold has been produced from this site (Moffit, 1944).

Workings and Facilities: Evidence of old hand mining exists for a 500-foot length along the bedrock bench, just north of Limestone Creek. Recent mechanized mining has concentrated on a 650- by 2,000-foot stretch of bench gravels further to the north and 0.5 miles northwest of Trout Lake. In places, the overburden is up to 50 feet thick. Workings and facilities include two water-filled mining pits, and tailings piles. A series of ditches and pipes brought in water for mining. A nearby camp consists of several old school buses, wooden buildings, and trailers. Mining equipment on site consists of two bulldozers, a front-end loader, and a belly dumper.

A road leads to the mine site from a long airstrip near the mouth of Slate Creek, 7 miles to the west. There are several shorter airstrips along the road. Another airstrip is located on the middle fork of the Chistochina River, 1.5 miles southeast of the mine site.

Geologic Setting: Bedrock in the area consists of Triassic Nikolai Greenstone and the Early Permian Eagle Creek Formation. Subaerial amygdaloidal basalt flows of the Nikolai Greenstone make up the bulk of the peaks immediately to the northwest of the site, whereas bedrock under the placer workings and in the adjacent creek canyon is composed of cherty argillite, meta-argillite, and limestone of the Eagle Creek Formation (Nokleberg and others, 1992b).

The upper reaches of Limestone Creek flow over volcanic bedrock, but for most of its length, the creek flows across glacial drift and outwash gravels. The western edge of the bench rests against the bedrock of the peaks that make up the western slope of the valley, whereas the northern and eastern edges of the bench follow the boundary of the Middle Fork floodplain (Moffit, 1944).

Gold-bearing placers occur near the base of gravels found on a sloping bench on the north side of the creek. These are primarily made up of greenstone, slate, limestone, conglomerate, and granite cobbles and boulders (Moffit, 1944). The gravels contain numerous 1-foot boulders.

A thorough examination of the property incorporating drilling, test pits and careful sampling was carried out prior to the development of the early 1940's. These tests showed that gold is equally distributed throughout the 30 to 40 feet of gravel but is more concentrated near the bedrock contact. The drilling also revealed that some stratification is present, and false bedrock separates different gold bearing gravel beds. In the earlier days, the richest zone in gold was reported to be a layer of rusty colored gravel resting on a blue clay layer (Moffit, 1912). This layer of blue clay probably acted as a false bedrock surface on which gold was concentrated as it migrated down through the coarse gravel.

Heavy minerals found along with the gold include magnetite, pyrite, chromite, garnet, minor galena, olivine, and platinum (Moffit, 1944). Copper nuggets weighing from a few grams up to several pounds were occasionally caught in the sluice boxes (Moffit, 1911). Kraemer and Bedrock creeks, both smaller than Limestone Creek, cut through the same gravel deposit and have produced gold in the past (Moffit, 1944).

Bureau Investigation: The BLM made several brief visits to the property, but the claim owner was not on site, and no samples were collected.

Mineral Development Potential: N/A

Conclusions: N/A

KRAEMER CREEK

Alternate Name(s):		**Map No:**	490
		MAS No:	0020680353
Deposit Type:	Placer	**Commodities:**	Au, Ag, Pt
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 03, T21S, R16E
Meridian:	Fairbanks	Elevation:	3,600 feet
Latitude:	63.13120	Longitude:	-144.65309

Geographic: Kraemer Creek is a 0.75-mile-long southeast tributary of Trout Lake, near the headwaters of the middle fork of the Chistochina River.

Access: The site can be accessed by a 7-mile-long road from an airstrip at the mouth of Slate Creek. Ground access is via a 40-mile winter trail, starting at Chistochina on the Glenn Highway, following the Main Fork and eventually the Middle Fork of the Chistochina River.

History: Moffit (1944) reported mining at this site from 1941 to 1944.

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A placer cut is reported about midway up and on the north side of the creek.

Geologic Setting: Kraemer Creek cuts through a broad, low, eastward-sloping, gravel bench, nearly 1 mile wide, on the west side of the middle fork of the Chistochina River. Kraemer Creek is said to contain gold of greater average coarseness than other drainages in the area, producing pieces worth as much as 75 cents (0.02 ounces at 1944 gold price; Moffit, 1944). Principle heavy minerals in descending order of abundance are magnetite, pyrite, chromite, garnet, minor galena, and a heavy gray-green sand (olivine?). Native copper is common; it generally ranges in size from small particles to pieces weighing half an ounce, but occasionally in pieces weighing as much as 2 to 3 pounds. Appreciable amounts of platinum were reported to be present, mostly as small grains. Occasional small particles of silver were also reported (Moffit, 1944). The creek has cut into the underlying bedrock, which is composed of argillite of the Early Permian Eagle Creek Formation (Nokleberg and others, 1991).

Bureau Investigation: The BLM did not investigate this site.

Mineral Development Potential: Low to Medium

Conclusions: Although the BLM was unable to visit the site, Moffit (1944) describes gold values of approximately 0.02 oz/cy from bench gravel nearly 1 mile wide. An exploration program designed to determine the extent and gold values of the bench gravel could identify a significant resource.

CHISNA RIVER (LOWER)

Alternate Name(s):		Map No:	496
		MAS No:	0020680072
Deposit Type:	Placer	Commodities:	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 34, T21S, R15E
Meridian:	Fairbanks	Elevation:	3,182 feet
Latitude:	63.07135	Longitude:	-144.81990

Geographic: The lower Chisna River placer workings are located about 1.7 miles upstream from the Chistochina River and approximately 1 mile downstream from the Chisna River canyon and falls.

Access: Access to the Lower Chisna River site is most practical by helicopter. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west or Chistochina on the Glenn Highway to the south.

History: Hazlet and Meals discovered gold on the lower Chisna River in 1899. This was the first discovery of gold in the Chistochina area (Mendenhall, 1905). M. Dempsey was the owner in 1940. Acme Mining Company of San Francisco operated the mine in 1941 (Alaska Kardex 068-03). Subsequent owner/operators were S. Thomas and J. Bolam, Jr. in 1950 (Alaska Kardex 068-71), R. Spelta in 1957 (Alaska Kardex 068-03), S. Thomas in 1958, and W. Major in 1967 (Alaska Kardex 068-103). In 1974, Hazlet's heirs formed Alaska Enterprises, Ltd. to develop the Chisna properties and spent over $1.5 million on development of the property (Stevens, 1987).
(Note: It is difficult to distinguish between historical accounts of the Chisna River (Lower) and Chisna River (Map no. 497) sites. Some of the references to historical activity cited above may have occurred at the Chisna River site.)

ARDF Name / No.: None **Alaska Kardex:** 068-03, 71, 103

Production: The amount of gold recovered from mining operations at the site is unknown.

Workings and Facilities: The Lower Chisna River placer site has been mined extensively by heavy machinery. There are three large shallow pits up to 450 by 850 feet cut into low bench gravels on the east side of the river (Figure 51). Gravel was extracted up a depth of 10 feet and run through a grizzly wash plant. The wash plant and the remains of a sluice box currently rest on top of one of three large tailings piles. The remains of an old cabin are located about 100 feet away from the largest pit, up against the outwash terrace that runs along the length of the river. Unlike the Chisna River placer site, no signs of small hand operations were found. A modern camp with buildings and airstrip are located in the vicinity of the placer workings.

Geologic Setting: The Chisna River drains a variety of rock types, including Early Permian to Middle Pennsylvanian Slana Spur Formation which is composed of a thick sequence of marine volcaniclastic rocks and lesser volcanic sandstone, conglomerate, tuff, volcanic breccia and flows, and limestone. The volcanic rocks are generally dacite and lesser andesite, rhyodacite, and basalt. Andesite and marine sedimentary rocks (Early Cretaceous and Late Jurassic) consisting of interlayered argillite, siltstone, and pebble conglomerate occur near the headwaters of the drainage. Early Permian, shallow-level intrusive stocks, dikes, sills, and small plutons intrude the older rocks (Nokleberg and others, 1991).

The placers on the lower Chisna River appear to be associated with clay-rich layers within fluvial gravels on the river floodplain. Mining operations concentrated on low-bench gravels on the east side of the river. Here, gravel was stripped to a depth of 10 feet without exposing bedrock. The placer deposits in the low benches probably formed through reworking of gold occurring in the high-bench deposits on the floodplain of the Chisna River. The ultimate source of the gold in the benches is probably a combination of Tertiary gravel occurring near the headwaters of the Chisna River and the metamorphosed argillites also found there (Mendenhall, 1905; Foley and Summers, 1990).

A drilling program was conducted in 1987 to test the ground for deeply buried "Valdez Creek-type" channels. The best value on the lower Chisna River was 0.002 oz/cy gold. This value came from an interval of 105 to 110 feet beneath the surface. At the time, this value was considered too low to make the deposit economic (Stevens, 1987).

A sample of high-bench gravel near the confluence of the Chisna and Chistochina rivers contained 0.0006 oz/cy gold.

At least two resource estimates have been made for the Chisna River (Lower) site. D. Colp (written communication, 1978) estimated the lower Chisna River to contain an inferred resource that could exceed 3.0 million cubic yards of gravel with grades ranging from 0.044 to 0.056 oz/cy gold. F. Deakin (written communication, 1984) estimated the lower Chisna River to contain an inferred resource of 33 million cubic yards at grades ranging from 0.010 to 0.015 oz/cy gold.

Bureau Investigation: The BLM took test pans from three areas in the vicinity of the lower placer workings. The first 2 pans were dug from under a boulder in the bottom of the smallest pit and had a total of 1 very coarse, 3 coarse, 6 fine, and 10 very fine flakes of gold (sample 10451). Three more pans were taken from a gravel bank along the edge of the medium sized pit and produced a total of 1 fine flake and 15 very fine flakes of gold (sample 10452). Another pan taken from a similar gravel bank at the south end of the workings, along the edge of the largest pit, contained two fine flakes and one very fine flake of gold (sample 10453). The third series of test pans was collected from the modern riverbed and the high terrace of glacial material on the north side of the stream. The pan from the riverbed contained two fine and four very fine flakes of gold, whereas two pans from the glacial material contained one coarse and four very fine flakes of gold.

All of the gravels that were tested are clay rich, hold moderate quantities of heavy black sand, and commonly contain cobbles and large boulders. The high terrace of glacial material is an exception, as it contains about half as many larger cobbles and boulders as the stream channel. Gold found in test pans from both the streambed and the terraces of glacial material confirms the widespread occurrence of gold in the area; however, most of the gold is probably finely disseminated or, at best, concentrated over clay horizons.

A sample of sluice concentrates (10254) found in barrels near an old sluicing operation in one of the pits, contained 177 ppb platinum, 1,085 ppm chromium, and 2,880 ppm vanadium.

Mineral Development Potential: Medium

Conclusions: There is potential for placer gold in the large gravel benches on the north side of the river and also in the stream gravels that remain around the edges of the existing mine pits; however, it is unknown how gold is distributed throughout the bench gravels. Hydraulic concentrator samples from bench gravels on the north side of the river and also from remaining stream gravels adjacent to historic mine workings would help determine the distribution.

CHISNA RIVER

Alternate Name(s):		Map No:	497
		MAS No:	0020680071
Deposit Type:	Placer	Commodities:	Au, Ag, PGE
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	N1/2 Sec: 26, T21S, R15E
Meridian:	Fairbanks	Elevation:	3,200 feet
Latitude:	63.05829	Longitude:	-144.83734

Geographic: The Chisna River is a 10-mile-long, south-flowing tributary of the Chistochina River. Placer workings are concentrated along a gorge cut in bedrock beginning 2 miles upstream from the Chistochina River. The site is approximately 0.3 miles downstream (southwest) of the “Chisna, Placer Mine” site marked on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: Access to the Chisna River site is most practical by helicopter. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west, or Chistochina on the Glenn Highway to the south.

History: Hazelet and Meals discovered gold near the mouth of the Chisna River in 1899 (Mendenhall, 1905). Mining in the Chisna River canyon continued through 1902 (Mendenhall, 1903). Moffit (1909) reported ditch construction and prospecting with some gold recovery. Prospecting of bench claims continued in 1909 (Brooks, 1910), and utilized a churn drill in 1912 (Brooks, 1913). Brooks (1915) reported prospecting for dredge ground in 1914. In 1915 J. Hazelett was given a patent on about 325 acres of ground around the Chisna River site. The claims were inherited(?) by M. Hazelett Osborne in 1954 and subsequently divided in one-third interests for J. Mellinger, R. Osborne, and E. Osborne in 1967 (Alaska Kardex 068-10).

The ACME Mining Co. of San Francisco operated on the Chisna River site in 1940. By 1941, all work had been abandoned (Moffit, 1954).

Lease holders or nearby claimants of the Chisna River property included L. Smith and J. Thackerey in 1960 (Alaska Kardex 068-76), F. Whitehead in 1967 (Alaska Kardex 068-10), and J. Morgan and C. Garner in 1980 (Alaska Kardex 068-76). H. Speerstra acquired claims in the area from J. Morgan in 1982 and maintained them with annual assessment work through 1995 (Alaska Kardex 068-76). In 1986, a resistivity survey was completed half a mile downstream from the Chisna River canyon by Geo-Recon International, Ltd (Ringstad, 1986). Between 1987 and 1989 H. and J. Speerstra optioned claims in the area to Alaska Enterprises Ltd. (Alaska Kardex 068-76).
(Note: It is difficult to distinguish between historical accounts of the Chisna River and Chisna River (Lower) (Map no. 496) sites. Some of the references to historical activity cited above may have occurred at the Chisna River (Lower) site.)

ARDF Name / No.: Chisna River / MH356 **Alaska Kardex:** 068-10, 66, 76

Production: Unknown

Workings and Facilities: The Chisna River has been extensively mined by small hand operations as well as by large mechanized means. Placer tailings are extensive. Recent large-scale operations are located at 0.5 (Map no. 496) and 1.7 (this site) miles upstream from the Chistochina River. The remains of small-scale operations, including hydraulic cuts and cabins are located in and just above a canyon, starting 1.8 miles upstream from the Chistochina River. Early mining concentrated on shallow gravels in the modern stream channel whereas more recent large-scale operations mined deeper pay below the canyon. There has also been considerable testing of the bench gravels overlying bedrock in the canyon. Hydraulic operations concentrated just below the mouth of the canyon. Water for these operations, as well as ground sluicing of bench gravels, was transported from upstream by ditches running along both sides of the river. It is reported that drill holes have been put down on many of the claims (Moffit, 1944).

Geologic Setting: The Chisna River drains a variety of rock types, including Early Permian to Middle Pennsylvanian Slana Spur Formation, which is composed of a thick sequence of marine volcaniclastic rocks and lesser volcanic sandstone, conglomerate, tuff, volcanic breccia and flows, and limestone. The volcanic rocks are generally dacite and lesser andesite, rhyodacite, and basalt. Marine sedimentary rocks (Early Cretaceous and Late Jurassic) consisting of interlayered argillite, siltstone, pebble conglomerate, and andesite occur near the headwaters of the drainage. Early Permian shallow-level intrusive stocks, dikes, sills, and small plutons intrude the older rocks (Nokleberg and others, 1991).

The shallowest concentrations of placer gold occur within and just below a canyon cut by the river through a diorite intrusive body (Figure 64). This site is located about 1.8 miles upstream from the Chistochina River. Just above the canyon, gravel overlying bedrock was 4 to 8 feet thick and contained many coarse boulders, which could not be handled by ordinary sluicing methods. The gold from the Chisna River area is reported to be much like that from Slate Creek and Miller Gulch in general appearance, but is finer and somewhat more uniform in grain size. Nuggets were rare, but flakes an eighth of an inch or more in diameter were reported to be abundant. Pans taken below the canyon were reported to run up to $1.00 (0.05 oz) per pan (Mendenhall, 1905). The gold has a fineness of about 906 (Ellis and others, 2004). Overlying the diorite are bench gravels from 20 to 30 feet thick. These occur along the entire length of the canyon, which extends for about 0.4 miles.

The placers in the active stream channel were probably formed by erosion and reconcentration of pre-existing disseminated placer gold occurring in the bench gravels. There is evidence of extensive testing of the high bench gravels, but apparently gold was not found in amounts sufficient to warrant mining. The ultimate source of the gold in the benches is probably a combination of the Tertiary conglomerate and metamorphosed argillite found near the headwaters of the Chisna River (Mendenhall, 1905; Foley and Summers, 1990).
A drilling program, conducted in 1987, tested the ground below the mouth of the Chisna River canyon for deeply buried "Valdez Creek-type" channels. The highest gold value obtained was 0.005 oz/cy. This value came from an interval 10 to15 feet beneath the surface in a hole located just downstream from the Chisna River canyon. At the time, this value was considered

too low to make the deposit economic (Stevens, 1987). A sample of black sands from a panned concentrate, taken in the Chisna River canyon, contained 100 ppb platinum.

Concentrations of gold vary along the Chisna River canyon. Four pans taken from gravels in the canyon contained the equivalent of 0.169 oz/cy gold. Two pans taken at the mouth of the canyon contained the equivalent of 0.071 oz/cy gold (D. Colp, written communication, 1978). A 0.83-cubic-foot sample of low-bench gravel collected a short distance below the mouth of the Chisna River canyon contained 0.019 oz/cy gold (J. Holland, written communication, 1981).

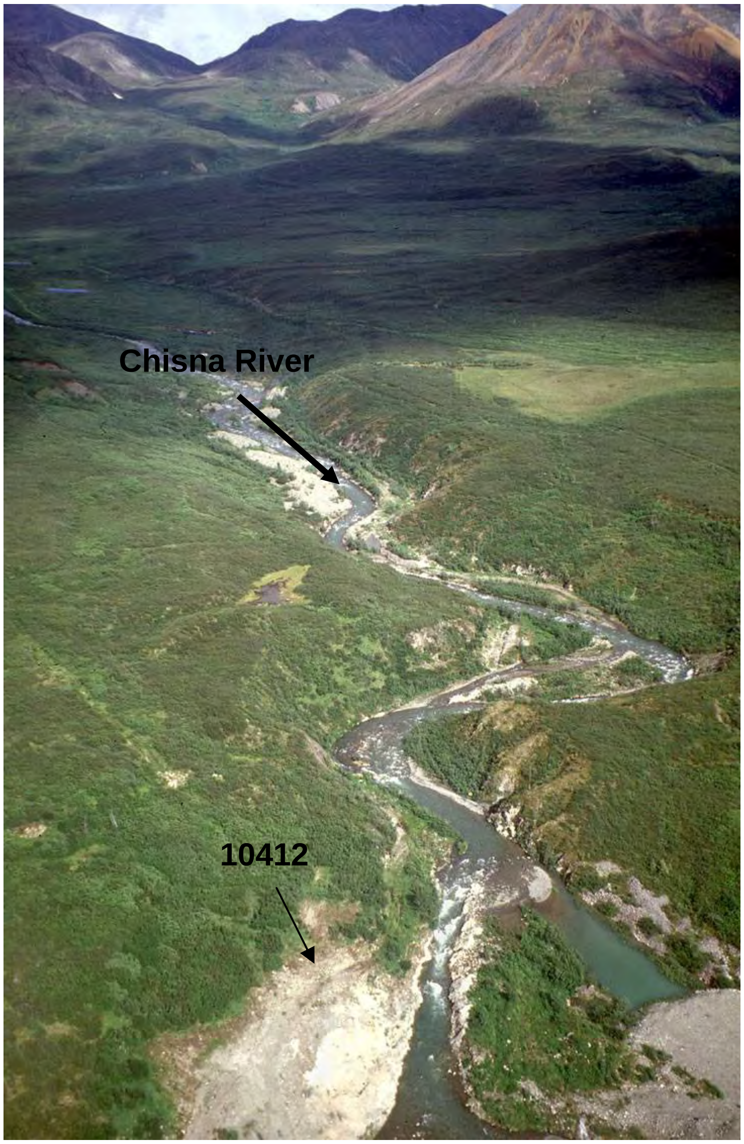


Figure 64. Lower Chisna River canyon. Shallow bedrock in the canyon has been mined extensively for placer gold. View to northeast.

Bureau Investigation: The BLM took test pans from cracks and crevices in broken diorite bedrock just below the canyon, which contained up to nine coarse flat gold flakes (sample 10407). A test pan from around boulders at the head of a point bar nearby contained one very fine gold flake.

The contact between bench gravels and underlying bedrock is exposed at the upper end of the mining cut on the north side of the river, just below the canyon. Test pans from the base of the gravel contained up to five fine and four very fine gold flakes (sample 10408). A placer sample (10412) collected at the same site contained 0.012 oz/cy gold (Figure 64). The gold occurred as subrounded flakes with some rock fragments attached. There were rock and crystal imprints on the flat sides of some flakes. The magnetic fraction of one sample (10466) contained 2.17 ppm platinum. The base of the bench gravels sets about 20 feet above the present river level. The same benches on the north side of the river, 0.5 miles upstream had been mined through ground sluicing. Four test pans collected from gravel in the bottom of the cuts contained one fine and one very fine gold flakes. The bedrock underlying these benches sits 15 feet above the modern stream channel. A placer sample (10259) collected from the active streambed, 1.8 miles above the Chisna River canyon, contained 0.0036 oz/cy gold.

Mineral Development Potential: Medium

Conclusions: There is an inferred resource of 400,000 cubic yards of bench gravels near the lower end of the Chisna River canyon. A placer sample collected from this gravel by the BLM contained 0.012 oz/cy gold.

F. Deakin (written communication, 1984) estimates an inferred resource on the upper Chisna River at 9.4 million cubic yards with grades ranging from 0.0177 to 0.0227 oz/cy gold. These inferred resources could be investigated by additional sampling.

DEMPSEY

Alternate Name(s):		Map No:	498
		MAS No:	0020680076
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NW1/4 Sec: 03, T22S, R15E
Meridian:	Fairbanks	Elevation:	3,050 feet
Latitude:	63.04916	Longitude:	-144.85520

Geographic: The Dempsey prospect is located in bench gravels on the west side of the Chistochina River, about 0.2 miles downstream of the mouth of the Chisna River.

Access: Access to the Dempsey site is most practical by helicopter. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west or Chistochina on the Glenn Highway to the south.

History: The earliest mention of the Dempsey prospect is by Moffit (1909) who reports prospecting and ditch construction at the site. Moffitt (1912) reports a tunnel had been driven at the site and prospecting had occurred during the previous several years.

D. Duffy and others are reported to have held claims in the Dempsey area in 1959 (Alaska Kardex 068-75). F. and M. Heinz held claims in the area between 1981 and 1983 (Alaska Kardex 068-61).

ARDF Name / No.: Dempsey / MH355 **Alaska Kardex:** 068-61, 75

Production: None

Workings and Facilities: A collapsed tunnel is located at the site.

Geologic Setting: Thick bench deposits, composed mostly of outwash gravels, occur on the west side of the Chistochina River near Dempsey. They are reported to have yielded some fine gold (Moffit, 1911). Prospecting by tunnel did not reveal a definite paystreak (Moffit, 1912).

Bureau Investigation: Aerial reconnaissance by the BLM found evidence of what may be a collapsed tunnel in the gravel bench on the west side of the Chistochina River at N63.04916, W-144.85520. No ground follow-up was done.

Mineral Development Potential: Low

Conclusions: There was no production reported from this site and no sample results are available.

DAISY CREEK

Alternate Name(s):	Dempsey	**Map No:**	500
		MAS No:	0020680073
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NW1/4 Sec: 10, T22S, R15E
Meridian:	Fairbanks	Elevation:	3,050 feet
Latitude:	63.02678	Longitude:	-144.85491

Geographic: Daisy Creek is a 3.5-mile-long, southeast-flowing tributary of the Chistochina River that meets the river about 1 mile south of the historic settlement of Dempsey. Dempsey is marked in the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: Access to the Daisy Creek site is most practical by helicopter. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west or Chistochina on the Glenn Highway to the south.

History: The year of discovery of the Daisy Creek prospect is unknown, but in 1908, the site was being prospected (Moffit, 1909).

ARDF Name / No.: Daisy Creek / MH354 **Alaska Kardex:** 068-58

Production: Unknown

Workings and Facilities: Prospecting and ditch construction were reported on Daisy Creek, and a thawer and hydraulic plant were to be installed on the creek in1909 (Moffit 1909); however, no evidence of mining on the creek was noted by the BLM.

Geologic Setting: Daisy Creek cuts through a sequence of Quaternary glacio-fluvial deposits that were probably deposited by glacial activity in the Chistochina River valley. These bench gravels were reported to carry fine gold. Some of the bench gravels were reported to be frozen (Moffit, 1909). This occurrence is probably an extension of the gold-bearing bench gravels explored by a tunnel at the Dempsey prospect, 1.5 miles to the north (Ellis and others, 2004).

Bureau Investigation: The BLM's aerial and ground examination of Daisy Creek failed to find evidence of prospecting or mining on the creek. The stream bed contains numerous boulders. Test pans did not contain visible gold. A pan concentrate sample (10247) taken from under a boulder at the upper end of a point bar, 0.2 miles upstream from the mouth of the creek, did not contain visible gold. Analysis of the sample showed it was not anomalous in gold.

Mineral Development Potential: Low

Conclusions: Although none of the BLM's samples contained gold, additional testing of the bench gravels may identify a small resource.

RED BEAR

Alternate Name(s):		**Map No:**	503
		MAS No:	0020680091
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NE1/4 Sec: 29, T21S, R15E
Meridian:	Fairbanks	Elevation:	3,200 feet
Latitude:	63.06857	Longitude:	-144.90144

Geographic: The Red Bear placer occurrence is on a 1 mile-long, northeasterly flowing tributary of the Chistochina River, 1.7 miles upstream from its junction with the Chisna River.

Access: Access to the Red Bear site is most practical by helicopter. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west or Chistochina on the Glenn Highway to the south. The USGS Mt. Hayes A-2 quadrangle map shows a landing strip about half a mile southeast of the Red Bear drainage. The status of this airstrip is unknown.

History: Owners of claims in the Red Bear area in 1968 were Charles Monroe and Northland Mines (Alaska Kardex 068-104).

ARDF Name / No.: None **Alaska Kardex:** 068-104

Production: None

Workings and Facilities: Several test pits are located along the Red Bear stream valley. Mining evidence includes overgrown placer tailings adjacent to a 100–foot placer cut on the southeast side of the creek.

Geologic Setting: The tributary containing the Red Bear placer cuts through terraces on the margin of the Chistochina River, which are composed of poorly sorted glacial outwash gravel. Bedrock is not exposed in the creek bed, but hill '3,870' (shown on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map), 1.2 miles to the south-southeast, comprises Early Permian dacitic intrusive rocks with lesser amounts of andesite, rhyodacite, and diabase (Nokleberg and others, 1992b). Low bench gravels adjacent to the active stream are gold-bearing.

Bureau Investigation: The BLM took test pans from a 7-foot-thick section of low bench gravel in a test pit, 0.3 miles upstream from the Chistochina River that contained gold. At the same site, a placer sample collected from a 2-foot-thick section of boulder gravel in the lower part of the bench contained 0.005 oz/cy gold (sample 11301; Figure 65). The gold in the sample occurred as flat, slightly rounded flakes. A little more than a half of the gold was greater than + 40 mesh in size. The gravel contained moderate amounts of clay.

Mineral Development Potential: Low

Conclusions: There is an inferred resource of 4,060 cubic yards of low bench gravel, but observed gold values are low.

Figure 65. Poorly sorted fluvial gravels on Red Bear Creek.

CHISTOCHINA RIVER EAST TRIBUTARY

Alternate Name(s):		**Map No:**	504
		MAS No:	0020680387
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 21, T21S, R15E
Meridian:	Fairbanks	Elevation:	3,208 feet
Latitude:	63.07515	Longitude:	-144.88104

Geographic: The Chistochina River East Tributary is a 2.5-mile-long eastern tributary of the Chistochina River, 1.8 miles upstream from the mouth of the Chisna River.

Access: The site can be accessed from an airstrip at the mouth of Slate Creek, about 8 miles to the north, however, the airstrip is privately owned and prior permission must be attained before using. Access is easy by helicopter, with numerous nearby landing sites for light helicopters. Access is also possible via winter trails from either Paxson Lake on the Richardson Highway to the west or Chistochina on the Glenn Highway to the south.

History: The BLM could not locate any historical records for this site.

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A cabin sits near the mouth of the creek, and placer tailings are located just upstream and on the south side of the creek. It appears that a 600-foot stretch from the mouth, upstream on the present stream, and left limit bank may have been mined.

Geologic Setting: This unnamed creek drains exposures of the Early Permian to Middle Pennsylvanian Slana Spur Formation, which is composed of a thick sequence of marine volcaniclastic rocks and lesser volcanic sandstone, conglomerate, tuff, volcanic breccia and flows, and limestone. The volcanic rocks are generally dacite and lesser andesite, rhyodacite, and basalt (Nokleberg and others, 1992b).

Bedrock was not observed at the mine site. The lower part of the creek cuts through terraces composed of Quaternary cobble gravel, which appears to form a bench deposit along this part of the Chistochina and neighboring Chisna rivers. The base of these gravels, where resting on bedrock, were found to contain placer gold on the Chisna River. Fine placer gold distributed through this gravel has probably been concentrated by the present stream, forming the placer deposit. Bench gravels of possibly similar composition, 2.5 miles down-river at Dempsey (Map no. 498), have been prospected for placer gold (Moffit, 1912).

Bureau Investigation: The BLM took five test pans from bank-run gravel on the south side of the creek near the placer workings. These pans produced only one very fine gold flake. Two pans taken from the present stream bed near the creek mouth contained four fine and one very fine, flat gold flakes (sample 10413). The creek bottom at this point is about 100 feet wide.

Mineral Development Potential: Low

Conclusions: The present stream bottom, where the most placer gold was found, has been extensively worked, and only minor resources remain.

ALDER CREEK

Alternate Name(s):	Little Daisy Claims	Map No:	506
		MAS No:	0020680394
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	SE1/4 Sec: 24, T21S, R13E
Meridian:	Fairbanks	Elevation:	3,400 feet
Latitude:	63.09223	Longitude:	-145.19942

Geographic: Alder Creek is a 3-mile-long southeast tributary of the Gakona River, approximately 2.5 miles downstream from the terminus of the Gakona Glacier. The creek is not named on the 1963, USGS, Mt. Hayes, A-3, topographic map. The creek drains Alder Lake, which is shown in this map.

Access: Access to the Alder Creek site is most practical by helicopter.

History: Sluice operations may have taken place in the 1930’s to 1940’s and suction dredging during the 1970’s. In 1971, Weldon Appelt staked the Little Daisy claims on Weldon and Houston creeks, which drain into Alder Creek. Appelt is listed as and agent for Northland Mines (Chitina Recording District, Book 9 Lode, p. 408, 9/22/1971). The BLM found no records of the mining activity that occurred on Alder Creek.

ARDF Name / No.: None **Alaska Kardex:** None

Production: Unknown

Workings and Facilities: A 500-foot length of the active stream bed has been mined at the Alder Creek Mine. In addition there has been some limited mining of the low bench gravel on the west side of the creek. The remains of an 8- to 10-inch suction dredge and placer tailings are located on the east side of the creek. Test pits are scattered along the low bench gravel on the west side of the creek. The remains of a tent camp are located about 200 feet upstream from the suction dredge and placer tailings on the west side of the creek.

Geologic Setting: Bedrock is not exposed in Alder Creek; however, Cretaceous to Late Jurassic granitic plutonic rocks are exposed on hill ‘4810’ (shown on the USGS, Mt. Hayes, A-3, topographic map) 2.8 miles to the south (Nokleberg and others, 1992b). The high terraces on both sides of the creek are composed of glacial outwash gravel. Down cutting by Alder Creek has probably concentrated placer gold disseminated throughout the terrace gravel. Meandering of the stream has resulted in the formation of low bench gravel on the west side of the stream valley in the vicinity of the placer occurrence.

Bureau Investigation: The BLM took a placer sample (11300) from the upper 3 feet of a 6-foot-thick section of low bench, poorly sorted cobble-boulder gravel, containing boulders up to 3 feet in diameter. The sample contained abundant magnetite with pieces up to a quarter inch in size. The sample contained 0.0018 oz/cy gold. A visual count showed one fine and four very fine gold colors. The gold was rough and flakey. The sample site is located at the northern end of a 1,000-foot-long area of low bench gravel on the west side of the creek.

Mineral Development Potential: Low

Conclusions: There is an inferred resource of 10,600 cubic yards of low bench gravel on the west side of the creek. However, there is little potential for additional placer mining at the Alder Creek Mine, as all BLM samples returned low gold values. Further testing of the low bench gravel on the west side of Alder Creek could identify additional gold-bearing material.

GUNN CREEK

Alternate Name(s):		Map No:	510
		MAS No:	0020680066
Deposit Type:	Placer	Commodities:	Au, Ag, W
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	SE1/4 Sec: 33, T20S, R12E
Meridian:	Fairbanks	Elevation:	3,400 feet
Latitude:	63.13226	Longitude:	-145.45090

Geographic: Gunn Creek drains a series of peaks 5 miles west of the Gakona Glacier and continues for 10 miles until it flows into the north end of Summit Lake.

Access: The mouth of Gunn Creek can be accessed from the Richardson Highway. A rough ATV trail runs up the creek for several miles. Access to the upper reaches of the creek is most practical by helicopter.

History: Glenn Heatherly staked the first known claims on Gunn Creek in 1969, and held them for 3 years (Alaska Kardex 068-122).

ARDF Name / No.: Gunn Creek / MH240 **Alaska Kardex:** 068-122

Production: Unknown

Workings and Facilities: A discontinuous trail runs along the north bank of Gunn Creek roughly 4 miles upstream from Summit Lake. A pile of claim posts was found in the vicinity of this trail about 3.5 miles upstream from the Richardson Highway.

Geologic Setting: Gunn Creek is located north of the Eureka Creek fault and south of the Slate Creek fault. The series of high peaks in the uppermost headwaters of the creek lie north of the Slate Creek fault. They comprise early Tertiary(?) to Late Jurassic granite to granodiorite and a mid to late Tertiary unit consisting of sandstone, conglomerate, and volcanic deposits, including rhyodacite flows, rhyodacite ash, rhyodacite and dacite tuff, dikes, and sills. About 4 miles upstream from Summit Lake, the creek cuts a 2-mile-long gorge through another occurrence of the Tertiary to Late Jurassic granite to granodiorite (Nokleberg and others, 1990).

Placer gold, scheelite, and sphalerite were identified in a pan concentrate collected on Gunn Creek, about 1.3 miles upstream from the Richardson Highway (Rose and Saunders, 1965). This gold may be coming from placer gold disseminated in glacial till deposits occurring on the margins of the Gulkana River Valley. Another possible source could be the intrusive rocks cut by the creek 3.5 miles upstream from the Richardson Highway (Rose and Saunders, 1965).

Bureau Investigation: The BLM investigated two sites on Gunn Creek. The first site is located in the headwaters at 4,260 feet, near a prominent fork in the creek. Much of the float, including many large boulders, is of granitic composition, though material of basaltic composition was also noted. A pan concentrate sample (10419) was collected from this site after five other test pans taken from the creek bed showed no gold but a considerable quantity of black sand. Analysis showed the sample to contain 58 ppb gold and less than 10 ppm tungsten.

The second site is located in a gorge at an elevation of 3,441 feet about 4 miles upstream from Summit Lake. This location is 2.5 miles upstream from a reported geochemical anomaly where a pan concentrate contained magnetite, chromite, ilmenite, scheelite, gold, and sphalerite (Rose and Saunders, 1965). In this area, Gunn Creek cuts through an early Tertiary(?) to Late Jurassic(?) granitic stock (Nokleberg and others, 1992b). Granite and monzonite bedrock was observed along the 200- to 300-foot-high canyon walls, though bedrock was not found in the creek bottom. Large boulders are absent in this area, and the creek meanders around distinct gravel point bars. A pan concentrate (sample 10420) was taken after three other test pans taken from the gravel point bars resulted in moderate black sand but no gold. Analysis showed the sample to contain 14 ppb gold and less than 10 ppm tungsten. A lack of gold in pans at this site does not support the possibility of an intrusive rock source for the gold found downstream.

Mineral Development Potential: Low

Conclusions: The lack of gold in test pans indicates there is low development potential for this site. Additional pan concentrate samples collected closer to the previously reported geochemical anomaly may have better results.

DAN CREEK

Alternate Name(s):		**Map No:**	515
		MAS No:	0020680062
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NW1/4 Sec: 19, T20S, R11E
Meridian:	Fairbanks	Elevation:	3,300 feet
Latitude:	63.17111	Longitude:	-145.52914

Geographic: Dan Creek drains a series of hills south-southeast of the Gulkana Glacier and continues for 2.1 miles until it flows into Gunn Creek. The confluence of Dan and Gunn creeks forms the Dan Creek placer location.

Access: The site can be accessed via the Richardson Highway and lies approximately 0.8 miles from the north end of Summit Lake along the ancestral Gulkana River plain.

History: The Dan Creek site was staked in 1953 by H. E. Buzby. According to State of Alaska records up to 12 claims covered the site and were active until 1975 (Alaska Kardex 068-42).

ARDF Name / No.: None

Alaska Kardex: 068-42

Production: None

Workings and Facilities: None

Geologic Setting: The series of low peaks in the uppermost headwaters of Dan Creek lie to the northeast of the Gulkana River floodplain. The low peaks comprise early Tertiary(?) to Late Jurassic granite to granodiorite and a mid to late Tertiary unit consisting of sandstone, conglomerate, and volcanic deposits, including rhyodacite flows, rhyodacite ash, rhyodacite and dacite tuff, dikes, and sills (Nokleberg and others, 1990).

Bureau Investigation: The BLM investigated and sampled two sites, one on Dan Creek at its confluence with Gunn Creek (sample 10554), and the other to the southwest along Gunn Creek (sample 10113). The pan concentrate samples were taken from the creek beds and showed no gold, but a moderate quantity of black sand. An additional pan concentrate sample was obtained to the north-northeast along the ancestral Gulkana River plain, approximately 0.2 miles south of the Richardson Monument. Again, no gold was seen in the sample, but it had a moderate quantity of black sand.

Mineral Development Potential: Low

Conclusions: Mineralization appears to be insufficient in quantity for a profitable small- or medium-scale mining operation.

GULKANA RIVER EAST TRIBUTARY

Alternate Name(s):	Hoodoo Creek, Richardson Monument Placer	Map No:	528
		MAS No:	0020680064
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	N1/2 Sec: 04, T20S, R12E
Meridian:	Fairbanks	Elevation:	4,100 feet
Latitude:	63.21892	Longitude:	-145.43617

Geographic: The Gulkana River East Tributary occurrence is located along a1 mile stretch of an unnamed eastern tributary of the Gulkana River. It is situated immediately south of the Hoodoos, which are a series of low hills and ridges marked on the USGS, Mt. Hayes, A-3, 1:63,360-scale, topographic map. Hoodoo Creek is an unofficial name for this creek.

Access: Access to the site can be gained by a 4-mile dirt road, which branches off the Richardson Highway several hundred feet south of the Richardson Monument. A narrow, four-wheel-drive trail leads up Hoodoo Creek for approximately 1.5 miles.

History: N. Hammond and R. Timroth are listed as the first owners of the Sunny Jim Association claims at the Gulkana River East Tributary site in 1956 (Alaska Kardex 068-70). The claims were owned by Paul Scott from 1958 through 1972 (Alaska Kardex 068-73) and then by Janette Calton in 1973 (Alaska Kardex 068-70). John Lund owned the claims from 1974 through 2004, except in 1982, when the owners were Tran M. Jones and Koyla Hatfield (Alaska Kardex 068-153).

ARDF Name / No.: None **Alaska Kardex:** 068-70, 73, 153

Production: Unknown

Workings and Facilities: Test pits were found at 0.44 and 0.75 miles upstream from the Gulkana River, but no evidence of actual mining was observed. A few planks, located 1.2 miles upstream from the Gulkana River, may be the site of the cabin shown on the USGS, Mt. Hayes, A-3 topographic map.

Geologic Setting: Limestone, volcaniclastic sediments, and dacite and andesite of the Permian to Pennsylvanian Slana Spur Formation dominate near the toe of the Gulkana Glacier, which is 2 miles north of the mouth of Hoodoo Creek (Nokleberg and others, 1990). A small, folded section of the Permian Eagle Creek Formation exists in the Hoodoos area as steeply dipping beds of bioclastic limestone and black argillite, which strike northward. Folded Tertiary deposits of interbedded conglomerate, sandstone, gray siltstone and claystone, and rhyodacitic to rhyolitic ash can be found at several locations in the headwaters of Hoodoo Creek. Some of the siltstone and claystone is reported to contain fragments of carbonized wood and organic matter (Bond, 1976).

Lower Hoodoo Creek cuts through glacial till, which blankets the lower slopes of all the mountains along the edge of the Gulkana River valley. Hoodoo Creek has carved a wide, shallow gulch through the glacial material and subsequently deposited a 6- to 8-foot-thick by 100- to 150-foot-wide by 1/8 mile-long stream terrace in the lower drainage, though it does not appear to rest on bedrock. Glacial outwash material on the margins of the stream valley may contain finely disseminated placer gold. Downcutting by the stream through these deposits has probably reworked and concentrated the gold in the active stream bed. Tertiary deposits, consisting of interbedded conglomerate, sandstone, and siltstone containing carbonized wood, are exposed along the north side of the creek, 1.5 miles upstream from the Gulkana River.

Bureau Investigation: The BLM collected four test pans from the modern stream bed just above the alluvial fan at the mouth of the creek. The pans contained a total of one fine and six very fine gold flakes (sample 10448). Pans from two test pits 0.44 and 0.75 miles upstream from the Gulkana River averaged one very fine gold flake. Test pans were taken 0.8 miles upstream from the modern streambed and also from the upper end of the 1/8-mile-long stream terrace that runs along the north side of the creek. Two pans from the streambed contained only one very fine flake of gold. Four pans collected from underneath boulders in the terrace produced a total of four very fine flakes of gold (sample 10505). A sample collected off sandstone bedrock, 1.5 miles upstream from the Gulkana River, contained one fine gold flake (sample 10255). Analysis showed the sample to contain 5.5 ppm gold.

Mineral Development Potential: Low

Conclusions: Examination showed that, although test pits had been excavated along the active streambed, no evidence of mining was found. A lack of bedrock exposures on the lower stream and poor results from test pans indicate that the stream has low potential for placer gold

PHELAN CREEK (UPPER)

Alternate Name(s):	Gulkana River	Map No:	530
		MAS No:	0020680063
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	E1/2 Sec: 32, T19S, R12E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.22358	Longitude:	-145.48661

Geographic: Phelan Creek is a 17-mile-long tributary to the Delta River. Its headwaters are near the foot of the Gulkana Glacier. The Phelan Creek (Upper) placer occurrence is situated in the upper mile of Phelan Creek below the mouth of College Creek.

Access: The upper stretch of Phelan Creek can be accessed by a 4-mile gravel road that joins the Richardson Highway several hundred feet south of the Richardson Monument.

History: Claims in the area or upper Phelan Creek have been active from the late 1950's into the 1990's. In 1958 Norman Hammond and Ron Timreth were the owners of claims near upper Phelan Creek (Alaska Kardex 068-70). G. Moore and J. Petitjean are listed as owners of claims in the area in 1960 (Alaska Kardex 068-77). In 1973 Janette Calton (Alaska Kardex 068-70) and in 1974 Tom Calton (Alaska Kardex 068-158) owned claims along upper Phelan Creek. In 1985, the owner was Joseph Taylor (Freeman, 1985), who, with W. Blasingame, staked claims in the area in 1979. Claims in the area remained active until 1995 (Alaska Kardex 068-157).

ARDF Name / No.: Phelan Creek / MH239 **Alaska Kardex:** 068-70, 77, 157, 158, 287

Production: Unknown

Workings and Facilities: The remains of a placer processing plant and camp buildings are located on the east side of Phelan Creek, 0.6 miles below College Creek. Test pits are scattered across the Phelan Creek-Gulkana River outwash plain for at least another 0.5 miles.

Geologic Setting: The Gulkana Glacier, at the headwaters of Phelan Creek, cuts Permian to Pennsylvanian volcanic, clastic, and carbonate rocks of the Slana Spur Formation that have been intruded by Mississippian(?) to Cretaceous granitic and gabbroic rocks (Nokleberg and others, 1992b). South of College Creek, Phelan Creek and the Gulkana River flow within a broad outwash plain that is up to 0.4 miles wide. The present channel of Phelan Creek flows along the west side of this plain. Outwash gravels on upper Phelan Creek below the Gulkana Glacier are reported to contain placer gold, tin, and platinum (Freeman, 1985).

A total of 10 bulk bank run gravel samples of unknown size were collected from the Phelan Creek placer in late 1979. It was calculated that the samples contained an average of $9.25 (0.028 ounces gold) per cubic yard. No values were assigned for tin or platinum group elements (Freeman, 1985).

A 500-cubic yard test run of bank run gravel was made using a sluice box on Phelan Creek in 1981. The total amount of free gold recovered is unknown. However it was estimated that the combined magnetic and nonmagnetic fractions averaged 0.155 oz/cy gold. Over 98 percent of the contained metal is derived from the nonmagnetic fraction of the gravel concentrates (Freeman, 1985).

A sample of nonmagnetic concentrate from the occurrence was composed mainly of pyrite with minor amounts of cinnabar, scheelite, bismuthinite, cassiterite, and galena. Trace amounts of tellurobismuthinite and mercury-gold amalgam were also noted in the sample. A fire assay showed the concentrate to contain 11.9 oz/ton gold. Gold particles, viewed under magnification, exhibited only moderate to minor amounts of wear. Wire and dendritic textures were observed, indicating a possible nearby source for the gold (Freeman, 1985).

A 1.0 ounce sample was crushed to -200 mesh and concentrated by spiral concentrator. Analysis by fire assay showed the concentrate to contain 32.27 oz/ton gold. It did not appear that a significant portion of the gold was contained in the crystal lattice of the pyrite. Concentration by spirals proved to be the best recovery method for fine gold at upper Phelan Creek (Freeman, 1985).

Platinum has been detected in two separate analyses of concentrates from Phelan Creek. The nonmagnetic fraction of one concentrate contained 3.6 oz/ton platinum. The nonmagnetic fraction from the 500-cubic yard test run was found to contain four (up to 935 micron) beads, exhibiting an alligator-skin like texture characteristic of platinum group metals in concentrations of 10 gold to 1 platinum group elements (Freeman, 1985). Sampling by the U.S. Bureau of Mines also detected PGE in the Phelan Creek gravels. Placer samples from Phelan Creek are reported to contain up to 760 ppb platinum (Foley and others, 1989). Freeman (1985) suggests the source of the platinum is the numerous small dismembered ultramafic bodies that have been tectonically emplaced along the Slate Creek fault (Freeman, 1985).

A magnetic concentrate sample contained 0.57 percent tin. However, no cassiterite was observed in the concentrate. It did contain abundant garnet, which could be derived from a tin-tungsten skarn. Cassiterite was detected in the nonmagnetic fraction of the concentrate (Freeman, 1985).

Bureau Investigation: The BLM took test pans near the placer processing plant that contained moderate amounts of magnetite, but no visible gold. A pan concentrate sample (10257) collected at the site contained 49 ppb gold. A series of pans were collected from test pits and outwash gravels between College and Gulkana River East Trib creeks (Map no. 528). None of the samples contained visible gold. Sample 10447, with abundant black sand, was collected from a test pit on the Phelan Creek-Gulkana River floodplain. It contained 340 ppb gold. This sample was collected near the mouth of Gulkana River East Trib placer (Map no. 528), and it is possible that the gold may be from that source. Significant amounts of platinum were not detected in any of the samples. The samples were not analyzed for tin.

Mineral Development Potential: Low

Conclusions: Freeman (1985) suggested it may be possible to produce a gold-bearing pyrite concentrate from the Phelan Creek (Upper) gravels that could be processed by cyanide leach methods or shipped directly to a smelter for gold recovery.

Visible gold was not found in any test pans collected by the BLM.

There is an inferred(?) resource of 10,164,000 cubic yards containing 284,592 ounces gold. This would represent an average grade of 0.028 oz/cy gold (Freeman, 1985).

EUREKA CREEK

Alternate Name(s):		Map No:	538
		MAS No:	0020680383
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 22, T19S, R10E
Meridian:	Fairbanks	Elevation:	2,650 feet
Latitude:	63.25026	Longitude:	-145.80565

Geographic: Eureka Creek is a 20-mile-long, generally east-flowing tributary to the Delta River, with headwaters at Eureka Glacier. The creek flows through a gorge with 400- to 500-foot walls for about 4.5 miles before its confluence with the Delta River, which is 2 miles south of the mouth of Rainy Creek. Placer gold has been found on gravel bars located along the lower section of the creek.

Access: Access to the Eureka Creek site is most practical by helicopter.

History: Little is known of the early history of the Eureka Creek placer, but the area was known as the Eureka Mining District from 1901 until 1910 (Moffit, 1912). From 1970 to 1974, the owners were R. W. Krebs and Hoyt Moss. A number of owners (11) are listed as owning claims at the mouth of Eureka Creek in 1970 (Alaska Kardex 068-127). Some of these people were associated with the Miller Mine and Mt. Si project (Map no. 265, p. 295).

ARDF Name / No.: None

Alaska Kardex: 068-37, 127

Production: Moffit (1912) reports a small amount of production from Eureka Creek between about 1900 and 1910.

Workings and Facilities: None

Geologic Setting: Eureka Creek is fed by the Eureka Glacier and other minor tributaries, mainly from the north. It flows for about half of its length over Quaternary deposits. The creek closely follows, though mostly remains north of, the southeast-trending Eureka Creek fault for the majority of its length. This places Eureka Creek in the Slana River subterrane of the Wrangellia terrane. An exception is a 2-mile stretch where the creek crosses the fault and flows over cumulate ultramafics of the Tangle subterrane of the Wrangellia terrane. The final 4.5 miles of the creek's course cuts through a narrow, steep-sided canyon, exposing the Early Permian Eagle Creek Formation. This formation consists of argillite, chert-bearing limestone, and volcanic graywacke. In some areas, this formation has been metamorphosed to the lower greenschist facies (Nokleberg and others, 1990). The channel widens considerably along the last 0.5 miles of the creek before it joins the Delta River and is divided into multiple channels by gravel bars.

Bureau Investigation: The BLM took test pans from gravel bars in the Eureka Creek floodplain at 0.5 miles and 0.1 miles upstream from the Eureka Creek confluence with the Delta River. Fine gold was found at both sites. At 0.1 miles upstream, a pan concentrate sample (10518) contained five very fine flakes of flat gold and abundant black sand. On the south bank of Eureka creek, a test pan was taken from a 100-foot-high bluff composed of semi-consolidated gravel interbedded with sand, silt and pebble layers. The concentrating effort resulted in very little black sand and no visible gold.

Mineral Development Potential: Low

Conclusions: Although some gold resources may remain at this site, mining would be very difficult due to the narrowness of the gorge that extends upstream from the confluence of Eureka Creek and the Delta River.

DELTA RIVER

Alternate Name(s):	Delta River Placer	**Map No:**	539
		MAS No:	0020680049
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	E1/2 Sec: 27, T19S, R10E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.24013	Longitude:	-145.79296

Geographic: The Delta River flows north from Tangle Lakes and joins the Tanana River at Big Delta. Placer mining activity on the Delta River, at the site referred to here, occurred near the mouth of Eureka creek and within 2 miles upstream on the Delta River.

Access: Access to the Delta River can be gained from the Richardson Highway, north of Mile 212. However, there is no road access to the Eureka Creek area, which are located about 5 miles south of Richardson Highway Mile 212. One can put a small watercraft in at the Tangle Lakes and float to the Delta River placer site, but even this requires some portaging. The most practical access is by helicopter.

History: There has been sporadic mining or prospecting on the Delta River since discovery of gold there in 1900 (Mendenhall, 1905). In general, the early reports state that only minor amounts have been located and though encouraging, quantities have been insufficient to support commercial operations (Mendenhall, 1905; Moffit, 1912). Cobb (1972b) reports mining on the east side of the Delta River in 1946, but states activity there ceased within 2 years. A problem with the early reports of mining on the Delta River is that there is little information on where on the river the mining took place. Most is assumed to have occurred from about the mouth of Garrett Creek (Map no. 540) to 1 or 2 miles below the mouth of Phelan Creek (Phelan Creek (Lower), Map no. 263).

R. Krebs, along with various partners, maintained claims on the Delta River about 1 mile upstream of the mouth of Eureka Creek between 1967 and 1987 (Alaska Kardex 068-128; 156). Some of these claims may have been in the Broxson Gulch area.

ARDF Name / No.: Delta River / MH180 **Alaska Kardex:** 068-127, 128, 156

Production: Unknown

Workings and Facilities: None

Geologic Setting: The upper headwaters of the Delta River drain the flood basalts of the Nikolai Greenstone and the dunites and wehrlites of the Fish Lake mafic-ultramafic complex. The Nikolai Greenstone is found in the peaks of the Amphitheatre Mountains, whereas the mafic-ultramafic rocks crop out on a series of lower hills several miles to the north, in the vicinity of Fish Lake. A significant feature of the Amphitheatre Mountains west of the Delta

River is the Amphitheatre Syncline, which trends west-northwest-east-southeast and plunges northwesterly (Stout, 1976). The string of hills to the north, exposing ultramafic rocks, is roughly parallel to the Eureka Creek fault, which trends northwest-southeast. Based on lithogeochemical studies, it has been hypothesized that the ultramafic rocks of the Fish Lake complex are co-magmatic with the Nikolai basalt. The Tangle, Eureka, Rainy, and Canwell complexes, which are other ultramafic bodies located in the region, are also thought to be associated with the Nikolai flood basalts (Hinderman, 2001; Ellis and others, 2004).

Near the mouths of Garrett and Eureka creeks the Delta River runs through a broad open valley up to half a mile wide. Low bench gravels are found on both sides of the river.

Bureau Investigation: No indications of prospecting or mining were observed at the site located on the east side of the Delta River and approximately 1 mile upstream from Eureka Creek. A 2-pan sample (11309) of low bench gravel, taken 35 feet back from the river edge, did not contain visible gold. In addition, the sample was not anomalous in gold.

Mineral Development Potential: Low

Conclusions: Low development potential due to lack of gold in test pans.

DELTA RIVER-GARRETT CREEK

Alternate Name(s):		**Map No:**	540
		MAS No:	0020680393
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NW1/4 Sec: 10, T20S, R10E
Meridian:	Fairbanks	Elevation:	2,750 feet
Latitude:	63.20105	Longitude:	-145.81575

Geographic: This site is located near the junction of Garrett Creek with the Delta River. The headwaters of Garrett Creek are near the south end of Fielding Lake and the northeast side of Sugarloaf Mountain.

Access: River access to the Delta River-Garrett Creek area can be gained from the Richardson Highway north of Mile 212; however, there is no road access to the Garrett Creek area, which is located about 8.5 miles south of highway Mile 212. One can put a small watercraft in at the Tangle Lakes and float to the Delta River-Garrett Creek placer site, but even this requires some portaging. The most practical access is by helicopter.

The stretch of the Delta River that includes the Delta River-Garrett Creek occurrence has been designated as wild and scenic. This designation precludes the staking of mining claims.

History: Mendenhall (1905) reports the discovery of gold in the Delta River area in 1900. Moffit (1912) reported that gold was being panned from Delta River gravels near Garrett Creek starting in 1910. In 1967, Kreb's Mining Co. held claims in the area as well as farther downstream toward the mouth of Eureka Creek (Map no. 539). These claims are reported to have been active until 1995. They were initially held by Robert and Patricia Krebs and partners and subsequently by five other owners (Alaska Kardex 068-156). Claims in the area were also held by the C.L.M Mining Co. in 1973 (Alaska Kardex 068-155).

ARDF Name / No.: Delta River / MH180 **Alaska Kardex:** 068-128, 155, 156

Production: None

Workings and Facilities: Garrett's cabin, which is mentioned in older literature and is marked on the USGS, Mt. Hayes, A-4, 1:63,360-scale, topographic map as being located slightly upstream from the mouth of Garrett creek, could not be found and is assumed to no longer exist. No other workings or facilities were observed in the vicinity of Garrett Creek.

Geologic Setting: The headwaters of the Delta River drain the flood basalts of the Nikolai Greenstone and the dunites and wehrlites of the Fish Lake complex. The Nikolai Greenstone is found in the peaks of the Amphitheatre Mountains, whereas the ultramafic rocks crop out on a series of lower hills several miles to the north, in the vicinity of Fish Lake. Based on lithogeochemical studies, it has been hypothesized that the ultramafic rocks of the Fish Lake complex are co-magmatic with the Nikolai basalt (Nokleberg and others, 1992b; Bill Ellis, personal communication, 2002).

With the exception of a gorge cut through Nikolai Greenstone about 2 miles north of Long Tangle Lake, the Delta River flows over Quaternary glacial deposits upstream of the Delta River-Garrett Creek occurrence (Nokleberg and others, 1990). Members of the USGS panned gold from the Delta River in 1910 at the mouth of Garrett Creek (Moffit, 1912). Garrett Creek also has its headwaters in the Nikolai Greenstone, although it flows for most of its length over Quaternary sediments. Glaciofluvial deposits on the margins of the Delta River valley may contain disseminated placer gold that has been reconcentrated along Garrett Creek and occurs as flood gold on the gravel bars of the Delta River.

Bureau Investigation: The BLM collected a pan concentrate sample (10416) from gravels in the bed of Garrett Creek 500 feet upstream from its confluence with the Delta River. One very fine flake of gold was visible in this sample. Analysis showed the sample to contain 985 ppb gold.

Several test pans were taken and a second pan concentrate sample (10417) was collected from the upstream edge of a gravel point bar in the bed of the Delta River. Two very fine flakes of gold were observed in this sample; analysis showed it to contain 1.6 ppm gold. This location is about 200 feet downstream from where Garrett Creek joins the Delta River.

Mineral Development Potential: Low

Conclusions: Mineral development potential is low at this site due to the small quantity of gold and difficulty in mining river bars. The stretch of the Delta River above and below the mouth of Garrett Creek has also been designated as wild and scenic; a status that precludes claim staking.

MACLAREN RIVER (EAST FORK)

Alternate Name(s):		Map No:	572
		MAS No:	0020680169
Deposit Type:	Placer	**Commodities:**	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 18, T19S, R07E
Meridian:	Fairbanks	Elevation:	3,050 feet
Latitude:	63.26753	Longitude:	-146.48746

Geographic: The east fork is a 4-mile-long eastern tributary of the Maclaren River. The drainage intersects the river 10 miles upstream from the Denali Highway. Claims staked on the Maclaren River (East Fork) occurrence at one time covered the entire 4-mile length of the stream (Talkeetna Recording District, Book 79, page 391).

Access: Access to the Maclaren River East Fork site is most practical by helicopter. Ground access is via a 10-mile-long bulldozer trail off the Denali Highway.

History: The earliest record of claim staking in the Maclaren River (East Fork) area was in 1954, when E. Albertson and E. Pettyjohn staked some claims (Alaska Kardex 068-05). Subsequent claims were staked in the area in 1979 by R. Wilks and B. Nealy and by E. Huxel and W. Hiber in 1981. They completed testing of the claims with a backhoe and suction dredge in 1981, 1985, and 1986 (Alaska Kardex 068-206; unpublished BLM field notes).

ARDF Name / No.: East Fork Maclaren River / MH097 **Alaska Kardex:** 068-05, 206

Production: None

Workings and Facilities: There are some test pits along the lower part of the drainage.

Geologic Setting: The upper part of the east fork of the Maclaren River cuts through a mantle of unconsolidated glacial deposits overlying bedrock. Bedrock exposures in the upper part of the drainage include tuffs and agglomerate interlayered with tuffaceous sediments and black shale. The lower 1.5 miles of the drainage exposes basalts, recrystallized locally to greenstone (Stout, 1976). Placer gold disseminated within the glacial deposits has probably been reworked and reconcentrated on bedrock in the active streambed of the east fork. The source of the platinum in one placer sample could be the ultramafic rocks exposed west of the Eureka Glacier.

Bureau Investigation: As part of the adjacent Valdez Creek Mining District study, the U.S. Bureau of Mines collected test pans and placer samples at several locations along the lower 3.5 miles of the east fork of the Maclaren River. A placer sample collected 3.5 miles upstream from the Maclaren River contained 0.0005 oz/cy gold. Visual inspection showed the sample to contain one coarse, three fine, and 100 to 150 very fine gold flakes. A second placer sample, collected 0.7 miles upstream from the Maclaren River, contained 0.0019 oz/cy gold. Visual inspection showed the sample to contain five fine and 30 very fine gold flakes. A third placer sample, collected 2.6 miles upstream from the Maclaren River, did not contain recoverable gold, but analysis of the sample showed it to contain 40 ppb platinum.

A pan concentrate sample collected by the BLM from under and around boulders resting on bedrock about 1.5 miles upstream from the mouth of the creek contained 5.14 ppm gold and 28 ppb platinum (sample 10423).

Mineral Development Potential: Low

Conclusions: Although gold values were relatively low in placer samples, bedrock depressions could be tested as potential sites for suction dredging.

BOULDER CREEK

Alternate Name(s):	7-Mile Discovery	Map No:	583
		MAS No:	0020680042
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-5	TRS:	SW1/4 Sec: 17, T20S, R07E
Meridian:	Fairbanks	Elevation:	3,300 feet
Latitude:	63.18143	Longitude:	-146.44922

Geographic: Boulder Creek is an east-northeast tributary to the Maclaren River. Its mouth is about 1 mile upstream of where the Denali Highway crosses the Maclaren River. The occurrence is about 2 to 3 miles above the mouth of the creek, upstream of where the creek flows into the Maclaren River valley.

Access: Ground access to the Boulder Creek site is via an ATV trail that is parallel to the Maclaren River and Boulder Creek. Alternate access to the site is possible by helicopter.

History: The first recorded evidence of the occurrence on Boulder Creek is by M.H. Borrago and F.S. Pettyjohn in 1978. M. Borrago acquired all the claims in late 1978. He is listed as the owner through 1986, but was active on the claims only until 1981 (Alaska Kardex 068-198).

ARDF Name / No.: Boulder Creek (Seven Mile Claims) / MH074
Alaska Kardex: 068-198

Production: None

Workings and Facilities: None

Geologic Setting: Boulder Creek is located in an area of amygdaloidal basalt, metabasalt, and andesite with interbedded siliceous tuffs and volcaniclastic rocks of the Triassic Nikolai Greenstone (Stout, 1976; Nokleberg and others, 1992b). These rocks were subsequently covered by largely unconsolidated moraine and glacial till of Quaternary age.

Bureau Investigation: The BLM took test pans from modern stream gravels and a terrace along the right limit of Boulder Creek. Bedrock is not present in the creek bottom, which measures greater than 20 feet across, so gravel was dug from under boulders in the stream bed and under vegetation on the terrace. The sample contained approximately 1 percent magnetite, but no gold was observed. Analysis of the sample showed gold values to be low (10564). Additional pan concentrate samples from the site also returned low gold values (samples 10634, 10698, 11013).

Mineral Development Potential: Low

Conclusions: Mineralization appears to be insufficient in quantity for a profitable small- or medium-scale mining operation.

ONE-MILE CREEK

Alternate Name(s):	Bear Creek, Gulkana River – Paxson	Map No:	636
		MAS No:	0020680099
Deposit Type:	Placer	Commodities:	Au, Ag
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	S1/2 Sec: 08, T22S, R12E
Meridian:	Fairbanks	Elevation:	2,707 feet
Latitude:	63.01915	Longitude:	-145.48710

Geographic: One-Mile Creek is a 2-mile-long, west-flowing tributary to the Gulkana River, 1.1 miles south of Paxson on the Richardson Highway. The creek is not named on the USGS, Mt. Hayes, A-3, 1:63,360-scale, topographic map.

Access: The One-Mile Creek occurrence can be accessed from the adjacent Richardson Highway.

History: J. Schandelmeier staked at least one claim on the One-Mile Creek occurrence in 1978. The claim was active through 1981 (Alaska Kardex 068-194).

ARDF Name / No.: None **Alaska Kardex:** 068-194

Production: None

Workings and Facilities: Some old test pits were found along the creek, a short distance upstream from the Richardson Highway bridge. No evidence was found of a cabin shown on the Mt. Hayes, A-3 topographic map as being about 2 miles up the creek.

Geologic Setting: No bedrock is exposed in the lower part of One-Mile Creek. The creek drains the western slope of Wolverine Mountain, which is composed of Triassic Nikolai Greenstone (Nokleberg and others, 1991). The lower part of the creek cuts through bench gravels, deposited by the ancestral Gulkana River, which probably contain disseminated placer gold. The gold is probably being reconcentrated through down cutting by the present stream through these terrace gravels.

Bureau Investigation: The BLM traversed up the southeast and northeast forks of the creek. Four test pans taken from a 30-foot-high bluff along the creek, composed of clayey pebble gravel, 0.25 miles upstream from the road on the southeast fork, contained 3 very fine gold flakes (sample 10500). Analysis showed the sample to contain 230 ppb gold. A pan from the active stream nearby did not contain any gold.

Three pans taken from the active stream on the northeast fork, 0.2 miles upstream from the Richardson Highway contained 4 very fine gold flakes (sample 10501). Analysis showed the sample to contain 5 ppm gold. A pan of gravel from a 10-foot-high bluff on the south side of the creek, 0.1 miles upstream from the highway, contained one very fine gold flake. A small test pit is located on the south side of the creek near this site.

Two test pans were taken from the active streambed on One-Mile Creek, just downstream from the highway bridge (samples 10119, 10206). Analysis of the samples showed they do not contain anomalous amounts of gold.

Mineral Development Potential: Low

Conclusions: The BLM has determined that the One-Mile Creek site has a low mineral development potential due to low gold values in test pans.

Other Deposit Types

There are numerous mineral occurrences in the Delta River study area that are not one of the deposit types included in the preceding sections. Additional deposit types include both copper and molybdenum porphyries, basaltic copper, and polymetallic vein. A few occurrences are described below that represent the only example of its type currently known in the study area. These include pluton-hosted gold, replacement, and pegmatite.

The porphyry occurrences have attracted some exploration attention in the past, probably because of their potential for large tonnages. The Ptarmigan porphyry molybdenum prospect (Map no. 9) is in the northeast part of the study area and is now part of Fort Greely. This site was active in the 1910's and 1930's, before Fort Greely was established and closed the area to mineral entry.

The other porphyry occurrences in the district contain copper; all are on the south side of the Alaska Range in the study area. One site, the Ghezzi prospect (Map no. 199) was drilled in the 1960's. Another, the Coppertone prospect (Map no. 452) received quite a bit of exploration attention in the 1970's to 1980's. The other porphyry occurrences are minor and some are only questionably of porphyry origin.

Some of the earliest lode prospecting in the Delta River study area targeted basaltic copper occurrences on Paxson Mountain, west of Paxson (Martin, 1920). There are a number of these occurrences in the district. Most of them are quite small. Only the GR 13-9 occurrence (Map no. 625) is known to have been drilled – it was drilled in the late 1960's or early 1970's (Alaska Kardex, 68-120). Several of the other sites were prospected by trenching. Most of the basaltic copper occurrences are associated with the Triassic Nikolai basalt that is found in the southern part of the district. Some early authors suggested the Nikolai basalt may represent a geologic setting similar to that of the productive copper deposits of northern Michigan (Rose and Saunders, 1965). This may have been one reason for the early prospecting attention. Later investigators, working mainly in the Wrangell Mountains to the southeast of the Delta River area, suggest the occurrences are associated with Cretaceous metamorphism of the basalt, probably associated with accretion of the terrane to North America. They suggest the Nikolai basalt itself, with an "intrinsic" copper content averaging 155 ppm, is the source of the copper (Silberman and others, 1980a, 1980b; Mackevett and others, 1980).

The polymetallic vein classification is used here as a bit of a catch-all. In the occurrences listed as such, analytical results may have shown the presence of various base and/or precious metals, but the mode of occurrence may not have been easily discernible. In many cases the occurrences are not defined by a prominent vein or vein system, but may be defined by disseminated base metal sulfides, commonly hosted in intermediate to felsic, commonly volcaniclastic rock. The majority of the occurrences listed here as polymetallic veins are found in the vicinity of Rainbow Mountain, which is east of the Richardson Highway and south of the Canwell Glacier. One polymetallic vein prospect of note is the Hajdukovich Gold prospect (Map no. 88) in the northeast part of the study area. This prospect was drilled in 2005 by

Canaco Resources (Press Release, Canaco Resources, September 2, 2005). Little was known by BLM investigators about the site until after the final field season was completed. The Hajdukovich Gold prospect is particularly notable because of its large extent and potential for large tonnages. It also represents a type of occurrence that currently attracts mineral exploration attention.

There is one occurrence of a pegmatite type deposit in the Delta River study area, the Tourmaline occurrence (Map no. 48). This site is noted for its specimens of watermelon tourmaline.

PTARMIGAN

Alternate Name(s):	Ptarmigan Creek, Conradt Prospect, John Hajdukovich, Molybdenum Ridge	Map No:	9
		MAS No:	0020680081
Deposit Type:	Porphyry Mo	Commodities:	Mo, Au
Location:			
Quadrangle:	Mt. Hayes, D-6	TRS:	NW1/4 Sec: 11, T13S, R06E
Meridian:	Fairbanks	Elevation:	2,600 feet
Latitude:	63.80327	Longitude:	-146.53185

Geographic: The Ptarmigan prospect is located along Ptarmigan Creek, a western tributary to Delta Creek, which lies to the west of the Delta River on the north side of the Alaska Range. Ptarmigan Creek lies south of Molybdenum Ridge. The prospect is near the mouth of Ptarmigan Creek where it has incised a steep sided canyon. The prospect is within the boundaries of Fort Greely, a U.S. Army installation.

Access: Access to the Ptarmigan prospect is easiest by helicopter. Landing a light helicopter is possible in the creek near the intersection of Contact and Ptarmigan creeks. Alternative landing sites are on the edges of the canyon and require descending the steep canyon slopes to the creek below. Permission to access the site should be coordinated with Range Control personnel at Fort Greely.

Historic access to the site was made cross country from the Richardson Highway, but this route requires crossing the Delta River. A winter trail accessed the property from the Richardson Highway up the Delta Creek drainage (Joesting, 1942a). In later years, a landing strip was built on the east side of Delta Creek, north of the mouth of Ptarmigan Creek. From the landing strip, a foot trail led to the prospect (Joesting, 1942a), a distance of about 2 miles.

History: Frank Gillespie discovered molybdenum at the Ptarmigan prospect in 1912 (U.S. Bureau of Mines, 1943) or 1914 (Smith, 1942b; Burr Neely, 2001). Gillespie drove the first adit, the Gillespie adit, on the discovery vein soon after discovery (U.S. Bureau of Mines, 1943). Other development occurred between 1914 and 1918, which included the driving of several short adits (Smith, 1942b).

J. Hajdukovich staked 15 lode claims on the Ptarmigan prospect in 1937. Additional claims were staked by Hajdukovich and A. Conradt in 1939 and 1940 (Burr Neely, 2001). By 1942 there were a total of 19 lode claims covering the property and 6 placer claims near the mouth of Ptarmigan Creek, below the canyon. Development occurred between 1937 and 1940, which included the driving of an adit 90 feet long (Smith, 1942b). No further development is recorded after about 1940.

ARDF Name / No.: Ptarmigan Creek / MH003 **Alaska Kardex:** 68-32

Production: There has been no production from the Ptarmigan prospect. Several tons of ore were stockpiled at the site, but never shipped (Martin, 1920; Smith, 1942b; Cobb, 1972b).

Workings and Facilities: Workings at the Ptarmigan prospect include four adits and numerous pits and open cuts. Three of the four adits are caved. One short adit ('No. 3 Tunnel') is accessible over a partially collapsed portal.

The No. 1 adit is the farthest downstream. BLM investigators attempted to locate the adit following the information on Plate 1 of Joesting (1942a), but an obvious adit was not located. Instead, investigators found evidence of timbers protruding from the south-southwest side of Ptarmigan Creek near the location shown by Joesting (1942a). Numerous quartz stringers in the granodiorite at this location also correspond to Joesting's (1942a) Plate 1 information.

The No. 2 adit is farthest upstream according to Joesting's (1942a) Plate 1. At the indicated location of the adit (Joesting, 1942a, Plate 1) there is a land slide that obscures bedrock, so no evidence of an adit was found by BLM investigators. At this site the BLM found rubble of granodiorite with quartz stringers and associated molybdenite. BLM also found the granodiorite-schist contact as portrayed by Joesting (1942a, Plate 1).

The No. 3 adit is shown by Joesting (1942a) on the north-northwest side of the creek on the Grouse claim of Plate 1. A partially caved adit was found by the BLM. The adit was driven at 310 degrees and originally extended for about 25 feet; it is currently open for about 10 and accessible by climbing over the collapsed material at the portal.

The No. 4 adit ('Gillespie Tunnel') was not located by BLM investigators.

Geologic Setting: The Ptarmigan prospect is a porphyry molybdenum-gold occurrence associated with a Late Cretaceous granodiorite that has been intruded into metasedimentary schists of the Jarvis Creek Glacier subterrane of the Yukon-Tanana lithotectonic terrane (Nokleberg and others, 1992b). Locally, the intrusive varies from granodiorite to biotite granite and quartz diorite (Joesting, 1942a; Nokleberg and others, 1992b). The granodiorite is cut by aplite dikes and includes mafic xenoliths. The hosting schist and slate is hornfelsed in places adjacent to the intrusive. Pyrite along with minor chalcopyrite and sphalerite are concentrated in the hornfels. Analytical results indicate that mercury is elevated in the hornfels as well.

Mineralized rock within the granodiorite comprises flakes of molybdenite associated with white to glassy quartz veins and stringers. The flakes are generally found in seams parallel to the margins, and at the margins, of the veins. In places the quartz veins are numerous enough to form vein swarms. The veins range up to about 6 inches across, but are generally 1 to 2 inches thick. In addition to molybdenite, the veins contain minor amounts of other sulfides including arsenopyrite, pyrite, galena, chalcopyrite, and sphalerite. The veins with these other sulfides are distinct from the molybdenite-bearing veins. Joesting (1942a) describes a type of quartz vein that he calls "fissure veins," which he distinguishes from the molybdenite-bearing quartz veins in tension fractures and "gash fractures" (Joesting, 1942a, p. 7). The fissure veins are larger than the molybdenite-bearing stringers and are mineralized by arsenopyrite, pyrite, galena, and gold (Joesting, 1942a). Joesting (1942a) believes the fissure veins postdate the molybdenite veins.

BLM investigators found vein orientations to occur in three groups: strikes of about 025 to 055 degrees with shallow to steep dips; 230 to 250 degrees with moderate dips; and 310 to 335 degrees with moderate to steep dips. Limited sampling indicates that molybdenum is associated with the 230 to 250 degree set of veins and gold is associated more with the 310 to 335 degree set. Joesting (1942a) reports that most of the veins strike to the northwest and have steep dips.

In one location along the creek BLM investigators found what appears to be a shear zone with parallel quartz veins standing out in relief from altered, sheared, poorly indurated granodiorite. The shear is oriented to the northwest with a moderate dip to the northeast. Pyrite and minor chalcopyrite are associated with the quartz veins. Analytical results indicate that gold is associated as well.

Bureau Investigation: BLM investigators collected 12 rock chip samples at the Ptarmigan prospect. Analytical results indicate values up to 5,350 ppm molybdenum (sample 11285), 2.92 ppm gold (sample 11288), 9.5 ppm silver (sample 6988), 143 ppm copper (sample 6987), 846 ppm lead (sample 6988), 150 ppm zinc (sample 6987), 7,180 ppm arsenic (sample 11287), and 20 ppm mercury (sample 6987).

Although some of the analytical results indicated elevated metal values, most were associated with select samples. All of the molybdenum values over 100 ppm were from samples of individual quartz veins. Samples collected over measured widths contained insignificant molybdenum values. This was the conclusion of earlier investigators as well (Joesting, 1942a; Smith, 1942b; U.S. Bureau of Mines, 1943).

Gold is associated with the quartz veining at the Ptarmigan prospect, but it seems to be sporadic in occurrence. The highest concentration detected, 2.92 ppm (sample 11288) is from a shear zone with quartz veins that is about 8 to 10 feet across. Of this length, however, only about 10 to 15 percent is made up of quartz veins. The next highest gold value detected was 1.5 ppm gold. This came from an approximately 2-inch thick quartz vein (sample 6988). Arsenic and mercury are also associated with the quartz veining at the prospect. Based on limited BLM sampling there may be a weak gold-arsenic association, but a gold-mercury association is not evident.

Several metals were detected in elevated concentrations in pyrite-bearing, hornfelsed? slate near the granodiorite contact. Only one sample was collected of the hornfels, however, and this from rubble near the contact (sample 6987). This sample produced the highest returns of copper (143 ppm) and zinc (150 ppm) from the prospect, although these are well below ore grades. It also had at least 20 ppm mercury, which was one of the highest mercury returns from rock chip samples in the mining district.

Mineral Development Potential: Low

Conclusions: The Ptarmigan prospect covers a large area and would require several days at least to accomplish a good evaluation. BLM investigators did not conduct a thorough evaluation. Instead, they collected samples to corroborate the thorough investigation completed in the early 1940's by Joesting (1942a). A factor in the decision to limit the scale of the investigation was the restricted land status of the prospect.

As determined by earlier investigators (e.g., Joesting, 1942a; Smith, 1942b), there appears to be no concentrations of mineralized rock that would approach a grade of being economic. Rock mineralized with molybdenite occurs in scattered locations and in relatively low grades. Gold grades, although significant for a porphyry style deposit, are also too widespread in occurrence to reach ore grade.

TOURMALINE

Alternate Name(s):		Map No:	48
		MAS No:	0020680392
Deposit Type:	Pegmatite	Commodities:	Tourmaline, mineral specimens
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4 Sec: 36, T16S, R07E
Meridian:	Fairbanks	Elevation:	4,500 feet
Latitude:	63.48274	Longitude:	-146.30809

Geographic: The Tourmaline prospect is located on the north edge of the Black Rapids Glacier approximately 16 miles west of the Richardson Highway at an approximate elevation of 4,500 feet.

Access: Access is primarily by helicopter. Access by foot requires crossing the Delta River and hiking over 15 miles up the Black Rapids Glacier.

History: Taylor's Gold-N-Stones, Inc. currently holds claims covering the likely source area. Most of the pegmatite float in the medial moraine is currently covered by state claims.

ARDF Name / No.: None **Alaska Kardex:** None

Production: Pieces of mineral specimens of watermelon tourmaline and lepidolite from the prospect have been observed for sale at various gem shows around the state.

Workings and Facilities: There are no workings or facilities at the Tourmaline prospect, but ample evidence of specimen collecting.

Geologic Setting: Ice covers much of the bedrock in this area, and exposures are generally limited to steep valley walls and cliffs. Talus and the likely source rock of the Tourmaline prospect lies between the Denali fault to the south and the Nenana Glacier fault to the north. Nokleberg and others (1992b) have mapped several granitic intrusions in this region; most appear to be early Tertiary to late Cretaceous in age.

Bureau Investigation: The BLM found that the primary occurrence is essentially a small ice-cored hill of pegmatite float sitting on a medial moraine along the north edge of the Black Rapids Glacier. The hill is very prominent, appearing as a misplaced patch of snow in otherwise dirty moraine debris. The occurrence covers an area of approximately 150 feet square and is several yards high; although close inspection reveals that the hill consists of mostly ice with a veneer of pegmatite debris. At least one piece of float exhibited the contact margin of the pegmatite. The host is a gabbro (sample 11009). The pegmatite displays good specimens of lepidolite, tourmaline (both schorl and elbaite/watermelon varieties), in a matrix of quartz, microcline, and spodumene. Large tourmaline crystals up to 2 feet long are exposed in boulders. The tourmaline is generally highly fractured and is, therefore, of sub-gemstone quality. The pegmatite is presumed to be relatively small in original size due to the presence of zones representing multiple stages of crystallizations of the pegmatite body. Biotite-rich banded zones probably occurred at the edges of the crystallizing body (sample 11139). Schorl tourmaline-rich boulders likely represent intermediate zones of the pegmatite (sample 11141), whereas the elbaite tourmalines (sample 11010) represent the later stages of crystallization, when iron in the closed system has been depleted. This results in the tourmaline, mica, and pyroxene incorporating incompatible elements such as lithium and boron into their structures, forming elbaite, lepidolite, and spodumene. The matrix of late stage crystallization contains large crystals of quartz, spodumene, and microcline (sample 11011). A significant amount of lepidolite is also present (sample 11140). The depletion of iron and concentration of incompatible elements is evident in the analytical results.

Remnants of pegmatite can be traced up the moraine for several miles, and then it vanishes. The moraine leads up a tributary glacier about 7 miles to an inaccessible cliff face below an icefall. A light-colored intrusive exposed in the cliff face appears to be the most likely source of the pegmatite. This likely source is located at approximate latitude and longitude of 63.5230 and -146.4800.

Mineral Development Potential: Low

Conclusions: As the only documented occurrence of watermelon tourmaline in Alaska this site is of interest to mineral collectors. The highly fractured nature of the minerals and limited quantity of material precludes the site from becoming a significant source of gem grade tourmaline.

Table 18. Whole rock, trace, and rare earth element data from the Tourmaline occurrence.

Sample no.	Al_2O_3 %	BaO %	CaO %	Cr_2O_3 %	Fe_2O_3 %	K_2O %	MgO %	MnO %	Na_2O %	P_2O_5 %	SiO_2 %	SrO %	TiO_2 %	LOI %	Total %	Remarks
11009	15.03	0.02	14.9	0.08	8.81	0.15	11.4	0.16	1.10	0.02	47	0.05	0.36	0.8	99.8	gabbro host
11010	11.25	0.02	0.56	0.01	0.65	0.17	0.08	0.09	0.75	0.01	83.7	<0.01	0.04	1.2	98.5	elbaite rich pegmatite
11011	18.91	0.02	0.12	<0.01	0.17	10.7	0.03	0.01	2.20	0.02	65.8	<0.01	0.04	0.4	98.4	feldspar rich pegmatite
11139	17.92	0.02	1.51	0.04	3.1	0.79	0.41	0.09	5.43	0.05	68.1	0.01	0.1	0.6	98.2	biotite banded pegmatite
11140	14.55	<0.01	0.13	0.02	0.21	5.24	0.01	0.14	1.78	<0.01	64.5	<0.01	0.01	1.5	88.1	lepidolite rich pegmatite
11141	27.5	<0.01	1.34	0.02	4.08	1.66	0.2	0.41	3.63	0.26	51	0.01	0.06	2.9	93	schorl rich pegmatite

Sample no.	Be ppm	Ce ppm	Dy ppm	Er ppm	Eu ppm	Ga ppm	Gd ppm	Ge ppm	Hf ppm	Ho ppm	In ppm	La ppm	Li ppm	Lu ppm	Nb ppm	Nd ppm	Remarks
11009	0.16	5.4	1.7	1	0.8	12.3	1.6	0.15	0.4	0.4	0.03	2.2	8.5	0.1	0.5	4.3	gabbro host
11010	3.12	6.9	0.2	<0.1	<0.1	53.4	1	0.1	<0.1	<0.1	0.19	3.2	>500	<0.1	9	2.6	elbaite rich pegmatite
11011	2.73	1.6	0.1	<0.1	<0.1	47.4	0.1	0.11	<0.1	<0.1	0.08	1.1	>500	<0.1	9.4	<0.5	feldspar rich pegmatite
11139	3.69	102	39.9	20	0.5	27	33	0.15	0.9	7.4	0.05	39.2	135	3	28.3	61.3	biotite banded pegmatite
11140	13.4	1.2	0.5	0.1	<0.1	68.4	0.5	<0.05	0.1	<0.1	0.86	<0.5	>500	<0.1	88.1	0.6	lepidolite rich pegmatite
11141	7.36	103	42.7	21.9	0.3	81.5	36.9	0.16	0.7	7.3	0.89	18.1	>500	5	>500	68.9	schorl rich pegmatite

Sample no.	Pr ppm	Rb ppm	Re ppm	S pct	Se ppm	Sm ppm	Tb ppm	Te ppm	Th ppm	Tl ppm	Tm ppm	U ppm	V ppm	W ppm	Y ppm	Yb ppm	Zr ppm	Remarks
11009	0.08	2.4	<0.002	0.15	<1	1.5	0.3	<0.05	<0.2	<0.02	0.1	0.1	341	0.2	7.9	0.9	12	gabbro host
11010	0.08	130	<0.002	<0.01	<1	2	0.1	<0.05	0.2	0.61	<0.1	0.9	2	0.7	0.3	<0.1	0.9	e baite rich pegmatite
11011	0.10	>500	<0.002	<0.01	<1	0.1	<0.1	<0.05	<0.2	24.20	<0.1	0.2	1	0.7	0.2	<0.1	<0.5	feldspar rich pegmatite
11139	15.30	42	0.01	<0.01	3	31.5	7.5	<0.05	45.3	0.27	3.1	45.5	1	5	69.5	21.6	11	biotite banded pegmatite
11140	0.10	>500	0.01	<0.01	2	0.6	0.1	<0.05	<1	22.80	<0.1	4.2	<1	25	2.3	0.1	<0.5	lepidolite rich pegmatite
11141	16	>500	0.01	0.01	4	44	8.3	0.05	38.6	4.75	4	46.6	<1	23	109	31.7	6.7	schorl rich pegmatite

Table 18 note: Whole rocks were analyzed by XRF, and trace and rare earth elements were analyzed by ICP-MS. For a more complete description of these analytical techniques and detection limits for individual elements refer to Appendix tables B-3 and B-5 respectively.

HAJDUKOVICH GOLD

Alternate Name(s):	Sneaker, Upeg, Gert, Hajd Claims, Canaco, Haj	**Map No:**	88
		MAS No:	0020680396
Deposit Type:	Vein Au	**Commodities:**	Au, Cu, PGE
Location:			
Quadrangle:	Mt. Hayes, C-2		SW1/4 Sec: 35, T15S, R14E
Meridian:	Fairbanks	Elevation:	4,900 feet
Latitude:	63.57061	Longitude:	-144.9804

Geographic: The Hajdukovich project claim block (10,920 acres [Freeman, 2005]) is centered on an intrusive complex, on the northern flanks of Mt. Hajdukovich, in the northeast part of the Delta River Mining District study area, between the Johnson and Gerstle rivers. The specific point selected to represent the prospect is to the northeast of Mt. Hajdukovich, on the eastern side of the claim block, in an area where the most prospective mineralization has been found to date. This site is in a saddle near the '4937' mark on the USGS, Mt. Hayes, C-2, 1:63,360-scale, topographic map.

Access: Access to the Hajdukovich claim block is most practical by helicopter.

History: The Hajdukovich Gold prospect was discovered by Teck Exploration Ltd. in 1999. The property was optioned from Teck Resources, Inc. (subsidiary of Teck Cominco) by Canaco Resources Inc. in 2005. Canaco staked additional claims in the area in 2005 (Freeman, 2005).

In 2000 and 2001 the Hajdukovich property was explored by geologic mapping and soil and rock-chip sampling (Freeman, 2005). The eastern part of the Hajdukovich Gold prospect was drilled in 2005 by Canaco Resources (Press Release, Canaco Resources, September 2, 2005).

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: The eastern part of the Hajdukovich property, the Sneaker zone, has been drilled (Press Release, Canaco Resources, September 2, 2005).

Geologic Setting: Mineralization at the Hajdukovich Gold prospect is spatially associated with a Tertiary alkalic intrusive complex (Freeman, 2005) that is hosted by mid-Paleozoic and older metamorphic rocks of the Jarvis Creek subterrane of the Yukon-Tanana terrane (Nokleberg and others, 1992b). The intrusive complex includes a variety of rock types including granite, syenite, mafic-ultramafic rocks, diorite to granodiorite, and monzonite (Freeman, 2005). Most of the gold on the property is hosted by the granite and syenite (Adams and others, 2005; Freeman, 2005). The complex is cut by high angle, northeast-trending faults that have uplifted deeper level rocks to the east (Adams and others, 2005). The complex extends for about 10 miles, roughly east-west, and 2 miles north-south (Freeman, 2005).

Workers have defined a large variety of mineralization styles on the property. The most prospective is low-sulfide, gold-quartz veins associated primarily with bismuth and hosted by granite on the eastern side of the property at what has been called the Sneaker zone. These discontinuous veins are hosted by northeast-trending structures and are exposed over approximately 2,000 by 3,000 feet with an open vertical extent of approximately 1,150 feet (Freeman, 2005). In addition to the bismuth, the low-sulfide veins include elevated copper, lead, and antinomy. Visible gold is present in the veins (Adams and others, 2005). A second set of high-sulfide quartz veins crosscut the low-sulfide veins at the Sneaker zone. These veins are oriented east-west or northwest-southeast, occupy en echelon shears, and include elevated arsenic and silver. The gold assays are lower for this second set of veins at the Sneaker zone (Adams and others, 2005).

Additional mineralization styles on the Hajdukovich Gold property include aplite-hosted quartz veins; quartz-calcite-pyrite veins; gold-silver-palladium-nickel-bearing chalcopyrite-magnetite pods and veinlets; gold-bearing stockwork quartz and iron carbonate veins; gold-arsenic hydrothermal breccias; stockwork copper-arsenic-molybdenum-gold quartz-sulfide veins; and calc-silicate mineralization (Adams and others, 2005; Freeman, 2005). These mineralization styles are found at occurrences across the 10-mile-long Hajdukovich claim block at sites named "NW Sneaker, Upeg, Upeg Saddle, Gert, and Cu-Pd Zone" (Freeman, 2005, Figure 2).

No resource calculations are known to have been made public for the Hajdukovich Gold prospect.

Bureau Investigation: The BLM did not investigate the Hajdukovich Gold prospect as part of the Delta River Mining District mineral assessment. Although claim maps showed an extensive claim block in the area, the BLM did not have any information on the nature of the mineralization on the property. Freeman (2005) reports that no significant exploration was conducted on the property between 2002 and 2004 – these were the years in which the BLM was active in field work in the district. Information on the Hajdukovich Gold prospect was released when Canaco optioned the claims in early 2005 and began making press releases on their work in the area.

The BLM collected three stream sediment samples (11020, 11169-170) from the vicinity of the Hajdukovich Gold prospect. All of the samples contained detectable gold. One sample returned 48 ppb gold (sample 11020). This sample came from the eastern part of the Hajdukovich claim block, from a creek that drains the Sneaker area, where Canaco has identified the highest gold concentrations on the prospect (Adams and others, 2005).

Mineral Development Potential: Unknown. (The BLM does not have sufficient primary information to make a determination on the potential of the property.)

Conclusions: A thorough description of the Hajdukovich Gold prospect, including history of exploration, land status, and geology was made by Freeman (2005). Freeman's (2005) report is available through the Canaco Resources Inc. website (www.canaco.ca). The BLM did not investigate the prospect as part of its Delta River Mining District evaluation, because information on the property was released after the BLM completed field work in the district.

GUNNYSACK

Alternate Name(s):		Map No:	91
		MAS No:	0020680021
Deposit Type:	Vein	Commodities:	Au, Sb
Location:			
Quadrangle:	Mt. Hayes, C-4	TRS:	SE1/4 Sec: 17, R16S, R10E
Meridian:	Fairbanks	Elevation:	2,600 feet
Latitude:	63.52467	Longitude:	-145.82334

Geographic: The Gunnysack prospect is located in the heart of the Alaska Range, east of the Richardson Highway. The adit occurs on the south bank of Gunnysack Creek approximately 1 mile upstream from it's confluence with the Delta River.

Access: The Richardson Highway provides road access to the mouth of Gunnysack Creek. From here, it is an easy 1 mile hike upstream to the prospect. Small helicopters can also land on gravel bars near the prospect, but the canyon at this location is fairly steep and narrow.

History: In 1912 Capps (1912) reports that claims and workings at this prospect have been abandoned for some time. Prospectors again took interest in the site in 1932 (Alaska Kardex 068-39), 1969, and 1979 (Alaska Kardex 068-124).

ARDF Name / No.: Gunnysack Creek / MH015 **Alaska Kardex:** 068-39, 124

Production: None

Workings and Facilities: A mostly intact adit is still present at the site. The adit has been driven a few feet above the creek level in the south bank of the creek and drifts for approximately 30 feet (Figures 66 and 67).

Geologic Setting: Capps (1912) calls the unit the Birch Creek Schist. Nokleberg and others (1992b) mapped the rocks in this area as "Fine-grained metasedimentary rocks" of Devonian and older age. K-Ar ages on white mica give ages of 106 to 118 Ma (Nokleberg and others, 1992b). This prospect explores mineralization in a very thick, structurally controlled, massive quartz vein, up to 20 feet thick, which cuts through schist country rock. The vein strikes 60 degrees and dips 80 degrees to the north.

Much of the mica schist in this drainage is a bright apple-green, presumably due to chrome in the mica. The green schist from Gunnysack Creek is known to be utilized by local rock shops as an ornamental stone.

Bureau Investigation: The BLM found this site as described by Capps (1912), Moffit (1942), and Joesting (1942b). Pyrite ± stibnite sulfide minerals occur sporadically in irregular patches and stringers throughout the quartz vein. Five samples were taken from just inside and near the adit (samples 10100-103, 10105).

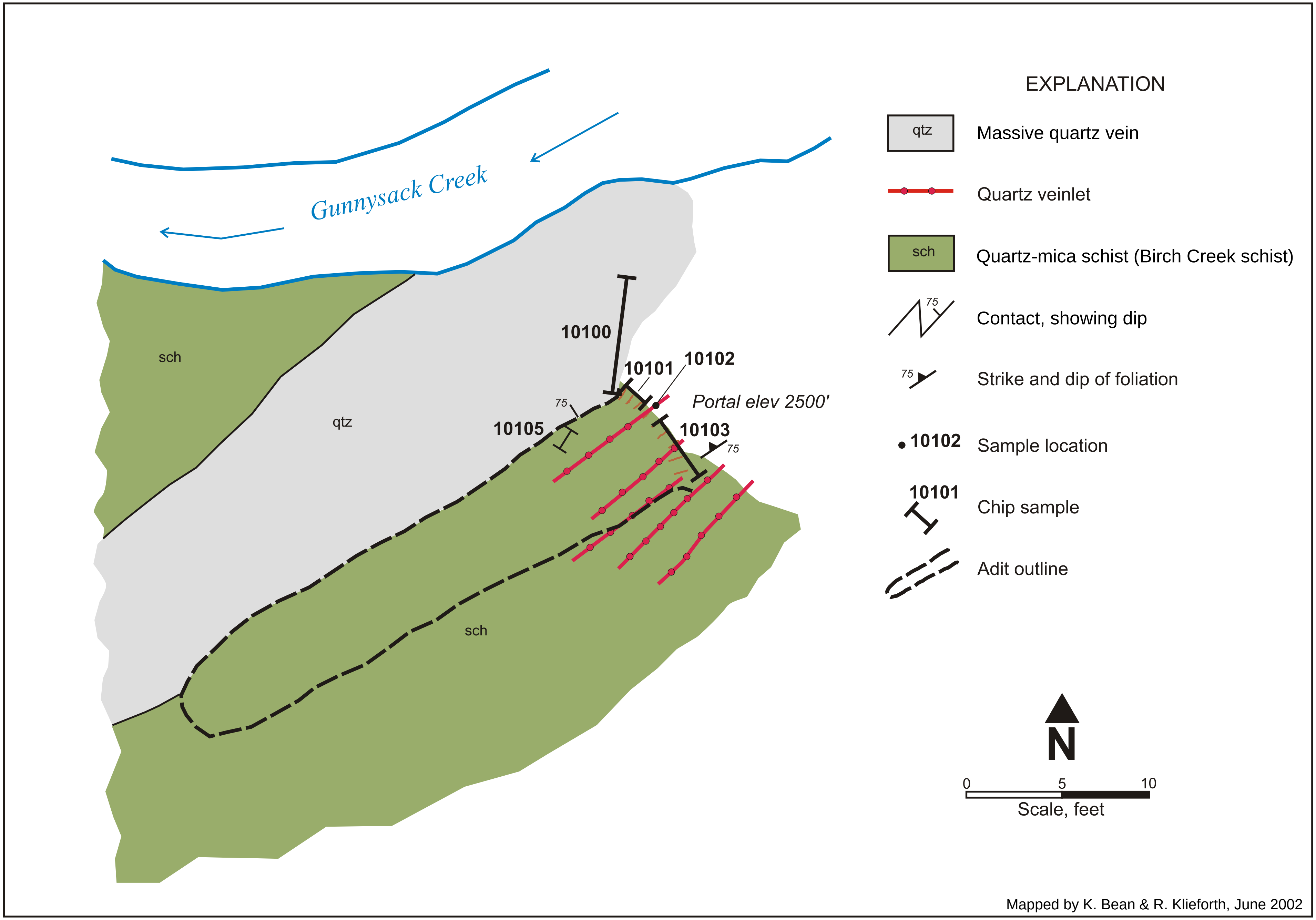


Figure 66. Sketch map of the Gunnysack prospect.

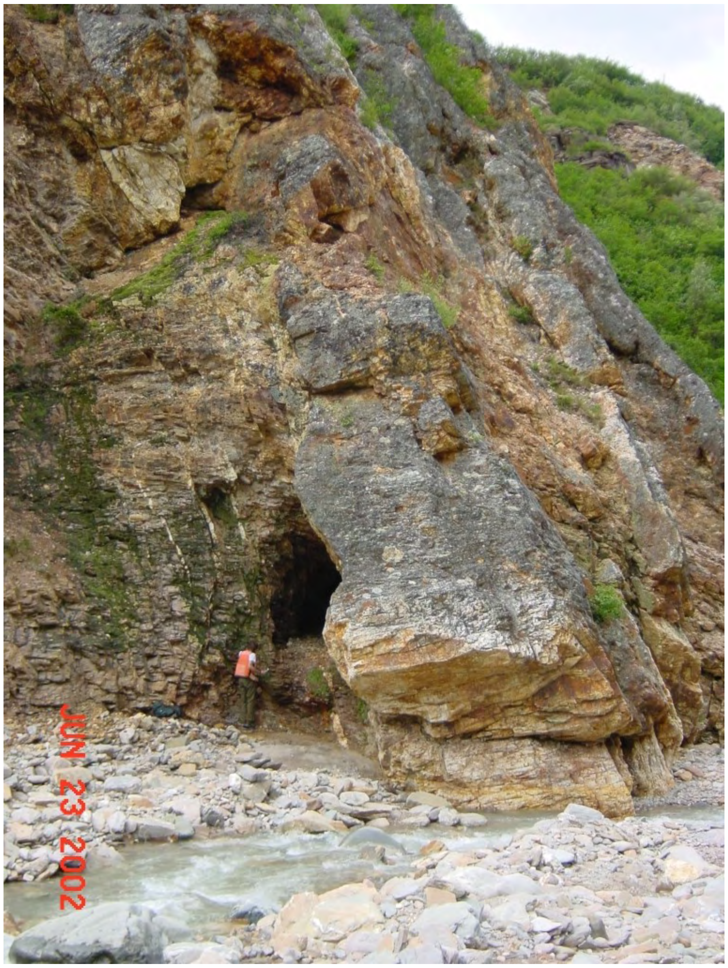


Figure 67. Geologist inspecting the Gunnysack adit.

Two additional samples were taken from the massive quartz vein (up to 20 feet thick) cropping out upstream. Although high-grade select samples contained up to 2.49 ppm gold (sample 10304) and 333 ppm antimony (sample 10104), this grade is not maintained over the vein's width, as measured samples yielded much lower values.

Mineral Development Potential: Low

Recommendations: At the turn of the last century prospectors recognized that the Gunnysack prospect was not viable as a mining operation. In that regard nothing has changed. The development potential for this prospect is very low.

COMPASS CREEK

Alternate Name(s):	Unnamed occurrence ARDF #80 North of Upper East Fork Maclaren River	**Map No:**	113
		MAS No:	0020680209
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 04, T19S, R07E
Meridian:	Fairbanks	Elevation:	4,300 feet
Latitude:	63.299282	Longitude:	-146.418897

Geographic: The Compass Creek occurrence is marked by the ARDF (Ellis and others, 2004) as being on the west side of the eastern fork of the first drainage west of the Eureka Glacier, which flows southward into the East Fork of the Maclaren River. Rose (1966a) marks this creek as "Compass Creek" (his Figure 3). Rose (1966a) shows his mineral occurrence to the south and west of the ARDF location, on the northwest side of the creek, where the creek flows to the southwest, and above the point where it joins the west fork of Compass Creek. Rose's location is in the southwest quarter of Section 4, T19S, R07E.

Access: Access to the Compass Creek site is most easily accomplished by helicopter. There are numerous landing sites for a light helicopter in the area.

History: The Compass Creek occurrence was first described by Rose in the Economic Geology section of his report under "Other copper occurrences" (Rose, 1966a, p. 21). In the report he lists the site as being in Township 18S, but this would locate the site in the high mountains to the north, north of the area shown in his map. Therefore the site is most likely in Township 19S. This discrepancy is noted by Cobb (1979) in his compilation of mineral sites in the Mt. Hayes quadrangle.

ARDF Name / No.: Unnamed (north of upper east fork Maclaren River) / MH095
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1966a, p. 21) describes the Compass Creek site as comprising "Vesicles in basalt filled by opal, chlorite, pyrite and minor chalcopyrite." The map accompanying his report shows a unit of Triassic "Amphitheater basalt" cropping out in the area (Rose, 1966a). Stout (1976) includes Rose's (1966a) Amphitheater basalt in his Amphitheater Group and correlates this with the Triassic Nikolai basalt. Nokleberg and others (1992b) map Triassic Nikolai pillowed basalts in the Compass Creek occurrence area as well.

Bureau Investigation: BLM personnel examined the Compass Creek area in 2002. They collected one sample of amygdaloidal basalt with the amygdules filled mainly with calcite and quartz. Minor euhedral pyrite and anhedral chalcopyrite was found in some of the basalt and was included in the sample. The sample returned only 145 ppm copper and had very low precious metal contents (sample 10075).

Mineral Development Potential: Low

Conclusions: The Compass Creek occurrence seems to be of very little significance. Small amounts of copper sulfide are hosted in amygdules in basalt, but their concentration and extent is very minimal. This may be one of the reasons previous investigators (Ellis and others, 2004 and the present authors) have had a hard time agreeing on a location for the occurrence. Little bits of copper sulfide in basalt can probably be found almost anywhere across the immediate area.

GR 20-5

Alternate Name(s):		Map No:	149
		MAS No:	0020680147
Deposit Type:	Polymetallic vein	Commodities:	Cu, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	NW1/4 Sec: 34, T18S, R08E
Meridian:	Fairbanks	Elevation:	4,700 feet
Latitude:	63.31647	Longitude:	-146.1999

Geographic: The GR 20-5 prospect is approximately 1½ miles west of Broxson Gulch, on the south flanks of the Alaska Range, west of the Delta River.

Access: Helicopter access is highly recommended; however, Broxson Gulch is accessible via a mine access winter trail or by ATV. The site is accessible by foot from Broxson Gulch during times of low water flow.

History: The GR 20-5 prospect was reported by Rose (1966a), whose samples contained 2.95 percent copper and 2.2 ounces per ton silver. Subsequent sampling by the USGS contained 3.8 percent copper, and 50 ppm silver (Nokleberg and others, 1991).

ARDF Name / No.: Unnamed / MH113 **Alaska Kardex:** None

Figure 68. Examining rocks at the GR 20-5 occurrence.

Production: None

Workings and Facilities: Rose (1967) reported the presence of a shallow trench and several small pits at this prospect. The BLM could not confirm this, but the slopes here are generally composed of loose talus which could easily have obscured workings over the years.

Geologic Setting: The bedrock here is mapped as mafic and ultramafic rocks along the Broxson Gulch Thrust (Nokleberg and others, 1992b).

Bureau Investigation: The BLM located a small iron-stained outcrop surrounded by loose talus (Figure 68). The outcrop appears to be a fine-grained gabbro dike with iron and copper oxide staining. Part of the outcrop was brecciated and silicified and contained several pods of chalcopyrite. Iron oxidized areas extending along the northeast-southwest-trending, sub vertically dipping dike/shear and can be traced up the talus slope for approximately 100 yards. High grade samples from the outcrop yielded 3,440 ppm copper and 71.7 ppm silver (sample 10936).

Mineral Development Potential: Low

Conclusions: The mineral concentrations found in the gossan are sub economic and occur in what appears to by a thin breccia zone along the Broxson Gulch Thrust. Given the low potential for high tonnage this occurrence has a low potential for development, but mapping, sampling, and/or trenching the entire trend could confirm geologic relationships and better delineate mineralization.

GR 20-4

Alternate Name(s):		Map No:	153
		MAS No:	0020680237
Deposit Type:	Polymetallic vein	Commodities:	Zn, Cu, Pb
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SW1/4Sec: 26, T18S, R08E
Meridian:	Fairbanks	Elevation:	3,900 feet
Latitude:	63.32031	Longitude:	-146.17048

Geographic: The GR 20-4 prospect is located on the south flanks of the Alaska Range, west of the Delta River and Broxson Gulch, at an elevation of approximately 3,900 feet.

Access: Gentle slopes below the prospect provide helicopter access to the site. A primitive trail up Broxson Gulch provides four-wheeler road access to within walking distance of the prospect.

History: Rose (1966a) reported high zinc, lead, and copper in limonite-cemented talus. An old pit was evident and had not reached bedrock, which was inferred to be slate.

ARDF Name / No.: Unnamed / MH116 **Alaska Kardex:** None

Production: None

Workings and Facilities: There is an old prospect pit at the GR 20-4 prospect.

Geologic Setting: Nokleberg and others (1992b) map the bedrock here as Jurassic phyllite.

Bureau Investigation: The BLM located an area of iron cemented talus containing an old pit as described by Rose (1966a). The gossan zone was approximately 50 by 100 feet and contained limonite cemented talus fragments of phyllite. Another similar gossan zone measuring 100 by 100 feet was also located 500 feet to the south and at an elevation of approximately 3,800 feet. Samples of the gossan yielded values as high as 1,725 ppm zinc (sample 10384), 90 ppm copper (sample 10385), and which, with the exception of lead (13 ppm) (sample 10384), are comparable to values found by Rose (1966a). The source of mineralization was not observed in the field.

Mineral Development Potential: Low

Conclusions: The mineral concentrations found in the gossan are sub economic; however, there is not a good understanding of the source of mineralization. Additional trenching or drilling at the occurrence could identify a source of mineralization in bedrock.

GR 14-18

Alternate Name(s):	Broxson Ridge Unnamed Occurrence 5	Map No:	158
		MAS No:	0020680143
Deposit Type:	Skarn / Basaltic Cu	Commodities:	Cu, Co
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 17, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,800 feet
Latitude:	63.348837	Longitude:	-146.050458

Geographic: The GR 14-18 occurrence is located on the southeast-facing side of the ridge between the East and Middle forks of Broxson Gulch.

Access: Access is easiest by helicopter, although ATV and winter trails allow access to a camp on the East Fork of Broxson Gulch. The camp on Broxson Gulch also has an airstrip. From the camp the GR 14-18 occurrence is accessible on foot, 2 miles to the northeast.

History: Rose (1965) discovered lenses of semi-massive and massive sulfides at the GR 14-18 occurrence during mapping of the area in 1964. Besides Rose’s references (1965; 1966a), there is no other known mention of the occurrence in published literature.

ARDF Name / No.: Unnamed (ridge between middle and east forks in Broxson Gulch) / MH129
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1965), who discovered the GR 14-18 occurrence, originally described the host rock as amphibole “serpentinite,” but subsequently describes it as basalt (Rose, 1966a). The basalt is part of his Mississippian to Pennsylvanian Rainy Creek Basalt, which is thought to be at least 1,500 feet thick and represent flows with interbedded sediments (Rose, 1966a). He maps the occurrence about 50 feet structurally above an outcrop of peridotite and dunite (Rose, 1965).

BLM investigators found at least five outcrops with lenses of massive to semi-massive sulfide hosted in basalt. The lenses are approximately 1 to 2 feet wide and 6 to 8 feet long. They occur mostly within a radius of about 100 feet (Figures 69 and 70), but are also found up to 1,200 feet along the slope to the west-southwest. In the area where the lenses are concentrated, they are hosted primarily in basalt, but mostly where there are pods of peridotite within the basalt and close to the contact with structurally underlying peridotite and dunite. The ultramafic pods or inclusions in the basalt are generally rounded and vary from less than an inch to several feet across.

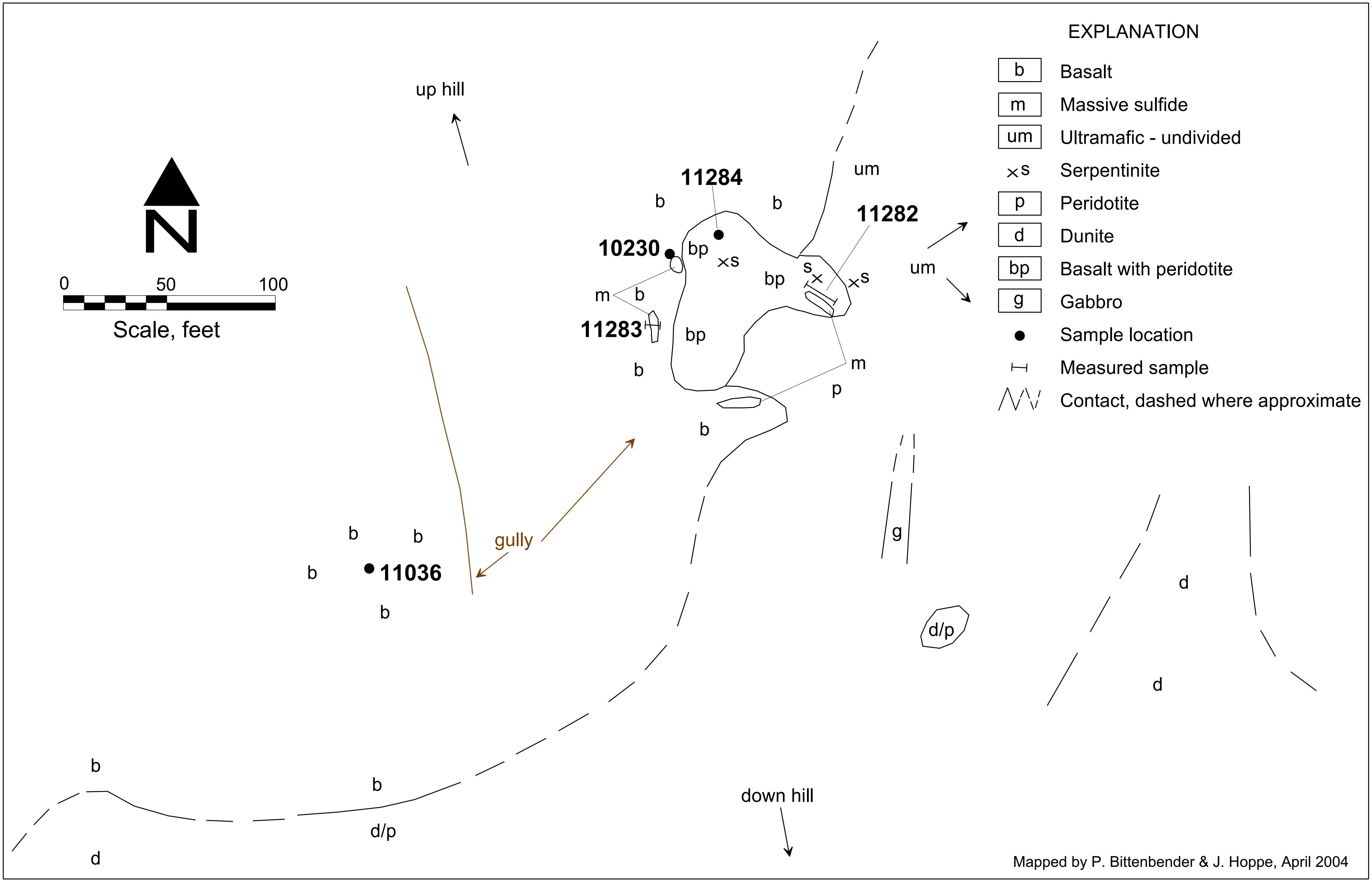


Figure 69. - Sketch map of the GR14-18 occurrence.

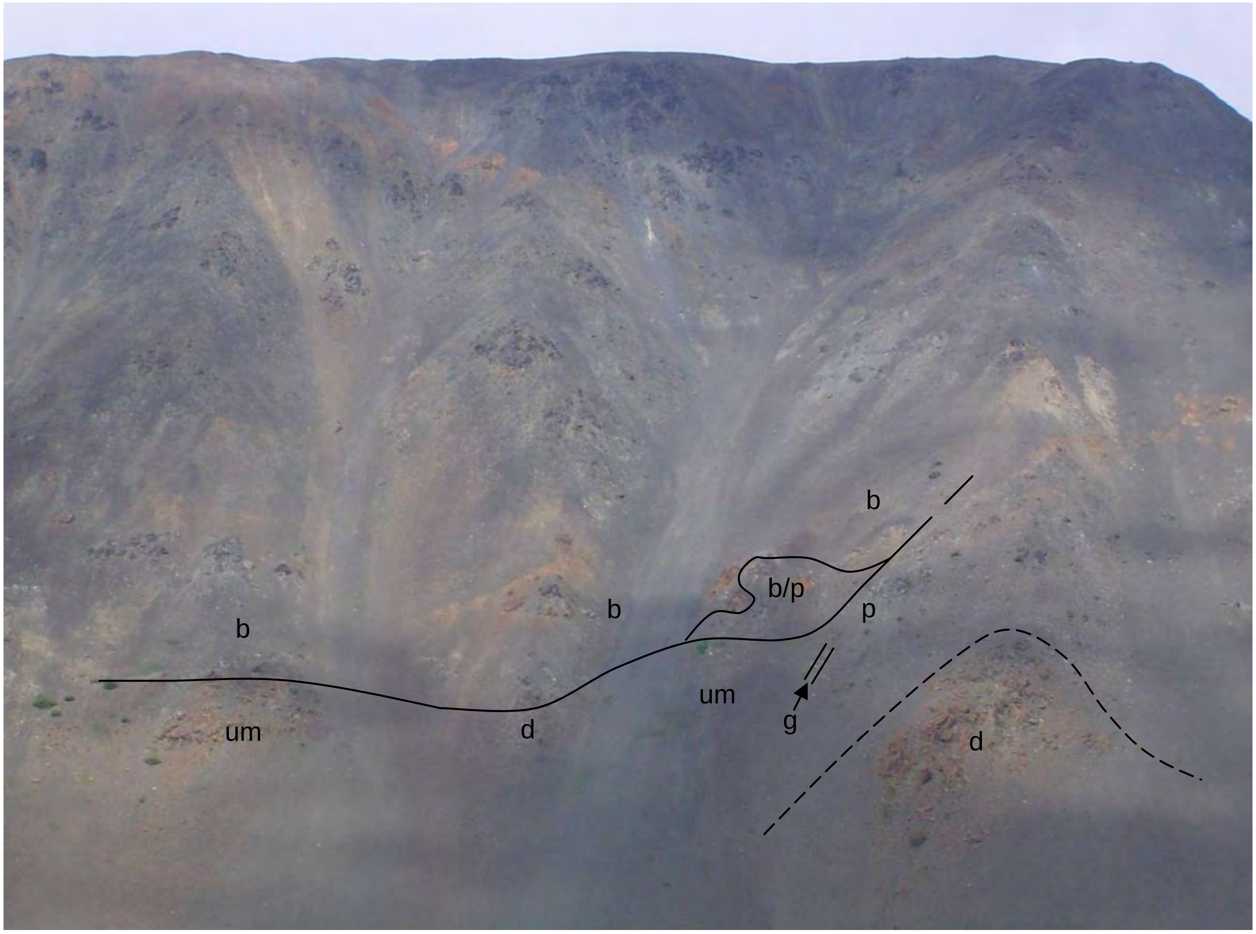


Figure 70. Aerial view of the GR 14-18 occurrence.
(Massive to semi-massive sulfides of pyrrhotite and chalcopyrite hosted in basalt and peridotite near contact with ultramafic rocks. View to west. b = basalt, p = peridotite, d = dunite, g – gabbro, um = undifferentiated ultramafic rocks - mostly peridotite and dunite.)

Late brittle faulting is evident by breccia zones commonly found near the sulfide lenses. The breccia zones are made up mostly of angular basalt clasts in a matrix of hematite. Brittle faulting is also evident at the contact between the basalt and underlying ultramafic rocks. However, the faulting is discontinuous along the contact and intrusive relations between the basalt and ultramafics are locally evident.

The primary metallic minerals in the lenses comprise pyrrhotite, pyrite, chalcopyrite, and magnetite. They are generally very fine grained. Textures and segregations of minerals in one hand sample suggested several distinct episodes of mineralization: 1) An early episode with chalcopyrite dominant along with pyrrhotite, 2) a second one with chalcopyrite and magnetite, 3) a third with magnetite dominant, and 4) a late stage of crosscutting pyrrhotite with minor chalcopyrite (sample 10230). Another sample revealed intergrown pyrrhotite and chalcopyrite, with the pyrrhotite commonly altered along crystallographic axes to magnetite. Late stage veinlets of pyrrhotite and hematite (after magnetite?) crosscut the sample (sample 10807). Along with the semi-massive to massive metallic suites in thin section are isolated euhedral to anhedral clinopyroxene crystals and epidote. One sample comprised about 25 percent garnet along with pyroxene and epidote.

The BLM identified no carbonate minerals in the immediate vicinity of the occurrence, or in samples or thin sections collected from the occurrence. Nonetheless, the way the lenses crop out, the existence of skarn minerals, and the chalcopyrite-pyrrhotite-magnetite association with little to no precious metal values suggest a skarn-type occurrence for at least some of the mineralized rocks in the area. Other parts of the site may represent a basaltic copper type occurrence.

Bureau Investigation: BLM investigators made a brief visit to the GR 14-18 site in 2003 and a more thorough examination in 2004. Two samples from lenses of semi-massive to massive sulfide collected in 2003 revealed 1.78 and 1.75 percent copper along with 414 and 536 ppm cobalt (samples 10230 and 10807 respectively). Precious metal values were low.

In 2004 the BLM collected 12 additional samples from the area. Three of these were from the area of concentrated massive sulfide lenses; the others were from lenses scattered to the west-southwest of the main occurrence. Analyses of the three samples reveal concentrations of base and precious metals similar to those collected in 2003. A spaced chip sample along 14 feet of an elongate lens returned 0.98 percent copper, 174 ppm cobalt, and 34 ppb gold (sample 11282). Another sample returned 0.97 percent copper, 348 ppm cobalt, and 116 ppb gold in a continuous chip sample across 3.8 feet of another massive to semi-massive sulfide lens (sample 11283). The highest PGE value of the samples was only 15 ppb platinum (sample 11282).

BLM investigators collected nine samples from the scattered sulfide lenses and iron-stained zones to the west and southwest of the main occurrence. The highest copper values were 1.23 percent and 1.5 percent from lenses 500 feet to the west-southwest (sample 11037) and 700 feet to the west (sample 11038) respectively of the main occurrence. One of these samples had 67 ppb platinum (sample 11038), which was the highest PGE value returned from the area. The highest gold value was 186 ppb (sample 11043), which came from a massive, iron-stained lens of magnetite and pyrrhotite with minor chalcopyrite about 1,200 feet to the west-southwest of the main occurrence.

Mineral Development Potential: Low

Conclusions: The GR 14-18 occurrence seems to be a basaltic copper or skarn type of deposit. Neither of these types of deposits has attracted recent mineral exploration interest in the district generally because of their small sizes. When BLM geologists first found the occurrence, its proximity to ultramafic rocks suggested it may be related to them. Massive sulfides in the Triassic ultramafic rocks of the district are generally elevated in PGE – in some places significantly elevated in PGE (e.g., Canwell Glacier prospect, Map no. 300, p. 134). For this reason the BLM collected a large number of samples and made a more detailed examination of the occurrence.

BROXSON RIDGE MAGNETITE

Alternate Name(s):	Broxson Ridge Mag, GR 14-18 area	Map No:	160
		MAS No:	0020680391
Deposit Type:	Basaltic Cu	**Commodities:**	Cu, Ag, Au
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 17, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,300 feet
Latitude:	63.349991	Longitude:	-146.059411

Geographic: The Broxson Ridge Magnetite occurrence is located on the southeast-facing side, near the crest, of the ridge between the East and Middle forks of Broxson Gulch.

Access: Access is most practical by helicopter, although ATV and winter trails allow access to a camp on the East Fork of Broxson Gulch. The camp on Broxson Gulch also has an airstrip. From the camp the Broxson Ridge Magnetite occurrence is accessible on foot, about 2 miles to the northeast.

History: The Broxson Ridge Magnetite occurrence was discovered by BLM investigators in 2003.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The host rock of the Broxson Ridge Magnetite occurrence was originally described by Rose (1965) as amphibole “serpentinite,” but he subsequently changed his interpretation to basalt (Rose, 1966a). The basalt is part of his Mississippian to Pennsylvanian Rainy Creek Basalt, which is thought to be at least 1,500 feet thick and represent flows with interbedded sediments (Rose, 1966a).

The host rock is generally a massive, black, porphyritic aphanite that appears to have been serpentinized. It is similar to what is found farther to the east, near Rainy Creek, and is thought to be the host of the Rainy Ultramafic complex. In the Rainy complex area this rock has been defined on the basis of petrography and whole rock chemistry as picritic basalt (Larry Hulbert, personal communication, 2002). In the Rainy area, the picritic basalt is more altered. The host rock at Broxson Ridge, on the other hand, exhibits euhedral phenocrysts of olivine, only partially altered, in a basaltic matrix. The olivine phenocrysts are partially altered to serpentine and magnetite.

The Broxson Ridge Magnetite occurrence is exposed in an iron-stained knob that measures approximately 25 by 35 feet (Figure 71). It protrudes about 15 feet above the surrounding talus on its downhill side. The knob is made up mainly of fine-grained, granular, gray to greenish-gray clinopyroxenite with lenses of massive magnetite and gossan. One prominent mass of magnetite measures approximately 6 by 5 feet and occurs about in the middle of the outcrop. The gossan occurs in rounded lenses up to 2 to 3 feet across and appears as a yellowish-orange,

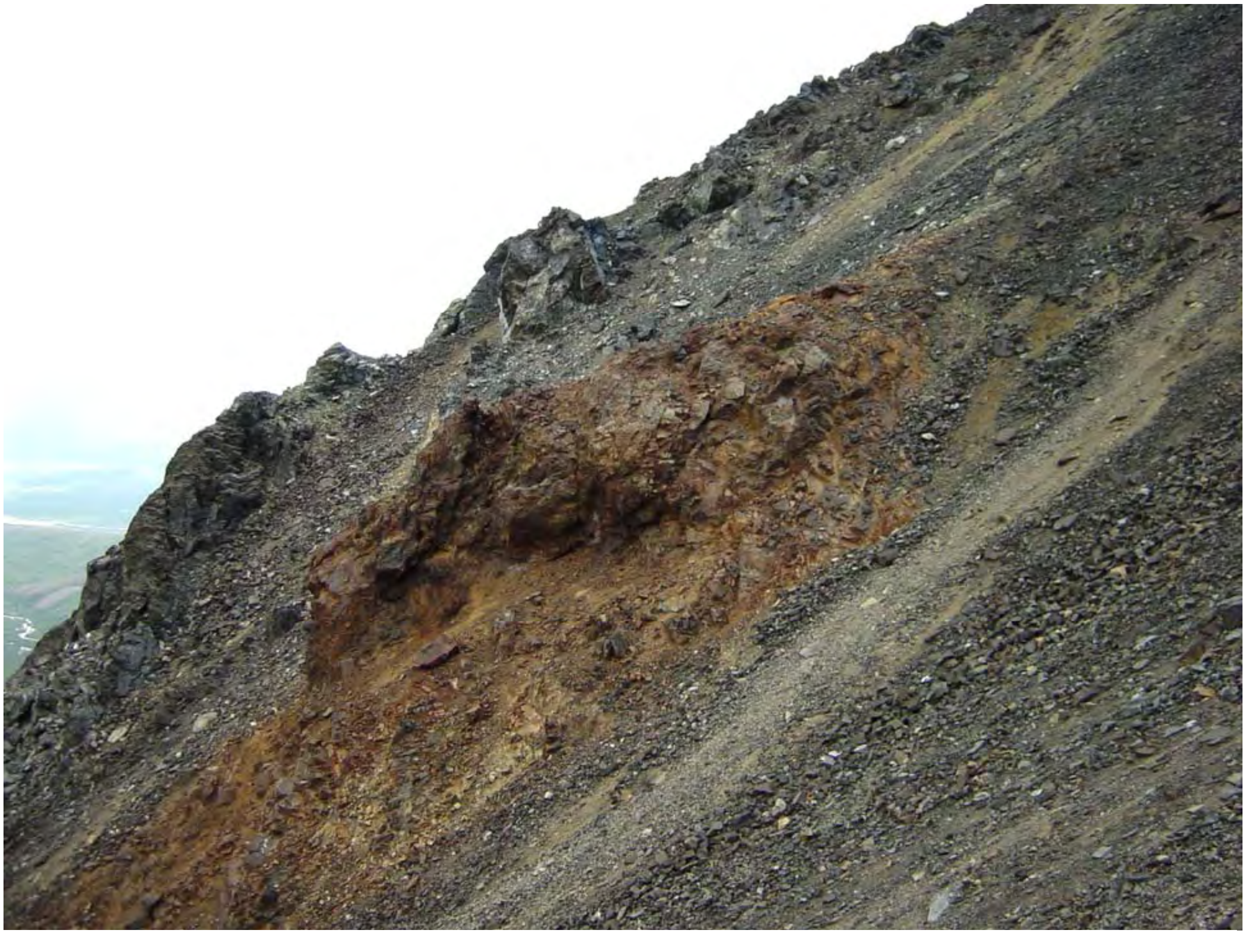


Figure 71. View to the south of the iron-stained outcrop at the Broxson Ridge Magnetite occurrence.

unconsolidated sandy substance. Several discontinuous bands of brecciated rock cut across the outcrop (Figure 72). The breccia is composed of clasts of magnetite and clinopyroxenite in an iron oxide matrix. Copper staining is common on fracture surfaces of the clinopyroxenite.

The sulfides at the Broxson Ridge Magnetite occurrence are generally finely disseminated in the clinopyroxenite. Chalcopyrite predominates, but is associated with minor amounts of covellite, cubanite, and native copper.

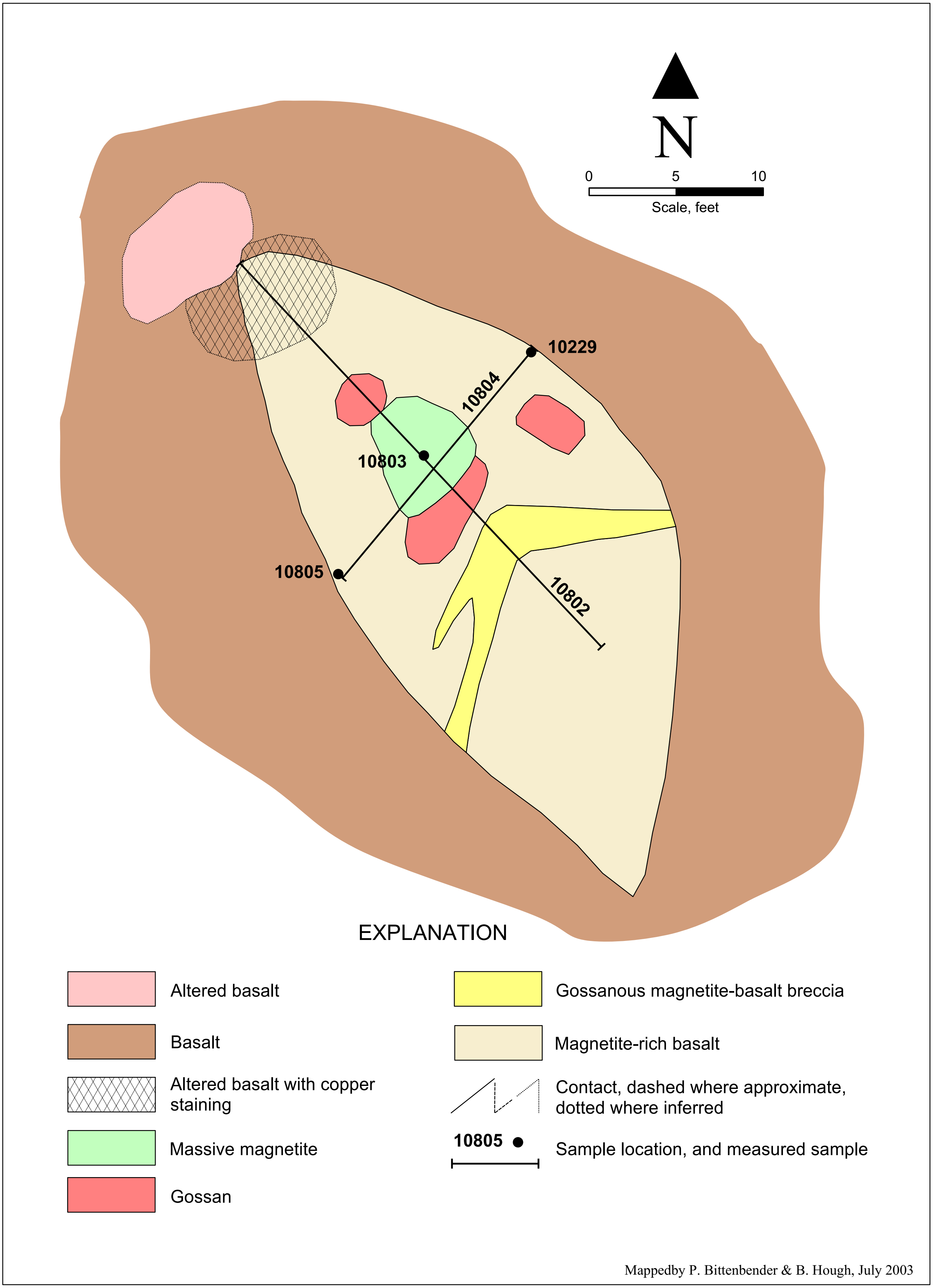


Figure. 72. Sketch map of geology and sample locations at the Broxson Ridge Magnetite occurrence.

About 100 feet east of the Broxson Ridge Magnetite knob is an outcrop of what BLM investigators originally described as “altered, silicified, serpentinite,” or “silicified andesite.” A thin section of similarly described material from the Broxson Ridge Magnetite outcrop was determined to be clinopyroxenite. The size of the outcrop to the east is on the order of hundreds of feet. Near the downhill end of the outcrop is an area, approximately 40 by 75 feet, with common copper staining (Figure 73). Several lenses of semi-massive sulfide and gossan are exposed in the steep face of the outcrop. One lens measured about 1.5 by 3 feet. About 30 feet farther up the cliff face there is another lens that appears to be about 3 by 10 feet. Iron and copper staining that cover parts of the cliff face seem to originate from these lenses. In this exposure to the east of the Broxson Ridge Magnetite outcrop, there is little evidence of magnetite.

Figure 73. Iron and copper staining on outcrop 100 feet east of Broxson Ridge Magnetite knob.

Bureau Investigation: BLM investigators mapped the Broxson Ridge Magnetite knob and collected several samples across the exposure. Sample 10802 was collected across the longer dimension of the knob, over 30 feet; it contained 0.25 percent copper, 1.9 ppm silver, and 0.1 ppm gold. Sample 10804, collected over 14 feet across the shorter dimension of the knob, contained 0.17 percent copper, 2.3 ppm silver, and 0.1 ppm gold. Higher concentrations of copper, silver and gold were found in more restricted parts of the occurrence. A select sample contained 2.06 percent copper, 10.4 ppm silver, and 0.9 ppm gold.

A sample collected from one of the lenses exposed in the outcrop about 100 feet east of the Broxson Ridge Magnetite knob contained 1.59 percent copper, 6.0 ppm silver, and 0.35 ppm gold (sample 10806).

Mineral Development Potential: Low

Conclusions: The Broxson Ridge Magnetite occurrence is probably an example of a basaltic copper type of deposit. If this is the case, and the occurrence is similar to the other basaltic copper occurrences in the area, it is unlikely to attract much exploration attention. Most of the basaltic copper occurrences in the district are limited in size and generally contain few precious metals. On the other hand, the Broxson Ridge Magnetite occurrence seems to contain more precious metals than the other basaltic copper occurrences, although they are still relatively low. A possible reason for this difference is that this occurrence is hosted by picritic basalts that may have been the first eruptive rocks of the Nikolai basalt sequence (Larry Hulbert, personal communication, 2004). These potentially hotter eruptive rocks may have concentrated relatively more precious metals than the other basaltic copper occurrences hosted in the tholeiitic Nikolai basalts. One might still expect that the occurrence has only a limited size potential, similar to the other basaltic copper occurrences in the area.

GR 14-20

Alternate Name(s):	Broxson Ridge	Map No:	164
		MAS No:	0020680249
Deposit Type:	Unknown	Commodities:	Ni, Ag
Location:			
Quadrangle:	Mt. Hayes, B-5		SE1/4 Sec: 18, T18S, R09E
Meridian:	Fairbanks	Elevation:	4,850 feet
Latitude:	63.349401	Longitude:	-146.078969

Geographic: The GR 14-20 occurrence is located on the northwest facing slope of the ridge between the East and Middle forks of Broxson Gulch.

Access: Access is easiest by helicopter, although ATV and winter trails allow access to a camp on the East Fork of Broxson Gulch. The camp on Broxson Gulch also has an airstrip. From the camp the GR 14-19 occurrence is accessible on foot, about 1.75 miles to the north-northeast.

History: Rose (1965) discovered the GR 14-20 occurrence during mapping of the area in 1964. Besides Rose's references (1965; 1966a), there is no other known mention of the occurrence in published literature.

ARDF Name / No.: Unnamed (ridge between the middle and east forks in Broxson Gulch) / MH119
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Rose (1966a) locates the GR 14-20 occurrence in a unit of tuffs and sediments associated with his Mississippian to Pennsylvanian Rainy Creek basalt. The tuffs and sediments are thought to be interlayered with the basalt, which is at least 1,500 feet thick. The occurrence is located adjacent to a plug of ultramafic rocks (Rose, 1966a).

Rose (1965) describes the GR 14-20 occurrence as an iron-stained, silicified, hornfelsic sandstone that contains disseminated pyrrhotite. He reports nickel and silver along with traces of copper and gold in samples collected from the occurrence (Rose, 1965).

BLM investigators found an iron-stained outcrop of chert with disseminated pyrrhotite that is likely to be the site described by Rose (1965). The outcrop is exposed for 130 feet in a northwest-southeast direction and is about 30 feet thick. It is covered beyond these dimensions by talus. The next closest outcrop, to the north, is un-mineralized and looks like the altered basalt described by Rose (1966a) as the Rainy Creek basalt.

The more iron-stained parts of the outcrop have about 5 to 10 percent disseminated pyrrhotite and make up about 20 percent of the 130-foot exposure. Other parts of the outcrop contain about 1 to 2 percent pyrrhotite. The pyrrhotite is mainly very fine grained and disseminated, but also occurs in patches and thin veinlets. There are some gossanous zones on either end of the outcrop, about 3 to 5 feet across, that suggest there may be lenses of more massive sulfides present that are not exposed.

Bureau Investigation: BLM investigators collected two measured samples across particularly iron-stained parts of the GR 14-20 outcrop. One of the samples was across 13 feet (sample 10864) and the other across 14 feet (sample 10865). Neither of the samples returned elevated base or precious metal values.

Mineral Development Potential: Low

Conclusions: The GR 14-20 occurrence seems to be made up primarily of iron sulfides with few associated base and precious metals. There is evidence of larger masses of sulfides having previously been weathered away, but it is most likely that these sulfide bodies would have the same base and precious metal contents as what remains. The extent of the mineralized rock is limited as well.

GR 14-15

Alternate Name(s):	Unnamed Occ. 11	**Map No:**	190
		MAS No:	0020680149
Deposit Type:	Replacement	**Commodities:**	Au, Cu
Location:			
Quadrangle:	Mt. Hayes, B5	TRS:	SW1/4 Sec: 28, T18S, R09E
Meridian:	Fairbanks	Elevation:	5,200 feet
Latitude:	63.320856	Longitude:	-146.032226

Geographic: The GR 14-15 occurrence is located near the top of a ridge on a south-facing slope near the head of Specimen Creek. Specimen Creek drains the foothills of the south flanks of the Alaska Range approximately 10 miles west of the Richardson Highway.

Access: A primitive, seasonal access road runs part way up Specimen Creek about 1 mile south of the occurrence. Access to the road during summer months is difficult, as one must cross the Delta River. Helicopters can land within a hundred yards or so of this occurrence.

History: Rose (1965) reported copper staining in serpentinite and light colored rock. Exploration company geologists sampled the area during 2001 and 2002 with good gold results (Alan Day personal communication, 2003). Claims covering the occurrence are currently held by Nevada Star Resources.

ARDF Name / No.: Unnamed/MH137 **Alaska Kardex:** None

Production: None **Workings and Facilities:** None

Geologic Setting: The GR 14-15 occurrence is located in Triassic mafic rocks equivalent to the Nikolai Greenstone (Nokleberg and others, 1992b). Tectonically, these rocks occur south of the Broxson Gulch thrust and north of the Eureka Creek fault. A 4- foot sample of mineralized rock collected by Rose (1965) contained 0.09 oz/ton gold and 1.18 ounces silver.

Bureau Investigation: The BLM found the occurrence to consist of a collection of several light colored and iron oxidized outcrops protruding from a rubblecrop slope composed mostly of serpentinized mafic to ultramafic rocks over an area approximately 150 by 300 feet. The outcrops appear to consist of lighter colored gabbro dikes which cut the serpentinite. Copper staining in the dikes was observed, as well as disseminated chalcopyrite.

A measured sample across 10 feet of outcrop returned 10.7 ppm silver, 1.37 ppm gold, and 2.15 percent copper (sample 10147). These mineral concentrations are less than reported by Rose (1965) and Alan Day (personal communication, 2003) but are still anomalous for the area.

Mineral Development Potential: Medium

Conclusions: The gold and silver values over this area are relatively high, occur over a sizable area, and may extend to depth, making this an attractive exploration target.

GHEZZI

Alternate Name(s):	Rainbow Eastern Star Pioneer	Map No:	199
		MAS No:	0020680046
Deposit Type:	Porphyry(?) Cu	Commodities:	Cu, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4, Sec: 34, T18S, R09E
Meridian:		Elevation:	5,000 feet
Latitude:	63.31357	Longitude:	-145.98547

Geographic: The Ghezzi prospect is located at the end of a southeast-trending ridge, between the west and north forks of Rainy Creek.

Access: Access to the Ghezzi prospect is by helicopter. Open ground makes for easy helicopter landings anywhere around the Ghezzi prospect.

History: The first record unequivocally pertaining to the Ghezzi prospect is a reference to claims being staked at the property. In 1953 Alfred Ghezzi and William McCann staked the Rainbow, Eastern Star, and Pioneer claims (Alaska Kardex 68-44). Prior to this there are two obscure references to copper lode deposits on Rainy Creek. Brooks (1918) reports prospecting for copper in the area in 1916. Martin (1920) reports that a deposit of copper on Rainy Creek was discovered in 1915. His report may have been referring to the Ghezzi prospect.

In 1966, claims covering the Ghezzi prospect were acquired by the Tennessee Corp. (Alaska Kardex 68-44). At about this same time, Leo Mark Anthony became associated with the prospect (Alaska Kardex 68-44, 68-46). L.M. Anthony eventually staked more claims in the area until he controlled a block of at least 36 claims (Alaska Kardex 68-44). In 1974 L.M. Anthony drilled two core holes at the prospect (Stout, 1976; unpublished map from L.M. Anthony, dated “Nov/74”).

ARDF Name / No.: Pioneer; Eastern Star; Rainbow; Ghezzi / MH148
Alaska Kardex: 68-44

Production: None

Workings and Facilities: Workings at the Ghezzi prospect include numerous pits and trenches. There is evidence at the site of diamond core drilling and the remains of a camp.

Geologic Setting: On a broad scale the Ghezzi prospect area has been mapped as gabbro (Rose, 1966a; Nokleberg and others, 1992b) in basalt (Rose, 1966a). In the immediate area of the prospect it seems that a host Triassic basalt has been intruded by two phases of gabbro, a light- colored leucogabbro and a dark-colored melagabbro (Figure 74).

Figure 74. Sketch map of the Ghezzi prospect

Mineralized rock at the Ghezzi prospect appears to be restricted to the leucogabbro, particularly in places where it is the most altered. Alteration includes the introduction of silica, epidote, titanite, and chlorite; argillic and sericitic alteration of plagioclase; and destruction of mafic minerals. The leucogabbro is cream to light brown-colored rock on weathered surfaces. The fresher leucogabbro looks more black and white, with black, subhedral pyroxene phenocrysts and interstitial, anhedral plagioclase. The highest degree of alteration seems to be associated with areas of brecciation, which are also the most mineralized with copper.

Mineralization consists of disseminated and patchy chalcopyrite and pyrrhotite. The sulfides are commonly associated with alteration minerals in the gabbro, e.g., epidote, titanite, chlorite, etc. Oxidation of the copper minerals is common with chrysocolla/malachite staining common. Chrysocolla/malachite also occurs as the matrix to weathered gabbro clasts in tectonic breccia.

In about 1974, two diamond drill holes were drilled at the Ghezzi prospect. The holes are marked on a hand-drawn map given to the BLM by Leo Mark Anthony in 2002, which is dated November, 1974. According to the map, one of the holes intercepted 90 feet that assayed 0.13 percent copper. The other hole failed to intersect significant mineralized rock. Surface sampling of trenches marked on the map are indicated to have returned the following: 70 feet at 0.71 percent copper, 22 feet at 1.04 percent copper, 100 feet at 0.93 percent copper, and 23 feet at 0.8 percent copper. Each of these zones are suggested to be part of an approximately east-west striking interval about 40 to 90 feet thick that dips to the north at about 30 degrees (unpublished map, 1974).

Bureau Investigation: BLM personnel surveyed and mapped the Ghezzi prospect in 2002 and collected 19 samples in 2001 and 2002. Analytical results from the sampling indicates that only copper is present in significant quantities. BLM personnel collected a grab sample with 5.5 percent copper (10218), which is the highest grade sample collected. Measured samples include almost 1 percent copper over 70 feet (10020), 55 feet at 0.3 percent copper (10221), 36 feet at 0.6 percent copper (10220), and 11 feet at 0.4 percent copper (10019). The highest precious metal value was 1.1 ppm gold from a ‘representative’ sample that also contained 3.11 percent copper (9761). The highest platinum or palladium value was about 10 ppb.

Mineral Development Potential: Medium

Conclusions: Mineralized rock at the Ghezzi prospect is generally low grade, but relatively widespread. The site may represent a large tonnage, low grade deposit. As such, it might be of interest to mineral exploration companies.

The highest concentrations of copper seem to be associated with breccias. Additional mapping of structures in the area may provide evidence for concentrations of structures with the potential for higher copper values.

SOUTH ANN COPPER

Alternate Name(s):	South Ann Cu	**Map No:**	245
		MAS No:	0020680271
Deposit Type:	Porphyry(?) Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 28, T18S, R10E
Meridian:		Elevation:	4,400 feet
Latitude:	63.32159	Longitude:	-145.84778

Geographic: The South Ann Copper occurrence is located on a small knob that is part of a northeast-trending ridge between Ann Creek and Rainy Creek. It is approximately 500 feet south of the 90 degree bend in the largest tributary to Ann Creek, which flows to the east-northeast.

Access: Access is most easily accomplished by helicopter. A light helicopter can land above or below the talus slope on which the mineralized rock is exposed.

History: The South Ann Copper occurrence was discovered by mineral exploration companies during nickel-copper-PGE exploration in the 1990's (Bill Ellis, personal communication, 2002).

ARDF Name / No.: Unnamed (south of Ann Creek) / MH162 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Copper-bearing mineralized volcanic rock at the South Ann Copper occurrence is part of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b).

The volcanic rocks at the occurrence appear to be dacitic to andesitic tuffs. They are fine to very fine grained, commonly iron-stained and appear to be silicified. Mineralization includes pyrite and chalcopyrite, which is disseminated and in patches within the rock. The mineralized rock is widespread in the area of the occurrence.

Bureau Investigation: BLM personnel collected two samples from the South Ann Copper occurrence in 2002. One sample, collected from about 10 pieces of rubble across about 150 feet of the slope was considered to be representative of the iron-stained rocks in the area, which make up about 15 percent of the rocks. The sample returned 5,100 ppm copper (sample 10059). A select sample of silicified andesite with sulfides from the site contained 2.38 percent copper and 13.1 ppm silver (sample 10179). Neither of the samples had elevated gold contents.

Mineral Development Potential: Low

Conclusions: The rock mineralized with copper at the South Ann Copper occurrence is quite widespread. A representative BLM sample across 150 feet contained over half a percent copper. The mineralized rock at the occurrence may have extended beyond the BLM's 150-foot sample length as well. These are the grades and extents that might interest a mineral exploration company.

The BLM does not have enough information, however, to be definitive about the occurrence. All BLM samples were collected from rubble, so the nature of the occurrence is still largely unknown. If the BLM sampling happened to be along the strike of the occurrence, there may only be a relatively small amount of mineralized rock at the site. More work needs to be done to determine the significance of the occurrence. This might include digging to expose bedrock.

JOE CLAIMS

Alternate Name(s):		**Map No:**	247
		MAS No:	0020680380
Deposit Type:	Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NE1/4 Sec: 29, T18S, R10E
Meridian:	Fairbanks	Elevation:	4,120 feet
Latitude:	63.33038	Longitude:	-145.86117

Geographic: The Joe Claims occurrence is on the north side of an eastward draining valley near the head of Ann Creek. The occurrence is located about 1 mile southeast of the peak of elevation 6,300 feet, which is marked on the USGS, Mt. Hayes, B-4, 1:63,300-scale topographic map.

Access: Access to the site is easiest by helicopter.

History: Cominco Alaska Inc. staked two blocks of claims that they called the Joe claims in 1984 and 1985. A total of 66 claims were staked. Assessment work on the claims is recorded until 1987 (Alaska Kardex 068-275). Additional information on Cominco Alaska's work at the site is not available to the BLM.

ARDF Name / No.: None **Alaska Kardex:** 068-275

Production: None

Workings and Facilities: None

Geologic Setting: The Joe Claims occurrence is situated immediately north of the Rainy Creek mafic-ultramafic complex, in Pennsylvanian to Permian andesitic volcanic rocks of the Slana Spur (Nokleberg and others, 1992b) or Lower Tetelna Formation (Rose, 1965; 1966a; Stout, 1976). Rose (1966a) maps a generally east-west-trending fault in the immediate area that may account for shearing, silicification, and copper mineralization that BLM personnel found in the andesitic rocks

Bureau Investigation: BLM personnel collected two samples from the area in 2002. A 5-foot sample of sheared meta-andesite, altered by silicification, included 3 to 5 percent pyrite, both disseminated and in stringers along with minor chalcopyrite (sample 10176). Analysis of this iron-stained rock returned 2,840 ppm copper and only minor gold (4 ppb). A select sample of rubble collected below the outcrop (sample 10054) of silicified andesite with 5 to 10 percent disseminated and patchy pyrite and chalcopyrite contained 1.98 percent copper and 262 ppb gold. This sample came from a cobble about 1 cubic foot in dimension. Most of the iron-stained rubble in the area, however, seems to contain only pyrite.

Mineral Development Potential: Low

Conclusions: The Joe Claims occurrence may warrant further investigation. Clearly there is an elevated copper content in the rock and there is also elevated gold. The BLM did not do enough investigation of the site to establish the continuity of grade or extent of mineralized rock. However, if there was a significant amount of mineralized rock in the area, there would have been more mineralized rubble found by BLM investigators. The rubble sampled by the BLM apparently emanated from an iron-stained band of andesite that was not extensive enough to attract further BLM investigation.

RED KNOB

Alternate Name(s):	Gossan Hill	Map No:	278
		MAS No:	0020680318
Deposit Type:	Polymetallic vein / Porphyry(?)	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 18, T18S, R11E
Meridian:	Fairbanks	Elevation:	2,750 feet
Latitude:	63.350505	Longitude:	-145.702906

Geographic: The Red Knob prospect is on a small spur that juts into the south entrance of a small valley locally known as Red Rock Canyon. The occurrence is about 0.7 miles east of the Richardson Highway and is approximately 1 mile south of the terminus of the Canwell Glacier.

Access: Red Knob is located adjacent to a primitive dirt road accessible from the Richardson Highway. The road primarily provides access to quarry materials and is locally known as Red Rock Canyon Road.

History: Copper mineralization was reported by Dave Johnson, the current claim holder (D. Johnson, personal communication, 2002). Freeman (2002) conducted a prospect evaluation for Northridge Exploration/Dave Johnson in 2002.

ARDF Name / No.: Unnamed (Gossan Hill) / MH210 **Alaska Kardex:** None

Production: None

Workings and Facilities: Minor amounts of hand trenching have occurred at this showing.

Geologic Setting: The Red Knob prospect occurs in a package of volcaniclastic rocks of the Slana Spur Formation, Pennsylvanian to Permian in age (Nokleberg and others, 1992b). Tectonically, the occurrence is immediately south of the Denali fault and lies between the Broxson Gulch thrust to the north and the Eureka Creek fault to the south. Mineralization at the prospect is different in nature and presumably younger than that at the nearby Emerick prospect.

Bureau Investigation: The BLM found a brilliant red/orange rocky knob of volcaniclastics that protrudes into the southern edge of a small valley. The lower slopes are covered with talus and thick, red clayey soil. Mineralization consisting of chalcopyrite plus pyrite up to 50 percent is evident in float near the base of the slope, as well as in poorly exposed veins under the soil cover. The mineralization appears to be occurring in silicified veins in the highly sheared and altered volcanic host. Veins dip steeply and strike approximately 320 degrees. The presence of rather large float (approximately 3 feet in diameter) near the base of the hill suggests that some of the mineralization is concentrated in lenses or at vein/fracture intersections. The BLM sampled the massive to semi-massive sulfide mineralization from hand dug pits. Analyses revealed elevated copper up to 8,880 ppm, iron in excess of 15 percent, and anomalous silver, zinc, and barium (samples 10302, 10394). Freeman (2002) reported copper values of up to 11.2 percent at the same occurrence.

Mineral Development Potential: Low

Conclusions: Areas of similar alteration in volcaniclastics rocks occur in the uplands above the Red Knob prospect. Several of these areas are known to have copper mineralization as well, suggesting the possibility of a larger porphyry system. The lack of continuity of mineralization and insufficient ore volumes make it unlikely this occurrence will attract additional interest. A detailed study of copper mineralization in the area could help determine the presence of a porphyry system and the possible relationship to other copper porphyry systems elsewhere in the Alaska Range.

EAGLE'S NEST

Alternate Name(s):	Red Rock Canyon	Map No:	285
		MAS No:	0020680370
Deposit Type:	Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 01, T18S,R11E
Meridian:	Fairbanks	Elevation:	2,880 feet
Latitude:	63.34221	Longitude:	-145.70658

Geographic: The Eagle's Nest occurrence is located east of the southern end of Red Rock Canyon. The site sampled was from a bench about 150 feet above the canyon floor, where quarry blasting was done to produce quarry rock for road construction.

Access: The Eagle's Nest occurrence is accessible by road and on foot. A dirt road leads from the Richardson Highway, about 1 mile north of the mouth of Phelan Creek, to the east to Red Rock Canyon. The Eagle's Nest occurrence in up a steep road, accessible by tracked vehicle to the east of the southern end of Red Rock Canyon (the road was constructed for a track-mounted drill).

History: In 2002, Dave Johnson from Delta Junction held State mining claims that cover the area (BLM claim records). He showed the occurrence to BLM investigators.

Shot rock from Red Rock Canyon has been used for an unknown period of time for road construction and maintenance on the Richardson Highway. The site sampled by BLM investigators was newly exposed by drilling and blasting for shot rock. The drilling and blasting at the Eagle's Nest occurrence was halted due to the discovery of a nearby eagle's nest.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: At least two core holes and significant excavation work has been done at the Eagle's Nest occurrence, however, this work was done to acquire shot rock and not for base or precious metal development.

Geologic Setting: Dacitic pyroclastic rocks have been intruded by andesitic porphyritic sills and dikes in the Eagle's Nest area. These are thought to be Pennsylvanian to Permian in age (Bond, 1976).

Mineralization consists predominantly of disseminated sulfides, mainly chalcopyrite and pyrite, in andesite. Copper staining of the rocks is common. In places the rocks have been cut by veins of quartz and calcite, which concentrate chalcopyrite.

Bureau Investigation: BLM personnel examined the Eagle's Nest occurrence in 2002 and collected five samples. Two samples from drill cuttings that represent 20 to 50 feet of rock indicate very low grades of copper (approximately 600 to 700 ppm; samples 10004-05). Another sample from the andesite, which contains a trace of sulfides and shows surficial copper staining (malachite) returned 515 ppm copper (sample 10208). A sample across a 2-inch quartz-calcite vein contained 3.04 percent copper (sample 10209). The highest gold value from the BLM samples was only 15 ppb (sample 10209).

Mineral Development Potential: Low

Conclusions: The copper mineralization in the area is low grade, but widespread. Higher grades may exist elsewhere in the mineralized area. The low precious metal values in the BLM samples make the site a less attractive exploration target.

GR 2-4

Alternate Name(s):	Unnamed Occurrence 15	**Map No:**	288
		MAS No:	0020680153
Deposit Type:	Polymetallic vein	**Commodities:**	Cu, Ag, Au
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 29, T18S, R11E
Meridian:	Fairbanks	Elevation:	4,500 feet
Latitude:	63.32708	Longitude:	-145.68726

Geographic: The GR 2-4 occurrence is located on the west side of Rainbow Mountain, approximately 1 mile east of the Richardson Highway near the confluence of Phelan Creek and Delta River.

Access: This site is on steep talus slopes and is only accessible by hiking up from the road or down from the ridge top where a helicopter can land.

History: Hanson (1963) reported sulfide-bearing quartz veins and areas of patchy copper staining at this locality. Active state claims cover the occurrence.

ARDF Name / No.: Unnamed / MH219 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Pennsylvanian to Permian volcaniclastics of the Slana Spur Formation host the GR 2-4 occurrence (Nokleberg and others 1991; 1992b).

Bureau Investigation: The BLM traced pieces of copper stained float up talus slopes to an outcrop containing small zones of copper oxide staining and a small pod (approximately 1 foot by 1 foot) containing chalcopyrite. A select grab sample of the pod contained 17.5 percent copper, 310 ppm silver, 29 ppb gold, and 264 ppm zinc (sample 10106).

Mineral Development Potential: Low

Conclusions: Copper concentrations are sub-economic at this locality, making it unattractive for further development. Based on geologic relationships, it appears most likely that the copper originated with the host volcanics and was concentrated by quartz veins emanating from nearby granitic intrusions. Additional investigation could confirm the porphyry/non-porphyry potential of the intrusions and their possible relationship to quartz-chalcopyrite veins.

VERONA PICK

Alternate Name(s):		**Map No:**	294
		MAS No:	0020680297
Deposit Type:	Polymetallic vein	**Commodities:**	Pb, Zn, Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 28, T18S, R11E
Meridian:	Fairbanks	Elevation:	5,050 feet
Latitude:	63.32180	Longitude:	-145.65329

Geographic: The Verona Pick prospect is located on the northeast flank of Rainbow Ridge (east of the Richardson Highway) and overlooks a small tributary to the Canwell Glacier. The site occurs along a fracture/shear that is exposed intermittently between an elevation of 5,000 and 5,100 feet.

Access: Access is most practical by helicopter, but the site can also be reached by hiking from Red Rock canyon up along the Canwell Glacier and over to the prospect, a distance of about 4 miles.

History: Dave Johnson, Northridge Exploration, discovered the Verona Pick occurrence sometime prior to 2000, at which time the occurrence was covered by the Talnakh No. 25 claim (BLM claim records; Dave Johnson, personal communication, 2002).

ARDF Name / No.: Verona Pick / MH220 **Alaska Kardex:** None

Production: None

Workings and Facilities: Two small pits have been dug along the vein/fracture to expose mineralization.

Geologic Setting: The Verona Pick prospect is located in a package of Permian (?) dacitic volcanic rocks (Nokleberg and others, 1992b) that have only recently been exposed by deglaciation. The dacite is locally very oxidized and fractured (Figure 75).

Bureau Investigation: The BLM found semi-massive sphalerite, pyrite, chalcopyrite, and galena occurring in a quartz-calcite vein hosted in dacite. The vein is concordant with steeply dipping, north-northeast-trending fractures and varies in thickness from 0.3 feet to 1 foot. The vein can be traced for about 100 feet, but exposure is not continuous, and the vein disappears under dacite rubble at either end. Samples across the vein ran as high as 5.06 percent lead (sample 10163), 21.8 percent zinc (sample 10335), 6,870 ppm copper (sample 10336), and 4.97 ppm gold (sample 10335). Smaller veins in fractures to either side of this main occurrence contained lesser to no concentrations of metals.

Figure 75. Altered dacite at the Verona Pick occurrence.

Mineral Development Potential: Low

Conclusions: Although the quartz sulfide vein at Verona Pick contains impressive concentrations of metals, the narrow and spotty mineralization makes it unlikely that enough tonnage exists to make this occurrence economic. The potential for further development of this occurrence is very low.

VERONA CIRQUE

Alternate Name(s):	Northridge Exploration	**Map No:**	296
		MAS No:	0020680243
Deposit Type:	Polymetallic vein	**Commodities:**	Au, Ag, Cu, Zn, Pb
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SE1/4 Sec: 28, T18S, R11E
Meridian:	Fairbanks	Elevation:	4,900 feet
Latitude:	63.32449	Longitude:	-145.63337

Geographic: The Verona cirque is north-northwest of Rainbow Mountain and southwest of the Canwell Glacier, near its toe. The occurrence itself is approximately 1.6 miles east-southeast of VABM Canwell and the peak marked ‘5422’ on the USGS, Mt. Hayes, 1:250,000-scale, topographic map.

Access: Access to the occurrence is most practical by helicopter, with numerous landing sites available in the cirque that hosts the occurrence. Alternative access is possible by road and on foot. A dirt road leads from the Richardson Highway, about 1 mile north of the mouth of Phelan Creek, to the east through Red Rock Canyon and on along the southwest side of the Canwell Glacier. From the end of the road it is about a 2.5-mile walk and 2,000-foot elevation gain to the occurrence.

History: Mineralized rock at the Verona Cirque occurrence was discovered by Dave Johnson of Delta Junction, Alaska, sometime prior to 2003 (Dave Johnson, personal communication, 2003).

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: None

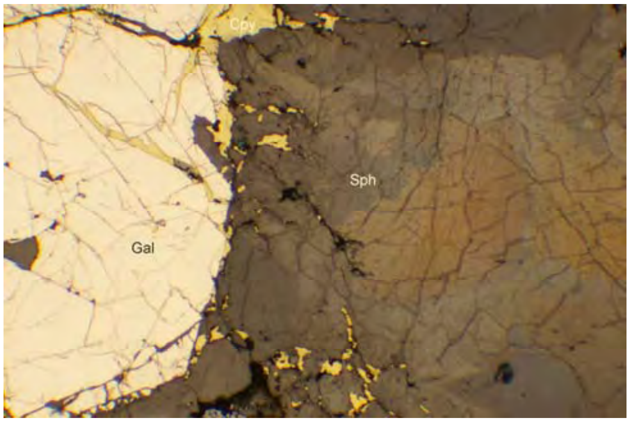
Geologic Setting: The cirque that hosts the Verona Cirque occurrence is mostly filled with Quaternary glacial deposits (Figure 76). To the east of the cirque is the Rainbow Mountain granodiorite of Nokleberg and others (1992b) that Hanson (1963) refers to more locally as hornblende quartz diorite. To the west Hanson (1963) maps mostly porphyritic andesite that he believes is Early Mesozoic in age. He also maps interlayered limestone, greywacke, and pyroclastic lava flows in the area to the west of the cirque (Hanson, 1963). These volcanic and sedimentary rocks are grouped in the Pennsylvanian to Permian Slana Spur Formation of Nokleberg and others (1992b).

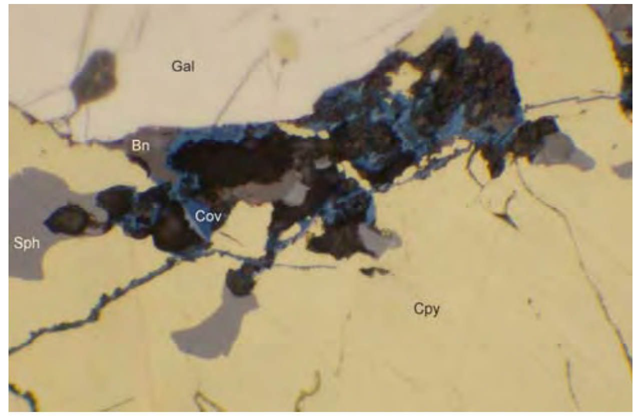
Exposures at the Verona Cirque occurrence are sparse due to the abundant Quaternary deposits. Much of the mineralized rock examined by the BLM was found in widely scattered float of probable local origin. The few mineralized outcrops that BLM investigators examined were found hosted in volcanic and sedimentary rocks, but in close proximity to the contact with the intrusion to the east of the cirque.

The host volcanic and sedimentary rocks comprise intermediate to mafic volcanics, described in the field as andesite. The rock commonly appears as dark green, massive, crystalline greenstone with porphyritic plagioclase and quartz in a fine-grained matrix. Porphyritic dacite is also present. The rock is commonly cut by epidote veinlets. In places the host rocks are iron stained and include disseminations and seams of pyrite and minor chalcopyrite.

The mineralization at the Verona Cirque occurrence is commonly associated with quartz veining or strong silicic alteration. The quartz veins seem to be structurally controlled and are commonly found within 20 to 30 feet of the contact with intrusive rocks. In one location a mineralized shear in andesite is exposed for about 35 feet, is covered on both ends by glacial debris, is 1 to 2 feet wide, and is oriented 140 degrees with a steep dip. The shear is within 20 to 30 feet of a quartz-bearing granitoid. Sulfides make up more than 50 percent of the mineralized shear in some places.

Figure 76. Mineralized volcanic rocks at the Verona Cirque occurrence. D.H. Johnson, Northridge Exploration. View approximately to the northwest, down the cirque hosting the occurrence.





77a **77b**

Figure 77. Reflected light images of massive sulfides from the Verona Cirque occurrence. (Sample 11136. Gal = galena, Sph = sphalerite, Cpy = chalcopyrite, Bn = bornite, Cov = covellite; 59a: 20X magnification, 0.86 mm long dimension; 59b: 50X magnification, 0.35 mm long dimension.)

Quartz veins or silicic parts of the volcanic sequence at the Verona Cirque occurrence locally include semi-massive sulfides, predominantly pyrite and pyrrhotite, but also with chalcopyrite, (plus other copper minerals), galena, and sphalerite (Figure 77). The semi-massive sulfides are generally only a few inches thick. Pyrite may be euhedral and banded in the quartz-rich parts of the rock, which commonly thicken and pinch out over a few feet.

Some of the float sampled by the BLM at the Verona Cirque occurrence is jasperoid with very fine- to coarse-grained euhedral pyrite and minor chalcopyrite. The jasperoid is interpreted as altered volcanic rock, which also includes epidote alteration. Dave Johnson, the claim holder, reports elevated gold concentrations associated with the jasper-bearing rock. A single BLM sample did not support this association.

The float and rubble that the BLM sampled at the Verona Cirque occurrence was scattered for over half a mile from the top of the cirque, at the foot of the cirque ice field, to where the day's traverse was ended. Dave Johnson reports that additional float and rubble can be found even farther down the cirque valley (Dave Johnson, personal communication, 2004).

Bureau Investigation: BLM investigators examined the Verona Cirque site with Dave Johnson, the current claim holder. While doing so they collected 11 samples to evaluate the mineralized rock. Due to the rarity of outcrops, only three of the BLM samples were from outcrop; the rest were from float or rubble crop.

The predominant metals revealed by analysis of the Verona Cirque samples are copper, zinc, and lead. These base metals are locally accompanied by elevated gold and silver values. The highest grade precious metals were 5.58 ppm gold and 279 ppm silver (sample 11133) from a grab sample of what was described in the field as a quartz-rich boulder. The boulder exhibited 5 to 10 percent chalcopyrite (3.35 percent copper in analysis) and other possible copper minerals along with pyrite and minor galena. The highest grade base metals were 5.7 percent copper (sample 11136), 7.01 percent zinc (sample 11247), and 1.36 percent lead (sample11136). Each of these samples was collected from float or rubble.

Seven of the 11 BLM samples contained over 1 percent copper and three contained over 1 percent zinc. Only two of the samples had more than 1 ppm gold, but six had more than 20 ppm silver. The highest grade gold and silver sample also contained the highest antimony concentration (sample 11133). There also seems to be a strong correlation between gold and silver concentrations and a somewhat weaker correlation between the base and precious metals.

Looking at the geographic distribution of the BLM's 12 samples indicates that the higher grade samples came from farther down the cirque valley, to the northwest. This correlation is suspect, however, due to the small number of samples collected, and the fact that all samples were collected on the same day.

Mineral Development Potential: Low

Conclusions: Analytical results of BLM samples from the Verona Cirque occurrence reveal high base and precious metal concentrations. In addition, the mineralized rock is spread over a large area. Given the paucity of outcrop in the area, however, it is difficult to evaluate the extent of mineralized rock. Additional exploration of the occurrence is warranted.

GR 2-12

Alternate Name(s):	Unnamed Occurrence 12	**Map No:**	322
		MAS No:	0020680150
Deposit Type:	Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	SW1/4 Sec: 12, T19S, R11E
Meridian:	Fairbanks	Elevation:	5,225 feet
Latitude:	63.280789	Longitude:	-145.56675

Geographic: The GR 2-12 prospect is located on the south side of the Alaska Range about 3 miles east of the Richardson Highway on a ridge immediately west of the McCallum Glacier.

Access: This site is best accessed by helicopter from the ridge crest above the site. It can also be accessed by foot via a relatively long hike up McCallum Creek from where it crosses the Richardson Highway.

History: Hanson (1963) reported sulfide bearing quartz veins at this locality. State claims of Nevada Star Resources Co. covered the occurrence in 2004 (State claim records).

ARDF Name / No.: Unnamed / MH235 **Alaska Kardex:** None

Production: None

Workings and Facilities: Two small, hand-dug trenches, approximately 150 feet apart, expose mineralization along the ridge crest.

Geologic Setting: Pennsylvanian to Permian volcaniclastics hosts the occurrence. Granitic rocks of Tertiary-Cretaceous age have intruded the host rocks immediately south of the occurrence.

Bureau Investigation: The BLM noted two orange, iron-stained rubblecrop areas which occur approximately 150 feet apart along the crest of the ridge. Small, hand-dug trenches across each zone reveal massive to semi-massive lenses of chalcopyrite, pyrite, and pyrrhotite in quartz-rich veins which cut the volcaniclastic host. Mineralized lenses up to a foot thick are exposed in the rubblecrop and do not appear to extend more than a few feet. The area of extreme oxidation at each site is limited to an area approximately 20 by 40 feet. Leaching of copper from the sulfides forms malachite- and azurite-coated talus just below the prospect. This phenomenon was also observed at least one location 200 meters up the ridge, but the source of the copper was covered by thick rubble. A sample of the sulfide-rich lens contained 10.95 percent copper and 100 ppm silver (sample 10538).

Mineral Development Potential: Low

Conclusions: Copper concentrations are sub-economic at this locality, making it unattractive for further development. Based on geologic relationships, it appears most likely that the copper originated with the host volcanics and was concentrated by quartz veins emanating from nearby granitic intrusions. Additional investigation could confirm the porphyry/non-porphyry potential of the intrusions and their possible relationship to quartz-chalcopyrite veins.

GR 2-13

Alternate Name(s):		**Map No:**	324
		MAS No:	0020680315
Deposit Type:	Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-4	TRS:	NW1/4 Sec: 12, T19S, R11E
Meridian:	Fairbanks	Elevation:	5,260 feet
Latitude:	63.284839	Longitude:	-145.566857

Geographic: The GR 2-13 occurrence is located on the south side of the Alaska Range about 3 miles east of the Richardson Highway on a ridge immediately west of the McCallum Glacier.

Access: This site is best accessed by helicopter from the ridge crest above the site. It can also be accessed by foot via a relatively long hike up McCallum Creek from where it crosses the Richardson Highway.

History: Hanson (1963) reported sulfide bearing quartz veins at this locality.

ARDF Name / No: Unnamed / MH236 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Pennsylvanian to Permian volcaniclastics hosts the GR 2-13 occurrence.

Bureau Investigation: The BLM collected a single sample of iron oxidized gossanous rock containing minor amounts of pyrite and pyrrhotite that yielded 1,150 ppm copper (sample 10371). The host rock is variably oxidized with a few local quartz veins up to about half an inch thick. Several small occurrences of copper-bearing minerals in rubble crop were noted down the ridge from this locality.

Mineral Development Potential: Low

Conclusions: Small concentrations of copper are scattered throughout the metavolcanics in the region. Unless they can be shown to be part of a larger porphyry system, they are unlikely to attract much exploration attention.

MINYA MOLY

Alternate Name(s):		Map No:	333
		MAS No:	0020680197
Deposit Type:	Porphyry Cu-Mo	Commodities:	Mo, Cu
Location:			
Quadrangle:	Mt. Hayes, B-3	TRS:	SW1/4 Sec: 34, T18S, R12E
Meridian:	Fairbanks	Elevation:	5,200 feet
Latitude:	63.30561	Longitude:	-145.42825

Geographic: The Minya Moly occurrence is located on the south edge of the Canwell Glacier approximately 10.5 miles up the glacier from the Richardson Highway.

Access: Access to this site is strictly by helicopter during favorable weather. Landing sites near the occurrence are restricted to the glacier; care should be taken to avoid crevasses. The occurrence is located in rubble crop at the base of cliffs which contain the upper part of the Canwell Glacier.

History: The BLM discovered this occurrence in 2001 during a reconnaissance investigation of the area. The occurrence is not covered by claims at this time.

ARDF Name / No.: None

Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: Outcrops in the area are limited to cliffs and peaks that jut out from surrounding glacial ice. The Minya Moly occurrence is on the southern edge of the Denali fault in a package of rocks mapped as Triassic gabbro, diabase, and metagabbro by Nokleberg and others (1992b).

Bureau Investigation: The BLM found metagabbro to diabase intrusive rubble crop at the base of the cliff which contains copper staining on fractures, rare disseminated coarse molybdenite, and disseminated chalcopyrite up to 1 to 2 percent. A select sample from rubblecrop contained 2,493 ppm copper, 953 ppm molybdenum, and anomalous barium at 454 ppm (sample 9275).

Mineral Development Potential: Low

Conclusions: There is the potential for a porphyry system at this site and further exploration could determine the extent of mineralization and relationship to other igneous rocks in the vicinity; however, the site is remote, in a hazardous glacial environment, and has low overall grade of mineralization.

GR 28-6

Alternate Name(s):		Map No:	402
		MAS No:	0020680323
Deposit Type:	Polymetallic vein	**Commodities:**	Ag, Pb, Zn
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NW1/4 Sec: 11, T20S, R14E
Meridian:	Fairbanks	Elevation:	5,100 feet
Latitude:	63.19953	Longitude:	-145.02224

Geographic: The GR 28-6 prospect is located in a east-west tributary valley, just west of the West Fork Glacier about 17 miles east of the Richardson Highway.

Access: The GR 28-6 prospect can be accessed by helicopter.

History: Rose (1967) reported a galena-quartz-carbonate vein at this locality. Hand-trenching and small pits indicate that this site was prospected subsequent to reporting by Rose (1967).

ARDF Name / No.: Unnamed / MH270 **Alaska Kardex:** None

Production: None

Workings and Facilities: Two hand-dug trenches, the largest measuring approximately 45 feet in length and 2 feet deep, and several small pits were observed at this prospect (Figure 78).

Geologic Setting: Rose (1967) maps the rocks in the area as andesite to dacite agglomerates of the Pennsylvanian to Permian age Chisna Formation. Nokleberg and others (1992b) map these same rocks as Permian to Pennsylvanian volcaniclastics of the Slana Spur Formation.

Bureau Investigation: The BLM observed a small color anomaly that is easily seen on the south slope of the valley. Closer inspection revealed an orange to white altered rubble/vein hosted in fossiliferous andesitic agglomerate. Several small pits and trenches have exposed very oxidized and weathered, vein of quartz, carbonate, and pyrite ± galena. The vein has an apparent trend of east-west, is perpendicular to the trenching and roughly parallel to the agglomerate, and is only exposed for a few meters. Select samples yielded 7 ppm silver, 1,065 ppm lead (sample 10947), and 411 ppm zinc (sample 10949).

Mineral Development Potential: Low

Conclusions: Exploration for copper porphyries in the area appears to have drawn exploration interest in the past. Due to its size and sub-economic mineral grades this small prospect is unlikely to attract significant exploration interest.

Figure 78. Trenches at the GR 28-6 prospect.
(View to the north.)

GR 28-8

Alternate Name(s):	Chester, D & M, Bonanza, Eldorado	**Map No:**	412
		MAS No:	0020680140
Deposit Type:	Porphyry Cu(?)	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	SE1/4 Sec: 14, T20S, R14E
Meridian:	Fairbanks	Elevation:	3,800 feet
Latitude:	63.17502	Longitude:	-145.00008

Geographic: The GR 28-8 prospect is located on the West Fork of the Chistochina River about 16 miles east of the Richardson Highway. It is about 1.3 miles northwest of peak '5581', marked on the USGS, Mt. Hayes, A-2, 1:63,360-scale, topographic map.

Access: The GR 28-8 prospect can be accessed by primitive access roads that branch off from the Glenn Highway to the south. These roads are best utilized in winter when the ground is frozen. Helicopter is the preferred method to access this occurrence. A dozer trail leads to the site from a cabin and airstrip 0.4 miles to the west-southwest.

History: Rose (1967) reported a quartz-pyrite-chalcopyrite vein at this locality that had been prospected by a small pit. Various lode claims covering the area were active from 1966 to about 1980. Many of these claims changed hands between parties in the 1970's. At one time, Alaska Petroleum and Mining, Inc. held the claims and entered into a joint venture with Gulf Mineral Resources Co. (Alaska Kardex 068-98, 148). The Bonanza placer(?) claims currently (2006) cover the occurrence (State of Alaska mining records, e.g., Case Id: ADL 358665).

ARDF Name / No.: Unnamed (near terminus of glacier at head of West Fork Chistochina River) / MH273
Alaska Kardex: 068-98, 148

Production: None

Workings and Facilities: A small pit was reported by Rose (1967); however, this was not found by the BLM.

Geologic Setting: Rose (1967) maps the rocks in the area as andesite to dacite tuffs and flows of Permian age. Nokleberg and others (1992b) map these same rocks as Permian to Pennsylvanian volcaniclastics of the Slana Spur Formation. A small plug of felsite intrudes these rocks in a few places near the occurrence.

Figure 79. Massive sulfide vein in fracture at the GR 28-8 occurrence.

Bureau Investigation: The BLM found pervasive hematite and copper staining in felsic intrusive rocks in cliff walls along the incised stream bed over an area approximately 450 by 1,500 feet (Figure 80). Copper minerals seem to be concentrated in veins and fractures with or without quartz (Figure 79). Scattered pods in veins of massive pyrite ± chalcopyrite ± bornite were also observed. Eight rock chip samples were taken along the occurrence. Representative chip samples along a 150-foot length contained 2.12 percent copper and 11.6 ppm silver (sample 10509). Metavolcanic rocks immediately upstream (north) of the intrusives contain pyrite and chalcopyrite in fractures, stringers, and lenses and returned values as high as 3.57 percent copper (sample 10107).

Figure 80. Aerial view to west of iron-stained rocks of the GR 28-8 occurrence. West Fork Chistochina River in background

Mineral Development Potential: Medium

Conclusions: There is copper porphyry potential here that appears to have drawn exploration interest in the past. Detailed mapping is needed at this site, in part to fill in gaps in previous mapping efforts, and also to determine if copper here is derived from the small local intrusion or from the older volcaniclastic host rocks.

CHISTOCHINA AIRSTRIP

Alternate Name(s):		Map No:	445
		MAS No:	0020680342
Deposit Type:	Polymetallic vein	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-3	TRS:	NE1/4 Sec: 21, T20S, R15E
Meridian:	Fairbanks	Elevation:	3,650 feet
Latitude:	63.1702	Longitude:	-144.86872

Geographic: The Chistochina Airstrip occurrence is located south of the Chistochina Glacier, on the east side of the valley just south of the mouth of Slate Creek. The occurrence is just east of the south end of the airstrip.

Access: The site is adjacent to an airstrip, so is easily accessed by small plane or helicopter.

History: Rose (1967) reported a highly pyritized andesitic dacite from north of the occurrence; but it was first specifically investigated as part of this study.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None

Workings and Facilities: There is no evidence that the Chistochina Airstrip occurrence has been worked. The old cabins and equipment, as well as the more recent airstrip, likely supported placer mining in the Slate Creek area (Figure 81).

Geologic Setting: The Chistochina Airstrip occurrence is located just south of the Slate Creek fault zone in up thrown rocks mapped as pyritic andesite to dacite agglomerates of the Pennsylvanian to Permian age Chisna Formation of Rose (1967). The occurrence is located near the contact between Early Permian volcanics to the north and Permian to Pennsylvanian marine sediments and volcaniclastics of the Slana Spur Formation to the south (Nokleberg and others, 1992b).

The BLM noted that oxidized rocks are easily seen on the cliff slopes east of the south half of the airstrip. Closer inspection revealed a highly iron oxidized, limonitic volcanic breccia (Figure 81). The orange-red breccia is iron cemented, with prominent iron and minor copper oxide staining. The deposit contains clasts of andesite to dacite with disseminated pyrite, minor chalcopyrite, and clots of semi-massive pyrite. The breccia forms resistant cliffs with large boulders on the hillside. Because this deposit is located on the geologic contact of Nokleberg and others (1992b), but south of the Slate Creek fault zone (Rose, 1967), it is unclear if the deposit is related to brecciation of a fault, contact between units, a splay of the Slate Creek fault zone, a lateral ice-contact glacial deposit from the adjacent slopes, or similar sediments from the Slate Creek fault zone that have been smeared down the valley.

Bureau Investigation: The BLM collected five samples from this occurrence. Assays returned values as high as 4,460 ppm copper, 4 ppm silver, and 1,850 ppm arsenic (sample 11111).

Mineral Development Potential: Low

Conclusions: Exploration for copper porphyries in the area has been of interest in the past, but relatively low grades make it unlikely that this occurrence will attract much interest. Detailed mapping of the occurrence and surrounding area could help to determine the type and characterization of mineralization, as well the relationship to surrounding geologic units and the Slate Creek fault zone.

Figure 81. Views of the Chistochina Airstrip occurrence vicinity and mineralized rock.

COPPERTONE

Alternate Name(s):	Northland Mines Discovery Chisna	Map No:	452
		MAS No:	0020680090
Deposit Type:	Porphyry Cu	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-2		SW1/4 Sec: 22, R 20S, R15E
Meridian:	Fairbanks	Elevation:	4,600 feet
Latitude:	63.16154	Longitude:	-144.86373

Geographic: The Northland Mines property (including the Coppertone prospect) historically refers to a small section of uplands between Slate Creek, Powell Gulch, Chisna Pass, and the Chisna River. The Coppertone prospect specifically identifies a mineralized zone in a group of claims located south of Slate Creek and west of Powell Gulch and east of the Chistochina River.

Access: The most practical way to access this site is by helicopter. A primitive road runs through Powell Gulch connecting nearby airstrips with a winter access route up the Chistochina River to the Slate Creek area. The site is within hiking distance of the road.

History: Charles W. Monroe is credited with the early prospecting of this area (Rose, 1967). He was active in the area, between 1964 to at least 1973. Monroe represented Northland Mines and, with the exception of perhaps Zelma Monroe, appears to have been the sole representative. Claim notices and maps filed with the local recording district indicate that the Coppertone 1-16 claims filed in 1969 covered the uplands south of Slate Creek and west of Powell Gulch (Chitina Recording District, Book 6 Lode, p. 48A and 221). State of Alaska records suggest that, by 1977, there were as many as 116 Coppertone claims (Alaska Kardex 068-119). This is supported by a claim corner notice the BLM found in the field titled “Coppertone Claim # 49.”

Resource Associates of Alaska (RAA) explored the area during the late 1970’s and early 1980’s. At least 116 claims (titled POW claims) covering the property were held by RAA in 1978 (Alaska Kardex. 068-192).

Cominco Alaska Exploration sampled the property in 1993 and acquired it in 1994. Some mapping and sampling was done as part of their evaluation (Athey, 1999).

ARDF Name / No.: None **Alaska Kardex:** 068-119, 192

Production: None

Workings and Facilities: Workings at the Coppertone prospect consist of a small hand dug trench and pit located on the crest of a small ridge.

Geologic Setting: Rose (1967) mapped the rocks in this area as pyritic andesite to dacite agglomerates.

Regional mapping by Nokleberg and others (1992b) show that the Coppertone prospect lies immediately south of the Slate Creek fault in a unit of shallow-level Permian(?) andesite to rhyolite stocks, dikes, and sills which intrude the Permian to Pennsylvanian Slana Spur Formation.

Bureau Investigation: The BLM noted a small trench and nearby pit that exposes traces of chalcopyrite, azurite, and malachite in brecciated, dark gray, silicified volcanics. Analyses of samples collected from the trench and pit indicate copper values averaging 155 ppm (sample 10938).

Mineral Development Potential: Low

Conclusions: There is anomalous copper in rocks of this type throughout this area that may be of continuing exploration interest; however, the grades and type of mineralization at the Coppertone prospect make it a low priority target, unlikely to be developed.

GR 28-27

Alternate Name(s):	Unnamed Occurrence 4, Coppertone	Map No:	455
		MAS No:	0020680142
Deposit Type:	Polymetallic vein	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-2	TRS:	NW1/4 Sec: 27, T20S, R15E
Meridian:	Fairbanks	Elevation:	5,750 feet
Latitude:	63.15475	Longitude:	-144.85747

Geographic: The GR 28-27 prospect is located on a ridge crest just north of benchmark 5950, east of the Chistochina River, south of Slate Creek, and west of Powell Gulch. This occurrence is within the claim block of the Coppertone claims (Map no. 452).

Access: Small airstrips and a network of primitive roads provide access to the general area. The site can then be reached by hiking from the primitive roads or, preferably, by helicopter.

History: The GR 28-27 site is named after Rose's (1967) reporting of mineralized rock at the prospect. Prior to this Charles W. Monroe is credited with the early prospecting of this area (Rose, 1967). He was active in the area between 1964 to at least 1973. Monroe represented Northland Mines and is likely to have been the sole representative of this company.

Cominco Alaska Exploration sampled in the GR 28-27 area in 1993 and acquired claims that covered the property in 1994. Some mapping and sampling at the prospect was done as part of their evaluation (Athey, 1999).

ARDF Name / No.: Unnamed / MH315 **Alaska Kardex:** 068-148

Production: None

Workings and Facilities: A small hand dug trench measuring 12 by 8 feet by 4 feet deep exposes mineralized rubble crop on the ridge crest at the GR 28-27 prospect.

Geologic Setting: Rose (1967) mapped the rocks in the area as andesite to dacite tuffs and flows of Permian age. Nokleberg and others (1992b) mapped these same rocks as Permian to Pennsylvanian volcaniclastics of the Slana Spur Formation.

Rose (1967) reported boulders with quartz, chlorite, and epidote alteration containing chalcopyrite and hematite. Rose's sample contained 1.3 percent copper (Rose, 1967).

Bureau Investigation: The BLM found hematite and copper staining in epidote, quartz, and chlorite altered volcaniclastic rubblecrop across a narrow zone on the ridge crest. The best exposure is found in and around a hand dug trench on the ridge crest where samples were found containing chalcopyrite and pyrite to 10 percent. Select samples contained copper as high as 1.81 percent (sample 10558), 33 ppb gold, and 12 ppm silver (sample 10559).

Mineral Development Potential: Low

Conclusions: The pervasive epidote, quartz, chlorite alteration of volcaniclastics is common in this area, as are small isolated concentrations of copper. Although the largest occurrences have in the past attracted exploration interest for their copper porphyry potential, the interest has waned as exploration has not supported the porphyry model (Athey, 1999). This small occurrence is unlikely to attract much attention.

AZURITE

Alternate Name(s):		Map No:	570
		MAS No:	0020680369
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, B-5	TRS:	SE1/4 Sec: 16, T19S, R07E
Meridian:	Fairbanks	Elevation:	3,760 feet
Latitude:	63.26199	Longitude:	-146.40695

Geographic: The Azurite prospect is located about half a mile south of the East Fork Maclaren River, southwest of the toe of the Eureka Glacier. It is about 1,000 feet north-northwest of elevation marker '3860' on the USGS, Mt. Hayes, B-5, 1:63,360-scale quadrangle map.

Access: The Azurite prospect is accessible by helicopter.

History: The existence of the Azurite prospect was referred to the BLM by Bill Ellis (personal communication, 2002). The trench at the prospect is likely to have been dug in the 1960's to 1970's, as little interest has been paid to similar copper showings in basalt in the area since that time.

ARDF Name / No.: Azurite / MH098 **Alaska Kardex:** None

Production: None

Workings and Facilities: There is one trench at the Azurite prospect that is approximately 25 feet in length (Figure 82).

Geologic Setting: The trench at the Azurite prospect exposes copper minerals in altered amygdaloidal basalt. The basalt is Triassic Nikolai basalt, which has been altered to include epidote and quartz. The quartz is commonly found filling relict vesicles in the basalt.

The copper minerals include bornite and tennantite, which occur disseminated, in patches, and in seams in the basalt. Copper minerals, chrysocolla and azurite, are common oxidation products. One seam of chrysocolla and azurite, oriented 120 degrees, dipping 35 degrees southwest, is 1.5 to 2 inches thick and extends for approximately 3 feet.

The mineralized rock at the Azurite occurrence extends over an area of approximately 10 by 25 feet, with only minor copper mineralization in about half of that area.

Bureau Investigation: BLM personnel mapped and sampled the Azurite prospect in 2002 (Figure 82). They collected three measured samples and a grab sample from the trench dump. A sample collected along the length of the trench, for 23 feet, returned 2.44 percent copper (sample 10021). A sample across 8.5 feet returned 2.45 percent copper (sample 10022). A

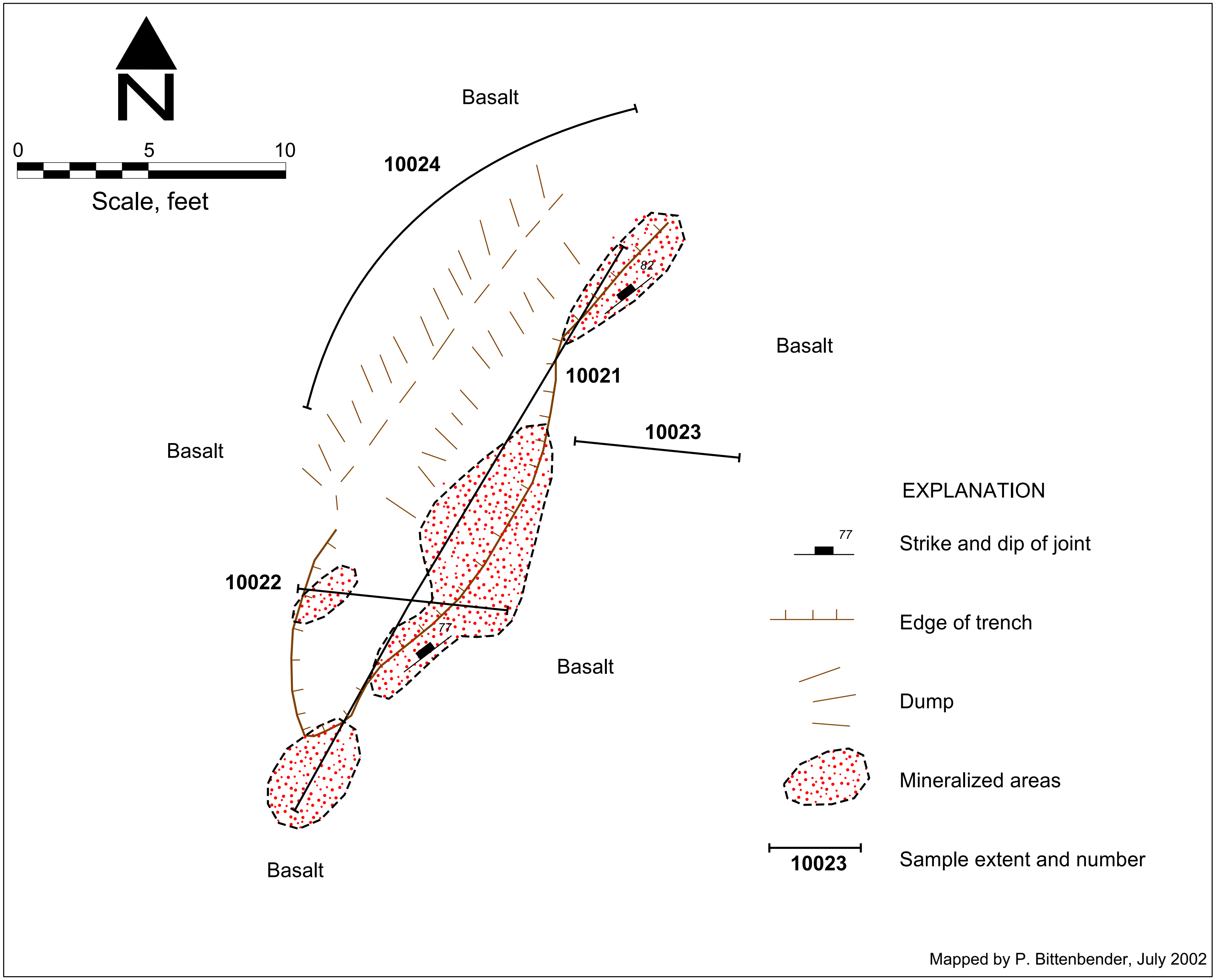


Figure 82. - Sketch map of the Azurite prospect.

high-grade sample collected from the trench dump returned 16 percent copper, 49.3 ppm silver, and 323 ppb gold (sample 10024).

Mineral Development Potential: Low

Conclusions: Although samples collected by the BLM from the Azurite prospect reveal high concentrations of copper, the extent of the mineralized rock is limited. The limited extent of other basaltic copper deposits found in the Delta River study area to date suggests little potential for a deposit of economic size to be located in the area.

GREENSTONE

Alternate Name(s):		Map No:	581
		MAS No:	0020680181
Deposit Type:	Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-5	TRS:	NE1/4 Sec: 33, T19S, R08E
Meridian:	Fairbanks	Elevation:	4,150 feet
Latitude:	63.2279	Longitude:	-146.40555

Geographic: The Greenstone occurrence is located approximately 3 miles northwest of Sevenmile Lake in the heart of the Amphitheater Mountains. Just south of Boulder Lake and about a quarter of a mile east of Boulder Creek is a small hill of basalt that hosts the occurrence.

Access: A helicopter provides the most practical way to reach the Coppertone occurrence, as there are many suitable places to land nearby. An ATV trail provides access to the west end of Sevenmile Lake, so it is possible to access the site by driving an off-road vehicle and hiking from there.

History: Although Northland Mines staked as many as 286 claims in the area between 1966 and 1976 (Alaska Kardex 068-91), the earliest located and published reference to a copper occurrence at this location is by Stout (1976). U.S. Bureau of Mines geologists visited the occurrence in the early 1990's and collected 14 samples from the general area (Balen, 1990; Kurtak and others, 1992).

ARDF Name / No.: Greenstone Occurrence / MH100 **Alaska Kardex:** 068-91

Production: None

Workings and Facilities: None

Geologic Setting: The Greenstone occurrence is hosted in a package of Triassic basalt flows (Stout, 1976; Nokleberg and others, 1992b). The basalts here are thought to be correlative with the Nikolai Greenstone to the east. A north to northeast-trending fracture system is ubiquitous in this region. The fractures often contain quartz veins, some of which are known to host various copper minerals. The K&M prospect to the west across the Maclaren River is a north-trending quartz-chalcopyrite-bornite vein hosted in similar rocks (Kurtak and others, 1992).

Bureau Investigation: Although earlier investigations apparently found several quartz-copper mineral veins in the vicinity (Kurtak and others, 1992), the BLM was only able to locate one vein with significant copper mineralization. This vein occurs along a fracture trending 220 degrees and dipping 85 degrees west. The 4- to 6- inch- wide quartz-epidote vein contains significant chalcocite and chrysocolla and was well exposed along strike for about 15 feet.

Analyses from across the width of the vein yielded 28.1 percent copper, 100 ppm silver, and 1.21 ppm gold (sample 10487).

Mineral Development Potential: Low

Recommendations: Given the extremely limited amount of potential ore, the Greenstone occurrence is very unlikely to attract development interest; however, similarities between the Greenstone and the much larger K&M prospect indicate that copper mineralization is spread over a wide area, and that where localized, the copper grade is quite high. Detailed mapping and ground geophysics may yield drillable targets.

TV BAS

Alternate Name(s):	Landslide Creek	Map No:	591
		MAS No:	0020680221
Deposit Type:	Basaltic Cu	Commodities:	Cu
Location:			
Quadrangle:	Mt. Hayes, A-5	TRS:	NW1/4 Sec: 35, T19S, R08E
Meridian:	Fairbanks	Elevation:	4,350 feet
Latitude:	63.23077	Longitude:	-146.16949

Geographic: The Tv Bas occurrence is located on the south rim of a small mesa-like hill approximately 5 miles west of Fish Lake.

Access: Helicopter access is good, as the area is above tree line, and the hill top is relatively flat. There are also ATV trails that provide access into the area from the Denali Highway.

History: This site was reported to the BLM by Bill Ellis (personal communication, 2002).

ARDF Name / No.: Tv Bas / MH173 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: The rocks at the Tv Bas occurrence are mapped as Tertiary volcanics (Bill Ellis, written communication, 2003) that overlay mafic to ultramafic rocks of the Triassic Wrangellia terrane (Nokleberg and others, 1992b).

Bureau Investigation: The BLM found that the occurrence lies in a package of basaltic to andesitic flows and tuffs exposed in the south edge of a small bluff. Light gray laminar tuffs contain fine-grained olivine and disseminated chalcopyrite and covellite. Grab samples of the tuff contained copper as high as 253 ppm (sample 10594).

Mineral Development Potential: Low

Conclusions: The copper concentration is too low to be considered economic; however, the question as to whether the copper is primary or secondary replacement in Tertiary volcanics could be of interest for exploration.

LTLW

Alternate Name(s):	Lower Tangle Lake Lower Tangle Lake West	**Map No:**	603
		MAS No:	0020680276
Deposit Type:	Basaltic Cu / Polymetallic vein	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NE1/4 Sec: 34, T20S, R09E
Meridian:	Fairbanks	Elevation:	4,500 feet
Latitude:	63.14578	Longitude:	-145.99097

Geographic: The LTLW occurrence is on a steep, north-northwest facing slope, on the east side of a cirque, west of Lower Tangle Lake. The cirque, with a lake at its head, empties into Lower Tangle Lake near its downstream end. It is 2.25 miles directly west of the top of Sugarloaf Mountain, which is east of Lower Tangle Lake.

Access: Access is easiest by helicopter, however, the area could also be accessed by boat from the Denali Highway to the downstream end of Lower Tangle Lake, a distance of about 7 miles. From there the occurrence must be accessed by foot, about 1½ miles to the west-southwest.

History: The LTLW occurrence is first reported by Stout in his publication in 1976. Field work for his report was apparently done between 1971 and 1973 (Stout, 1976). There is no other published reference to the LTLW known to the authors.

ARDF Name / No.: Unnamed (west-northwest of Lower Tangle Lake) / MH185
Alaska Kardex: None

Production: None

Workings and Facilities: None

Geologic Setting: The LTLW vein occurrence is hosted in Triassic Nikolai basalts of the Wrangellia terrane (Nokleberg and others, 1992b). Stout (1976) reports copper-bearing veins occurring at the crest of the Amphitheater Syncline, which folds the Nikolai basalts into a broad, open, west-northwestward plunging syncline (Stout, 1976; Nokleberg and others, 1992b). Stout suggest the veins postdate pre-Late Jurassic folding and may be as young as Tertiary. Ellis and others (2004) suggest the veining may be associated with Cretaceous metamorphism and granitic plutonism.

The vein sampled by BLM investigators was observed only in rubble (The steep slopes from which the rubble was emanating prevented direct access. Figure 83). Joints in the Nikolai basalt in the vicinity of the gullies from which BLM personnel found mineralized rubble trend 350 degrees and dip steeply to the northeast. Stout (1976) reports similar north to northeast trends for fractures that he believes host the mineralized veins.

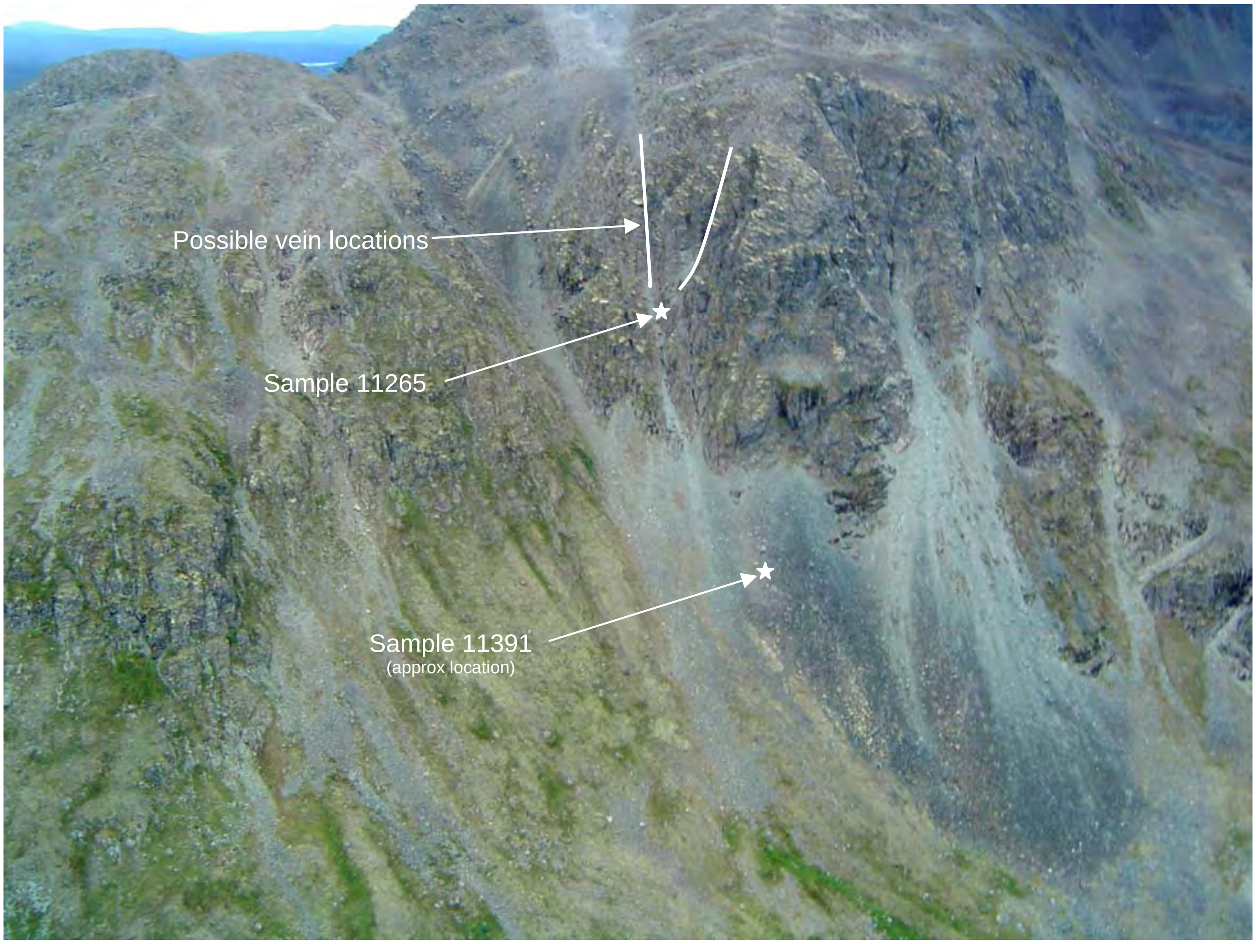


Figure 83. Aerial view to southeast of the LTLW occurrence.

He reports the veins to be from about 1 to 12 inches in width. Based on the rubble examined by the BLM, the vein width at the LTLW occurrence is about 2 to 3 inches wide.

Stout (1976) reports quartz veins at the LTLW site with chalcopyrite, bornite, malachite, azurite, and minor calcite. The BLM found evidence of sulfide-bearing epidote-quartz veins at the site. Sulfides include massive bornite, up to about 1 inch thick along with covellite, digenite, chalcocite, and chalcopyrite. In addition to the sulfides are minor native copper and copper alteration minerals such as malachite and azurite. X-ray defraction of a selvage from one piece of rubble indicates the presence of dioptase, a hydrated copper-silicate mineral, as well.

Bureau Investigation: BLM investigators collected two samples immediately below the suspected outcrop of the LTLW occurrence. We also collected two samples of similarly mineralized rock from further down the slope. All the samples show elevated concentrations of copper and minor silver. The highest concentration of copper was 8.89 percent, but this was from a sample of rock chips that were selected for their metallic mineral contents (sample 11265). This same sample had the highest silver return of 34.6 ppm.

Mineral Development Potential: Low

Conclusions: Although analytical returns indicate high concentrations of copper at the LTLW occurrence, the extent of the mineralized rock sampled is small, and the mineralized vein is narrow. There may be more copper-sulfide bearing veins in the area, but evidence of a significant tonnage of mineralized rock is absent.

LANDMARK GAP COPPER

Alternate Name(s):		Map No:	609
		MAS No:	0020680227
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-5	TRS:	SW1/4 Sec: 31, T20S, R09E
Meridian:	Fairbanks	Elevation:	3,950 feet
Latitude:	63.13816	Longitude:	-146.09673

Geographic: Landmark Gap Copper occurrence is located in the Amphitheater Mountains about 0.3 miles west of Landmark Gap on a prominent bench of glacial origin at an elevation of about 3950 feet.

Access: Access is possible by ATV with additional hiking or preferably by helicopter.

History: Geologists with Alaska Earth Sciences discovered this occurrence while doing exploration work in the area (Bill Ellis, personal comm., 2002). The site was first spotted from the air while doing aerial reconnaissance due to a color anomaly created by a bright red moss locally known as “copper moss.” The moss is prevalent at this location and is thought to be locally indicative of copper mineralization (Figure 84). BLM botanists have identified the “copper moss” as a free-living green alga *Trentepohlia sp.* (Randy Meyers, personal comm., 2003).

ARDF Name / No.: Landmark Gap / MH182 **Alaska Kardex:** None

Production: None

Workings and Facilities: None

Geologic Setting: Bedrock is mapped as Nikolai Greenstone (subaerial basalt flows member) of Late Triassic age by Nokleberg and others (1992b).

Bureau Investigation: The BLM geologists found elevated copper concentrations in two major areas, 30 to 50 feet wide by 100 feet long and 500 feet apart along a northwest strike. The copper minerals are mostly massive to semi-massive chalcopyrite pods, lenses, and veins with minor malachite and are predominately in narrow, 1 to 2-inch quartz-calcite veins which occur along fractures in the host basalt. The mineralization here seems to be occurring most strongly at intersections of a predominantly northwest-striking and orthogonal fracture set. Although high-grade select samples taken from the veins had copper values as high as 10.8 percent copper (sample 10234), measured samples across veins were more typically1 to 3 percent copper.

Mineral Development Potential: Medium

Conclusions: Copper minerals are confined to narrow veins but occur over an impressive distance. This occurrence may be of interest to exploration companies and is considered of medium development potential. High resolution ground geophysics could indicate the absence or presence of more copper minerals at depth, which, in turn, might provide an inviting drill target.

Figure 84. Red 'copper moss' marks the rocks mineralized with copper at the Landmark Gap Copper occurrence.
View is generally to the west.

CHITTI STAIN

Alternate Name(s):	Tripp, Savage, GR 13-10, Victory, Paxson Mountain	**Map No:**	624
		MAS No:	0020680098
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	SW1/4 Sec: 15, T21S, R11E
Meridian:	Fairbanks	Elevation:	3,550 feet
Latitude:	63.09049	Longitude:	-145.62929

Geographic: The Chitti Stain prospect is located on the north side of Paxson Mountain, approximately 700 feet southwest of the Denali Highway at a point approximately 900 feet past the "Mile 7" marker.

Access: Some mineralization is exposed adjacent to the Denali Highway in a road cut. Small pits and trenches are concentrated across brushy tundra to the southwest of the highway, which may be traversed on foot.

History: Three claims were staked over mineralized rock at the Chitti Stain prospect in 1953 by Victor Manville. He called the claims the Victory, Victory #2, and Three Johns (Jasper, 1953; Alaska Kardex 68-23). Jasper (1953) reports that Manville had been trying to follow up float to locate a lode occurrence in 1951 and 1952, which resulted in his staking of lode claims in 1953.

In 1962 two claims were staked over the Chitti Stain prospect by Jack Tripp (Saunders, 1963; Alaska Kardex 68-82). Soon after, the prospect was examined by State Mining Engineer Robert Saunders (Saunders, 1963). In 1964 another two claims were staked in the area by John Ferbiak and Jack Pearson and called the Monkit #1-2 claims (Alaska Kardex 68-88). These claims may have been staked to the west of the Chitti Stain prospect.

From 1969 to 1978 up to 16 claims covered the Chitti Stain prospect and land farther to the west. These claims were held by William and Mildred Buck. The Bucks record assessment work on the claims to include trenching, drilling, and sampling (Alaska Kardex 68-120; Chitina Recording District, Book 6Lode, p. 62).

In 1991 David H. Johnson staked six claims over the Chitti Stain prospect (Dave Johnson, personal communication, 2003).

ARDF Name / No.: Tripp / MH196 **Alaska Kardex:** 068-23, 82, 88, 120

Production: None

Workings and Facilities: The Chitti Stain prospect consists of three to four pits and three to four trenches exposing mineralized rock. Mineralized rock is also exposed in a road cut of the Denali Highway, northeast of the pits and trenches (Figure 85).

Geologic Setting: Mineralized rock at the Chitti Stain prospect consists of altered basalt with minor copper minerals. The basalt is part of the Triassic Nikolai Greenstone Formation that comprises much of Paxson Mountain (Nokleberg and others, 1992b). The Nikolai Greenstone is part of the Wrangellia terrane, which extends from at least Vancouver Island in southern British Columbia, Canada, through the Delta River area and farther to the southwest (Monger and Berg, 1987; Jones and others, 1987). The base of the Nikolai basalt indicates subaerial volcanism, whereas most of the sequence is believed to have been extruded in a submarine environment (Nokleberg and others, 1992b; Stout, 1976).

Rose and Saunders (1965) report chalcopyrite, bornite, and chalcocite or digenite, plus chrysocolla and possibly other oxidation products are found in altered vesicular basalt at the Chitti Stain prospect. They say the copper minerals occur both in and adjacent to veins, pods, and amygdules of quartz and epidote within the basalt. The veins and pods are generally less than 1 inch wide, and can be traced only a few feet (Rose and Saunders, 1965).

Mineralization in the basalts seems to be restricted to areas where the basalt is most altered and most vesicular. Epidote, chlorite, and quartz mark the alteration zones. The mineralization also occurs on joint surfaces, mainly as secondary copper minerals, in breccia zones, and disseminated in the basalt. In general, the copper mineralized basalt is widespread, but the mineralization is erratic and makes up only a small percentage of the overall rock.

Bureau Investigation: BLM personnel surveyed the Chitti Stain prospect in 2002, and collected 12 samples to characterize the mineralization. A survey of the Chitti Stain prospect, with sample locations, is shown below.

Analytical results from the 12 BLM samples from the Chitti Stain prospect reveal elevated concentrations particularly for copper and slightly for silver. Other metals may be anomalous compared to basaltic hosts elsewhere, but they are not near the concentration required for economic consideration. The highest copper value was 1.16 percent (sample 10001). This sample also had the highest silver return of 6.2 ppm. The average copper value from the 12 samples is calculated at just over 0.5 percent. A sample collected across about 20 feet of mineralized rubble also returned about 0.5 percent copper (4,670 ppm copper; sample 10000). A measured sample over 3.0 feet returned 4,990 ppm copper, again close to the 0.5 percent average.

Mineral Development Potential: Low

Conclusions: Little bits of copper mineralization are exposed over quite a large area at the Chitti Stain prospect. The occurrences are erratic, however, and make up only a small percentage of the rock in the immediate area. Surface indications of sufficient metal concentrations over mineable widths are lacking. This prospect is unlikely to attract future mineral industry exploration efforts.

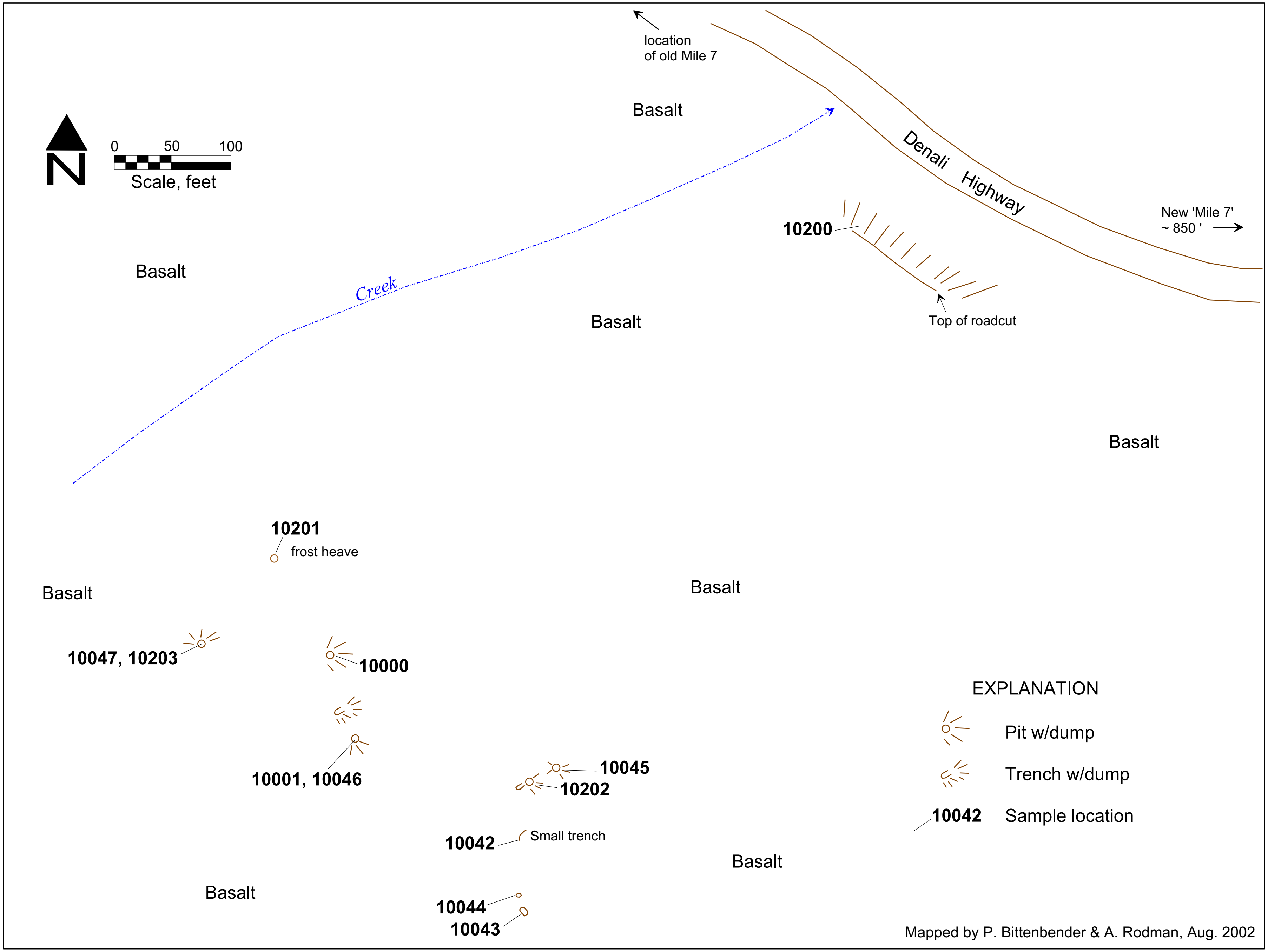


Figure 85. - Sketch map of the Chitti Stain prospect.

GR 13-9

Alternate Name(s):		**Map No:**	625
		MAS No:	0020680285
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NW1/4 Sec: 35, T21S, R11E
Meridian:	Fairbanks	Elevation:	~3,460 feet
Latitude:	63.008622	Longitude:	-145.64210

Geographic: The GR 13-9 prospect is located about 300 feet south of the Denali Highway, from a point approximately 0.2 miles west of the 7-mile post on the Denali highway. The prospect is on the north side of Paxson Mountain.

Access: Access is easy by vehicle along the Denali Highway and then by foot to the prospect.

History: Mineralized rock was first reported at the GR 13-9 site by Rose and Saunders (1965) as a result of their geologic investigations in the area in 1964. By 1971 claims were staked to cover the occurrence. Maps accompanying affidavits of annual labor on the adjacent Chitti Stain claims (Map no. 624) show the GR 13-9 prospect covered by adjoining claims (Chitina Recording District, Lode Mining Claim Book 9, p. 163; Book 10, p. 343). These claims were held by William and Mildred Buck until about 1978 (Alaska Kardex 68-120). The Bucks report trenching and drilling to fulfill annual assessment work requirements on the claims. It may have been during this time that the prospect was diamond drilled.

ARDF Name / No.: Unnamed (north flank of Paxson Mountain) / MH195
Alaska Kardex: 68-120

Production: None

Workings and Facilities: There may have been some trenching at the GR 13-9 prospect. Mineralized rock is exposed in an outcrop that may have been dug out. A 4.25-inch drill casing is evidence that the prospect was drilled at one time.

Geologic Setting: Mineralized rock at the GR 13-9 prospect consists of altered, vesicular basalt with minor copper minerals. The basalt is part of the Triassic Nikolai Greenstone Formation that comprises much of Paxson Mountain (Nokleberg and others, 1992b). The Nikolai basalt is part of the Wrangellia terrane, which extends from at least Vancouver Island in southern British Columbia, Canada, through the Delta River area and farther to the west and southwest (Monger and Berg, 1987; Jones and others, 1987).

BLM investigators found that copper mineralization in the basalt is mainly evident as copper alteration minerals, chrysocolla ± malachite. Minor chalcopyrite and bornite are found in knots, generally associated with quartz-filled amygdules. Quartz, epidote, and chlorite mark the alteration of the basalt. These findings vary somewhat from the report by Rose and Saunders (1965) who indicate a half-inch quartz vein at the site that contains bornite.

Bureau Investigation: BLM personnel examined the GR 13-9 prospect in 2002 and collected two samples. One sample, across 10 feet of outcrop returned 1.22 percent copper (sample 10002). A higher grade sample collected from rubble in the area contained 1.74 percent copper (sample 10003). The highest gold return was only 16 ppb (sample 10002)

The BLM does not have information on the results of the drilling at the prospect.

Mineral Development Potential: Low

Conclusions: The GR 13-9 prospect is one of about a dozen similar basaltic copper occurrences on Paxson Mountain. Most of these occurrences are limited in size, so that they do not make attractive exploration targets. The BLM sample that returned 1.22 percent copper over 10 feet is significant and suggests why the prospect was drilled at one time.

GR 13-6

Name:	GR 13-6	**Map No:**	629
Alternate Name(s):		**MAS No:**	0020680288
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	NW1/4 Sec: 35, T21S, R11E
Meridian:	Fairbanks	Elevation:	3,460 feet
Latitude:	63.05577	Longitude:	-145.58443

Geographic: The GR 13-6 occurrence is located approximately 2,000 feet south-southwest of the 90-degree bend (at approximately Mile 4.1) in the Denali Highway on the northeast side of Paxson Mountain.

Access: The GR 13-6 occurrence is accessible by foot from the Denali Highway, which is open for traffic when snow removal is not required. Snow is initially removed from the highway in about April of each year.

History: In 1965, Rose and Saunders (1965) reported copper mineralization at the site.

ARDF Name / No.: None **Alaska Kardex:** None

Production: None **Workings and Facilities:** None

Geologic Setting: Mineralized rock at the GR 13-6 occurrence consists of altered, vesicular basalt with minor copper minerals. The basalt is part of the Triassic Nikolai Greenstone Formation that comprises much of Paxson Mountain (Nokleberg and others, 1992b).

Rose and Saunders (1965) describe a pod of chrysocolla at the GR 13-6 site as 2 by 3 feet in dimension. BLM investigators found chrysocolla concentrated in the altered parts of the vesicular Nikolai basalt. Alteration in the basalt consists of silicification and epidotization. Some parts of the basalt seem to be altered to massive epidote. Epidote and quartz also occur in thin veins, up to 1 inch thick.

Bureau Investigation: BLM investigators examined and sampled the GR 13-6 site in 2002, but did not find a 2- by 3-foot pod of chrysocolla as described by Rose and Saunders (1965). BLM investigators collected one sample of altered, vesicular basalt with minor chrysocolla and malachite. The mineralized lens sampled by BLM personnel trends approximately east-west, which may be influenced by a fault. The sample contained 3,120 ppm copper (sample 10204).

Mineral Development Potential: Low

Conclusions: The GR 13-6 occurrence is one of about a dozen similar copper concentrations in Triassic Nikolai basalt on Paxson Mountain. Like most of the other deposits, the GR 13-6 occurrence is very limited in extent. Consequently, it is unlikely to be a target of current mineral exploration interest.

GR 13-3

Alternate Name(s):	Locality 3	**Map No:**	630
		MAS No:	0020680289
Deposit Type:	Basaltic Cu	**Commodities:**	Cu
Location:			
Quadrangle:	Mt. Hayes, A-4	TRS:	SW1/4 Sec: 01, T22S, R11E
Meridian:	Fairbanks	Elevation:	3,600 feet
Latitude:	63.03728	Longitude:	-145.56208

Geographic: The GR 13-3 prospect is located on the east side of Paxson Mountain, about 2.2 miles west-northwest of Paxson. It is situated on the east side of a north-trending gulley, which is formed by the main Paxson Mountain massif to the west and a small knob to the east. The site is about 1.1 miles due west of the westernmost part of Mud Lake, as shown on the USGS, Mt. Hayes A-4, 1:63,360-scale, topographic map.

Access: Access to the site is most practical by helicopter. Alternative access is possible by foot from the Denali Highway. This would require walking to the south, about 1.7 miles, from a point about 4.1 miles along the Denali Highway from Paxson.

History: The GR 13-3 prospect is described and sketched by Rose and Saunders (1965) in their report on mineral investigations near Paxson. They indicate that the GR 13-3 prospect may be one mentioned by Martin (1920) in his report on the Alaska mining industry in 1918. He states that there is a copper deposit 1½ to 2 miles west of Paxson's Roadhouse (Martin, 1920).

ARDF Name / No.: Paxson's / MH201 **Alaska Kardex:** None

Production: None

Workings and Facilities: There is a shallow pit at the GR 13-3 prospect.

Geologic Setting: Mineralized rock at the GR 13-3 prospect consists of altered basalt with disseminated copper minerals. The basalt is part of the Triassic Nikolai Greenstone Formation that comprises much of Paxson Mountain (Nokleberg and others, 1992b). The Nikolai Greenstone is part of the Wrangellia terrane, which extends from at least Vancouver Island in southern British Columbia, Canada, through the Delta River area and farther to the southwest (Monger and Berg, 1987; Jones and others, 1987). In the Delta River area, the base of the Nikolai basalt indicates subaerial volcanism, whereas most of the sequence is believed to have been extruded in a submarine environment (Nokleberg and others, 1992b; Stout, 1976). Much of the basalt in the GR 13-3 area has been altered to chlorite and epidote.

Rose and Saunders (1965) report chrysocolla and chalcocite in highly vesicular basalt at the GR 13-3 prospect. The mineralization seems to be structurally controlled because it is most concentrated near a fault on the north side of the exposure. The copper minerals are less

Figure 86. Geologist sampling mineralized, vesicular basalt at the GR 13-3 prospect. (View approximately to the north.)

abundant farther away from the fault, which also apparently offsets the mineralized rock at the prospect. The mineralized vesicular zone is oriented 255 degrees, dipping 35 degrees northwest (Rose and Saunders, 1965). Rose and Saunders (1965) report an assay of 6.9 percent copper across 10 feet of mineralized basalt at the prospect. They say the sample contained no gold or silver (Rose and Saunders, 1965).

Bureau Investigation: BLM investigators found vesicular basalt with chalcocite and chrysocolla exposed over a 13-foot by 10-foot area at the GR 13-3 prospect (Figure 86). They collected two samples from the site. One sample across the longest dimension, 13 feet, returned 5.79 percent copper (sample 10120). Analyses showed this sample with only 14 ppb gold and 12.2 ppm silver. A sample across a much smaller part of higher grade material, across 1 foot, returned 7.44 percent copper, 69 ppb gold, and 19.3 ppm silver (sample 10121).

Mineral Development Potential: Low

Conclusions: Samples from the GR 13-3 prospect indicate high grades of copper over relatively significant lengths. This prospect, along with Chitti Stain (Map no. 624), represent the most significant basaltic copper occurrences on Paxson Mountain. Both of these occurrences, however, are limited in extent. They are unlikely to attract further mineral industry exploration attention.

Summary

BLM investigators completed 3 years of field work evaluating the mineral potential of the Delta River Mining District study area between 2002 and 2004. A 2-week reconnaissance of the 2.9-million acre study area was completed in 2001. The study area is centered on the Ransome and Kerns (1954) Delta River Mining District, but is expanded to include the entire Tangle Lakes Archaeological District to the southwest and the upper Chistochina Mining District to the southeast. BLM investigators examined 205 of the 252 recognized mines, prospects, or mineral occurrences in the study area and have described 110 of the most important of these in detail in the main body of this report. All 252 recognized mines, prospects, and occurrences are included in the summary table, Appendix Table A-1. The analytical results from 1,460 rock chip, stream sediment, pan concentrate, and soil samples collected during the mineral assessment, are presented herein. About 860 of these samples are from mineral occurrences and 600 are of a reconnaissance nature.

The Delta River study area is easily accessed by the Richardson, Alaska, and Denali highways. The Trans-Alaska Pipeline bisects the district from north to south, generally parallel to the Richardson Highway. The major population center in the study area is Delta Junction in the north. Paxson lies at the intersection of the Richardson and Denali highways in the south; Glennallen is about 60 miles farther to the south on the Richardson Highway.

The Alaska Range dominates the center of the Delta River study area and along with the generally east-west-trending Denali fault, divides the district geologically as well as physiographically. The dominant terranes in the area are the Yukon-Tanana terrane to the north of the Denali fault and the Wrangellia terrane to the south. Elevated mineral potentials are found dominantly in the Wrangellia terrane, south of the Alaska Range and Denali fault.

The USGS conducted an Alaska Mineral Resource Appraisal Program (AMRAP) study of the Mt. Hayes quadrangle in the late 1970’s and early 1980’s. Several products resulted from this investigation including geologic maps and maps depicting the distribution of geochemical anomalies and mineral occurrences (Nokleberg and others, 1982, 1990, 1991, 1992b; Curtain and others, 1989). The USGS effort produced a good compilation of metallic mineral resources in the district and effectively conveys the mineral potential of various elements across the quadrangle. However, the USGS apparently did not fully recognize the importance of PGE associations with the mafic-ultramafic rocks in the area. They modeled gabbroic nickel-copper deposits and podiform chromium deposits, but did not evaluate PGE associations. In the 1980’s, and even more in the 1990’s and continuing today, the international mineral industry has focused exploration attention on the nickel-copper-PGE potential of the mafic and ultramafic rocks in the area. Although the BLM’s mineral assessment effort in the district included all deposit types, considerable attention was given to the nickel-copper-PGE potential in the mafic-ultramafic rocks.

In addition to mapping and sampling known mineral occurrences, the BLM’s mineral assessment included geophysical surveying, both airborne and ground-based; $^{40}Ar/^{39}Ar$ isotopic age dating; and various petrographic techniques including examination of thin and polished rock sections, and microprobe and x-ray analyses. Many of these additional techniques were made possible through collaborations with the State of Alaska, ADGGS; USGS; and the University of Alaska Fairbanks.

The BLM's airborne geophysical survey, released in a series of State of Alaska publications (Burns and Clautice, 2003; Burns and others, 2003) targeted Triassic mafic-ultramafic rocks of the Wrangellia terrane that represent magmatic chambers underlying the voluminous Nikolai Greenstone basalts. The total field magnetics defines the surface extent of five mafic-ultramafic complexes in the southwestern part of the study area that host nickel-copper-PGE occurrences. The two large complexes to the south are relatively undeformed and preserve evidence of cyclic intrusive activity reflected by the change in rock types generally from dunite to pyroxenite to gabbro. Up to four cycles of intrusive activity are evident in the largest exposed complex (Ellis and others, 2004). Within this relatively quiescent magmatic environment reef-type accumulations of sulfides and associated metals may occur.

Three mafic-ultramafic complexes to the north, on the south flank of the Alaska Range, are more deformed, probably due to folding and faulting associated with the terrane bounding Eureka Creek thrust fault and subsequent movement along the Denali fault, which borders the complexes to the north (Rose, 1965, 1966; Nokleberg and others, 1992b). Although there are less distinct Nikolai basalts associated with these three complexes, the BLM's $^{40}Ar/^{39}Ar$ age dating indicates they are Triassic, similar to the two complexes to the south. The three deformed complexes may be more deeply exhumed. The basalts associated with these complexes tend to have a more primitive, picritic composition (Larry Hulbert, personal communication, 2003). Evidence for a more dynamic magmatic system is found in the three deformed complexes in the form of magmatic breccias that likely represent feeders to the magmatic chambers. Some investigators suggest an open, dynamic system is required to accumulate sufficient nickel and copper to form economic deposits (see Li and others, 2001).

The survey also defined a circular conductive anomaly to the east that is cored by a less conductive body. Although the conductive anomaly represents mafic and ultramafic rocks, $^{40}Ar/^{39}Ar$ age dating by the BLM suggests the mafic-ultramafic rocks are Cretaceous and not associated with the Triassic Nikolai basalts. Only minor amounts of nickel, copper, and PGE are found associated with these circular anomaly mafic-ultramafic rocks.

The ground-based geophysics included two lines of magnetotelluric and gravity surveys. These lines are perpendicular to the trend of the two largest mafic-ultramafic complexes in the southwestern part of the study area that are broadly folded into a west-northwest plunging syncline. Models resulting from these geophysical data suggest the two limbs of the syncline are connected at depth and that the root zone of the syncline may include a dense conductive body that also plunges to the west-northwest. This body may represent an accumulation of sulfide minerals (Schmidt, 2002; Pellerin and others, 2003a; 2003b; Glen and others, 2002a).

Regional airborne magnetic data (ADGGS, 1973), the BLM's reanalysis of USGS stream sediment samples, and historic placer production suggest the potential for mafic-ultramafic rocks and associated PGE occurrences in the southeastern part of the study area, east of the known nickel-copper-PGE lode occurrences. Minor PGE-bearing minerals were recovered with historic placer gold operations in the upper Chistochina area (Mendenhall and Schrader, 1903; Foley and Summers, 1990). Similar associations of PGE with placer gold production are not reported to the west, where the known lode PGE occurrences are found. Some of the highest platinum and palladium returns from the BLM's reanalysis of USGS stream sediment samples from the southern part of the Delta study area came from the southeastern part of the area. Again, these are situated to the east of the known PGE lode occurrences. The State's regional airborne magnetic compilation indicates several large conductive bodies to the east of the mafic-ultramafic complexes that host known nickel-copper-PGE occurrences in the southwestern part of the study area. These data sets led the BLM to focus a significant part of their Delta River mineral assessment efforts on the mafic-ultramafic rocks in the southeastern part of the study area.

The results of the mineral assessment of the southeastern mafic-ultramafic rocks indicate a separate and distinct magmatic event occurred and may have included associated PGE minerals. The southeastern mafic-ultramafic rocks return mid-Early Cretaceous ages (about 120 to 125 Ma) that the BLM interprets to be primary magmatic ages of crystallization. These are opposed to the early-Late Triassic magmatic ages (about 225 to 230 Ma) from the western mafic-ultramafic rocks. Petrographic studies also indicate a distinction between the eastern and western suites of mafic-ultramafic rocks. Dunites are common in the west and rare in the east. Orthopyroxene is common in the west, but rare in the east. Phlogopite is a common late magmatic mineral phase in the east, but is rare in the west. Pentlandite is a common sulfide in the west, but is rare in the east.

A possible explanation for the presence of lode PGE occurrences in the west and lack thereof in the east, albeit with the elevated presence of PGE in stream gravels in the east, is a sulfide versus oxide association of the PGE. A sulfide association of PGE in the west makes the recognition of lode sources more obvious; investigators have only to look for sulfides in mafic-ultramafic rocks, which in many cases are associated with iron-stained outcrops. The recognition of oxide-associated PGE in lode sources is more difficult. The oxide association might also explain the presence of elevated PGE in stream gravels. The oxide-associated minerals would be more impervious to chemical and possibly physical erosion than would the sulfide-associated minerals, so the PGE would be more easily preserved in the stream gravels. This would result in elevated PGE in placers and in stream sediment samples. Because oxide-associated PGE minerals could be preserved in stream sediments, the lode source of the eastern PGE anomalies may be more distal than proximal. One source identified for the placer gold in the area is a Tertiary conglomerate, whose provenance is undetermined. In the same way, a lode source of the PGE may be north of the Denali fault and may have been fault-displaced some distance away. The BLM did not identify a lode source for the PGE in the eastern suite of mafic-ultramafic rocks, even though the eastern rocks did locally contain elevated PGE concentrations; however, Foley and Summers (1990) did identify PGE minerals in argillites in the Miller Gulch area in the eastern part of the study area.

There are 22 recognized skarn occurrences in the Delta River study area; they are restricted to the south side of the Alaska Range within the Wrangellia terrane. The skarn occurrences are generally hosted in rocks of the Pennsylvanian to Permian Slana Spur Formation (Nokleberg and others, 1992b) and are generally high in copper and iron, but low in gold, silver, and PGE. Triassic mafic to ultramafic intrusions are generally responsible for regional hornfelsing and contact metamorphism of calcareous rocks in the west, whereas more felsic Late Paleozoic monzodiorite intrusions appear to be responsible for most of the skarn mineralization in the east (Athey, 1999).

Skarns associated with mafic intrusions in the west are generally small and thin (a few inches to a few feet thick), discontinuous, and form in small lenses and pods at or near contact margins. Sulfide minerals are mostly pyrrhotite with lesser concentrations of chalcopyrite. Gangue minerals are mostly garnet and epidote. In contrast, the eastern skarns are commonly continuous over several tens of yards and are up to several yards thick. Gold and silver values appear to be higher, whereas nickel values appear to be lower, on average, than in the west. Gangue minerals in the eastern skarns are commonly garnet, coarse calcite, epidote, and jasperoid.

Skarn occurrences in the Delta River study area have not received much exploration attention. They are generally too small or low grade to be considered for economic development. There are two exceptions, however, in the southeastern part of the study area where prospects have high concentrations of copper and iron and in more significant quantities than other skarns in the study area. They have also received the most exploration attention.

Placer gold and minor PGE constitute the only metallic mineral production from the Delta River Mining District study area. (There has been some production of industrial minerals and minor amounts of coal.) Production totals approximately 182,074 troy ounces gold, greater than 17,000 troy ounces silver, and 83 troy ounces of platinum (Szumigala and Hughes, 2005; Foley and Summers, 1990). The majority of this production comes from the upper Chistochina River area in the southeastern part of the study area where mining began in about 1900 (Mendenhall and Schrader, 1903) and continues today. The gold in the richest deposits has been mostly reworked from Tertiary conglomerate and glacial deposits to form gulch and bench placers. Inferred gold-bearing gravel resources in the district total 2.9 million cubic yards, whereas inferred resources of Tertiary gravel total 2.6 million cubic yards. Samples of these resources contain from 0.0018 to 0.059 oz/cy gold (see Appendix Table B-1).

Early mining operations used hand methods to work the shallow placer deposits. Recent operations have utilized bulldozers and large earth-moving equipment to transport gravel to large washing plants, engineered to recover fine gold. Large motorized pumps were used to bring water to mine sites. These operations mined gravels 80 to 90 feet thick (Colp, 1981). Nuggets weighing up to 4 ounces have been reported from the upper Chistochina area; 1 ounce nuggets were not rare (Moffit, 1912). Placer gold from Slate Creek, in the upper Chistochina area, ranges from 857 to 887.75 fine, whereas that from Rainy Creek, in the southwestern part of the study area, averages 876 fine (Smith, 1941).

Glacial ice has had considerable influence over distribution of the placer deposits in the district. Ice has dammed various drainages, sometimes resulting in drainage reversal (Mendenhall, 1905). Gold distributed throughout glacial drift material was reworked by Pleistocene and Holocene streams cutting across the drift deposits. This action concentrated the gold in the active stream bed resulting in the formation of economic placers (Yeend, 1981).

Volcanogenic massive sulfide (VMS) deposits are found in the northern part of the Delta River Mining District study area. These deposits are part of a broader belt of VMS deposits that extend from the Bonnifield district in the northwest to the Delta district in the southeast, a distance of over 110 miles (Nauman and Duke, 1986; Lange and others, 1993). Both the Bonnifield and Delta VMS districts are outside the Delta River Mining District study area as defined in this report.

The VMS deposits are hosted in Devonian metavolcanic and metasedimentary rocks along the southern margin of the Yukon-Tanana terrane (Lange and others, 1993, Dusel-Bacon and others, 2004). The bimodal suite of metavolcanic rocks that host the VMS occurrences are thought to occur in a setting of extensional continental margin crust (Dusel-Bacon and others, 2004). Within the Delta River study area there are more metasedimentary than metavolcanic rocks making up the Yukon-Tanana terrane. The small number and restricted extent of VMS deposits in the study area is likely due to the overall lack of metavolcanic rocks (Nokleberg and others, 1992b), particularly as compared to the Bonnifield and Delta VMS districts adjacent to the study area.

The VMS occurrences in the Delta River Mining District study area are widespread, but are penetratively deformed and dismembered. Analytical results from sampling indicate low or sporadic higher grades of precious and base metals. It seems unlikely that a large contiguous low grade ore body is likely to be present and so far, no small, high grade occurrences have been discovered.

Less numerous deposit types in the Delta River Mining District study area include both copper and molybdenum porphyries, basaltic copper, and polymetallic vein. A few deposit types are represented by single occurrences in the study area, e.g., pluton-hosted gold, replacement, and pegmatite deposit types.

The porphyry occurrences have attracted some exploration attention in the past, probably because of their potential for large tonnages. A porphyry molybdenum prospect in the northeast part of the study area was prospected in the 1910's to 1930's but is now part of the Department of Defense's Fort Greely, so is closed to mineral entry. Other porphyry occurrences in the study area contain copper; all are on the south side of the Alaska Range. One site was drilled in the 1960's; another received exploration attention in the 1970's to 1980's.

Some of the earliest lode prospecting in the Delta River study area targeted basaltic copper occurrences. Most of the basaltic copper occurrences are associated with the Triassic Nikolai basalt that is found in the southern part of the district. Some early authors suggested the Nikolai basalt may represent a geologic setting similar to that of the productive copper deposits of northern Michigan (Rose and Saunders, 1965). This may have been one reason for the early prospecting attention.

Other mineral occurrences in the Delta River Mining District study area are defined as polymetallic vein deposits; however, this definition includes numerous occurrences of base and/or precious metals whose mode of occurrence may not be easily classified. In many cases the occurrences are not defined by a prominent vein or vein system, but may be defined by disseminated base metal sulfides, commonly hosted in intermediate to felsic, commonly volcaniclastic rock. The majority of the occurrences listed in this report as polymetallic veins are found in the vicinity of Rainbow Mountain, which is on the south flank of the Alaska Range in the center of the district. One polymetallic vein prospect of note is in the northeast part of the study area. It is notable because of its large extent and potential for large tonnages. It represents a type of occurrence that currently attracts mineral exploration attention.

There is one occurrence of a pegmatite type deposit in the Delta River study area. This site is noted for its mineral specimens of watermelon tourmaline (elbaite).

Mineral exploration activity is likely to continue in the Delta River Mining District study area with special attention given to the nickel-copper-PGE potential of the mafic-ultramafic rocks in the southern part of the area. To date no deposits of sufficient tonnage and grade to be considered economic have been discovered. There is a chance that a small tonnage-high grade deposit may be discovered that would make underground mining economically feasible. Alternatively, the discovery of a high tonnage-low grade deposit is also a possibility. A deposit of this size may be mined by surface mining techniques. Any potential mining operation would likely take 8 to 10 years or more to go from discovery to production given the design, economic feasibility, environmental, logistical, and permitting requirements that precede mine development.

It is likely that small-scale placer operations will continue to be active, particularly in the upper Chistochina area in the southeastern part of the study area. Elevated gold prices may encourage larger-scale development of the placer resources in this area.

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Appendix A - Summary Information for Mines, Prospects, and Mineral Occurrences

Appendix Table A-1 lists summary information for mines, prospects, and mineral occurrences found in the Delta River Mining District study area. The information provided includes prospect name and Alaska Mineral Information System (AMIS) number; location information; land status; deposit type; workings and current condition; production figures (when available); BLM work conducted during this study; selected references for additional information; and mineral exploration (MEP) and mineral development potential (MDP). These last two categories are subjective rankings that prioritize the properties with respect to one another. The various parts of the table, including abbreviations used, etc., are described in the paragraphs and tables below. The mines, prospects, and mineral occurrences are organized alphabetically in Appendix Table A-1.

Abbreviations and descriptions

Map number:
Refers to the mine, prospect, or occurrence numbers used to show locations on Plate 1.

Name/AMIS No.
Name refers to the property name. AMIS refers to the Alaska Mineral Information System database developed by the BLM in Alaska from a subset of the minerals information database originally compiled by the U.S. Bureau of Mines.

Latitude/Longitude:
Coordinates for each property are expressed in decimal degrees using the North American Datum of 1927 Alaska (NAD27 Alaska).

Land status:	
N	Native
S	State
OF	open Federal (open to mineral entry)
CF	closed Federal (closed to mineral entry)
P	Private

Deposit type:	
UM	ultramafic related
Skarn	skarn
PV	polymetallic vein
PR	polymetallic replacement
Mag Seg	magmatic segregation
P	porphyry

Deposit type:	
Dissem	disseminated sulfide
VMS	volcanogenic massive sulfide
Peg	pegmatite
SSb	simple antimony

Development:	
T(s)	trenches(es)
Pit(s)	one or more pits
Adits(s):	lengths, in feet, if available; (caved lengths in parentheses)
# Shafts(s):	depths, in feet, if available; (flooded depths in parentheses)
# DDH	diamond drill holes

BLM work:	
M	mapped
S	sampled
NF	not found
NE	not examined

Remarks:	
cp	chalcopyrite
cy	cubic yard
oz	troy ounces
po	pyrrhotite
ppb	parts per billion
ppm	parts per million
py	pyrite/pyritic
qz	quartz

Select references:
The references presented in the table are the primary references for each of the properties. The complete reference listing can be found in the Select References section of this report, preceding the appendices.

MDP (mineral development potential):
All mines, prospects, and mineral occurrences are assigned a high, medium, or low mineral development potential classification. These rankings reflect the authors' opinions with regard to each property. The rankings are based on the following criteria:

H High grades and probable continuity of mineralized rock exist. The property is likely to have economically mineable resources under current economic conditions. A high potential exists for developing tonnage or volume with reasonable geologic support for continuity of grade.

M Either a high grade or continuity of mineralized rock exists, but not both. Mineralized rock is confined by geology and/or structures, or grades are overall low. It could serve as a resource if economics were not a factor, but is presently uneconomic under existing conditions.

L The property exhibits uneconomic grades and/or little evidence of continuity of mineralized rock. There is little or no obvious potential for developing resources or is an insignificant source of interest.

MEP (mineral exploration potential):

All mines, prospects, and mineral occurrences are assigned a high, medium, or low mineral exploration potential classification, which addresses the likelihood of a site being explored in the future. This ranking differs from the MDP described above in that MEP may be higher with less knowledge of the extent and grade of the occurrence. The rankings do not reflect the current land status at the site, but do take into account the potential for extent of mineralized rock, e.g., geographic limitations such as tidewater. These rankings reflect the authors' opinions with regard to each property. One of the authors' intents in making these rankings is to identify for land managers areas that may attract future mineral exploration interest. The rankings are based on the following criteria:

H The site has some potential for hosting an economic mineral deposit. The deposit type is one that may have been locally explored in the recent past. It may be part of a larger identified mineralizing system. There is a high likelihood that additional mineralized rock and/or higher grade material will be found. The site is likely to receive mineral exploration attention in the future.

M There is a medium likelihood that additional mineralized rock and/or higher grade material will be found at the site. The site may be part of a larger mineralizing system, but one that is newly identified and/or has not attracted recent exploration interest in the local area. The site may receive mineral exploration attention in the future, particularly if economic conditions change and/or our knowledge of the occurrence changes.

L Too little is known about the site to determine the likelihood of future mineral exploration attention or the site is so well known that there is little chance that additional mineralized rock and/or higher grade material will be found. The site is unlikely to host an economic mineral deposit and is unlikely to attract mineral exploration attention in the future.

Table A-1. Summary information for mines, prospects, and occurrences in the Delta River Mining District study area.

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
506	Alder Creek 20680394	63.09223 -145.19942	S	Placer Au & Ag		Inferred resource: 10,600 cy; sample contained 0.0018 oz/cy gold	S	Kardex 68-9	L	L
623	Amphi 20680097	63.05801 -145.74858	S	Ultramafic	None	Po & cp in peridotite; geophysics suggest possible buried sulfides	S	Pellerin and others, 2003	L	L
266	Ann Creek 20680164	63.34112 -145.77835	OF	Ultramafic		Ni-Cu-PGE occurrence outside major mafic-ultramafic complexes – between Rainy to west & Canwell to east; limited extent of mineralized rock	S	Saunders, 1962; Barker 1988	L	L
246	Ann Fork 20680268	63.32816 -145.86218	OF	Ultramafic		Semi-massive, net-textured, & disseminated sulfides in gabbro, peridotite & pyroxenite, & gossanous fault breccia; generally low values in BLM samples	S	Barker, 1988; Ellis and others, 2004	L	L
541	Antler 20680275	63.209562 -145.904764	S	Ultramafic		Gabbro & diabase intruding mafic-ultramafic rocks of Fish Lake complex; low base & precious metal values in BLM samples	M, S	Ellis and others, 2004	L	L
169	Arch 20680044	63.3108 -146.1467	State	Unknown	None	Poor locations from 2 Kardex entries: one from 1965 claim block, Arch No. 1 & Far No. 1-4; one from 1974-77 Ferrocrete No. 1-8 claim block.	NF	Kardex 68-95; 68-160	L	L
570	Azurite 20680369	63.26199 -146.40695	S	Basaltic copper	T	Bornite & tennantite in seams & patches in basalt; elevated Cu values in samples, but limited extent to mineralization	M, S	Ellis and others, 2004	L	L
488	Bedrock Creek 20680352	63.13858 -144.63281	S	Placer Au & Ag		Inferred resource: 3,250 cy.	S	Moffit, 1944	M	M

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
173	BGM 20680245	63.3222 -146.0654	OF	Ultramafic		Reported occurrence of mafic-ultramafic magmatic breccia float w/ sulfides; BLM couldn't duplicate analyses	S	Ellis & oth., 2004	L	L
461	Big Four Creek 20680074	63.18476 -144.81664	S	Placer Au, Ag & PGE	T	Estimated resource 7,500 cy; sample contained 0.005 oz/cy gold	S	Moffit, 1912, 1944	M	M
118	Bird's Beak 20680212	63.32048 -146.39190	S	Ultramafic		Peridotite cut by gabbro sill; Cu & PGE associated w/ sill; moderate metal values	S	Ellis and others, 2004	L	M
121	Bird's Foot 20680213	63.324226 -146.384263	S	Ultramafic		Mafic-ultramafic inclusions w/ minor metal concentrations in younger intrusive	S	Ellis and others, 2004	L	L
96	Black Rapids 20680020	63.50622 -145.85314	CF	Polymetallic vein	Adit (275 ft)	Small lens of quartz w/ 50% stibnite; other nearby quartz veins w/ little stibnite (Van Alstine, 1942)	NF	Pilgrim, 1930, Van Alstine, 1942	L	L
559	BM-75 20680220	63.24934 -146.20972	S	Ultramafic		Serpentinized peridotite in Fish Lake complex; BLM samples reveal low base and precious metal concentrations	S	Ellis and others, 2004	L	L
129	Boot Flap 20680231	63.32337 -146.31967	S	Ultramafic		Disseminated & net-textured sulfides in gabbro & serpentinite of Eureka complex; BLM samples indicate moderate to low metal values	S	Ellis & oth., 2004	L	L
126	BOS 20680368	63.33179 -146.28868	State	Ultramafic		BLM samples to 292 ppb Pt, 308 ppb Pd, 0.11% Cu, 0.37% Ni from peridotite & serpentinite in Eureka complex; in area BLM samples to 1.04% Cu, 169 ppb Au in faulted gabbro dike	S	Ellis & oth., 2004	L	L
583	Boulder Creek 20680042	63.18143 -146.44922	S	Placer Au & Ag		Low values in U.S. Bureau of Mines placer samples	S	Kurtak and others, 1992	L	L
168	Broxson Gulch 20680388	63.32869 -146.13204	S	Placer Au & Ag	T	Active only in 1993; 75 ft by 1,000 ft mined; either mined out or poor returns; BLM samples contained little Au	S	Bundtzen & others, 1994	L	L
183	Broxson Gulch (Lower E Fork) 20680384	63.28789 -146.10588	S	Placer Au & Ag	T	Active about 1993 to 2002; minor Au in BLM samples; anomalous PGE	S	Bundtzen & others, 1994	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
170	Broxson Gulch (Upper E Fork) 20680385	63.32528 -146.10214	OF	Placer Au & Ag	Camp, T	Active about 1993 to 2002; fine Au; anomalous Pt; little gravel remains in active stream bed	S	This report	L	L
160	Broxson Ridge Magnetite 20680391	63.349991 -146.059411	OF	Ultramafic /Basaltic Copper		Massive magnetite & gossan lenses in pyroxenite; Cu minerals finely disseminated in pyroxenite; select BLM sample to 2% Cu, 10 ppm Ag, 1 ppm Au	M, S	This report	L	L
300	Canwell Glacier 20680165	63.32886 -145.58893	State	Ultramafic	T, DDH	Extensively explored w/ geophysics, grid sampling, diamond drilling; Bonanza grade results from small massive sulfide layer; mineralized rock >1,000 ft along strike	S	Freeman, 2004; Ellis, 2004; Barker, 1988	M	H
265	Casey's Cache 20680056	63.33589 -145.73077	S	Placer Au & Ag	Pits	Historic small placer; now combined w/ Miller Mine (Map no. 265)	S	Pilgrim, 1930	L	L
471	Chisna Ridge 20680083	63.14581 -144.80005	N	Skarn	DDH, T	Up to 11% Cu and 0.72 oz/ton gold in Athey samples; BLM samples lower, but significant	S	Rose, 1967; Athey, 1999	M	M
497	Chisna River 20680071	63.05829 -144.83734	S	Placer Au, Ag & PGE	T	Inferred resource: 400,000 cy. Sample contained 0.012 oz/cy gold		Mendenhall, 1903; Moffit, 1944	M	M
496	Chisna River (Lower) 20680072	63.07135 -144.8199	S	Placer Au, Ag & PGE	T	Inferred resource: 3.0 million cy containing 0.044 - 0.056 oz/cy gold	S	Moffit, 1954	L	M
492	Chisna River (Middle) 20680351	63.12053 -144.80137	N	Placer PGE		BLM samples from about 2 miles in middle part of creek, between Powell Gulch & Willow Creek, contain elevated Au, and PGE	S	Mendenhall and Schrader, 1903	L	L
445	Chistochina Airstrip 20680342	63.1702 -144.86872	S	Porphyry		Limonitic volcanic breccia w/ py & minor cp; BLM samples up to 0.45% Cu, 4 ppm Ag, & 0.18% As	S	Rose, 1967	L	L
439	Chistochina Glacier 20680130	63.18631 -144.85451	S	Placer Au & Ag		Minimum production: Au 254 oz; inferred resource: 14,900 cy; BLM samples averaged 0.025 oz/cy Au	S	Rose, 1967	M	H

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
504	Chistochina River (E Trib) 20680387	63.07515 -144.88104	S	Placer Au & Ag	T	Little information; extensively worked creek – little resource remains; little Au in BLM samples	S	This report	L	L
411	Chistochina River , West Fork 20680078	63.1745 -145.00016	S	Placer Au & Ag	T	400 ft by 500 ft area stripped to bedrock ; no visible Au in BLM samples;	S	Rose, 1967; Nokleberg and others, 1991	L	L
624	Chitti Stain 20680098	63.09049 -145.62929	S	Basaltic Cu	3 T's, 3 Pits	Sporadic Cu mineralization in basalt extends over large area; no mineable widths	M, S	Saunders, 1963; Rose and Saunders, 1965	L	L
113	Compass Creek 20680209	63.29928 -146.41890	S	Basaltic copper		Vesicles in basalt with minor cp; BLM sampling indicates small and low grade occurrence	S	Rose, 1966	L	L
334	Cony East 20680382	63.29688 -145.41145	S	Ultramafic		Triassic Ni-Cu-PGE-bearing mafic-ultramafic rocks intrude polymetamorphic complex; select BLM sample to 409 ppb Pt, 414 ppb Pd, 117 ppb Au, 1.500 ppm Cu, 1,880 ppm Ni	S	This report	L	L
331	Cony Mountain 20680198	63.29033 -145.420996	S	Ultramafic		Furthest westward occurrence of Triassic Ni-Cu-PGE in district; limited in extent	S	This study	L	L
452	Coppertone 20680090	63.16154 -144.86373	S	P	T, Pit	Claims originally covered a large area; cp, azurite, & malachite in brecciated, dark gray, siliceous volcanics; low values in BLM samples	S	Rose, 1967; Athey, 1999	L	L
143	Crash 20680234	63.316628 -146.221753	S	Ultramafic		Disseminated sulfides, po & cp, in mafic-ultramafic rocks of Eureka complex; BLM samples show moderate base & precious metal concentrations	S	Ellis & oth., 2004	L	L
500	Daisy Creek 20680073	63.02678 -144.85491	S	Placer Au & Ag		Frozen gravels in 1908; no visible Au in BLM pans, but more testing needed	S	Moffit, 1909	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
515	Dan Creek 20680062	63.17111 -145.52914	S	Placer Au & Ag		Only Kardex information; difficult to locate occurrence; some claim names same as for North Star (0020680061).	S	Kardex 68-42	L	L
317	Dandy Dan 20680060	63.26 -145.57	OF	Unknown		Kardex reports Sn, Ti, gypsum, and talc; active 1963-66	NE	Kardex 68-83	L	L
539	Delta River 20680049	63.24013 -145.79296	OF	Placer Au & Ag		Reportedly active near turn of 19^{th} century; very little gold in BLM test pans	S	Moffit, 1912	L	L
540	Delta River - Garret Creek 20680393	63.20105 -145.81575	S	Placer Au & Ag		Very little gold in BLM samples; no evidence remains of mining activity	S	Moffit, 1912	L	L
498	Dempsey 20680076	63.0496 -144.8552	S	Placer Au & Ag	Adit	Reported fine gold; no paystreak found by adit	NE	Moffit, 1909, 1912	L	L
275	DJ-Silver 20680298	63.32832 -145.69032	S	Polymetallic vein		6” qz vein w/ py, cp, gray sulfides; minor Ag, Pb, Zn	S	This report	L	L
135	Dunite Diatreme 20680206	63.305232 -146.282543	S	Ultramafic	T’s, Pits	Sedimentary conglomerate of mostly ultramafic clasts; some associated gold and PGE	S	Foley, 1992; Ellis and others, 2004	L	L
622	Dunite Hill 20680274	63.06780 -145.74536	S	Ultramafic		Little surface expression; BLM-USGS geophysics suggest buried, dense, conductive, anomaly	S	Ellis and others, 2004	M	H
576	E Fork Maclaren Lode 20680208	63.26147 -146.49171	S	Basaltic copper		Cu minerals in qz veins cutting Triassic Nikolai basalt; Cu to 1.5% in USGS sample	NF	Nokleberg and others, 1991	L	L
285	Eagle's Nest 20680370	63.34221 -145.70658	S	Polymetallic vein / porphyry?	DDH	Part of widespread Cu mineralization in Red Rock Canyon area; low Cu values in BLM samples	S	This report	L	L
227	East Broxson Gold 20680365	63.347473 -146.001208	OF	Ultramafic		ARDF reports sample w/ 1.9 ppm Au & minor Cu, Ni, & PGE from peridotite; BLM could not find &/or duplicate sample	S	Ellis and others, 2004	L	L
225	East Canyon 20680363	63.341202 -145.997558	OF	Ultramafic		Mineralized serpentinized peridotite in Rainy complex; BLM samples w/ low metal values	S	Ellis and others, 2004	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
27	East Hayes Glacier 20680375	63.68634 -146.55312	S	VMS	None	1- to 1.5 ft- thick layers of massive po, ± cp, py, galena in chlorite to talc schists; this occurrence is 1 of 3 VMS occurrences defining a zone ¾ mile long	S	Nokleberg & others 1991; Lange & others 1993	L	L
220	East Peak 20680260	63.32904 -145.98654	OF	Ultramafic		Minor mineralized gabbro in Rainy mafic-ultramafic complex; low base & precious metals in BLM samples	S	Ellis and others, 2004	L	L
219	East Peak South Ridge 20680364	63.325963 -145.979818	OF	Ultramafic		Minor Cu-Ni-PGE mineralization in gabbro near footwall of Rainy complex	S	Ellis and others, 2004	L	L
248	East Rainy 20680267	63.33027 -145.88186	OF	Ultramafic	DDH	Cyclic mafic-ultramafic rocks w/ sulfides mainly in feldspathic peridotite; BLM samples consistently anomalous; averages 0.4% Cu, 0.45% Ni, 1.8 ppm Pt+Pd+Au within about 300 feet	M, S	Ellis and others, 2004; Ellis, 2002a; Freeman, 2004	M	H
556	Eb No. 4 20680218	63.25293 -146.18378	S	Ultramafic	DDH	Part of Fish Lake mafic-ultramafic complex; drill results not released; BLM samples w/ low metal concentrations	S	Ellis and others, 2004	L	M
277	Emerick 20680052	63.35382 -145.70033	S	Ultramafic	T, DDH	First Ni-Cu-PGE prospect discovered in area; small massive sulfide lenses in serpentinite and fault-emplaced(?) dike w/ disseminated sulfide; good grades, but limited known extents	S	Hinderman, 1989; Barker and others, 1985; Wells, 1998	L	M
538	Eureka Creek 20680383	63.25026 -145.80565	OF	Placer Au & Ag		Active around turn of 20th century; recently active 1970-74; minor fine Au in BLM samples	S	Moffit, 1912	L	L
119	Eureka Glacier 20680168	63.3209 -146.39839	S	Ultramafic		Ni, Cu, & PGE in mafic-ultramafic rocks; po, cp, pentlandite, disseminated, patchy, and net-textured; name also refers to westernmost mafic-ultramafic complex	S	Balen, 1990; Kurtak and others, 1992	L	M
111	Eureka Glacier West 20680170	63.30535 -146.43443	S	Ultramafic		Mafic-ultramafic inclusions w/ Ni, Cr, PGE in younger granitoid; BLM samples from area w/ anomalous, but low Ni, Cu, PGE	S	Balen, 1990; Kurtak and others, 1992	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
542	Fish Lake 20680167	63.21758 -145.93113	S	Ultramafic	T, Pit, DDH	Large mafic-ultramafic complex w/ numerous Ni-Cu-PGE occurrences described elsewhere in this report	S	Ellis and others, 2004; Nokleberg and others, 1991; Freeman, 2004	M	H
132	FLF 20680230	63.30596 -146.30437	S	Ultramafic		Cp & py in gabbro breccia; samples reported to 1.1% Cu	S	Ellis & oth., 2004	L	L
238	Foley's 20680265	63.316869 -145.921616	OF	Ultramafic		This “occurrence” refers to general U.S. Bureau of Mines work in North Rainy Creek area; active exploration continues in 2006 for Ni-Cu-PGE in mafic-ultramafics	S	Nokleberg and others, 1991; Foley, 1992	L	M
398	Gakona Glacier 20680094	63.17781 -145.13745	S	Placer Au, Ag & PGE		Active 1971; very little information	S	Kardex 68-138	L	L
637	Gakona River Trib 20680093	63.03075 -145.3492	SS	Placer Au		Active 1974; very little information	S	Kardex 68-154	L	L
274	Galena Slide 20680371	63.35158 -145.6926	S	Polymetallic vein		Single BLM sample w/ 5.15% Zn, 1.27% Pb, 45 ppm Ag, & 45% Ba from float	S	Rose, 1965	L	L
199	Ghezzi 20680046	63.31357 -145.98547	OF	Porphyry?	T, Pits, DDH	Porphyritic gabbro w/ Cu intruding basalt; up to about 1% Cu over 70 feet in trench samples	S, M	Rose, 1965	L	M
272	Glacier Lake 20680117	63.352398 -145.65901	S	Ultramafic	T, Pit	Ni-Cu-PGE mineralization in serpentinite adjacent to younger diorite; high grades, but limited known extent	M, S	Forbes, 1962; Barker, 1988	L	M
280	GR 2-1 20680295	63.34817 -145.69642	S	Polymetallic vein		Cp in 1.5 ft zone at vein margin; 1.6% Cu & 2% Pb in State sample; BLM samples returned much lower values	S	Hanson, 1963	L	L
287	GR 2-2 20680154	63.34074 -145.70302	S	Vein		Cp at margin of qz vein	NE	Hanson, 1963	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
264	GR 2-3 20680317	63.33121 -145.73129	OF	Polymetallic veins		Cp, galena, & py in discontinuous qz veins; up to 0.5% Pb & 0.3% Cu; one of several vein occurrences reported in area	S	Hanson, 1963	L	L
288	GR 2-4 20680153	63.32708 -145.68726	S	Polymetallic vein		Cu-stained volcanic rocks host small zone of bornite; select BLM sample of 17.5% Cu; limited extent to mineralized rock	S	Hanson, 1963	L	L
303	GR 2-5 20680151	63.31634 -145.67134	S	Polymetallic vein		Cp & galena in qz veins in tuffaceous rocks; reported Cu to 3.99%, 0.02 oz/ton Au, 1.4 oz/ton Ag	NE	Hanson, 1963	L	L
305	GR 2-6 20680309	63.2879 -145.62896	OF	Polymetallic vein		Minor Cu & Pb in swarm of qz veins in dacite; Cu to 0.8%, Pb to 0.3%; one of several vein occurrences reported in area	NE	Hanson, 1963	L	L
306	GR 2-7 20680310	63.2865 -145.61655	OF	Polymetallic vein		Scattered sulfides in swarm of qz veins in dacite; USGS sample to 0.4% Cu, 0.6% Pb, & trace Au & Ag; one of several vein occurrences reported in area	S	Hanson, 1963; Nokleberg and others, 1991	L	L
307	GR 2-8 20680311	63.28595 -145.60968	OF	Polymetallic vein		Minor Cu & Pb in qz veins cutting andesitic to dacitic volcanics; one of several vein occurrences reported in area	S	Hanson, 1963;	L	L
312	GR 2-9 20680312	63.27728 -145.62092	OF	Polymetallic vein		Qz and calcite veins w/ minor py & cp; one of several vein occurrences reported in area	NE	Hanson, 1963	L	L
320	GR 2-10 20680313	63.27055 -145.58647	OF	Polymetallic vein		Scattered sulfides in qz vein along fault; up to 2.6% Pb; minor Cu, Ag, Au; one of several vein occurrences reported in area	S	Hanson, 1963	L	L
318	GR 2-11 20680314	63.26279 -145.56669	OF	Polymetallic vein		Qz veins w/ cp near fault; one of several vein occurrences reported in area	S	Hanson, 1963	L	L
322	GR 2-12 20680150	63.280789 -145.56675	OF	Polymetallic vein	T	Lenses of cp, py, po in qz veins in volcanic; Pb reported but not found in BLM samples; up to 11% Cu in select BLM samples, but small widths	S	Hanson, 1963	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
324	GR 2-13 20680315	63.284839 -145.566857	OF	Polymetallic vein		Scattered cp and galena in 0.5 ft & smaller qz veins; one of several vein occurrences reported in area	S	Hanson, 1963	L	L
325	GR 2-B3EC 20680316	63.29034 -145.56297	OF	Porphyry(?)		Disseminated py & cp in granodiorite; low metal values in BLM samples	S	Hanson, 1963	L	L
310	GR 2-B3SW 20680152	63.28189 -145.62639	OF	Porphyry?		Disseminated py in granodiorite; reported trace Au	NE	Hanson, 1963	L	L
301	GR 2-B4EC 20680308	63.32705 -145.57743	S	Porphyry		Py ± arsenopyrite in granodiorite; also cp-bearing qz veins in area; USGS sample to 1.2% Cu, 30 ppm Ag, & 0.1 ppm Au; other investigators w/ lower returns	S	Hanson, 1963; Nokleberg and others, 1991	L	L
293	GR 2-C4C 20680300	63.32412 -145.66273	S			One of several disseminated sulfides in volcanics noted by Hanson (1963); BLM sample w/ low metal values	S	Hanson, 1963	L	L
292	GR 2-C4NW 20680299	63.32718 -145.67807	S			Qz-cc-epidote veinlets w/ bornite, cp, malachite; BLM sample from area w/ 0.5% Cu	S	Hanson, 1963	L	L
632	GR 13-1 20680290	63.03514 -145.54271	N	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	NE	Rose and Saunders, 1965	L	L
633	GR13-2 20680291	63.03244 -145.55373	N	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	NE	Rose and Saunders, 1965	L	L
630	GR 13-3 20680289	63.03728 -145.56208	N	Basaltic Copper	Pit	5.8% Cu over 13 feet in BLM sample; good grade and width, but limited overall extent to mineralized zone	S	Rose and Saunders, 1965	L	L
631	GR 13-4 20680293	63.04428 -145.54383	N	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	NE	Rose and Saunders, 1965	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
635	GR 13-5 20680292	63.01638 -145.55056	N	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	NE	Rose and Saunders, 1965	L	L
629	GR 13-6 20680288	63.05577 -145.58443	S	Basaltic Copper		Reported 3 ft by 2 ft pod of chrysocolla not found by BLM; mineralized amygdaloidal basalt w/ 0.3% Cu	S	Rose and Saunders, 1965	L	L
627	GR 13-7 20680287	63.07322 -145.63663	S	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	S	Rose and Saunders, 1965	L	L
626	GR 13-8 20680286	63.08433 -145.63269	S	Basaltic Copper		One of several basaltic copper occurrences reported by Rose & Saunders (1965) on Paxson Mtn.	NE	Rose and Saunders, 1965	L	L
625	GR 13-9 20680285	63.008622 -145.64210	S	Basaltic Copper	T, DDH	Cu minerals fill amygdules in basalt; BLM sample w/ 1.2% Cu over 10 ft	S	Rose and Saunders, 1965	L	L
216	GR 14-4 20680258	63.32059 -145.96698	OF	Skarn		Semi-massive lenses of sulfide in hornfelsed sediments intruded by gabbro dikes; low metal values in BLM samples	S	Rose, 1965	L	L
193	GR 14-8 20680148	63.30146 -145.99877	S	Skarn		Lens of po, py, cp between marble and gabbro; metal concentrations in BLM samples lower than reported by Rose, 1965	S	Rose, 1965	L	L
212	GR 14-9 20680253	63.29308 -145.94554	S	Skarn		Skarn adjacent gabbro dike; local pods of py; low BLM sample values	S	Rose, 1965	L	L
191	GR 14-10 20680251	63.30013 -146.01073	S	Skarn		Limestone in mafic-ultramafic rocks; py, po, minor cp	NE	Rose, 1965	L	L
180	GR 14-11 20680240	63.29995 -146.07125	State	Unknown		Reported copper- & iron-stained float in basalt adjacent to limestone; BLM found no significant mineralized rock, but may have been too far E	NF	Rose, 1965	L	L
181	GR 14-12 20680239	63.30225 -146.08033	S	Skarn		Po, cp, py in altered limestone within Triassic mafic-ultramafic rocks	S	Rose, 1965	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
190	GR 14-15 20680149	63.320856 -146.032226	OF	Ultramafic		Mineralized gabbro dikes cut basalt; others suggest skarn or shear controlled mineralization; BLM sample w/ 2.15% Cu & minor Au, Ag over 10 ft	S	Rose, 1965; Ellis and others, 2004	L	M
223	GR 14-16 20680250	63.33494 -146.00645	OF	Skarn		Mafic intrusive altering limestone; magnetite, py, cp; low values in BLM sample	S	Rose, 1965	L	L
230	GR 14-17 20680262	63.3485 -145.94854	OF	Polymetallic vein		6” by 10 ft shear in dacite w/ cp & Cu staining	S	Rose, 1965	L	L
158	GR14-18 20680143	63.348837 -146.050458	OF	Basaltic copper		Lenses of massive sulfide in basalt near mafic-ultramafic contact; low precious & base metals in BLM samples	M, S	Rose, 1965	L	L
166	GR 14-19 20680248	63.34607 -146.08280	SS	Skarn		Limestone altered by gabbro; BLM found mainly rubble w/ massive to semi-massive po, cp; low precious metal values	S	Rose, 1965; USBM records, 1983	L	L
164	GR 14-20 20680249	63.349401 -146.078969	OF	Replacement		30 ft by 130 ft iron-stained chert; low base and precious metals in BLM samples	S	Rose, 1965	L	L
617	GR 19-1 20680281	63.10648 -145.77445	S	Ultramafic		“Gabbro” w/ 28% magnetite extends 100-150 ft by 500 ft; 22% Fe in State sample	S	Rose, 1966b	L	L
618	GR 19-2 20680280	63.10739 -145.76969	S	Ultramafic	Pits	Gabbro w/ cp & po; low values; qz vein w/ Cu stain nearby; pits cut on qz vein	S	Rose, 1966b	L	L
599	GR 19-3 20680277	63.15092 -145.91102	S	basaltic Cu		Cu stain & chalcocite veinlets in epidote altered basalt; no outcrop found by BLM	S	Rose, 1966b	L	L
600	GR 19-4 20680278	63.13526 -145.91197	S	shale-hosted		Black shale w/ py lenses in basalt; low metal values in BLM sample	S	Rose, 1966b	L	L
217	GR 20-2 20680159	63.31974 -145.97249	OF	Skarn		Sulfides at melagabbro-limestone contact; limited extent to mineralized rock; Cu to 0.75% in BLM sample; trace Au, Ag	S	Rose, 1966	L	L
152	GR 20-3 20680238	63.31526 -146.17092	S	Asbestos		Chrysotile asbestos veins to ¼” wide in dunite; evidence of coarser asbestos also present; possible large tonnage	NE	Rose, 1966b	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
153	GR 20-4 20680237	63.32031 -146.17048	S	Unknown	Pit	Limonite-cemented talus w/ minor Zn, Cu, and Pb mineralization	S	Rose, 1966b	L	L
149	GR 20-5 20680147	63.31647 -146.1999	S	Polymetallic vein	T, Pits	Shear controlled mineralization in volcanic/gabbro; BLM samples to 0.3% Cu, 72 ppm Ag; reported 2.95% Cu over 1 ft	S	Rose, 1966	L	L
375	GR 28-1 20680137	63.23206 -145.09329	S	Ultramafic	None	Disseminated sulfides in mafic-ultramafic rock; BLM samples had low metal concentrations	S	Rose, 1967	L	L
392	GR 28-5 20680322	63.20336 -145.06464	S	Skarn		Cu mineralization near carbonate-diorite contact; native Cu present in thin veinlets in diorite	S	Rose, 1967	L	L
402	GR 28-6 20680323	63.19953 -145.02224	S	Polymetallic veins	T's, Pits	Qz-calcite vein w/ py & minor galena; up to 1% Pb and 7 ppm Ag in BLM sample	S	Rose, 1967	L	L
412	GR 28-8 20680140	63.17502 -145.00008	S	Porphyry	Pit?	Significant Cu as high as 3.57%; mineralization extends over an area approximately 450 by 1,500 ft	S	Rose, 1967	L	M
410	GR 28-9 20680327	63.18581 -144.9701	S	Replacement		Py, cp, magnetite, in pods in andesite close to intrusive contact; low metal values in BLM samples	S	Rose, 1967	L	L
422	GR 28-10 20680328	63.18052 -144.94752	S	Unknown		Cu mineralization associated w/ qz-monzonite dike cutting volcanics; BLM sample to 0.3% Cu	S	Rose, 1967; Nokleberg and others, 1991	L	L
421	GR 28-11 20680329	63.17445 -144.95278	S	Skarn		Approx. 15 ft by 300 ft zone of hematite & qz; possible replacement of volcanics similar to GR 28-10 (Map no. 422); low metal values in BLM sample	S	Rose, 1967	L	L
434	GR 28-14 20680141	63.2 -144.9	S	Polymetallic vein		Iron-stained argillite at contact w/ basalt; minor Cu; BLM samples had low values	S	Rose, 1967	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
435	GR 28-15 20680144	63.21 -144.89	S	Polymetallic vein		Qz veins in basalt w/ minor Cu, Au, Ag reported; low metal values in BLM samples; 313 ppm Cu, 10 ppb Au	S	Rose, 1967	L	L
436	GR 28-16 20680335	63.21711 -144.88119	S	Polymetallic vein		Minor base & precious metals in qz veins cutting amphibolite; BLM sample nearby w/ 340 ppb Au	S	Rose, 1967	L	L
433	GR 28-17 20680336	63.20646 -144.87385	S	Shale-hosted		Stained argillite w/ traces of Au, Ag, Pt, & Ni reported; BLM sample w/ very low metal values	S	Rose, 1967	L	L
432	GR 28-18 20680337	63.20407 -144.87232	S	Ultramafic		Boulder of dunite w/ 0.75% Cu & traces of precious metal reported; BLM sample of float w/ high PGE – 1.2 ppm Pt+Pd+Au; may be from distant source?	S	Rose, 1967	L	L
430	GR 28-19 20680338	63.20009 -144.87624	S	Ultramafic		BLM sample of pyroxenite adjacent gabbro dike returned 1.8% Cu & minor PGE +Au; Rose reports chrysotile in dunite & magnetite in hornblendite	S	Rose, 1967	L	L
429	GR 28-20 20680339	63.19545 -144.87656	S	Ultramafic		Iron-stained mafic-ultramafic rocks w/ py, magnetite, po, cp; BLM sample returned 2.7 ppm Au over 54 ft sample	S	Rose, 1967	L	L
466	GR 28-22 20680350	63.17627 -144.76413	S	Unknown		Pyritic argillite w/ trace Au & Ag	S	Rose, 1967	L	L
446	GR 28-24 20680145	63.17116 -144.86179	S	Unknown		Disseminate py & cp in volcanic; 310 ppm Cu & low Au, Ag in BLM samples	S	Rose, 1967	L	L
449	GR 28-25 20680146	63.16539 -144.84646	S	Polymetallic vein		Qz veinlets w/ minor reported Au in volcanic;	NE	Rose, 1967	L	L
456	GR 28-26 20680331	63.15507 -144.84873	S	Skarn		Reported boulders of magnetite-hematite-pyrite-chlorite rock; BLM sample w/ minor Cu & Zn	S	Rose, 1967	L	L
455	GR 28-27 20680142	63.15475 -144.85747	S	Polymetallic vein	T	Disseminate Cu in altered volcanic; BLM samples contained Cu as high as 1.81%, 33 ppb Au, & 12 ppm Ag;	S	Rose, 1967; Athey, 1999	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
418	GR 28-30 20680194	63.14837, -145.00691	S	Placer		About 85 placer claims reported by Rose (1967), no known activity since 1960's	NE	Rose, 1967	L	L
409	GR 28 SS61 Anomaly 20680326	63.18848 -144.96195	S	Unknown		Zn & Pb anomalous in State & BLM stream sediment samples; BLM rock samples to 0.3% Pb, 104 ppm Ag, 256 ppb Au, but low Zn; samples over 3-5 ft in siliceous dacite/andesite; mineralized rocks extend 100-200 ft	S	Rose, 1967; This report	L	L
179	Green Wonder 20680002	63.30722 -146.282543	OF	Skarn		Bright green skarn outcrop contains high chromium and zinc values.	S	Rose, 1965	L	L
581	Greenstone 20680181	63.2279 -146.40555	S	Vein		Qz-epidote veins in basalt w/ Cu minerals; Cu to 28% in BLM sample; limited extent	S	Stout, 1976; Balen, 1990; Kurtak and others, 1992	L	L
528	Gulkana River E Trib 20680064	63.21892 -145.43617	S	Placer Au & Ag		Low values in BLM samples; no bedrock exposed; no evidence of mining	S	Kardex 68-70, -73, -153	L	L
510	Gunn Creek 20680066	63.13226 -145.4509	S	Placer Au & Ag		Rose & Saunders pan con sample included chromite, scheelite, gold, and sphalerite	S	Rose and Saunders, 1965	L	L
91	Gunnysack 20680021	63.52467 -145.82334	CF	Polymetallic Vein	Adit 30 ft	Adit explores a very large, 25-foot wide, quartz vein that is exposed over several hundred yards.	S	Capps, 1912; Moffit, 1942; Joesting, 1942	L	L
92	Gunnysack Creek 20680102	63.52588 -145.84276	CF	Placer Au		Evidence of exploration or recreational panning only	S	Alaska Kardex 068-191, 279	L	L
237	Hail Creek 20680264	63.32761 -145.93011	OF	Ultramafic		Mineralized rock adjacent to gabbro dikes intruding dunite; bornite, cp, and tennantite in patches & seams; limited extent	M, S	Ellis and others, 2004	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
88	Hajdukovich Gold 20680396	63.57061 -144.9804	S	Pluton-hosted Au	DDH	Several varied occurrences centered in alkalic intrusive complex; best Au returns from low sulfide qz veins; associated w/ Cu, Pb, Sb; some visible Au	NE	Freeman, 2005; Adams & others, 2005	L	M
247	Joe Claims 20680380	63.33038 -145.86117	OF	Polymetallic vein	None	Sheared volcanic rocks w/ disseminated & stringered py & cp; select BLM sample to 262 ppb Au, 1.98% Cu	S	This report	L	L
374	JS 20680397	63.22988 -145.09437	S	Ultramafic		Po, cp, bornite, ± covellite, py in pyroxenite; BLM sample across 5.3 ft returned 17 ppb Au, 1.1 ppm Ag, 258 ppb Pd, 68 ppb Pt, 0.75% Cu	S	This report	L	L
490	Kraemer Creek 20680353	63.1312 -144.65309	S	Placer Au & Ag		Placer reportedly included PGE & native copper nuggets to 1-2 lbs	NE	Moffit, 1944	?	?
609	Landmark Gap Copper 20680227	63.13816 -146.09673	S	Basaltic Cu		Cu minerals in basalt; extends 30-50 ft by 100 ft; measured BLM samples average about 1-3% Cu	S	Ellis & oth., 2004	L	M
608	Landmark Vein 20680226	63.14462 -146.10324	S	Basaltic Cu		Cu minerals in qz-epidote veinlets & amygdules in basalt; BLM sample to 2.3% Cu	S	Stout, 1976	L	L
138	Landslide Creek 20680158	63.32014 -146.25938	S	Ultramafic		Rose location #6; dunite cut by veins of opal, calcite , chrysotile, magnetite, chromite; no concentrations of metals; low values in BLM sample	S	Rose, 1966	L	L
555	LFF 20680219	63.25233 -146.16033	S	Ultramafic	DDH	Peridotite w/ disseminated & net textured po, cp, & pentlandite; BLM samples to 1.1% Ni & 1,470 ppb Pd	S	Ellis and others, 2004	L	M
489	Limestone Creek 20680079	63.13614 -144.64443	S	Placer Au & Ag	T, Pits	Production: 580 oz Au	NE	Moffit, 1912, 1944	M	M
505	Little Daisy-Weldon Creek 20680324	63.14036 -144.98327	S	Placer		2 claims staked in 1970; 15 claims staked in 1971; BLM samples indicate low Au	S	This report	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
140	Lower Crash 20680367	63.31541 -146.25659	S	Ultramafic		Mineralized peridotite & brecciated serpentinite in Eureka complex; one BLM sample w/ 2.6% Cu, but mostly low metal values in other samples	S	Ellis & oth., 2004	L	L
603	LTLW Vein 20680276	63.14578 -145.99097	S	Basaltic Cu		Cu minerals in qz-epidote vein cutting basalt; high Cu values, but very limited extent	S	Stout, 1976	L	L
562	Lucky 7 20680217	63.25995 -146.21393	S	Ultramafic		Gabbroic unit in Fish Lake complex; ARDF: 0.14% Cu, 0.17%Ni, 94 ppb Pt, 94 ppb Pd; BLM results lower	S	Ellis & oth., 2004	L	L
276	M & R 1-12 20680055	63.36 -145.687	S	Unknown		Poor location, only Kardex information	NF	Kardex 68-116	L	L
104	Maclaren Glacier Lode 20680175	63.30179 -146.49166	S	Skarn		Extensive magnetite mineralization where dike cuts limestone; includes Cu, Ni, Cr; too little Fe (up to 17%) to be a resource	S	Rose, 1966; Kurtak and others, 1992	L	L
572	Maclaren River (East Fork) 20680169	63.26753 -146.48746	S	Placer Au & Ag	Pits	Generally low Au values in placer samples; some possible bedrock sites for suction dredging	S	Balen, 1990; Kurtak and others, 1992	L	L
388	Magnetite Cirque 20680321	63.21358 -145.07178	S	Ultramafic		Minor, but persistent, cp disseminated in peridotite; anomalous PGE & Au, but relatively low values	S	This study	L	M
385	Magnetite Cirque East 20680395	63.20881 -145.06385	S	Ultramafic		Mineralized rock in hornfels at contact between basalt and ultramafic; anomalous Cu, Pt, Co	S	This report	L	L
257	Marsha 20680269	63.34375 -145.84706	OF	Ultramafic		Sulfide lenses near gabbro dikes intruding ultramafics and volcanics; high Cu in BLM sample (6.25%), but limited extent	S	Stout, 1966; Rose, 1966	L	L
75	McCumber 20680018	63.72 -145.48	S	Polymetallic vein		Galena in stringers of quartz	NF	Moffit, 1942	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
67	McCumber Creek 20680019	63.6998 -145.55704	S	Placer Au & Ag	Shafts, drifts, pits	Inferred resource: 580,000 cy averaging 0.006 oz/cy gold	S	Hinderman, 1986	M	M
70	McCumber Creek (Upper) 20680399	63.68944 -145.51167	S	Placer Au & Ag	Pit	Minor Au in BLM samples; some suction dredge potential, but unlikely large operation	S	Hinderman, 1986	L	L
66	McCumber Creek Trib 20680389	63.72884 -145.61799	S	Placer Au & Ag	T	Inferred resource: 3,700 cy; sample contained 0.008 oz/cy gold	S	This report	L	L
45	McGinnis Glacier 20680126	63.56782 -146.18791	S	VMS	None	8 Resource Assoc.'s of AK claims; active 1978 only; qz-mica sc w/ py in area; low values; location uncertain	NF	Kardex 68-196	L	L
108	MF1996C-37 20680211	63.3155 -146.4291	S	Podiform chromite		USGS sample w/ >5,000 ppm Cr as disseminated chromite serpentinized ultramafic	NE	Nokleberg and oth, 1991; Ellis & others, 2004	L	L
563	MF1996C-40 20680215	63.27795 -146.30346	S	Ultramafic		One of several occurrences in the mafic-ultramafic rocks of the area that USGS reports > ½% Cr	NE	Nokleberg and oth, 1991	L	L
145	MF1996C-44 20680236	63.30453 -146.19098	S	Porphyry?		Low Au values in pyritic dacite of Permian-Pennsylvanian age; USGS reports 0.1 ppm Au	S	Nokleberg and others, 1991	L	L
561	MF1996C-45 20680216	63.25402 -146.21951	S	Ultramafic		One of several occurrences in the mafic-ultramafic rocks of the area that USGS reports > ½% Cr	S	Nokleberg and oth, 1991	L	L
176	MF1996C-52 20680242	63.31805 -146.06364	OF	Vein		Reported Cu & Ag bearing minerals in qz vein in diabase dike intruding mafic-ultramafic; USGS reports 0.15 ppm Au	S	Nokleberg and others, 1991	L	L
174	MF1996C-54 20680244	63.32316 -146.05531	OF	vein gold (qz vein)		Mineralized altered graywacke w/ Ag to 150 ppm, Au to 2.3 ppm & Mo to 30 ppm reported; BLM sample w/ lower values	S	Nokleberg and others, 1991	L	L

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551	MF1996C-70 20680223	63.23561 -146.06614	S	Ultramafic		One of several occurrences in the mafic-ultramafic rocks of the area that USGS reports > ½% Cr	S	Nokleberg and oth, 1991	L	L
621	MF1996C-87 20680282	63.0985 -145.74963	S	Ultramafic-Cr		> ½% Cr in mafic-ultramafic rocks of the Tangle complex; nearby BLM samples w/ low base & precious metals	S	Nokleberg and others, 1991	L	L
304	MF1996C-110 20680320	63.29903 -145.66949	OF	Polymetallic veins		Qz veins w/ Cu minerals in Penn-Perm volcanics; up to 1% Cu & 20 ppm Ag reported; low BLM sample returns suggest occurrence not found?	S	Nokleberg and others, 1991	L	L
425	MF1996C-129 20680332	63.19567 -144.91335	S	Polymetallic vein		USGS reports 0.22% Cu in sample from pegmatite dike; BLM samples returned very low metal values	S	Nokleberg and others, 1991	L	L
493	MF1996C-138 20680345	63.1241 -144.90289	S	Porphyry		Dacite porphyry w/ py & cp; USGS sample to 1.1% Cu & 50 ppm Ag; BLM sample w/ 0.5% Cu	S	Nokleberg and others, 1991	L	L
270	Miller Creek 20680058	63.36833 -145.69778	SS	Placer Au		Little information; low gold value in BLM sample, but location uncertain	S	Kardex 68-13	L	L
457	Miller Gulch 20680069	63.16985 -144.82499	S	Placer Au, Ag & PGE	T	Production: 50,000 oz Au; 15 oz PGE. Inferred resource: 950 cy. BLM sample contained 0.083oz/cy gold	S	Mendenhall, 1905; Foley and Summers, 1990	M	M
458	Miller Gulch Dikes 20680381	63.17592 -144.82362	OF	Ultramafic		Mafic to ultramafic dikes intrude Jura-Cretaceous argillite; dikes & adjacent argillite elevated in PGE, Au, Ag, Hg, As	S	Foley and Summers, 1990	L	L
265	Miller Mine 20680155	63.33811 -145.73133	OF	Placer/Lode	Pit	Site shown on USGS topographic maps; corresponds to small, early placer work; later, claims staked for lode as well; corresponds to Casey's Cache and Mt. Si project	S	Pilgrim, 1930; Wedow and others, 1954; Cobb, 1972;	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
128	Mini U Landslide 20680232	63.32241 -146.28212	S	Ultramafic		Minor sulfides, po, cp, in mafic-ultramafic rocks of Eureka complex; low metal values in BLM samples	S	Ellis & oth., 2004	L	L
333	Minya Moly 20680197	63.30561 -145.42825	S	Porphyry		Gabbros contained disseminated chalcopyrite and molybdenite.	S	This study	L	L
19	Miyaoka 20680161	63.71299 -146.73918	S	VMS		Lenses of massive to semi-massive po, py, & minor cp in chlorite-mica-qz schist; extensive mineralized rock, but low grades	M, S	Lange and others, 1993	L	L
198	Moneta Porcupine 20680257	63.317058 -145.990386	OF	Skarn		Calcareous inclusion in serpentinized mafic-ultramafic; Cu minerals in gabbro dike; select BLM sample to 1.65% Cu, but representative sample 0.35% Cu	S	Rose, 1965	L	L
68	Morningstar Creek 20680116	63.69556 -145.54812	S	Placer Au & Ag	T’s, Pits	Inferred resource: 150,000 cy averaging 0.02 oz/cy Au	S	Smith, 1932	L	L
171	No Name Creek 20680045	63.32764 -146.08956	OF	Placer Au & Ag	T	Inferred resource: 7,200 cy; BLM samples contain up to 0.0054 oz/cy gold	S	Rose, 1965; Nokleberg and others, 1991	M	M
619	Norel 20680279	63.11436 -145.75381	S	Ultramafic		10-15-ft-thick gabbro dike/sill cutting ultramafic rocks; mineralized gabbro margins; low metal values in BLM samples	S	Nokleberg and others, 1991;	L	L
254	North Ann Creek 20680272	63.34889 -145.87521	OF	Skarn		Faulted slivers of sediments in ultramafic rocks; sulfides in both rock types; low BLM sample values	S	Ellis and others, 2004	L	L
44	North McGinnis Glacier 20680377	63.61328 -146.1808	S	um?		BLM sample of cp-bearing amphibolite w/ 4.3% Cu & 480 ppb Au found about 1.5 miles west of ARDF designated location (MH011)	S	Nokleberg & others, 1991	L	L
233	North Rainy 20680263	63.34056 -145.93337	OF	Ultramafic		Mafic-ultramafic rocks w/ minor sulfides; massive sulfide lenses in adjacent hornfels & mineralized shears also present; hornfels to 1% Cu and shears to 2% Cu, 0.4% Pb	S	Ellis and others, 2004	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
279	North Red Rock Canyon 20680296	63.3486 -145.70542	S	Polymetallic vein		Rose reports 0.46 ounces per ton Au from qz vein in area; BLM could not find vein; BLM samples from area returned low base and precious metal values	S	Rose, 1965; Nokleberg and others, 1991	L	L
470	Northland Mines 20680029	63.81423 -144.81423	S	Skarn	MT	Massive specular hematite vein/replacement bed exposed for ~1000 ft	S	Athey, 1999	M	M
150	Notar 20680235	63.317957 -146.201402	S	Ultramafic		Net-textured po w/ cp in peridotite of Eureka complex; low metal values in BLM samples	S	Ellis & oth., 2004	L	L
64	Ober Creek 20680016	63.71972 -145.77077	S	Placer Au & Ag	Pits, shafts	Only small production, if any; frozen gravels (Moffit, 1954)	S	Pilgrim, 1930; Moffit, 1954	L	L
299	Odie 20680303	63.33569 -145.61436	S	ultramafic	T, DDH	Mineralized gabbro dike cutting dunite of Canwell complex; average values moderate from dike; select samples return high grade precious metals; limited exposure	S	Ellis and others, 2004;	L	M
636	One-Mile Creek 20680099	63.01915 -145.4871	SS	Placer Au & Ag		Active 1978-81; very little information	S	Kardex 68-194	L	L
634	Paxson Mountain 20680100	63.00717 -145.57029	OF	Basaltic Cu		Discovered by USGS in 1970’s; 2.6% Cu & 20 ppm Ag in amygdaloidal basalt	NE	Nokleberg and others, 1991	L	L
86	Pegmatite Creek 20680014	63.59653 -144.95601	S	Placer Au & Ag		Moffit (1942) reports no commercial deposits found at site	S	Moffit, 1942	L	L
263	Phelan Creek (Lower) 20680059	63.32655 -145.73411	OF	Placer Au & Ag		Little gold evident in BLM samples	S	Kardex 68-112, -145	L	L
530	Phelan Creek (Upper) 20680063	63.22358 -145.48661	S	Placer Au & Ag	Pits	Inferred(?) resource of 10,164,000 cy containing 284,592 oz gold at an average grade of 0.028 oz/cy	S	Freeman, 1985	L	M
243	Picrite Hill Skarn 20680373	63.31809 -145.86908	OF	Skarn		5-11ft by 45 ft exposure of skarn & py/cp in area of picritic basalts; low metal values in BLM samples	S	This report	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	M D P	M E P
52	Pillsbury 20680024	63.57035 -145.93824	OF	Placer Au & Ag		Active 1978-83; low values in BLM samples	S	Kardex 68-185	L	L
141	PP Diatreme 20680366	63.31703 -146.24906	State	Unknown		Anomalous Pt & Pd reported; BLM sample had only background values; possible ice-dam-conglomerate (IDC?)	S	Ellis & oth., 2004	L	L
9	Ptarmigan (Conradt Prospect) 20680081	63.80327 -146.53185	CF	Porphyry	Adits, Pits	Located within Fort Greely; sporadic concentrations of molybdenum – insufficient in size; interesting Au concentrations in structure-controlled veins	S	Joesting, 1942; Smith, 1942; Burr Neely, 2001; USBM, 1943	L	L
8	Ptarmigan Creek 20680080	63.80749 -146.50874	CF	Placer Au & Ag		Located within Fort Greely; low Au values in BLM samples	S		L	L
482	Quartz Creek 20680205	63.15099 -144.75288	S	Placer Au & Ag		Inferred resource: 784,800 cy as of 1979	S	Rose, 1967; Cobb, 1979	L	L
481	Quartz Creek Head 20680349	63.16276 -144.7178	S	ultramafic		Small outcrop of mafic & ultramafic rocks w/ py & minor po, cp; Cretaceous age; BLM samples returned minor base & precious metal values	S	Matteson, 1973; Foley & Summers, 1990	L	L
302	Rainbow Peak 20680302	63.30925 -145.62638	S	Polymetallic vein		ARDF reports 8.7% Cu from qz-calcite vein w/ chalcocite; ARDF reports minor Zn & Pb in metadacite		Ellis and others, 2004; Nokleberg and others, 1991	L	L
252	Rainy Breccia 20680266	63.333632 -145.898317	OF	Ultramafic		Low metal values in BLM samples of brecciated mafic-ultramafic Rainy complex rocks	S	Ellis and others, 2004	L	L
241	Rainy Complex 20680163	63.32576 -145.90395	OF	Ultramafic	T, DDH	Large mafic-ultramafic complex w/ numerous Ni-Cu-PGE occurrences described elsewhere in this report	M, S	Rose, 1965, 1966; Barker, 1988	M	H

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
210	Rainy Creek 20680048	63.28133 -145.84897	OF	Placer Au & Ag	T's, Pits	Production: Au 3,717 oz; Inferred resource: 17,960 cy; values range from 0.016 to 0.127 oz/cy gold	S	Pilgrim, 1930 Rose, 1965	M	M
201	Rainy Creek Skarn 20680252	63.30403 -145.98202	S	Skarn	T	Skarn extends about 200 ft on both banks; po, py, cp in massive lenses; up to 2.2 ppm Au & 0.5% Cu in BLM samples; averages are lower	S	Brooks, 1918; Martin, 1920; Rose, 1965	L	L
196	Rainy Creek, West Fork 20680047	63.30223 -145.97764	S	Placer Au & Ag	Pits?	Some work prior to 1965; very little gold in BLM samples	S	Rose, 1965	L	L
503	Red Bear 20680091	63.06857 -144.90144	S	Placer Au & Ag	T, Pits	Active 1968; very little information	S	Kardex 68-104	L	L
278	Red Knob 20680318	63.350505 -145.702906	S	Polymetallic veins	T	Cp & py in silicified veins in highly sheared volcanic; up to 11.2% Cu (Freeman); BLM samples much lower	S	Freeman, 2002	L	M
281	Red Rock Canyon, E Wall 20680294	63.34586 -145.69981	S	Polymetallic vein		Minor Cu mineralization across large area of volcanic rocks; Cu to 0.3%, Zn to 0.1% in BLM sample; low precious metals	S	Hanson, 1963	L	L
582	Richards 20680039	63.19813 -146.3632	S	Basaltic Cu		Active 1964-66; qz veinlets in basalt; low values	NF	Kurtak and others, 1992	L	L
33	Roberts No. 1 20680378	63.59760 -146.26387	S	VMS	None	Penetratively deformed, isoclinally folded layered massive sulfides; mostly po & py w/ minor cp & sphalerite; in calcareous qz-chlorite schist; thickest layer 6 ft by 60 ft; BLM sample across 3.2 ft returned 102 ppb Au, 1.3 ppm Ag, 970 ppm Cu, 1.58% Zn	S	Nokleberg & Lange, 1985; Nokleberg & others 1991; Lange & others, 1993	L	L
42	Roberts No. 2 20680379	63.59293 -146.24654	S	VMS	None	Deformed layered massive sulfides; mostly po w/ py & cp ± sphalerite, galena; in calcareous, carbonaceous, & chloritic schist; 30 ft by 200 ft; BLM samples to 18 ft of 44 ppb Au, 1.0 ppm Ag, 2,470 ppm Cu, & 16 ft of 215 ppm Pb, 3,560 ppm Zn	MS	Nokleberg & Lange, 1985; Nokleberg & others 1991; Lange & others, 1993	L	L

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549	Ronnie 20680053	63.21887 -146.05066	S	Ultramafic		Claims staked in 1973; very little information	S	Kardex 68-150	L	L
459	Round Wash 20680390	63.17554 -144.81025	S	Placer Au, Ag & PGE	Pits	Inferred resource: 2.6 million cy; three samples averaged 0.007 oz/cy gold	S	Kardex 68-63	L	L
480	Ruby Gulch 20680070	63.15904 -144.76807	S	Placer Au, Ag & PGE		Inferred resource: 300,980 cy averaging 0.0239 oz/cy gold	NE	Moffit, 1912	L	L
65	Savage Creek Tributaries 20680199	63.71564 -145.76588	S	Placer Au & Ag		Low Au values in BLM samples	S	Pilgrim,1930	L	L
586	Sevenmile Lake Vein 20680225	63.17666 -146.22206	S	Basaltic Cu		Cu minerals in qz veinlets & disseminated; in basalt; BLM samples to about ½% Cu	S	Stout, 1976	L	L
28	Sherpa 20680124	63.65124 -146.4471	S	Lode		Up to 14 Resource Assoc.'s of AK claims active 1978 only; location uncertain	NF	Kardex 68-195	L	L
448	Slate Creek 20680068	63.16983 -144.84273	S	Placer Au, Ag & PGE	T	Production: 64,427 oz Au; Indicated resource: 722,000 cy averaging 0.0116 oz/cy gold	S	Mendenhall, 1905; Foley and Summers, 1990	M	M
245	South Ann Copper 20680271	63.32159 -145.84778	OF	Porphyry(?)		About 0.5% Cu in representative BLM sample across 150 ft of volcanic talus; moderate values – good extent	S	Ellis and others, 2004	L	M
244	Southeast Rainy 20680270	63.30424 -145.83401	OF	Ultramafic		SE end of Rainy mafic-ultramafic complex; BLM samples very low metal concentrations – ARDF site maybe not found?	S	Ellis & oth, 2004	L	L
184	Specimen Creek (Lower) 20680114	63.28283 -146.04932	S	Placer Au & Ag	T's, Pits	Inferred resource: 154,000 cy; BLM sample contained 0.059 oz/cy Au	S	Rose, 1965	M	M
188	Specimen Creek (Upper) 20680241	63.31669 -146.0537	OF	Placer Au & Ag	T's, Pits	Inferred resource: 130 cy; BLM sample contained 0.016 oz/cy Au	S	Rose, 1965	M	M
511	Summit Hill 20680319	63.13158 -145.47180	S	ultramafic		Cretaceous age for diorite & surrounding mafic-ultramafics; ARDF reports 1% Cu, 1.6% Ni, w/ PGE & Au; BLM sampling could not reproduce ARDF report	S	Ellis and others, 2004	L	L

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578	Sunshine 20680040	63.23988 -146.44177	S	Basaltic Cu		Qz-epidote-carbonate lenses and veinlets w/ minor Cu in basalt	S	Kurtak and others, 1992	L	L
48	Tourmaline 20680392	63.48274 -146.30809	SS	Pegmatite		Collector interest watermelon tourmaline; source not located; little to no gem quality	S	This report	L	L
438	Treasure Gulch 20680138	63.21055 -144.83848	S	Placer Au, Ag & PGE		Active 1914 and 1940; some PGE recovered in placer Au efforts; Pb & Zn anomalies in same creek – unknown source	S	Brooks, 1915; Smith, 1942	L	L
564	Tres Equis 20680347	63.27983 -146.30972	S	Ultramafic	T's, DDH's	Gabbro dike w/ po, cp, & pentlandite cuts mafic-ultramafic rocks of Fish Lake complex; high base & precious metals in BLM samples; limited apparent extent	S	Ellis and others, 2004	L	H
591	Tv Bas 20680221	63.23077 -146.16949	S	Basaltic Cu		Cu minerals in mapped Tertiary volcanics; BLM sample to 253 ppm Cu	S	Ellis and others, 2004	L	L
298	Upper Glacier 20680304	63.33881 -145.61854	S	Ultramafic	DDH	Mineralized peridotite in predominant dunite of Canwell complex;	S	Ellis and others, 2004	L	M
380	UWF Occurrence 20680398	63.23498 -145.05143		Ultramafic		Prominent iron-stained zone in gabbro; BLM sample to 134 ppb Pd, 48 ppb Pt, 641 ppb Au, 4,350 ppm Cu; limited extent to higher grade rock	S	This report	L	L
99	Valdez A-06 20680173	63.326646 -146.5031	SS	Vein		Kurtak and others site A-06, Ag anomaly; BLM stream sediment sample from gully to north w/ anomalous Au (sample 2664)	S	Kurtak and others, 1992	L	L
296	Verona Cirque 20680243	63.32449 -145.63337	OF	Polymetallic vein		Polymetallic vein w/ Cu, Zn, Pb, Au, & Ag in volcanic/sedimentary rocks adjacent to intrusive; scattered mineralization over large area	S	This report	L	M
294	Verona Pick 20680297	63.32180 -145.65329	S	Polymetallic vein	Pits	High grade base metals & moderate Au in BLM samples from qz-calcite vein in dacite; limited extent	S	Ellis and others, 2004	L	L

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567	WEG 20680214	63.28948 -146.37008	S	Ultramafic		Magmatic cycle of mafic-ultramafic rocks at northern margin of Fish Lake complex; minor metal concentrations in peridotite-pyroxenite layer	S	Ellis and others, 2004	L	L
229	West Bowl 20680261	63.33881 -145.97432	OF	Skarn		Skarn w/ adjacent dunite; up to 1.2% Cu & 20 ppm Ag in BLM samples; sporadic distribution of mineralized rocks	S	Ellis and others, 2004	L	L
142	West Crash 20680233	63.316603 -146.24554	S	Ultramafic		Altered gabbro in mafic-ultramafic sill of Eureka complex w/ up to ½% Ni in BLM sample	S	Ellis & oth., 2004	L	L
468	West DAT 20680346	63.15111 -144.81317	S	Skarn	DDH	Skarn w/ cp in thin limestone near qz-monzonite; select BLM samples to 6.4% Cu and 50 ppm Ag, but limited extents	S	Athey, 1999	L	L
25	West Hayes Glacier 20680376	63.69027 -146.65686	S	VMS	None	Qz-mica to qz-chlorite schists host thin massive sulfide pods, lenses, and stringers; generally low base & precious metals in BLM samples; this occurrence is 1 of 3 VMS occurrences defining a zone ¾ mile long	S	Nokleberg & others 1991; Lange & others 1993; Ellis & others, 2004	L	L
205	West Rainy Skarn 20680203	63.29444 -145.96462	S	Skarn		Gabbro intrudes limestone w/ associated po, py, & cp; BLM samples w/ up to 0.7% Cu, 2.9 ppm Ag; limited extent, low grades	S	Brooks, 1918; Martin, 1920	L	L
239	White Band 20680273	63.32089 -145.91035	OF	ultramafic		Moderate precious metal values in BLM and industry samples; uncertain correlation between BLM & ARDF locations for site	S	Ellis and others, 2004	L	L
613	White Socks 20680228	63.0885 -146.1031	State	Ultramafic		Iron stain in ultramafic rocks with cp, pentlandite, po; analytical results indicate: 0.13% Ni; 0.08% Cu; 30 ppb Pt; 8 ppb Pd	NE	Ellis & others, 2004	L	L

Map No.	Name MAS no.	Latitude Longitude (dec deg)	Land status	Deposit type	Develo pment	Remarks	BLM work	Select references	MDP	MEP
550	Wild One 20680224	63.2275 -146.0606	State	Ultramafic		Gabbro rubble w/ po, cp, pentlandite; ARDF reports 0.14% Cu, 0.13% Ni, 56 ppb Pd, 40 ppb Pt; BLM samples of peridotite & serpentinized dunite w/ < 1% sulfides returned similar results	S	Ellis & others, 2004	L	L
491	Willow Creek 20680348	63.10651 -144.7348	N	Polymetallic vein		Mainly Cu in qz vein cutting volcanics; minor Ag & Au	NE	Nokleberg and others, 1991	L	L

Appendix B – Analytical Results

Sampling and Analytical Procedures

Sampling methods

BLM personnel collected several types of samples during the process of evaluating mineral occurrences in the Delta River Mining District study area. **Channel** samples are rock fragments, chips, or dust from a continuous channel of uniform width and depth across an exposure. **Chip channel** samples are chips of rock taken in a continuous line across a relatively uniform width and depth of an exposure. **Continuous chip** samples are chips of rock taken in a continuous line across an exposure. **Representative chip** samples are discontinuous chips of rock taken across an exposure. **Spaced chip** samples are chips of rock taken at a specified interval across an exposure. **Random chip** samples are chips of rock taken randomly across an exposure. **Grab** samples are rock chips or fragments taken more or less at random from an outcrop, float, or mine dump. **Select** samples are rock chips collected from the highest-grade parts of a mineralized zone.

Stream sediment, soil, and pan concentrate samples are collected detect anomalous metal concentrations that may indicate the presence of mineralized rock in an area. **Stream sediment** samples are collections of silt- and clay-sized particles taken from a stream bed. **Soil** samples are silt- and clay-sized particles taken from B and C soil horizons just above bedrock. **Pan concentrate** samples consist of one or more 14-inch gold pans heaped with coarse gravel, sand, and/or fines reduced by standard panning methods. The presence of heavy minerals such as gold, sulfides, magnetite, and garnet in the concentrate was noted in the field. The resultant concentrate of fines is then analyzed.

Placer samples consist of approximately 0.1 cubic yards of gravel processed through a hydraulic concentrator having a grizzly and spray bar. The concentrated material is then panned down to produce approximately 2.5 oz of concentrate. **Sluice concentrate** samples are collected mostly from active placer mines. They consist of a variable amount of black sands and other heavy minerals remaining after the placer gold has been removed by miners. The amount of gravel washed to produce the concentrate is often unknown. These samples are processed like placer samples (see Table B-1).

Analytical methods

All analyses were conducted by a commercial laboratory. Rock samples were dried, crushed to a minus 10 mesh, split and pulverized to minus 200 mesh. Stream sediment samples were dried and sieved to a minus 80 mesh. Pan concentrate samples were pulverized to minus 200 mesh. The magnetic and non-magnetic fractions from placer and sluice concentrate samples are treated by the laboratory like rock samples and are pulverized to minus 200 mesh.

For samples analyzed by inductively coupled argon plasma (ICP) and atomic absorption spectroscopy (AA), a 0.5-gram sample was dissolved in aqua regia for measurement. For samples analyzed by X-ray fluorescence (XRF), a 10-gram pressed pellet was prepared for measurement.

Samples were analyzed for gold, platinum and palladium by fire assay pre-concentration of a 30-gram sample followed by an ICP-AES (atomic emission spectroscopy) or ICP-MS (mass spectroscopy) finish with results reported in parts per billion.

The remaining elements were analyzed by ICP-AES or ICP-MS with results reported as either parts per million or percent. In most instances, when the results of samples analyzed by this method exceeded the upper detection limits, the samples were not reanalyzed, but results were reported as being greater than the corresponding upper detection limit.

Reporting methods

The results presented in the tables below are in the units reported by the laboratory and are dependent primarily on the analytical methods used to analyze the sample. The units are given in the "analytical methods and detection limits" table following each appendix table.

Abbreviations

Sample types:	
R	rock chip
SS	stream sediment
S	soil
PC	pan concentrate

***Collection method (Rock Chip)*:**	
C	continuous chip
CC	chip channel
CH	channel
G	grab
RC	random chip
Rep	representative chip
S	select
SC	spaced chip

Sample size: Sample sizes are given in feet. The sizes of spaced chip samples are given by the overall size of the sample followed by the sample spacing (e.g., 10 feet @ 0.5-foot spacings).

Sample sites:			
FL	float (original source unknown)	TP	trench, pit, or cut
MD	mine dump	UW	underground workings
MT	mine tailings	OC	outcrop
RC	rubblecrop (source of rock known)		

Sample descriptions:			
@	at	felds	feldspar/feldspathic
~	approximately	fest	iron-stained
adj	adjacent	fg	fine-grained
alt	altered	fract	fracture
amp	amphibolite/amphibole	gdi	granodiorite
arg	argillite	gn	galena
aspy	arsenopyrite	gp	graphite/graphitic
bn	bornite	gs	greenstone
br	breccia/brecciated	gw	graywacke
bt	biotite	hbl	hornblende
carb	carbonate	int(s)	intrusive(s)
calc	calcareous	K-spar	potassium feldspar
cc	calcite	ls	limestone
cg	coarse-grained	mag	magnetite
cgl	conglomerate	mal	malachite
chl	chlorite/chloritic	meta	metamorphic
clinopyx	clinopyroxene		
clinopyxite	clinopyroxenite	mg	medium-grained
cp	chalcopyrite	mo	molybdenite
cs	coarse	mod	moderate
Cu-st	copper-stain(ed)	monzodi	monzodiorite
di	diorite	msv	massive
dissem	disseminated/disseminations	musc	muscovite
dol	dolomite/dolomitic	ol	olivine
dun	dunite	peg	pegmatite
epid	epidote	pent	pentlandite
fel	felsic	perid	peridotite
phlog	phlogopite	serp	serpentine/serpentinite

Sample descriptions:			
phy	phyllite	serp’zd	serpentinized
plag	plagioclase	sil	silicified/siliceous
po	pyrrhotite	sl	sphalerite
porph	porphyry/porphyritic	ss	sandstone
py	pyrite/pyritic	sulf	sulfide(s)
pyx	pyroxene	tr	trace
pyxite	pyroxenite	um	ultramafic
qz	quartz	v	very
rhy	rhyolite	vn(s)	vein(s)
sc	schist	vnlets	veinlets
sed	sediment/sedimentary	volc	volcanic
ser	sericite	w/	with

Placer and sluice concentrate sample evaluation

Appendix Table B-1 presents the results of placer and sluice concentrate sample processing by Don Keill, of the BLM's Northern Field Office in Fairbanks, Alaska. He dried and sieved the samples and removed the coarse gold. He weighed, measured, and described the gold in each sample and examined each with a microscope, noting other conspicuous metals and minerals. He separated each sample into magnetic and non-magnetic fractions. The two fractions were then submitted to a laboratory for analysis. The results of trace element analysis of the fractions are presented in Table B-2, ordered by the same map and sample numbers as in Table B-1.

The "Au wt (g)" column presents the weight of gold after separation from each placer concentrate. As much gold as possible was removed manually from the samples. Any gold that was too fine to be removed manually is included in the analytical results from the geochemical analysis of material sent to a commercial laboratory and presented in Table B-2.

The map numbers in table correspond to the numbered locations on Plate 1.

ABBREVIATIONS FOR TABLE B-1

PL	placer concentrate
SL	sluice concentrate- collected from placer operation, generally after gold was removed
BCY or bcy	bank cubic yards
cy	cubic yard
LCY	loose cubic yard
wt	weight
g	grams
oz	troy ounces
lbs	pounds
Vol	volume
$	U.S. dollars
@	at
--	not analyzed

Table B-1. Results of placer and sluice concentrate sample evaluations.

Map no.	Sample no.	Sample type	Location	Au wt (g)	Volume LCY	Concentration oz/lcy	Volume BCY	Concentration oz/bcy	$/bcy @ $500/oz
65.2	10649	PL	Mineral Creek	0.0000	0.10	**0.0000**	0.08	**0.0000**	**$0.00**
66.1	10644	PL	McCumber Creek Trib	0.0243	0.10	**0.0078**	0.08	**0.0098**	**$4.88**
67.4	10653	PL	McCumber Creek	0.0058	0.05	**0.0037**	0.04	**0.0047**	**$2.33**
67.5	10263	SL	McCumber Creek	0.0110	--	--	--	--	--
171.1	10415	PL	Broxson Gulch	0.0769	--	--	--	--	--
171.1	11012	PL	No Name Creek	0.0054	0.13	**0.0014**	0.10	**0.0017**	**$0.87**
183.1	10435	SL	Broxson Gulch	0.2833	--	--	--	--	--
184.1	10436	PL	Specimen Creek (Lower)	0.1820	0.10	**0.0585**	0.08	**0.0731**	**$36.57**
188.1	10437	PL	Specimen Creek (Upper)	0.0486	0.10	**0.0156**	0.08	**0.0195**	**$9.77**
210.1	10729	SL	Lower Rainy Creek	0.2074	2 lbs.	--	--	--	--
210.3	10728	PL	Rainy Creek	0.0886	0.10	**0.0285**	0.08	**0.0356**	**$17.80**
210.5	10414	SL	Rainy Creek	0.0327	--	--	--	--	--
210.5	10514	PL	Rainy Creek	0.0496	0.10	**0.0159**	0.08	**0.0199**	**$9.97**
210.6	10515	PL	Rainy Creek	0.0212	0.10	**0.0068**	0.08	**0.0085**	**$4.26**
413	10511	SL	W Fork Chistochina River	0.0000	--	--	--	--	
439.1	10409	PL	Chistochina Glacier	0.1342	0.13	**0.0345**	0.10	**0.0431**	**$21.57**
439.2	10769	SL	Chistochina Glacier	0.2825	--	--	--	--	--
439.2	10811	SL	Chistochina Glacier	0.5559	--	--	--	--	--
439.3	11302	PL	Chistochina Glacier	0.0465	0.10	**0.0150**	0.08	**0.0187**	**$9.34**
442	10745	PL	Chistochina River	0.0016	0.13	**0.0004**	0.10	**0.0005**	**$0.26**
457.1	10400	PL	Miller Gulch	0.2596	0.10	**0.0835**	0.08	**0.1043**	**$52.16**
457.2	10250	PL	Miller Gulch	0.0933	0.02	**0.1333**	0.018	**0.1666**	**$83.32**
457.3	10258	PL	Miller Gulch	0.8721	0.10	**0.2804**	0.08	**0.3505**	**$175.24**
459.1	10411	PL	Round Wash	0.0159	0.05	**0.0102**	0.04	**0.0128**	**$6.39**
459.2	10428	PL	Round Wash	0.0053	0.05	**0.0034**	0.04	**0.0043**	**$2.13**
459.3	10427	PL	Round Wash	0.0162	0.05	**0.0104**	0.04	**0.0130**	**$6.51**
461.1	10403	SL	Big Four	0.4528	--	--	--	--	--
461.4	10410	PL	Big Four	0.0169	0.10	**0.0054**	0.08	**0.0068**	**$3.40**
492.2	10259	PL	Chisna River (Middle)	0.0112	0.10	**0.0036**	0.08	**0.0045**	**$2.25**
496.1	10412	PL	Chisna River (Lower)	0.0361	0.10	**0.0116**	0.08	**0.0145**	**$7.25**
497.3	10254	SL	Chisna River	0.0000	--	--	--	--	--
497.3	10454	SL	Chisna River	0.0000	--	--	--	--	--
503.1	11301	PL	Red Bear	0.0159	0.10	**0.0051**	0.08	**0.0064**	**$3.19**
503.2	10664	PL	Red Bear	0.0042	0.09	**0.0016**	0.07	**0.0020**	**$0.99**
506.1	11300	PL	Alder Creek	0.0082	0.15	**0.0018**	0.12	**0.0022**	**$1.10**

Table B-2. Analytical results for samples from mines, prospects, occurrences, and reconnaissance investigations

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
1	10750	Delta Creek, W Trib	PC		PC		Bench gravels	7	4	99	<0.2	19
2	11395	Molybdenum Ridge, N	PC				Bench gravels, 70% monzodi, 30% gneiss	<5	2	27	0.5	185
2	11396	Molybdenum Ridge, N	R	F	S		Hornfels w/ 3-5% py in banded layers, w/ cpy	<5	5	<1	0.4	68
3	10749	Molybdenum Ridge, N	PC		PC		Tr black sands	<5	<1	56	<0.2	39
3	11397	Molybdenum Ridge, N	R	F	S		Hornfels crosscut by po/py/apy-bearing qz vns	<5	1	1	0.6	68
4	10748	Molybdenum Ridge, N	PC		PC			<5	<1	174	0.2	28
4	11394	Molybdenum Ridge, N	PC				Bench gravels, 80% monzodi, 20% gneiss	<5	1	27	0.7	332
5	11393	Delta Creek area	PC				Bench gravels, 50% monzodi, 50% gneiss	<5	<1	<1	<0.2	19
6	10747	Delta Creek area	PC		PC		Mod black non-magnetic sands-hematite?	<5	1	<1	<0.2	8
6	11392	Delta Creek area	PC				Bench gravels, 50% monzodi, 50% gneiss	<5	1	<1	<0.2	9
7	10746	Delta Creek area	PC		PC		Mod black non-magnetic sands-hematite?	<5	1	1	<0.2	10
7	11323	Delta Creek area	PC				50% monzodi, 50% gneiss	<5	<1	1	<0.2	8
8	10274	Ptarmigan Creek	PC				Trace magnetite, no visible Au	<5	1	96	0.5	37
9.1	6988	Ptarmigan	R	OC	G		Qz vn w/ aspy & mo w/ minor py, gn, sl	<5	<1	1498	9.5	11
9.1	11047	Ptarmigan, Adit #1	R	OC	SC	13	Bt-rich gdi w/ rare qz vns & gossan	<5	<1	1	<0.2	38
9.1	11289	Ptarmigan, Adit #1	R	OC	G		Qz vns in gdi, w/ mo	<5	5	107	2.9	19
9.2	11288	Ptarmigan	R	OC	Rep		Qz vns in gdi w/ py +/- cpy	<5	<1	2920	0.3	15
9.3	11046	Ptarmigan, Adit #2	R	OC	S	1	Qz vn w/ mo along margin	<5	1	<1	<0.2	3
9.3	11286	Ptarmigan, Adit #3	R	UW	Rep		Qz vn, 1", in gdi w/ cpy, py, po(?)	<5	<1	120	0.3	82
9.3	11287	Ptarmigan, Adit #3	R	UW	C	2.5	Gdi w/ qz vnlets	<5	<1	21	<0.2	14
9.4	1024	Ptarmigan	R	RC	S		Fest gdi w/ 2-6" qz vns containing mo +/- py & v minor cpy	<5	10	13	<0.2	14
9.4	6987	Ptarmigan	R	RC	S		Slate & hornfelsed slate near gdi w/ fg py	<5	4	15	0.5	143
9.4	11044	Ptarmigan	R	OC	S	1	Gray glassy qz vn w/ rare mo flakes	<5	2	<1	<0.2	11
9.4	11045	Ptarmigan	R	OC	C	1.3	Mg bt-monz w/ local mo along qz vn	<5	<1	<1	<0.2	6
9.4	11285	Ptarmigan	R	RC	S		Qz vnlets w/ mo in gdi	<5	11	5	0.2	28
10	11223	Whistler Creek	R	OC	G		Chert w/ 20% po/py	<5	1	<1	<0.2	126
11	10292	Whistler Creek	R	OC	S	5x5	Chl qz sc & gossan	<5	2	2	0.4	207
11	10293	Whistler Creek	R	OC	G	10x10	Fest chl-qz sc	<5	2	1	0.2	83
11	11224	Whistler Creek	R	OC	S		Qz-mica sc & arg w/ py +/- po	<5	<1	5	0.4	103
12	10962	Miyaoka area (NW)	R	OC	SC	8.5@0.5	Semi-msv sulf in arg(?) w/ cc & qz lenses	<5	1	34	<0.2	290
12	10963	Miyaoka area (NW)	R	OC	SC	10@0.5	Msv & semi-msv sulf in arg(?)	<5	1	3	<0.2	218
12	10964	Miyaoka area (NW)	R	OC	S		Msv & semi-msv sulf in arg(?)	<5	<1	11	0.4	1065
13	10972	Miyaoka area (NW)	R	OC	C	0.5	Msv po w/ 2-3% cpy	9	1	66	0.5	2110
13	10973	Miyaoka area (NW)	R	OC	S		Chl-qz sc w/ bands & lenses of py or po	8	<1	302	0.5	130
13	10974	Miyaoka area (NW)	R	OC	C	18	Banded & semi-msv py in chl sc	<5	<1	74	0.9	1035
14	10917	Miyaoka West	R	OC	C	2	Msv sulfs in qz-chl sc	<5	<1	51	1.6	2570
15	10735	Miyaoka West	R	OC	C	3	Msv po & tr cpy in fest chl sc	<5	<1	12	<0.2	737
15	10736	Miyaoka West	R	OC	C	3	Msv po in chl sc	9	1	41	7.1	586
15	10737	Miyaoka West	R	OC	C	3	Msv sulf in marble	<5	1	97	<0.2	1355
16	10740	Miyaoka West	R	OC	C	10	Msv sulfs	<5	1	113	1.1	819
17	10739	Miyaoka West	R	OC	S	1	Msv pods of po in qz chl sc	<5	<1	509	<0.2	430
18	10738	Miyaoka West	R	OC	S	1	Msv sulf	5	1	112	0.4	537

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
1	10750	2	47	2	28	106	1.88	3	240	<2	1.26	<0.5	12	3.21	10	0.01	0.13	10	0.8	493	0.07	<2	4	50	0.35	110	<10
2	11395	5	974	7	267	169	1.52	69	1610	<2	0.59	11	125	2.24	<10	0.03	0.32	20	0.54	3400	0.09	5	4	67	0.06	77	10
2	11396	20	92	4	21	117	0.54	10	420	<2	0.41	0.9	6	0.63	<10	0.13	0.09	<10	0.27	194	0.02	2	2	56	0.02	67	<10
3	10749	14	178	4	51	314	1.4	51	2070	<2	0.44	1.9	15	2.32	<10	0.03	0.32	20	0.59	654	0.06	3	3	55	0.07	56	10
3	11397	14	96	1	90	315	6.95	8	40	<2	3.73	<0.5	23	3.98	20	0.01	1.94	<10	3.47	484	0.27	5	16	27	0.09	93	<10
4	10748	12	84	5	33	163	1.48	71	3770	<2	0.51	0.6	8	2.32	<10	0.03	0.31	20	0.68	298	0.08	<2	4	77	0.1	61	30
4	11394	7	1500	7	422	365	1.68	100	960	<2	0.79	19.1	223	2.2	<10	0.03	0.3	20	0.51	5770	0.11	5	4	44	0.07	76	<10
5	11393	4	44	3	25	147	1.41	2	270	<2	0.96	<0.5	9	2.6	<10	0.02	0.12	10	0.59	394	0.06	<2	3	74	0.32	65	<10
6	10747	<2	38	1	12	212	1.68	3	190	<2	1.16	<0.5	13	3.12	<10	<0.01	0.13	10	0.57	630	0.24	<2	5	83	0.43	61	10
6	11392	<2	46	1	13	210	1.6	3	200	<2	1.36	<0.5	14	4.13	<10	0.01	0.13	20	0.76	847	0.25	<2	8	92	0.58	90	<10
7	10746	4	39	2	13	112	1.76	14	200	<2	1.18	<0.5	10	2.98	<10	0.03	0.14	10	0.54	644	0.26	<2	5	40	0.45	52	<10
7	11323	2	35	2	11	110	1.49	<2	170	<2	1.33	<0.5	7	3.58	<10	0.01	0.11	20	0.62	504	0.24	<2	7	31	0.68	74	<10
8	10274	27	88	8	22	49	0.86	176	470	2	0.28	0.7	10	2.24	<10	40.3	0.31	10	0.55	356	0.02	3	3	25	0.1	48	60
9.1	6988	846	115	23	11	147	0.28	4033	57	14	0.62	12.7	9	4.24	2	0.094	0.15	9	0.31	1216	0.02	6	7	10	<0.01	38	<20
9.1	11047	4	51	5	19	93	1.75	16	490	<2	4.82	<0.5	13	3.14	10	0.03	0.7	30	1.1	826	0.15	<2	10	11	0.2	90	**10**
9.1	11289	124	62	1970	9	158	0.29	176	80	7	3.13	1.6	3	1.3	<10	0.02	0.14	10	0.19	409	0.03	<2	3	23	0.02	16	**10**
9.2	11288	50	97	2	14	71	0.68	130	100	<2	0.91	0.6	11	3.87	<10	0.54	0.22	20	0.45	1100	0.05	5	12	68	0.02	53	**<10**
9.3	11046	<2	4	594	7	172	0.19	4	70	<2	0.12	<0.5	2	0.59	<10	0.14	0.09	10	0.09	77	0.03	<2	1	116	0.02	9	**20**
9.3	11286	15	77	30	13	51	0.52	1815	80	<2	7.77	<0.5	8	4.12	<10	3.49	0.24	10	3.53	1990	0.02	2	6	30	0.01	22	**30**
9.3	11287	13	100	25	19	116	1.54	7180	260	<2	1.71	0.5	52	3.66	10	0.78	0.43	20	1.52	738	0.07	7	10	149	0.08	83	**20**
9.4	1024	22	30	2833	6	191	0.23	14	93	<5	0.18	0.8	1	1.27	<2	0.572	0.11	4	0.17	256	0.02	<5	<5	11	0.021	28	66
9.4	6987	10	150	35	63	124	0.63	136	30	<5	0.14	1.9	7	2.74	3	20	0.27	7	0.14	56	<0.01	<5	<5	14	<0.01	96	<20
9.4	11044	3	9	428	8	176	0.29	2	130	<2	0.22	<0.5	3	1.22	<10	1.24	0.15	10	0.23	202	0.04	<2	3	9	0.04	23	**20**
9.4	11045	2	39	8	21	122	1.82	43	560	<2	1.37	<0.5	15	3.38	10	5.61	0.87	30	1.52	559	0.19	<2	12	23	0.24	108	**30**
9.4	11285	8	14	5350	13	231	0.37	11	200	<2	0.36	<0.5	5	1.36	<10	1.32	0.19	<10	0.25	235	0.03	<2	3	32	0.04	28	**370**
10	11223	10	32	8	21	23	2.81	<2	40	<2	2.56	2.5	10	8.48	10	0.01	0.03	10	0.39	198	0.01	<2	4	14	0.06	6	<10
11	10292	23	112	26	91	93	3.11	<2	20	<2	0.22	<0.5	28	14.9	<10	0.04	0.05	<10	1.86	519	0.01	2	7	10	0.22	105	<10
11	10293	12	130	15	20	151	2.67	<2	10	<2	0.28	<0.5	11	10.3	10	0.01	<0.01	<10	2.24	530	0.02	<2	11	6	0.34	146	<10
11	11224	22	286	6	37	5	2.61	18	30	3	0.02	<0.5	11	21	10	0.02	0.03	<10	1.04	278	0.01	3	8	14	<0.01	6	<10
12	10962	<2	15	2	7	21	0.56	15	30	7	5.67	<0.5	338	>15	<10	0.05	0.05	10	0.12	2760	<0.01	<2	1	7	0.04	5	<10
12	10963	<2	12	<1	5	20	0.56	3	50	5	4.45	<0.5	177	>15	<10	0.01	0.15	10	0.12	2550	0.01	<2	<1	112	0.07	5	<10
12	10964	6	8	2	25	25	1.02	9	10	12	0.32	<0.5	520	>15	<10	<0.01	0.01	10	0.23	298	<0.01	<2	1	37	0.04	5	<10
13	10972	<2	18	4	42	18	1.34	<2	<10	16	1.72	<0.5	148	>15	<10	0.01	0.01	10	0.59	1280	<0.01	<2	3	19	0.01	9	<10
13	10973	44	23	2	36	30	1.26	275	<10	30	5.62	<0.5	464	>15	<10	0.03	<0.01	10	1.34	5490	<0.01	8	3	37	0.01	7	<10
13	10974	64	170	3	14	24	0.43	83	<10	8	7.07	<0.5	163	>15	<10	0.05	<0.01	10	1.24	4210	<0.01	2	1	94	<0.01	3	<10
14	10917	21	32	2	14	20	0.89	58	10	14	2.23	<0.5	273	>15	<10	0.12	0.02	10	0.43	2240	<0.01	7	2	14	<0.01	6	<10
15	10735	10	41	1	7	25	1.04	<2	20	3	2.96	<0.5	24	>15	10	0.01	0.22	10	0.36	3020	0.01	<2	1	46	0.16	10	<10
15	10736	985	2290	1	9	9	0.69	7	10	38	3.69	4.1	52	>15	10	0.2	0.25	10	0.4	2930	0.02	<2	<1	90	0.02	4	<10
15	10737	7	56	1	7	14	0.88	<2	10	11	1.38	<0.5	53	>15	10	0.03	0.2	10	0.36	2120	0.02	<2	<1	59	0.06	8	<10
16	10740	19	21	1	5	28	1.13	124	10	3	0.94	<0.5	77	>15	20	0.03	0.01	<10	0.26	596	<0.01	4	<1	30	0.01	12	<10
17	10739	9	20	1	5	25	1.11	29	40	38	0.55	<0.5	146	>15	10	0.03	0.08	10	0.33	2260	<0.01	2	<1	38	0.02	13	<10
18	10738	31	69	2	47	14	0.73	74	10	<2	1.93	<0.5	651	>15	<10	0.42	0.01	<10	0.85	5320	<0.01	15	<1	70	0.01	6	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
19.1	6972	Miyaoka	R	OC	G		Msv & semi-msv po w/ cpy in chl-actinolite sc	<5	3	18	<0.2	1332
19.1	10580	Miyaoka	R	OC	Rep	11	Msv po & py	<5	<1	21	<0.2	536
19.1	10581	Miyaoka	R	OC	Rep	10	Msv sulf lens	<5	<1	6	<0.2	559
19.1	10582	Miyaoka	R	OC	Rep	8	Msv po pod	<5	2	118	<0.2	1100
19.1	10583	Miyaoka	R	OC	Rep	10	V fg msv po	<5	2	14	<0.2	771
19.1	10584	Miyaoka	R	OC	Rep	7	Sulf-rich rock w/ po, py	<5	<1	5	<0.2	190
19.1	10585	Miyaoka	R	OC	Rep	17	Po & py to 80%	<5	<1	35	<0.2	396
19.1	10883	Miyaoka	R	OC	SC	16@0.5	Msv + semi-msv po +/- py, cpy in ls + chl-qz-sc	<5	<1	30	<0.2	526
19.1	10884	Miyaoka	R	OC	SC	17.5@1	Sil arg to chert w/ patches & knots of po +/- cpy	<5	1	12	<0.2	245
19.2	9758	Miyaoka	R	RC	Rep	4	Fest msv po	6	<1	1	<0.2	699
19.2	10885	Miyaoka	R	OC	C	6.2	Msv to semi-msv po w/ py & cpy	<5	<1	16	0.5	2070
19.2	10886	Miyaoka	R	OC	SC	30@1	Sil arg w/ patches & lenses of po +/- cpy	<5	<1	2	<0.2	90
19.2	10887	Miyaoka	R	OC	Rep		Fest qz lenses in sulf-bearing arg	5	<1	<1	<0.2	66
19.2	10888	Miyaoka	R	OC	S		Msv to semi-msv po +/- cpy	<5	1	244	0.7	4440
19.2	10889	Miyaoka	R	OC	SC	20@0.5	Ls & muddy ls w/ patchy & msv lenses of po +/- py, cpy	<5	<1	25	<0.2	286
19.2	10890	Miyaoka	R	OC	C	4.9	Msv to semi-msv po + minor cpy	6	<1	77	0.3	2750
19.2	10892	Miyaoka	R	OC	SC	10@0.5	Arg(?) w/ dissem stringers & patches of po +/- cpy	<5	1	38	<0.2	373
19.2	10893	Miyaoka	R	OC	SC	27@1	Lenses of msv & semi-msv sulf in arg(?)	<5	1	1190	<0.2	502
19.2	10894	Miyaoka	R	OC	Rep		Semi-msv & msv po w/ cpy in chl-qz sc	9	<1	14	1.5	1645
19.2	10895	Miyaoka	R	OC	C	4.7	Arg(?) w/ msv sulf lenses & cut by cc & qz lenses & stringers	<5	<1	9	<0.2	662
19.3	10896	Miyaoka	R	OC	S		Msv po w/ minor cpy in chl sc	8	<1	46	0.6	2770
19.3	10897	Miyaoka	R	OC	SC	10@0.5	Msv to semi-msv po, w/ py + cpy, in arg(?)	7	<1	27	0.4	1570
20	10967	Miyaoka East	R	OC	SC	9.5@0.5	Semi-msv sulf in arg(?), sulf in lenses	<5	<1	18	<0.2	245
20	10968	Miyaoka East	R	OC	C	2.9	Semi-msv to msv sulf in qz-chl sc	<5	<1	22	<0.2	898
20	10969	Miyaoka East	R	OC	SC	9@0.5	Msv sulf lenses & patchy sulf in arg(?), in qz-chl sc	<5	1	106	<0.2	697
21	10970	Miyaoka East	R	OC	SC	6@0.25	Semi-msv sulf lenses in arg(?) & chl sc	<5	<1	29	<0.2	144
21	10971	Miyaoka East	R	RC	S		Msv to semi-msv sulf in arg(?)	8	7	16	0.5	1185
22	10957	Miyaoka area (SE)	R	OC	C	0.75	Fest qz +/- cc vn in chl-mica-qz sc	<5	<1	2	<0.2	27
23	10958	Miyaoka area (SE)	R	OC	C	2.9	Semi-msv sulf layers & gossan, chl sc & qz	<5	2	56	<0.2	216
23	10959	Miyaoka area (SE)	R	OC	S		Arg(?) w/ semi-msv po w/ cpy	7	2	50	0.2	866
23	10960	Miyaoka area (SE)	R	OC	G		Po & cpy knot in mica-qz sc	<5	1	11	<0.2	1020
23	10961	Miyaoka area (SE)	R	OC	C	1	Po & cpy in qz rich layers in mica-qz sc	<5	<1	3	<0.2	652
24	10929	W Hayes Glacier area	R	RC	Rep		Qz-mica sc, fest	<5	<1	423	0.9	37
24	10965	W Hayes Glacier area	R	RC	S		Mica-qz sc w/ minor dissem, euhedral py	<5	1	5	<0.2	100
24	10966	W Hayes Glacier area	R	OC	G		Chl-qz sc w/ minor py	<5	1	146	0.5	95
25.1	10923	W Hayes Glacier	R	OC	C	2	Msv sulf lens (fest) in chl sc	<5	1	435	0.7	4640
25.1	10924	W Hayes Glacier	R	OC	C	1	1' x 2' py lens in muscovite sc	<5	1	685	5.1	1070
25.1	10925	W Hayes Glacier	R	OC	C	0.5	Fest qz-mica sc	<5	1	105	0.2	123
25.2	10918	W Hayes Glacier	R	OC	C	3	Fest qz-ser sc	<5	2	40	<0.2	265
25.2	10919	W Hayes Glacier	R	OC	C	3	Fest ser sc w/ light gray lenses ~ 6" x 1' of py	<5	1	4	0.6	15
25.2	10920	W Hayes Glacier	R	OC	S		Msv py in qz-chl sc	5	1	12	1.7	16
25.2	10926	W Hayes Glacier	R	OC	C	1	Qz-mica sc	<5	<1	6	<0.2	21

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
19.1	6972	18	72	<1	11	13	0.49	<5	19	12	0.47	<0.2	35	>10	12	0.027	0.18	2	0.23	1710	<0.01	<5	<5	18	0.021	8	<20
19.1	10580	9	28	<1	7	22	0.48	14	30	9	2.77	<0.5	7	14.45	<10	0.01	0.06	<10	0.06	2990	<0.01	<2	<1	15	0.04	4	<10
19.1	10581	5	49	1	6	22	0.69	5	20	23	3.52	<0.5	5	>15	<10	0.01	0.19	<10	0.18	4220	<0.01	<2	<1	30	0.04	4	<10
19.1	10582	4	117	1	12	21	1.3	2	10	<2	0.93	<0.5	22	>15	<10	0.02	0.37	10	0.67	4290	<0.01	<2	<1	49	0.06	8	<10
19.1	10583	5	45	1	13	20	1.14	<2	20	7	3.66	<0.5	6	>15	<10	<0.01	0.37	10	0.5	5570	0.01	<2	1	66	0.07	9	<10
19.1	10584	3	27	<1	11	19	0.73	<2	30	4	1.28	<0.5	15	11.05	<10	0.01	0.14	<10	0.18	2880	<0.01	<2	<1	68	0.09	5	<10
19.1	10585	7	34	1	4	12	0.59	<2	20	9	7.19	<0.5	16	>15	<10	0.01	0.23	10	0.36	3800	<0.01	<2	<1	53	0.02	4	<10
19.1	10883	3	42	2	5	23	0.95	3	20	15	2.66	<0.5	13	>15	<10	0.01	0.34	10	0.34	4900	0.01	<2	1	56	0.08	9	<10
19.1	10884	<2	47	1	10	22	1.34	4	30	12	2.8	<0.5	4	>15	<10	0.01	0.39	10	0.43	5840	0.02	<2	1	49	0.09	13	<10
19.2	9758	27	100	<1	6	16	0.81	<5	16	9	1.2	<0.2	100	>10	16	0.022	<0.01	4	0.38	832	<0.01	<5	<5	21	0.012	10	<20
19.2	10885	52	97	2	16	22	1.3	<2	20	44	0.06	<0.5	68	>15	<10	0.01	0.08	10	0.56	377	<0.01	<2	2	43	0.01	9	<10
19.2	10886	3	41	1	18	35	0.56	4	120	12	2.43	<0.5	3	8.49	<10	0.01	0.09	10	0.08	3590	<0.01	<2	<1	4	0.07	6	<10
19.2	10887	4	19	1	9	106	0.09	<2	30	7	1.32	<0.5	5	2.48	<10	0.01	0.02	<10	0.03	1230	<0.01	<2	<1	45	<0.01	1	<10
19.2	10888	<2	49	4	5	17	0.41	<2	<10	87	1.9	<0.5	39	>15	<10	0.02	0.13	10	0.12	3610	<0.01	<2	1	10	0.04	3	<10
19.2	10889	2	54	1	7	17	1.04	<2	20	15	7.84	<0.5	3	>15	<10	0.04	0.25	10	0.33	5040	<0.01	<2	1	31	0.05	7	<10
19.2	10890	3	52	3	13	14	1.51	2	<10	36	0.45	<0.5	15	>15	<10	0.04	0.21	10	0.42	1630	<0.01	<2	3	227	0.01	11	<10
19.2	10892	2	41	2	10	18	0.99	<2	20	15	4.07	<0.5	6	>15	<10	0.01	0.27	10	0.22	5700	<0.01	<2	1	143	0.05	10	<10
19.2	10893	8	33	1	2	4	0.36	<2	20	12	2.15	0.6	6	>15	<10	0.02	0.09	10	0.11	3560	<0.01	2	<1	66	0.02	3	<10
19.2	10894	104	391	3	13	12	1.32	9	20	30	2.61	<0.5	180	>15	<10	0.03	0.03	10	0.55	1060	<0.01	<2	1	26	0.02	8	<10
19.2	10895	3	74	1	5	28	0.78	<2	10	14	8.03	<0.5	42	>15	<10	0.01	0.3	10	0.36	4780	<0.01	<2	1	40	0.03	5	<10
19.3	10896	<2	35	3	17	10	0.74	<2	<10	28	0.53	<0.5	231	>15	<10	0.01	0.22	10	0.32	1365	<0.01	<2	1	75	0.06	3	<10
19.3	10897	7	38	2	13	25	0.77	8	<10	33	0.4	<0.5	97	>15	<10	0.01	0.24	10	0.39	1080	0.01	<2	1	61	0.06	5	<10
20	10967	4	25	<1	7	10	0.45	3	80	8	1.34	<0.5	52	9.29	<10	0.01	0.09	10	0.17	2670	<0.01	<2	<1	2	0.04	3	<10
20	10968	2	25	3	16	36	2.01	<2	10	10	1.89	<0.5	76	>15	10	0.01	0.21	10	0.75	2340	<0.01	<2	2	33	0.11	18	<10
20	10969	9	9	1	6	20	0.61	2	20	26	1.14	0.7	45	13.95	<10	0.01	0.17	10	0.16	1820	0.01	<2	<1	128	0.13	8	10
21	10970	2	48	1	7	10	0.34	4	60	9	4.02	<0.5	59	10.1	<10	0.01	0.11	10	0.07	2520	<0.01	<2	<1	77	0.02	1	<10
21	10971	5	30	3	48	11	0.92	<2	<10	45	0.27	<0.5	83	>15	<10	0.01	0.15	10	0.37	1900	0.01	<2	1	25	0.03	5	<10
22	10957	<2	44	<1	9	81	0.07	3	10	<2	1.42	<0.5	4	1.42	<10	<0.01	0.01	<10	0.41	1010	0.02	<2	1	74	<0.01	1	<10
23	10958	11	53	1	20	54	2.84	5	20	54	3.24	<0.5	28	12.75	10	0.01	0.04	10	0.95	1200	0.01	<2	2	112	0.16	29	<10
23	10959	13	35	2	60	44	2.94	<2	10	61	0.73	<0.5	47	>15	<10	0.02	0.01	20	0.92	1400	0.01	<2	3	104	0.1	28	<10
23	10960	17	40	2	29	47	1.63	4	10	26	0.37	<0.5	89	>15	10	0.02	0.03	10	0.66	254	0.02	<2	4	43	0.03	29	<10
23	10961	13	17	1	18	50	0.63	<2	10	15	0.23	0.6	15	>15	<10	0.01	0.03	10	0.26	165	0.02	<2	1	11	0.02	8	<10
24	10929	100	39	1	4	102	0.3	1380	<10	53	0.07	<0.5	3	3.47	<10	0.01	<0.01	<10	0.27	60	<0.01	<2	1	186	<0.01	5	<10
24	10965	4	11	1	6	80	0.63	275	70	5	0.03	<0.5	6	2.8	<10	0.01	0.02	10	0.48	88	<0.01	<2	1	25	<0.01	17	<10
24	10966	40	69	3	16	89	1.13	88	30	102	0.02	<0.5	16	4.69	<10	0.03	0.01	10	0.7	64	<0.01	<2	1	2	<0.01	33	<10
25.1	10923	10	167	3	11	36	3.11	470	10	60	0.6	<0.5	152	>15	10	0.19	0.01	<10	1.7	330	<0.01	4	7	51	0.01	58	<10
25.1	10924	995	1035	4	19	21	0.95	711	10	74	9.96	1	107	>15	<10	1.37	0.01	10	0.71	1445	<0.01	6	2	8	<0.01	20	<10
25.1	10925	22	17	1	17	88	0.71	45	20	9	0.07	<0.5	16	6.74	<10	0.07	0.01	<10	0.57	113	<0.01	<2	2	145	<0.01	39	<10
25.2	10918	3	49	3	36	71	3.46	22	20	13	2.88	<0.5	46	7.88	10	0.02	0.01	10	3.15	1195	<0.01	<2	5	30	<0.01	80	<10
25.2	10919	18	18	1	9	114	0.2	12	30	<2	0.03	<0.5	3	6.44	<10	0.07	0.08	<10	0.1	43	<0.01	<2	<1	43	<0.01	8	<10
25.2	10920	18	<2	5	15	67	0.12	30	<10	4	0.02	0.6	<1	>15	<10	0.11	0.06	<10	0.02	<5	<0.01	8	<1	4	<0.01	6	<10
25.2	10926	16	14	4	7	110	0.27	18	50	3	0.03	<0.5	2	1.64	<10	0.02	0.05	<10	0.19	41	<0.01	<2	<1	4	<0.01	13	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
25.2	10927	W Hayes Glacier	R	OC	C	0.5	Qz-mica sc	18	1	362	0.5	1020
25.2	10928	W Hayes Glacier	R	OC	Rep		Qz-chl sc	5	1	235	1.2	1240
25.3	10921	W Hayes Glacier	R	OC	S	0.5	Qz-ser sc	5	1	198	13.7	40
26	10172	Hayes Glacier Toe	R	FL	C	3	Dark gray gp qz sc	1.5	3	2	<0.2	53
26	10173	Hayes Glacier Toe	R	FL	S		Gp qz sc	1.5	3	4	0.2	61
27.1	10933	E Hayes Glacier (west ridge)	R	OC	S	0.5	Qz-chl sc	<5	<1	15	1.3	18
27.2	10590	E Hayes Glacier (west ridge)	R	OC	G	.0.2	Msv po to ~60%	9	<1	16	<0.2	635
27.2	10591	E Hayes Glacier (west ridge)	R	OC	G	1	10" wide vn of 80% po	<5	1	9	<0.2	1205
27.2	10932	E Hayes Glacier (west ridge)	R	OC	C	1	Qz-chl sc w/ msv po lenses & stringers	<5	<1	1	0.2	1295
27.3	10269	E Hayes Glacier (west ridge)	R	OC	C	2	Fest chl sc, carb rich	<5	<1	12	0.3	105
27.3	10270	E Hayes Glacier (west ridge)	R	OC	C	1.5	Qz-ser sc	<5	<1	2400	22.4	638
27.3	10589	E Hayes Glacier (west ridge)	R	OC	Rep	1	About 12" zone of sulfs, gn, sp, py, cpy	5	<1	1680	8.4	379
27.4	6973	E Hayes Glacier (middle ridge)	R	OC	G		Gs w/ patches of dissem po	<5	1	16	<0.2	73
27.4	10265	E Hayes Glacier (middle ridge)	R	OC	S	0.3	Msv po pod in chl sc	<5	<1	8	0.2	91
27.4	10266	E Hayes Glacier (middle ridge)	R	OC	C	2	Msv sulfs in chl sc	5	<1	73	0.3	37
27.4	10588	E Hayes Glacier (middle ridge)	R	OC	Rep		Sulf- (po) rich	<5	1	45	1	49
27.4	10930	E Hayes Glacier (middle ridge)	R	OC	C	0.5	Cu-st qz-chl sc, fest	<5	<1	207	29.4	**1.94%**
27.4	10931	E Hayes Glacier (middle ridge)	R	OC	C	1.5	Qz-chl sc (fest)	5	<1	12	0.6	117
27.5	10267	E Hayes Glacier (east ridge)	R	OC	C	1	Msv sulfs in chl sc	<5	<1	<1	0.5	57
27.5	10268	E Hayes Glacier (east ridge)	R	OC	C	4	Fest chl sc	<5	<1	3	0.5	61
27.5	10592	E Hayes Glacier (east ridge)	R	OC	G		V fg po to 50%	<5	<1	1	0.3	33
29	11025	McGinnis Glacier area	R	FL	G		Qz vn in phy w/ minor py & tr cpy	<5	1	1	0.2	36
30	11274	McGinnis Glacier area	R	OC	G		Qz vns in chl sc	<5	<1	<1	0.2	12
31	11026	Roberts No. 1 area, W	R	FL	S		Cg cc vn w/ clots of msv sulf w/ blebs of sl, gn	<5	<1	7	12.9	506
31	11027	Roberts No. 1 area, W	R	FL	S		Msv sulf w/ more cpy than typical	8	3	27	1.9	6970
32	11275	Roberts No. 1 area, W	R	RC	S		Msv & semi-msv sulf in qz-chl sc	<5	<1	48	1.5	2840
33	10953	Roberts No. 1	R	OC	C	3.2	Semi-msv po w/ py, cpy, & sp in sil sc	<5	1	102	1.3	970
33	10954	Roberts No. 1	R	OC	C	3.8	Msv & semi-msv sulf in sil sc	<5	<1	60	0.5	726
33	10955	Roberts No. 1	R	OC	C	0.6	Arg(?) w/ patches of po & cpy	<5	1	49	1.6	4960
33	10956	Roberts No. 1	R	OC	S		Msv sulf of po, py, cpy, & sp	6	<1	41	1.2	4560
34	10950	Roberts No. 1 area	R	OC	S		Fest chl-felds sc w/ ~ 5% py	5	<1	2	0.2	136
34	10951	Roberts No. 1 area	R	OC	G		Py-bearing gossanous gp mica-qz sc	<5	1	2	0.5	44
34	10952	Roberts No. 1 area	R	OC	G		Gossan zone in gp qz sc	<5	1	3	0.3	80
35	10899	Roberts No. 1 area	R	OC	G		Fest chl-qz sc w/ minor py	<5	<1	<1	0.2	120
36	10898	Roberts No. 1 area	R	RC	G		Fest qz +/- cc vns/segregations in gp sc	<5	<1	2	0.2	37
37	6968	Roberts No. 1 area	R	RC	S		Py, po, cpy, +/- sl? in qz-white mica sc	<5	<1	13	1.5	3956
37	6969	Roberts No. 1 area	R	RC	S		Cg, recrystallized py w/ cpy & sl? in qz-chl matrix	<5	2	97	1.3	2224
37	6970	Roberts No. 1 area	R	RC	S		Sl, po, cpy, gn in sil cobble w/ chl	<5	<1	64	25	636
37	6971	Roberts No. 1 area	R	RC	S		Sl, gn, cpy, po in fg, dark green msv rock	<5	<1	59	<0.2	275
37	9756	Roberts No. 1 area	R	RC	Rep		Msv po, py, cpy & sl	11	3	3	1	2911
38	6967	Roberts No. 1 area	R	RC	S		Msv to semi-msv po & cpy in sil matrix	<5	5	75	30.1	3909
39	9757	Roberts No. 1 area	R	RC	Rep	1	Msv po, py w/ cpy & sl	<5	1	32	26.6	**1.63%**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
25.2	10927	35	65	3	22	31	2.25	419	20	120	11 05	<0.5	358	>15	<10	0.05	<0.01	10	4.21	2250	<0.01	3	3	2	<0.01	40	<10
25.2	10928	20	56	3	27	29	1.76	103	20	95	13.6	<0.5	161	>15	10	0.14	<0.01	10	1.42	1290	<0.01	5	2	158	<0.01	43	<10
25.3	10921	1335	167	1	8	86	0.92	3570	30	40	0.02	<0.5	15	5.1	<10	1.04	0.03	<10	0.61	85	<0.01	31	1	1	<0.01	28	<10
26	10172	4	140	1	65	192	2.71	<2	**1280**	<2	0.25	<0.5	12	4 02	20	<0.01	1.82	10	1.92	531	0.09	<2	13	12	0.26	163	**<10**
26	10173	2	91	1	19	86	1.27	<2	**1230**	<2	0.1	<0.5	7	3 52	<10	<0.01	0.29	10	0.73	136	0.02	2	2	<1	0.06	45	**10**
27.1	10933	6	20	1	14	80	0.43	26	20	<2	1.09	<0.5	9	4.64	<10	0.04	0.07	10	0.12	292	<0.01	<2	1	47	<0.01	5	<10
27.2	10590	13	34	<1	40	30	2.42	55	30	<2	0.44	<0.5	35	>15	10	0.02	0.13	10	0.82	507	<0.01	<2	2	16	0.18	22	<10
27.2	10591	9	26	2	27	40	2.29	15	10	<2	0.51	<0.5	151	>15	10	0.01	0.04	20	1.03	330	0.01	<2	4	42	0.01	30	<10
27.2	10932	<2	29	1	28	37	2.67	<2	30	7	0.46	<0.5	69	>15	<10	0.02	0.16	10	1.08	507	0.01	<2	2	21	0.22	23	<10
27.3	10269	<2	38	<1	12	8	0.57	3	30	<2	10.4	<0.5	94	13.6	<10	0.06	0.22	10	0.24	4930	0.01	<2	<1	196	0.01	3	<10
27.3	10270	3470	762	2	7	57	0.4	>10000	20	<2	0.08	1	4	4 91	<10	1.1	0.07	10	0.1	124	<0.01	203	<1	15	<0.01	4	<10
27.3	10589	2560	1140	4	11	58	0.73	>10000	30	<2	0.09	1.8	4	5.1	<10	0.55	0.1	10	0.25	133	0.01	160	1	37	<0.01	7	<10
27.4	6973	8	72	<1	8	78	0.47	<5	56	<5	2.27	<0.2	29	>10	5	0.072	0.1	2	0.16	1531	<0.01	<5	<5	22	0.038	6	<20
27.4	10265	4	91	<1	6	9	0.54	<2	20	<2	6.69	<0.5	45	9.28	<10	0.44	0.19	<10	0.14	4280	0.02	5	<1	85	0.02	2	<10
27.4	10266	2	40	<1	10	25	0.45	12	20	3	4.05	<0.5	23	10.55	<10	0.15	0.11	10	0.14	2570	<0.01	2	<1	80	0.02	4	10
27.4	10588	4	29	<1	4	25	0.75	9	30	2	9.29	<0.5	17	>15	10	0.04	0.09	<10	0.12	3960	<0.01	<2	<1	19	0.02	4	30
27.4	10930	1115	958	3	5	59	0.6	87	100	36	1.64	4.7	10	5.47	<10	2.31	0.08	10	0.19	647	0.04	<2	3	2	0.05	8	<10
27.4	10931	12	37	1	22	66	0.44	17	10	3	0.37	<0.5	28	12.3	<10	0.08	0.05	<10	0.16	785	<0.01	<2	<1	33	0.06	5	<10
27.5	10267	2	22	<1	11	17	0.81	<2	90	<2	4.91	<0.5	19	5.12	<10	0.01	0.13	10	0.14	2480	<0.01	<2	1	72	0.12	7	<10
27.5	10268	2	33	1	6	17	1.26	4	350	<2	9.42	<0.5	17	13.1	<10	0.01	0.34	10	0.24	4600	0.01	<2	1	46	0.07	10	10
27.5	10592	3	28	<1	9	21	1.21	4	420	<2	10.3	<0.5	20	10.3	<10	0.01	0.33	10	0.26	5140	<0.01	<2	1	30	0.08	9	10
29	11025	64	85	3	40	148	0.73	4	740	<2	1.15	0.5	4	1.9	<10	<0.01	0.21	10	0.34	190	0.05	2	3	24	0.04	27	<10
30	11274	73	33	2	4	63	0.82	9	70	<2	3.93	<0.5	5	2.51	<10	0.01	0.28	10	0.73	807	0.07	<2	3	70	0.02	18	<10
31	11026	3010	4820	1	10	11	0.31	30	50	44	22.4	19	2	3.14	<10	0.06	0.01	20	1.16	>10000	0.02	11	9	53	<0.01	2	<10
31	11027	36	143	1	5	46	0.35	<2	10	32	0.47	<0.5	132	28.9	<10	<0.01	0.04	<10	0.29	706	0.01	3	1	369	<0.01	3	10
32	11275	116	803	<1	3	83	0.44	19	<10	38	0.45	5.6	108	26.6	<10	0.02	0.09	<10	0.37	1470	<0.01	4	1	187	<0.01	3	<10
33	10953	94	**1.58%**	1	7	31	0.48	2	10	30	5.38	72.1	16	>15	<10	0.27	0.21	<10	1.28	7980	0.01	<2	1	106	<0.01	4	20
33	10954	49	188	2	25	52	2.48	5	10	83	0.69	<0.5	69	>15	10	0.01	0.08	10	1.35	1725	<0.01	<2	4	215	0.01	21	<10
33	10955	30	5750	2	21	38	1.06	4	10	68	1.14	24	106	>15	<10	0.12	0.23	10	0.67	3490	0.02	<2	3	41	0.01	10	<10
33	10956	22	7170	3	19	36	1.47	2	10	61	1.47	28.8	92	>15	<10	0.17	0.38	10	0.91	4840	0.03	<2	3	63	0.01	14	<10
34	10950	2	51	<1	22	11	2.94	<2	10	<2	1.08	<0.5	40	6.27	10	0.01	0.01	10	2.22	774	0.03	<2	1	28	0.59	101	<10
34	10951	12	266	4	69	50	1.58	10	70	<2	3.99	1.3	11	4.69	<10	0.09	0.19	10	1.14	488	0.01	<2	2	61	0.07	35	<10
34	10952	3	148	5	56	133	3.67	77	110	<2	1.97	<0.5	20	10.4	20	0.07	0.12	20	2.47	680	0.01	2	9	180	0.65	197	<10
35	10899	<2	92	2	15	50	2.1	3	20	<2	1.8	<0.5	22	4.98	10	0.02	0.03	10	1.51	584	0.04	<2	3	73	0.62	109	<10
36	10898	4	87	4	22	103	0.16	3	50	<2	0.94	1.1	7	0.97	<10	0.01	0.04	<10	0.14	166	<0.01	<2	1	34	0.01	23	<10
37	6968	33	3237	1	14	193	0.71	<5	20	<5	0.05	14.7	24	5.58	4	0.124	0.06	3	0.46	566	<0.01	<5	<5	2	0.031	9	<20
37	6969	81	592	<1	7	42	0.93	19	15	22	0.46	2.3	87	>10	14	0.068	0.02	<1	0.55	1701	<0.01	<5	<5	9	<0.01	9	<20
37	6970	7382	**2.65%**	2	6	131	0.24	<5	24	107	5.71	80.4	7	5.84	2	0.666	0.11	<1	0.26	4134	<0.01	<5	<5	103	<0.01	3	<20
37	6971	64	5039	<1	2	18	0.37	<5	52	19	5.33	23.2	3	6.91	3	0.118	0.19	3	0.21	8772	0.04	<5	<5	54	<0.01	2	21
37	9756	114	839	<1	10	19	0.62	<5	16	<5	0.06	3	245	>10	14	0.143	<0.01	<1	0.44	486	<0.01	<5	<5	2	<0.01	14	<20
38	6967	3542	9398	<1	27	38	0.67	<5	14	151	0.12	43.6	88	>10	12	0.48	0.02	<1	0.42	697	<0.01	<5	<5	6	<0.01	9	<20
39	9757	**2.56%**	**7.49%**	<1	6	38	0.85	<5	10	76	0.19	151.3	15	>10	11	0.43	<0.01	<1	0.55	1474	<0.01	<5	<5	10	<0.01	7	32

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
40	9755	Roberts No. 1 area	R	RC	Rep	1.5	Msv po, sl + cpy	<5	<1	83	6.9	**1.39%**
41	10271	Roberts No. 1 area	R	OC	RC		Fest qz-rich meta tuff/rhy	<5	<1	10	0.3	10
42	11028	Roberts No. 2	R	RC	C	10	Sheared marble/carb/phy contact w/ limonite	<5	1	17	0.2	203
42	11029	Roberts No. 2	R	OC	SC	16	70% po/py msv sulf & 30% chl phy	<5	<1	22	0.8	2030
42	11030	Roberts No. 2	R	OC	SC	16	Msv sulf of po, py, minor cpy in phy	<5	<1	34	0.4	1210
42	11031	Roberts No. 2	R	OC	SC	16	Po & py msv sulf w/ chl sc & phy	<5	<1	14	0.2	881
42	11032	Roberts No. 2	R	OC	S	1	60% po, 30% py & 10% carb gangue	<5	<1	12	0.3	2560
42	11033	Roberts No. 2	R	OC	SC	16	Mg, msv carb w/ local msv fg carb lenses, w/ po	<5	<1	30	0.8	423
42	11277	Roberts No. 2	R	OC	SC	18	Msv & semi-msv po, w/ py & cpy in qz-mica sc	5	3	44	1	2470
42	11278	Roberts No. 2	R	OC	C	1.2	Msv & semi-msv po, py, cpy w/ minor chl sc host	<5	2	16	0.9	1810
42	11279	Roberts No. 2	R	OC	G		Qz lenses in msv to semi-msv sulf & chl sc	<5	<1	2	0.5	721
42	11276	Roberts No. 2 area	R	OC	C	0.5	Qz-mica sc w/ band of msv po +/- cpy	<5	18	8	0.4	916
43	11034	Roberts No. 2 area	R	OC	S		Sc/phy w/ sil phy layers w/ blebs & dissem of fg to mg py	<5	<1	12	0.5	35
43	11280	Roberts No. 2 area	R	RC	S		Qz-rich volc(?) w/ po, py, cpy, sl, minor gn	<5	1	27	0.6	463
44.1	10922	N McGinnis Glacier	R	RC	S		Black amph bole gbo w/ Cu-st & cpy ~ 10%	<5	1	480	4.5	**4.28%**
44.2	10171	N McGinnis Glacier	R	FL	S		Sc & granite rubble	1.4	3	4	0.4	83
46	10295	McGinnis Glacier, NW side	R	OC	Rep		Qz-musc-chl sc w/ py	<5	<1	2	0.4	441
46	11226	McGinnis Glacier, NW side	R	OC	S		Qz-mica & qz-chl sc w/ 25% py	5	1	2	0.6	620
46	11227	McGinnis Glacier, NW side	R	OC	SC	5	Qz-mica sc w/ 10% py +/- cpy	<5	<1	7	0.2	251
47	10294	McGinnis Glacier, NW side	R	OC	SC	25	Chl-qz sc	<5	<1	8	<0.2	123
47	11225	McGinnis Glacier, NW side	R	OC	S		Qz-rich sc w/ dissem & foliation-parallel seams of py	<5	1	14	0.6	261
48	10399	Tourmaline	R	RC	G		Peg w/ tourmaline & lepidolite	<5	<1	<1	<0.2	31
48	11009	Tourmaline	R	FL	G	1x1	Gbo	<5	<1	1	<0.2	33
48	11010	Tourmaline	R	RC	G		Watermelon tourmaline	<5	<1	<1	<0.2	9
48	11011	Tourmaline	R	RC	S	20x20	Spodumine w/ qz	<5	<1	<1	<0.2	6
48	11139	Tourmaline	R	FL	Rep	10x10	Dark gray white banded peg (biotite)	<5	<1	3	0.3	24
48	11140	Tourmaline	R	FL	S	0.5	Lepidolite-rich peg	<5	5	2	<0.2	12
48	11141	Tourmaline	R	FL	S	1	Schorl tourmaline-rich peg	<5	2	<1	<0.2	9
49	10679	Mt. Pillsbury area	PC		PC		No visible Au	5	2	871	0.6	80
50	10683	Mt. Pillsbury	R	OC	S	1X15	Qz vn swarm along micaceous sc lamina	<5	<1	2	0.4	2
50	10684	Mt. Pillsbury	R	OC	RC	1X2	Micaceous sc w/ hemititic staining & casts after py	<5	<1	1	<0.2	5
50	10685	Mt. Pillsbury	R	OC	G		Black micaceous sc w/ qz vns	<5	<1	10	<0.2	3
51	11305	Mt. Pillsbury	R	OC	C	1	1-ft thick qz-carb vns	<5	<1	8	1	14
51	11306	Mt. Pillsbury	R	OC	RC	6	Sil chl sc cut by qz vns	<5	<1	9	<0.2	9
51	11307	Upper Pillsbury Creek	PC				Fest qz vn fragments 10%, chloritic sc 90%	<5	<1	9	0.6	73
52.1	10273	Pillsbury Creek	PC				Trace mag, minor garnet, 1 v fine Au flake	<5	2	65	3.8	90
52.2	11303	Pillsbury Creek	PC				Meta-quartzite 15%, chl sc 45%, phy 40%	7	2	9	1	66
53	10680	E Mt. Pillsbury	PC		PC		No visible Au	<5	<1	4	0.7	55
54	10049	Ruby Creek	SS				Qz mica sc, lots of mica flakes	0.7	2	3	<0.2	46
55	10650	Ruby Creek	PC				5 v fine Au, tr mag, abundant silca sand, tr garnet	7	1	1455	<0.2	47
56	10165	Barite area	R	OC	Rep		Hematite-rich zone in fine sandstone	<0.5	<1	1	<0.2	9
57	10882	Ruby Creek Head	R	RC	G		Fg cgl to cg ss w/ fest knots +/- sulf	<5	<1	3	<0.2	11

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
40	9755	204	**4.91%**	<1	5	14	0.1	<5	14	16	4.38	141.9	64	>10	7	0.548	0.07	<1	0.8	7646	<0.01	<5	<5	219	<0.01	4	22
41	10271	58	71	12	5	44	0.19	186	80	<2	0.09	<0.5	2	2.8	<10	0.05	0.12	30	0.02	106	0.04	7	<1	4	0.01	3	<10
42	11028	15	19	9	15	60	1.02	<2	90	18	0.04	<0.5	7	11.95	10	0.12	0.28	10	0.47	295	0.02	<2	2	12	<0.01	28	<10
42	11029	49	36	1	22	17	1.04	<2	10	78	0.17	<0.5	169	39.5	<10	0.01	0.02	<10	0.5	445	0.01	5	2	30	<0.01	14	<10
42	11030	38	34	<1	23	20	1.29	3	10	59	0.95	<0.5	143	27.1	<10	0.01	0.03	<10	0.81	719	0.01	3	2	7	<0.01	14	<10
42	11031	18	71	1	14	49	2.94	3	20	21	0.05	<0.5	33	16.2	10	<0.01	0.03	<10	1.36	998	0.01	4	5	72	0.01	41	<10
42	11032	42	26	1	13	11	0.89	<2	10	50	0.1	<0.5	142	37.8	<10	<0.01	0.02	<10	0.45	439	0.01	2	2	4	<0.01	11	<10
42	11033	215	3560	<1	10	11	1.14	3	60	27	11.3	20.6	16	19.9	<10	0.57	0.08	<10	2	>10000	0.03	<2	2	6	<0.01	10	<10
42	11277	36	38	<1	8	27	1.44	5	<10	62	0.14	<0.5	151	40.8	10	0.01	0.02	<10	0.69	605	<0.01	<2	3	7	0.01	15	<10
42	11278	30	29	<1	4	22	1.15	<2	<10	114	0.22	<0.5	382	45.2	<10	<0.01	0.03	<10	0.59	606	<0.01	<2	2	7	<0.01	11	<10
42	11279	8	15	1	6	244	0.39	<2	10	16	1.48	<0.5	7	3.82	<10	0.01	0.02	<10	0.23	943	<0.01	<2	1	12	<0.01	3	<10
42	11276	32	41	<1	29	67	1.02	6	10	10	0.14	0.7	134	20.3	<10	<0.01	0.03	<10	0.59	580	<0.01	<2	3	13	<0.01	12	<10
43	11034	47	162	20	8	19	0.4	82	20	3	0.04	0.5	4	7.68	10	0.23	0.12	20	0.2	122	0.03	5	<1	307	<0.01	1	<10
43	11280	90	**1.17%**	<1	2	24	0.46	<2	30	17	9.76	75.7	5	16	<10	1.88	0.04	<10	2.9	>10000	0.01	<2	1	58	<0.01	4	10
44.1	10922	15	193	10	9	21	1.5	35	70	<2	5.33	3.9	47	10.4	10	0.38	0.37	10	0.95	1070	0.12	3	11	4	0.52	36	<10
44.2	10171	<2	28	3	48	88	1.52	2	**2470**	<2	0.01	0.7	12	2 25	10	0.01	0.18	10	0.34	70	0.02	<2	1	7	0.01	73	**<10**
46	10295	7	16	<1	16	73	0.96	22	20	4	0.02	<0.5	7	17.4	<10	0.02	0.06	<10	0.34	72	0.01	2	1	3	<0.01	9	<10
46	11226	13	18	<1	17	47	1.81	6	20	5	0.02	<0.5	9	22.6	<10	0.02	0.06	<10	0.71	84	0.01	<2	2	2	<0.01	16	<10
46	11227	2	9	<1	6	46	0.21	17	20	2	0.08	<0.5	2	4.8	<10	0.01	0.06	<10	0.1	79	0.01	16	1	2	<0.01	3	<10
47	10294	3	8	<1	5	68	0.51	20	30	<2	0.72	<0.5	1	3.96	<10	<0.01	0.1	10	0.2	118	0.01	2	1	17	<0.01	6	10
47	11225	3	10	<1	9	57	0.73	15	20	3	0.03	<0.5	7	6.55	<10	0.02	0.07	<10	0.34	38	0.01	4	1	4	<0.01	6	<10
48	10399	<2	2	<1	2	63	1.1	12	<10	<2	0.16	1	<1	0.13	10	0.01	0.66	<10	0.02	263	0.11	2	3	3	<0.01	1	10
48	11009	<2	9	<1	20	20	6.34	5	70	2	4.22	<0.5	22	2.17	10	<0.01	0.05	<10	1.58	306	0.43	2	1	25	0.02	15	<10
48	11010	<2	16	1	5	45	0.14	6	<10	<2	0.06	0.5	1	0.37	<10	<0.01	0.03	<10	0.05	60	0.02	2	1	395	<0.01	1	<10
48	11011	<2	4	1	3	29	0.1	5	<10	<2	0.04	<0.5	<1	0.09	<10	<0.01	0.08	<10	0.01	29	0.02	<2	<1	4	<0.01	<1	<10
48	11139	7	8	1	26	154	0.13	7	<10	35	0.03	<0.5	1	0.28	<10	0.03	0.02	20	0.01	102	0.06	<2	1	11	<0.01	<1	<10
48	11140	<2	4	<1	13	71	3.21	4	<10	<2	0.03	0.6	<1	0.12	30	<0.01	2.41	<10	0.01	584	0.05	<2	10	1	<0.01	<1	10
48	11141	3	10	<1	4	85	0.62	131	<10	<2	0.19	2	<1	0.2	<10	0.25	0.51	10	0.01	339	0.05	7	8	1	<0.01	<1	10
49	10679	29	94	2	58	57	2.03	348	120	<2	1.72	<0.5	48	5.78	10	0.06	0.61	10	1.26	552	0.06	2	6	45	0.17	99	10
50	10683	123	33	<1	3	38	0.05	<2	20	2	0.47	<0.5	1	0.54	<10	<0.01	0.01	<10	0.12	275	0.02	<2	<1	22	<0.01	1	<10
50	10684	9	9	<1	5	35	0.14	7	50	<2	0.02	<0.5	2	0.54	<10	<0.01	0.08	10	0.03	65	0.01	<2	<1	12	<0.01	1	<10
50	10685	10	6	<1	6	23	0.11	2	30	<2	0.07	<0.5	1	0.53	<10	0.01	0.06	10	0.02	48	0.01	<2	<1	2	<0.01	1	<10
51	11305	265	11	10	10	158	0.1	118	20	4	0.67	<0.5	3	0.98	<10	0.01	0.04	<10	0.28	178	<0.01	<2	<1	50	<0.01	2	<10
51	11306	8	13	7	8	148	0.22	242	40	<2	0.15	<0.5	2	0.99	<10	0.19	0.12	10	0.04	157	<0.01	2	<1	20	<0.01	1	<10
51	11307	152	138	1	102	56	0.63	79	100	<2	0.96	<0.5	45	8.15	<10	0.16	0.23	20	0.49	671	0.03	6	3	9	<0.01	11	<10
52.1	10273	475	144	1	111	24	0.22	187	40	<2	0.72	1.1	51	9.36	<10	0.22	0.07	10	0.42	541	0.01	154	2	29	<0.01	7	<10
52.2	11303	142	94	1	85	39	0.45	82	70	<2	1.5	<0.5	37	6.46	<10	0.18	0.19	10	0.69	620	0.03	26	2	48	<0.01	8	<10
53	10680	47	150	<1	45	20	0.34	49	50	<2	0.25	0.7	19	5.03	<10	0.03	0.08	20	0.25	673	0.02	11	2	65	<0.01	10	<10
54	10049	11	107	1	34	43	0.58	16	**1480**	<2	0.41	0.7	14	2 26	<10	0.07	0.12	20	0.33	428	0.01	<2	5	21	0.04	32	**10**
55	10650	21	57	2	32	131	0.91	156	400	7	0.8	<0.5	13	3.99	10	<0.01	0.25	30	0.64	440	0.02	7	4	30	0.09	96	10
56	10165	26	92	4	16	8	0.31	4	**160**	13	0.25	17.3	46	>15	100	0.03	0.03	40	0.19	5930	0.01	<2	2	<1	0.01	32	**10**
57	10882	13	36	4	19	44	0.4	71	80	<2	6.6	<0.5	8	5.26	<10	0.09	0.13	10	0.08	353	<0.01	<2	3	9	0.01	20	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
58	10734	Ruby Creek Head	R	RC	Rep		Hematite matrix cgl w/ minor py	<5	1	13	0.4	<1
59	10733	Ruby Creek Head	R	RC	C	2	Ochre	<5	<1	2	<0.2	44
59	10881	Ruby Creek Head	R	OC	Rep		Fest ser-qz sc	<5	1	<1	<0.2	10
60	10166	Little Gold Creek Trib	PC					<0.5	<1	140	1.6	7
61	10648	Little Gold Creek, E Fork	PC				Bedrock: mg black sc	5	6	120	0.4	62
62	10647	Sargent Creek	PC				No visible Au	25	2	22	<0.2	13
63	10646	Harding Gulch	PC				No visible Au	<5	<1	56	<0.2	16
63	10587	Snow Gulch	PC				No Au seen, no heavy minerals	138	1	239	<0.2	26
64.1	10686	Ober Creek	PC		PC		Barren sample	<5	<1	<1	<0.2	18
64.2	10051	Ober Creek	PC				Pelitic sc	0.7	1	**56.6**	0.3	12
64.3	10645	Ober Creek	PC				1 v fine Au	7	1	1130	<0.2	11
65.1	10052	Savage Creek	PC				Pelitic sc	0.8	1	310	<0.2	24
65.1	10053	Savage Creek	PC				Pelitic sc	<0.5	1	267	<0.2	12
65.2	10649	Savage Creek Trib	PL				1 v fine grain Au; bedrock: phy & sc	385	7	5830	0.5	14
65.3	10264	Savage Creek Trib	PC				6 v fine Au flakes, sc bedrock	<5	1	**17.2**	0.3	15
65.3	10586	Savage Creek Trib	PC				1 fine, 2 v fine Au, some small garnet, v little mag	8	1	1790	<0.2	15
66	10279	McCumber Creek Trib	PL				Magnetic fraction of sample 10644				0.2	35
66	10577	McCumber Creek Trib	PC				1 coarse, 1 fine, 6 v fine Au flakes	5	1	**29.3**	0.3	12
66	10642	McCumber Creek Trib	PC				Bedrock: blue-green sc	8	1	124	<0.2	13
66	10644	McCumber Creek Trib	PL				1 coarse, 12 fine, 24 v fine flat flakes Au; minor mag & garnet	<5	<1	3600	<0.2	19
66	10916	McCumber Creek Trib	PC				No visible Au	15	1	2530	<0.2	35
67.1	11310	McCumber Creek	PC				1 fine, 4 v fine Au flakes	<5	<1	4270	<0.2	14
67.2	10272	McCumber Creek	PC				1 coarse, 5 fine, 15 v fine flakes Au	<5	<1	**11.25**	77.4	20
67.2	10687	McCumber Creek	PC		PC		2 coarse, 7 fine, 11 v fine Au flakes	6	<1	**47.1**	0.8	15
67.3	10643	McCumber Creek	PC				3 coarse, 7 fine, 10 v fine flat Au; abundant garnet				<0.2	19
67.4	10261	McCumber Creek	PC				1 v fine Au, abundant garnet, chl sc bedrock	8	<1	10	<0.2	14
67.4	10280	McCumber Creek	PL				Magnetic fraction of sample 10653				4.8	70
67.4	10653	McCumber Creek	PL				1 coarse, 3 fine Au, 3-5% garnet, tr to minor mag	562	<1	**13.65**	<0.2	20
67.5	10263	McCumber Creek	PL				Garnet-rich sample	<5	<1	**8.03**	10.9	28
67.5	10278	McCumber Creek	SL				Magnetic fraction of sample 10263				1.1	180
68	10641	Morningstar Creek	PC				Minor coarse mag, mod garnet	<5	2	1	<0.2	12
69	10688	Upper Morningstar Creek	PC		PC		Barren sample	<5	<1	72	<0.2	19
70.1	10262	McCumber Creek (Upper)	PC				Chl sc/gneiss bedrock	14	<1	>10000	0.3	22
70.2	11399	McCumber Creek (Upper)	PC				1 v coarse, 2 coarse Au flakes, nuggety & rounded			**180.5**	11.1	31
71	10751	Upper McCumber Creek	PC				No visible Au, no black sands, garnet	<5	1	<1	<0.2	19
71	11398	Upper McCumber Creek	PC				95% muscovite sc w/ garnet, 5% metaquartzite; no visible Au	<5	<1	5	<0.2	25
72	11138	McCumber area	R	OC	S	1	Meta bull qz in qz-chl-muscovite sc	<5	1	10	0.2	110
73	10914	McCumber Creek area	R	OC	S	0.5	Qz-white mica sc (fest) along fault	<5	2	7	<0.2	7
74	10915	McCumber Creek area	R	OC	S	0.5	Meta qz stringers in qz-white mica sc	<5	1	1	0.2	17
76	6985	McCumber area	R	RC	S		Gossan w/ qz & minor sulfs	<5	<1	<1	<0.2	49
77	10175	McCumber area	R	OC	S		Mafic volc highly oxidized, abundant bt	<0.5	1	<1	<0.2	5
78	10346	McCumber Creek Trib	PC				Bedrock is gneissic qz sc	0.5	<1	8	<0.2	20

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
58	10734	16	123	1	98	30	0.42	25	390	<2	0.26	1.5	32	>15	<10	0.09	0.09	20	0.11	>10000	<0.01	<2	6	5	<0.01	56	<10
59	10733	7	91	4	8	110	0.24	10	40	<2	0.07	<0.5	3	2.7	<10	0.01	0.06	<10	0.02	60	<0.01	4	<1	42	0.01	9	<10
59	10881	16	182	1	40	44	0.36	<2	60	<2	0.12	<0.5	25	11.65	<10	0.02	0.15	20	0.25	916	0.01	<2	4	51	<0.01	16	<10
60	10166	6	12	<1	6	88	0.14	3	30	<2	0.01	<0.5	2	1.27	<10	0.09	0.06	10	0.02	56	0.01	<2	1	3	0.01	5	<10
61	10648	37	106	1	63	63	0.76	53	130	<2	1.02	0.7	29	4.81	<10	0.02	0.11	30	0.45	797	0.01	<2	2	14	0.03	19	<10
62	10647	4	46	<1	32	48	0.72	5	280	<2	0.29	0.5	8	1.25	<10	0.11	0.05	10	0.42	135	<0.01	<2	2	12	0.06	31	<10
63	10646	13	57	<1	18	53	0.72	7	210	<2	0.23	<0.5	10	2.95	<10	0.06	0.22	20	0.29	471	0.01	<2	5	11	0.04	33	<10
63	10587	14	65	1	28	95	0.66	18	90	<2	0.35	<0.5	12	2.49	<10	0.02	0.11	20	0.32	502	0.01	<2	2	21	0.03	18	<10
64.1	10686	12	34	<1	17	52	0.51	28	40	<2	0.16	<0.5	8	1.95	<10	0.03	0.1	10	0.2	274	0.03	<2	2	4	0.03	13	<10
64.2	10051	8	41	<1	18	59	0.58	15	100	2	0.31	<0.5	7	1.88	10	0.11	0.08	10	0.28	389	0.02	<2	2	11	0.08	35	<10
64.3	10645	9	38	<1	18	54	0.49	13	80	<2	0.32	<0.5	7	2.21	<10	0.42	0.05	10	0.24	329	0.01	<2	2	22	0.09	39	<10
65.1	10052	13	48	1	36	63	0.53	23	190	<2	0.24	<0.5	16	2.73	30	0.03	0.08	20	0.23	2000	0.02	2	2	7	0.07	35	<10
65.1	10053	9	47	1	20	62	0.41	12	140	<2	0.15	<0.5	20	2.69	20	0.02	0.08	20	0.14	1330	0.02	<2	3	5	0.04	22	<10
65.2	10649	8	70	1	24	11	0.35	23	150	2	0.44	<0.5	12	4.38	<10	0.1	0.07	60	0.11	691	<0.01	4	3	45	0.04	24	<10
65.3	10264	6	68	1	28	53	0.41	36	140	<2	0.13	0.6	16	4.9	<10	1.81	0.13	20	0.13	774	0.01	<2	4	22	0.02	23	10
65.3	10586	7	67	<1	25	56	0.37	24	140	<2	0.17	0.5	14	4.5	<10	0.04	0.11	20	0.1	667	<0.01	2	4	124	0.03	21	<10
66	10279	<2	105	8	612	946	0.43	12	20	2	0.28	<0.5	87	>15	10	0.04	0.02	<10	0.34	895	<0.01	<2	4	9	0.58	2070	10
66	10577	8	63	<1	28	100	1.01	10	70	<2	0.42	<0.5	9	3.86	<10	<0.01	0.11	20	0.37	925	0.01	<2	4	10	0.06	25	<10
66	10642	9	55	<1	19	64	0.75	12	50	<2	0.23	<0.5	8	2.34	<10	0.02	0.08	10	0.31	646	0.01	<2	2	10	0.03	14	<10
66	10644	12	66	1	34	33	0.65	14	50	<2	0.58	0.8	9	3.03	<10	0.08	0.03	20	0.32	471	<0.01	2	3	12	0.07	67	10
66	10916	35	89	<1	39	41	0.19	19	80	<2	0.2	<0.5	17	5.25	<10	0.16	0.06	20	0.16	754	<0.01	2	3	4	0.01	18	<10
67.1	11310	8	46	<1	15	61	1.22	2	70	<2	0.52	<0.5	8	3.25	<10	0.04	0.17	10	0.3	1000	0.02	<2	7	39	0.07	13	<10
67.2	10272	37	34	<1	21	50	0.91	41	40	<2	0.56	<0.5	10	3.57	<10	<0.01	0.05	20	0.19	920	<0.01	<2	8	12	0.06	13	<10
67.2	10687	87	34	<1	19	41	0.84	8	50	2	0.42	<0.5	9	3.03	<10	0.05	0.08	20	0.21	806	0.01	<2	6	12	0.06	11	<10
67.3	10643	216	34	<1	20	62	1.09	22	30	<2	0.64	0.5	10	3.83	<10	3.94	0.05	20	0.22	1085	<0.01	2	9	9	0.07	14	<10
67.4	10261	7	36	<1	15	58	0.77	4	40	<2	0.3	<0.5	8	2.41	<10	0.02	0.08	10	0.27	545	<0.01	<2	5	9	0.03	9	<10
67.4	10280	<2	150	16	1710	327	0.26	7	20	<2	0.23	<0.5	93	>15	10	0.32	0.02	70	0.22	662	<0.01	<2	2	12	0.39	1125	10
67.4	10653	15	39	1	23	8	0.42	21	30	<2	0.51	<0.5	10	2.09	<10	20.8	0.04	20	0.21	407	<0.01	<2	3	7	0.03	13	<10
67.5	10263	258	104	1	22	12	0.51	66	40	2	0.47	0.9	10	2.51	<10	0.66	0.06	30	0.26	488	<0.01	9	3	17	0.04	19	10
67.5	10278	84	88	30	229	370	0.47	55	50	3	0.25	1.5	50	>15	10	0.19	0.05	10	0.28	1440	<0.01	2	3	12	0.24	753	<10
68	10641	9	35	<1	14	82	0.77	3	40	<2	0.41	<0.5	6	2.82	<10	0.01	0.07	10	0.22	751	<0.01	<2	6	58	0.05	11	<10
69	10688	14	47	<1	24	66	0.89	6	80	<2	0.42	<0.5	11	2.68	<10	0.01	0.17	10	0.34	643	0.03	<2	4	12	0.04	12	<10
70.1	10262	136	44	<1	23	51	1.02	18	50	3	0.47	<0.5	10	3.51	<10	<0.01	0.08	20	0.32	819	<0.01	<2	7	12	0.04	10	<10
70.2	11399	15	68	3	31	148	2.2	11	210	<2	0.83	<0.5	12	5.52	<10	0.4	0.39	30	0.4	1590	0.03	<2	13	23	0.11	21	<10
71	10751	12	50	1	21	186	1.64	3	100	<2	0.73	<0.5	10	4.07	<10	<0.01	0.18	20	0.37	1265	0.02	<2	11	57	0.11	16	<10
71	11398	12	58	1	31	281	1.85	5	130	<2	0.76	<0.5	12	4.62	<10	0.01	0.24	20	0.43	1490	0.03	<2	11	140	0.1	17	<10
72	11138	23	76	1	109	174	0.19	<2	20	<2	0.09	<0.5	5	0.9	<10	<0.01	0.03	<10	0.09	138	<0.01	<2	<1	3	<0.01	2	<10
73	10914	20	90	<1	43	49	0.82	23	210	3	0.19	0.5	20	6.51	<10	0.17	0.04	30	0.08	2100	<0.01	2	14	61	0.01	80	<10
74	10915	81	60	3	12	95	0.19	8	90	2	0.07	<0.5	4	1.52	<10	0.01	0.08	10	0.05	432	<0.01	<2	1	30	<0.01	15	<10
76	6985	9	72	<1	18	139	0.41	11	61	<5	0.11	<0.2	8	5.52	3	<0.01	0.05	7	0.05	2936	<0.01	<5	<5	23	<0.01	22	<20
77	10175	18	143	<1	32	62	1.71	8	**2700**	<2	0.1	<0.5	18	3.45	10	0.01	0.84	10	0.51	411	0.02	3	13	15	0.13	53	**10**
78	10346	33	55	<1	21	64	1.28	13	140	<2	0.19	<0.5	10	2.91	10	0.01	0.41	30	0.55	353	0.03	6	3	8	0.06	20	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
79	10174	McCumber Creek Trib	R	OC	S		Orthogneiss, sub horiz layers of muscovite, qz, hbl, & bt	0.7	1	10	<0.2	110
80	11178	Upper McCumber Creek	R	OC	S		Clear white bull qz lenses in qz-chl-musc-garnet sc	<5	1	<1	0.2	30
81	11175	Gerstle River Trib 3	SS				Float = sc	<5	<1	2	0.2	34
82	11023	Gerstle River Trib 2	SS					7	<1	6	<0.2	34
83	11022	Gerstle River Trib 1	SS				Bedrock = mica sc	<5	1	3	<0.2	42
83	11174	Gerstle River Trib 1	SS				Bedrock = sc, granite, di, sc float	<5	2	2	0.2	39
84	11173	Sheep Creek	SS				Bedrock = sc, lots of granite float	<5	2	<1	<0.2	42
84	11172	Sheep Creek Trib	SS				Bedrock = sc	<5	<1	1	<0.2	29
85	11169	Little Gerstle River	SS				Sc, various granite-di int float	<5	1	25	0.4	32
85	11170	Little Gerstle River	SS				Granite int, garnet-mica sc float	<5	1	15	0.2	48
86.1	10651	Pegmatite Creek	PC				No visible Au; bedrock: sc	<5	1	551	<0.2	44
86.2	10652	Pegmatite Creek	PC				Bedrock: granite	<5	1	12	<0.2	8
86.3	11021	Pegmatite Creek	R	FL	G		Mal staining from unknown Cu min	<5	<1	22	2.6	793
86.3	11171	Pegmatite Creek	SS				Granite peg, monzonite, di; 1 piece granite w/ Cu-st	5	1	7	0.3	38
87	11020	Johnson River, W Tr b	SS				Granite, monzonite, syenite float	<5	2	48	0.5	42
89	6986	N Mt. Hadjukovich	R	RC	S		Dissem py in rhy porph	<5	<1	<1	0.2	5
90	10105	Gunnysack area	R	OC	G	1x1	Qz vn	<5	<1	108	0.2	8
90	10304	Gunnysack area	R	FL	G		Qz, fest w/ stibnite blebs	<5	7	2490	**303**	162
91	10100	Gunnysack	R	OC	C	5	Qz vn, host rock:qz-mica sc	<5	<1	19	0.6	17
91	10101	Gunnysack	R	OC	C	4.5	Qz-mica sc	<5	1	15	0.4	45
91	10102	Gunnysack	R	OC	C	12	7" wide qz vn	<5	1	9	<0.2	6
91	10103	Gunnysack	R	OC	C	5.5	Qz mica sc, fest	<5	1	52	0.4	52
91	10104	Gunnysack	R	OC	S	1x1	Qz vn w/ Sb	<5	<1	107	5	32
91	10112	Gunnysack	PC				Bedrock: qz-mica sc	<5	1	47	1.1	12
92	10050	Gunnysack Creek	PC				Bedrock: qz mica sch	0.7	1	280	<0.2	37
93	10111	Gunnysack area	R	FL	S		Qz w/ sulfs (py, aspy?, garnet?)	<5	<1	57	0.4	49
94	10301	Falls Creek	R	OC	C	1.5	Quartzite - qz sc w/ sulfs	<5	2	27	3.4	63
95	10300	Falls Creek	R	OC	Rep	1	qz vns & lenses in qz-mica sc, v minor gray sulfs (st binite)	<5	1	8	<0.2	50
95	11357	Falls Creek	R	OC	CH	0.2	White, coarsely crystalline qz vn w/ tr py, cpy, aspy	5	2	2	<0.2	19
97	11358	Black Rapids area	R	TP	S		Qz vns & sc inclusions w/ tr py, aspy, fest	<5	1	3	<0.2	12
98	2663	Maclaren Glacier	SS				Float - sc, arg, metavolcs, till	<5	3	32	0.2	57
98	2664	Maclaren Glacier	SS				Float - granite, metavolcs, till.	<5	6	136	<0.2	87
100	11116	Maclaren Glacier Lode area	R	OC	C	2	Pea gravel quartzite w/ tr py	<5	<1	<1	<0.2	20
101	2665	Maclaren Glacier	SS				Float - phy, granite - ints, um, lots of fest mafic ints	<5	3	5	<0.2	82
102	2666	Maclaren Glacier	SS				Float: ints, cg granite, phy, arg	<5	3	16	0.5	74
103	2667	Maclaren Glacier	SS				Float - phy, arg, some fest ints, fg	7	7	12	0.5	76
104	1043	Maclaren Glacier Lode	R	OC	SC	5@1	Skarn w/ mag, qz, garnet, pyx, py <<1% (dissem) & cpy? <<1%	<5	3	94	2	1235
104	2680	Maclaren Glacier Lode	R	OC	Rep		Diabase dike - v weathered/alt	24	10	4	<0.2	32
104	10937	Maclaren Glacier Lode	R	OC	Rep	10x10	Sil br skarn w/ up to 50% mag	11	1	16	0.2	45
105	10980	GP Anoms A3-A5	R	RC	Rep		Fest fg gbo w/ 5-10% v fg sulf	6	12	3	0.3	302
106	2668	E Fork Maclaren River Trib	SS				Float - fg granite, till	<5	3	14	<0.2	100
107	10979	GP Anom A2	R	RC	S		Sil sed(?) w/ dissem mg po	<5	4	1	<0.2	106

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
79	10174	2	49	<1	26	57	1.65	6	**5140**	<2	0.07	<0.5	23	4.43	10	<0.01	0.14	20	1.33	333	0.02	<2	2	<1	0.03	23	**<10**
80	11178	2	20	<1	13	66	0.37	<2	30	<2	0.16	<0.5	4	1	<10	<0.01	0.08	10	0.2	102	<0.01	<2	1	98	0.01	4	<10
81	11175	21	74	<1	30	13	1.04	8	50	<2	0.57	<0.5	15	3.05	<10	<0.01	0.06	30	0.55	328	<0.01	2	2	46	0.02	11	<10
82	11023	15	81	<1	32	16	0.99	37	50	<2	0.86	<0.5	16	3.5	<10	0.01	0.07	30	0.64	470	0.01	2	3	22	0.02	17	<10
83	11022	23	92	1	44	15	1.2	27	80	<2	0.31	<0.5	27	4.32	<10	0.01	0.09	60	0.6	777	0.01	<2	3	58	0.04	22	<10
83	11174	61	85	2	29	15	0.87	89	90	<2	1.19	<0.5	15	3.31	<10	0.01	0.13	40	0.61	525	0.01	5	3	26	0.03	21	<10
84	11173	27	88	1	31	11	1.01	15	50	<2	0.49	<0.5	18	3.41	<10	<0.01	0.06	30	0.61	476	0.01	<2	2	22	0.04	17	<10
84	11172	24	82	<1	31	13	0.8	11	50	<2	0.39	<0.5	16	3.02	<10	0.02	0.09	50	0.38	455	<0.01	<2	3	55	0.03	15	<10
85	11169	38	52	<1	24	47	0.88	244	40	<2	1.36	<0.5	16	2.31	<10	<0.01	0.11	20	0.6	355	0.02	4	2	3	0.04	36	<10
85	11170	31	103	1	43	9	0.32	89	110	<2	1.18	<0.5	21	4.6	<10	0.03	0.1	10	0.63	614	0.01	37	4	52	<0.01	12	<10
86.1	10651	91	54	2	33	104	0.82	98	420	5	0.62	<0.5	13	3.53	<10	1.63	0.21	20	0.61	367	0.02	8	4	34	0.08	81	10
86.2	10652	7	42	<1	16	48	0.61	10	50	2	0.16	<0.5	7	1.76	<10	0.04	0.08	10	0.27	425	0.01	<2	2	29	0.03	11	<10
86.3	11021	28	38	50	12	23	0.95	77	20	8	1.27	<0.5	5	1.97	<10	<0.01	0.16	40	0.59	201	0.03	8	3	89	0.01	21	<10
86.3	11171	20	100	1	30	36	1.25	139	220	<2	1.11	<0.5	16	3.92	<10	0.03	0.27	20	0.84	677	0.03	6	6	148	0.06	48	<10
87	11020	20	45	1	23	134	1.13	214	60	<2	1.71	<0.5	13	3.11	10	0.01	0.14	30	1.08	358	0.03	9	4	379	0.09	132	10
89	6986	40	32	4	9	103	0.32	10	62	<5	0.05	<0.2	<1	0.71	2	<0.01	0.22	9	0.06	28	0.08	<5	<5	8	<0.01	2	<20
90	10105	7	5	<1	6	84	0.11	1110	**320**	<2	0.01	<0.5	1	1.72	<10	0.11	0.07	<10	0.02	95	0.01	11	<1	15	<0.01	2	**10**
90	10304	**7.69%**	12	2	577	115	0.05	683	**<10**	580	0.08	3.4	13	1 08	<10	0.1	<0.01	<10	0.04	44	0.01	**2.79%**	1	25	<0.01	4	**<10**
91	10100	93	20	<1	8	128	0.13	515	**150**	<2	0.03	<0.5	1	0.73	<10	0.19	0.04	<10	0.08	52	0.01	52	<1	5	<0.01	4	**10**
91	10101	53	133	<1	28	23	0.63	1080	**1910**	<2	0.06	<0.5	9	4 55	<10	0.36	0.19	<10	0.25	309	0.01	42	4	9	<0.01	13	**20**
91	10102	8	4	1	5	173	0.05	81	**30**	<2	0.01	<0.5	<1	0.42	<10	0.05	0.01	<10	0.01	19	0.01	4	<1	2	<0.01	1	**<10**
91	10103	21	238	<1	50	27	0.45	1665	**1610**	6	0.42	<0.5	18	5 34	<10	0.41	0.18	<10	0.53	716	0.01	36	5	32	<0.01	8	**30**
91	10104	607	64	<1	20	63	0.4	1625	**1030**	7	0.05	<0.5	11	3 04	<10	1.53	0.12	<10	0.06	123	0.01	333	2	7	<0.01	5	**30**
91	10112	160	20	1	7	51	0.17	2660	80	2	0.04	<0.5	1	2.35	<10	10	0.17	<10	0.03	63	0.01	661	1	17	<0.01	5	<10
92	10050	34	54	<1	37	48	0.33	2180	50	<2	0.29	<0.5	13	3.16	10	0.13	0.11	20	0.23	411	0.01	16	2	11	<0.01	11	20
93	10111	19	96	<1	14	18	0.52	7410	**200**	5	6.05	0.9	6	3 93	<10	0.39	0.03	<10	2.06	1870	0.01	39	11	701	<0.01	6	**40**
94	10301	1740	337	1	5	80	0.13	240	**1270**	8	0.13	1	1	2 02	<10	1.24	0.15	<10	0.04	118	0.01	735	1	11	<0.01	3	**20**
95	10300	9	27	1	5	134	0.18	1145	**430**	<2	0.34	<0.5	7	1 25	<10	0.07	0.1	<10	0.03	241	0.01	9	1	5	<0.01	3	**<10**
95	11357	34	93	2	37	126	0.04	257	<10	<2	0.5	1.2	2	0.75	<10	0.09	0.01	<10	0.16	262	<0.01	8	<1	28	<0.01	2	<10
97	11358	2	9	6	21	145	0.1	106	20	2	0.01	<0.5	2	1.14	<10	0.01	0.06	<10	0.03	343	0.01	<2	1	11	<0.01	2	<10
98	2663	5	114	2	38	33	1.21	67	32	<5	0.72	<0.2	18	3.99	<2	0.128	0.06	5	0.85	610	<0.01	<5	<5	35	0.057	33	<20
98	2664	4	87	<1	64	66	1.39	108	49	<5	1.8	<0.2	28	4.55	<2	0.807	0.06	4	1.49	689	0.01	<5	6	67	0.068	57	<20
100	11116	10	49	1	5	60	0.59	38	140	<2	0.95	<0.5	4	1.12	<10	0.3	0.28	<10	0.04	365	0.06	<2	1	195	<0.01	8	<10
101	2665	4	93	1	26	48	1.72	52	133	<5	2.79	<0.2	23	5.03	<2	1.268	0.06	4	1.26	896	0.01	<5	13	93	0.027	114	<20
102	2666	7	228	9	48	24	1.05	81	129	<5	2.11	1.4	18	5.33	<2	0.177	0.09	7	0.76	711	0.03	7	5	138	0.021	53	<20
103	2667	5	203	5	74	107	0.79	80	113	<5	1.57	1.2	17	4.41	<2	0.316	0.06	6	1.25	735	0.02	16	<5	111	<0.01	43	<20
104	1043	2	89	6	108	44	0.74	53	19	<5	5.1	0.6	34	6.41	<2	0.125	0.04	3	0.89	503	0.04	<5	<5	42	0.102	28	<20
104	2680	<2	175	<1	127	114	1.72	57	15	<5	10	0.3	21	4.34	<2	0.03	<0.01	14	2.66	4653	<0.01	<5	8	227	0.061	32	<20
104	10937	9	126	<1	207	20	0.09	5	10	2	6.93	0.5	57	22.8	<10	0.01	<0.01	<10	0.67	1205	0.01	<2	1	18	0.02	8	<10
105	10980	<2	13	<1	75	61	2.73	<2	110	<2	1.6	<0.5	29	3.38	10	0.1	0.1	<10	0.52	147	0.3	<2	4	69	0.15	55	<10
106	2668	5	159	4	53	45	2.29	88	95	<5	0.73	0.6	34	6.77	3	0.077	0.08	6	1.08	1128	0.03	8	10	44	0.103	114	<20
107	10979	5	59	8	75	50	2.25	53	110	<2	1.62	0.5	12	3.27	10	0.01	0.18	10	1.1	320	0.17	<2	10	31	0.11	129	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
109	10013	Eureka Glacier West area	R	RC	G		Serp'zd dun cut by minor leucocratic d ke	12	10	2	0.7	58
110	10014	Eureka Glacier West area	R	OC	G	0.8	Gossan & qz from a vug in alt gbo	33	87	50	0.6	285
112	10425	Compass Creek	PC				Minor mag, no visible Au	3.6	3	10	<0.2	42
113	10075	Compass Creek	R	RC	G		Nikolai basalt w/ v minor cpy & py	4.5	13	3	<0.2	145
114	2669	Eureka Glacier	SS				Float - epid, K-spar granite	<5	5	8	<0.2	40
115	10012	Bird's Beak area	R	RC	G		Melagbo to perid w/ 5% net-textured po, cpy, & pent	483	366	140	1.3	1340
116	10010	Bird's Beak area	R	RC	G		Melagbo w/ 1-2% cpy, po, pent(?)	201	176	103	0.7	846
117	10011	Bird's Beak area	R	RC	G		Felsic int w/ 2-3% sulfs	<5	2	12	0.2	123
118.1	11242	Bird's Beak	R	RC	S		Pyxite w/ po, cpy, pent, + unknown sulf	647	403	130	0.8	2030
118.1	11243	Bird's Beak	R	OC	G		Granitoid(?) w/ poss ble native Cu	<5	1	<1	<0.2	35
118.1	11244	Bird's Beak	R	RC	S		Perid to felds perid w/ cpy, po, pent	462	385	167	0.7	1820
118.1	11355	Bird's Beak	R	OC	Rep	10	Gbo w/ tr po	105	94	34	0.2	592
118.1	11356	Bird's Beak	R	RC	S	0.5	Mafic-um inclusion in leucogbo/felsite	452	331	103	0.7	1430
118.2	11240	Bird's Beak	R	OC	S		Perid to felds perid w/ 1% po & cpy	27	25	8	<0.2	226
118.2	11241	Bird's Beak	R	OC	SC	24	Perid, gbo, & serp w/ minor po, cpy	8	9	3	<0.2	150
118.2	11353	Bird's Beak	R	OC	SC	28	Po-bearing serp'zd perid, tr cpy	30	34	12	0.2	333
118.2	11354	Bird's Beak	R	OC	SC	25	Felds perid, fg to mg, w/ minor po +/- cpy	8	8	5	0.2	83
119	10029	Bird's Beak area	R	RC	S		Mela gbo & perid w/ 3-5% cpy, po, pent(?)	489	468	147	0.7	2000
119	10030	Bird's Beak area	R	RC	G		Porph gbo(?) w/ 10-15% fg, dissem sulf	0.8	3	7	<0.2	182
119	10429	Bird's Beak area	R	RC	S		Fg granitic int rocks, cut by barren qz/peg vns	<0.5	<1	2	<0.2	86
120	10031	Bird's Beak area	R	OC	G		Partially serp'zd perid w/ 1-2% sulf, minor cpy	182.5	97	33	<0.2	704
120	10430	Bird's Beak area	R	FL	S		Serp'zd perid, minor net-textured sulfs	406	383	99	1	1205
121	10195	Bird's Foot	R	RC	Rep		Feldspathic perid & perid w/ ~ 0.5% cpy	28	23	5	<0.2	145
121	10196	Bird's Foot	R	OC	RC		Mafic gbo to feldspathic perid w/ ~ 1% sulf	16	14	5	<0.2	177
121	10197	Bird's Foot	R	FL	S		Perid to mafic gbo w/ 3-5% cpy, po	533	381	148	1.1	2190
121	10226	Bird's Foot	R	RC	G		Pegmatitic(?) vns in perid	17	19	4	<0.2	126
122	10981	Bird's Foot area	R	OC	S		Fest felsic int w/ 3-5% po	<5	<1	2	<0.2	237
122	10982	Bird's Foot area	R	OC	G		Serp'zd perid w/ 2-3% po	24	14	5	<0.2	122
123	11236	BOS area	R	OC	G	2	Alt gbo(?) w/ cpy & py in faulted zone	5	4	14	1.8	6090
123	11237	BOS area	R	RC	S		Alt gbo w/ 5-10% cpy	40	130	169	8.5	**1.04%**
123	11351	BOS area	R	OC	Rep	1	Fest fract zone in mg gbo	5	12	16	1.9	3620
124	11239	BOS area	R	RC	Rep		Serp'zd perid w/ 1% po	33	31	6	<0.2	159
124	11352	BOS area	R	OC	RC		Serp'zd perid w/ tr dissem po	22	18	5	0.4	208
125	11238	BOS area	R	OC	G		Serp'zd dun w/ minor po	31	31	5	<0.2	166
126	11147	BOS	R	OC	C	1	Perid w/ dissem cpy + po/pent	106	86	36	0.2	594
126	11370	BOS	R	OC			Serp adj leuco gbo w/ 3% mg, dissem po/pent	292	308	110	0.3	1145
127	10081	Mini U Landslide area	R	RC	Rep		Mostly perid w/ felds perid & minor gbo	18	19	3	0.3	171
127	10601	Mini U Landslide area	R	RC	RC		Felds perid w/ minor gbo	45	41	13	0.7	806
128	10080	Mini U Landslide	R	RC	S		Mostly perid, but also pyxite, gbo, felds perid	33	36	10	<0.2	188
128	10600	Mini U Landslide	R	RC	Rep	10x100	1-3% sulf/po, minor phlog	20	19	3	0.3	104
129.1	11270	New Boot Flap	R	OC	G		Mg gbo w/ po +/- cpy	17	17	4	<0.2	196
129.1	11271	New Boot Flap	R	RC	S		Melagbo w/ po & cpy	17	28	5	0.3	330

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
109	10013	2	24	1	1340	431	0.96	3	**60**	6	0.71	<0.5	75	4 58	<10	0.07	0.01	<10	11.65	437	0.01	<2	4	18	0.03	27	**<10**
110	10014	3	12	15	34	46	1.34	355	**50**	<2	0.1	<0.5	<1	9.11	<10	10	0.03	<10	0.67	184	0.03	2	3	5	0.01	65	**40**
112	10425	7	49	<1	42	59	1.42	18	240	<2	0.77	<0.5	14	3.32	10	3.08	0.07	10	1.18	399	0.04	3	5	37	0.09	64	<10
113	10075	<2	66	<1	47	28	2.09	8	**230**	<2	1.95	<0.5	27	4 96	20	0.03	0.05	10	1.61	562	0.03	2	3	<1	0.37	114	**<10**
114	2669	6	53	<1	101	59	1.21	43	57	<5	0.56	<0.2	18	3.35	<2	0.039	0.06	36	1.29	695	0.02	<5	<5	37	0.04	50	<20
115	10012	2	31	<1	3500	289	0.29	3	**10**	<2	0.13	<0.5	114	6.1	<10	0.14	0.01	<10	12 9	671	0.01	<2	3	1	0.01	19	**<10**
116	10010	<2	26	<1	2330	286	0.97	4	**60**	5	0.34	<0.5	83	5 21	<10	0.04	0.04	<10	8.48	514	0.03	<2	3	12	0.01	35	**<10**
117	10011	<2	50	<1	28	17	2.24	6	**300**	2	0.54	<0.5	21	4 52	<10	0.02	0.02	<10	1.66	593	0.04	<2	1	19	0.08	51	**<10**
118.1	11242	3	53	<1	4550	1410	2.61	11	20	2	0.45	0.9	127	4.92	<10	0.03	0.03	<10	6.64	427	0.02	<2	4	21	0.11	67	<10
118.1	11243	<2	46	<1	21	21	2.35	8	20	<2	0.95	<0.5	13	3.84	10	<0.01	0.02	<10	1.33	535	0.07	<2	2	8	0.17	52	<10
118.1	11244	3	37	<1	3380	480	1.4	<2	50	<2	0.48	<0.5	106	6.66	<10	0.05	0.12	<10	9.88	659	0.04	<2	4	59	0.08	44	<10
118.1	11355	8	34	<1	1815	569	1.41	3	40	<2	0.58	<0.5	78	5.41	<10	0.05	0.09	<10	8.6	594	0.05	<2	5	22	0.09	48	<10
118.1	11356	7	35	1	4540	562	1.88	<2	90	2	0.65	<0.5	110	5.17	<10	0.04	0.03	<10	3.87	326	0.04	<2	3	20	0.07	47	<10
118.2	11240	2	40	<1	1760	289	0.95	8	10	<2	0.26	<0.5	96	6.08	<10	0.02	0.03	<10	13.6	758	0.01	<2	4	6	0.03	14	<10
118.2	11241	2	35	<1	1795	323	0.97	<2	10	<2	0.62	<0.5	92	6.02	<10	0.03	0.03	<10	14.15	762	0.01	<2	4	14	0.04	15	<10
118.2	11353	10	49	1	1840	412	1.04	5	10	<2	0.35	<0.5	103	6.57	<10	0.2	0.03	<10	13.6	800	0.01	2	6	3	0.04	22	<10
118.2	11354	3	43	2	1745	319	1.22	<2	30	<2	0.43	<0.5	94	6.01	<10	0.03	0.09	<10	14.1	796	0.05	<2	4	26	0.05	21	<10
119	10029	<2	32	<1	3820	484	1.81	<2	**60**	<2	0.31	<0.5	95	4.74	140	0.02	0.07	10	5.88	441	0.04	<2	3	<1	0.06	36	**<10**
119	10030	<2	39	<1	22	22	1.39	<2	**720**	<2	0.54	<0.5	31	4 36	10	<0.01	0.03	10	1.24	409	0.03	<2	3	14	0.07	39	**<10**
119	10429	2	71	<1	3	23	2.21	4	**610**	<2	0.61	<0.5	16	5 33	<10	0.15	0.06	<10	1.45	784	0.05	<2	5	12	0.11	86	**10**
120	10031	<2	28	<1	1980	462	1.89	<2	**40**	<2	0.35	<0.5	75	4 26	70	0.01	0.04	10	6.88	457	0.03	<2	4	<1	0.05	35	**<10**
120	10430	<2	29	<1	3550	334	0.84	<2	**20**	<2	0.21	<0.5	112	6.41	<10	0.03	0.04	<10	12.1	654	0.02	<2	3	26	0.02	22	**<10**
121	10195	<2	40	1	1940	311	0.7	<2	30	<2	0.23	<0.5	127	6.88	<10	0.02	0.06	<10	15	943	0.03	<2	4	11	0.05	15	<10
121	10196	<2	28	1	1595	439	1.94	6	20	<2	0.23	<0.5	118	6.87	<10	0.01	0.06	<10	12.05	725	0.01	<2	5	14	0.05	25	<10
121	10197	<2	37	3	2970	591	1.9	<2	30	<2	0.43	<0.5	99	6.61	<10	0.01	0.09	<10	8.14	608	0.04	<2	6	14	0.06	41	<10
121	10226	<2	32	1	1720	316	0.59	<2	30	2	0.2	<0.5	99	5.49	<10	0.01	0.06	<10	13.15	810	0.03	<2	4	11	0.04	12	<10
122	10981	11	38	<1	6	26	1.82	34	40	<2	1.36	<0.5	37	3.76	10	0.03	0.02	<10	0.73	470	0.06	<2	6	47	0.23	53	<10
122	10982	<2	35	<1	1860	497	1.36	<2	40	<2	0.47	<0.5	98	6.34	<10	0.02	0.1	<10	13 9	767	0.07	<2	5	74	0.07	31	<10
123	11236	33	138	<1	19	73	2.76	11	60	5	1.38	1.1	28	3.91	<10	2.83	0.04	<10	2.19	638	0.03	8	8	162	0.21	78	<10
123	11237	6	85	1	35	101	2.87	301	80	16	0.95	1	125	8.32	<10	71.7	0.06	<10	2.44	616	0.01	44	14	80	0.09	87	<10
123	11351	6	32	5	31	44	2.33	28	100	2	2.62	<0.5	35	5.07	<10	25.9	0.03	<10	1.7	346	0.02	12	5	16	0.03	33	<10
124	11239	<2	41	<1	2260	357	0.49	<2	10	<2	0.13	<0.5	121	7.9	<10	0.3	0.01	<10	17.65	1055	<0.01	<2	7	5	0.02	15	<10
124	11352	10	42	2	2360	538	0.36	4	<10	2	0.11	<0.5	141	8.66	<10	0.21	0.01	<10	19.95	1155	0.01	<2	6	136	0.02	13	<10
125	11238	5	36	<1	2710	319	0.13	<2	10	<2	0.1	<0.5	120	6.01	<10	0.15	0.01	<10	20.1	841	<0.01	<2	5	59	0.01	9	<10
126	11147	5	29	<1	2030	681	2.35	3	50	<2	0.48	<0.5	87	5.59	<10	0.01	0.09	<10	9.36	591	0.03	<2	5	80	0.08	44	<10
126	11370	11	39	<1	3710	511	3.46	<2	40	<2	0.5	<0.5	93	6.06	<10	0.01	0.12	<10	9.5	778	0.05	<2	5	2	0.07	40	<10
127	10081	9	44	1	1870	209	1.17	2	10	2	0.33	<0.5	102	7.3	<10	0.01	0.03	<10	14 8	1075	0.02	<2	4	20	0.02	8	<10
127	10601	3	28	<1	1870	228	1.34	3	20	<2	0.35	<0.5	81	5.56	<10	0.01	0.03	<10	11.65	806	0.11	<2	3	3	0.02	12	<10
128	10080	<2	33	<1	1890	252	0.72	<2	20	2	0.24	0.9	98	6.13	<10	<0.01	0.04	<10	13.85	841	0.03	<2	4	15	0.03	9	<10
128	10600	6	36	1	2420	180	0.14	2	10	<2	0.08	<0.5	118	7.75	<10	0.01	0.01	<10	15	1225	0.01	<2	4	11	0.01	6	<10
129.1	11270	<2	37	<1	1265	322	1.33	4	50	<2	0.76	<0.5	92	6.15	<10	<0.01	0.14	<10	11.65	734	0.15	<2	3	35	0.09	33	<10
129.1	11271	5	33	<1	983	430	2.05	13	130	<2	1.25	<0.5	74	5.17	<10	<0.01	0.21	<10	7.47	526	0.29	<2	3	42	0.14	57	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
129.1	11317	New Boot Flap	R	OC	S	4X10	Sil volcs in footwall of um sill	<5	7	17	2.3	1520
129.1	11318	New Boot Flap	R	OC	RC		Serp'zd gbo, locally br	6	8	3	<0.2	117
129.1	11319	New Boot Flap	R	OC	RC		Gbo, locally serp'zd	15	16	5	<0.2	126
129.2	10700	Boot Flap	R	RC	Rep		Perid (mag gone, serp & epid remain)	112	83	50	1	711
129.3	10082	Boot Flap	R	OC	RC	2	Serp & mag w/ minor sulf	32	32	20	0.3	171
129.3	10602	Boot Flap	R	RC	Rep	5	Gossan w/ strong hematite/goethite, epid, & serp	120	69	34	0.4	313
129.3	10701	Boot Flap	R	OC	Rep		Perid w/ mag	52	56	36	0.4	586
130	2670	Eureka Glacier	SS				Float - granite, mal stained	<5	6	4	<0.2	112
131	10015	5550 Peak	R	RC	G		Gbo w/ 1% po, cpy, & pent(?)	18	15	6	0.6	158
131	10016	5550 Peak	R	RC	G		Gossan in alt gbo	<5	3	67	1	274
132	10534	FLF	R	RC	RC	30@1	Py & po, 1-3%, fest rock	<5	1	10	0.6	466
133	2671	Landslide Creek Trib	SS				Float - cg ints	<5	4	28	<0.2	236
134	2672	Landslide Creek Trib	SS				Float - cg ints, some arg, granite	<5	3	4	<0.2	222
135.1	10007	Dunite Diatreme	R	RC	G		Matrix from dun diatreme	68	40	8	1	221
135.2	10073	Dunite Diatreme	R	RC	G		Serp matrix br from diatreme	69.9	52	9	<0.2	177
135.3	10072	Dunite Diatreme	R	RC	G		Hematite matrix br from "diatreme"	23.3	37	3	0.2	132
135.4	10074	Dunite Diatreme	R	RC	G		Fest matrix of diatreme	59.6	43	8	<0.2	127
136	2673	Landslide Creek	SS				Float - cg granite	<5	5	19	<0.2	78
136	2674	Landslide Creek	SS				Float - cg granite	<5	5	13	<0.2	98
137	2659	Landslide Creek area	R	FL			Chalcedony-bearing rock	24	24	5	<0.2	41
137	9759	Landslide Creek area	R	RC	Rep	1	Chromite?	15	11	4	<0.2	105
138	10621	Landslide Creek	R	OC	SC	45	Dun, modly to weakly serp'zd	14	9	3	<0.2	71
139	10555	Landslide Creek area	R	FL	G		Asbestos	48	39	6	<0.2	126
139	10620	Landslide Creek area	R	OC	Rep	10	Serp'zd dun w/in fault br	35	39	3	<0.2	62
140.1	10198	Lower Crash	R	RC	RC		Variably serp'zd perid w/ 1-2% sulf	13	17	6	<0.2	207
140.1	10199	Lower Crash	R	OC	RC		Fest meta gbo w/ v minor cpy & v minor Cu-st	6	11	2	<0.2	67
140.1	10227	Lower Crash	R	FL	S		Pyxite & serp w/ cpy & common mal(?) color	86	115	150	11.6	**2.59%**
140.1	10228	Lower Crash	R	RC	RC		Pyxite	20	22	11	<0.2	245
140.2	10800	Lower Crash	R	RC	SC	45	Fg to mg perid to felds perid w/ 1-2% cpy + po	28	29	12	0.2	303
140.2	10801	Lower Crash	R	RC	S		Perid w/ 3-5% sulf, mainly po	93	91	56	1.2	1385
141	10006	PP Diatreme	R	OC	G		Cgl or Tetelna volc, collected mainly matrix	<5	3	1	0.3	73
142	10083	West Crash	R	OC	G		Gossanous serp w/ minor garnierite	<5	12	5	<0.2	872
142	10603	West Crash	R	RC	RC		Pyxite	8	7	2	0.2	201
142	10604	West Crash	R	RC	RC	30	Gossan of pyxite	118	168	37	1.2	757
142	10702	West Crash	R	RC	Rep		Um	10	11	1	<0.2	132
143	10096	Crash	R	RC	RC	25	Gbo, perid, & pyxite w/ minor sulf	30	35	7	<0.2	394
143	10542	Crash	R	OC	G		Perid	322	414	85	0.7	1315
143	10543	Crash	R	RC	G		Perid	19	20	5	<0.2	322
144	2675	Broxson Gulch Trib	SS				Float - gbo, granite	<5	3	8	<0.2	109
145	10386	MF1996C-44	R	OC	RC		Metavolc tuff, fest	<5	<1	2	<0.2	64
146	2676	Broxson Gulch area	SS				Float - gbo, granite	<5	5	10	0.3	94
147	9760	Broxson Gulch, West side	R	RC	C	2	Sil fest volcs	<5	<1	2	0.2	33

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
129.1	11317	3	59	2	21	12	2.71	118	60	2	0.12	<0.5	41	15.8	10	0.08	0.51	<10	0.7	496	0.03	5	17	31	0.15	222	<10
129.1	11318	<2	34	<1	673	125	4.53	107	110	<2	4.73	<0.5	37	3.8	10	0.01	0.08	<10	9.21	689	0.52	<2	7	10	0.09	118	<10
129.1	11319	2	36	<1	1275	330	1.57	28	100	<2	1.43	<0.5	86	5.79	<10	<0.01	0.19	<10	10.45	720	0.13	<2	3	1030	0.09	33	<10
129.2	10700	13	94	2	1515	203	0.23	82	10	2	2.99	3	117	>15	<10	0.01	0.01	<10	1.54	3600	0.07	<2	5	39	0.01	22	<10
129.3	10082	2	21	1	1735	1290	0.08	2	<10	<2	0.04	<0.5	110	7.8	<10	<0.01	<0.01	<10	15	1100	<0.01	<2	5	1	0.01	10	<10
129.3	10602	19	162	2	1395	301	0.05	41	10	<2	1.19	3	119	>15	<10	0.01	0.01	<10	0.67	5260	0.02	<2	18	70	0.01	50	<10
129.3	10701	6	25	<1	2260	758	0.05	<2	<10	<2	0.02	<0.5	145	7.83	<10	<0.01	<0.01	<10	15	1175	<0.01	<2	4	172	0.01	6	<10
130	2670	6	84	<1	236	112	1.54	81	78	<5	0.68	<0.2	31	4.1	<2	0.066	0.08	5	1.52	979	0.02	<5	6	57	0.073	63	<20
131	10015	<2	28	1	1450	388	0.79	10	**260**	7	0.46	<0.5	88	5 56	<10	0.16	0.02	<10	10 9	640	0.01	<2	5	17	0.01	18	**<10**
131	10016	8	43	8	5	19	1.42	27	**1110**	5	0.05	2.3	<1	12.3	10	2.39	0.12	<10	0.57	280	0.01	21	1	3	<0.01	11	**10**
132	10534	2	114	2	8	39	3.01	10	320	<2	0.14	<0.5	27	6.65	10	0.01	0.37	<10	2.34	1160	0.07	<2	12	91	0.1	89	<10
133	2671	5	83	2	72	63	1.72	17	150	<5	0.71	0.2	27	5.86	<2	0.064	0.19	7	1.61	961	0.03	<5	7	79	0.1	155	<20
134	2672	2	64	6	77	35	2.33	9	388	<5	0.36	0.3	37	4.6	<2	0.081	0.41	6	1.86	880	0.03	<5	6	57	0.078	82	<20
135.1	10007	<2	38	1	2150	288	0.72	8	**10**	3	0.06	<0.5	124	6 99	<10	0.02	0.01	<10	15	943	0.01	2	5	2	0.01	20	**<10**
135.2	10073	<2	39	<1	1810	200	0.82	4	**10**	<2	0.21	0.8	95	5 39	70	0.01	0.01	10	15	819	0.01	<2	6	<1	0.02	22	**<10**
135.3	10072	5	67	<1	1730	885	0.48	7	**30**	<2	0.35	1.1	99	5 85	70	0.01	0.01	10	15	783	0.01	<2	9	<1	0.03	19	**<10**
135.4	10074	<2	42	<1	2030	235	0.96	5	**10**	<2	0.09	1.1	107	6.19	80	0.01	0.01	10	15	937	0.01	<2	6	<1	0.02	23	**<10**
136	2673	7	65	<1	219	107	1.35	26	87	<5	0.43	<0.2	28	3.91	<2	0.383	0.06	8	2.28	734	0.02	<5	<5	31	0.058	45	<20
136	2674	6	77	<1	177	128	1.57	44	91	<5	0.58	<0.2	28	4.01	<2	0.146	0.06	12	2.06	731	0.02	<5	5	48	0.073	56	<20
137	2659	<2	27	1	1372	857	0.18	117	13	<5	0.32	0.5	63	3.12	<2	0.03	0.03	<1	8.43	541	0.04	<5	<5	27	0.014	8	<20
137	9759	58	149	<1	1048	731	0.56	39	33	<5	0.56	0.5	60	4.97	<2	<0.01	0.13	<1	10	630	0.02	<5	<5	17	0.035	28	<20
138	10621	<2	26	1	1745	1540	0.12	39	20	<2	0.48	<0.5	97	5.5	<10	0.14	0.05	<10	11.75	809	0.04	2	5	62	0.01	12	<10
139	10555	2	34	1	1615	1095	1.98	57	70	<2	2.86	<0.5	93	6.06	<10	0.03	0.08	<10	12 8	950	0.02	<2	5	148	0.07	45	<10
139	10620	3	36	<1	1815	1755	0.87	27	10	<2	0.99	<0.5	110	5.87	<10	0.01	0.01	<10	15	916	<0.01	<2	7	53	0.03	22	<10
140.1	10198	<2	45	1	1880	338	1.86	6	30	<2	0.39	<0.5	131	7.15	<10	<0.01	0.11	<10	15	935	0.02	<2	6	14	0.06	21	<10
140.1	10199	<2	50	1	603	73	3.57	<2	20	2	1.8	<0.5	80	6.36	<10	<0.01	0.05	<10	7.55	830	0.43	<2	2	78	0.02	9	<10
140.1	10227	17	108	1	2130	668	2.6	282	<10	<2	0.39	2.2	111	6.2	<10	0.68	<0.01	<10	13.55	2490	<0.01	<2	15	9	0.06	62	<10
140.1	10228	<2	37	1	1285	293	2.39	<2	50	2	0.52	<0.5	102	6.24	<10	<0.01	0.15	<10	11.1	536	0.05	<2	4	40	0.07	30	<10
140.2	10800	11	44	1	1445	346	2	5	40	<2	0.39	<0.5	108	7.07	<10	0.01	0.11	<10	14.15	696	0.03	<2	5	27	0.06	31	<10
140.2	10801	10	45	1	2590	349	1.96	9	40	<2	0.37	<0.5	149	8.12	<10	0.01	0.1	<10	14.4	726	0.03	<2	5	33	0.06	30	<10
141	10006	3	70	<1	34	41	2.4	23	**630**	2	0.35	<0.5	11	3.3	<10	0.04	0.12	<10	4.57	700	0.02	<2	2	13	0.05	35	**<10**
142	10083	<2	30	<1	4020	198	1.68	231	30	<2	0.82	<0.5	75	5.82	<10	0.01	0.08	<10	1.29	366	0.06	<2	12	34	0.12	103	<10
142	10603	2	37	<1	379	268	2.42	17	10	<2	0.54	<0.5	47	4.14	<10	<0.01	0.02	<10	3.7	547	0.02	<2	4	100	0.04	29	<10
142	10604	5	24	<1	1095	399	1.97	106	10	<2	0.79	<0.5	39	8.96	<10	0.05	0.02	<10	2.01	323	0.02	<2	7	22	0.08	70	<10
142	10702	4	51	<1	75	67	2.09	23	80	<2	1.03	<0.5	29	4.35	<10	0.01	0.16	10	1.31	586	0.06	<2	11	1	0.17	127	<10
143	10096	<2	38	<1	1190	452	2.46	19	10	<2	0.39	<0.5	99	7.05	<10	<0.01	0.08	<10	6.86	924	0.01	<2	4	20	0.04	41	<10
143	10542	4	30	<1	2180	288	0.41	31	10	<2	0.35	<0.5	103	5.69	<10	0.01	0.02	<10	9.85	722	<0.01	<2	4	20	0.02	11	<10
143	10543	<2	32	<1	925	350	1.76	6	10	<2	0.52	<0.5	75	6.13	<10	<0.01	0.05	<10	6.78	766	0.01	<2	5	15	0.04	30	<10
144	2675	14	138	<1	58	90	2.55	19	119	<5	0.51	0.4	25	3.97	<2	0.047	0.08	4	1.66	690	0.03	<5	7	40	0.059	71	<20
145	10386	7	31	1	3	28	2.26	25	40	<2	0.03	<0.5	6	9.62	10	0.01	0.22	<10	2.61	231	0.02	<2	7	2	<0.01	87	<10
146	2676	9	110	<1	159	102	2.09	12	260	<5	0.64	0.3	34	4.29	<2	0.092	0.07	6	2.42	1200	0.02	<5	<5	44	0.077	56	<20
147	9760	36	137	1	9	56	1.28	47	56	<5	0.6	0.3	4	4.29	2	0.14	0.12	2	0.48	525	0.06	<5	<5	40	0.065	13	<20

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
148	10098	Notar area	R	OC	S		Perid w/ patches of net-textured sulf	27	22	49	0.4	653
148	10099	Notar area	R	RC	S		Sil arg w/ minor cpy	<5	<1	<1	<0.2	48
149	10287	GR 20-5	R	OC	C	4	Fg gbo dike w/ qz vns, fest & Cu-st	<5	<1	65	29.7	780
149	10936	GR 20-5	R	OC	S	0.3	Fest sil br zone, ~ 1-2' wide in fg dark gray gbo	<5	1	93	71.7	3440
150	10097	Notar	R	OC	RC		Dun, minor serpentinization	22	10	2	<0.2	15
150	10544	Notar	R	OC	G		Perid	88	51	17	0.4	344
150	10545	Notar	R	OC	G		Dun, some serp	27	17	2	<0.2	79
150	10546	Notar	R	OC	G		Dun	37	26	3	0.2	114
150	10547	Notar	R	RC	G		Dun w/ copper moss	78	46	1	<0.2	69
151	10858	GR 20-3 area	R	OC	G		Alt gbo w/ minor sulf	9	7	3	<0.2	162
153.1	10385	GR 20-4	R	RC	G		Iron oxide-cemented talus, almost gossan, bedrock = phy sc	<5	<1	1	0.2	90
153.2	10384	GR 20-4	R	RC	RC		Iron oxide-cemented talus, almost gossan, bedrock = phy sc	<5	2	5	0.4	47
154	2677	Broxson Gulch area	SS				Float - gbo, qz	<5	5	11	0.5	106
155	2678	Broxson Gulch area	SS				Float - garnet? chl sc, qz, minor granite	<5	3	141	<0.2	51
156	11142	Upper Broxson Gulch	R	OC	S	1	Qz vn w/ blebs of cpy + gn(?)/sl(?), garnet-chl-hbl sc	<5	1	28	10.5	765
157	11281	Broxson Ridge	R	RC	G		Serp w/ v minor po & cpy	14	9	1	<0.2	59
158	10230	GR 14-18	R	OC	G		Po- & cpy-rich gossanous material w/ fg matrix	<5	<1	57	2	**1.78%**
158	10807	GR 14-18	R	OC	G		Msv sulf in alt serp, 30-40% po, 10-20% cpy	<5	7	69	2.8	**1.75%**
158	11282	GR14-18	R	OC	SC	14	Semi-msv to msv sulf lens in basalt	15	1	34	0.8	9780
158	11283	GR14-18	R	OC	C	3.8	Semi-msv & msv sulf hosted in basalt	<5	7	116	2.1	**0.97%**
158	11284	GR14-18	R	OC	G		Basalt w/ cpy hosted in perid	8	11	92	0.5	2410
159	11035	GR14-18 area	R	FL	S		Minor cpy dissem in gray dike or sil dike	<5	8	164	1.2	3400
160	10229	Broxson Ridge Magnetite	R	OC	G		Gossanous zone on west edge of fest mag body	<5	7	933	10.4	**2.06%**
160	10802	Broxson Ridge Magnetite	R	OC	SC	30	Alt serp w/ msv & semi-msv crystalline mag +/- cpy	5	4	100	1.9	2460
160	10803	Broxson Ridge Magnetite	R	OC	Rep		Msv mag w/ approx 1% cpy	<5	1	171	1.2	3040
160	10804	Broxson Ridge Magnetite	R	OC	SC	14	Alt serp w/ msv mag, gossan, & minor cpy	<5	13	103	2.3	1695
160	10805	Broxson Ridge Magnetite	R	OC	S		Alt serp w/ ~3% cpy & v minor native Cu	7	7	68	0.6	2330
160	10806	Broxson Ridge Magnetite	R	OC	S		Semi-msv sulf lens in alt serp	<5	3	355	6	**1.59%**
161	11038	GR14-18 area	R	OC	Rep	1	Perid clasts in chl-mal matrix	67	37	5	0.2	**1.50%**
161	11039	GR14-18 area	R	OC	S	6x6	Dark gray, fg perid w/ mal in fractures	70	15	2	<0.2	2930
161	11040	GR14-18 area	R	OC	C	3.2	Alt basalt, perid & perid br along fault	46	23	5	<0.2	1890
162	11036	GR14-18 area	R	OC	S		Msv sulf of po, py & mag	<5	1	17	1.1	4650
162	11037	GR14-18 area	R	OC	S	1.5x1.5	Alt pyxite w/ py & cpy blebs	<5	1	6	3	**1.23%**
163	11041	GR14-18 area	R	OC	SC	13	Alt basalt w/ local Cu-st	<5	6	88	1.4	3390
163	11042	GR14-18 area	R	OC	Rep	1.3	Rock w/ 2% po, 0.5% cpy +/- py	18	6	14	0.3	515
163	11043	GR14-18 area	R	OC	Rep		Msv sulf of po w/ mag & minor cpy	<5	18	186	0.5	2160
164	10864	GR 14-20	R	OC	SC	13@1	Chert w/ v fg dissem & patchy po	<5	1	1	<0.2	38
164	10865	GR 14-20	R	OC	SC	14@1	Chert w/ patchy & finely dissem po	<5	4	4	<0.2	154
165	10863	Broxson Ridge	R	RC	Rep		Ol perid	54	56	62	0.3	182
166	10866	GR 14-19	R	RC	S		Msv sulf of mainly po in mapped basalt(?)	13	8	23	0.9	4800
166	10867	GR 14-19	R	OC	S		Fest gbo to di w/ pockets of msv sulf	12	6	6	0.4	899
166	10868	GR 14-19	R	OC	S		Msv sulf of po +/- cpy	7	7	8	0.9	3280

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
148	10098	4	40	<1	1540	344	2.24	4	40	<2	0.25	<0.5	125	6.91	<10	<0.01	0.1	<10	12	608	0.02	<2	4	49	0.07	29	<10
148	10099	2	96	1	17	12	2.83	<2	80	<2	0.98	<0.5	19	4.94	10	<0.01	0.13	<10	1.98	709	0.09	<2	7	42	0.3	124	<10
149	10287	13	13	3	5	56	0.57	18	50	<2	0.19	<0.5	1	5.4	<10	0.04	0.09	<10	0.25	164	0.03	3	4	13	0.09	7	<10
149	10936	8	23	3	3	46	0.83	17	100	<2	0.29	<0.5	4	7.29	<10	0.04	0.3	<10	0.23	190	0.02	2	3	43	0.09	13	<10
150	10097	<2	38	1	2150	201	0.04	<2	<10	<2	0.09	<0.5	150	7.11	<10	<0.01	<0.01	<10	15	1120	<0.01	<2	5	2	<0.01	1	<10
150	10544	<2	47	<1	2390	822	0.05	5	<10	<2	0.01	<0.5	142	8.72	<10	0.02	<0.01	<10	15	1060	<0.01	<2	5	24	0.01	5	<10
150	10545	<2	41	<1	2540	223	0.09	2	<10	<2	0.08	<0.5	142	7.61	<10	0.01	<0.01	<10	15	1095	<0.01	<2	5	<1	0.01	3	<10
150	10546	2	42	<1	2560	156	0.07	<2	10	<2	0.14	<0.5	138	7.38	<10	<0.01	<0.01	<10	15	1065	<0.01	<2	5	<1	<0.01	3	<10
150	10547	2	44	<1	2900	139	0.03	4	<10	<2	0.08	<0.5	148	7.79	<10	0.01	<0.01	<10	15	1135	<0.01	<2	5	<1	<0.01	2	<10
151	10858	<2	71	<1	92	30	3.09	<2	40	2	1.22	<0.5	37	6.19	10	0.03	0.13	<10	1.72	684	0.1	<2	4	172	0.28	178	<10
153.1	10385	9	1345	2	48	29	0.87	25	100	2	0.04	<0.5	46	>15	<10	0.1	0.13	10	0.15	1140	0.01	2	3	7	0.07	31	<10
153.2	10384	13	1725	12	106	15	1.02	44	160	2	0.02	11.8	50	>15	<10	0.93	0.1	90	0.29	1720	0.02	19	3	19	<0.01	39	<10
154	2677	8	572	8	63	20	0.92	49	77	<5	2.98	6.6	24	5.55	2	0.089	0.06	13	0.42	895	0.02	6	6	201	0.021	57	<20
155	2678	5	114	1	51	48	2.06	65	24	<5	0.77	<0.2	19	4.66	2	<0.01	0.06	9	1.15	689	0.01	<5	<5	54	0.031	47	<20
156	11142	1135	38	1	12	190	0.06	6	10	17	0.11	1.4	2	0.57	<10	0.01	0.01	<10	0.03	76	<0.01	<2	<1	1	<0.01	2	<10
157	11281	2	64	<1	2060	999	0.4	9	20	<2	0.24	<0.5	97	6.38	<10	0.02	0.02	<10	16.25	416	<0.01	<2	6	178	0.03	25	<10
158	10230	9	66	3	618	31	0.54	<2	<10	<2	0.2	4.2	414	>15	10	0.08	<0.01	<10	0.29	9	<0.01	<2	<1	2	0.02	21	<10
158	10807	7	151	4	1305	109	0.62	2	<10	<2	0.4	<0.5	536	>15	10	0.08	<0.01	<10	0.2	19	0.01	<2	1	27	0.05	37	<10
158	11282	22	194	1	397	242	0.84	<2	<10	16	0.7	1.8	174	20.7	<10	0.07	0.01	<10	2.01	404	0.02	2	2	6	0.09	38	<10
158	11283	10	176	<1	765	45	0.94	21	<10	22	2.44	3.3	348	24.9	10	0.12	<0.01	<10	0.31	323	<0.01	<2	1	14	0.04	23	<10
158	11284	2	47	<1	394	455	2.11	6	40	<2	1.97	<0.5	33	4.32	<10	0.12	0.07	<10	2.93	367	0.23	<2	6	9	0.24	81	<10
159	11035	5	55	<1	149	45	1.44	3	10	<2	3	<0.5	41	1.01	10	0.16	0.01	<10	0.64	199	0.04	<2	1	3	0.11	23	<10
160	10229	13	62	2	30	18	0.5	<2	10	<2	0.46	1.4	9	9.03	10	0.36	0.01	<10	0.42	178	0.02	<2	1	7	0.03	23	<10
160	10802	8	33	8	29	123	0.57	4	<10	4	0.48	<0.5	20	>15	10	0.07	0.01	<10	1.02	263	0.02	<2	2	30	0.07	35	<10
160	10803	8	30	22	10	13	0.42	3	<10	8	0.2	<0.5	25	>15	10	0.06	0.01	<10	0.37	149	<0.01	<2	1	7	0.02	11	<10
160	10804	11	11	9	31	59	0.46	<2	<10	2	0.52	<0.5	18	>15	10	0.06	0.01	<10	0.48	219	0.01	<2	1	4	0.06	24	<10
160	10805	3	66	1	124	374	1.18	2	10	<2	1.36	<0.5	14	5.82	<10	0.05	0.01	<10	1.36	296	0.04	<2	3	9	0.15	81	<10
160	10806	9	121	2	79	80	0.79	<2	10	<2	1.06	3.1	28	6.2	<10	1.87	0.01	<10	0.65	154	0.01	<2	1	18	0.12	22	<10
161	11038	20	329	1	1595	778	0.9	8	10	<2	0.26	5.8	269	2.65	<10	0.78	0.01	10	14 9	1020	0.02	<2	5	24	0.03	41	<10
161	11039	8	90	<1	1985	463	0.25	<2	<10	<2	0.02	<0.5	128	6.89	<10	0.38	0.01	<10	19.75	879	0.01	2	5	7	0.02	15	<10
161	11040	15	78	1	659	375	1.35	<2	<10	<2	0.43	<0.5	57	7.07	<10	0.16	<0.01	<10	7.59	618	0.02	<2	3	1	0.08	31	<10
162	11036	10	33	1	430	176	0.54	<2	<10	<2	0.34	<0.5	198	20.1	10	0.23	<0.01	<10	0.46	79	0.01	3	1	50	0.05	38	<10
162	11037	50	138	1	183	12	0.92	<2	<10	<2	1.67	9.8	23	2.39	<10	0.67	<0.01	<10	0.71	242	0.01	<2	1	2	0.03	16	10
163	11041	4	60	<1	73	109	1.06	12	10	2	2.35	1.3	23	1.82	<10	0.49	0.02	<10	0.44	281	0.05	<2	2	12	0.18	28	<10
163	11042	<2	103	<1	277	489	1.38	<2	<10	<2	1.4	<0.5	26	7.36	10	0.05	<0.01	<10	1.12	240	0.02	<2	2	55	0.22	113	<10
163	11043	48	56	1	92	62	1.27	<2	<10	10	1.85	<0.5	34	49.3	10	0.08	0.01	<10	0.38	1155	0.02	3	2	10	0.12	125	<10
164	10864	7	40	2	60	85	2.05	<2	10	<2	4.58	<0.5	12	2.01	<10	0.09	0.03	10	0.22	73	0.03	<2	1	<1	0.12	18	<10
164	10865	3	18	2	112	67	1.34	<2	20	<2	2.42	<0.5	17	2.38	<10	0.1	0.05	10	0.76	67	0.04	<2	1	70	0.15	27	<10
165	10863	<2	43	2	3010	196	0.08	<2	<10	<2	0.08	<0.5	154	7.81	<10	0.03	<0.01	<10	15	1220	<0.01	<2	5	110	<0.01	1	<10
166	10866	2	15	7	689	41	0.59	<2	<10	2	0.79	1.5	535	>15	<10	0.17	<0.01	<10	0.16	<5	0.01	<2	1	85	0.08	16	<10
166	10867	<2	25	6	386	148	2.47	<2	30	2	1.76	<0.5	138	7.06	10	0.06	0.03	<10	1.32	203	0.13	2	4	19	0.11	37	<10
166	10868	3	9	12	665	22	0.38	<2	<10	4	0.55	0.8	633	>15	<10	0.2	<0.01	<10	0.12	<5	0.01	3	1	46	0.04	10	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
167	10742	Broxson Gulch Trib	PC		PC		Barren sample	<5	<1	11	<0.2	49
168.1	10519	Broxson Gulch	PC				4 fine Au flakes, black sand, garnet	<5	3	8140	<0.2	52
168.2	10421	Broxson Gulch	PC				Bedrock: volc, agglomerate w/ rounded cobbles	<5	2	4100	0.2	52
170	10444	Broxson Gulch (Upper E Fork)	PC					5.8	4	674	<0.2	38
171.1	10160	No Name Creek	PC				Minor garnet & mag in pan, 3 fine Au	53.8	11	**10.8**	<0.2	57
171.1	10415	No Name Creek	PL				Non-magnetic fraction	115	1191	**22.8**	0.7	97
171.1	10468	No Name Creek	PL				Magnetic fraction of 10415	37000	94200	3342	<0.2	1155
171.1	10773	No Name Creek	PL				Magnetic fraction of sample 11012	138	289	2060	<0.2	161
171.1	11012	No Name Creek	PL				Non-magnetic fraction, (mag =10773)	7	1	1150	<0.2	26
171.2	10438	No Name Creek	PC				2 coarse, 6 fine, 1 v fine Au	258	17	7160	<0.2	71
171.3	10439	No Name Creek	PC				5 v fine Au, mod fine mag	1.6	2	300	<0.2	56
172	10149	BGM area	R	RC	G		Moderately serp'zd dun w/ mag vnlets	5	6	7	1.2	44
173	10150	BGM	R	RC	G		Serp'zd um contacting gbo	<5	6	31	1.4	2770
173	10905	BGM	R	OC	C	0.7	Gbo (lt gray) dike contact w/ serp (black) Cu-st	16	7	76	0.8	2790
174	10481	MF1996C-54	R	OC	RC		Fest epid alt dacite? w/ minor qz vns	5	1	<1	<0.2	23
175	10906	MF1996C-52 area	R	OC	C	6	Cc- & mag-cemented gbo br	27	56	<1	0.2	12
176	10576	MF1996C-52 area	R	RC	G		Serp w/ dissem cpy	33	30	7	<0.2	349
176	10907	MF1996C-52 area	R	OC	C	2	Cu-st light felsic dike intruding serp	10	7	12	3	7020
177	10141	Green Wonder area	R	RC	S	2	Sil, mafic rock	<5	12	21	0.3	43
178	10142	Green Wonder area	R	FL	S		Qz vn float	<5	1	3	0.4	1580
178	10512	Green Wonder area	R	FL	G		Piece of float picked out of serp'zd area	23	27	<1	0.2	125
179	10312	Green Wonder	R	OC	C	5.5	Green-stained, carb alt & serp'zd um(?), light tan	115	149	2	0.2	63
179	10313	Green Wonder	R	OC	S		Qz-cc alt serp, also epid blebs & dark brown garnet(?)	98	157	4	0.2	73
179	11366	Green Wonder	R	OC	C	3.3	Calcsilicate skarn w/ chrome diopside	172	212	3	0.3	63
181.1	10528	GR14-12	R	OC	Rep	1	Alt fest outcrop adj to white ls outcrop, fairly sil	7.3	6	1	1.5	5870
181.2	10193	GR 14-12	R	OC	S		Semi-msv sulf in metased	<5	6	6	0.3	1220
181.2	10383	GR 14-12	R	OC	S	1	Fest skarn in ls, xenolith in serp	<5	2	<1	0.9	1215
181.2	10717	GR 14-12	R	OC	S		Fest sil ls w/ Cu-st	6	4	1	4	4980
181.2	10718	GR 14-12	R	OC	S		Fest um rock w/ sulfs	<5	4	<1	<0.2	88
181.2	10356	GR14-12	R	OC	G	1	Msv cpy lens in fest & Cu-st skarn	2.8	6	27	8.4	**1.97%**
181.2	10529	GR14-12	R	OC	Rep	1	Fest gossan zone along ls contact, msv sulf	1.4	4	4	<0.2	1180
181.2	10530	GR14-12	R	OC	C	.5	Nodule of semi-msv sulf in skarn?	2.1	6	6	1.9	3430
181.3	10194	GR 14-12	R	OC	S		Skarn w/ msv & semi-msv po & cpy	<5	6	6	2.7	4430
182	2679	Broxson Gulch area	SS				Float - gbo	11	8	2	<0.2	181
183.1	10435	Broxson Gulch (Lower E Fork)	SL				Non-magnetic fraction	7	7	**97.2**	5.9	47
183.1	10471	Broxson Gulch (Lower E Fork)	O				Magnetic fraction of 10435	585	195	**244**	23.6	194
183.2	10443	Broxson Gulch (Lower E Fork)	PC				1v fine Au	5.1	5	521	<0.2	44
184.1	10436	Specimen Creek (Lower)	PL				Non-magnetic fraction	5	6	**16.7**	0.3	48
184.1	10472	Specimen Creek (Lower)	PL				Magnetic fraction of 10436	69	26	9698	1.1	115
184.2	10426	Specimen Creek (Lower)	PC				2 fine, 2 v fine Au flakes	19.4	6	370	<0.2	147
184.2	10434	Specimen Creek (Lower)	PC					9.1	26	**20.6**	<0.2	113
184.3	10503	Specimen Creek (Lower)	PC				1 fine, 4 v fine flakes flat Au, mod black sand	11.6	5	9050	<0.2	80

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
167	10742	3	48	<1	29	44	1.26	14	110	<2	0.81	<0.5	12	2.55	<10	0.28	0.15	10	0.7	602	0.05	<2	5	46	0.13	48	<10
168.1	10519	149	119	1	90	112	1.63	55	190	2	0.53	0.7	18	3.76	10	0.03	0.16	10	1.18	519	0.03	2	3	33	0.06	48	10
168.2	10421	163	108	2	116	124	1.83	49	310	2	0.58	0.8	21	4.6	10	0.03	0.17	10	1.32	576	0.05	3	3	33	0.07	62	10
170	10444	13	53	<1	116	96	1.72	10	50	<2	0.59	<0.5	19	3.68	10	0.52	0.1	20	1.72	642	0.04	<2	5	26	0.13	79	<10
171.1	10160	8	48	1	219	175	1.3	8	70	2	0.4	<0.5	30	4.87	10	0.05	0.11	20	1.41	549	0.04	<2	4	15	0.1	56	<10
171.1	10415	4	225	<1	242	126	1.28	17	300	<2	0.4	0.5	40	3.12	<10	4.68	0.11	10	1.34	462	0.02	<2	4	18	0.07	62	<10
171.1	10468	63	153	10	>10000	275	0.41	<2	30	4	0.09	5.6	865	>15	70	0.04	0.02	<10	2.18	582	<0.01	25	1	<1	0.02	43	60
171.1	10773	9	50	2	2970	632	0.37	4	30	<2	0.11	<0.5	124	44.3	<10	0.14	0.02	<10	2	780	0.01	<2	2	27	0.1	148	<10
171.1	11012	6	39	<1	99	96	1.2	15	80	<2	0.43	<0.5	18	3.26	<10	0.18	0.09	40	1.01	738	0.03	<2	5	3	0.16	74	<10
171.2	10438	11	58	1	276	150	1.24	18	110	<2	0.99	0.7	26	6.93	20	0.06	0.11	20	1.91	596	0.03	<2	5	27	0.09	57	<10
171.3	10439	18	72	<1	60	83	1.13	20	260	<2	0.26	<0.5	10	3.57	10	0.3	0.12	20	0.52	424	0.02	<2	5	16	0.06	49	<10
172	10149	2	40	2	2110	351	0.05	9	**<10**	<2	0.04	<0.5	125	5.42	<10	0.01	<0.01	<10	15	772	0.01	2	2	1	<0.01	3	**<10**
173	10150	61	180	<1	331	206	0.52	14	**60**	7	0.87	1	20	0 97	<10	0.19	<0.01	<10	2.69	337	0.01	3	1	2	0.05	11	**<10**
173	10905	27	55	<1	517	180	1.1	8	<10	<2	1.22	<0.5	23	1.79	<10	0.12	<0.01	<10	1.53	370	0.01	7	1	1	0.08	23	<10
174	10481	2	53	<1	7	27	1.92	8	30	<2	0.97	<0.5	13	2.1	10	<0.01	0.03	10	1.28	326	0.05	<2	4	56	0.13	36	<10
175	10906	<2	64	1	2190	1250	0.66	48	20	<2	1.24	<0.5	138	6.72	<10	0.02	0.01	<10	15	1045	<0.01	<2	8	2	0.07	35	<10
176	10576	<2	26	<1	1225	580	0.87	32	20	<2	0.71	<0.5	82	6.06	<10	0.11	0.02	<10	5.94	244	0.04	<2	3	3	0.05	36	<10
176	10907	4	41	<1	198	201	1.28	10	40	<2	1.94	1.4	30	2.61	<10	0.24	0.02	<10	1.22	246	0.13	<2	4	45	0.21	40	<10
177	10141	2	26	<1	155	69	1.32	7	**40**	2	0.07	<0.5	36	6 36	<10	0.03	<0.01	<10	1.45	293	0.03	<2	2	2	0.14	62	**<10**
178	10142	<2	10	1	18	56	0.33	3	**210**	9	2.32	<0.5	6	0.74	<10	<0.01	0.05	<10	0.21	391	0.01	<2	1	11	0.02	5	**<10**
178	10512	3	161	1	535	352	0.64	26	**130**	<2	5.78	0.5	44	0 94	<10	0.24	0.01	<10	0.98	2520	0.01	<2	1	63	0.06	12	**<10**
179	10312	9	1130	1	6610	488	0.26	80	**170**	2	3.16	3.9	200	0 87	<10	3.71	<0.01	<10	0.4	961	0.01	6	2	20	0.12	13	**<10**
179	10313	4	145	1	9980	507	0.21	89	**140**	<2	2.49	<0.5	305	0 96	<10	0.4	<0.01	<10	0.27	890	0.01	2	2	13	0.07	12	**<10**
179	11366	<2	1195	<1	9940	2190	0.75	89	10	<2	5.01	6.4	301	1.39	<10	4.58	<0.01	<10	0.35	1810	0.01	<2	6	43	0.32	33	<10
181.1	10528	<2	183	1	146	118	0.38	39	**20**	7	1.68	0.7	44	3.3	<10	0.13	<0.01	<10	0.63	323	0.01	2	2	<1	0.09	18	**<10**
181.2	10193	9	73	1	684	11	0.24	<2	<10	<2	0.7	2.5	496	>15	<10	<0.01	0.01	10	0.1	63	<0.01	<2	1	27	0.04	40	<10
181.2	10383	13	51	2	107	24	0.94	130	10	<2	5.37	<0.5	43	13.35	<10	0.06	0.01	<10	0.39	607	<0.01	<2	2	6	0.04	62	<10
181.2	10717	4	146	<1	231	171	0.82	51	<10	<2	1.77	0.6	56	3.42	<10	0.27	0.01	<10	0.74	283	<0.01	3	2	561	0.15	26	<10
181.2	10718	4	27	<1	101	134	1.78	<2	20	<2	0.7	<0.5	13	3.66	<10	0.01	0.07	10	1.66	218	0.07	<2	4	62	0.26	87	<10
181.2	10356	41	691	<1	557	32	0.26	51	**<10**	<2	1.08	12	353	13.25	<10	0.37	<0.01	<10	0.22	95	0.01	<2	1	63	<0.01	11	**<10**
181.2	10529	13	49	1	490	12	0.04	2	**<10**	<2	0.21	4.2	564	>15	10	0.02	<0.01	<10	0.07	129	0.01	<2	<1	23	<0.01	6	**<10**
181.2	10530	9	159	4	2360	50	0.27	3	**<10**	<2	0.33	2.4	1075	>15	<10	0.08	<0.01	<10	0.18	31	0.01	<2	1	<1	0.04	12	**<10**
181.3	10194	7	132	6	2180	30	0.76	402	<10	<2	1.06	2.6	1170	>15	<10	0.06	0.01	<10	0.22	156	<0.01	<2	3	45	0.07	22	<10
182	2679	<2	42	<1	457	380	1.65	23	44	<5	0.7	<0.2	62	4.24	<2	0.064	0.05	<1	2.97	484	0.04	<5	<5	48	0.117	49	<20
183.1	10435	773	115	1	133	129	1.59	30	70	<2	0.5	0.5	18	3.23	<10	7.94	0.08	<10	1.77	481	0.03	6	3	23	0.09	51	30
183.1	10471	91	469	<1	3580	836	0.55	<2	40	6	0.21	17.1	193	>15	10	13.85	0.03	<10	2.52	1055	0.02	<2	2	<1	0.11	303	70
183.2	10443	7	70	1	147	144	1.73	12	60	2	0.68	<0.5	22	3.78	10	0.83	0.08	10	1.84	523	0.05	<2	6	97	0.09	63	10
184.1	10436	<2	49	<1	178	219	1.71	27	30	<2	0.82	<0.5	21	2.79	<10	1.18	0.04	<10	1.9	360	0.07	3	4	19	0.14	56	10
184.1	10472	46	70	<1	1110	378	0.48	9	20	37	0.21	19.8	128	>15	10	1.42	0.02	<10	1.91	751	0.02	7	1	<1	0.13	237	60
184.2	10426	9	49	<1	274	242	1.54	12	110	<2	0.86	<0.5	31	5.82	10	7.05	0.04	10	2.06	408	0.08	<2	4	37	0.15	82	<10
184.2	10434	7	46	<1	275	234	1.55	10	140	<2	0.83	<0.5	29	4.99	10	2.21	0.04	10	1.93	377	0.08	<2	4	28	0.14	77	10
184.3	10503	5	40	<1	186	198	1.51	3	50	<2	0.7	<0.5	21	3.48	10	1.33	0.04	10	1.84	316	0.07	<2	3	24	0.12	58	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
185	1025	Specimen Creek	SS				Float - chl-rich int	<5	3	7	<0.2	602
186	1028	Specimen Creek	SS				Float - um	<5	7	2	<0.2	128
187	1026	Specimen Creek	SS				Float - um?, mafic, int	12	7	3	<0.2	182
187	1027	Specimen Creek	SS				Float - gbo, um, fg	8	6	3	<0.2	156
188	10151	Specimen Creek (Upper)	R	OC	Rep	4	Serp'zd aphanitic mafic rock	8	11	1	<0.2	1060
188	10432	Specimen Creek (Upper)	PC				1 fine, 1 v fine Au flake, tr mag	8.9	6	5580	<0.2	98
188	10433	Specimen Creek (Upper)	PC				1 coarse, 2 fine, 4 v fine, curled Au flakes	9.4	5	167	<0.2	77
188	10437	Specimen Creek (Upper)	PL				Non-magnetic fraction	5	6	**8.95**	2.4	91
188	10473	Specimen Creek (Upper)	PL				Magnetic fraction of 10437	1445	49	66	1	161
189	10148	GR 14-15 area	R	OC	G		Sil part of serp'zd um	6	10	10	0.9	4320
190	10147	GR 14-15	R	OC	CC	10	Dissem to semi-msv sulf (cpy+sl?) lenses & pods in serp perid	<5	39	1370	10.7	**2.15%**
190	10498	GR 14-15	R	OC	C	6	V green stained gabbroic d ke in serp (basalt?)	<5	4	748	2.4	5270
190	10499	GR 14-15	R	OC	S	0.75	Cu-st light gabbroic d ke	<5	1	20	12.8	**2.29%**
190	10573	GR 14-15	R	OC	Rep	4	Felsic dike w/ mal stained on fracture surface	7	10	209	0.2	1555
190	10900	GR 14-15	R	OC	C	3	Light felsic dike in dark host (serp) w/ minor Cu-st	<5	29	480	5.7	4740
192	10382	GR 14-10 area	R	OC	C		Sil hornfels, seds, fest w/ qz stringers	<5	3	1	<0.2	85
192	10613	GR 14-10 area	R	OC	SC	3x20	Fault br healed w/ mod to strong fest gouge	<5	4	2	0.2	93
192	10614	GR 14-10 area	R	OC	SC	15	Gbo apophysis & d kelets w/in weakly sil diopsidic marble	6	6	1	<0.2	57
193	10483	GR 14-8	R	OC	C	2.5	Msv sulf near gbo/ls/skarn contact	8	12	9	2.2	659
194	10183	GR 14-8 area	R	OC	C	3	Br zone between basalt & ls	0.7	1	<1	<0.2	127
194	10184	GR 14-8 area	R	OC	S	1	Oxidized br/gossan	4.2	4	1	<0.2	136
194	10484	GR 14-8 area	R	OC	S	1	Sil marble skarn w/ fest & dissem cpy	7	11	13	0.2	259
195	10185	GR 14-8 area	R	RC	S	3	Sil br	1.1	<1	6	<0.2	16
195	10186	GR 14-8 area	R	RC	S	0.7	Skarn, cc-qz-epid	3.5	4	2	0.2	57
195	10459	GR 14-8 area	R	OC	Rep	5	Fest int	1	1	16	0.5	476
196	10440	West Fork Rainy Creek	R	OC	Rep		Serp'zd aphanitic um rock (serp basalt?)	10.3	10	1	<0.2	69
196	10441	Rainy Creek, West Fork	PC				No Au, coarse mag	15.5	4	155	<0.2	47
197	2878	West Fork Rainy Creek	SS					<5	2	6	<0.2	53
197	2879	West Fork Rainy Creek	SS					<5	4	3	<0.2	79
198.1	6984	Moneta Porcupine	R	RC	G		Hornfels adj to gbo w/ minor sulfs	12	7	<1	<0.2	8
198.2	10482	Moneta Porcupine	R	OC	S	1	Sil gbo w/ blebs of bn & Cu-st	8	17	55	6.3	3440
198.2	10722	Moneta Porcupine	R	OC	Rep		Fest serp	22	7	3	0.3	297
198.2	6983	Moneta Porcupine area	R	RC	S		Contact meta rock w/ knots of bn w/ mal	68	138	99	20.8	**1.65%**
199.1	2660	Ghezzi	R	TP	Rep		Gbo	<5	2	342	1.2	4667
199.1	9761	Ghezzi	R	TP	Rep		Cu-st gbo w/ dissem po & cpy	6	5	1099	4.5	**3.11%**
199.1	9762	Ghezzi	R	TP	Rep	2	Fest & Cu-st gbo w/ dissem cpy	<5	2	167	2.8	**1.76%**
199.1	9763	Ghezzi	R	TP	Rep	2	Fest gbo w/ sparse dissem cpy & sparse mal	<5	5	322	2.3	6386
199.1	9764	Ghezzi	R	TP	Rep	3	Fest gbo w/ sparse dissem cpy & sparse mal	<5	2	480	1.2	4223
199.1	10032	Ghezzi	R	MD	Rep		Light to medium colored gbo, no evident sulf	10.3	10	3	<0.2	78
199.1	10069	Ghezzi	R	MD	G		Alt leuco gbo w/ minor cpy	<0.5	2	307	2	4420
199.1	10070	Ghezzi	R	MD	G		Medium grained fest leuc gbo w/ v minor cpy	1.4	1	263	0.4	2550
199.1	10071	Ghezzi	R	MD	S		Alt leuco gbo w/ Cu sulf & oxides	0.8	3	20	0.8	**2.18%**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
185	1025	9	170	<1	49	69	2.56	12	104	<5	0.62	0.6	121	4.39	<2	0.973	0.05	5	1.94	2144	0.01	<5	7	44	0.129	90	<20
186	1028	<2	39	1	179	227	2.99	<5	51	<5	1.71	<0.2	32	2.99	<2	0.08	0.07	3	1.72	374	0.12	<5	<5	109	0.177	68	<20
187	1026	<2	40	<1	295	377	2.86	6	52	<5	1.67	<0.2	54	4.08	<2	0.117	0.04	2	2.62	553	0.14	<5	6	161	0.184	84	<20
187	1027	2	148	1	267	326	2.14	32	53	<5	1.44	1.2	46	3.99	<2	0.59	0.06	3	2.43	690	0.08	<5	6	77	0.104	69	<20
188	10151	<2	29	<1	283	281	2.18	7	**200**	4	0.55	<0.5	41	2 82	<10	0.01	0.02	<10	2.61	403	0.05	<2	3	37	0.06	40	**<10**
188	10432	6	60	<1	175	241	1.77	12	60	<2	0.86	<0.5	21	3.68	10	10	0.04	10	2	375	0.09	<2	4	23	0.16	56	10
188	10433	7	39	<1	385	203	1.78	8	50	<2	0.78	<0.5	30	4.99	20	0.11	0.07	10	2.42	419	0.08	<2	4	39	0.12	62	<10
188	10437	<2	55	<1	168	200	1.93	25	40	<2	0.73	0.5	26	3.67	<10	0.43	0.07	<10	2.07	469	0.06	<2	4	28	0.13	72	10
188	10473	65	52	<1	4480	232	0.23	<2	10	45	0.11	21.8	247	>15	<10	0.11	0.01	<10	2.47	663	<0.01	<2	<1	<1	0.04	34	60
189	10148	<2	31	<1	207	182	0.84	3	**80**	7	0.63	<0.5	63	1.43	<10	0.05	<0.01	<10	0.83	149	0.01	<2	2	24	0.11	23	**10**
190	10147	8	45	<1	120	30	0.24	23	**20**	8	1.05	1	25	4 32	<10	2.78	0.02	<10	0.28	231	0.03	<2	1	20	0.03	13	**<10**
190	10498	24	21	1	59	67	0.95	10	10	<2	1.54	0.5	14	2.35	<10	0.05	0.01	<10	0.4	237	0.01	2	2	43	0.17	25	<10
190	10499	50	22	1	73	35	0.48	44	10	<2	0.76	1.1	13	3.11	<10	0.08	0.02	<10	0.21	281	0.01	3	2	41	0.08	17	<10
190	10573	2	22	<1	198	257	0.88	5	10	<2	1.29	<0.5	11	1.5	<10	0.08	0.01	<10	0.83	161	0.01	<2	1	49	0.17	32	<10
190	10900	17	169	1	95	57	0.96	3	10	<2	1.89	4.4	23	2.1	<10	0.08	0.01	<10	0.54	251	0.03	<2	3	67	0.15	26	<10
192	10382	2	128	3	77	100	3.6	13	30	<2	2.62	<0.5	17	3.6	10	0.01	0.18	10	0.89	196	0.08	<2	12	36	0.34	122	<10
192	10613	6	198	1	165	180	3.19	26	30	<2	2.43	<0.5	22	4.1	10	0.01	0.21	10	1.02	338	0.07	<2	8	92	0.3	119	<10
192	10614	2	63	<1	96	65	3.24	<2	70	<2	2.31	<0.5	20	3	<10	<0.01	0.23	<10	1.62	359	0.17	<2	3	55	0.12	58	<10
193	10483	7	18	2	982	38	0.38	9	<10	<2	1.12	<0.5	581	>15	<10	0.09	<0.01	50	0.08	31	<0.01	<2	1	66	0.06	8	<10
194	10183	<2	5	1	203	116	1.83	<2	**110**	2	0 9	<0.5	36	2.68	<10	0.01	0.02	<10	0.64	91	0.21	<2	2	120	0.1	23	**<10**
194	10184	<2	12	1	413	202	2.11	4	**150**	6	1.17	<0.5	49	3.18	<10	<0.01	0.07	<10	1.08	153	0.28	<2	2	105	0.1	26	**<10**
194	10484	<2	33	1	405	70	2.78	27	<10	<2	4.6	<0.5	50	5.56	10	0.02	0.04	10	0.64	148	0.05	<2	4	9	0.17	58	<10
195	10185	2	35	<1	13	63	0.99	3	**<10**	4	6.58	0.8	26	6 35	<10	0.03	<0.01	<10	0.12	520	0.01	3	4	12	0.05	29	**<10**
195	10186	3	14	<1	49	118	0.41	<2	**40**	13	3.41	<0.5	28	1 95	<10	0.01	<0.01	<10	0.41	248	0.01	2	4	68	0.16	18	**<10**
195	10459	<2	23	1	81	38	0.66	18	**130**	7	1.21	<0.5	23	5 32	10	0.08	0.03	<10	0.28	252	0.02	<2	2	24	0.08	25	**<10**
196	10440	<2	24	1	542	310	1.31	<2	**120**	2	0.74	<0.5	39	2 93	<10	<0.01	0.19	<10	3.78	251	0.13	<2	4	16	0.09	53	**<10**
196	10441	9	88	1	182	126	2.16	11	40	<2	1.35	0.6	26	5.99	10	0.01	0.26	10	1.98	368	0.1	<2	6	27	0.11	80	10
197	2878	9	148	1	54	63	2.69	31	58	<5	3.46	0.3	22	5.09	3	0.019	0.4	5	1.27	407	0.09	<5	9	318	0.081	83	<20
197	2879	11	294	2	92	58	2.78	21	106	<5	1.92	0.6	32	5.63	3	0.019	0.18	8	1.26	699	0.05	<5	7	224	0.084	90	<20
198.1	6984	<2	16	<1	190	361	1.98	<5	14	<5	1.18	<0.2	22	2.64	<2	<0.01	0.04	2	2.86	275	0.19	<5	<5	25	0.108	48	<20
198.2	10482	5	3	<1	15	36	1.5	2	10	<2	2.54	<0.5	3	0.71	<10	0.53	<0.01	<10	0.34	139	0.01	<2	1	93	0.1	18	<10
198.2	10722	<2	50	1	395	464	2.17	4	30	<2	1.55	<0.5	41	4.38	<10	0.01	0.08	<10	4.23	669	0.22	<2	7	13	0.16	64	<10
198.2	6983	23	48	1	33	116	1.85	7	6	6	2.66	0.2	8	1.11	<2	1.973	<0.01	2	0.31	100	0.01	<5	<5	55	0.102	34	<20
199.1	2660	<2	23	<1	69	31	1.28	<5	23	<5	1.69	<0.2	13	1.1	<2	0.081	0.05	7	0.4	61	0.06	<5	<5	32	0.318	65	<20
199.1	9761	9	116	3	110	25	1.23	<5	25	6	1.21	0.4	22	2.7	<2	0.289	0.05	6	0.32	52	0.04	<5	<5	36	0.254	76	<20
199.1	9762	12	81	2	149	21	1.72	<5	28	<5	1.91	0.5	23	1.83	<2	0.183	0.03	6	0.42	83	0.04	<5	<5	23	0.251	72	<20
199.1	9763	3	32	2	69	24	1.13	6	12	<5	1.5	0.4	14	1.68	<2	0.175	0.02	6	0.34	80	0.06	<5	<5	32	0.324	88	<20
199.1	9764	5	27	1	29	23	1.22	8	20	<5	1.62	0.2	12	1.95	<2	0.112	0.04	7	0.26	96	0.05	<5	<5	29	0.325	108	<20
199.1	10032	<2	29	<1	59	113	1.59	<2	**190**	<2	0.67	<0.5	16	2.14	10	0.01	0.02	<10	1.27	242	0.04	<2	2	21	0.1	70	**<10**
199.1	10069	2	10	<1	35	28	0.73	12	**260**	<2	1.06	<0.5	6	1 92	<10	0.09	0.02	10	0.34	107	0.06	3	2	20	0.37	90	**<10**
199.1	10070	2	17	<1	60	25	0.82	<2	**260**	<2	0.82	<0.5	10	1.2	<10	0.04	0.02	10	0.4	91	0.03	2	2	17	0.15	51	**<10**
199.1	10071	<2	66	<1	178	16	2.95	<2	**100**	<2	4.25	0.5	40	0 94	10	0.18	<0.01	10	0.21	105	0.01	<2	3	12	0.22	76	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
199.1	10222	Ghezzi	R	TP	SC	100	Leucogbo, gbo (fg to med gr)	2.6	3	289	2.1	2780
199.1	10431	Ghezzi	R	OC	SC	8	Leuco gbo	23.6	25	152	0.7	6170
199.1	11272	Ghezzi	R	RC	G		Basalt	9	8	<1	<0.2	88
199.2	2661	Ghezzi	R	TP	Rep		Gbo	<5	3	50	1.4	7906
199.2	2662	Ghezzi	R	TP	Rep		Gbo	<5	2	65	0.9	5189
199.2	10019	Ghezzi	R	TP	SC	11	Med to cg leuco gbo w/ dissem & patchy cpy	10.8	12	167	1.4	3930
199.2	10020	Ghezzi	R	TP	Rep	70	Leuco gbo w/ dissem cpy	1.4	3	48	1.1	9770
199.2	10217	Ghezzi	R	RC	Rep		Gbo w/ sulf	5.3	8	20	0.7	3630
199.2	10218	Ghezzi	R	RC	G		Br gbo w/ mal matrix	6.7	5	8	<0.2	**5.49%**
199.2	10219	Ghezzi	R	TP	G		Leucogbo	0.5	1	7	0.7	7690
199.2	10220	Ghezzi	R	TP	SC	36	Gbo, leucogbo	0.6	1	96	1.5	5920
199.2	10221	Ghezzi	R	TP	SC	55	Gbo, leucogbo	3.8	1	50	0.9	2930
199.2	11273	Ghezzi	R	RC	G		Basalt	7	9	<1	<0.2	120
200	10143	WFR Chrome	R	RC	G		Sil int in serp perid/um	<5	3	1	<0.2	27
201.1	10146	Rainy Creek Skarn	R	OC	C	1.5	Ol-rich um	9	9	11	<0.2	102
201.1	10367	Rainy Creek Skarn	R	OC	C	8	Epid, sil skarn, v alt ls	<5	1	1	<0.2	21
201.1	10513	Rainy Creek Skarn	R	OC	C	4X6	Fest, sil contact metamorphosed ls	<5	2	3	0.5	1885
201.1	10532	Rainy Creek Skarn	R	OC	RC	15@1	Serp'zd dun w/ pyx phenocrysts, magnetic	10	8	2	<0.2	62
201.2	10144	Rainy Creek Skarn	R	OC	G		Oxidized um	9	10	4	0.2	104
201.2	10145	Rainy Creek Skarn	R	RC	G		Msv po (py & cpy)	<5	1	2490	3.4	4770
201.2	10368	Rainy Creek Skarn	R	OC	C	5	Fest & epid alt ls, skarn w/ msv po lenses ~ 2-3"	<5	2	27	0.4	667
201.2	10369	Rainy Creek Skarn	R	RC	G	1	Gossan w/ v fest alt & weathered out sulf (po) mostly gone	<5	3	275	2.4	349
201.2	10533	Rainy Creek Skarn	R	OC	C		Highly alt fest zone w/ fossils, po, Cu-st	<5	3	3	0.2	132
202	10187	MF1996C-65 area	R	RC	S		Sil shear/fault in gbo	0.9	1	2	<0.2	3
203	10442	West Fork Rainy Creek	R	OC	RC	5	Mg gbo or di	13.7	20	13	0.3	348
204	10716	West Rainy Skarn area	R	OC	C	6@0.5	Um rocks	<5	4	1	<0.2	91
205	10357	West Rainy Skarn	R	OC	C	0.5	Fest msv po +/- cpy lens in fest gbo	7.5	64	84	<0.2	2180
205	10358	West Rainy Skarn	R	OC	C	4	Fractured fest gbo w/ po 3-5%	6.3	37	22	0.7	945
205	10380	West Rainy Skarn	R	OC	C	23	Fest gbo (dike, sill?) w/ 1-3% po +/- tr cpy	7	23	13	0.4	610
205	10381	West Rainy Skarn	R	OC	S	0.5	Msv sulf lenses in gbo, v fest	47	52	55	1.7	2740
205	10612	West Rainy Skarn	R	OC	SC	40@2.5	Gbo	7	8	1	<0.2	99
206	10224	West Rainy Skarn area	R	OC	G		Skarn band	0.6	1	9	2.9	1210
206	10225	West Rainy Skarn area	R	OC	C	5	Fest, sil limey shale	1.1	2	3	0.3	106
206	10359	West Rainy Skarn area	R	OC	S	0.3	Fest skarn w/ py	1.9	2	25	1.2	142
206	10360	West Rainy Skarn area	R	OC	C	1	Sil epid alt muddy ls (skarn) w/ cpy	1.7	1	25	3.1	7040
206	10819	West Rainy Skarn area	R	OC	S		Sil arg w/ patches, seams, & dissem py (+/-po)	<5	<1	<1	<0.2	112
206	10820	West Rainy Skarn area	R	OC	S		Sil arg w/ lenses of semi-msv py, po, + minor cpy	<5	1	4	0.5	582
206	10821	West Rainy Skarn area	R	OC	S		Sil, bleached arg w/ pods of py	<5	<1	16	3.9	1510
207	10682	Arch Creek, Head	PC		PC		Barren sample	5	2	<1	<0.2	36
208	11304	Arch Creek	PC				Ls 50% basalt/gbo 50%	5	4	2	<0.2	58
209	10681	Arch Creek	PC		PC		Barren sample, tr mag	11	2	<1	<0.2	59
210.1	10281	Rainy Creek	SL				Magnetic fraction of sample 10729	43	128	91	1.1	180

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
199.1	10222	3	17	<1	56	64	1.16	2	**270**	7	1 2	<0.5	11	1.61	<10	0.12	0.03	<10	0.67	142	0.07	<2	3	23	0.25	76	**10**
199.1	10431	2	18	1	124	230	1.17	2	**110**	6	1.1	<0.5	17	1.43	<10	0.04	0.02	<10	0.93	117	0.07	<2	3	7	0.17	55	**<10**
199.1	11272	<2	17	<1	291	273	2.73	<2	30	<2	1.65	<0.5	25	2.78	<10	<0.01	0.06	<10	2.54	362	0.31	<2	5	84	0.13	54	<10
199.2	2661	3	47	1	85	22	2.67	<5	12	<5	3.5	0.7	42	1.29	<2	0.084	0.02	8	0.46	106	0.02	<5	<5	37	0.368	137	<20
199.2	2662	3	31	<1	47	36	1.41	<5	16	<5	1.58	0.4	21	1.3	<2	0.059	0.03	7	0.45	104	0.06	<5	<5	44	0.294	104	<20
199.2	10019	2	20	<1	43	56	1.24	<2	**270**	<2	1.05	<0.5	15	1.73	<10	0.11	0.02	10	0.62	115	0.03	<2	2	18	0.2	68	**<10**
199.2	10020	<2	30	1	102	13	1.68	2	**300**	<2	2	<0.5	33	1 34	10	0.15	0.01	10	0.45	98	0.02	<2	4	14	0.22	92	**<10**
199.2	10217	2	25	<1	144	123	1.29	3	**210**	5	0.99	<0.5	28	2.6	<10	0.02	0.02	<10	1.68	266	0.06	<2	3	36	0.16	91	**<10**
199.2	10218	3	89	7	93	135	1.54	5	**90**	5	0.84	<0.5	215	2 27	<10	0.01	0.01	<10	1.04	1035	0.05	<2	6	31	0.11	78	**<10**
199.2	10219	5	32	1	66	32	1.24	8	**210**	9	1.07	<0.5	25	2.65	<10	0.04	0.02	<10	0.55	152	0.06	<2	5	31	0.24	186	**<10**
199.2	10220	2	22	1	64	15	0.97	5	**330**	4	1.35	<0.5	19	1 35	<10	0.05	0.03	<10	0.33	80	0.07	<2	3	22	0.4	135	**<10**
199.2	10221	3	19	<1	40	32	1.17	4	**260**	5	1.21	<0.5	13	1 84	<10	0.02	0.03	<10	0.59	167	0.07	<2	3	35	0.33	134	**<10**
199.2	11273	<2	24	<1	215	373	2.62	<2	20	<2	1.68	<0.5	23	3.03	<10	0.01	0.06	<10	2.97	437	0.28	<2	6	130	0.14	64	<10
200	10143	<2	11	<1	34	59	1.48	<2	**220**	6	1.14	<0.5	6	0.66	<10	<0.01	0.05	<10	0.45	95	0.15	<2	1	35	0.07	13	**<10**
201.1	10146	<2	9	1	574	356	1.45	7	**80**	3	0 3	<0.5	47	2.12	<10	0.01	0.02	<10	2.3	93	0.03	<2	1	7	0.04	29	**<10**
201.1	10367	<2	43	<1	198	102	1.4	4	30	<2	1.64	<0.5	11	1.02	<10	0.08	0.06	<10	0.74	95	0.05	<2	1	30	0.16	27	<10
201.1	10513	2	20	1	529	43	0.58	5	**210**	5	0.64	<0.5	144	3.68	<10	0.09	0.08	<10	0.15	65	0.04	<2	1	24	0.03	13	**<10**
201.1	10532	<2	19	<1	743	536	2.17	2	180	<2	0.85	<0.5	50	3.72	<10	<0.01	0.13	<10	5	332	0.14	<2	4	64	0.11	56	<10
201.2	10144	<2	3	1	405	302	1.22	43	**80**	3	0.29	<0.5	24	3	<10	0.02	<0.01	<10	1.7	49	0.02	<2	2	3	0.09	28	**10**
201.2	10145	22	28	<1	50	43	0.45	122	**300**	23	1.4	10.9	1065	>15	10	0.52	0.06	<10	0.23	551	0.01	8	1	<1	0.01	10	**10**
201.2	10368	10	37	<1	18	34	1.32	50	<10	2	14.6	2.2	26	10.65	<10	0.26	<0.01	<10	0.61	710	<0.01	2	3	133	0.11	38	<10
201.2	10369	22	3	3	1	28	0.78	206	<10	7	14.4	8.3	18	>15	<10	0.18	<0.01	<10	0.06	1140	<0.01	4	<1	4	0.02	19	<10
201.2	10533	2	24	1	47	171	1.73	3	90	<2	1.44	<0.5	18	2.93	10	0.1	0.17	<10	1.05	261	0.09	2	3	107	0.27	69	<10
202	10187	6	<2	<1	23	69	2.92	9	**10**	5	4.56	<0.5	7	2.49	10	0.01	<0.01	<10	0.04	21	0.01	<2	2	24	0.11	55	**<10**
203	10442	7	51	2	75	88	2.33	4	**280**	3	1.15	<0.5	25	4 89	<10	<0.01	0.15	<10	1.24	253	0.2	<2	5	60	0.13	115	**<10**
204	10716	2	35	<1	54	54	3.68	2	150	<2	2.32	<0.5	16	3.06	10	<0.01	0.14	<10	1.28	236	0.23	<2	3	44	0.12	56	<10
205	10357	25	36	29	1720	106	1.03	91	**<10**	<2	0.08	12.4	650	>15	20	<0.01	0.03	<10	0.4	96	0.01	7	3	<1	0.03	163	**<10**
205	10358	11	40	6	96	141	2.33	20	**190**	<2	1	0.9	25	8.64	10	0.01	0.1	<10	1.05	178	0.15	<2	3	145	0.07	70	**<10**
205	10380	10	56	4	200	154	3.74	10	80	<2	1.5	<0.5	58	7.89	10	0.01	0.15	<10	1.38	246	0.19	<2	5	247	0.13	93	<10
205	10381	8	46	39	1720	138	2.36	109	<10	5	0.22	4.6	865	>15	<10	0.01	0.04	<10	0.5	<5	0.02	<2	4	15	0.06	185	<10
205	10612	6	60	<1	54	42	2.61	<2	90	<2	1.78	<0.5	21	3.47	10	0.01	0.16	10	1.32	346	0.15	<2	3	22	0.14	87	<10
206	10224	146	258	<1	15	44	0.79	121	**<10**	4	4.43	0.8	46	3.68	<10	0.2	<0.01	<10	0.05	848	0.01	5	1	13	0.04	10	**<10**
206	10225	5	59	1	35	81	1.82	27	**350**	3	2.26	<0.5	14	2 82	<10	0.01	0.07	<10	0.73	123	0.07	<2	5	26	0.16	66	**<10**
206	10359	4	12	1	25	104	1.73	88	**10**	5	3.11	<0.5	17	3.43	10	0.04	0.01	<10	0.11	240	0.04	<2	3	22	0.15	53	**10**
206	10360	4	54	<1	116	41	2.1	14	**60**	3	3.89	<0.5	96	6 05	10	0.02	0.03	<10	0.12	333	0.02	<2	2	12	0.06	25	**<10**
206	10819	2	43	1	42	112	2.17	13	20	<2	1.66	<0.5	14	3.53	10	<0.01	0.12	10	0.76	151	0.12	<2	5	8	0.29	89	10
206	10820	2	26	1	136	105	2.21	9	10	<2	5.69	<0.5	140	5.16	10	0.03	0.01	10	0.47	942	0.02	<2	3	62	0.11	39	<10
206	10821	44	1850	1	49	53	4	36	<10	<2	6.1	7.8	55	2.84	10	0.64	<0.01	20	0.08	285	0.01	<2	<1	14	0.1	11	<10
207	10682	2	43	<1	177	162	1.73	4	40	<2	0.55	<0.5	28	3.27	<10	0.22	0.03	<10	1.86	574	0.03	<2	4	32	0.15	68	<10
208	11304	11	102	1	198	150	2.61	33	550	<2	1.76	<0.5	30	4.72	10	0.09	0.11	10	2.26	1225	0.08	<2	7	71	0.17	126	<10
209	10681	7	74	<1	210	132	2.86	36	150	<2	1.04	<0.5	32	4.34	<10	0.05	0.07	<10	2.25	683	0.05	<2	9	16	0.14	113	<10
210.1	10281	<2	80	11	6990	592	0.19	8	20	3	0.16	<0.5	277	>15	<10	0.06	0.01	<10	0.64	622	0.01	<2	2	7	0.18	2060	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
210.1	10729	Rainy Creek	SL				Abundant flat flake Au & coarse mag, tr cinnabar	<5	7	7250	6.8	95
210.2	10730	Rainy Creek	SS					11	8	**11.75**	<0.2	51
210.3	10282	Rainy Creek	PL				Magnetic fraction of sample 10728	59	56	>10000	0.2	87
210.3	10445	Rainy Creek	PC				2 fine, 2 v fine flakes Au	38.4	6	**25.1**	<0.2	48
210.3	10728	Rainy Creek	PL				24 coarse, 50 fine flakes of Au, abundant mag			7250	1.1	38
210.4	10517	Rainy Creek	PC				Black sand (mag) present, garnet	12	6	121	<0.2	67
210.5	10414	Rainy Creek	SL				Non-magnetic fraction	8	18	9979	<0.2	46
210.5	10467	Rainy Creek	O				Magnetic fraction of 10414	985	209	**9.41**	0.9	202
210.5	10476	Rainy Creek	PL				Magnetic fraction of 10514	75	22	4167	1.5	97
210.5	10514	Rainy Creek	PL				Non-magnetic fraction	8	8	28	0.3	52
210.6	10477	Rainy Creek	PL				Magnetic fraction of 10515	444	29	92	1.1	75
210.6	10515	Rainy Creek	PL				Non-magnetic fraction	<5	6	1375	0.2	46
210.6	10516	Rainy Creek	PC				6 v fine Au flakes	68	14	7140	0.7	55
211	10758	Delta River Trib	PC				Weak to mod black sands,	17	6	1295	0.3	43
212.1	10153	GR 14-9	R	FL	S		Gbo	50	251	12	0.5	786
212.2	10152	GR 14-9	R	OC	G		Fg sil gbo(?)	<5	5	3	0.3	96
213	10818	Picrite Hill West	R	OC	G		Fragmental mafic volc (picrite?) w/ fest	12	9	<1	<0.2	113
214	10068	Picrite Hill West	R	OC	Rep		Andesitic to dacitic pyroclastic w/ sulfs (po, cpy) py?	16.6	13	1	<0.2	264
214	10078	Picrite Hill West	R	RC	Rep		Pyroclastic picritic basalt, minor py	1.3	1	<1	<0.2	28
215	2880	North Fork Rainy Creek Tr b	SS					6	7	9	<0.2	134
215	2881	North Fork Rainy Creek Tr b	SS				Float - ol gbo, ls; fest calc int w/ dissem py & py lenses, sil ls?	<5	8	6	<0.2	80
216.1	1023	GR 14-4	R	RC	G		Med gr gbo w/ minor py, po <<1%	15	17	14	<0.2	73
216.1	6981	GR 14-4	R	OC	S		Semi-msv sulfs in sil fg sed/volcs	<5	2	12	0.4	344
216.1	6982	GR 14-4	R	RC	G		Sil br w/ seams, patches & vnlets of sulf	<5	2	2	<0.2	263
216.1	10391	GR 14-4	R	OC	C	2	Fest skarn, near gbo int, epid/sil alt ls w/ py & po pods	5	8	7	0.4	194
216.2	10388	GR 14-4	R	OC	G	1	Fest sil metaseds near gbo dike	<5	1	1	<0.2	102
216.2	10389	GR 14-4	R	OC	C	1	V fest sil limey seds @ gbo-dike contact	13	13	1	0.2	281
216.2	10390	GR 14-4	R	OC	G	1	Metagbo d ke w/ tr po	22	18	2	<0.2	160
217	6979	GR 20-2	R	OC	G		Skarn w/ cpy, py, po	<5	<1	<1	<0.2	89
217	6980	GR 20-2	R	OC	G		Gbo dike w/ minor po	12	12	3	<0.2	121
217	11145	GR 20-2	R	OC	S	1	Cu-st/fest melagbo + ls skarn @ contact, lots of calcsilicates	<5	1	6	1.3	3010
217	11146	GR 20-2	R	OC	S	0.5	Semi-msv po & cpy, to 40%	<5	<1	33	3.3	7340
217	11369	GR 20-2	R	OC	C	4	Gossan in siliciclastic carb	<5	1	9	2.1	1050
218	10387	N of GR 20-2	R	OC	C	2	Fest v sil ls w/ v fine dissem sulfs, po?	<5	4	3	<0.2	902
218	10661	N of GR 20-2	R	OC	S		Chert & arg for poss ble bio-age dating	<5	2	4	<0.2	76
218	10719	N of GR 20-2	R	OC	C	2	Fest gbo d ke	7	7	<1	<0.2	162
218	10720	N of GR 20-2	R	RC	C	3	Fest sil muddy ls adj to gbo d ke	<5	1	<1	0.2	480
218	11143	N of GR 20-2	R	OC	C	6	Gbo dike, dark gray partly serp'zd w/ dissem py	5	32	3	<0.2	318
218	11144	N of GR 20-2	R	OC	C	1	Fest skarn @ ls/volc contact	<5	7	5	0.3	200
218	11367	N of GR 20-2	R	RC	S		Skarn w/ loc mg py boxwork & common fg dissem py	<5	1	2	0.3	77
218	11368	N of GR 20-2	R	OC	S		Skarn w/ white carb & gray sil beds	5	11	2	0.2	229
219	10989	East Peak South Ridge	R	OC	SC	14	Gbo w/ minor po & cpy	15	35	5	<0.2	172

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
210.1	10729	51	47	2	472	161	0.97	17	70	4	0.71	<0.5	41	6.9	<10	0.15	0.03	10	4.36	538	0.02	2	4	25	0.12	255	40
210.2	10730	<2	42	<1	326	269	2.04	5	60	<2	1.26	<0.5	31	5.53	<10	0.11	0.11	10	3.66	577	0.1	<2	5	28	0.26	160	10
210.3	10282	<2	59	8	1720	578	0.23	3	10	<2	0.22	<0.5	108	>15	<10	0.09	0.01	<10	1.28	602	0.01	<2	2	9	0.17	1615	<10
210.3	10445	6	44	<1	285	191	1.59	3	30	<2	0.65	0.5	29	5.01	10	0.02	0.06	10	3.21	449	0.04	2	3	25	0.13	143	<10
210.3	10728	7	32	1	485	158	0.6	24	20	<2	0.71	0.6	49	8.93	<10	0.66	0.02	10	4.55	537	0.01	2	3	200	0.13	399	20
210.4	10517	5	41	2	243	189	1.44	14	40	<2	0.58	<0.5	27	4.55	10	0.06	0.08	<10	2.64	432	0.04	4	2	19	0.09	100	10
210.5	10414	<2	53	<1	201	141	1.43	8	60	<2	0.5	<0.5	23	3.75	<10	0.93	0.05	<10	2.27	380	0.02	<2	3	33	0.07	110	10
210.5	10467	101	58	<1	882	266	0.34	<2	30	<2	0.18	13.6	89	>15	10	0.52	0.02	<10	1.37	596	<0.01	<2	1	<1	0.12	1000	60
210.5	10476	35	63	<1	431	434	0.43	<2	30	6	0.27	16.6	76	>15	10	0.09	0.02	<10	1.38	761	0.01	6	1	<1	0.24	1825	70
210.5	10514	<2	57	<1	235	192	1.76	16	180	<2	0.89	<0.5	26	3.64	<10	0.09	0.07	<10	2.73	447	0.05	<2	4	24	0.14	93	20
210.6	10477	28	72	<1	549	677	0.53	<2	30	9	0.32	15.8	74	>15	10	0.11	0.02	<10	2.07	826	0.02	8	2	<1	0.26	1540	70
210.6	10515	<2	51	<1	371	175	1.47	<2	40	<2	0.74	0.6	34	4.05	<10	0.24	0.05	10	4.13	486	0.04	<2	3	28	0.13	110	30
210.6	10516	3	37	1	287	229	1.28	8	50	2	0.64	1.5	35	7.74	10	0.52	0.05	<10	3.01	451	0.04	2	2	19	0.11	309	<10
211	10758	<2	44	1	938	245	1.8	<2	40	<2	1.02	<0.5	62	5.65	<10	0.07	0.05	<10	10.45	766	0.07	<2	5	52	0.18	65	<10
212.1	10153	5	25	1	909	113	2.83	24	**250**	6	0.97	<0.5	121	5 08	<10	0.03	0.07	<10	1.14	172	0.19	3	2	54	0.04	55	**<10**
212.2	10152	9	59	1	97	193	3.35	7	**270**	8	1.52	<0.5	21	3 33	10	<0.01	0.03	<10	1.76	397	0.26	<2	2	113	0.19	47	**<10**
213	10818	<2	63	1	1095	1010	4.19	5	<10	<2	0.68	<0.5	67	4.57	10	0.01	0.01	<10	5.74	438	0.03	<2	2	36	0.29	85	<10
214	10068	<2	26	<1	834	983	2.66	<2	**40**	<2	0.28	<0.5	66	3.8	40	0.02	0.01	10	4.28	243	0.01	<2	1	<1	0.14	49	**<10**
214	10078	<2	44	1	424	694	2.55	8	**100**	<2	0.59	<0.5	37	3.73	<10	<0.01	0.01	<10	3.81	444	0.05	<2	2	4	0.24	62	**<10**
215	2880	4	58	<1	316	379	2.33	5	41	<5	0.76	<0.2	40	3.98	<2	0.029	0.05	2	2.86	438	0.06	<5	<5	54	0.171	80	<20
215	2881	7	120	<1	267	371	2.55	16	37	<5	1.58	<0.2	40	5.19	<2	0.027	0.12	2	3.18	594	0.06	<5	6	101	0.16	86	<20
216.1	1023	5	36	2	22	36	2.01	<5	89	<5	1.86	<0.2	14	2.57	2	0.07	0.18	11	0.67	208	0.08	<5	<5	57	0.113	109	<20
216.1	6981	11	26	<1	165	42	0.63	41	5	<5	1.37	<0.2	73	8.27	3	0.03	<0.01	2	0.24	119	<0.01	<5	<5	135	0.064	16	<20
216.1	6982	5	23	1	28	130	2.56	<5	15	<5	2.18	<0.2	26	2.2	<2	<0.01	0.05	7	0.16	62	0.28	<5	<5	149	0.152	22	<20
216.1	10391	15	76	<1	108	130	2.48	22	<10	<2	3.32	<0.5	45	7.05	10	0.06	<0.01	<10	1.37	514	0.03	<2	6	22	0.37	128	<10
216.2	10388	5	22	<1	39	57	2.44	8	30	<2	2.44	<0.5	22	4.77	10	<0.01	0.42	10	0.58	105	0.16	<2	7	100	0.2	73	<10
216.2	10389	6	22	3	283	218	2.85	24	50	<2	1.82	<0.5	41	6.32	10	<0.01	0.1	10	1.6	186	0.18	<2	3	66	0.09	51	<10
216.2	10390	5	50	<1	664	196	2.97	2	40	<2	1.85	<0.5	71	5.92	10	0.01	0.15	10	6.33	620	0.28	<2	4	53	0.07	45	<10
217	6979	<2	27	<1	26	51	1.53	11	17	<5	5.13	<0.2	20	5.18	3	0.023	0.01	3	0.26	1094	0.01	<5	<5	36	0.072	27	<20
217	6980	4	51	<1	27	28	2.17	<5	51	<5	1.28	<0.2	23	4.49	4	<0.01	0.11	11	0.91	322	0.12	<5	<5	82	0.087	133	<20
217	11145	8	79	<1	44	49	2.57	15	40	<2	7.87	<0.5	211	2.75	10	0.01	<0.01	<10	0.63	1250	0.01	2	5	86	0.07	23	<10
217	11146	15	48	<1	40	10	0.75	19	20	29	4.28	<0.5	429	33.4	<10	0.19	0.01	<10	0.15	132	<0.01	5	1	89	0.03	7	<10
217	11369	35	18	1	20	63	0.62	130	<10	2	0.25	<0.5	31	27.9	<10	0.16	0.01	<10	0.3	125	0.02	3	2	91	0.15	64	<10
218	10387	5	20	1	156	118	2.36	19	40	<2	2.4	<0.5	35	3.58	10	<0.01	0.18	10	0.73	61	0.14	<2	1	120	0.34	58	<10
218	10661	5	44	<1	47	75	1.93	5	10	<2	1.8	<0.5	17	2.65	10	0.01	0.05	10	0.95	71	0.09	<2	9	1	0.24	79	<10
218	10719	4	29	<1	264	320	1.75	10	10	<2	1.29	<0.5	40	4.08	10	0.01	0.04	<10	1.84	276	0.16	<2	4	33	0.24	59	<10
218	10720	4	35	<1	29	43	1.31	37	20	<2	1.7	<0.5	12	2.73	<10	0.01	0.07	10	0.29	100	0.06	<2	2	50	0.2	32	<10
218	11143	8	70	<1	29	27	1.88	10	20	<2	1.72	<0.5	31	6.04	10	<0.01	0.04	<10	0.92	380	0.05	<2	5	8	0.57	198	<10
218	11144	4	34	<1	274	245	2	62	20	<2	2.56	<0.5	32	5.66	<10	0.01	0.05	<10	1.06	192	0.1	<2	5	72	0.22	59	<10
218	11367	3	83	1	35	38	1.98	<2	<10	<2	5.56	<0.5	5	1.46	<10	0.05	<0.01	<10	0.14	347	0.01	<2	1	27	0.08	10	<10
218	11368	8	43	<1	77	47	2.14	4	10	<2	7.2	<0.5	22	2.83	<10	0.04	0.01	10	0.55	263	0.03	<2	2	61	0.39	115	<10
219	10989	<2	56	<1	1090	150	1.58	<2	30	<2	0.82	<0.5	93	7.56	<10	<0.01	0.09	<10	11 5	954	0.16	<2	4	195	0.09	27	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
219	10990	East Peak South Ridge	R	OC	S		Gbo & mafic gbo w/ 5% cpy + po	75	236	29	0.6	1690
219	10991	East Peak South Ridge	R	RC	G		Peg-textured gbo w/ minor cpy	5	12	3	<0.2	248
220	10986	East Peak	R	OC	G		Leuco & mela gbo, mg to cg	5	10	<1	<0.2	30
220	10987	East Peak	R	RC	G		Fg to mg perid w/ 3-5% po +/- cpy	72	57	36	0.8	2010
220	10988	East Peak	R	RC	S		Gbo w/ po & cpy	100	65	36	0.3	1295
221	10658	East Peak area	R	RC	Rep	1X4	Leuco-gbo crosscut by serp w/ mag	25	2	<1	<0.2	157
221	10659	East Peak area	R	OC	S	30X20	Perid	26	25	7	<0.2	28
221	10660	East Peak area	R	OC	Rep	15X20	Serp	<5	1	1	<0.2	11
222	10985	East Peak, N side	R	OC	Rep		Mg gbo w/ v minor po & cpy	10	17	5	<0.2	241
223	10392	GR 14-16	R	RC	S	1	Fest calc seds, ls	9	1	3	0.8	177
224	10393	GR 14-16 area	R	OC	C	3	Fest sil seds (hornfels)	<5	1	<1	<0.2	75
225	11007	East Canyon	R	OC	S		Serp'zd perid	8	7	4	1	1905
225	11008	East Canyon	R	OC	SC	30	Serp'zd perid	10	9	4	0.4	459
226	11363	East Canyon area	R	RC	S		Mg perid, weak serp	9	9	3	<0.2	97
227	11005	East Broxson Gold	R	OC	Rep	15x15	Dun	5	5	1	<0.2	5
227	11006	East Broxson Gold	R	OC	SC	10	Arg(?)	9	7	<1	<0.2	128
228	11362	East Broxson Gold area	R	RC	S		Variably serp'zd perid w/ tr po	12	7	2	<0.2	239
229	10063	West Bowl	R	RC	S		Sil part of skarn w/ cpy, chalcocite(?)	9.4	13	237	3.5	2590
229	10862	West Bowl	R	RC	Rep		Skarn w/ large euhedral garnets in clinopyx +/- cc	5	1	3	<0.2	69
229	11068	West Bowl	R	RC	S		Skarn w/ minor cpy	28	57	146	19.7	**1.21%**
229	10859	West Bowl area	R	RC	S		Micaceous peg(?) vn in dun, w/ Cu-st	30	25	31	0.2	218
229	10860	West Bowl area	R	RC	G		Potato br of dun clasts in dun	10	4	<1	<0.2	26
229	10861	West Bowl area	R	RC	Rep		Dun	32	8	<1	<0.2	8
230	11129	GR 14-17	R	OC	Rep	2	Sil volc seds	<5	2	5	0.2	205
230	11130	GR 14-17	R	RC	S	0.5	Gray sil volc seds w/ small blebs & vnlets of cpy	7	5	2	0.4	1415
230	11361	GR 14-17	R	RC	S		Alt di or sed w/ fg dissem py +/- aspy	<5	3	68	0.7	934
231	10379	GR 14-17 area	R	OC	RC		Metavolc, dacite(?) porph w/ ~ 1% py, light gray/green	<5	1	1	<0.2	66
232	10908	North Rainy area	R	OC	C	1	Hackly-weathering perid w/ tr sulfs & copper moss	28	28	5	<0.2	71
233.1	11263	North Rainy	R	RC	G		Sil, fg sed (arg?) w/ lenses of semi-msv sulf	<5	6	9	0.6	1135
233.1	11264	North Rainy	R	FL	S		Msv & semi-msv sulf in meta-sed	<5	3	158	3.4	**1.04%**
233.1	11389	North Rainy	R	OC	S	1X3	Alt sil um	12	10	5	<0.2	98
233.1	11390	North Rainy	R	F	S	0.5X0.5	Qz vn in shear w/ tetrahedrite(?), cpy	<5	3	445	24.9	**1.33%**
233.2	11388	North Rainy	R	OC	S	0.2	Qz vn crosscutting hydrothermal alt gbo	<5	1	178	5.5	**2.08%**
233.3	11262	North Rainy	R	RC	G		Perid w/ minor po, cpy, native Cu(?)	<5	<1	27	0.2	262
233.3	11387	North Rainy	R	F	S		Dun float w/ mal staining	7	3	68	0.5	551
233.4	11261	North Rainy	R	OC	Rep		Fresh dun, v minor serp	74	62	29	<0.2	259
234	10977	Hail Creek area	R	OC	G		Fest dun adj to gbo	51	34	2	<0.2	20
235	10654	Hail Creek area	R	OC	RC	1X3	Dun crsscut by leucogbo	42	48	4	0.2	92
236	10978	Hail Creek area	R	OC	G		Dun w/ v minor po	<5	1	<1	<0.2	8
237	10033	Hail Creek	R	OC	S		Contact zone between fg gbo & serp (serp dun?)	1.3	2	3	2.2	2430
237	10034	Hail Creek	R	OC	G		Fest, serp'zd dun	20.5	19	2	<0.2	21
238	10060	Foley's	R	OC	Rep		Phlog-bearing mela gbo	3	2	1	<0.2	105

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
219	10990	4	59	<1	1045	162	1.76	<2	20	<2	0.92	<0.5	78	6.62	<10	<0.01	0.07	<10	9.76	777	0.14	<2	4	33	0.08	32	<10
219	10991	<2	33	<1	144	89	1.68	3	40	<2	1.4	<0.5	19	2.33	10	<0.01	0.1	10	1.89	249	0.16	<2	4	31	0.32	150	<10
220	10986	<2	33	<1	441	77	3.91	<2	10	<2	2.28	<0.5	50	4.38	<10	0.01	0.03	<10	4.98	567	0.45	<2	3	95	0.02	16	<10
220	10987	3	46	<1	1175	112	2.38	<2	20	<2	1.22	<0.5	124	8.88	<10	0.08	0.03	<10	9.72	786	0.28	<2	4	75	0.02	19	<10
220	10988	7	44	<1	783	55	7.03	<2	50	<2	3.9	<0.5	75	5.88	10	<0.01	0.07	<10	6.63	698	0.65	<2	2	64	0.02	14	<10
221	10658	5	40	<1	1665	149	1.22	6	10	<2	0.58	<0.5	102	7.09	<10	<0.01	0.04	<10	14.6	769	0.13	<2	5	48	0.08	45	<10
221	10659	6	31	<1	2340	1080	0.08	<2	<10	<2	0.01	<0.5	100	20.1	<10	0.01	<0.01	<10	16 9	702	0.01	<2	5	19	0.01	13	<10
221	10660	3	25	<1	2590	210	0.04	<2	<10	<2	0.02	<0.5	138	6.93	<10	0.01	<0.01	<10	20 2	967	0.01	<2	5	2	<0.01	6	<10
222	10985	2	27	<1	32	27	4.99	3	10	<2	3.07	<0.5	16	3.62	10	<0.01	0.05	<10	0.65	234	0.68	<2	3	65	0.27	213	<10
223	10392	16	18	<1	22	17	1.14	18	30	3	7.54	1.5	107	>15	<10	0.02	0.04	10	0.09	1630	<0.01	<2	2	3	0.05	23	<10
224	10393	11	63	<1	8	25	5.56	5	180	<2	3.98	<0.5	8	5.69	10	0.02	0.24	10	0.95	656	0.19	<2	14	152	0.22	184	<10
225	11007	5	124	<1	351	424	2.86	<2	10	<2	1.3	<0.5	42	4.75	10	0.6	0.01	<10	5.07	2420	0.02	<2	5	30	0.24	77	<10
225	11008	7	66	<1	599	480	2.79	2	20	<2	1.39	<0.5	46	3.98	10	0.18	0.03	<10	6.09	1225	0.1	<2	5	4	0.2	68	<10
226	11363	2	22	<1	249	421	2.84	<2	50	<2	2.36	<0.5	23	2.51	10	0.01	0.1	<10	2.41	282	0.55	<2	9	23	0.2	82	<10
227	11005	6	37	<1	2170	135	0.03	2	<10	2	0.04	<0.5	114	6.26	<10	0.03	<0.01	<10	20.4	994	0.01	2	4	14	<0.01	3	10
227	11006	<2	21	<1	128	234	1.91	<2	20	<2	1.46	<0.5	15	2.03	<10	<0.01	0.02	<10	2.13	303	0.12	<2	4	<1	0.16	44	<10
228	11362	<2	32	<1	757	570	1.66	2	60	<2	0.74	<0.5	52	4.24	<10	0.02	0.09	<10	5.08	408	0.09	<2	4	39	0.11	62	<10
229	10063	4	640	4	164	94	2.93	5	**10**	<2	15	4	26	2.78	<10	0.01	<0.01	<10	5.36	678	0.01	<2	3	176	0.05	6	**<10**
229	10862	<2	355	<1	81	156	4.69	77	10	<2	15	<0.5	16	2.62	10	0.03	<0.01	10	1.5	365	<0.01	4	7	1	0.21	30	<10
229	11068	22	564	<1	357	160	2.2	147	10	<2	20.7	10.7	39	3.48	10	0.38	<0.01	<10	1.6	518	0.01	<2	8	208	0.12	32	<10
229	10859	112	37	1	2730	887	0.3	7	<10	<2	0.06	<0.5	144	7.78	<10	0.05	<0.01	<10	15	1105	0.01	<2	5	28	0.01	7	<10
229	10860	<2	32	1	2000	193	0.46	<2	30	<2	0.16	<0.5	128	6.67	<10	0.02	0.09	<10	15	968	0.05	<2	3	2	0.05	14	<10
229	10861	3	36	1	2600	117	0.05	<2	<10	<2	0.04	<0.5	147	7.51	<10	0.03	<0.01	<10	15	1155	<0.01	<2	5	12	0.01	2	<10
230	11129	11	33	1	83	102	1.98	7	40	<2	1.19	<0.5	22	3.31	<10	0.01	0.06	<10	1.23	360	0.06	7	4	30	0.18	74	<10
230	11130	<2	57	<1	226	436	2.33	3	30	<2	0.81	<0.5	29	3.48	<10	0.05	0.02	<10	2.78	557	0.06	2	4	23	0.3	69	<10
230	11361	<2	29	1	25	29	1.15	7	20	<2	0.55	<0.5	25	2.52	<10	0.02	0.01	10	0.84	278	0.08	<2	4	17	0.12	33	<10
231	10379	2	69	<1	11	23	2.53	5	10	<2	0.78	<0.5	16	4.68	10	0.06	0.01	<10	2.3	701	0.08	2	10	46	0.25	122	<10
232	10908	3	46	1	1640	257	1.14	<2	70	2	0.21	<0.5	123	6.92	<10	0.02	0.24	<10	15	992	0.09	3	4	85	0.05	14	<10
233.1	11263	4	19	1	186	107	1.13	51	10	<2	0.97	0.5	140	13.5	<10	0.07	0.01	<10	0.98	212	0.01	2	3	3	0.14	37	<10
233.1	11264	17	57	5	552	72	0.72	<2	10	15	0.36	1.1	304	34.3	10	0.15	0.01	<10	1.12	188	0.02	<2	2	71	0.04	27	<10
233.1	11389	12	27	1	1005	347	0.1	5	20	2	6.42	<0.5	61	4.67	<10	0.13	0.04	<10	12.05	680	0.04	<2	7	21	0.01	27	<10
233.1	11390	77	99	1	335	120	0.19	2	<10	<2	1.52	5.8	52	5.06	<10	5.71	0.01	<10	3.89	425	0.01	<2	1	762	0.02	12	<10
233.2	11388	4070	253	2	44	59	1.5	<2	30	<2	4.24	17.8	18	4.8	<10	0.46	0.01	<10	0.33	742	0.01	2	1	7	0.03	11	<10
233.3	11262	5	59	<1	2080	244	0.25	5	10	<2	0.09	<0.5	126	8.01	<10	0.02	0.06	<10	20 5	1285	0.01	<2	4	1	0.02	9	<10
233.3	11387	23	58	1	1790	425	0.66	2	<10	2	0.24	<0.5	116	7.55	<10	0.04	0.02	<10	16.95	1170	0.04	<2	5	88	0.05	24	<10
233.4	11261	3	36	<1	2590	156	0.06	4	<10	2	0.01	<0.5	136	7.75	<10	0.17	<0.01	<10	23	1105	<0.01	<2	4	61	0.01	4	<10
234	10977	<2	43	<1	2680	219	0.12	<2	<10	<2	0.1	<0.5	150	8.83	<10	<0.01	<0.01	<10	23 8	1250	0.02	<2	5	3	<0.01	6	<10
235	10654	6	41	<1	2770	142	0.07	<2	<10	<2	0.06	<0.5	160	8.83	<10	0.26	<0.01	<10	23.4	1260	0.02	<2	6	19	<0.01	7	<10
236	10978	<2	11	<1	41	31	0.85	<2	20	<2	0.56	<0.5	4	1.03	<10	<0.01	0.01	10	0.75	99	0.09	<2	3	2	0.08	15	<10
237	10033	2	568	<1	70	31	1.7	<2	**30**	<2	0.7	7.4	14	3 08	30	0.06	<0.01	<10	4.9	2120	0.01	<2	4	<1	0.08	47	**<10**
237	10034	<2	20	<1	1910	455	0.33	7	**<10**	<2	0.78	0.9	114	5.11	70	0.03	<0.01	10	15	426	0.01	<2	4	<1	<0.01	5	**<10**
238	10060	<2	47	<1	57	82	5.17	<2	**200**	<2	3.48	<0.5	20	2.19	10	<0.01	0.13	<10	0.6	261	0.85	2	1	216	0.05	69	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
238	10180	Foley's	R	OC	G		Gbo	<0.5	<1	<1	<0.2	170
239	10332	White Band	R	FL	S		Serp melagbo w/ minor Cu-st	227	348	1070	1.6	1570
240	10039	White Band area	R	OC	S		Br gbo dike at dun contact	7.3	23	15	0.3	1340
240	10040	White Band area	R	OC	CC	1.2	Fg gbo dike at contact w/ dun	5.6	23	5	<0.2	255
240	10041	White Band area	R	OC	CC		Serp'zd dun at contact w/ gbo dike	59	45	16	0.3	33
240	10330	White Band area	R	OC	C	1	Gbo, from contact w/ dun	5.1	23	6	0.3	231
240	10331	White Band area	R	OC	C	1	Dun at contact w/ gbo dike?	74.5	54	2	1.2	11
241.1	10038	Rainy Complex	R	RC	G		Dun w/ copper moss	142	104	19	0.2	81
241.2	6999	Rainy Complex	R	RC	Rep		Troctolite to gbo	5	7	<1	<0.2	9
242	10076	Picrite Hill	R	RC	Rep		Picritic basalt w/ minor py, cpy	9.9	10	1	<0.2	74
242	10077	Picrite Hill	R	RC	Rep		Fg gbo w/ ~1% cpy + py	1.1	1	1	<0.2	145
243	10061	Picrite Hill Skarn	R	OC	CC	5.5	Gossan & skarn w/ minor sulf	0.5	1	37	<0.2	309
243	10062	Picrite Hill Skarn	R	OC	G		Mag-bearing skarn	<0.5	<1	8	<0.2	78
243	10525	Picrite Hill Skarn	R	OC	SC	6	Garnet, sulf-rich zone, mostly py	1.9	1	9	<0.2	1205
243	10526	Picrite Hill Skarn	R	OC	SC	5	Garnet, sulf-rich zone	4.6	3	3	<0.2	805
243	10527	Picrite Hill Skarn	R	FL	G		Msv sulf	1.7	1	21	0.4	2750
244	10856	Southeast Rainy	R	RC	Rep		Fest gbo to melagbo w/ minor sulf	20	12	1	<0.2	75
244	10857	Southeast Rainy	R	RC	Rep		Meta-andesite	7	6	3	<0.2	216
245	10059	South Ann Copper	R	RC	Rep	150	Sil volc w/ dissem cpy & py	1.9	2	14	4.3	5100
245	10179	South Ann Copper	R	FL	S		Sil andesite(?) (no phenocrysts…very sil)	1	3	18	13.1	**2.38%**
246	10056	Ann Fork	R	OC	SC	6.5	Mainly perid, variably serp'zd & mineralized w/ cpy, po, pent	18.7	60	38	1.5	1350
246	10057	Ann Fork	R	RC	S		Msv sulf lens in gbo cutting perid	71.6	375	39	9.1	**2.15%**
246	10177	Ann Fork	R	OC	C	4	Gbo, in contact w/ serp'zd perid	0.8	3	<1	4.2	**1.16%**
246	10178	Ann Fork	R	OC	C	2	Contact between serp perid & gbo + br + msv sulfs	3.1	4	<1	1	4960
246	10055	Ann Fork area	R	FL	S		Semi-msv sulf in leuco gbo (or alt andesite??)	16.7	25	109	1	1445
246	10058	Ann Fork area	R	OC	G		Alt andesite w/ 10% py	19	17	9	<0.2	184
247	10054	Joe Claims	R	RC	S		Alt andesite w/ 5-10% dissem & patchy sulf	0.6	<1	262	5.4	**1.98%**
247	10176	Joe Claims	R	OC	C	5	"Meta" andesite (alt by sil & shear?) (lacks phenocrysts)	<0.5	<1	4	1.1	2840
248	10321	East Rainy	R	FL	S		V fest perid - melagbo w/ dissem net-textured cpy & po	515	643	258	6	5140
248	10322	East Rainy	R	FL	S		Leucogbo (dike?) in perid w/ blebs of cpy & minor bn?	676	772	206	6.2	4060
248	10323	East Rainy	R	RC	S	0.5	Perid w/ net-textured po + cpy	575	631	249	3.3	4670
248	10324	East Rainy	R	RC	S	1	Semi-msv to net-textured cpy & po in perid	731	875	709	3.2	2930
248	10325	East Rainy	R	RC	Rep	1	Fest perid w/ net-textured po, cpy	898	950	190	4.6	3630
249	11128	North Star Ann	R	RC	Rep	1	Perid w/ sulf ~1%	184	93	11	0.2	133
249	11360	North Star Ann	R	OC	S		Plag & anthophyllite-bearing perid	15	8	2	<0.2	82
250	11127	North Star Ann	R	RC	Rep	6x6	Fest serp melagbo(?)	7	12	<1	<0.2	40
250	11359	North Star Ann	R	RC	S		Mg gbo dike w/ tr fg dissem po	12	11	1	<0.2	89
251	10037	Rainy Breccia area	R	OC	G		Serp dun at contact w/ gbo dike	89.7	69	12	<0.2	39
252	10036	Rainy Breccia	R	RC	G		V fg br(?) of mafic to um rocks	8.9	8	3	<0.2	116
252	10328	Rainy Breccia	R	OC	C	1	Cg perid br intruded by white gbo (plag peg?)	6.6	3	<1	<0.2	5
252	10329	Rainy Breccia	R	OC	C	1	Iron oxide, orange-yellow stained, sil alt serp	4	3	62	<0.2	17
253	10035	Rainy Breccia area	R	RC	G		Alt br w/ gossanous matrix	1.6	2	1	<0.2	18

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
238	10180	3	25	<1	98	60	5.75	<2	30	3	4.02	<0.5	26	3	10	<0.01	0.04	<10	1.58	377	0.76	4	2	114	0.02	35	<10
239	10332	2	90	1	1270	341	0.25	2	10	<2	0.09	1.4	137	11.55	<10	0.03	<0.01	<10	13.05	1520	0.01	<2	6	4	0.02	48	<10
240	10039	<2	72	<1	66	46	4.32	<2	100	<2	3.4	0.9	20	3 86	20	0.01	0.03	10	3.68	516	0.18	<2	4	9	0.18	102	<10
240	10040	<2	45	<1	46	28	2.6	<2	320	<2	1.28	<0.5	15	2 81	10	<0.01	0.27	10	1.22	195	0.51	<2	2	57	0.19	117	<10
240	10041	<2	38	<1	2030	157	0.05	20	<10	<2	0.06	<0.5	122	6 83	<10	<0.01	<0.01	<10	15	1020	0.01	<2	4	<1	<0.01	3	<10
240	10330	<2	43	<1	47	44	2.36	<2	170	6	1.4	<0.5	15	3	10	0.06	0.15	<10	0.95	218	0.45	2	2	48	0.24	141	<10
240	10331	2	26	1	2030	147	0.05	<2	<10	<2	0.04	<0.5	120	6 06	<10	0.1	<0.01	<10	15	912	0.01	<2	2	3	<0.01	2	<10
241.1	10038	<2	39	<1	2400	185	0.03	2	<10	<2	0.09	1.1	132	6.45	90	<0.01	<0.01	10	15	998	0.01	<2	4	<1	<0.01	2	<10
241.2	6999	2	22	<1	292	64	3.44	<5	23	<5	1.88	<0.2	42	3.9	4	<0.01	0.03	<1	6.02	452	0.29	<5	<5	184	<0.01	7	<20
242	10076	<2	21	<1	318	374	1.85	18	80	<2	0.44	<0.5	31	2.41	20	0.01	0.01	<10	2.34	233	0.05	<2	2	5	0.12	35	<10
242	10077	<2	99	1	82	40	2.3	12	130	<2	1.14	<0.5	29	5 04	<10	0.01	0.04	<10	1.62	490	0.11	<2	3	7	0.32	159	<10
243	10061	25	30	1	4	33	0.47	27	10	2	8.14	4.2	5	>15	10	0.04	0.01	<10	0.07	716	0.01	<2	1	<1	0.02	16	<10
243	10062	48	43	<1	18	19	0.19	17	<10	8	4.19	6.7	15	>15	20	0.01	0.01	<10	0.04	469	0.02	<2	<1	<1	0.01	9	<10
243	10525	9	10	<1	107	49	0.4	25	<10	<2	5.94	8.2	151	>15	10	0.02	0.01	<10	0.1	495	0.01	3	2	16	0.02	20	10
243	10526	6	16	<1	77	101	0.69	13	20	3	3.96	1.8	102	11.65	<10	0.03	0.01	<10	0.23	595	0.01	<2	2	<1	0.07	31	<10
243	10527	5	28	<1	13	42	0.84	13	<10	<2	5.06	3.1	129	13.95	10	0.01	0.01	<10	0.06	1130	0.01	<2	2	5	0.03	13	10
244	10856	2	39	<1	966	100	2.97	<2	10	2	1.31	<0.5	88	5.68	<10	0.02	0.06	<10	10.25	738	0.17	2	3	43	0.02	8	<10
244	10857	3	35	<1	190	83	8.32	<2	40	3	3.69	<0.5	57	4.7	10	0.03	0.04	<10	2.11	283	0.51	2	4	43	0.04	56	<10
245	10059	<2	79	1	67	117	1.37	23	40	<2	1.75	<0.5	30	2.74	<10	0.16	0.01	<10	0.53	141	0.03	2	2	12	0.15	30	<10
245	10179	4	171	1	217	91	1.15	74	20	6	2.23	0.8	75	5 99	<10	0.4	0.01	<10	0.45	148	0.02	2	2	33	0.09	23	<10
246	10056	<2	38	<1	761	528	1.81	74	40	<2	0.24	1.7	79	11.3	<10	0.01	0.03	<10	6.84	579	0.01	<2	3	<1	0.06	47	10
246	10057	73	160	<1	1820	146	1.53	84	90	13	0.65	8.9	443	>15	<10	<0.01	0.03	<10	0.81	301	0.03	<2	1	52	0.03	51	<10
246	10177	5	115	<1	207	112	2.61	12	550	<2	0.91	2.4	52	8.65	<10	0.01	0.06	<10	1.73	585	0.03	<2	4	66	0.1	104	<10
246	10178	13	63	<1	2110	268	1.37	27	<10	<2	0.16	10.7	639	>15	10	0.02	0.01	<10	3.35	454	0.01	<2	4	13	0.03	36	<10
246	10055	5	109	1	156	84	1.85	9	720	<2	0.58	0.7	112	10.7	<10	0.01	0.07	<10	1.37	587	0.05	<2	4	32	0.1	119	<10
246	10058	6	21	<1	27	75	1.43	48	270	5	0.03	0.8	36	13.45	10	0.33	0.01	<10	0.88	214	0.03	3	4	<1	<0.01	46	<10
247	10054	<2	41	9	4	107	0.47	14	890	8	0.05	<0.5	238	6.6	<10	0.59	0.15	<10	0.11	110	0.01	<2	1	<1	<0.01	4	<10
247	10176	4	65	<1	7	27	3.57	2	1160	<2	0.39	0.5	86	8 03	10	0.06	0.11	<10	2.81	990	0.02	<2	9	12	0.15	106	<10
248	10321	17	34	1	3220	319	0.74	<2	60	2	0.25	0.5	137	8.62	<10	0.02	0.04	<10	10.65	580	0.05	<2	3	13	0.05	24	<10
248	10322	21	20	<1	1230	109	1.7	19	200	6	0.98	0.6	24	1.72	<10	0.18	0.01	<10	2.15	222	0.04	12	2	50	0.09	30	<10
248	10323	17	33	1	4220	231	0.66	2	70	3	0.22	<0.5	159	8.11	<10	<0.01	0.05	<10	11 2	655	0.05	<2	2	12	0.04	19	<10
248	10324	9	40	1	6150	350	0.72	<2	20	<2	0.24	<0.5	242	9.6	<10	0.01	0.02	<10	9.99	587	0.04	<2	3	11	0.04	25	<10
248	10325	22	40	1	7760	289	0.6	<2	60	<2	0.19	<0.5	276	11.95	<10	0.01	0.04	<10	10 2	586	0.04	<2	3	11	0.04	23	<10
249	11128	<2	32	1	974	406	1.34	4	60	<2	0.66	<0.5	73	5.12	<10	0.01	0.12	<10	9.84	662	0.12	<2	4	108	0.09	34	<10
249	11360	5	21	1	2040	319	0.8	2	20	<2	0.34	<0.5	99	5.98	<10	0.01	0.05	<10	17.25	847	0.03	<2	4	57	0.04	13	<10
250	11127	4	18	<1	2280	538	0.25	24	10	<2	1.2	<0.5	97	5.63	<10	0.05	<0.01	<10	18.7	513	0.01	2	5	25	0.02	13	<10
250	11359	7	60	1	130	59	2.98	9	90	<2	1.46	<0.5	28	4.04	10	0.01	0.1	<10	1.96	519	0.11	<2	5	2	0.15	98	<10
251	10037	<2	19	<1	1790	313	0.23	<2	<10	<2	0.32	0.9	123	6.71	70	0.06	<0.01	10	15	525	0.01	<2	3	3	<0.01	2	<10
252	10036	<2	22	<1	351	249	2.57	<2	140	<2	0.46	<0.5	30	3 01	20	0.01	0.02	<10	3.68	430	0.04	<2	2	5	0.14	38	<10
252	10328	<2	16	<1	205	382	2.59	<2	120	2	2.16	<0.5	18	1 86	<10	<0.01	0.01	<10	2.11	253	0.04	<2	3	15	0.14	44	<10
252	10329	4	65	<1	217	119	0.61	26	280	<2	10.65	0.9	40	5 07	<10	10	0.03	<10	4.16	1960	0.01	36	21	407	0.01	172	<10
253	10035	<2	41	<1	10	31	0.9	2	230	<2	1.39	<0.5	6	1 34	10	0.03	0.01	<10	0.3	623	0.03	<2	5	28	0.14	27	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
253	10326	Rainy Breccia area	R	OC	Rep	2	Serp'zd mafic-um breccia, v magnetic	13.9	16	4	0.7	135
253	10327	Rainy Breccia area	R	OC	C	2.5	Serp'zd mag alt perid br, trace sulf	9.4	7	1	0.6	22
254.1	11126	N Ann Creek	R	OC	C	2	Black/brown serp w/ tr sulf	31	21	2	<0.2	37
254.2	11122	N Ann Creek	R	OC	C	2	Fractured msv black serp	23	19	1	0.3	59
254.2	11123	N Ann Creek	R	OC	C	5	Gray melagbo to serp w/ fg dissem sulf	7	7	1	<0.2	186
254.2	11124	N Ann Creek	R	OC	C	4	Lt gray hbl gbo dike w/ dissem sulf	<5	3	3	<0.2	81
254.2	11125	N Ann Creek	R	OC	C	0.3	Black serp along contact of hbl gbo dike	11	8	1	0.2	89
255	10541	Upper Ann Creek	R	OC	G		Thin qz vn in fest metavolc	5	<1	8	0.5	196
256	10349	Marsha area	R	OC	G		Serp'zd melagbo/perid w/ <1% cpy & po/pent	20.2	39	13	0.6	627
256	10374	Marsha area	R	OC	C	5	Serp'zd mafic gbo dike w/ 1% po/pent	21	25	6	<0.2	169
256	10375	Marsha area	R	OC	S	1	Fest semi-msv po/pent in gbo br (dike margin)	11	30	2	0.2	681
256	10376	Marsha area	R	OC	C	4	Light gray gbo, slightly serp'zd, no sulfs detected	8	6	1	<0.2	120
256	10377	Marsha area	R	OC	C	5	Serp black/green	22	18	4	<0.2	83
256	10378	Marsha area	R	OC	C	7	Fg gray gbo dike	10	6	<1	<0.2	128
256	10524	Marsha area	R	OC	G		Perid w/ dissem sulfs	15.4	21	5	0.4	321
256	10539	Marsha area	R	OC	C	8	Serp'zd pyxite w/ slight red stain	20	18	10	1.7	1580
256	10540	Marsha area	R	OC	C	6	Serp'zd pyxite w/ slight red stain	10	12	3	<0.2	186
257	10520	Marsha	R	OC	C	1.3	Alt gbo at perid contact, Cu/Ni stain (fest gbo)	4.3	4	19	1.4	4150
257	10521	Marsha	R	OC	S	0.5	Alt gbo at perid/gbo contact, w/ msv sulf	5.5	8	89	22.9	**6.25%**
257	10522	Marsha	R	OC	C	6	Alt gbo along serp'zd perid contact, w/ msv sulf	3.7	13	250	1.2	4840
257	10523	Marsha	R	OC	S		Msv sulf pent/po+cpy	2.3	8	56	0.3	2680
258	2884	Upper Ann Creek	SS					14	11	3	<0.2	193
258	2885	Upper Ann Creek	SS					<5	4	5	<0.2	91
258	2886	Upper Ann Creek	R	OC	G		Fest sil sheared fault? Host rock: fg gbo, dissem py in qz vns	<5	4	48	0.3	84
259	2883	Ann Creek	SS					31	24	62	<0.2	150
260	10566	Western Trib to Delta River	PC					11	8	12	<0.2	91
260	10636	Western Trib to Delta River	PC					10	6	36	<0.2	78
261	10565	Western Trib to Delta River	PC				Few black sands	15	12	150	<0.2	60
261	10635	Western Trib to Delta River	PC					64	13	8	0.3	70
262	2882	Delta River Trib	SS					<5	4	2	<0.2	39
263.1	10205	Phelan Creek (Lower)	PC				Minor fg mag in pan	<5	5	3	<0.2	72
263.1	10117	Phelan Creek Trib	PC				Mostly gbo float	<5	2	8	<0.2	17
263.1	10118	Phelan Creek Trib	PC				Abundant mag in pan	10	4	67	<0.2	79
263.2	10446	Phelan Creek (Lower)	PC				Abundant mag, no visible Au	10.6	4	3	<0.2	63
264	10168	GR 2-3	R	OC	RC		Br qz vn/zone	0.5	1	8	0.3	89
265.1	10109	Miller Mine	R	OC	G	1	Sil greenstone	<5	<1	<1	<0.2	113
265.1	10110	Miller Mine	R	OC	G	1x1x1	Granite w/ qz vns	<5	<1	1	<0.2	68
265.2	10048	Miller Mine	R	OC	G		Cg ss to br w/ qz	0.9	1	1	<0.2	86
265.2	10678	Miller Mine	PC		PC		2 v fine Au flakes	<5	3	4	<0.2	41
266.1	10347	Ann Creek	R	OC	G		Serp'zd perid w/ minor garnierite & minor fest	70.1	75	24	1.3	509
266.1	10506	Ann Creek	PC				No visible Au, mod black sand	6.2	5	7	<0.2	70
266.1	10507	Ann Creek	R	OC	Rep		Perid	64.9	56	16	0.9	322

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
253	10326	5	27	<1	1120	448	1.36	2	**50**	<2	0.16	<0.5	64	4 81	<10	0.03	0.04	<10	10.35	604	0.02	<2	4	8	0.05	40	**<10**
253	10327	2	24	<1	1285	424	1.08	<2	**60**	<2	0.18	<0.5	74	4 91	<10	0.04	0.05	<10	10.6	504	0.02	<2	3	7	0.03	27	**10**
254.1	11126	5	38	1	1675	253	0.86	<2	30	2	0.51	<0.5	95	6.55	<10	0.01	0.03	<10	15.25	735	0.06	<2	5	40	0.04	21	<10
254.2	11122	2	18	<1	1375	356	1.37	8	20	<2	0.74	<0.5	96	5.6	<10	0.11	0.01	<10	10 9	471	0.02	<2	4	283	0.06	25	<10
254.2	11123	2	29	<1	146	164	2.14	<2	60	2	1.46	<0.5	19	3	10	0.04	0.07	<10	2.07	457	0.07	<2	4	13	0.2	72	<10
254.2	11124	9	59	<1	15	57	2.37	6	30	<2	2.39	<0.5	14	2.95	10	0.03	0.17	10	1.07	583	0.09	<2	5	55	0.13	105	<10
254.2	11125	<2	61	<1	492	540	3.63	8	20	<2	0.96	<0.5	40	4.53	10	<0.01	0.07	<10	5.54	713	0.08	2	4	149	0.11	58	<10
255	10541	7	128	2	6	42	2.83	8	120	<2	0.44	<0.5	22	6.84	10	0.04	0.2	<10	1.21	1885	0.06	<2	11	18	0.18	106	<10
256	10349	<2	48	<1	1180	342	1.67	4	**90**	<2	0.31	<0.5	74	5 37	<10	0.05	0.06	<10	8.48	646	0.05	<2	4	11	0.04	39	**<10**
256	10374	5	31	<1	1540	583	1.9	35	30	<2	0.81	<0.5	94	7.35	<10	0.01	0.05	<10	11.95	794	0.03	<2	7	20	0.07	51	<10
256	10375	8	29	1	946	424	2.45	7	90	<2	0.37	<0.5	152	8.91	<10	0.02	0.12	<10	2.99	322	0.03	<2	2	13	0.11	62	<10
256	10376	4	36	<1	255	369	3.17	5	90	<2	2.28	<0.5	37	4.39	10	0.19	0.1	<10	4.1	792	0.06	<2	11	65	0.16	108	<10
256	10377	4	23	1	1460	570	2.1	21	10	<2	0.63	<0.5	93	6.39	<10	0.01	0.02	<10	13.45	635	0.02	<2	8	16	0.06	61	<10
256	10378	3	47	<1	149	315	3.14	9	120	<2	3.48	<0.5	35	5	10	0.08	0.14	<10	3.07	810	0.04	2	15	85	0.15	135	<10
256	10524	<2	28	1	1240	362	1.43	<2	**70**	<2	0.41	<0.5	79	5.61	<10	0.02	0.1	<10	9.43	540	0.05	<2	4	<1	0.04	38	**<10**
256	10539	4	35	<1	1435	635	2.19	4	30	<2	0.67	<0.5	91	6.72	<10	0.03	0.08	<10	11.75	815	0.04	<2	9	6	0.08	58	<10
256	10540	<2	28	<1	784	636	3.16	5	20	<2	0.66	<0.5	55	4.26	<10	0.07	0.05	<10	7.53	785	0.07	<2	7	20	0.11	71	<10
257	10520	2	183	<1	69	155	1.05	3	**<10**	<2	7.72	1.7	13	7.76	<10	0.99	<0.01	<10	0.87	322	<0.01	<2	5	35	0.1	49	**10**
257	10521	3	1470	<1	329	129	0.95	44	**<10**	<2	5.98	6.1	79	11.85	10	5.8	<0.01	<10	0.92	275	<0.01	<2	6	<1	0.1	42	**<10**
257	10522	7	171	<1	542	51	0.19	7	**<10**	<2	0.74	4.4	310	>15	10	0.68	<0.01	<10	0.25	62	0.01	5	1	<1	0.02	18	**<10**
257	10523	8	53	<1	453	24	0.1	7	**<10**	<2	1.01	2.4	266	>15	<10	0.49	<0.01	<10	0.15	60	0.01	<2	<1	<1	0.01	8	**<10**
258	2884	6	94	<1	69	237	1.92	13	77	<5	1.28	0.5	40	8.34	<2	0.149	0.09	<1	1.69	733	0.04	<5	9	62	0.106	288	<20
258	2885	3	75	<1	88	117	1.91	16	58	<5	2.13	0.5	23	4.07	<2	0.112	0.06	2	1.7	705	0.03	<5	6	81	0.127	89	<20
258	2886	5	58	8	8	73	1.68	9	88	<5	0.23	<0.2	10	3.91	5	0.581	0.19	2	1.52	738	0.02	<5	<5	7	<0.01	50	<20
259	2883	4	147	<1	1364	314	1.13	13	67	<5	0.37	<0.2	93	7.38	<2	0.055	0.04	<1	10	1072	0.02	<5	<5	21	0.038	44	<20
260	10566	3	47	<1	602	279	1.98	5	40	<2	1.27	<0.5	49	6.43	<10	0.14	0.07	10	6.08	640	0.08	<2	5	54	0.21	75	<10
260	10636	<2	46	<1	442	250	2	3	40	<2	1.05	<0.5	38	4.71	<10	0.14	0.06	<10	4.69	549	0.07	<2	5	45	0.18	65	<10
261	10565	<2	41	<1	697	278	1.58	6	50	<2	1.23	<0.5	54	6.28	<10	0.09	0.07	10	6.77	758	0.07	<2	5	104	0.25	104	<10
261	10635	<2	40	<1	745	258	1.34	<2	50	<2	1.04	<0.5	56	7.44	<10	0.42	0.06	10	6.8	789	0.05	<2	4	57	0.26	132	<10
262	2882	4	62	<1	197	93	1.62	7	90	<5	0.6	<0.2	25	4.04	<2	0.026	0.09	6	2.33	560	0.02	<5	<5	38	0.085	82	<20
263.1	10205	2	38	2	43	77	1.59	4	140	<2	1.06	<0.5	14	4.16	10	0.12	0.08	<10	1.09	379	0.1	2	3	46	0.1	167	<10
263.1	10117	14	68	2	8	35	1.41	2	130	<2	0.17	<0.5	5	1.76	10	0.02	0.11	<10	1.13	523	0.06	<2	1	8	0.02	22	<10
263.1	10118	<2	40	1	44	72	1.64	6	80	<2	0.82	<0.5	14	4.32	10	0.1	0.08	<10	1.14	358	0.1	<2	3	36	0.1	166	<10
263.2	10446	6	41	<1	44	68	1.68	3	90	<2	1.23	0.6	14	4.71	10	0.09	0.08	10	1.14	398	0.09	<2	5	18	0.14	187	<10
264	10168	40	162	1	6	100	0.49	14	**200**	<2	0.19	1.4	8	1.44	10	0.02	0.03	10	0.37	286	0.02	<2	3	2	<0.01	24	**<10**
265.1	10109	9	36	<1	3	56	0.29	10	**270**	<2	0.04	<0.5	3	1 27	<10	0.03	0.07	<10	0.08	221	0.05	2	2	3	<0.01	8	**<10**
265.1	10110	<2	20	<1	4	57	0.63	<2	**410**	2	0.45	<0.5	3	1	<10	0.02	0.13	10	0.27	226	0.06	2	1	6	<0.01	6	**<10**
265.2	10048	5	63	1	17	63	0.59	31	**1670**	<2	0.06	<0.5	10	1 88	<10	0.17	0.07	<10	0.03	232	0.01	<2	6	6	0.01	23	**<10**
265.2	10678	7	42	<1	80	55	1.54	7	50	<2	0.71	<0.5	14	2.61	<10	0.16	0.07	<10	1.36	476	0.05	<2	4	41	0.13	66	<10
266.1	10347	5	53	<1	2620	289	0.54	<2	**<10**	<2	0.49	<0.5	147	9 32	<10	0.03	0.02	<10	15	1260	0.01	<2	5	5	0.03	16	**<10**
266.1	10506	9	54	1	120	66	1.71	8	310	2	1.46	<0.5	18	3.58	10	0.14	0.08	10	2.1	524	0.06	<2	5	38	0.1	80	<10
266.1	10507	4	42	1	1585	107	0.57	<2	**<10**	<2	0.25	0.6	132	8.11	<10	<0.01	0.01	<10	15	1115	0.02	<2	3	39	0.01	8	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
266.1	10766	Ann Creek	PC				1 v fine Au, minor mag; gbo-norite & perid bedrock	6	8	19	<0.2	84
266.1	11193	Ann Creek	R	OC	C	1	Perid/gbo contact	22	26	4	<0.2	335
266.2	10760	Ann Creek	R				Perid, semi-net-textured sulf, 5% pent & cpy	90	116	26	0.6	1140
266.2	10761	Ann Creek	R				Perid, ~1% dissem cpy, tr pent	35	35	8	0.2	384
266.2	10762	Ann Creek	R				Leucogbo to gbo-norite w/ weak serp	5	3	<1	<0.2	118
266.2	11189	Ann Creek	R	OC	G	1	Fresh dun	47	58	25	0.3	510
266.2	11190	Ann Creek	R	OC	C	1	Msv pent/po in fest shear in serp perid	483	825	35	1.6	7890
266.2	11191	Ann Creek	R	OC	C	0.5	6" gbo dike w/ dissem po in perid	41	64	11	0.3	854
266.2	11192	Ann Creek	R	OC	C	1.5	White gbo dike in perid	<5	1	<1	<0.2	64
266.3	6995	Ann Creek	R	RC	S		Ol gbo-norite w/ po, cpy, pent?	168	253	62	0.8	1120
266.3	6996	Ann Creek	R	RC	S		Ol gbo-norite w/ po, cpy, pent?	182	293	72	1	1315
266.3	10087	Ann Creek	S			3x2	Green, fg andesite(?) chips in soil	109	176	44	1.1	1245
266.3	10088	Ann Creek	S				Fel int, gdi, w/ plag, qz, & green mafic (hbl?) in soil	11	35	13	<0.2	394
266.3	10089	Ann Creek	S					61	81	3	<0.2	345
266.3	10090	Ann Creek	R	RC	G		Alt gbo, no evident sulf	<5	14	3	<0.2	151
266.3	10091	Ann Creek	S				Alt gbo, w/ phlog in soil	57	69	17	0.2	420
266.3	10092	Ann Creek	S				Serp bedrock	30	101	136	1.1	1680
266.3	10093	Ann Creek	S				Probably volc bedrock	370	174	57	1	1390
266.3	10094	Ann Creek	R	OC	G		Serp, gbo, & pyxite w/ 3-5% sulf	222	319	50	2.1	2230
266.3	10095	Ann Creek	R	OC	G		Serp	67	69	15	0.4	545
266.3	10607	Ann Creek	R	OC	SC	1.5	Gbo to felspathic perid	91	126	28	1.1	856
266.3	10608	Ann Creek	R	OC	SC		Gbo to felspathic perid	136	196	46	1.3	1375
266.3	10609	Ann Creek	R	OC	SC	2	Gbo to felspathic perid	100	152	34	0.9	1005
266.3	10610	Ann Creek	R	OC	SC	2	Gbo & modly to strongly serp'zd perid	87	106	20	0.7	656
266.3	10611	Ann Creek	R	OC	SC	2	Gbo to felspathic perid	111	146	38	0.9	988
266.3	10710	Ann Creek	R	TP	Rep		Serp w/ fg dissem sulfs, cpy, & po	248	373	80	2.3	2270
266.3	10759	Ann Creek	R				Norite dike in serp, minor sulf & garnierite	124	186	12	0.2	65
266.4	11188	Ann Creek	R	OC	G	1	Light brown weathered gbo	<5	10	4	0.3	296
267	6997	Ann Creek area	R	RC	Rep		Gabbroid dike	8	22	4	<0.2	175
267	6998	Ann Creek area	R	FL	S		Stream float - alt gabbroid w/ knots of cpy	<5	8	22	3.9	2844
267	10765	Ann Creek area	PC				1 fine, 1 v fine Au, minor mag	48	9	1580	<0.2	118
267	11194	Ann Creek area	R	OC	G	2	Gray-green serp'zd gbo	<5	19	4	<0.2	206
268	10348	Muddy Creek	PC				Gypsum cobbles in creek, no visible Au	2.3	2	4	<0.2	101
269	2658	Miller Creek	SS				Float - till	<5	3	4	0.2	60
270	11308	Miller Creek	PC				Glacial outwash of Canwell Glacier	<5	4	<1	<0.2	112
271	10567	Verona Creek	PC				Few black heavies, mostly ol	<5	4	10	<0.2	165
272	1045	Glacier Lake	R	OC	S	0.5	Alt di, qz di w/ msv (>50%) bronze sulf (pent/po?), trace cpy	460	839	160	3.9	**1.87%**
272	1046	Glacier Lake	R	RC	S		Serp (alt perid) w/ dissem fg sulfs 1-2%	71	80	24	0.3	895
272	7000	Glacier Lake	R	OC	S		Msv po, pent +/- cpy	671	1381	53	2.2	5875
272	11137	Glacier Lake	R	TP	S		Msv to semi-msv po, pent, cpy in serp	317	413	225	2.4	4910
272	11251	Glacier Lake	R	MD	G		Msv & semi-msv pent, po, cpy in serp	600	421	8	3.6	8480
272	11252	Glacier Lake	R	RC	G		Cu- & Ni-stained qz di/gdi/di	8	3	5	<0.2	961

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
266.1	10766	<2	61	<1	247	144	2.45	11	610	<2	1.89	<0.5	24	5.87	<10	0.3	0.15	10	2.8	682	0.07	<2	8	101	0.22	161	<10
266.1	11193	10	73	2	1450	132	2.81	<2	10	<2	4.02	<0.5	116	8.95	<10	<0.01	0.02	10	14 9	1300	0.01	<2	14	536	0.19	131	<10
266.2	10760	4	54	<1	3570	77	1.52	<2	90	<2	1.64	<0.5	126	8.13	<10	0.01	0.02	<10	14.15	984	0.09	<2	3	65	0.01	7	<10
266.2	10761	<2	43	<1	1880	100	0.68	<2	20	<2	0.48	<0.5	122	8.31	<10	<0.01	0.01	<10	18 5	1090	0.06	<2	3	83	0.01	7	<10
266.2	10762	<2	54	<1	70	15	2.53	3	10	<2	0.99	<0.5	22	4	10	<0.01	0.03	<10	1.24	294	0.38	<2	1	53	0.27	113	<10
266.2	11189	<2	43	1	3360	95	0.07	5	20	<2	0.08	<0.5	156	8.41	<10	<0.01	0.01	<10	21 9	1200	<0.01	<2	5	16	0.01	5	<10
266.2	11190	25	17	2	**6.74%**	203	0.34	13	20	11	0.17	<0.5	1765	34.4	<10	<0.01	0.01	<10	5.17	274	0.01	<2	3	3	0.05	28	<10
266.2	11191	6	32	1	2590	194	3.26	2	190	<2	2.92	<0.5	96	5.2	<10	0.01	0.04	<10	6.87	542	0.5	<2	3	6	0.03	27	<10
266.2	11192	7	50	1	172	8	4.81	2	770	<2	6.58	<0.5	12	1.97	10	<0.01	0.08	<10	2.25	477	0.16	<2	3	770	0.07	53	<10
266.3	6995	5	48	<1	1628	236	1.4	<5	24	<5	0.78	0.4	83	6.67	2	0.025	0.06	<1	8.79	717	0.04	<5	<5	19	0.035	22	<20
266.3	6996	7	51	<1	1520	219	1.33	<5	32	<5	0.36	0.4	78	6.59	3	0.011	0.11	<1	7.22	656	0.04	<5	<5	15	0.034	26	<20
266.3	10087	5	53	1	2550	666	4.84	8	80	2	1.85	<0.5	196	7.16	10	0.01	0.08	<10	5.97	1575	0.04	<2	10	50	0.11	85	<10
266.3	10088	21	73	1	567	68	3.27	31	20	<2	1.18	<0.5	68	4.57	10	0.01	0.01	<10	5.09	590	0.02	<2	6	116	0.09	67	<10
266.3	10089	3	30	<1	497	640	3.13	2	30	<2	1	<0.5	58	3.69	10	0.01	0.02	<10	6.18	592	0.02	<2	15	35	0.14	92	<10
266.3	10090	2	24	1	200	152	2.15	5	70	<2	0.89	<0.5	24	2.06	<10	<0.01	0.06	<10	2.49	295	0.05	<2	5	67	0.1	43	<10
266.3	10091	3	43	<1	997	769	4.7	4	30	<2	0.52	<0.5	106	5.85	10	<0.01	0.06	<10	7.53	701	0.02	<2	12	12	0.14	108	<10
266.3	10092	3	41	<1	1855	651	4.63	5	60	<2	1.2	<0.5	239	8.07	10	0.01	0.03	<10	7.83	940	0.02	<2	7	20	0.11	110	<10
266.3	10093	5	51	<1	1735	732	4.89	2	40	2	2.38	<0.5	138	6.6	10	<0.01	0.08	<10	6.61	873	0.03	<2	9	58	0.1	82	<10
266.3	10094	8	31	1	2110	334	2.54	5	30	2	0.64	<0.5	94	6.28	<10	<0.01	0.03	<10	9.11	539	0.02	2	4	25	0.06	33	<10
266.3	10095	7	18	<1	2290	638	0.51	6	20	<2	0.33	1	122	7.16	<10	<0.01	0.01	<10	15	538	<0.01	<2	6	7	0.02	17	<10
266.3	10607	6	57	<1	1750	194	1.66	2	50	<2	0.5	<0.5	107	7.94	<10	<0.01	0.05	<10	12 2	1120	0.03	<2	3	6	0.04	18	<10
266.3	10608	9	54	1	2140	244	1.52	2	60	<2	0.45	<0.5	112	7.86	<10	<0.01	0.05	<10	11.4	1050	0.04	<2	3	24	0.04	23	<10
266.3	10609	6	53	<1	1865	193	1.38	2	40	<2	0.45	<0.5	107	7.77	<10	<0.01	0.05	<10	11.95	1070	0.03	<2	4	19	0.03	19	<10
266.3	10610	5	47	<1	1505	323	1.78	5	30	<2	0.96	<0.5	91	7.05	<10	<0.01	0.09	<10	10 8	925	0.04	<2	4	22	0.05	27	<10
266.3	10611	6	54	1	1835	218	1.64	3	50	<2	0.56	<0.5	101	7.55	<10	<0.01	0.05	<10	10.75	1020	0.03	<2	3	23	0.04	21	<10
266.3	10710	12	71	1	2970	377	1.64	3	60	<2	4.37	<0.5	127	9.22	<10	<0.01	0.12	<10	8.16	1105	0.07	<2	5	8	0.09	44	<10
266.3	10759	4	28	<1	1240	637	2.44	6	<10	<2	0.68	<0.5	34	2.37	<10	<0.01	<0.01	<10	2.54	449	0.01	<2	2	38	0.09	36	<10
266.4	11188	<2	92	<1	77	44	2.72	<2	110	<2	1	<0.5	40	6.63	10	0.01	0.02	<10	2.13	748	0.02	<2	15	66	0.28	170	<10
267	6997	<2	31	<1	41	30	2.66	<5	15	<5	1.67	<0.2	21	4.4	4	<0.01	0.06	4	1.1	257	0.28	<5	<5	49	0.148	184	<20
267	6998	38	383	2	59	30	1.47	11	7	<5	5.85	3.4	11	2.22	3	0.215	<0.01	<1	0.61	292	<0.01	<5	<5	71	0.037	22	<20
267	10765	4	68	1	291	205	2.48	9	850	<2	2.03	<0.5	29	6.79	10	0.2	0.13	<10	2.99	689	0.08	<2	9	43	0.25	189	<10
267	11194	<2	44	1	40	10	2.26	7	40	<2	1.62	<0.5	21	4.85	10	0.01	0.09	<10	1.1	390	0.22	<2	5	18	0.32	220	<10
268	10348	8	54	<1	45	58	2.14	8	120	2	2.07	0.8	27	6.72	10	1.61	0.04	10	1.78	612	0.03	<2	10	44	0.16	160	10
269	2658	12	91	2	49	33	1.19	24	57	<5	1.78	<0.2	21	3.54	<2	0.184	0.06	5	1.17	588	0.03	<5	<5	96	0.046	50	<20
270	11308	8	47	<1	89	79	1.86	4	70	<2	0.85	<0.5	20	3.48	<10	0.29	0.05	<10	1.78	452	0.05	<2	6	55	0.12	104	<10
271	10567	13	114	<1	23	44	2.4	5	200	<2	1.13	<0.5	20	3.94	10	0.25	0.07	10	1.83	696	0.05	<2	8	55	0.28	123	<10
272	1045	11	168	<1	>20000	77	3.48	<5	22	<5	4.35	3.1	591	>10	10	0.436	<0.01	<1	1.19	287	0.01	<5	<5	67	0.033	31	<20
272	1046	6	50	<1	2056	293	1	8	20	<5	0.27	0.4	101	7.7	3	0.051	0.03	<1	10	797	0.02	<5	<5	11	0.026	19	<20
272	7000	16	130	<1	18775	12	1.28	<5	18	<5	1.71	1.8	532	>10	12	0.257	<0.01	<1	0.29	127	<0.01	<5	<5	23	0.014	26	<20
272	11137	35	86	<1	**2.37%**	585	1.76	<2	20	<2	0.87	1.8	617	19.2	<10	0.08	0.03	<10	7.33	577	0.01	<2	5	3	0.07	45	<10
272	11251	20	666	<1	**1.66%**	174	1.66	<2	<10	20	1.58	6.5	633	29	<10	0.18	<0.01	<10	1.24	148	0.01	<2	2	55	0.06	21	<10
272	11252	7	42	<1	415	43	8.65	8	30	<2	12 35	<0.5	31	4.22	10	0.01	0.01	<10	2.41	617	0.03	<2	11	5	0.07	102	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
272	11253	Glacier Lake	R	RC	S		Di w/ net-textured pent, cpy, po	316	259	194	1.4	**1.97%**
272	11254	Glacier Lake	R	OC	C	2.0	Serp	30	19	12	<0.2	264
272	11312	Glacier Lake	R	TR	S	1	Sulf-bearing serp	386	439	101	3.3	**1.20%**
272	11313	Glacier Lake	R	TR	S		Sulf-bearing serp	218	262	99	1.5	2870
272	11314	Glacier Lake	R	CO	SC	8X1	Sulf-bearing serp	393	570	104	3.3	**1.66%**
272	11380	Glacier Lake	R	OC	C	5	Sulf-bearing gbo	411	603	218	5.8	**4.13%**
272	11381	Glacier Lake	R	OC	C	7	Sulf-bearing gbo	342	707	66	2.3	9660
272	11382	Glacier Lake	R	OC	C	4.5	Sulf-bearing gbo	654	751	100	3.1	**1.13%**
273	11250	Verona Creek	PC				Minor mag, py, cpy; no visible Au	5	3	32	0.2	177
274	10308	Galena Slide	R	FL	G		Qz clast w/ fg gray sulf in 1" band	<5	2	97	45.3	203
275	10207	DJ-Silver	R	OC	S	0.5	Qz lens/vn(?) in volc metased, trace py, cpy	<5	4	3	10.2	194
275	10307	DJ-Silver	R	OC	G		Light gray, sil, metavolc, fest	<5	4	15	2.2	76
277.1	6962	Emerick	R	OC	G		Gbo-norite dike w/ pent, cpy	895	987	271	3	5227
277.1	6963	Emerick	R	RC	G		Msv chromite? in serp	443	298	80	1.8	2182
277.1	10130	Emerick	R	OC	C	3	Dun(?)	<5	10	<1	0.3	214
277.1	10131	Emerick	R	OC	C	1.4	Gbo-norite dike	5	8	1	0.3	149
277.1	10132	Emerick	R	OC	C	6	Gbo-norite dike	1175	1330	371	5	8050
277.1	11148	Emerick	R	OC	C	3	Black serp w/ tr garnierite stain	50	39	5	<0.2	98
277.1	11149	Emerick	R	OC	C	2	Sliver of gbo-norite dike	148	155	48	0.5	988
277.1	11150	Emerick	R	OC	S	0.5	Fest shear along margin of gbo-norite dike	32	46	19	<0.2	221
277.1	11371	Emerick	R	OC	CH	1.3	Fg gbo-norite dike w/ sheared serp contacts, tr Cu-st	33	41	8	<0.2	325
277.1	11372	Emerick	R	OC	SC	5.6	Gbo-norite, mg, weak serp, w/ 8% pent/po	1070	1205	314	4.9	8200
277.1	11373	Emerick	R	OC	SC	5.6	Gbo-norite, mg, weak serp, w/ 8% pent/po	848	1045	280	4.2	8930
277.2	10133	Emerick	R	OC	C	8.5	Gbo-norite dike	145	188	23	0.7	1045
277.2	10134	Emerick	R	OC	G	0.25	Serp from margins of gbo-norite dikes (#10133)	30	26	7	0.9	26
277.2	10135	Emerick	R	OC	C	4	Gbo-norite dike	10	9	1	0.2	103
277.2	10136	Emerick	R	OC	C	4	Gbo-norite dike	<5	3	5	0.4	272
277.2	11156	Emerick	R	OC	C	7	Sheared serp'zd gbo	59	69	13	0.2	43
277.2	11377	Emerick	R	OC	C	4.3	Serp & fg, msv gbo/basalt	20	24	<1	<0.2	140
277.3	6964	Emerick	R	RC	S		Msv sulf in serp	459	1038	53	2.9	**2.25%**
277.3	10137	Emerick	R	OC	C	5.5	Gbo-norite dike(?)	<5	2	1	0.3	75
277.3	10138	Emerick	R	OC	C	0.6	Sulf vns	63	71	3	0.3	201
277.3	10139	Emerick	R	OC	C	0.5	Sulf vns, msv pent	827	2090	269	2.9	8560
277.3	10140	Emerick	R	OC	C	2	Thin sulf vn, msv pent & po	294	674	62	1.4	3610
277.3	10303	Emerick	R	OC	G		Serp	462	2280	133	3.9	5730
277.3	11151	Emerick	R	OC	S	0.5	Fest shear in serp w/ Ni stain	457	321	14	0.7	2460
277.3	11152	Emerick	R	OC	S	0.5	Fest sheared serp w/ Ni stain	126	416	30	1.1	1380
277.3	11153	Emerick	R	OC	S	0.5	Fest serp w/ Ni stain	144	245	15	0.4	1855
277.3	11154	Emerick	R	OC	S	1	Fest sheared gbo	33	28	4	0.2	106
277.3	11155	Emerick	R	OC	S	0.5	Fest sheared serp	24	31	2	<0.2	122
277.3	11374	Emerick	R	OC	C	3.3	Fest serp w/ garnierite stain	300	266	40	1	2650
277.3	11375	Emerick	R	OC	C	3.3	Sheared serp w/ fest	80	94	9	0.2	1785

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
272	11253	4	38	<1	8210	76	4.7	4	30	3	6.94	0.9	213	8.59	<10	0.07	0.04	<10	1.9	350	0.04	<2	4	133	0.05	31	<10
272	11254	<2	48	<1	1445	549	1.7	<2	10	<2	0.57	<0.5	108	7.46	<10	0.02	0.02	<10	14.15	1050	0.01	<2	8	162	0.07	33	<10
272	11312	10	63	1	**2.98%**	264	4.86	<2	<10	7	4.6	1.6	658	20.3	<10	0.25	0.01	<10	4.09	673	0.01	<2	9	16	0.07	48	<10
272	11313	10	59	<1	**1.34%**	608	1.98	<2	10	<2	0.73	0.7	401	13.55	<10	0.08	0.02	<10	8.8	663	<0.01	<2	6	25	0.06	42	<10
272	11314	14	62	<1	**2.73%**	156	5.41	<2	10	30	8.13	1.8	580	18.7	<10	0.07	0.01	<10	2.44	394	0.02	<2	6	4	0.08	58	<10
272	11380	34	89	2	**2.56%**	149	4.29	4	<10	<2	6.36	0.7	582	23.9	<10	0.06	0.01	<10	1.84	250	0.04	<2	4	48	0.06	38	<10
272	11381	33	66	<1	**2.25%**	28	7.12	5	20	<2	11 05	<0.5	507	20.3	<10	0.02	0.01	<10	1.78	546	0.03	<2	13	99	0.07	115	<10
272	11382	41	53	1	**2.80%**	23	6.84	<2	10	<2	9.02	<0.5	570	25.9	<10	0.02	0.01	<10	1.56	490	0.02	<2	13	200	0.06	110	<10
273	11250	16	114	<1	23	31	2.42	6	260	<2	0.92	<0.5	22	3.96	10	0.64	0.06	<10	1.76	694	0.05	<2	7	3	0.22	112	<10
274	10308	**1.27%**	**5.15%**	<1	11	20	0.14	53	**45%**	<2	0.03	242	2	0.66	<10	10	0.03	<10	0.17	213	0.01	17	1	96	<0.01	8	**<10**
275	10207	530	1600	<1	6	20	1.02	29	**7.89%**	<2	9.66	8.4	7	1.76	10	0.51	0.04	<10	1.05	6350	0.01	9	3	98	0.01	31	**<10**
275	10307	306	458	5	49	23	0.79	20	**2230**	<2	0.14	2.5	8	3 81	<10	0.2	0.18	<10	0.8	417	0.03	13	3	6	0.09	51	**10**
277.1	6962	12	75	<1	7316	163	2.72	<5	56	<5	2.01	1.5	128	6.56	4	0.021	0.08	1	1.99	316	0.35	<5	<5	170	0.095	68	<20
277.1	6963	2	100	<1	4047	2768	0.17	<5	4	<5	0.18	1.1	68	2.2	<2	0.121	<0.01	<1	3.14	353	<0.01	<5	<5	3	0.025	18	<20
277.1	10130	<2	41	<1	277	48	3.18	6	**430**	7	2.43	<0.5	29	3.7	<10	0.04	0.12	<10	1.69	383	0.11	2	4	54	0.09	85	**<10**
277.1	10131	<2	36	<1	697	184	2.62	5	**40**	6	1.15	<0.5	46	4.13	<10	0.02	0.02	<10	6.44	762	0.02	<2	3	22	0.04	77	**<10**
277.1	10132	13	37	<1	**1.38%**	133	2.73	2	**120**	12	2.19	<0.5	189	6 37	<10	0.01	0.05	<10	2.25	277	0.3	<2	3	75	0.05	37	**<10**
277.1	11148	5	15	<1	2320	786	0.76	<2	<10	<2	0.02	<0.5	102	6.85	<10	<0.01	<0.01	<10	18.1	632	<0.01	<2	8	21	0.03	26	<10
277.1	11149	5	36	<1	1365	286	4.05	<2	30	<2	2.75	<0.5	57	4.83	<10	0.01	0.03	<10	5.88	621	0.18	<2	5	1	0.1	56	<10
277.1	11150	5	29	<1	2720	140	0.39	<2	30	<2	0.15	<0.5	95	5.29	<10	<0.01	<0.01	<10	17.45	491	0.01	<2	4	97	0.01	8	<10
277.1	11371	9	31	<1	613	261	5.96	<2	<10	<2	4.86	<0.5	41	3.76	<10	0.02	<0.01	<10	3.69	587	0.01	<2	8	31	0.09	71	<10
277.1	11372	24	46	<1	**1.39%**	180	3.06	2	30	<2	2.21	0.6	211	7.74	<10	<0.01	0.07	<10	2.69	397	0.25	<2	6	25	0.12	71	<10
277.1	11373	17	45	<1	**1.06%**	204	2.72	<2	40	<2	2.33	0.8	164	6.28	<10	0.01	0.07	<10	2.31	325	0.24	<2	4	98	0.1	64	<10
277.2	10133	<2	32	<1	1705	226	3.08	5	**220**	4	0.58	<0.5	48	3 34	<10	0.02	0.11	<10	3.19	480	0.85	<2	3	28	0.06	60	**<10**
277.2	10134	<2	9	2	1995	505	0.44	3	**<10**	9	1.76	<0.5	94	4 05	<10	0.01	<0.01	<10	14.65	454	0.01	3	4	90	0.01	16	**<10**
277.2	10135	<2	23	<1	180	217	2.93	2	**220**	7	0.96	<0.5	23	3.13	<10	<0.01	0.1	<10	2.75	290	0.41	<2	3	28	0.06	67	**<10**
277.2	10136	3	51	<1	186	106	4.08	11	**110**	11	1.81	<0.5	31	4 98	<10	0.01	0.08	<10	2.9	611	0.4	2	5	28	0.1	113	**<10**
277.2	11156	5	22	<1	2480	324	0.44	5	40	<2	0.95	<0.5	116	5.89	<10	<0.01	<0.01	<10	18.1	776	0.23	<2	4	16	0.01	7	<10
277.2	11377	7	35	<1	2350	231	0.07	<2	10	2	0.07	<0.5	131	8.25	<10	<0.01	<0.01	<10	19.4	1135	0.01	<2	5	45	0.01	6	<10
277.3	6964	14	240	<1	>20000	154	0.11	<5	20	<5	0.07	3.3	1408	>10	12	0.171	<0.01	<1	0.94	181	<0.01	<5	<5	2	0.011	21	<20
277.3	10137	2	64	<1	103	92	5.11	2	**320**	10	3.47	0.7	29	4 91	10	0.01	0.13	<10	2.87	511	2.3	<2	4	56	0.12	105	**<10**
277.3	10138	<2	10	1	2130	665	0.46	4	**50**	4	2.59	<0.5	103	5 94	<10	0.01	0.01	<10	7.6	463	0.01	3	5	74	0.02	30	**<10**
277.3	10139	3	98	<1	**4.67%**	248	0.16	4	**<10**	14	0.18	<0.5	1345	>15	<10	0.01	<0.01	<10	3.14	486	0.01	<2	1	<1	0.01	91	**<10**
277.3	10140	3	19	4	**1.31%**	696	0.78	3	**20**	9	0.96	<0.5	236	11.2	<10	0.01	0.01	<10	4.46	362	0.01	5	7	48	0.03	49	**<10**
277.3	10303	17	17	2	**6.30%**	88	0.16	7	**<10**	23	0.06	<0.5	2230	>15	<10	0.03	0.01	<10	1.03	233	0.01	<2	1	1	0.01	37	**<10**
277.3	11151	9	40	1	**1.17%**	838	0.58	6	10	2	1.12	<0.5	374	17	<10	<0.01	0.01	<10	10.35	854	<0.01	<2	8	12	0.05	47	<10
277.3	11152	15	25	1	7260	958	0.68	<2	10	2	0.79	<0.5	188	11.85	<10	<0.01	0.01	<10	13	618	<0.01	2	8	33	0.04	54	<10
277.3	11153	7	40	2	**1.07%**	838	0.68	10	20	2	0 8	<0.5	325	16	<10	<0.01	0.01	<10	11 3	930	<0.01	<2	9	14	0.04	46	<10
277.3	11154	4	5	<1	2370	525	0.14	67	<10	<2	1.1	<0.5	102	4.45	<10	<0.01	0.01	<10	12.35	701	0.02	<2	4	41	0.01	9	<10
277.3	11155	2	8	<1	2120	409	0.17	7	<10	<2	0.48	<0.5	104	5.6	<10	<0.01	<0.01	<10	16.15	443	<0.01	<2	5	68	0.02	21	<10
277.3	11374	9	25	2	5510	843	0.69	<2	10	<2	0.29	<0.5	114	8.93	<10	0.01	0.01	<10	2.14	157	0.01	<2	3	135	0.08	42	<10
277.3	11375	13	32	1	6240	786	1.49	<2	20	<2	0.63	<0.5	213	7.69	<10	0.01	0.04	<10	11 5	770	0.02	<2	9	2	0.06	52	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
277.3	11376	Emerick	R	OC	Rep	1.6	Sheared gbo w/ white oxide on anastomosing shears	10	19	3	<0.2	38
278	10302	Red Knob	R	OC	G		Msv cpy & py hosted in um	<5	4	82	13.9	8880
278	10394	Red Knob	R	RC	C	2	V fest volcs w/ lens of cpy	<5	1	36	9.7	2670
279	1021	N Red Rock Canyon	R	OC	Rep	3	Fest, sil fel volc to qz vn, shear w/ dissem py 1-3%	<5	1	123	8.2	169
279	9752	N Red Rock Canyon	R	RC	S		Sil intermed volcs (orange & yellow fest)	<5	2	36	3.4	63
280	11016	GR 2-1	R	OC	G	1x3	Fest perid	5	3	24	0.8	422
280	11160	GR 2-1	R	OC	G	2	Dark gray fest volc w/ dissem py & mal on fractures, sil	<5	1	<1	0.2	750
281	10169	Red Rock Canyon, E Wall	R	OC	C		Mafic aphanitic volc	<0.5	1	17	0.7	93
281	10170	Red Rock Canyon, E Wall	R	OC	Rep		Aphantic-porph volc (andesite?)	1.3	2	3	<0.2	36
281	10345	Red Rock Canyon, E Wall	R	OC	G		Fest metavolcs (andesite?) w/ py +/- cpy	1.1	3	14	4	3570
282	1022	Red Rock Canyon	R	OC	C	0.4	0.4' qz vn w/ v small amounts of gn & cpy <<1%.	6	2	32	3.3	365
282	6965	Red Rock Canyon	R	RC	S		Cpy in volcaniclastics & @ margin of diabase dike	<5	4	11	6	**2.00%**
283	6966	Red Rock Canyon	R	RC	S		Sil zones & qz vns in dacitic volcaniclastic	<5	2	4	1.1	1939
284	9753	Red Rock Canyon	R	RC	S		Iron, mal & azurite stained gw w/ py & cpy(?)	<5	4	3	3.8	2916
285	10004	Eagle's Nest	R	drill chips	Rep	20	Greenstone w/ minor cpy & py	<5	4	<1	0.3	704
285	10005	Eagle's Nest	R	drill chips	Rep	55	Greenstone w/ Cu-st	<5	4	3	0.5	605
285	10208	Eagle's Nest	R	OC	CC	2	Sil volc	1.3	3	1	0.3	515
285	10209	Eagle's Nest	R	OC	CC	0.2	Qz-cc vn in andesite w/ Cu-st	1	5	15	18.6	**3.04%**
285	10210	Eagle's Nest	R	OC	C	0.3	Qz vn/cc shear w/ cpy in andesite	0.7	1	2	0.8	1065
286	10337	GR 2-2 area	R	OC	C	0.5	Msv py along 2' qz vn in volcs (very fest)	1.4	1	73	39	**7.17%**
286	10338	GR 2-2 area	R	OC	S		Qz-cc vn	2.8	2	4	0.4	7560
286	10339	GR 2-2 area	R	OC	S		1" qz-cc vns w/ up to 20% cpy in stringers in fg gray volc	1.1	1	14	13.6	**2.21%**
289	10106	GR 2-4	R	OC	S	1x1	Greenstone, mal, bn(?) in sil metased host	<5	3	29	**310**	**17.50%**
290	10941	Rainbow Ridge	R	OC	G		Limonitic limey volc seds w/ micro fossils in small shear	<5	<1	4	<0.2	27
291	10942	Rainbow Ridge	R	OC	Rep	6x6	Sil fest pyritic light gray fg volc	<5	1	5	0.2	24
292	10943	GR 2-C4NW	R	RC	S		Volcaniclastic w/ qz/cc/epid vnlets to 0.06" w/ bn/mal/cpy	<5	7	9	3.6	5240
293	10944	GR 2-C4C	R	OC	Rep	10x10	Light gray fract pyritic sil volcaniclastic	<5	2	4	0.4	42
294	10335	Verona Pick	R	FL	Rep	1	Semi-msv sl & py +/-cpy +/-gn in qz-cc vn in dacite	2.6	2	4970	**113**	2690
294	10336	Verona Pick	R	OC	C	0.3	Qz-cc vn in dacite w/ ~10% sl +/- cpy +/-gn	1.6	1	874	32.3	6870
295	10161	Verona Pick area	R	OC	RC		Sil andesite/ tuff	<0.5	2	3	0.4	18
295	10162	Verona Pick area	R	FL	S		Qz-cc vn	<0.5	<1	95	5.2	774
295	10163	Verona Pick area	R	FL	S		Vuggy qz-cc vn	1.1	2	296	24.8	456
295	10333	Verona Pick area	R	OC	RC	2	V fest qz dacite w/ dissem py, alt shear zone w/ most py gone	1.5	3	6	0.4	16
295	10334	Verona Pick area	R	OC	C	2	V fest qz dacite shear zones w/ qz-cc vns, ~0.2"	2	3	736	11.9	626
296.1	11245	Verona Cirque	R	OC	G		Alt andesite w/ seam of dissem py, cpy	<5	<1	148	1.6	1240
296.2	11246	Verona Cirque	R	FL	S		Qz segregation in intermed to fel volc w/ cpy & py	<5	1	196	49.1	**2.44%**
296.2	11247	Verona Cirque	R	FL	S		Qz vn w/ cpy, py, gray sulf (possible gn)	<5	1	395	24.1	**1.76%**
296.2	11248	Verona Cirque	R	OC	C	0.6	Qz-rich lens in andesite w/ py, cpy	<5	<1	14	0.8	1255
296.2	11249	Verona Cirque	R	OC	Rep		Mineralized andesite w/ cpy, py, chalcocite, bn	<5	<1	86	8.6	**1.19%**
296.3	11131	Verona Cirque	R	OC	G		Semi-msv & dissem py + cpy in andesite	<5	<1	90	4.6	6290
296.3	11132	Verona Cirque	R	FL	S		Jasper w/ py & minor cpy in intermed volc	<5	1	87	0.6	1110
296.4	11133	Verona Cirque	R	FL	G		Qz-rich boulder w/ cpy, py, chalcocite, minor gn	5	<1	5580	**279**	**3.35%**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
277.3	11376	5	30	<1	3200	157	0.03	<2	10	2	1.12	<0.5	99	5.3	<10	<0.01	<0.01	<10	18 9	721	0.01	<2	5	9	0.01	4	<10
278	10302	69	265	66	8	35	4.65	53	**470**	15	0.02	2.6	48	>15	10	0.05	0.06	<10	3.61	2880	0.01	<2	7	3	0.03	159	**<10**
278	10394	29	112	31	6	41	1.98	40	20	7	0.08	<0.5	15	7.9	10	0.04	0.24	<10	1.32	919	0.01	<2	5	8	0.05	68	<10
279	1021	760	368	12	15	208	0.51	65	64	<5	0.29	2.9	9	3.94	4	0.152	0.1	2	0.28	199	0.02	6	<5	21	0.025	32	<20
279	9752	57	285	41	11	62	3.14	25	13	<5	0.05	0.4	53	>10	12	0.045	0.06	<1	2.39	2138	<0.01	<5	<5	1	<0.01	108	<20
280	11016	4	140	1	140	19	2.42	12	200	<2	0.15	<0.5	25	5.61	10	0.01	0.14	<10	1.97	1535	0.03	<2	7	<1	0.11	65	<10
280	11160	<2	120	<1	6	25	2.66	4	90	<2	0.27	<0.5	14	3.56	<10	<0.01	0.45	<10	2.13	1320	0.02	<2	6	2	0.1	54	<10
281	10169	49	72	7	2	40	0.65	41	**2650**	<2	0.1	<0.5	5	1.45	<10	0.08	0.19	<10	0.47	214	0.01	3	1	2	0.03	5	**<10**
281	10170	5	137	4	4	36	2.29	15	**0.11%**	<2	0.15	<0.5	9	4.15	20	0.05	0.09	10	2.31	1370	0.03	<2	3	1	0.07	60	**<10**
281	10345	9	199	1	18	39	3.42	295	**420**	<2	0.25	0.9	10	10.8	10	3	0.03	<10	2.47	2680	0.01	9	2	17	0.02	36	**<10**
282	1022	1287	5978	34	4	106	0.24	13	56	6	2.43	111.5	9	0.8	<2	6.005	0.16	<1	0.05	576	<0.01	<5	<5	30	0.021	8	<20
282	6965	26	477	<1	61	45	3.75	6	37	6	1.3	0.9	18	9.42	11	0.071	0.09	2	3.19	3413	<0.01	<5	<5	35	0.045	99	<20
283	6966	11	84	2	14	98	1.23	8	115	<5	0.42	0.4	8	2.27	3	0.089	0.19	2	0.72	759	0.03	6	<5	4	0.015	9	<20
284	9753	22	88	2	24	61	1.38	8	89	<5	0.14	<0.2	12	3.41	3	0.227	0.21	2	0.91	637	0.02	<5	<5	4	0.041	15	<20
285	10004	16	527	<1	10	30	3.11	8	**1850**	8	0.7	2	19	4 03	<10	0.05	0.08	<10	2.68	2320	0.03	<2	2	17	0.05	59	**<10**
285	10005	5	220	3	10	22	2.82	24	**1200**	4	0.31	<0.5	18	4 29	<10	0.05	0.12	<10	1.86	1925	0.02	<2	2	15	0.04	47	**<10**
285	10208	11	549	<1	12	43	2.92	4	**920**	<2	0.51	1.7	19	4 52	10	0.03	0.11	<10	2.65	2280	0.04	4	5	24	0.12	84	**<10**
285	10209	6	115	<1	5	91	1.16	225	**6280**	<2	0.41	1.5	7	3 37	<10	0.21	0.05	<10	0.64	892	0.01	10	2	39	0.02	30	**<10**
285	10210	203	299	1	4	67	0.92	14	**790**	8	5.44	1.2	5	1 37	<10	0.1	0.07	<10	0.66	1090	0.01	<2	2	27	0.04	20	**10**
286	10337	664	1355	58	6	103	0.93	90	**80**	<2	0.03	4.9	30	10.5	<10	1.99	0.04	<10	0.72	604	0.01	<2	3	3	0.02	21	**<10**
286	10338	37	253	<1	53	224	2.32	<2	**140**	<2	8.72	1.9	33	3.12	<10	0.05	0.02	<10	2.07	1770	0.02	4	11	31	0.08	101	**<10**
286	10339	29	98	<1	7	132	0.75	19	**60**	2	0.66	<0.5	12	4.43	<10	0.53	0.03	<10	0.58	605	0.02	3	3	4	0.02	25	**<10**
289	10106	24	264	2	5	40	1.47	25	**300**	4	0 2	<0.5	11	5 25	10	0.48	0.04	<10	0.63	895	0.02	<2	4	4	0.01	10	**<10**
290	10941	19	88	<1	6	8	0.83	29	1700	<2	13.8	<0.5	14	4.77	<10	0.02	0.12	10	0.91	4630	0.02	6	14	9	0.03	67	<10
291	10942	10	52	<1	<1	7	1.44	11	50	<2	0.65	<0.5	5	2.98	<10	0.06	0.05	<10	1.3	455	0.03	2	6	103	0.26	57	<10
292	10943	6	71	<1	8	18	1.95	40	360	<2	1.1	0.5	21	3.57	<10	0.43	0.19	<10	1.25	562	0.02	7	8	25	0.1	78	<10
293	10944	6	25	1	3	8	0.82	62	110	<2	0.39	<0.5	8	2.04	<10	0.65	0.12	<10	0.35	75	0.05	5	4	47	0.15	31	<10
294	10335	**5.06%**	**21.80%**	80	6	64	0.36	120	**110**	4	2.48	500	16	3.4	10	4.45	0.03	<10	0.41	1295	0.01	11	1	19	<0.01	23	**<10**
294	10336	**4.63%**	**10.65%**	2	5	68	1.62	301	**140**	<2	2.43	443	6	6.16	10	2.27	0.01	<10	2.17	6160	0.01	25	2	42	<0.01	61	**<10**
295	10161	97	139	1	5	48	1.41	12	**4390**	2	0.05	<0.5	6	2 89	<10	0.01	0.35	<10	1.34	2010	0.02	<2	3	3	0.03	31	**<10**
295	10162	4030	**1.35%**	30	3	32	0.79	46	**5180**	11	9.64	69.7	11	2.15	<10	0.51	0.1	<10	0.88	2210	0.01	2	2	43	0.04	17	**<10**
295	10163	**5.62%**	**6.04%**	6	4	53	1.08	90	**2210**	<2	0.33	348	11	2.76	20	2.35	0.17	<10	0.93	1300	0.01	21	2	4	0.04	23	**<10**
295	10333	29	90	1	31	34	0.96	46	**2550**	<2	0.03	<0.5	3	2 85	<10	0.09	0.18	<10	1.39	1120	0.02	2	2	3	0.08	23	**<10**
295	10334	8190	**1.17%**	34	18	93	0.72	41	**4600**	<2	0.04	55.1	4	2 37	<10	1.24	0.16	<10	0.89	965	0.01	7	1	13	0.01	17	**<10**
296.1	11245	<2	89	<1	8	19	2.95	6	20	<2	1.76	<0.5	16	5.04	10	0.08	<0.01	<10	2.15	922	0.04	<2	6	25	0.4	63	<10
296.2	11246	136	232	29	25	119	0.37	53	<10	14	0.08	2.9	54	15.8	<10	0.07	0.08	<10	0.23	94	<0.01	3	2	130	0.02	17	<10
296.2	11247	5520	**7.01%**	261	5	100	0.14	39	20	13	0.03	500	65	6.89	<10	0.03	0.06	<10	0.04	32	<0.01	6	<1	7	0.01	6	<10
296.2	11248	27	211	11	3	86	2.23	15	50	2	0.24	1.3	20	5.29	10	0.16	0.06	<10	1.78	746	0.01	<2	4	5	0.07	55	<10
296.2	11249	1905	2730	79	1	68	2.07	62	40	11	0.1	25.3	33	7.3	10	0.56	0.13	<10	1.58	740	<0.01	2	4	13	0.04	40	<10
296.3	11131	14	64	39	6	75	2.3	152	10	17	0.17	<0.5	148	18.2	<10	0.11	0.1	<10	1.68	674	0.01	2	5	19	0.08	37	10
296.3	11132	4	7	4	6	161	0.59	5	30	<2	0.92	<0.5	6	9.38	<10	0.02	0.01	<10	0.16	136	0.01	<2	2	3	0.05	76	<10
296.4	11133	6500	4080	225	3	119	0.07	49	40	39	<0.01	26.5	16	3.98	<10	0.34	0.03	<10	0.02	12	0.01	112	<1	48	<0.01	3	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
296.5	11134	Verona Cirque	R	FL	G		Qz-rich vn w/ cpy, py, +/- gn, sl	<5	2	488	68.8	**3.21%**
296.5	11135	Verona Cirque	R	FL	S		Semi-msv sulf in qz	<5	<1	252	96.9	**4.27%**
296.5	11136	Verona Cirque	R	FL	S	0.5	Msv cpy, gn, & chalcocite in qz vn intruding melavolc	<5	<1	1630	65.7	**5.70%**
297	9274	Canwell Complex	R	RC	G		Perid to gbo w/ dissem po	112	42	37	<0.2	222
298	10086	Upper Glacier	R	RC	G		Perid to pyxite w/ 3-5% sulf, cpy, po, pent(?)	259	280	144	1.8	2330
298	10306	Upper Glacier	R	OC	G	6	Mostly fg perid d ke, magnetic w/ minor sulf	15	18	13	1.1	179
298	10606	Upper Glacier	R	OC	Rep	30x100	Serp'zd felspathic perid w/ dun	76	70	22	0.7	603
298	10708	Upper Glacier	R	OC	SC	21@1	Um rocks, mod serp'zd	102	132	35	0.5	798
298	10709	Upper Glacier	R	OC	S		High grade sulf in um rocks	190	231	68	0.4	1060
299	10284	Odie	R	TP	S		Serp w/ Cu-st, phlog, mag	2780	5250	2120	7.1	**1.70%**
299	10305	Odie	R	OC	G	1	Melagbo or perid(?) dike w/ 1-3% sulf	131	169	49	4.5	821
299	10460	Odie	R	OC	C	2	Pyxite dike	16.8	14	4	0.5	1225
299	10975	Odie	R	OC	SC	16	Ol perid to ol gbo w/ minor po +/- cpy	47	49	14	0.3	262
299	10976	Odie	R	OC	S	2.5	Pyxite, gossan, & perid w/ po, mag, minor cpy	2840	1500	170	2.6	2610
300.1	6974	Canwell Glacier	R	TP	G		Hornblendite or pyxite w/ cpy, po, & pent?	1131	1368	577	3.5	8137
300.1	10085	Canwell Glacier	R	MD	S		Fest perid w/ minor sulf & gossan	1165	902	359	9	**4.12%**
300.1	10705	Canwell Glacier	R	TP	SC	6	Cu-st perid w/ po	874	880	296	3.8	5260
300.2	6975	Canwell Glacier	R	RC	G		Fg gbo w/ minor Cu-st	14	16	7	<0.2	431
300.2	10084	Canwell Glacier	R	TP	S		Gbo to mafic gbo w/ cpy, pent, po	1005	861	451	6.1	9700
300.2	10703	Canwell Glacier	R	TP	S		Fest serp'zd perid w/ sulf, garnerite on fractures	12850	12650	1390	51.1	**4.31%**
300.2	10704	Canwell Glacier	R	TP	S		Dun w/ po	120	281	14	1	1350
301.1	10706	GR 2-B4EC	R	OC	G		Gdi w/ minor cpy, po(?)	20	12	3	0.2	273
301.1	10707	GR 2-B4EC	R	RC	G		Pyxite to perid, no evident sulf	7	9	1	<0.2	135
301.2	10605	GR 2-B4EC	R	OC	RC	50	Qz, in granitoid	10	10	3	<0.2	212
302	10159	Rainbow Peak	R	OC	Rep		Basalt(?) or andesite(?)	0.7	2	<1	0.7	109
303	10945	GR 2-5	R	FL	S	0.5	Fest pyritic volcaniclastic	<5	2	5	0.2	165
304	10167	MF1996C-110	R	OC	C		Qz-cc-epid vn	2.8	17	2	<0.2	128
304	10344	MF1996C-110	R	OC	RC		Qz-cc-epid vn, up to 1', in fest mafic metavolcs	4.3	23	11	0.3	251
306	10622	GR 2-7	R	RC	SC	1x5	Dacite/basalt w/ 0.5-2" non mineralized qz vn/vnlets	5	<1	1	<0.2	50
307	10556	GR 2-8	R	FL	G		Qz vn w/ green Cu-st	<5	<1	2	0.4	1495
307	10623	GR 2-8	R	RC	SC	1x15	Metaseds-marble	7	1	<1	<0.2	15
308	11378	GR 2-9 area	R	OC	C	2.6	Qz vn w/ local limonite in shears	<5	1	3	<0.2	36
308	11379	GR 2-9 area	R	OC	S		Qz vn in arg w/ 2% py in clots & dissem	5	3	4	0.4	84
309	11176	GR 2-9 area	R	OC	S	0.5	Gray sil arg in limonite-weathered zone	<5	1	<1	0.3	116
309	11177	GR 2-9 area	R	OC	Rep	1	2 " aplitic d ke w/ gray sil halo & dissem py & po	10	38	1	<0.2	174
311	11157	GR 2-9 area	R	FL	S		Fest sil volc w py dissem & in fracts	<5	1	33	2.3	16
313	10628	Fossil Creek	PC				Float: igneous	8	4	8	<0.2	84
314	10626	Fossil Creek	PC				No heavies	10	2	39	<0.2	82
314	10627	Fossil Creek	PC					7	4	10	<0.2	95
315	10822	Fossil Creek Ridge	R	OC	G		Calc arg w/ minor py & gossan	6	1	<1	0.2	57
316	10557	Dandy Dan area	R	FL	S		Red grey highly sil chert(?), original metased?	<5	<1	1	<0.2	96
318	10190	GR 2-11	R	OC	Rep	16	Qz vn w/ minor cc (6-9" wide)	<0.5	1	2	0.3	26

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
296.5	11134	1890	1295	43	5	126	0.47	61	10	3	0.1	9.7	58	12.5	<10	0.16	0.09	<10	0.31	228	<0.01	6	2	4	0.01	18	<10
296.5	11135	685	**2.34%**	158	<1	90	0.27	84	20	22	0.01	151	69	15.2	<10	2.36	0.05	<10	0.14	126	<0.01	5	1	7	<0.01	12	10
296.5	11136	**1.36%**	**2.32%**	104	2	98	0.07	85	20	24	<0.01	213	73	15.7	<10	1.4	0.02	<10	0.03	45	<0.01	6	1	3	<0.01	6	10
297	9274	<2	40	<1	1016	193	0.56	<5	22	<5	0.22	<0.2	87	7.41	<2	<0.01	0.07	<1	10	864	0.05	<5	<5	13	0.028	12	<20
298	10086	3	28	<1	3600	620	0.51	<2	20	<2	0.21	<0.5	80	3.9	<10	0.01	0.05	<10	2.76	402	0.02	<2	6	8	0.05	44	<10
298	10306	162	38	1	1310	211	1.03	9	**130**	7	0.53	<0.5	68	5 22	<10	0.01	0.01	<10	8.13	487	0.02	59	3	7	0.03	47	**<10**
298	10606	4	37	<1	2310	288	0.83	<2	10	<2	0.21	<0.5	110	7.15	<10	0.01	0.01	<10	15	1065	0.01	<2	5	46	0.02	11	<10
298	10708	8	32	<1	3140	212	0.92	2	10	<2	0.27	<0.5	115	7.17	<10	<0.01	0.01	<10	15	1030	0.01	<2	4	5	0.03	10	<10
298	10709	5	26	<1	2990	736	1.18	4	10	2	0.34	<0.5	103	5.1	<10	0.01	0.01	<10	10.35	626	0.02	<2	5	11	0.06	40	<10
299	10284	25	46	1	**1.70%**	752	1.14	13	50	<2	0.17	1.4	338	23	<10	<0.01	0.01	<10	3.28	578	0.02	<2	3	4	0.06	84	<10
299	10305	701	50	2	3140	131	0.42	19	**20**	6	0.08	<0.5	149	9.67	<10	0.01	0.03	<10	15	1420	0.01	247	3	4	0.01	8	**<10**
299	10460	2	39	<1	448	823	2.57	2	**50**	<2	0.35	0.5	48	5.17	<10	0.04	0.01	<10	4.4	426	0.04	<2	3	31	0.11	78	**<10**
299	10975	7	41	<1	1725	183	1.7	<2	20	<2	0.24	<0.5	124	8.55	<10	0.01	0.03	<10	14.1	1145	0.02	<2	5	108	0.01	13	<10
299	10976	9	32	<1	9500	706	1.72	7	30	<2	0.53	<0.5	209	11.35	<10	<0.01	0.02	<10	9.44	846	0.02	<2	8	6	0.04	43	<10
300.1	6974	11	95	<1	5377	861	1.89	<5	32	<5	0.27	1	105	>10	6	0.143	0.05	2	6.18	448	0.04	<5	<5	5	0.039	61	<20
300.1	10085	19	37	<1	**1.67%**	126	2.67	4	100	<2	1.48	5.1	216	6.62	<10	0.05	0.23	<10	1.18	466	0.27	2	8	442	0.13	125	10
300.1	10705	9	52	1	5850	737	2.29	3	40	<2	0.32	<0.5	124	10.5	<10	0.02	0.06	<10	7.3	668	0.05	2	5	7	0.06	56	<10
300.2	6975	4	37	2	64	93	2.64	<5	37	<5	1.74	<0.2	19	2.68	<2	<0.01	0.1	<1	2.23	385	0.43	<5	5	26	0.114	64	<20
300.2	10084	10	47	1	4240	809	2.27	7	40	<2	0.38	<0.5	87	9.91	<10	0.02	0.07	<10	6.19	576	0.07	<2	5	31	0.06	66	<10
300.2	10703	87	18	1	**10.45%**	74	0.07	8	<10	9	0.03	18.8	1520	>15	<10	0.37	<0.01	<10	0.57	174	0.01	<2	<1	60	0.01	9	10
300.2	10704	9	29	<1	6250	328	0.21	2	<10	<2	0.32	<0.5	195	8.49	<10	0.1	<0.01	<10	15	1070	<0.01	<2	5	14	0.01	9	<10
301.1	10706	4	237	1	200	16	2.38	2	190	<2	0.55	<0.5	12	4.46	10	0.37	0.41	<10	1.06	1235	0.09	<2	7	7	0.08	41	<10
301.1	10707	2	25	<1	926	812	3.1	5	10	<2	0.4	<0.5	62	4.95	<10	0.02	0.03	<10	6.27	375	0.03	<2	3	29	0.07	54	<10
301.2	10605	2	32	<1	79	52	3.03	4	30	<2	2.18	<0.5	22	3.2	10	0.01	0.05	<10	1.46	409	0.09	<2	3	31	0.14	86	<10
302	10159	<2	90	<1	61	29	2.61	7	**460**	4	1 3	<0.5	28	5 98	10	<0.01	0.11	<10	1.32	473	0.19	3	3	19	0.39	145	**10**
303	10945	6	64	<1	7	11	2.38	27	50	<2	0.59	<0.5	18	5.61	10	0.03	0.14	<10	1.78	657	0.03	<2	6	16	0.16	73	<10
304	10167	5	56	<1	34	65	1.69	<2	**40**	<2	2.03	<0.5	17	3 53	10	<0.01	<0.01	10	1.06	356	0.01	3	4	101	0.35	88	**<10**
304	10344	7	59	<1	102	53	2.11	7	**70**	<2	15	1	19	3 96	10	0.02	0.01	<10	1.42	1100	0.02	<2	10	89	0.23	135	**<10**
306	10622	5	77	<1	10	27	1.99	10	170	<2	5.71	<0.5	7	2.48	10	0.02	0.02	10	1.44	934	0.06	2	7	61	0.21	45	<10
307	10556	<2	47	1	12	66	0.79	5	110	<2	0.14	<0.5	6	1.39	<10	0.02	0.01	<10	0.88	414	0.02	<2	3	136	0.02	21	<10
307	10623	<2	24	1	33	80	0.73	2	40	<2	1.71	<0.5	5	1.19	<10	<0.01	0.03	<10	0.71	418	0.04	<2	3	93	0.01	26	<10
308	11378	3	19	5	25	90	0.17	5	40	<2	1.26	<0.5	3	1.04	<10	<0.01	0.01	<10	0.53	217	0.02	<2	4	3	<0.01	27	<10
308	11379	5	10	2	110	150	0.48	5	290	2	0.69	<0.5	6	1.46	<10	<0.01	0.03	<10	0.25	163	0.05	<2	1	65	0.02	20	<10
309	11176	10	90	<1	2	6	0.81	37	450	<2	1.24	1.1	9	3.5	<10	<0.01	0.06	<10	0.75	830	0.07	<2	8	30	<0.01	43	<10
309	11177	19	308	<1	10	33	0.95	14	340	<2	2.27	1.9	14	3.86	<10	<0.01	0.08	<10	1.23	1010	0.07	<2	18	96	<0.01	61	<10
311	11157	25	38	24	71	72	1.08	30	20	<2	0.81	<0.5	37	5.92	<10	0.01	0.01	<10	1.09	347	0.05	2	6	51	0.12	61	<10
313	10628	22	75	1	21	46	2.91	11	1090	<2	2.49	<0.5	21	4.41	<10	0.03	0.3	<10	1.8	685	0.11	<2	10	89	0.2	106	<10
314	10626	12	74	1	18	41	2.81	8	1530	<2	1.77	<0.5	20	4.56	<10	0.02	0.23	<10	1.98	705	0.06	<2	9	15	0.18	97	<10
314	10627	82	83	<1	20	39	2.61	20	340	<2	2.57	<0.5	24	4.78	<10	0.05	0.23	<10	1.78	676	0.09	<2	9	76	0.19	103	<10
315	10822	8	64	<1	17	81	7.42	45	20	<2	9.07	<0.5	10	1.98	20	0.05	<0.01	10	0.49	412	0.01	<2	9	26	0.24	69	<10
316	10557	9	83	1	8	28	3.04	23	130	<2	1.86	<0.5	18	5.26	10	0.01	0.2	10	1.73	930	0.06	2	11	8	0.22	104	<10
318	10190	30	20	1	5	86	0.46	10	**190**	6	1.35	<0.5	8	1.78	<10	0.02	0.03	<10	0.32	227	0.02	5	2	15	0.02	24	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
318	10192	GR 2-11	R	OC	Rep		Qz vn	5.1	7	7	0.4	378
318	10624	GR 2-11	R	OC	RC		Fault br, strong fest w/ qz vns	<5	3	4	<0.2	92
318	10625	GR 2-11	R	OC	RC		Qz vns w/ minor sulfs	<5	<1	1	<0.2	261
319	10373	GR 2-10 area	R	OC	G	1	Red/purple & green volcaniclastic	<5	1	42	<0.2	83
320	10189	GR 2-10	R	FL	S		Qz vn float (some pieces are vuggy & contain minor cc)	<0.5	<1	1	9.5	4560
321	2887	McCallum Creek	SS				Glacial seds	<5	4	5	<0.2	132
322	10538	GR 2-12	R	RC	S		Qz-rich lens w/ cpy	<5	1	44	**95**	**10.95%**
323	10372	GR 2-12 area	R	RC	S		Cu-st volc	13	8	2	0.2	**1.13%**
323	10537	GR 2-12 area	R	RC	S		Cu-st qz vn in mg volcaniclastic	<5	<1	5	<0.2	6250
324	10371	GR 2-13	R	OC	G		Gossan, v fest metavolc, dark gray	<5	1	4	0.7	1150
325	10370	GR 2-B3EC	R	OC	C	0.5	Fest qz veining in sheared country rock = granite	<5	1	4	0.6	898
325	10536	GR 2-B3EC	R	OC	C	0.7	Qz vn in shear, sulf to 3%	<5	1	4	0.2	77
326	10017	GR 2-B3EC area	R	RC	S		Sil intermed volcaniclastic w/ knots & dissem py	5	6	27	0.9	755
326	10018	GR 2-B3EC area	R		G		Arg in volcaniclastic, 20% py	<5	1	10	0.2	165
327	10826	Skull Peak area	R	RC	S		Qz vns in gdi w/ minor cpy & Cu-st	<5	<1	<1	<0.2	957
328	10827	Cony Mountain area	R	OC	S		Qz-bt sc w/ qz segregations/vns w/ py	<5	<1	<1	<0.2	192
329	10828	Cony Mountain area	R	OC	G		Meta ign rk (gbo?) w/ 5-7% dissem py	9	6	<1	<0.2	82
330	10235	Cony Mountain area	R	FL	S		Serp'zd & sil basalt w/ cpy	44	43	51	<0.2	408
330	10824	Cony Mountain area	R	OC	S		Carb +/- qz alt felsic volc w/ Cu-st & minor cpy	<5	1	43	29.7	5210
330	10825	Cony Mountain area	R	OC	G		Variably serp'zd felds perid w/ minor po +/- cpy	19	24	6	0.5	262
331	1048	Cony Mountain	R	RC	S		Fest fg perid w/ dissem po & cpy 1-3%, & pent?	330	686	111	0.9	2542
331	1049	Cony Mountain	R	RC			Black serp'zd perid w/ dissem po/pent & minor cpy (sulf 1-3%)	33	57	10	<0.2	174
331	9276	Cony Mountain	R	OC	G		Gbo w/ dissem & net-textured cpy, po, pent?	244	945	282	1.5	3169
331	10156	Cony Mountain	R	OC	CC	7	Fest mg perid dike, w/ dissem to net-textured cpy, pent, po, mag	385	827	340	2.3	4740
331	10157	Cony Mountain	R	OC	CC	3	Serp	132.5	222	51	0.4	1235
331	10155	Cony Mountain area	R	OC	CC	3	Fest metavolc? w/ py & minor cpy	4.3	6	5	<0.2	160
331	10158	Cony Mountain area	R	OC	Rep		Banded lueco gbo	5.8	9	3	<0.2	170
332	10154	Cony Mountain area	R	OC	Rep		Sil zone w/in meta-sed rock	2.2	2	135	1.5	5010
333	1047	Minya Moly	R	OC	CH	0.7	Red to yellow stained fault gouge in granitoid (qz di?)	7	9	3	<0.2	46
333	9275	Minya Moly	R	RC	S		Granitoid w/ cpy & mo	<5	43	67	1.4	2313
333	10398	Minya Moly	R	OC	G	1	Gdi w/ tr cpy & Cu-st	<5	3	2	<0.2	84
334.1	10236	Cony East	R	OC	G		Schistose perid w/ Cu-st	9	9	8	<0.2	1115
334.1	10237	Cony East	R	OC	G		Sil schistose perid w/ obvious Cu-st	30	52	1780	2.7	4500
334.2	10829	Cony East	R	RC	S		Perid to felds perid w/ ~5% po + cpy	409	414	117	0.6	1500
334.3	10830	Cony East	R	OC	Rep		Perid to felds perid w/ 1-2% po + cpy	50	56	12	0.2	330
334.4	11332	Cony East	R	RC	S		Felds perid w/ 5-7% cpy, po, +/- pent	404	445	136	1	2290
334.4	11333	Cony East	R	RC	S		Felds perid to melagbo w/ 5-10% cpy, po	316	254	123	0.7	1925
335	11049	Ridge E of Cony East	R	RC	Rep		Iron-rich volcaniclastic w/ qz grains (bedded?)	11	<1	<1	<0.2	16
336	11334	Moore Icefall, NW edge	R	OC	G		Alt gbo(?) w/ minor po/py	<5	1	8	<0.2	89
337	11260	Canwell Slide	R	RC	G		Gbo w/ patchy sulf, pent, cpy, po	<5	4	<1	0.2	528
338	11259	Canwell Slide	R	RC	G		Di or qz-bearing gbo w/ dissem cpy	<5	6	19	0.5	919
339	11024	Pegmatite Glacier	R	FL	Rep		Mostly perid or di	17	6	1	<0.2	122

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
318	10192	837	48	16	117	117	0.44	27	**310**	<2	0.23	<0.5	22	3.46	<10	0.01	0.01	<10	1.78	375	0.03	<2	5	5	0.01	41	**10**
318	10624	608	174	6	13	64	1.56	135	2020	<2	3.41	1.1	9	3.47	<10	0.03	0.04	<10	0.94	511	0.03	<2	9	27	0.02	63	<10
318	10625	2	12	1	5	130	0.36	4	30	<2	0.22	<0.5	3	0.73	<10	<0.01	0.01	<10	0.26	156	0.02	<2	2	106	0.02	14	<10
319	10373	3	76	1	6	39	2.21	4	150	<2	0.72	<0.5	14	4.62	10	0.01	0.32	<10	1.47	573	0.05	3	6	43	0.17	73	<10
320	10189	3320	1735	1	4	125	0.35	5	**50**	9	0.42	12.8	4	2 31	<10	0.91	0.01	<10	0.11	218	0.01	<2	2	5	0.14	54	**<10**
321	2887	<2	55	<1	10	19	1.68	<5	75	<5	0.82	0.3	22	3.98	<2	0.117	0.03	1	1.18	588	0.02	<5	5	48	0.121	86	<20
322	10538	18	88	1	2	60	0.38	15	20	30	0.02	1.5	25	>15	<10	0.45	0.01	<10	0.22	249	<0.01	4	1	36	<0.01	6	20
323	10372	12	273	<1	152	415	5.58	7	50	5	5.77	0.6	111	6.79	10	0.01	0.04	10	4.55	3600	0.04	3	24	26	0.22	215	<10
323	10537	78	260	1	2	38	1.54	<2	1100	<2	0.49	1.8	8	1.95	<10	0.12	0.2	20	1	915	0.03	<2	2	86	<0.01	11	<10
324	10371	2	51	7	2	47	1.48	9	30	<2	0.46	<0.5	27	7.72	<10	0.18	0.06	<10	0.92	631	0.02	2	5	42	0.15	51	<10
325	10370	<2	46	5	3	38	1.3	6	50	<2	0.44	<0.5	19	5.94	<10	0.12	0.05	<10	0.88	567	0.02	<2	4	36	0.14	43	<10
325	10536	5	72	6	3	38	2.93	3	20	<2	0.76	<0.5	14	6.48	10	0.04	0.02	<10	1.66	1120	<0.01	<2	2	82	0.05	31	<10
326	10017	4	172	<1	15	18	3.93	20	**920**	<2	0 2	0.7	8	10.5	10	0.04	0.13	<10	2.97	2070	0.02	2	6	6	0.12	120	**<10**
326	10018	22	231	<1	4	1	7.93	12	**340**	9	0.14	6.1	<1	>15	20	0.05	0.42	<10	3.77	3350	0.01	<2	26	<1	0.09	163	**<10**
327	10826	<2	32	<1	10	53	1.77	5	10	<2	1.4	<0.5	10	1.89	<10	0.02	<0.01	<10	0.99	357	<0.01	<2	4	71	0.12	49	<10
328	10827	3	4	2	6	142	0.13	13	10	<2	0.08	<0.5	16	1.57	<10	0.1	0.01	<10	0.06	55	0.02	<2	1	87	0.02	6	<10
329	10828	<2	27	<1	17	61	2.18	4	120	<2	0.72	<0.5	19	2.88	<10	0.07	0.13	<10	1.84	395	0.05	<2	5	5	0.08	65	<10
330	10235	2	22	1	1185	616	1.51	7	40	<2	0.42	<0.5	74	5.16	<10	0.02	0.06	<10	8.02	535	0.06	<2	4	25	0.06	41	<10
330	10824	5	130	2	16	12	1.5	6	160	<2	2.06	<0.5	65	7.15	10	4.12	0.12	<10	0.3	680	0.01	<2	15	761	<0.01	43	<10
330	10825	<2	22	1	1050	313	2.03	<2	90	<2	1.04	<0.5	71	5.02	<10	0.09	0.19	<10	8.49	636	0.2	<2	4	20	0.1	36	<10
331	1048	3	39	2	2029	484	1.56	<5	21	<5	0.48	0.4	91	4.78	3	0.491	0.04	1	3.77	285	0.06	<5	<5	12	0.065	47	<20
331	1049	4	20	<1	1346	557	0.76	<5	20	<5	0.26	<0.2	76	6.16	2	0.04	0.05	1	10	509	0.02	<5	<5	11	0.031	32	<20
331	9276	5	46	<1	4190	280	0.81	<5	37	<5	0.41	0.6	118	7.23	2	0.071	0.07	1	8.33	545	0.07	<5	<5	17	0.046	28	<20
331	10156	3	30	1	3710	299	0.97	<2	**110**	<2	0.45	<0.5	108	6	<10	0.02	0.08	<10	8.15	528	0.08	<2	3	21	0.06	35	**<10**
331	10157	2	15	1	1975	528	1.14	4	**70**	2	0.39	<0.5	82	4.47	<10	0.07	0.03	<10	5.54	322	0.05	<2	4	18	0.07	48	**<10**
331	10155	<2	39	<1	51	30	1.68	3	**250**	<2	1.02	<0.5	25	4.45	<10	0.08	0.04	<10	1.07	300	0.07	<2	6	43	0.2	125	**<10**
331	10158	3	33	<1	31	44	2.01	3	**360**	8	0.65	<0.5	21	3.62	<10	0.03	0.02	<10	1.74	469	0.03	<2	4	21	0.16	95	**10**
332	10154	<2	89	7	44	145	1.5	18	**250**	<2	1.94	<0.5	27	3.79	<10	5.07	0.04	<10	0.93	384	0.04	<2	8	15	0.04	60	**<10**
333	1047	2	38	<1	99	33	0.8	7	715	<5	7.17	<0.2	15	4.97	3	0.129	0.04	<1	2.39	1245	0.02	9	9	195	<0.01	110	<20
333	9275	2	63	726	19	75	2.27	<5	59	<5	0.9	0.4	18	4.01	<2	0.803	0.05	2	1.53	667	0.04	<5	<5	53	0.128	78	<20
333	10398	<2	59	<1	11	28	2.2	9	80	<2	1.22	<0.5	17	3.59	10	0.02	0.04	<10	1.66	758	0.05	<2	12	53	0.16	106	<10
334.1	10236	<2	64	<1	14	29	2.24	2	20	<2	0.93	<0.5	27	5.32	10	0.08	0.03	<10	1.5	545	0.07	<2	8	51	0.16	209	<10
334.1	10237	<2	38	<1	571	40	2.78	46	30	<2	1.04	1	44	3.24	10	0.11	0.04	<10	2.33	416	0.05	23	5	63	0.15	69	<10
334.2	10829	<2	22	1	1880	458	1.76	6	80	<2	1.04	<0.5	77	4.91	<10	0.06	0.16	<10	6.13	506	0.17	2	7	27	0.15	69	<10
334.3	10830	<2	21	<1	1500	436	1.62	4	80	<2	0.88	<0.5	84	5.35	<10	0.11	0.16	<10	10.1	685	0.19	<2	5	40	0.13	42	<10
334.4	11332	8	33	1	4520	237	1.12	<2	50	<2	0.85	<0.5	96	4.73	<10	0.05	0.07	<10	5.4	447	0.13	<2	4	83	0.07	30	<10
334.4	11333	<2	26	1	2650	323	0.85	<2	50	<2	0.64	<0.5	76	4.57	<10	0.06	0.08	<10	5.65	481	0.08	<2	4	40	0.07	34	<10
335	11049	6	28	1	8	16	0.43	<2	80	<2	5.04	<0.5	6	2.77	<10	0.02	0.01	<10	0.45	767	<0.01	2	8	58	0.01	71	<10
336	11334	4	49	1	43	35	1.84	8	20	<2	2.4	<0.5	21	3.76	10	0.53	0.01	<10	0.78	431	0.03	3	4	22	0.43	81	<10
337	11260	<2	99	<1	12	18	3.67	128	10	<2	1.17	<0.5	48	7.27	10	0.58	0.02	<10	2.23	870	0.09	<2	6	82	0.09	98	<10
338	11259	<2	86	<1	13	40	3.35	5	20	<2	1.38	<0.5	23	5.36	10	1.46	0.02	<10	2	909	0.09	2	8	93	0.1	129	<10
339	11024	<2	41	1	28	43	1.38	6	90	<2	1.08	<0.5	15	3.84	<10	0.12	0.08	<10	1.06	398	0.08	<2	5	37	0.13	85	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
339	11291	Pegmatite Glacier	R	RC	S		Qz-rich peg w/ cpy, py, & garnet(?)	<5	1	18	0.3	802
340	10831	Pegmatite Glacier	R	RC	S		Qz seam in gbo w/ ~5% py	6	2	<1	0.3	1230
341	11294	Pegmatite Glacier	R	RC	G		Diabase(?) d ke w/ fg dissem sulf	<5	<1	<1	<0.2	996
342	11290	Pegmatite Glacier	R	OC	S		Gdi at diabase contact w/ minor cpy	<5	8	4	0.5	1390
343	11050	Pegmatite Glacier	R	OC	SC	0.5	Di	6	1	<1	<0.2	134
343	11051	Pegmatite Glacier	R	FL	G		V cg to peg pyxite	8	2	7	<0.2	284
343	11292	Pegmatite Glacier	R	RC	G		V cg hbl gbo w/ po/py & minor cpy	<5	<1	24	0.3	617
343	11293	Pegmatite Glacier	R	OC	S		Cg hbl gbo w/ 5-10% po/py	<5	1	2	<0.2	160
344	10997	W College Glacier	R	RC	G		V cg gbo to pyxite w/ cpy, po/py(?)	5	3	6	<0.2	512
344	10998	W College Glacier	R	RC	S		Fg to peg gbo to hornblendite(?) or pyxite	<5	2	2	<0.2	589
345	10663	East College Ridge	R	O	RC	3X10	Gbo	<5	4	9	0.2	473
345	10995	East College Ridge	R	OC	S		Fest gbo w/ 5-7% po +/- cpy	<5	2	35	0.5	303
345	10996	East College Ridge	R	RC	S		Fg fest gbo w/ dissem fg & mg po +/- cpy	<5	12	44	0.2	544
346	10994	East College Ridge	R	RC	S		Gbo w/ seams & patches of py & minor cpy	<5	1	8	0.3	253
347	10662	East College Ridge	R	OC	RC	1X5	Gbo	<5	1	<1	<0.2	70
348	10993	East College Ridge	R	RC	S		Alt, fest gbo w/ gossan & minor cpy	<5	7	10	<0.2	267
349	11054	Backslide Glacier	R	RC	G		Peg gbo w/ pods & dissem sulf	<5	12	58	0.9	1660
349	11297	Backslide Glacier	R	RC	S		V v cg hbld gbo w/ cg py & cpy	<5	16	25	0.6	833
349	11298	Backslide Glacier	R	OC	Rep		V cg gbo w/ py & cpy	<5	46	12	<0.2	283
350	11207	Upper Gakona Glacier	R	RC	S		Gbo w/ pyxite w/ dissem/patchy cpy	64	508	376	2.9	4200
350	11208	Upper Gakona Glacier	R	RC	G		Fg gbo w/ ~5% cpy & 5% po	6	21	67	1.3	**1.04%**
351	11209	Upper Gakona Glacier	R	RC	G		Gbo & light green pyxite w/ cpy	6	47	83	1.9	5170
351	11210	Upper Gakona Glacier	R	RC	G		Mica sc in gbo	5	7	1	<0.2	97
352	10992	Upper Gakona Glacier	R	RC	S		Gbo & pyxite w/ dissem cpy	6	16	23	<0.2	1350
352	11211	Upper Gakona Glacier	R	RC	G		Serp'zd pyxite to felds pyxite	14	4	1	<0.2	126
353	10891	Upper Gakona Glacier	R	RC	G		Gbo cut by qz vnlets w/ cpy	<5	9	5	<0.2	198
353	10913	Upper Gakona Glacier	R	RC	G		Coarse perid, alt to hornblendite	47	152	21	<0.2	350
353	11212	Upper Gakona Glacier	R	RC	G		Cu-st leucogbo w/ cpy	<5	7	38	0.2	1200
354	11213	Upper Gakona Glacier	R	RC	G		Fg fest gbo w/ dissem cpy, po	6	65	36	2.7	**1.05%**
355	11214	Upper Gakona Glacier	R	RC	G		Po & cpy in fg gbo	<5	94	42	1.5	1555
356	11215	Upper Gakona Glacier	R	RC	G	10x10	V fg gbo w/ cpy, po	6	6	5	<0.2	391
357	11059	N side Gakona Glacier	R	OC	G	1.5x4	Gp shale	<5	<1	31	3.6	7
357	11340	N side Gakona Glacier	R	OC	G		Qz-cc vns in qz-rich, py-bearing sc	<5	2	1	<0.2	26
357	11341	N side Gakona Glacier	R	OC	G		Qz-rich sc w/ dissem & seams of py	<5	1	<1	0.2	87
358	11060	N side Gakona Glacier	R	OC	Rep		Qz +/- cc from vns & boudins	<5	<1	<1	<0.2	27
358	11342	N side Gakona Glacier	R	OC	SC	11.5	Gp sc w/ fg dissem py	<5	1	7	1.4	49
358	11343	N side Gakona Glacier	R	OC	G		Qz sc w/ layer of fg py	<5	2	1	<0.2	6
359	11061	N side Gakona Glacier	R	OC	Rep	200	Gp shale	7	2	54	4.9	21
360	11347	WF-G Saddle, NW	R	OC	G		Slate, qz-ser sc & quartzite w/ 5-10% py/po	5	1	2	0.7	111
360	11348	WF-G Saddle, NW	R	RC	S		Qz-gr sc & br w/ py	5	9	18	1.7	17
361	11062	WF-G Saddle, NE	R	RC	Rep		Perid	11	22	3	<0.2	242
361	11345	WF-G Saddle, NE	R	RC	G		Qz lenses in qz-ser sc	<5	1	<1	<0.2	186

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
339	11291	<2	2	<1	10	27	0.09	2	40	<2	0.21	<0.5	1	0.76	<10	0.18	0.01	<10	0.1	58	<0.01	<2	<1	58	<0.01	4	<10
340	10831	2	32	1	16	64	2.12	157	150	<2	1.28	<0.5	42	4.03	10	0.27	0.2	<10	0.76	347	0.18	2	8	45	0.12	67	10
341	11294	3	54	1	52	23	3.88	20	70	<2	2.45	<0.5	77	7.19	10	0.33	0.07	<10	1.68	395	0.36	<2	12	65	0.17	127	<10
342	11290	4	28	<1	39	27	1.94	3	110	<2	1.7	<0.5	12	2.22	10	0.11	0.08	<10	0.77	283	0.17	<2	5	23	0.14	75	<10
343	11050	<2	45	<1	19	38	2.25	<2	20	<2	1.26	<0.5	28	4.61	<10	0.09	0.04	<10	1.55	497	0.03	<2	5	110	0.18	109	<10
343	11051	8	44	<1	33	86	2.47	5	70	<2	2.63	<0.5	52	9.08	10	0.16	0.24	<10	2.44	514	0.31	<2	29	69	0.36	511	<10
343	11292	2	33	1	21	12	2.45	3	140	<2	2.63	<0.5	32	5.88	10	0.25	0.17	<10	1.8	415	0.19	2	14	2	0.22	227	<10
343	11293	2	42	<1	19	34	2.2	<2	30	<2	1.56	<0.5	34	5.36	<10	0.07	0.09	<10	1.6	523	0.1	<2	10	139	0.21	157	<10
344	10997	2	38	<1	36	19	2.26	<2	40	<2	2.45	<0.5	49	8.4	10	0.17	0.2	<10	1.96	449	0.25	<2	25	126	0.32	438	10
344	10998	2	41	<1	17	20	2.29	2	40	<2	1.8	<0.5	42	6.72	<10	0.13	0.13	<10	1.7	496	0.16	<2	16	104	0.23	240	<10
345	10663	6	39	<1	56	76	5.62	44	120	<2	3.21	<0.5	30	6.11	10	0.39	0.36	10	1.42	406	0.56	<2	7	322	0.25	112	<10
345	10995	321	101	4	10	22	3.06	359	200	<2	1.65	8.5	16	4.64	10	0.92	0.47	10	1.09	479	0.27	<2	5	61	0.23	105	<10
345	10996	4	34	1	62	57	2.47	24	60	<2	1.62	<0.5	25	6.2	<10	0.26	0.61	10	1.09	321	0.31	<2	5	181	0.26	118	<10
346	10994	114	50	47	5	9	1.18	9	30	<2	1.3	41.6	12	3.17	<10	4.03	0.17	10	0.61	325	0.11	<2	5	600	0.19	79	<10
347	10662	3	85	<1	10	20	4.84	2	80	<2	5.34	<0.5	21	6.21	10	0.09	0.21	10	2.66	1295	0.34	2	22	106	0.14	234	<10
348	10993	6	49	<1	11	15	2.03	<2	20	<2	4.02	<0.5	19	4.46	10	0.08	0.08	10	1.27	665	0.06	<2	6	549	0.18	122	<10
349	11054	2	25	<1	67	16	1.18	<2	60	<2	1.79	<0.5	37	7.62	<10	0.19	0.1	<10	1.33	313	0.11	<2	12	13	0.27	299	<10
349	11297	<2	21	<1	54	30	1.18	<2	60	<2	1.66	<0.5	33	6.55	<10	0.13	0.1	<10	1.26	291	0.11	<2	11	96	0.3	243	<10
349	11298	2	21	<1	58	48	0.75	<2	20	<2	1.52	<0.5	21	7.16	10	0.07	0.07	<10	0.97	265	0.1	2	12	140	0.24	359	<10
350	11207	<2	13	<1	51	122	1.62	65	30	<2	1.84	<0.5	10	2.48	<10	0.75	0.07	<10	0.84	188	0.14	3	4	19	0.07	122	<10
350	11208	2	51	<1	104	6	3.41	31	40	<2	1.97	<0.5	193	10.4	<10	0.14	0.58	<10	1.05	245	0.31	<2	1	241	0.03	34	<10
351	11209	3	47	<1	48	63	1.81	3	20	<2	1.74	<0.5	33	4.87	<10	0.08	0.06	<10	1.38	389	0.05	<2	4	422	0.15	198	<10
351	11210	<2	25	<1	325	674	3	2	310	<2	0.47	<0.5	32	2.99	10	0.04	2.29	<10	3.66	273	0.04	<2	3	204	0.18	93	<10
352	10992	4	48	<1	45	110	3.26	5	70	<2	2.73	<0.5	33	6.71	10	0.82	0.15	<10	1.45	422	0.28	<2	4	39	0.22	378	10
352	11211	3	74	<1	186	680	1.32	10	110	<2	1.13	<0.5	43	6.93	<10	0.03	0.45	<10	4.42	1020	0.08	<2	3	23	0.11	134	<10
353	10891	<2	66	<1	37	69	2.09	<2	70	<2	2.95	<0.5	26	7.55	10	0.21	0.24	10	1.4	506	0.13	<2	4	49	0.35	492	<10
353	10913	<2	24	1	142	138	1.05	4	20	<2	1.39	<0.5	53	>15	10	0.02	0.09	<10	1.35	527	0.08	<2	12	14	0.27	1030	<10
353	11212	<2	35	<1	24	40	2.01	<2	30	<2	1.6	<0.5	16	2.33	<10	0.03	0.08	10	1.24	279	0.04	<2	2	130	0.11	80	<10
354	11213	2	46	<1	76	43	2.25	<2	80	<2	1.09	<0.5	62	6.07	<10	0.31	0.25	<10	1.33	373	0.08	<2	4	278	0.15	144	<10
355	11214	<2	24	2	217	24	0.75	41	40	<2	0.77	<0.5	182	10.05	<10	0.29	0.09	<10	0.46	178	0.05	<2	2	154	0.06	39	<10
356	11215	4	58	2	83	66	2.82	<2	110	<2	2.25	<0.5	32	3.97	10	0.01	0.52	10	1.4	157	0.2	<2	4	36	0.16	83	<10
357	11059	40	16	37	26	35	0.25	110	10	<2	0.02	<0.5	1	6.6	<10	0.84	0.17	<10	0.04	24	<0.01	18	1	114	0.11	13	10
357	11340	18	30	1	13	43	1.56	<2	10	<2	3.18	<0.5	7	1.72	<10	<0.01	<0.01	<10	1.02	324	0.02	<2	3	92	0.19	85	<10
357	11341	2	66	2	31	33	4.01	<2	140	<2	2.75	<0.5	20	4.23	10	0.01	0.06	10	2.56	576	0.03	<2	6	162	0.38	165	<10
358	11060	5	87	2	15	15	0.1	<2	70	<2	3.56	1	1	0.79	<10	0.06	0.02	<10	0.17	168	<0.01	<2	1	2	0.01	14	<10
358	11342	43	381	18	71	44	0.32	103	10	2	0.29	2.1	5	9.32	<10	0.67	0.1	<10	0.05	38	<0.01	9	1	28	0.02	17	<10
358	11343	22	18	8	<1	4	1.28	72	20	<2	0.77	<0.5	2	9.5	10	0.25	0.01	10	0.78	69	0.02	4	2	5	0.09	9	<10
359	11061	54	62	43	42	46	0.25	53	<10	<2	0.05	0.6	3	8.14	<10	1.92	0.14	<10	0.02	23	<0.01	26	1	176	<0.01	22	<10
360	11347	10	118	5	80	93	2.59	14	60	<2	3.96	0.8	20	5.79	<10	0.05	0.06	<10	1.26	394	0.01	5	9	2	0.32	116	<10
360	11348	9	259	2	39	76	0.47	14	20	<2	3.61	1.9	<1	6.45	<10	0.1	0.05	<10	0.1	283	<0.01	16	1	85	0.04	103	<10
361	11062	<2	59	2	48	129	2.17	5	40	<2	1.27	<0.5	20	4.12	10	0.01	0.05	<10	1.23	572	0.02	2	4	5	0.46	108	<10
361	11345	25	44	1	8	124	0.73	<2	40	<2	0.13	0.7	5	2.39	<10	0.01	0.15	10	0.37	152	0.03	<2	2	17	0.13	22	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
361	11346	WF-G Saddle, NE	R	RC	Rep		Qz-rich qz-ser sc w/ minor sulf	<5	<1	<1	<0.2	170
362	11053	Spire Creek Cirque	R	OC	Rep	25	Fest diabase w/ minor sulf	<5	1	<1	<0.2	442
363	11052	Spire Creek Cirque	R	OC	Rep		Qz w/ py, aspy, minor mal stain	<5	1	13	0.6	2830
363	11296	Spire Creek Cirque	R	RC	G		Variably textured hbl gbo w/ po/py	<5	12	<1	<0.2	357
364	11295	Spire Creek Cirque	R	OC	S		Fest diabase w/ dissem & seams of fg py	<5	6	<1	<0.2	272
365	1039	Gakona Glacier area	SS				Float - glacial till	<5	2	13	<0.2	32
366	1040	Gakona Glacier area	SS				Float - glacial till, brown color overall.	<5	4	17	<0.2	48
366	1041	Gakona Glacier area	SS				Float - glacial till, overall gray in color	<5	7	5	<0.2	95
367	10123	Ram Ridge	R	MT	G	1	Gbo, minor qz vns & epid-qz	<5	16	10	0.2	540
368	10122	Ram Ridge	R	OC	G		Pyxite w/ bt, muscovite, pyx	5	2	<1	0.6	298
369	10875	Ram Ridge	R	OC	Rep		Pyxite to melagbo w/ py, cpy, +/- po(?)	5	8	1	<0.2	28
369	10876	Ram Ridge	R	OC	S		Sulf grus from pyxite	58	136	13	1.4	997
370	10879	W Foot of Ram Ridge	R	RC	G		K-spar rich peg dike cutting perid to pyxite	5	1	<1	<0.2	18
370	10880	W Foot of Ram Ridge	R	RC	Rep		Cg phlog-rich perid	7	12	<1	<0.2	10
371	10878	W Foot of Ram Ridge	R	RC	G		Sil metaseds w/ py, po, minor cpy	9	10	6	0.5	182
372	10873	Ram Ridge	R	OC	G		Fest ol perid to pyxite w/ minor po +/- cpy	24	33	4	0.2	1360
372	10874	Ram Ridge	R	RC	S		Fest clinopyxite w/ lesser perid + dissem + patchy po + cpy	59	92	4	0.2	412
373	10877	W Foot of Ram Ridge	R	RC	S		Semi-msv sulf in melagbo	8	38	38	0.4	852
374	10244	JS	R	RC	G		Dun	21	8	<1	<0.2	20
374	10869	JS	R	OC	S		Clinopyxite w/ dissem cpy & br	71	363	29	3.9	7570
374	10870	JS	R	OC	C	5.3	Clinopyxite w/ cpy, bn(?) & po +/- py	68	258	17	1.1	3320
374	10871	JS	R	OC	S		Clinopyxite w/ 2-3% cpy	39	178	16	2.3	5920
374	10872	JS	R	OC	G		Peg-textured gbo dike w/ po +/- py(?)	<5	7	1	<0.2	175
374	10848	Ram Ridge	R	OC	G		Perid w/ phlog & v minor cpy	16	26	1	<0.2	157
375	10243	GR 28-1	R	OC	G		Fg melagbo	6	7	1	<0.2	385
375	10846	GR28-1	R	OC	G		Melagbo w/ 5-10% py	17	37	3	<0.2	517
375	10847	GR28-1	R	OC	G		Mg to cg melagbo w/ dissem py	9	21	2	<0.2	740
376	11048	Magnetite Cirque	R	OC	Rep	40	Perid	14	4	1	<0.2	214
376	11055	Magnetite Cirque	R	OC	Rep	10	Gbo dike	<5	4	<1	0.3	71
376	11299	Magnetite Cirque	R	OC	G		Fg to mg gbo w/ 2-3% cpy	<5	3	<1	0.2	59
376	11324	Magnetite Cirque	R	RC	RC		Hornblendite to perid w/ minor cpy & py	9	26	<1	<0.2	35
376	11325	Magnetite Cirque	R	RC	G		Pyxite to perid w/ 2-3% sulf	12	35	<1	<0.2	746
376	11326	Magnetite Cirque	R	OC	Rep	6	Peg-textured gbo dike w/ tr cpy	<5	15	<1	0.2	79
377	11327	Magnetite Cirque	R	RC	Rep		Fg gbo w/ 3-5% dissem py	<5	<1	<1	0.2	86
377	11328	Magnetite Cirque	R	RC	G		Ol-rich(?) perid	<5	8	<1	<0.2	6
378	11329	Magnetite Cirque	R	RC	Rep		Granitoid(?) dike in hornblendite w/ minor cpy	<5	4	<1	<0.2	136
378	11330	Magnetite Cirque	R	RC	S		Hornblendite w/ minor cpy	<5	2	1	0.2	602
379	11331	Magnetite Cirque	R	RC	G		Fg to mg gbo w/ minor py	<5	1	<1	<0.2	142
380	11056	UWF occurrence	R	FL	Rep		Perid(?)	12	7	<1	<0.2	553
380	11057	UWF occurrence	R	FL	Rep		Cg perid	<5	4	<1	<0.2	255
380	11058	UWF occurrence	R	FL	Rep		Gbo, v fg to cg	8	8	4	<0.2	186
380	11335	UWF Occurrence	R	OC	C	4.3	Perid to hbld gbo w/ minor sulf	<5	7	1	<0.2	302

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
361	11346	7	57	1	11	92	0.43	<2	30	<2	0.04	1.9	10	1.24	<10	0.02	0.17	10	0.18	70	<0.01	2	1	3	0.06	6	<10
362	11053	<2	81	1	32	29	0.71	<2	<10	<2	0.81	0.5	30	3.02	<10	0.23	0.01	<10	0.53	228	0.07	<2	5	12	0.16	57	<10
363	11052	47	1550	3	6	9	0.5	10	70	<2	4.03	6.9	15	2.03	<10	4.52	0.01	<10	0.29	612	<0.01	<2	2	118	0.03	22	<10
363	11296	<2	31	<1	16	12	2.02	<2	20	<2	2.34	<0.5	30	4.21	10	0.27	0.1	<10	1.08	417	0.19	<2	14	22	0.2	123	<10
364	11295	<2	15	1	39	31	1.09	2	<10	<2	1.3	<0.5	28	2.66	<10	0.21	0.01	<10	0.67	232	0.11	2	7	122	0.17	64	<10
365	1039	7	65	<1	34	40	1.25	123	39	<5	1.59	<0.2	14	3.06	<2	0.116	0.07	8	0.76	441	0.02	<5	5	38	0.02	46	<20
366	1040	6	80	<1	41	77	2.52	12	148	<5	1.11	<0.2	19	4.26	3	0.535	0.15	9	1.3	484	0.09	<5	10	107	0.038	121	<20
366	1041	<2	36	<1	34	75	1.57	8	75	<5	2.21	<0.2	24	4.44	<2	1.797	0.07	<1	1.19	335	0.06	<5	6	65	0.146	176	<20
367	10123	3	50	<1	12	22	1.36	2	**480**	9	2.85	<0.5	15	3.74	<10	0.12	0.08	<10	1.24	678	0.03	<2	4	108	0.06	138	**<10**
368	10122	<2	31	1	919	581	1.56	7	**200**	<2	0.19	<0.5	60	3.43	<10	0.03	1.06	<10	8.67	474	0.24	<2	2	56	0.03	24	**<10**
369	10875	2	23	53	30	12	1.04	<2	20	<2	2.35	<0.5	24	5.87	<10	0.05	0.05	<10	1.28	279	0.05	<2	8	21	0.43	221	<10
369	10876	4	17	2890	63	36	0.24	3	10	<2	0.28	<0.5	87	>15	<10	1.26	0.07	<10	0.15	52	0.01	<2	<1	49	0.15	49	<10
370	10879	2	3	1	3	24	0.22	<2	100	2	1.04	<0.5	4	0.71	<10	0.31	0.16	10	0.15	52	0.06	<2	<1	36	0.06	28	<10
370	10880	2	23	3	63	32	2.2	3	260	<2	1.31	<0.5	41	9.41	10	0.02	1.31	<10	2.73	367	0.11	<2	15	25	0.36	378	<10
371	10878	5	29	30	36	32	2.55	<2	50	<2	3.38	<0.5	27	3.93	10	0.14	0.08	10	0.46	211	0.03	<2	4	23	0.15	60	<10
372	10873	<2	28	2	460	383	0.25	<2	10	<2	0.49	<0.5	130	6.31	<10	0.33	0.01	<10	2.57	365	0.02	<2	5	528	0.04	102	<10
372	10874	<2	29	1	66	273	0.55	<2	20	<2	0.84	<0.5	64	11.55	10	0.3	0.03	<10	0.68	225	0.05	<2	9	10	0.24	798	<10
373	10877	3	29	19	162	26	1.82	100	10	<2	0.54	<0.5	165	>15	10	0.42	0.05	<10	0.78	235	0.03	12	2	76	0.1	36	<10
374	10244	<2	9	<1	62	146	0.26	<2	10	<2	1.02	<0.5	17	1.41	<10	0.09	0.04	<10	2.12	171	0.02	<2	5	14	0.03	18	<10
374	10869	<2	11	1	302	128	0.16	<2	10	<2	0.62	<0.5	29	2.26	<10	0.96	0.01	<10	3.3	291	0.01	<2	6	6	0.02	15	<10
374	10870	5	16	3	379	131	0.13	3	10	<2	0.58	<0.5	29	2.06	<10	0.51	0.01	<10	2.06	219	0.01	<2	4	5	0.01	12	<10
374	10871	4	8	1	149	114	0.1	2	<10	2	0.65	<0.5	10	0.91	<10	1.14	<0.01	<10	0.79	76	0.01	<2	4	5	0.01	14	<10
374	10872	6	40	<1	16	12	5.1	<2	220	<2	12.5	<0.5	27	4.21	10	0.06	0.34	10	2.91	764	0.73	<2	10	7	0.17	171	<10
374	10848	3	20	<1	67	26	0.66	<2	30	<2	0.92	0.5	54	>15	10	0.1	0.06	<10	1.02	322	0.03	<2	14	48	0.35	976	<10
375	10243	2	55	<1	105	85	2.28	<2	120	<2	1.98	<0.5	49	5.79	10	0.43	0.29	<10	1.68	427	0.37	<2	14	41	0.21	169	<10
375	10846	3	53	<1	97	82	2.59	32	20	<2	2.51	<0.5	58	7.59	10	0.62	0.13	<10	2.25	621	0.42	8	19	10	0.41	214	<10
375	10847	3	50	<1	56	55	1.42	6	10	<2	1.96	<0.5	61	7.26	10	0.58	0.07	<10	1.02	401	0.16	<2	11	88	0.18	304	<10
376	11048	<2	40	<1	45	53	1.88	<2	20	<2	1.98	<0.5	31	5.91	10	0.06	0.15	<10	1.78	494	0.28	<2	15	80	0.21	239	<10
376	11055	2	21	<1	22	56	0.84	<2	30	<2	1.28	<0.5	10	1.63	<10	1.07	0.2	<10	0.76	248	0.13	<2	6	95	0.13	59	<10
376	11299	<2	21	<1	18	39	1	<2	20	<2	1.37	<0.5	9	2.04	<10	1.94	0.13	<10	0.86	265	0.13	<2	6	65	0.13	72	<10
376	11324	5	36	<1	59	88	1.13	<2	10	<2	2.23	<0.5	35	9.76	10	0.11	0.09	<10	1.64	424	0.13	<2	15	70	0.25	415	<10
376	11325	4	37	1	69	51	1.87	<2	10	<2	2.23	<0.5	65	7.85	10	0.43	0.14	<10	1.87	464	0.32	<2	20	58	0.25	283	<10
376	11326	2	57	1	11	21	2.9	<2	10	2	2.74	<0.5	26	6.07	10	0.02	0.08	<10	2	477	0.1	2	8	70	0.15	262	<10
377	11327	3	76	<1	9	7	3.32	2	310	<2	2.91	<0.5	20	5.44	10	0.57	1.56	<10	1.89	890	0.28	<2	4	280	0.3	192	<10
377	11328	2	16	<1	67	122	0.55	<2	10	<2	0.87	<0.5	49	13.05	10	0.09	0.06	<10	2.13	452	0.02	<2	9	193	0.25	625	<10
378	11329	6	17	1	5	15	0.71	<2	170	<2	1.64	<0.5	13	2.12	<10	0.21	0.13	<10	0.55	162	0.09	4	3	17	0.12	95	<10
378	11330	7	33	<1	21	16	1.95	<2	40	<2	4.42	<0.5	40	11.15	10	0.15	0.27	10	1.88	433	0.28	3	15	265	0.18	598	<10
379	11331	<2	45	<1	8	18	1.4	<2	260	<2	1.56	<0.5	12	3.6	10	0.01	0.48	<10	1.01	410	0.16	<2	5	326	0.19	120	<10
380	11056	4	32	<1	47	38	1.09	<2	20	<2	1.34	<0.5	51	7.56	10	0.15	0.07	<10	0.98	282	0.09	<2	8	128	0.17	343	<10
380	11057	4	45	<1	24	26	1.68	<2	20	<2	1.86	<0.5	35	8.94	10	0.17	0.09	<10	1.54	428	0.2	<2	17	48	0.27	436	<10
380	11058	<2	50	1	14	21	2.18	<2	20	<2	2.55	<0.5	34	6.87	10	0.08	0.07	<10	1.59	458	0.16	<2	12	71	0.22	271	<10
380	11335	<2	22	<1	34	13	0.64	<2	10	<2	1.62	<0.5	28	4.26	<10	0.01	0.02	<10	0.65	212	0.05	<2	7	77	0.12	212	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
380	11336	UWF Occurrence	R	OC	C	3.6	Gbo, variable textures, w/ minor py +/- cpy	<5	10	1	<0.2	504
380	11337	UWF Occurrence	R	OC	SC	14	Fg to mg perid to felds perid w/ 5% po +/- cpy	7	23	4	0.4	749
380	11338	UWF Occurrence	R	OC	G		Ol-rich perid to pyxite w/ po/py & cpy	7	6	<1	<0.2	186
380	11339	UWF Occurrence	R	OC	G		Fault gouge w/ 10-20% py + 1-2% cpy	48	134	641	1.7	4350
380	11344	UWF Occurrence	R	OC	RC		Fg, fol gbo w/ 1% or less py/po	<5	1	<1	<0.2	120
381	2931	Magnetite Cirque, E	R	RC	G	20x20	Dun(?) perid, sil	<5	6	7	<0.2	188
381	11258	Magnetite Cirque, E	R	RC	S		Hbl perid cut by gbo dikelets(?) w/ patchy po	14	3	10	<0.2	285
382	11233	Magnetite Cirque, E	R	FL	G		Alt diabase w/ dissem & patchy po	17	49	1	0.2	150
382	11350	Magnetite Cirque, E	R	OC	S	0.4	Fest diabase, weak chl, 3-5% dissem po +/- cpy	<5	4	<1	<0.2	216
383	11232	Magnetite Cirque, E	R	RC	S		V fg gbo to diabase w/ po & minor cpy	<5	4	7	0.2	1070
383	11234	Magnetite Cirque, E	R	FL	S		Sl, cpy, gn, py, minor aspy in qz-cc vn	<5	2	74	**163**	3510
383	11235	Magnetite Cirque, E	R	FL	Rep		Sil carb w/ qz-cc vns & sl, gn, aspy, py cpy	<5	2	46	10.4	249
384	11349	Magnetite Cirque, E	R	OC	C	0.5	Qz vn in basalt/diabase w/ py, cpy	<5	4	55	2.2	2310
385	11255	Magnetite Cirque, E	R	OC	SC	10	Perid to pyxite/hornblendite w/ patchy to dissem cpy, po	10	21	4	<0.2	967
385	11256	Magnetite Cirque, E	R	RC	G	8	Cg perid to pyxite w/ 5-10% po +/- cpy, py	47	74	7	0.4	1835
385	11257	Magnetite Cirque, E	R	RC	S		Dun to ol perid w/ po, cpy	32	87	27	0.7	4430
385	11383	Magnetite Cirque, E	R	OC	RC	2	Hornfelsed seds	<5	9	3	0.7	**2.08%**
385	11384	Magnetite Cirque, E	R	OC	S	2X10	Perid above hornfels contact	15	20	5	0.2	**1.33%**
385	11385	Magnetite Cirque, E	R	F	S	4X4	Perid w/ mal staining	45	50	2	<0.2	809
385	11386	Magnetite Cirque, E	R	F	S	10X10	Perid & dun float	25	43	1	<0.2	1085
386	11221	Magnetite Cirque	R	OC	Rep		Pyxite to perid	14	7	<1	<0.2	17
387	11222	Magnetite Cirque	R	RC	Rep		Perid to pyxite	<5	9	<1	<0.2	10
388	10290	Magnetite Cirque	R	OC	Rep	20	Phlog-bearing perid w/cpy & mag	52	127	18	0.3	824
388	10291	Magnetite Cirque	R	RC	G		Perid w/ phlog, cpy, mag, py	16	21	32	0.6	884
388	11218	Magnetite Cirque	R	OC	SC	36	Perid w/ 1 % cpy +/- po	36	65	15	0.4	1005
388	11219	Magnetite Cirque	R	OC	S		Mag-rich perid w/ 2-3% cpy	104	144	34	0.4	1055
388	11220	Magnetite Cirque	R	RC	S		Crystalline py in cc-qz vnlet	8	61	17	0.8	732
389	10289	Magnetite Cirque	R	FL	S	1	Phlog-bearing perid w/ cpy	11	27	10	0.8	1965
389	11217	Magnetite Cirque	R	FL	G		Perid w/ 1% cpy	<5	5	<1	<0.2	75
390	11216	Magnetite Cirque	R	FL	G		Perid to alt perid(?) w/ Cu-st & minor cpy	20	47	27	0.3	841
391	11063	Magnetite Creek	R	OC	G	15	Perid dike	8	9	3	<0.2	459
392	10711	GR 28-5	R	OC	S	1	Fest/Cu-st alt di	<5	25	18	<0.2	2020
393	10712	GR 28-5 area	SS					13	17	4	<0.2	56
394	10713	Magnetite Creek	SS					100	17	3	<0.2	53
395	10714	Magnetite Creek	SS					37	15	3	<0.2	36
396	1042	Gakona Glacier area	SS					6	10	41	<0.2	87
397	10715	Magnetite Creek	SS					179	19	4	<0.2	46
398	11364	Gakona Glacier area	PC				Um bedrock; no visible Au	1250	26	134	0.3	37
399	10690	Gakona Glacier	PC		PC		Barren sample, abundant mag	9	5	6	<0.2	49
400	2921	W Fork Chistochina River Trib	SS					19	16	3	<0.2	51
401	10946	GR 28-6 area	R	OC	Rep	10x10	Fg light gray pyritic volcaniclastic	<5	<1	3	0.5	30
402.1	10947	GR 28-6	R	TP	G		Fest sil alt whitish volc	<5	1	3	7	41

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
380	11336	3	14	<1	40	33	0.98	2	10	<2	1.72	<0.5	34	2.86	<10	0.01	0.01	<10	0.56	169	0.01	<2	3	38	0.08	34	<10
380	11337	3	44	4	53	35	1.14	<2	10	<2	1.72	<0.5	45	9.55	10	0.04	0.04	<10	0.95	315	0.07	<2	8	51	0.16	337	<10
380	11338	<2	43	<1	26	31	0.41	<2	<10	<2	0.66	<0.5	26	9.76	10	0.02	0.01	<10	0.44	201	0.02	<2	6	59	0.23	717	<10
380	11339	<2	26	38	205	92	0.39	<2	10	<2	6.47	0.5	251	9.75	<10	0.07	0.01	10	0.46	208	0.02	<2	10	9	0.05	176	<10
380	11344	5	43	<1	45	66	1.96	6	<10	<2	1.2	<0.5	28	4.8	10	0.06	0.02	<10	1.36	365	0.11	<2	9	20	0.17	232	<10
381	2931	3	67	4	28	75	1.6	<5	145	<5	1.23	0.7	16	3.3	2	0.335	0.2	6	0.72	409	0.03	<5	<5	22	0.089	60	<20
381	11258	<2	30	1	48	60	1.14	2	40	<2	1.56	<0.5	33	8.97	10	0.06	0.15	<10	1.53	394	0.12	<2	11	30	0.21	300	<10
382	11233	2	50	<1	74	111	2.48	2	90	<2	0.68	<0.5	36	4.88	10	<0.01	1.57	<10	2.29	434	0.14	<2	6	16	0.29	132	<10
382	11350	3	22	<1	54	44	1.27	<2	10	<2	1.48	<0.5	31	2.83	<10	0.38	0.02	<10	0.87	238	0.21	<2	9	4	0.16	73	<10
383	11232	<2	13	<1	49	71	1.16	411	10	<2	1.8	<0.5	82	4.17	<10	2.94	0.02	<10	0.45	216	0.02	7	4	49	0.18	54	<10
383	11234	**1.57%**	**3.87%**	<1	36	53	0.75	1365	70	2	8.31	258	26	5.93	<10	36.6	0.2	<10	1.1	>10000	0.01	882	12	9	<0.01	61	10
383	11235	613	1600	<1	45	58	1.54	1760	40	<2	10 35	9.3	28	5.67	<10	3.68	0.19	<10	3.02	4350	0.02	67	18	89	<0.01	109	<10
384	11349	<2	11	5	13	119	0.28	2	10	<2	0.16	<0.5	12	3.31	<10	0.38	0.02	<10	0.26	68	0.01	<2	2	130	0.03	27	<10
385	11255	<2	71	<1	179	56	2.75	5	140	<2	3.24	<0.5	52	8.61	10	0.14	0.77	<10	2.73	583	0.36	<2	23	5	0.39	469	<10
385	11256	3	88	<1	94	74	2.14	13	40	<2	3.24	<0.5	95	13	10	0.39	0.28	<10	2.21	594	0.31	<2	19	157	0.36	573	<10
385	11257	<2	29	<1	579	288	0.79	<2	20	<2	1.26	<0.5	207	9.61	<10	1.89	0.14	<10	1.32	245	0.06	<2	9	149	0.17	299	<10
385	11383	8	83	5	166	82	1.04	74	150	<2	0.39	1	18	3.84	<10	0.22	0.2	10	0.7	435	0.03	<2	2	136	0.01	42	<10
385	11384	18	78	1	183	41	1.83	<2	50	<2	3.8	<0.5	62	12.45	10	0.2	0.32	10	1.83	536	0.28	<2	18	11	0.33	748	<10
385	11385	9	45	<1	56	56	2.21	3	70	<2	3.52	<0.5	51	8.7	10	0.07	0.45	<10	2.29	520	0.36	<2	24	156	0.32	450	<10
385	11386	8	32	1	118	68	1.28	<2	40	<2	1.95	<0.5	84	9.18	10	0.63	0.2	<10	1.58	383	0.18	<2	17	186	0.25	492	<10
386	11221	<2	10	<1	35	198	0.67	<2	50	<2	1.12	<0.5	17	1.94	<10	0.12	0.29	<10	1.66	198	0.07	<2	8	94	0.08	58	<10
387	11222	<2	8	<1	64	29	0.46	<2	<10	<2	0.73	<0.5	44	12.4	10	0.02	0.01	<10	0.75	341	0.03	<2	9	40	0.19	621	<10
388	10290	4	20	<1	37	32	0.96	<2	50	<2	1.19	<0.5	50	13.25	10	0.12	0.26	<10	1.29	292	0.09	<2	14	51	0.22	764	<10
388	10291	3	17	<1	73	43	0.7	6	30	<2	1.83	<0.5	43	12.5	10	0.09	0.15	<10	1.06	324	0.08	<2	11	53	0.22	570	<10
388	11218	4	20	<1	35	26	0.55	<2	30	<2	0.67	<0.5	42	11.15	10	0.1	0.14	<10	0.74	185	0.04	<2	7	50	0.16	602	<10
388	11219	2	24	<1	34	12	0.85	<2	40	<2	1.12	<0.5	51	13.4	10	0.08	0.2	<10	1.1	292	0.09	2	13	33	0.22	741	<10
388	11220	16	2	<1	81	14	0.09	2	10	<2	3.05	0.5	510	23.9	<10	0.35	0.01	<10	0.2	131	0.02	<2	1	49	0.09	75	<10
389	10289	9	35	<1	42	68	2.01	4	280	<2	1.06	<0.5	54	11.6	10	0.06	1.16	<10	2.64	405	0.08	<2	14	39	0.38	591	<10
389	11217	4	11	<1	644	665	3.31	<2	370	<2	0.38	<0.5	50	3.92	<10	0.02	2.85	<10	6.29	234	0.04	<2	2	42	0.12	84	<10
390	11216	3	21	<1	40	20	0.68	16	10	<2	0.91	<0.5	60	13.05	<10	0.05	0.06	<10	2.14	460	0.04	<2	10	137	0.21	626	<10
391	11063	5	53	1	39	30	2.83	17	120	<2	3.64	<0.5	33	5.85	10	0.02	0.18	10	2.15	558	0.22	<2	17	33	0.28	283	<10
392	10711	6	57	<1	168	61	4.83	2	110	<2	2.92	<0.5	62	11.35	20	<0.01	0.29	10	0.78	304	0.36	<2	6	128	0.25	663	<10
393	10712	6	28	<1	50	166	0.79	18	60	<2	0.89	0.8	29	9.5	<10	0.11	0.09	<10	0.77	376	0.03	<2	5	582	0.11	400	<10
394	10713	4	18	<1	58	195	0.46	37	40	<2	0.77	1.2	30	9.82	<10	3.89	0.05	<10	0.78	229	0.02	<2	4	76	0.11	386	<10
395	10714	5	19	<1	56	198	0.49	26	40	<2	0.74	0.8	34	11.15	<10	0.22	0.05	<10	0.77	235	0.02	<2	3	39	0.11	449	<10
396	1042	2	82	<1	77	120	2.29	6	80	<5	0.86	0.4	30	5.82	<2	0.702	0.08	5	1.89	602	0.03	<5	10	58	0.117	225	<20
397	10715	7	27	1	62	225	0.47	73	50	<2	0.76	1	37	12	<10	0.13	0.05	<10	0.71	231	0.02	<2	4	37	0.11	495	<10
398	11364	<2	25	1	118	356	0.62	14	50	<2	0.74	<0.5	71	31	10	1.5	0.05	<10	0.73	492	0.05	<2	6	108	0.26	1245	<10
399	10690	7	42	<1	43	106	1.29	5	50	<2	1.38	<0.5	26	10.45	10	0.78	0.11	<10	0.74	498	0.07	2	5	68	0.18	467	10
400	2921	<2	35	<1	53	139	0.61	<5	52	<5	0.67	0.5	38	>10	6	0.21	0.04	<1	0.52	274	0.03	<5	<5	25	0.082	523	<20
401	10946	45	136	2	2	7	0.82	9	20	<2	0.37	1.1	3	1.82	<10	0.07	0.04	<10	0.4	413	0.04	<2	4	40	0.07	10	<10
402.1	10947	1065	210	1	<1	13	0.57	87	300	<2	0.04	0.9	<1	3.75	<10	0.38	0.25	<10	0.15	44	0.02	6	2	27	<0.01	13	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
402.1	10948	GR 28-6	R	OC	SC	20	Fest gray pyritic volc	<5	1	3	0.9	71
402.1	10949	GR 28-6	R	RC	Rep	4x6	Alt fest sil volc w/ vnlets of qz/epid/garnet w/ dissem sulf	<5	1	3	2.1	52
402.2	11100	GR 28-6	R	OC	S	1	1' fest zone in dark gray volcaniclastic w/ dissem py	<5	<1	5	1	73
403	10311	W Fork Chistochina River area	R	OC	G		Di	<5	7	3	0.4	127
404	11106	Upper West Fork Chistochina	R	RC	G	1	Fest volc (dark gray) w/dissem py	<5	12	1	<0.2	71
405	2923	W Side Chistochina Glacier	SS					<5	5	7	<0.2	80
406	2922	W Fork Chistochina River Trib	SS					6	18	123	0.4	136
407	10638	W Fork Chistochina River	PC					93	17	154	<0.2	68
408	2924	W Fork Chistochina River Trib	SS					<5	5	11	0.8	70
409	10495	GR 28 SS61 Anomaly	R	OC	C	5	Fest metavolc, dark gray, sil	<5	1	96	**104**	181
409	10496	GR 28 SS61 Anomaly	R	OC	C	3	Fest volc, sil dacite/andesite	<5	<1	256	62.2	187
410	10309	GR 28-9	R	OC	Rep	5.5	Fg, dark gray metavolc (andesite?) w/ fest pods of cpy, mag, py	<5	2	5	1.1	247
410	10310	GR 28-9	R	OC	S		High grade of msv mag & cpy from 5' pod of fest	<5	1	13	4.5	91
410	10497	GR 28-9	R	OC	C	7	Fest metavolc w/ cpy/mag/py	<5	<1	6	1.7	261
411	10510	Chistochina River (W Fork)	PC				No Au visible in pan, mod mag	<5	4	34	<0.2	261
412.1	10107	GR 28-8	R	RC	S		Sil meta-basalt	<5	<1	204	5.1	**3.57%**
412.1	10108	GR 28-8	R	RC	S		Sil meta-basalt	<5	<1	33	0.8	425
412.1	11102	GR 28-8	R	OC	C	10	Msv py/qz vns to 1' in volcs (highly fract) (volc = dark gray sil)	<5	2	25	0.2	1195
412.2	10288	GR 28-8	R	OC	C	10	Very fg volc(?) marine sed, sil (chert) w/ dissem py +/- cpy	<5	<1	6	0.6	144
412.2	10508	GR 28-8	R	TP	S		Felsic int	<5	2	3	<0.2	296
412.2	10509	GR 28-8	R	OC	Rep	150	Felsic int, perhaps w/ some calcification.	<5	<1	47	11.6	**2.12%**
412.2	11101	GR 28-8	R	OC	S	1	Msv py in qz vn in fract/shear of dark gray volc	<5	1	124	1.8	175
413	10475	W Fork Chistochina River	O				Magnetic fraction of 10511	47	49	10	0.9	76
413	10511	W Fork Chistochina River	SL				Non-magnetic fraction	5	6	618	0.6	72
414	2925	GR 28-8 Creek	SS					<5	6	50	<0.2	58
415	10571	W Fork Chistochina River Trib	PC				Lots of mag & ol, maybe 1 v small Au speck	62	13	73	<0.2	39
416	10665	Lower WF Chistochina Trib	PC	bed	PC		1 fine, 4 v fine Au flakes	<5	3	7	<0.2	32
416	10666	Lower WF Chistochina Trib	PC		PC		No visible Au	6	3	3	<0.2	37
417	10667	Lower WF Chistochina Trib	PC		PC		No visible Au	13	5	1	<0.2	30
419	10570	W Fork Chistochina River	PC					49	12	8	<0.2	85
420	11103	GR 28-12	R	RC	C	5	Metavolcaniclastics, sil alt w/ dissem py	<5	<1	2	1.8	176
421	10395	GR 28-11	R	RC	Rep	5	Msv hematite & mag in volcaniclastic	<5	3	<1	<0.2	25
421	11104	GR 28-11	R	OC	C	4	Msv hematite/mag alt volcaniclastic	<5	1	26	0.3	21
422	10494	GR 28-10	R	FL	S		Dacite in volcaniclastic w/ cpy & Cu-st, fest	<5	1	30	1.7	3110
423	11105	GR 28-10 area	R	RC	Rep	5	Fest volcaniclastic w/dissem py & py along fract	5	<1	29	1.1	186
424	10910	MF1996C-129 area	R	RC	G		Di to gbo(?)	9	6	1	<0.2	146
425	10909	MF1996C-129	R	OC	Rep	3x3	Cg granite w/ sporadic epid/K-spar vns	<5	1	<1	<0.2	95
426	11114	GR 28-20 area	R	RC	C	4	Qz vns in fest leucogbo	<5	1	2	<0.2	64
427	11003	GR 28-20 area	R	RC	G		Gbo w/ qz vns & minor py +/- cpy	<5	4	44	0.4	467
428	10845	GR 28-20 area	R	OC	Rep		Perid, no evident sulf	71	83	3	<0.2	91
429	10241	GR 28-20	R	OC	G	2 x2	Pyxite w/ py, cpy	25	27	32	<0.2	1990
429	10242	GR 28-20	R	OC	G		Melagbo w/ py & cpy	18	17	6	<0.2	736

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
402.1	10948	79	315	<1	7	22	2.16	16	120	<2	0.62	1.7	12	4.13	10	0.08	0.14	<10	1.66	1170	0.03	<2	9	45	0.2	68	<10
402.1	10949	290	411	<1	7	24	1.36	13	190	<2	0.41	3.6	6	2.32	<10	0.1	0.14	<10	0.99	714	0.03	2	5	16	0.04	20	<10
402.2	11100	25	54	2	8	14	1.38	25	40	<2	1.12	0.7	16	4.93	<10	0.07	0.17	<10	0.89	692	0.03	3	10	138	0.12	110	<10
403	10311	41	101	<1	17	27	1.33	8	**1770**	8	1.51	<0.5	14	4 52	<10	0.08	0.41	<10	1.28	750	0.12	<2	6	82	0.16	187	**10**
404	11106	<2	37	<1	17	47	1.04	<2	10	<2	0.33	<0.5	10	3.3	<10	0.03	0.02	<10	1.2	157	0.06	<2	5	27	0.08	70	<10
405	2923	5	59	<1	22	29	1.78	41	43	<5	1.22	<0.2	17	2.9	<2	0.16	0.11	1	0.81	378	0.08	<5	6	37	0.126	78	<20
406	2922	154	269	<1	34	54	1.09	1126	82	12	0.92	<0.2	29	6.3	<2	0.404	0.07	2	0.83	379	0.04	6	5	33	0.07	200	<20
407	10638	7	47	1	111	248	0.83	152	100	3	0.93	<0.5	74	>15	10	0.39	0.08	<10	0.75	495	0.06	<2	7	49	0.32	1215	10
408	2924	154	510	1	24	22	2.03	20	339	<5	0.75	1.8	19	4.1	2	0.076	0.1	16	1.08	1258	0.03	<5	6	62	0.078	81	<20
409	10495	2390	491	5	10	28	2.51	253	70	<2	1.74	3.9	18	6.16	10	0.68	0.34	10	0.72	2370	0.06	76	11	6	0.15	105	10
409	10496	3090	331	12	20	31	2.96	79	30	<2	0.16	0.8	22	12.55	10	0.1	0.53	10	1.63	3600	0.02	15	16	16	0.13	125	<10
410	10309	145	474	20	28	52	1.81	32	**1100**	13	0.4	3.6	58	>15	10	0.11	0.04	<10	0.83	2770	0.04	<2	3	34	0.05	43	**<10**
410	10310	156	162	13	21	67	0.45	55	**120**	12	0.57	2.5	31	>15	<10	0.14	0.01	<10	0.09	388	0.02	<2	1	91	0.06	26	**<10**
410	10497	45	300	10	4	29	2.74	48	140	4	2.53	0.8	49	>15	20	0.09	0.49	20	0.48	4820	0.26	<2	4	10	0.11	54	<10
411	10510	6	61	2	29	71	1.34	10	220	<2	0.53	<0.5	17	3.93	10	0.18	0.1	<10	0.92	458	0.05	<2	3	3	0.09	114	<10
412.1	10107	9	54	1	3	24	2.35	67	**1050**	11	0.09	<0.5	36	9.44	<10	0.03	0.13	<10	2.04	425	0.01	<2	2	1	<0.01	12	**<10**
412.1	10108	5	24	4	2	35	2.25	18	**990**	21	0.08	<0.5	56	9.43	<10	0.01	0.17	<10	1.79	521	0.02	<2	1	1	<0.01	12	**10**
412.1	11102	2	13	3	3	15	1.28	35	100	<2	0.06	<0.5	13	4.13	<10	0.01	0.21	<10	1.08	254	0.01	<2	1	3	0.01	11	<10
412.2	10288	29	35	<1	4	34	1.36	17	100	<2	0.29	<0.5	8	3.2	<10	0.09	0.16	10	1.14	348	0.02	<2	1	13	<0.01	11	<10
412.2	10508	7	45	<1	6	11	1.83	17	**3010**	3	0.35	<0.5	6	3.48	<10	0.01	0.19	<10	1.94	498	0.01	<2	1	9	0.01	15	**10**
412.2	10509	193	97	6	6	25	2.16	83	**1300**	7	0.11	<0.5	44	8 24	10	0.05	0.12	<10	2.19	623	0.01	<2	2	5	<0.01	20	**<10**
412.2	11101	26	19	11	1	11	0.44	182	<10	13	0.02	<0.5	56	23.4	<10	0.06	0.1	<10	0.27	83	0.01	2	1	11	<0.01	4	<10
413	10475	52	62	<1	183	326	0.53	<2	40	<2	0.64	28.2	102	>15	20	0.29	0.04	<10	0.84	949	0.03	<2	5	<1	0.33	1670	70
413	10511	<2	105	1	48	102	1.38	24	200	2	1.8	1.6	22	6.1	<10	0.29	0.15	<10	1.09	511	0.07	<2	6	23	0.11	211	30
414	2925	7	64	<1	27	48	1.43	41	171	<5	1.05	<0.2	18	3.45	<2	0.286	0.1	5	0.78	515	0.05	<5	<5	47	0.103	96	<20
415	10571	6	38	1	122	455	0.83	3	40	7	0.85	<0.5	65	>15	10	1.07	0.05	10	0.41	705	0.04	<2	6	57	0.35	1920	10
416	10665	5	57	1	28	69	1.62	7	120	<2	1.04	<0.5	14	3.7	<10	0.15	0.13	10	0.93	475	0.09	<2	5	47	0.22	139	<10
416	10666	6	60	1	31	74	1.52	9	110	<2	0.9	<0.5	16	4.47	10	0.45	0.13	10	0.9	522	0.07	2	5	47	0.21	177	<10
417	10667	3	50	1	31	68	1.54	4	110	<2	1.11	<0.5	15	4.11	10	1.4	0.11	10	0.85	413	0.1	<2	5	37	0.23	167	<10
419	10570	3	60	1	81	181	1.18	45	140	<2	1.5	<0.5	48	>15	10	0.21	0.11	<10	1.04	544	0.09	<2	9	128	0.29	673	10
420	11103	370	626	1	1	14	1.06	22	160	<2	0.36	1.3	10	2.52	10	0.75	0.09	20	0.37	844	0.04	<2	8	2	0.1	43	<10
421	10395	11	71	<1	9	23	1.57	36	30	2	1.13	<0.5	7	>15	30	0.01	0.02	10	0.34	1390	0.01	<2	4	4	0.03	90	20
421	11104	12	65	<1	10	19	1.92	19	50	4	1.66	<0.5	4	40.6	10	0.02	0.02	<10	0.37	1425	0.02	<2	3	14	0.02	96	20
422	10494	5	18	1	3	27	0.94	20	60	<2	0.41	<0.5	12	2.58	<10	0.04	0.18	<10	0.24	262	0.05	2	2	43	<0.01	36	230
423	11105	45	153	5	4	15	2.43	29	90	<2	0.52	<0.5	14	7.48	10	1.21	0.26	<10	1.62	1440	0.04	<2	15	9	0.23	123	<10
424	10910	3	27	1	14	79	2.3	5	100	<2	1.36	<0.5	18	4.34	10	0.01	0.64	10	0.76	244	0.34	<2	3	43	0.27	255	<10
425	10909	6	52	3	7	52	1.3	6	30	<2	0.84	<0.5	9	3.2	10	0.14	0.5	20	0.64	545	0.11	<2	5	33	0.15	56	<10
426	11114	<2	32	2	2	36	0.98	87	30	2	0.19	<0.5	2	2.34	<10	5.35	0.06	10	0.01	66	0.01	3	4	18	<0.01	35	10
427	11003	11	56	2	6	14	0.47	86	160	<2	0.2	<0.5	11	3.96	<10	19.1	0.07	<10	0.04	293	0.01	6	8	27	<0.01	62	<10
428	10845	2	25	<1	81	148	0.45	<2	<10	<2	0.69	<0.5	49	12.5	10	0.07	0.01	<10	1.19	536	0.03	<2	10	89	0.55	1000	<10
429	10241	5	48	<1	67	208	1.97	3	20	<2	1.46	<0.5	188	>15	10	0.18	0.11	<10	1.53	301	0.16	<2	17	87	0.3	685	<10
429	10242	<2	38	<1	35	203	2.46	5	20	<2	1.62	<0.5	80	13.05	10	0.08	0.19	<10	1.76	414	0.17	<2	15	112	0.23	561	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
429	10842	GR 28-20	R	OC	SC	36	Gbo + minor pyxite, w/ ~5% py	<5	2	<1	<0.2	120
429	10843	GR 28-20	R	OC	SC	54	Gbo & pyxite w/ ~5% sulf, mainly py	<5	14	2700	<0.2	837
429	10844	GR 28-20	R	OC	SC	14	Gbo w/ coarse to fine dissem sulf	11	15	4	<0.2	497
430	10240	GR 28-19	R	RC	G		Mg pyxite	10	5	10	0.2	128
430	10839	GR 28-19	R	OC	G		Pyxite to ol-pyxite w/ v minor cpy	14	15	4	<0.2	150
430	10840	GR 28-19	R	RC	Rep		Leucogbo w/ 3-5% cpy	11	9	18	2.8	4600
430	10841	GR 28-19	R	RC	G		Serp'zd pyxite w/ minor cpy & Cu-st	48	125	58	1.1	**1.80%**
431	10837	GR28-18 area	R	OC	C	2.0	Aplite dike of qz, plag, minor mica	<5	1	<1	<0.2	46
432	10838	GR28-18	R	FL	S		Perid, dun, & pyxite w/ 2-3% cpy	326	462	348	2.1	3870
433	10912	GR 28-17	R	OC	Rep	10x20	Fest arg	<5	5	3	0.8	92
434	11002	GR 28-14	R	OC	Rep	30x30	Black arg	5	7	5	<0.2	125
434	11113	GR 28-14	R	OC	C	2	Fest argillaceous seds w/ tr py	<5	5	5	0.5	120
435	10911	GR 28-15	R	RC	G	1	Sil fg di/diabase w/ qz vns, 0.02-4"	<5	1	10	0.2	313
436	10492	GR 28-16	R	OC	C	10	V fest fg gray gbo(?) di(?)	<5	<1	340	<0.2	135
437.1	11187	Treasure Gulch	SS				Primarily graphitic phyllite to schist float	7	7	12	1.1	134
437.2	11185	Treasure Gulch	SS				Primarily graphitic phyllite to schist float	<5	6	15	1.1	126
437.2	2928	Treasure Gulch area	SS					<5	10	18	1.3	140
437.3	11186	Treasure Gulch	SS				Primarily graphitic phyllite to schist float	<5	6	12	1	134
437.3	2927	Treasure Gulch area	SS					<5	8	16	1.2	140
437.4	10637	Treasure Gulch	PC				Bedrock: slate, phyllite, schist	13	10	180	3.3	378
437.5	10569	Treasure Gulch	PC				Heavies mostly hematite	5	6	18	1.1	155
438	2929	Treasure Gulch area	SS					6	8	12	0.9	90
439.1	10409	Chistochina Glacier	PL				Non-magnetic fraction	13	9	**10.5**	0.6	199
439.1	10463	Chistochina Glacier	PL				Magnetic fraction of 10409	418	60	>10000	1.3	142
439.2	10283	Chistochina Glacier	SL				Magnetic fraction of sample 10811				0.5	100
439.2	10769	Chistochina Glacier	PL				Non-magnetic fraction (magnetic fraction = sample 10772)	262	206	**29.1**	18.6	200
439.2	10772	Chistochina Glacier	PL				Magnetic fraction of sample 10769			609	20.9	126
439.2	10811	Chistochina Glacier	SL				Py-rich sluice con sample from operator's 2002 work	2880	2080	>10000	**253**	814
439.3	10776	Chistochina Glacier	PL				Magnetic fraction of sample 11302				1.4	59
439.3	11302	Chistochina Glacier	PL				Non-magnetic fraction	8	7	22	0.3	86
439.4	10743	Chistochina Glacier	PC		PC		2 fine Au flakes	<5	<1	253	<0.2	31
439.4	11320	Chistochina Glacier	PC				1 v coarse, 2 coarse, 5 fine, 10 v fine Au flakes	<5	9	**90.2**	0.8	102
440	10694	Chistochina River	PC		PC		1 v fine Au flake, tr mag, mod garnet	5	4	33	<0.2	64
440	10695	Chistochina River	PC		PC		2 fine, 2 v fine Au flakes, tr mag	6	4	209	0.3	168
441	10696	Chistochina River	PC		PC		2 fine, 1 v fine Au flake, tr mag	27	4	130	0.2	93
442	10657	Chistochina River	PC		PC		5 v fine Au flakes, tr mag	<5	7	2960	0.4	97
442	10745	Chistochina River	PL		PL		3 fine, 4 v fine Au flakes	6	6	71	0.4	100
442	10771	Chistochina River	PL				Magnetic fraction of sample 10745	40	14	104	0.3	102
443	10693	Chistochina River	PC		PC		2 v fine Au flakes, tr mag, mod garnet	16	6	2970	<0.2	68
444	2930	Chistochina River	PC					10	6	11	0.5	87
445	10563	Chistochina Airstrip	R	RC	RC	20	Pyritic andesine dacite, fest surface	<5	<1	1	1.2	1465
445	10632	Chistochina Airstrip	R	RC	Rep	25	Limonitic part of strongly fest andesite	<5	<1	6	0.5	461

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
429	10842	<2	15	<1	76	34	4.66	<2	20	<2	3.26	<0.5	19	1.22	10	0.13	0.02	<10	1	157	0.36	<2	4	31	0.03	20	<10
429	10843	2	38	<1	42	206	2.38	2	20	2	1.87	<0.5	81	12.15	10	0.08	0.15	<10	1.84	342	0.2	<2	20	188	0.3	560	<10
429	10844	<2	37	<1	38	79	2.29	<2	20	<2	1.7	<0.5	40	5.43	10	0.04	0.12	<10	1.45	322	0.1	<2	11	126	0.18	153	<10
430	10240	<2	46	1	188	578	0.57	3	<10	<2	0.34	<0.5	89	11.5	<10	0.03	0.01	<10	5.64	1010	0.01	<2	9	7	0.27	551	<10
430	10839	<2	16	<1	66	433	0.33	<2	<10	<2	0.81	<0.5	21	2.63	<10	0.06	0.02	<10	2.04	321	0.03	<2	8	10	0.07	85	<10
430	10840	7	91	<1	15	18	1.32	11	140	<2	1.56	1.5	26	2.3	<10	1.49	0.38	10	0.7	282	0.11	<2	4	14	0.14	43	<10
430	10841	3	223	<1	38	224	0.93	6	<10	<2	1.56	4.5	64	2.52	<10	0.29	0.04	<10	1.23	449	0.04	<2	11	83	0.24	107	<10
431	10837	4	5	<1	36	24	0.49	<2	60	<2	3.98	<0.5	4	0.49	<10	0.02	0.29	10	1.23	95	0.91	<2	<1	4	0.02	1	<10
432	10838	3	15	<1	226	204	0.22	<2	<10	<2	0.84	<0.5	29	2.47	<10	0.24	0.02	<10	2.59	320	0.03	<2	8	47	0.03	35	<10
433	10912	5	154	2	11	28	1.88	60	200	2	0.25	0.7	3	10.25	<10	0.16	0.13	10	0.52	467	0.03	2	6	27	<0.01	55	<10
434	11002	<2	52	<1	87	167	3.32	6	500	<2	1.86	<0.5	32	5.54	10	0.13	0.91	<10	1.1	402	0.24	<2	13	19	0.22	137	<10
434	11113	4	82	5	75	137	1.74	2	50	<2	1.22	0.9	16	3.9	<10	0.11	0.16	<10	0.8	293	0.03	<2	5	14	0.11	68	<10
435	10911	<2	24	3	28	52	2.95	7	20	<2	3.17	<0.5	26	4.54	10	0.31	0.09	<10	0.25	301	0.19	<2	5	132	0.15	63	10
436	10492	<2	20	<1	22	39	2.28	8	30	<2	1.81	<0.5	18	2.75	10	0.02	0.1	<10	0.69	274	0.22	<2	7	61	0.23	78	40
437.1	11187	23	630	12	102	12	0.37	83	70	<2	0.65	6.8	23	5.44	<10	0.24	0.05	10	0.4	357	0.01	12	3	61	<0.01	22	<10
437.2	11185	21	424	9	96	26	0.9	71	120	<2	1.46	4.3	23	4.63	<10	0.19	0.06	10	1	685	0.01	5	4	61	0.01	32	<10
437.2	2928	17	519	8	125	35	1.13	108	73	<5	1.42	5.1	35	6.77	<2	0.247	0.09	2	1.14	764	0.02	6	<5	116	0.013	34	<20
437.3	11186	20	567	11	106	16	0.47	82	60	<2	0.71	6.3	25	5.68	<10	0.21	0.04	<10	0.5	409	0.01	10	4	103	<0.01	22	<10
437.3	2927	18	588	12	102	16	0.53	70	67	<5	0.47	6	25	6.33	<2	0.266	0.06	6	0.42	402	0.01	11	<5	67	<0.01	25	<20
437.4	10637	110	743	7	310	101	1.22	368	10	<2	0.66	7	104	>15	<10	0.56	0.29	10	0.75	577	0.03	13	5	43	0.06	47	10
437.5	10569	22	255	6	105	91	1.44	94	30	<2	2.96	2.9	25	6.07	10	0.64	0.32	10	1.2	1070	0.02	4	5	58	0.03	51	<10
438	2929	9	282	8	65	19	0.59	39	192	<5	3.6	3.3	16	3.62	<2	0.115	0.07	4	1.1	849	<0.01	6	<5	196	<0.01	23	<20
439.1	10409	49	129	1	74	74	1.29	76	40	<2	1.06	1	38	5.91	<10	7.37	0.08	<10	1	438	0.02	6	3	32	0.11	72	30
439.1	10463	116	218	<1	465	2230	0.96	29	120	<2	1.15	14.8	66	>15	10	38	0.09	<10	0.94	1105	0.05	<2	7	<1	0.48	1565	50
439.2	10283	106	53	13	249	910	0.23	322	30	12	0.21	1	73	>15	<10	0.39	0.01	<10	0.21	421	<0.01	<2	3	10	0.19	1635	30
439.2	10769	280	104	2	86	53	1.22	1520	10	17	1.08	<0.5	88	9.02	<10	38.9	0.08	<10	0.95	403	0.02	7	4	59	0.09	69	620
439.2	10772	136	82	13	238	1010	0.56	381	70	21	0.52	<0.5	72	42.8	10	8.56	0.05	<10	0.47	611	0.02	<2	5	19	0.24	1525	120
439.2	10811	4840	195	8	310	38	0.29	>10000	<10	85	0.37	3.8	404	>15	<10	3.12	0.02	<10	0.25	138	<0.01	28	2	36	0.06	73	1330
439.3	10776	11	49	2	356	1490	0.7	15	70	<2	0.63	<0.5	65	42.8	10	0.29	0.04	<10	0.63	894	0.02	<2	7	19	0.43	1775	<10
439.3	11302	6	59	<1	46	78	1.55	15	280	<2	1.18	<0.5	19	3.28	<10	0.17	0.08	<10	1.19	414	0.03	<2	5	44	0.17	80	10
439.4	10743	6	56	<1	32	58	1.46	17	100	<2	0.33	<0.5	11	2.69	<10	0.04	0.15	10	0.73	869	0.03	<2	4	34	0.1	42	20
439.4	11320	8	57	<1	60	109	1.76	43	220	<2	1.9	<0.5	30	4.79	<10	1.15	0.1	<10	1.37	456	0.04	3	5	159	0.2	100	10
440	10694	5	74	1	54	132	1.3	12	190	<2	0.55	<0.5	17	4.05	<10	0.27	0.12	10	1.24	441	0.04	<2	5	30	0.13	146	10
440	10695	10	82	1	58	103	1.38	16	260	<2	0.6	<0.5	24	4.95	<10	0.26	0.08	<10	1.08	422	0.03	<2	4	26	0.15	154	10
441	10696	7	105	1	61	85	1.68	16	230	<2	0.99	<0.5	18	3.75	<10	0.09	0.11	10	1.28	501	0.03	<2	4	34	0.16	78	<10
442	10657	10	104	2	68	132	1.86	19	270	<2	1	0.7	30	6.4	10	0.37	0.21	10	1.28	572	0.06	4	6	40	0.23	195	10
442	10745	16	108	2	59	72	1.56	29	230	<2	0.78	0.7	20	4.13	<10	0.24	0.12	10	1.17	468	0.03	2	5	50	0.16	73	10
442	10771	12	62	4	222	1040	0.66	5	40	<2	0.5	<0.5	56	43.6	20	1.01	0.04	<10	0.68	677	0.03	<2	7	22	0.5	2640	10
443	10693	6	84	1	52	97	1.34	15	160	<2	0.53	<0.5	16	3.55	<10	0.18	0.11	10	1.15	449	0.03	<2	5	33	0.11	99	<10
444	2930	5	94	3	71	283	2.1	24	79	<5	1.61	0.8	29	6.41	<2	0.261	0.25	9	1.34	539	0.08	<5	7	77	0.247	188	<20
445	10563	5	68	35	8	33	2.25	33	50	<2	0.47	<0.5	34	9.93	10	0.04	0.17	<10	1.18	718	0.03	<2	8	2	0.13	85	<10
445	10632	5	66	15	5	21	2.03	54	430	<2	0.19	<0.5	3	7.57	10	0.03	0.13	<10	1.16	533	0.03	<2	9	2	0.08	100	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
445	10633	Chistochina Airstrip	R	FL	G		Cu-st rocks	<5	<1	<1	0.2	1010
445	11111	Chistochina Airstrip	R	RC	S	0.5	Angular Fe-oxide-cemented talus/lithic br of clasts of msv py	<5	<1	50	4	4460
445	11112	Chistochina Airstrip	R	RC	Rep	10	Fe-oxide-cemented talus clasts of volc to msv py	<5	<1	5	0.6	796
446	11110	Lower Slate Creek area	R	OC	Rep	10x10	Fest volc w/ py & po in vnlets & blebs along fracts	<5	<1	4	0.5	310
447	11109	Lower Slate Creek area	R	OC	Rep	10x10	Fest gray to dark gray fg sil/frac volc w/ py	<5	<1	3	0.3	281
450	10631	GR 28-28&29	R	RC			Intermed to granitic rock w/ specular hematite vns	<5	<1	7	0.2	68
451	10561	GR 28-28&29	R	FL	S		Specular hematite cobble	<5	<1	2	0.6	490
451	10562	GR 28-28&29	R	FL	S		Fracture filled w/ hematite & 1 spot of mal stain	<5	<1	<1	0.8	660
452	10938	Coppertone	R	OC	Rep	6x10	Fest volcs w/ po	<5	1	11	0.2	155
453	10940	Coppertone area	R	RC	Rep	3	Dacite to rhyodacite w/ po +/- py +/- cpy	<5	1	4	0.2	12
454	10939	GR 28-27 area	R	OC	C	2.5	Br shear, qz-flooded in dark gray volcs	<5	<1	2	<0.2	12
455.1	10629	GR 28-27 area	R	RC	RC	5	Mod-strong fest andesite w/ weak argillic alt, mod sulf	<5	<1	2	0.2	158
455.2	10558	GR 28-27	R	RC	S		Cu-st rock	5	2	1	0.9	**1.81%**
455.2	10559	GR 28-27	R	FL	RC		Boulder w/ dark reddish brown rind, fg gbo, up to 10% sulfs	5	1	33	12	**1.20%**
455.2	10630	GR 28-27	R	FL	RC		Weakly meta gbo & andesite	10	3	32	11.2	5350
456	10560	GR 28-26	R	FL	G		Dacite weathers to a dark gray w/ whitish dots	8	26	7	0.3	414
457.1	10400	Miller Gulch	PL				Bedrock: Banded arg	16	6	**63.8**	2.3	764
457.1	10461	Miller Gulch	PL				Magnetic fraction of 10400	29	16	**12.5**	<0.2	35
457.2	10250	Miller Gulch	PL				From dry arg bench	<5	7	2960	1	80
457.2	10275	Miller Gulch	PL				Magnetic fraction of sample 10250				0.3	40
457.2	10816	Miller Gulch Dikes	R	OC	Rep		Pyx porph di dike w/ ~1% euhedral py	<5	1	2	<0.2	88
457.3	10258	Miller Gulch	PL				46 coarse, 4 v coarse, 58 fine, 150 v fine Au, mag, tr cinnabar(?)	93	8	>10000	0.3	74
457.3	10276	Miller Gulch	PL				Magnetic fraction of sample 10258	8	10	194	0.3	45
458.1	10815	Miller Gulch Dikes	R	RC	G		Dark green, msv di dike w/ v minor py & cpy	<5	2	2	<0.2	158
458.2	6978	Miller Gulch Dikes	R	RC	G		Plag porph dike w/ minor dissem sulf	<5	5	7	<0.2	190
458.2	10401	Miller Gulch Dikes	R	OC	C	7	Di dike	5	6	3	0.2	444
458.3	6976	Miller Gulch Dikes	R	OC	G		Gbo dike w/ dissem po & py	19	17	<1	<0.2	479
458.3	6977	Miller Gulch Dikes	R	OC	G		Gbo dike w/ minor py & po	<5	3	<1	<0.2	194
458.3	10233	Miller Gulch Dikes	R	OC	RC		2' diabase(?) d ke intruding arg	8	4	4	<0.2	301
458.3	10817	Miller Gulch Dikes	R	OC	S		Pyxite to pyx-rich di dike w/ 5-10% py, po, cpy	18	24	3	<0.2	434
458.4	10813	Miller Gulch Dikes	R	OC	Rep		Plag porph di d ke	<5	3	3	<0.2	71
458.4	10814	Miller Gulch Dikes	R	OC	Rep		Alt mafic dike w/ large alt phenocrysts in places	6	5	<1	<0.2	126
459.1	10411	Round Wash	PL				Non-magnetic fraction	<5	5	545	<0.2	36
459.1	10465	Round Wash	PL				Magnetic fraction of 10411	60	23	935	<0.2	24
459.2	10428	Round Wash	PL				Non-magnetic fraction	<5	5	102	<0.2	41
459.2	10470	Round Wash	PL				Magnetic fraction of 10428				0.2	36
459.3	10427	Round Wash	PL				Non-magnetic fraction	5	9	**113.5**	0.2	58
459.3	10469	Round Wash	PL				Magnetic fraction of 10427	65	128	**13.2**	<0.2	40
460	11115	GR 28-23 area	R	RC	Rep	10	Mg dark gray gbo w/ vns of qz epid	8	10	2	0.2	53
461.1	10403	Big Four	SL				Garnet & abundant mag in concentrate	76	1	**>1000**	80.3	6670
461.1	10462	Big Four	O				Magnetic fraction of 10403	39	14	**77.7**	60.9	74
461.2	2926	Big Four	SS					10	9	12	<0.2	50

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
445	10633	2	77	1	8	21	2.27	5	90	<2	1.4	<0.5	17	4.8	10	0.03	0.05	10	1.68	945	0.05	<2	12	27	0.15	104	<10
445	11111	37	33	116	12	75	1.65	1850	10	2	0.09	<0.5	114	17.2	<10	0.02	0.22	<10	0.57	312	0.01	7	4	16	0.04	44	<10
445	11112	<2	62	19	6	37	2.63	39	80	<2	0.48	<0.5	24	7.4	10	0.01	0.2	<10	1.62	593	0.06	3	14	5	0.22	105	<10
446	11110	2	47	291	13	65	2.64	10	40	2	0.26	<0.5	55	10.95	10	0.29	0.11	<10	1.88	842	0.05	<2	9	33	0.11	69	10
447	11109	9	90	5	10	66	2.56	<2	90	<2	0.53	<0.5	16	5.6	10	0.02	0.09	<10	1.92	971	0.08	2	12	3	0.13	111	<10
450	10631	11	34	15	18	50	0.99	40	140	<2	0.16	<0.5	8	4.06	<10	1.35	0.23	20	0.45	436	0.02	<2	2	73	0.01	6	<10
451	10561	6	29	13	2	17	0.51	146	110	2	0.08	<0.5	3	>15	10	0.08	<0.01	<10	0.08	171	<0.01	<2	4	48	0.09	56	60
451	10562	2	162	18	4	27	3.56	10	110	<2	0.03	<0.5	40	11.65	10	0.03	0.04	20	1.17	4230	<0.01	19	6	4	0.02	32	10
452	10938	<2	58	<1	5	32	3.03	<2	90	<2	0.43	<0.5	10	8.93	10	0.01	0.08	<10	2.3	954	0.06	<2	9	52	0.11	129	<10
453	10940	<2	42	2	<1	7	1.58	<2	80	<2	0.18	<0.5	6	3.02	10	<0.01	0.06	10	1.26	524	0.04	3	4	2	0.01	22	<10
454	10939	<2	72	<1	<1	38	2.19	<2	80	<2	0.01	<0.5	15	4.2	10	<0.01	0.11	10	1.36	870	0.01	<2	2	32	<0.01	18	<10
455.1	10629	<2	99	5	3	20	4.01	5	140	<2	0.15	<0.5	8	6.64	10	<0.01	0.19	<10	2.38	1205	0.03	<2	12	94	0.03	150	<10
455.2	10558	2	65	<1	5	14	3.21	5	10	<2	2.02	<0.5	16	5.88	10	0.01	<0.01	<10	2.46	2350	<0.01	<2	10	20	0.19	63	<10
455.2	10559	9	204	1	7	20	7.16	5	<10	<2	0.6	<0.5	38	>15	20	0.03	<0.01	<10	4.36	3850	<0.01	<2	15	78	0.17	110	20
455.2	10630	7	170	1	29	32	7.38	3	110	<2	1.64	<0.5	31	12.3	10	0.02	0.02	<10	4.16	2980	0.11	<2	18	10	0.19	123	<10
456	10560	4	58	1	46	12	4.06	6	40	<2	2.36	<0.5	29	6.47	10	<0.01	0.07	<10	1.22	795	0.38	<2	5	26	0.46	159	<10
457.1	10400	210	143	<1	67	115	2.34	32	210	<2		0.5	30	8.21	<10	100	0.21	<10	1.59	771	0.03	<2	7	27	0.15	285	40
457.1	10461	64	58	<1	325	1130	0.7	<2	70	<2	0.35	5.1	50	>15	10	23	0.05	<10	0.51	852	0.01	<2	5	7	0.2	1030	50
457.2	10250	14	66	3	180	369	1.46	34	50	<2	0.58	<0.5	40	10.75	10	0.16	0.07	10	0.96	984	0.01	3	10	39	0.21	379	10
457.2	10275	<2	54	8	1000	2860	0.63	10	40	<2	0.23	<0.5	99	>15	10	0.06	0.01	<10	0.49	1850	<0.01	6	10	13	0.44	1460	<10
457.2	10816	6	33	<1	235	314	2.81	2	20	<2	1.98	<0.5	38	3.82	10	0.01	0.06	<10	3.83	470	0.09	<2	5	196	0.16	90	<10
457.3	10258	13	57	2	116	144	1.4	22	60	<2	0.86	<0.5	33	6.99	10	44	0.07	20	1.08	1145	0.01	4	9	50	0.22	229	20
457.3	10276	3	56	6	754	2080	0.64	18	60	3	0.36	1.8	91	>15	10	0.08	0.02	<10	0.58	1555	<0.01	6	12	18	0.43	1375	<10
458.1	10815	4	51	<1	23	39	2.87	5	20	<2	3.63	<0.5	35	4.9	10	0.81	0.1	<10	2.09	764	0.1	<2	8	51	0.22	123	<10
458.2	6978	6	65	<1	35	101	2.2	<5	25	<5	2.65	0.4	22	5.04	6	0.685	0.18	11	1.85	953	0.03	<5	10	111	0.126	148	<20
458.2	10401	6	81	1	36	63	3.12	7	30	8	1.98	0.5	27	6.59	10	0.05	0.25	<10	2.44	1055	0.02	<2	18	27	0.07	224	**<10**
458.3	6976	4	41	<1	91	62	1.57	<5	27	<5	1.68	<0.2	46	5.92	<2	0.165	0.21	2	1.24	405	0.1	<5	<5	38	0.204	122	<20
458.3	6977	4	38	<1	3	24	2.1	<5	36	<5	2.48	<0.2	14	3.87	3	0.153	0.2	3	1.28	643	0.12	<5	6	151	0.112	123	<20
458.3	10233	6	40	1	8	11	2.86	4	70	<2	3.01	<0.5	17	4.2	10	0.17	0.33	<10	1.37	718	0.2	<2	11	171	0.2	151	<10
458.3	10817	9	35	<1	75	106	1.48	3	20	<2	1.8	<0.5	51	6.74	10	0.07	0.13	<10	1.41	325	0.08	<2	10	55	0.25	193	<10
458.4	10813	6	66	<1	32	73	2.07	5	30	<2	1.47	<0.5	19	4.14	10	0.03	0.24	10	1.6	708	0.05	<2	6	65	0.29	153	<10
458.4	10814	<2	36	<1	227	525	2.65	9	10	<2	1.82	<0.5	53	3.49	<10	0.32	0.06	<10	4.18	522	0.05	<2	4	108	0.13	74	<10
459.1	10411	2	82	<1	65	89	1.88	11	20	<2	0.21	0.5	16	4.03	<10	1.63	0.05	<10	0.88	398	<0.01	<2	6	27	0.05	88	10
459.1	10465	40	60	2	296	1110	1.01	5	30	4	0.35	13.4	49	>15	20	0.87	0.04	<10	0.5	715	0.02	11	9	<1	0.23	1485	<10
459.2	10428	<2	84	1	108	120	1.82	23	40	<2	0.24	0.5	23	4.73	<10	0.33	0.06	<10	1.03	620	<0.01	<2	6	18	0.07	109	20
459.2	10470	48	92	<1	1375	4480	1.23	12	50	8	0.22	12.2	95	>15	20	0.44	0.03	<10	0.9	1660	0.01	<2	9	<1	0.21	869	70
459.3	10427	<2	69	<1	180	157	1.47	26	50	<2	0.4	0.9	34	6.27	<10	0.4	0.06	<10	1.1	754	0.01	4	8	20	0.12	194	30
459.3	10469	48	61	<1	633	1675	0.9	13	50	<2	0.29	11.5	89	>15	20	0.32	0.02	<10	0.88	1595	<0.01	<2	11	<1	0.33	1240	70
460	11115	<2	31	1	18	70	1.76	<2	190	<2	2.2	<0.5	14	3.04	10	0.1	0.1	<10	1.24	445	0.14	2	8	13	0.14	129	<10
461.1	10403	1495	72	5	88	271	0.59	28	310	<2	0.38	3.1	43	>15	10	100	0.04	10	0.33	1355	0.02	21	5	35	0.24	831	70
461.1	10462	77	36	16	652	2250	0.26	7	40	<2	0.14	3.3	38	>15	10	100	0.01	<10	0.28	881	<0.01	<2	3	<1	0.13	640	60
461.2	2926	5	77	<1	141	206	2.07	19	95	<5	0.73	<0.2	27	5.28	<2	0.087	0.13	6	1.23	701	0.03	<5	10	72	0.106	107	<20

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
461.3	10404	Big Four	PC				Bedrock: gbo	11	8	**84**	1.4	49
461.4	10402	Big Four	PC				Cobble, grey gravel, clay-rich, 1 v fine Au flake	<5	4	2520	6	35
461.4	10405	Big Four	PC				2 fine flat Au flakes	30	18	**17.45**	<0.2	37
461.4	10410	Big Four	PL				Non-magnetic fraction	8	6	**61.3**	<0.2	51
461.4	10464	Big Four	PL				Magnetic fraction of 10410	42	11	**32.8**	1	41
462	10767	Chistochina Moraine	PC				No visible Au, minor clay; black slate bedrock	<5	3	176	0.2	66
463	10768	Chistochina Moraine	PC				No visible Au, some clay; black slate bedrock	8	8	11	0.2	99
464	10812	Round Wash area	R	OC	S		Arg w/ py on fracture surfaces & 1-2% dissem	<5	1	<1	<0.2	84
465	10656	Upper Slate Creek	PC		PC		No visible Au, trace mag, bench gravels of slate	<5	5	11	0.3	67
466	10723	GR 28-22	R	RC	G		Fest qz vn in arg	<5	1	<1	<0.2	156
466	10724	GR 28-22	R	OC	G		Fest phyllitic arg	6	2	7	1.4	32
467	10406	Upper Slate Creek	PC				Bedrock: Arg-turbidite	<5	<1	7020	19.2	56
468.1	10753	West DAT	R				Fest cpy skarn, ~ 1% cpy	<5	1	10	18.2	1730
468.1	11182	West DAT	R	OC	S	1	Skarn w/ epid/wollastonite/specular hematite, cpy & mal	<5	<1	7	8.9	**4.89%**
468.1	11183	West DAT	R	OC	C	5	Gossanous shear in volc w/ sulf	<5	1	9	50.5	**6.43%**
468.1	11184	West DAT	R	OC	S		Jasperoid w/ qz/epid alt & disem cpy	<5	<1	<1	0.6	1895
468.2	11181	West DAT	R	OC	Rep	1	Fest volcaniclastic shea,r sil, w/ Cu-st	<5	1	11	13.6	3080
468.3	10752	West DAT	R				Leached sil ls w/ strong fest after py	<5	<1	152	1	73
468.3	11179	West DAT	R	OC	G	2	Pyritic silica replacement of ls, fest shear	<5	<1	<1	<0.2	104
468.3	11180	West DAT	R	OC	C	2	Limonitic qz-py shear in volc br	<5	1	5	0.3	52
469	10757	Powell Gulch	PC				Tr balck sands, no visible Au	<5	<1	5	0.2	55
470.1	10125	Northland Mines	R	RC	G		Meta-sed rock, w/ specular hematite layer	<5	<1	<1	2	1385
470.1	10126	Northland Mines	R	RC	S		Sed rock w/ specular hematite.	<5	<1	3	13.7	**1.76%**
470.1	10127	Northland Mines	R	OC	C		Ls w/ fossils, below hematite rock	<5	2	<1	2.8	**2.89%**
470.1	10128	Northland Mines	R	OC	S	5	Msv hematite	<5	<1	22	3.8	**2.46%**
470.1	10129	Northland Mines	R	OC	C	5	Msv specular hematite	<5	1	4	3.2	2900
470.1	10489	Northland Mines	R	OC	SC	20@1	Msv hematite w/ ~2% cpy	<5	<1	2	3.3	3770
470.2	10488	Northland Mines	R	RC	G	1	Msv specular hematite w/ Cu-st	<5	<1	3	1.1	2470
471.1	11019	Chisna Ridge	R	FL	G	2	Qz vn	<5	1	1	8.8	769
471.1	11167	Chisna Ridge	R	FL	S	10	Hematite jasper epid alt light volc	<5	<1	2	2.7	581
471.1	11168	Chisna Ridge	R	RC	S	1	Fest dark andesitic volc w/ py & cpy	<5	1	27	14.8	**3.20%**
471.2	10668	Chisna Ridge	R	T	G		Metabasalt w/ 20% cpy & hematite	<5	<1	**23.4**	53.9	**2.61%**
471.2	10669	Chisna Ridge	R	RC	S	30	Metabasalt w/ ~3% cpy/hematite	<5	<1	3000	34.3	**1.16%**
471.2	11018	Chisna Ridge	R	RC	G		Dark greenish-gray sil volc (clasitc?) w/vuggy qz vns	<5	<1	2	<0.2	24
471.2	11108	Chisna Ridge	R	TP	C	5	V fest dark green volc w/ cpy	<5	<1	230	12	1405
471.2	11166	Chisna Ridge	R	OC	G	2	Fest sil andesitic volc w/ tr dissem py, cpy	<5	<1	46	1	51
472	10670	Chisna Ridge area	R	OC	C	6	Metabasalt	<5	1	592	4.3	367
473	11165	Chisna Ridge area	R	OC	Rep	5	Sil pyritized shear in andesite, v alt	<5	<1	2	<0.2	21
474	11164	Chisna Ridge area	R	OC	G	1	V alt hematite/limonite stained pyritic andesite	<5	<1	4	0.3	337
475	11163	Chisna Ridge area	R	OC	G	1	Hematite & limonite stained alt dark andesitic volc w/ py	<5	<1	<1	0.2	173
476	11162	Chisna Ridge area	R	OC	G	1	Sil shear in andesite	<5	<1	12	0.5	11
477	11017	Chisna Ridge area	R	OC	G		Volc seds + qz vn	<5	2	52	1.5	160

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
461.3	10404	6	56	1	191	498	1.53	23	80	<2	0.59	1.6	34	9.89	10	0.47	0.09	10	1.08	747	0.05	7	10	<1	0.15	348	<10
461.4	10402	5	55	1	1185	1645	1.23	18	80	<2	0.56	1.2	51	13.1	10	0.04	0.07	<10	0.92	912	0.03	16	4	42	0.06	117	<10
461.4	10405	3	45	1	155	389	1.29	8	100	2	0.66	1.8	30	11.4	10	0.07	0.09	<10	0.8	740	0.04	5	14	42	0.15	481	<10
461.4	10410	6	72	1	135	233	1.39	29	60	9	0.56	<0.5	32	8.01	<10	2.15	0.07	10	0.89	978	0.02	7	7	32	0.15	276	30
461.4	10464	72	69	<1	853	2770	0.79	5	60	<2	0.35	10.5	72	>15	20	1.22	0.03	<10	0.67	1530	0.02	<2	8	<1	0.25	1015	60
462	10767	<2	138	2	38	68	2.67	17	230	<2	0.47	0.5	14	4.78	10	0.4	0.26	10	1.48	782	0.03	<2	6	85	0.05	71	<10
463	10768	3	99	1	83	166	3.55	17	100	<2	1.58	<0.5	24	5.48	10	0.82	0.23	10	2.61	770	0.04	<2	12	30	0.08	117	<10
464	10812	4	93	6	22	46	3.68	10	170	<2	0.75	<0.5	14	5.49	10	0.91	1.76	<10	2.13	816	0.22	<2	7	19	0.35	152	<10
465	10656	4	92	1	43	77	2.8	13	120	<2	0.68	<0.5	17	4.77	10	0.14	0.26	10	1.78	708	0.04	2	7	76	0.14	84	<10
466	10723	2	26	1	12	106	0.2	3	30	<2	0.53	1.1	3	0.9	<10	0.04	0.01	<10	0.23	282	0.01	<2	1	45	0.03	14	<10
466	10724	12	27	19	21	83	0.96	12	190	<2	0.3	<0.5	2	2.62	<10	0.48	0.12	<10	0.49	205	0.05	2	3	13	0.16	52	<10
467	10406	6	60	1	255	841	1.51	16	100	<2	0.51	1.1	30	8.06	10	0.84	0.1	10	1.01	929	0.04	8	6	85	0.1	187	<10
468.1	10753	19	114	1	8	14	3.87	9	10	8	0.58	<0.5	22	10.25	10	0.03	<0.01	<10	2.81	1800	0.01	<2	7	3	0.12	83	<10
468.1	11182	5	802	2	5	4	0.43	16	20	<2	7.1	4.9	10	11	<10	0.09	<0.01	<10	0.72	6670	0.01	4	1	43	0.01	8	20
468.1	11183	12	108	1	1	<1	3.75	53	30	<2	0.2	<0.5	27	22.2	10	0.1	0.02	<10	2.44	1620	<0.01	<2	12	23	0.1	140	10
468.1	11184	2	55	1	11	61	1.48	4	800	<2	1.72	<0.5	15	3.62	<10	<0.01	<0.01	<10	1.13	1785	<0.01	3	3	17	0.06	46	<10
468.2	11181	2	14	1	<1	10	0.68	5	830	2	0.26	<0.5	2	9.79	<10	0.04	0.05	<10	0.15	259	<0.01	<2	2	3	0.02	9	<10
468.3	10752	15	16	8	1	29	0.45	25	100	4	0.03	<0.5	4	3.26	<10	0.01	0.09	<10	0.18	129	0.02	<2	1	21	<0.01	5	<10
468.3	11179	<2	56	<1	1	5	1.68	<2	30	<2	0.03	<0.5	5	4.11	10	<0.01	0.07	<10	1.1	579	0.02	<2	5	7	<0.01	34	<10
468.3	11180	4	41	5	1	25	1.28	4	20	<2	0.02	<0.5	3	3.43	10	0.01	0.05	<10	0.68	516	0.04	<2	3	2	<0.01	23	<10
469	10757	7	85	1	29	110	2.3	7	120	<2	0.99	<0.5	14	4.54	10	4.01	0.11	10	1.26	772	0.07	3	7	68	0.17	146	<10
470.1	10125	4	228	1	6	38	1.59	9	**10**	12	1.93	1.2	4	7.43	10	0.02	0.01	<10	1.27	2780	0.01	<2	3	12	0.02	20	**60**
470.1	10126	12	90	1	3	42	1.04	3	**<10**	<2	0.02	<0.5	2	6.7	<10	0.04	<0.01	<10	0.77	626	0.01	<2	2	1	0.01	11	**40**
470.1	10127	2	776	<1	15	28	1.69	10	**90**	4	5.93	2.1	19	2 85	10	0.05	<0.01	<10	2	6650	0.01	2	5	40	0.04	24	**<10**
470.1	10128	15	65	2	3	18	3.01	15	**<10**	9	0.02	4.4	37	>15	20	0.26	<0.01	<10	2.35	639	0.01	7	6	<1	0.01	64	**10**
470.1	10129	7	570	3	3	26	1.43	6	**<10**	7	0.61	1.8	2	8 55	<10	2.93	<0.01	<10	1.4	1390	0.01	<2	4	12	0.03	21	**80**
470.1	10489	3	428	3	8	51	2.05	7	10	<2	1.68	1.7	16	11.7	<10	0.15	0.01	<10	1.5	3110	0.01	3	4	38	0.08	26	20
470.2	10488	2	86	4	5	8	1.29	<2	50	<2	6.62	<0.5	6	>15	<10	0.35	<0.01	<10	1.07	4120	<0.01	<2	3	66	0.02	27	70
471.1	11019	**3.20%**	2	4	13	9	0.05	<2	100	4	<0.01	2.9	1	0.25	<10	0.02	0.02	<10	0.01	15	0.01	5	<1	8	<0.01	1	<10
471.1	11167	4	81	1	5	64	2.25	15	50	2	0.36	<0.5	13	6.85	<10	0.01	0.04	<10	1.31	1770	<0.01	7	8	27	0.02	106	<10
471.1	11168	41	146	71	<1	88	2.01	22	10	13	0.03	0.8	54	16.2	10	0.06	0.03	<10	1.07	844	<0.01	4	4	24	<0.01	45	<10
471.2	10668	126	375	16	2	39	1.28	1900	10	156	0.04	2.6	9	17.3	<10	0.76	0.08	<10	0.71	830	0.01	50	4	48	0.03	41	<10
471.2	10669	122	487	3	2	27	3.23	426	60	100	0.04	1.2	10	11.45	<10	0.3	0.14	<10	1.98	1875	0.01	10	10	3	0.08	106	<10
471.2	11018	5	223	1	14	49	3.38	9	380	2	0.02	<0.5	10	4.92	10	<0.01	0.07	<10	3.07	2170	0.01	<2	6	6	0.02	73	<10
471.2	11108	67	589	<1	3	10	4.3	138	60	3	0.02	<0.5	10	8.89	10	0.1	0.15	<10	2.98	2630	0.01	<2	13	1	<0.01	130	<10
471.2	11166	79	259	<1	2	36	2.81	132	140	3	0.01	<0.5	9	5.41	<10	0.02	0.14	<10	2.55	2560	0.01	3	8	2	0.01	90	<10
472	10670	83	491	3	1	18	3.92	216	60	4	0.02	<0.5	9	9.24	10	0.04	0.13	<10	3.03	2630	0.01	<2	9	3	<0.01	112	<10
473	11165	<2	17	2	1	34	0.96	14	160	2	<0.01	<0.5	<1	5.62	<10	<0.01	0.3	<10	0.15	83	<0.01	<2	2	6	<0.01	5	<10
474	11164	7	29	1	1	24	1.3	6	270	2	0.01	<0.5	<1	8.55	10	0.01	0.37	<10	0.26	142	0.01	<2	3	2	0.08	14	<10
475	11163	7	73	<1	1	34	2.65	4	90	<2	0.01	<0.5	8	6.56	10	<0.01	0.22	<10	0.88	788	<0.01	3	4	1	<0.01	12	<10
476	11162	3	3	<1	5	44	0.54	<2	160	<2	0.01	<0.5	<1	0.54	<10	<0.01	0.36	<10	0.06	28	0.01	<2	1	7	<0.01	2	<10
477	11017	91	194	2	110	19	1.84	416	120	3	0.01	<0.5	10	8.41	10	0.01	0.18	<10	1.02	1070	0.01	3	5	13	0.01	72	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
477	11161	Chisna Ridge area	R	OC	G	1	Fest fractured andesitic volc w/ py & cpy	<5	<1	60	0.7	650
478	10672	Chisna Ridge area	R	F	RC	10	Metavolcanics	<5	<1	8	<0.2	56
479	10671	Chisna Ridge area	R	OC	C	2	Fest volcs w/ cpy & py to 5%	<5	1	31	2.2	2430
481.1	11202	Quartz Creek Head	R	RC	S		Fest pegmatoidal hbl gbo w/ 5% py	<5	3	2	<0.2	202
481.1	11203	Quartz Creek Head	R	RC	RC	12	Mg to v cg perid to hornblendite	43	25	<1	<0.2	8
481.1	11204	Quartz Creek Head	R	RC	S		Fest fg gbo w/ ~5% py +/- cpy	<5	7	1	<0.2	46
481.2	10999	Quartz Creek Head	R	OC	G		Fest arg w/ minor py	<5	2	3	<0.2	76
481.2	11200	Quartz Creek Head	R	RC	SC	12	Perid to ol pyxite w/ minor po & cpy	9	6	1	<0.2	10
481.2	11201	Quartz Creek Head	R	RC	Rep		Phlog-bearing dun/perid	<5	12	<1	<0.2	8
481.2	11205	Quartz Creek Head	R	RC	S		Phlog-bearing dun w/ cpy	16	25	6	1.4	1960
481.2	11206	Quartz Creek Head	R	RC	Rep	30	Pyxite, serp, +/- cg dun(?)	43	2	<1	<0.2	11
482.1	10640	Quartz Creek	PC				Mod mag, no vis ble Au	61	9	1790	<0.2	74
482.2	10744	Quartz Creek	PC		PC		Barren sample	8	5	275	0.3	60
483	10756	Upper Chisna River	PC				1 v fine Au flake, mod black sands	49	12	516	0.2	80
484	10655	Upper Chisna River	PC		PC		2 v fine Au flakes; bench gravels, 90% slate, 10% phy	20	6	366	<0.2	49
485	10754	Coal Creek	PC				Minor clay, abandonded channel	<5	6	722	0.2	56
485	10755	Coal Creek	PC				Abandoned channel	10	5	1050	<0.2	86
486	10490	Limestone Creek area	R	OC	S	0.2	Qz-epid-cc vn in dacite?	6	8	7	1.3	3280
487	10491	Limestone Creek area	R	RC	S	0.5	Qz-cc-epid vn w/ blebs of bn	9	10	364	1.5	2170
488	11321	Bedrock Creek	PC				1 v coarse, 1 fine, 1 v fine Au flakes	6	3	**34.9**	0.3	98
488	11322	Bedrock Creek	PC				1 v coarse, 4 coarse, 6 v fine Au flakes	40	4	**110.5**	2.6	60
492.1	10572	Chisna River (Middle)	PC				Lots of mag, some ol, 3 tiny specs of Au	132	24	9720	0.6	54
492.1	10639	Chisna River (Middle)	PC					10	10	554	<0.2	66
492.2	10251	Chisna River (Middle)	PC				Abundant black sands	12	10	5340	<0.2	57
492.2	10259	Chisna River (Middle)	PL				Abundant black sand	108	8	**14.5**	0.3	50
492.2	10277	Chisna River (Middle)	PL				Magnetic fraction of sample 10259	13	11	2190	0.7	28
493	10493	MF1996C-138	R	FL	S		Volcaniclastic dacite-andesite w/ Cu-st	<5	<1	23	2.1	4980
494	10245	Gold Creek	PC				Minor magnetite in pan, no visible Au	5	3	67	<0.2	93
494	10246	Gold Creek	R	OC	G	2x6	Felsic volc, qz rich	<5	2	4	<0.2	29
495	10252	Chisna River bench	PC				6 v fine Au flakes in pan	6	3	35	0.3	60
495	10253	Willow Creek	PC				Bedrock mostly di	6	3	2	0.3	69
496	10260	Chisna River (Lower)	PC				2 fine, 1 v fine Au flakes, 1 v fine PGE(?), diorite bedrock	7	4	71	<0.2	44
496	10407	Chisna River (Lower)	PC				Bedrock:qz monzonite cut by diabase dikes.	1555	13	**792**	63.8	84
496	10408	Chisna River (Lower)	PC				Bedrock: qz monzonite	2290	11	**82.2**	2	35
496	10412	Chisna River (Lower)	PL				Non-magnetic fraction	<5	9	238	<0.2	29
496	10466	Chisna River (Lower)	PL				Magnetic fraction of 10412	2170	33	**69.3**	4.9	33
497.1	10451	Chisna River	PC				1 coarse, 1 fine, 2 v fine Au	156	6	**43.3**	5.4	51
497.2	10455	Chisna River	PC				2 fine, 4 v fine Au	3.5	4	1020	<0.2	57
497.2	10456	Chisna River	PC				1 coarse, 3 v fine flakes Au	7.9	4	3330	<0.2	56
497.3	10254	Chisna River	SL				Mostly mag, no visible Au	177	13	271	0.6	37
497.3	10452	Chisna River	PC				3 v fine, 1 fine Au	5.5	6	1320	<0.2	45
497.3	10454	Chisna River	SL				Non-magnetic fraction	71	19	>10000	25	58

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
477	11161	31	236	2	3	15	6	48	60	5	0.03	<0.5	23	20.5	10	<0.01	0.18	<10	3.93	2140	0.01	<2	15	7	0.06	172	<10
478	10672	<2	40	<1	1	36	1.26	5	70	<2	0.01	<0.5	2	4.03	<10	<0.01	0.16	<10	0.52	430	0.01	<2	2	4	0.01	9	<10
479	10671	8	455	2	6	38	3.15	29	130	3	0.13	0.5	13	7.15	<10	0.02	0.18	<10	1.58	2850	0.01	<2	7	2	0.04	93	<10
481.1	11202	2	38	<1	8	16	3.15	<2	50	<2	3.72	<0.5	28	5.84	10	0.3	0.25	10	1.96	442	0.25	<2	12	13	0.19	248	<10
481.1	11203	2	33	<1	65	83	1.8	3	420	<2	0.95	<0.5	42	11.25	10	0.02	0.95	<10	2.08	270	0.07	<2	14	299	0.24	513	<10
481.1	11204	7	40	<1	26	27	1.02	<2	60	<2	0.6	<0.5	9	2.94	<10	0.01	0.15	10	0.87	201	0.03	<2	2	29	0.15	61	<10
481.2	10999	9	72	1	29	31	1.77	<2	40	<2	1.7	<0.5	14	4.54	10	0.19	0.16	10	1.2	452	0.04	<2	8	80	0.16	90	<10
481.2	11200	<2	36	<1	628	470	1.24	<2	240	<2	0.44	<0.5	67	8.29	<10	<0.01	0.65	<10	7.45	792	0.05	<2	8	29	0.2	234	<10
481.2	11201	3	21	<1	132	93	1.92	<2	380	<2	0.52	<0.5	51	11.2	10	<0.01	1.25	<10	2.66	268	0.06	<2	11	18	0.43	639	<10
481.2	11205	2	22	<1	102	99	1.82	<2	570	<2	0.87	<0.5	42	8.78	10	<0.01	1.09	<10	2.31	270	0.08	<2	10	45	0.37	459	<10
481.2	11206	<2	17	<1	205	319	0.26	<2	10	<2	0.77	<0.5	39	2.76	<10	<0.01	0.03	<10	5.06	368	0.02	<2	5	29	0.02	12	<10
482.1	10640	4	83	<1	66	172	2.12	8	170	<2	1.02	<0.5	25	9.26	10	0.16	0.26	10	1.48	681	0.06	<2	10	84	0.19	349	<10
482.2	10744	21	84	<1	47	96	2.22	12	100	<2	1	<0.5	18	5.25	10	0.1	0.22	10	1.39	693	0.05	<2	8	24	0.12	154	<10
483	10756	3	106	1	86	386	2.04	14	670	<2	1.12	<0.5	33	13.15	10	0.21	0.11	10	1.28	907	0.05	2	11	95	0.36	600	<10
484	10655	10	65	1	80	282	1.96	8	80	<2	1.21	<0.5	29	9.06	10	0.05	0.14	10	1.48	645	0.07	<2	11	1	0.3	373	<10
485	10754	5	104	<1	69	143	2.7	15	110	<2	0.97	<0.5	21	5.94	10	0.07	0.21	10	1.63	633	0.06	<2	12	42	0.18	162	<10
485	10755	11	72	1	85	294	2.13	11	110	<2	1.62	<0.5	28	9.85	10	0.03	0.14	10	1.59	781	0.08	<2	12	66	0.34	365	<10
486	10490	2	27	1	21	57	2.82	4	10	<2	7.96	<0.5	16	2.91	20	0.05	0.01	<10	1.06	1110	0.01	<2	3	53	0.17	74	<10
487	10491	<2	45	<1	40	67	2.87	2	10	<2	3.35	<0.5	25	3.51	10	0.05	0.04	<10	2.16	561	0.01	<2	5	17	0.45	103	<10
488	11321	5	81	<1	53	118	2.18	9	120	<2	0.95	<0.5	22	6.2	<10	0.08	0.11	<10	1.49	650	0.06	<2	8	61	0.19	212	<10
488	11322	<2	63	<1	45	80	2.33	4	130	<2	1	<0.5	21	5.12	10	0.05	0.4	10	1.74	570	0.07	<2	7	45	0.25	170	<10
492.1	10572	3	70	3	269	1210	0.78	<2	410	7	0.7	<0.5	94	>15	10	3.27	0.05	20	0.49	1470	0.03	<2	7	42	0.51	1915	10
492.1	10639	8	89	<1	130	449	1.78	11	270	<2	1.17	<0.5	44	>15	10	0.34	0.16	20	1.06	1090	0.06	<2	10	37	0.33	617	<10
492.2	10251	3	61	2	106	353	1.45	11	250	2	0.81	0.5	38	14.75	10	5.38	0.08	10	0.89	813	0.04	2	5	42	0.28	671	<10
492.2	10259	13	67	2	69	129	1.19	14	140	<2	0.61	0.8	28	8.96	10	47.2	0.06	10	0.86	750	0.01	2	6	36	0.18	337	20
492.2	10277	<2	63	7	267	1055	0.44	<2	60	<2	0.3	0.8	84	>15	10	21.6	0.02	<10	0.35	917	<0.01	<2	5	12	0.42	2090	10
493	10493	2	73	<1	6	32	2	8	90	<2	0.5	<0.5	7	2.89	10	0.06	0.02	<10	2.06	807	0.03	2	5	30	0.1	42	<10
494	10245	11	102	2	54	197	2.36	8	110	2	1.23	<0.5	21	9.12	10	49.1	0.28	10	1.31	832	0.13	<2	8	88	0.44	336	20
494	10246	<2	38	1	5	25	1.52	6	50	<2	0.05	<0.5	7	4.82	<10	0.06	0.21	10	1.4	258	0.01	<2	4	3	<0.01	36	<10
495	10252	11	74	<1	42	71	1.99	3	80	<2	0.67	<0.5	15	4.35	10	0.02	0.08	10	1.32	605	0.04	2	5	23	0.18	144	<10
495	10253	8	89	<1	65	70	2.23	5	160	<2	0.8	<0.5	16	4.22	10	0.03	0.07	10	1.74	661	0.07	<2	6	23	0.13	114	<10
496	10260	8	60	<1	41	74	1.57	7	90	<2	0.69	<0.5	16	4.56	10	1.06	0.07	10	1.01	569	0.04	3	4	28	0.18	184	<10
496	10407	5	73	1	55	186	1.75	11	200	<2	0.76	1	24	7.65	10	1.93	0.1	10	1.04	716	0.04	4	4	38	0.11	284	<10
496	10408	5	53	1	34	78	1.64	10	120	2	0.74	<0.5	15	5.02	10	0.75	0.1	<10	0.96	440	0.08	<2	4	70	0.16	186	<10
496	10412	4	62	<1	28	34	1.35	17	60	7	0.51	<0.5	12	2.46	<10	0.68	0.05	<10	0.85	370	0.02	<2	3	7	0.1	62	<10
496	10466	83	95	<1	148	520	0.9	5	40	21	0.53	13	79	>15	20	0.66	0.04	<10	0.59	689	0.04	<2	5	46	0.5	1965	60
497.1	10451	9	66	<1	41	93	1.67	6	80	<2	0.75	0.5	18	6.23	10	0.2	0.1	10	1.13	581	0.07	<2	5	58	0.15	203	10
497.2	10455	12	75	<1	43	86	1.66	7	90	<2	0.72	<0.5	17	5.06	10	0.35	0.09	10	1.15	601	0.05	<2	5	55	0.13	165	<10
497.2	10456	7	61	<1	35	65	1.54	5	90	2	0.66	<0.5	15	4.33	10	0.27	0.09	10	1.09	518	0.05	<2	5	27	0.16	150	<10
497.3	10254	<2	102	11	265	1085	0.47	<2	30	2	0.37	<0.5	93	>15	10	0.06	0.02	<10	0.34	1130	<0.01	<2	5	10	0.75	2880	10
497.3	10452	10	70	<1	46	102	1.74	10	90	2	0.85	<0.5	18	5.61	10	0.68	0.12	10	1.17	606	0.08	<2	6	26	0.17	204	<10
497.3	10454	94	87	<1	120	604	1.9	7	80	<2	1.5	6.2	44	>15	10	1.3	0.13	<10	1.38	974	0.17	3	11	22	0.63	819	60

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
497.3	10474	Chisna River	O				Magnetic fraction of 10454	30	16	52	0.9	33
497.4	10453	Chisna River	PC				1 fine, 1 v fine Au; much black sand	26.6	5	552	<0.2	53
499	10691	Dempsey area	PC		PC		3 v fine Au flakes	<5	5	2	<0.2	50
500	10247	Daisy Creek	PC					6	5	12	<0.2	38
501	10692	Daisy Creek	PC		PC		Barren sample	<5	1	<1	0.2	27
501	11365	Daisy Creek	PC				Granitic & mafic int float; poss slate	12	1	401	<0.2	32
502	11107	Daisy Creek area	R	OC	G	1	Light gray mg qz monzonite	60	51	16	<0.2	321
503.1	10248	Red Bear	PC					454	12	**114**	0.4	39
503.1	10775	Red Bear	PL				Magnetic fraction of sample 11301	110	19	575	<0.2	31
503.1	11301	Red Bear	PL				Non-magnetic fraction	<5	3	18	<0.2	34
503.2	10664	Red Bear	PL		PL		Non-magnetic fraction	7	4	709	<0.2	52
503.2	10770	Red Bear	PL				Magneitc fraction of sample 10664	26	9	104	<0.2	43
504	10413	Chistochina River (E Trib)	PC				Float/soil: gdi, mafic volc, diabase, sc	43	5	>10000	0.2	26
505.1	10675	Little Daisy-Weldon Creek	PC		PC		No visible Au	12	3	1	<0.2	29
505.2	10674	Little Daisy-Weldon Creek	PC		PC		2 v fine Au flakes	12	5	3	<0.2	22
505.3	10673	Little Daisy-Weldon Creek	PC		PC		3 fine Au flakes	22	6	493	<0.2	21
506.1	10676	Alder Creek	PC		PC		4 fine, 8 v fine Au flakes	60	9	5640	<0.2	21
506.1	10774	Alder Creek	PL				Magnetic fraction of sample 11300	46	13	264	<0.2	16
506.1	11300	Alder Creek	PL				Non-magnetic fraction	8	2	532	5	28
506.2	10677	Alder Creek	PC		PC		No visible Au	21	5	14	0.2	28
507	10852	Circular Anomaly area	R	OC	Rep	8	Mg to cg gdi w/ dikelets of K-spar	16	21	15	<0.2	217
508	10479	Circular Anomaly area	R	OC	G	1	Mg hbl/pyx perid w/ sparse felsic vns	6	8	1	<0.2	154
509	10480	Circular Anomaly area	R	RC	G		Mg di w/ qz	5	1	1	<0.2	52
510.1	10568	Gunn Creek	PC				Some black sand	5	3	5	<0.2	29
510.2	10420	Gunn Creek	PC				Bedrock: hbl granite, qz monzonite	<5	4	14	<0.2	27
511	10009	Summit Hill	R	RC	G		Pyxite w/ major mag	<5	25	5	<0.2	195
511	10231	Summit Hill	R	OC	Rep		Cpy-bearing mg gbo, may contain qz & K-spar	<5	18	8	<0.2	495
511	10232	Summit Hill	R	OC	G		Gbo w/ cpy & mag	<5	13	13	<0.2	486
511	10808	Summit Hill	R	OC	G		Gdi(?) w/ minor mag, cpy	5	25	22	<0.2	221
511	10809	Summit Hill	R	OC	Rep		Perid w/ 15-20% mag & v minor cpy	<5	29	1	<0.2	71
512	10810	Circular Anomaly area	R	OC	G		Perid to felds perid, v magnetic, no evident sulf	<5	14	<1	<0.2	30
513	10851	Summit Lake	R	OC	Rep		Nikolai basalt w/ ~1% py or po	8	14	4	<0.2	104
514	10553	Gunn Creek	PC					<5	2	29	<0.2	38
515.1	2655	Dan Creek	SS				Float - till	<5	3	2	<0.2	24
515.1	10113	Dan Creek	PC					<5	4	104	<0.2	37
515.1	10554	Dan Creek	PC					<5	3	139	<0.2	41
515.2	10114	Dan Creek	PC					<5	4	52	0.2	30
515.3	10689	Dan Creek area	PC	Stream	PC		1 v fine Au flake, abundant mag	16	4	43	<0.2	61
516	10115	Dan Creek area	PC				Minor magnetite in pan, no visible gold	<5	4	55	<0.2	44
516	10116	Dan Creek area	PC				Minor magnetite in pan, 1 v fine Au(?).	<5	5	2	<0.2	50
517	1030	Gulkana River Trib	SS					7	5	3	<0.2	66
518	1036	Gunn Creek Tr b	SS				Float - glacial till	<5	3	8	<0.2	37

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
497.3	10474	48	80	<1	268	759	0.51	<2	30	<2	0.39	19.3	87	>15	30	0.17	0.02	<10	0.48	749	0.02	2	3	<1	0.46	2100	70
497.4	10453	12	68	1	46	106	1.56	7	80	3	0.66	<0.5	19	6.26	10	0.89	0.07	10	1.12	581	0.05	<2	5	33	0.15	228	<10
499	10691	7	51	<1	52	102	1.1	8	70	<2	0.48	<0.5	24	6.76	<10	0.07	0.06	<10	0.8	417	0.03	<2	5	37	0.12	293	<10
500	10247	<2	43	1	35	104	1.52	9	130	<2	1.21	<0.5	19	6.3	10	0.17	0.09	10	0.85	913	0.1	<2	5	56	0.29	265	<10
501	10692	4	43	<1	32	59	1.5	<2	80	<2	0.7	<0.5	15	3.71	<10	0.05	0.08	<10	0.78	415	0.06	<2	4	21	0.2	148	<10
501	11365	<2	39	<1	42	89	1.42	4	100	<2	0.99	0.6	20	6.55	10	0.08	0.09	<10	0.83	432	0.08	<2	5	37	0.27	285	<10
502	11107	<2	34	<1	2360	168	0.08	<2	<10	<2	0.07	<0.5	171	7.58	<10	<0.01	<0.01	<10	24.7	1120	0.02	<2	5	4	<0.01	5	<10
503.1	10248	9	50	1	58	164	1.52	3	110	<2	1.1	<0.5	30	11.05	10	0.45	0.11	10	0.88	543	0.08	<2	6	51	0.36	515	<10
503.1	10775	4	36	2	121	341	0.67	4	40	<2	0.43	<0.5	70	38	10	0.17	0.04	<10	0.48	541	0.03	<2	5	8	0.39	1770	<10
503.1	11301	4	45	<1	27	51	1.56	5	110	2	0.98	<0.5	12	2.62	<10	0.46	0.08	<10	0.95	408	0.06	<2	5	47	0.23	87	<10
503.2	10664	7	65	<1	32	42	1.62	16	140	<2	0.98	<0.5	12	2.9	<10	1.93	0.1	10	0.97	467	0.05	2	6	260	0.25	90	<10
503.2	10770	8	46	2	132	393	0.76	8	50	<2	0.48	<0.5	71	45.7	10	0.38	0.05	<10	0.51	627	0.03	<2	6	44	0.4	1990	10
504	10413	4	50	1	26	84	1.5	6	130	<2	0.74	<0.5	13	3.83	10	0.34	0.11	<10	0.84	495	0.09	<2	3	14	0.13	136	<10
505.1	10675	7	50	<1	50	89	1.26	7	30	<2	0.38	<0.5	26	7.45	10	0.09	0.05	<10	0.75	475	0.03	2	4	39	0.15	318	<10
505.2	10674	6	42	<1	53	127	1.04	11	40	<2	0.75	<0.5	29	9.54	<10	0.91	0.06	<10	0.68	396	0.05	<2	5	26	0.22	451	<10
505.3	10673	7	44	<1	49	100	1.04	16	40	<2	0.54	<0.5	30	9.49	<10	0.17	0.05	<10	0.64	362	0.03	<2	4	1	0.16	442	<10
506.1	10676	4	38	<1	97	206	0.74	9	30	<2	0.44	<0.5	65	26.9	10	0.86	0.04	<10	0.52	456	0.03	2	4	20	0.25	1170	10
506.1	10774	6	21	2	148	325	0.37	<2	10	<2	0.22	<0.5	92	50	10	0.61	0.02	<10	0.34	560	0.01	<2	4	5	0.39	2190	<10
506.1	11300	6	35	<1	24	38	1.31	11	50	<2	1.01	<0.5	11	2.44	<10	11.3	0.06	<10	0.78	317	0.05	<2	5	111	0.22	92	20
506.2	10677	8	39	<1	46	102	1.18	9	50	<2	0.8	<0.5	27	8.65	<10	0.31	0.08	<10	0.75	384	0.06	<2	5	20	0.19	396	<10
507	10852	8	35	1	9	23	1.43	<2	70	<2	1.62	<0.5	14	4.17	10	0.07	0.27	10	0.73	450	0.1	2	4	59	0.2	184	<10
508	10479	2	33	1	41	43	0.89	2	30	<2	1.28	<0.5	31	8.76	10	<0.01	0.09	<10	1.03	487	0.11	<2	13	<1	0.27	451	<10
509	10480	<2	23	<1	5	28	0.64	2	30	<2	0.74	<0.5	5	2.41	<10	0.01	0.08	10	0.25	378	0.12	<2	2	45	0.09	94	<10
510.1	10568	3	46	<1	30	62	1.63	6	170	<2	1.86	<0.5	11	3.25	<10	0.12	0.11	10	1.04	456	0.13	<2	7	65	0.13	76	<10
510.2	10420	<2	41	1	26	70	1.22	6	100	<2	0.7	<0.5	11	3.5	<10	0.1	0.09	10	0.81	333	0.08	<2	4	34	0.07	113	<10
511	10009	2	31	<1	55	67	0.47	11	**240**	7	0.37	2.7	22	>15	10	0.03	0.05	<10	0.56	378	0.03	4	4	5	0.13	1025	**<10**
511	10231	<2	25	<1	20	33	2.69	<2	30	<2	2.14	<0.5	23	5.19	10	0.01	0.11	<10	0.5	232	0.12	<2	3	258	0.09	282	<10
511	10232	<2	27	<1	24	41	5.45	4	90	<2	3.69	<0.5	27	6.1	10	0.04	0.24	<10	0.88	247	0.24	<2	4	503	0.15	327	<10
511	10808	3	50	<1	23	65	3.97	4	70	<2	3.59	<0.5	28	7.35	10	0.01	0.26	10	1.71	572	0.36	<2	11	4	0.26	333	<10
511	10809	3	35	1	44	72	0.73	<2	20	<2	1.06	<0.5	49	>15	10	0.01	0.09	<10	0.86	466	0.07	<2	8	424	0.2	797	<10
512	10810	2	37	<1	58	21	0.7	<2	20	<2	1.12	<0.5	46	12	10	0.01	0.05	<10	0.96	498	0.06	<2	12	19	0.22	579	<10
513	10851	<2	33	<1	48	29	2.42	<2	40	<2	2.44	<0.5	12	2.56	10	0.13	0.16	<10	1.1	367	0.33	<2	7	128	0.37	116	<10
514	10553	6	50	1	51	143	5.33	4	630	2	3.49	<0.5	21	8.68	10	0.09	0.43	10	1.45	789	0.55	<2	13	47	0.48	342	<10
515.1	2655	4	59	<1	29	46	1.37	9	139	<5	0.81	<0.2	15	3.62	<2	0.085	0.09	8	0.92	515	0.07	<5	6	55	0.065	75	<20
515.1	10113	2	36	1	43	113	1.15	5	80	4	0.64	<0.5	12	6.34	<10	0.15	0.07	<10	0.89	468	0.07	<2	4	26	0.08	263	<10
515.1	10554	3	46	2	48	287	3.59	7	190	<2	2.56	<0.5	23	11.65	10	0.09	0.28	10	1.02	814	0.32	<2	11	201	0.48	578	<10
515.2	10114	3	36	1	38	91	1.58	8	210	10	1.01	<0.5	12	3.5	<10	0.16	0.14	<10	0.93	397	0.16	5	5	50	0.12	123	<10
515.3	10689	5	40	<1	66	160	1.61	5	60	<2	1.26	<0.5	21	12.2	10	0.82	0.08	<10	1	448	0.09	<2	6	19	0.19	592	<10
516	10115	2	36	1	59	62	1.43	2	80	7	0.62	<0.5	13	2.94	<10	0.07	0.08	<10	1.03	359	0.07	<2	4	30	0.09	97	<10
516	10116	5	43	1	54	84	1.58	6	180	<2	0.74	<0.5	16	4.57	10	0.2	0.09	<10	1.03	357	0.08	2	4	34	0.12	190	<10
517	1030	3	55	<1	257	127	1.36	<5	117	<5	0.64	0.3	32	6.57	<2	1.336	0.08	3	2.95	538	0.04	<5	<5	39	0.095	238	<20
518	1036	6	55	<1	31	50	1.93	25	92	<5	0.64	<0.2	15	4.26	3	0.162	0.08	7	0.73	464	0.03	<5	5	47	0.077	123	<20

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
519	10419	Gunn Creek	PC				Float/soil: gneiss, fossils, monzonite, volcaniclastic, basalt, cgl	<5	3	58	<0.2	30
520	1031	Gunn Creek	SS					<5	2	1	<0.2	27
520	1032	Gunn Creek	SS				Float - glacial till	<5	2	12	<0.2	21
521	1033	Gunn Creek	SS				Float - glacial till	<5	2	1	<0.2	26
522	1034	Gunn Creek	SS				Float - glacial till	<5	3	2	<0.2	34
522	1035	Gunn Creek	SS				Float - glacial till	<5	3	4	<0.2	27
523	1037	Gunn Creek Tr b	SS				Float - glacial till	<5	3	4	<0.2	53
524	1038	Gunn Creek Tr b	SS				Float - rhy tuff w/ fest, perid or gbo	<5	4	7	<0.2	49
525	11121	College Marble	R	OC	C	3	2' of oxidized marly seds over cc/sil phy w/ sulf	<5	<1	<1	<0.2	15
526	10551	Burglin	R	other	G		Weathered andesite(?) dacite(?)	<5	<1	<1	<0.2	45
527	10619	Burglin, NE	R	OC	G	1	Qz bt dacite	<5	<1	<1	<0.2	19
528.1	10255	Gulkana River (E Trib)	PC				Bedrock of ss w/ coal measures	9	4	5480	<0.2	40
528.2	10505	Gulkana River (E Trib)	PC				1 v fine Au, mod mag, clay-rich seds	3.8	4	774	<0.2	43
528.3	10448	Gulkana River (E Trib)	PC				1 fine, 2 v fine Au	4.3	4	39	<0.2	37
529	10447	Phelan Creek (upper) area	PC				No Au	4.6	6	340	<0.2	87
530	10257	Phelan Creek (Upper)	PC					7	6	49	<0.2	120
531	10449	Gulkana River	PC				V fine py but no vis ble Au, mag	2.9	4	26	<0.2	87
532	10256	College Creek	PC				Abundant mag, minor euhedral py in pan	10	11	8	<0.2	190
533	10188	McCallum Creek Tr b	R	RC	S		Cc vn in volcaniclastic (contacts andesite bedrock)	3.5	4	42	1.3	32
534	10823	McCallum Creek Tr b	R	RC	S		Py-rich concretion in black, fg arg	9	1	<1	<0.2	44
535	1029	McCallum Creek	SS					5	5	17	<0.2	158
536	2656	Phelan Creek	SS				Float - till	<5	5	6	<0.2	74
537	2657	McCallum Creek	SS				Float - till	<5	5	3	<0.2	126
538	10518	Eureka Creek Placer	PC				3 v fine Au colors, black sand	<5	4	662	<0.2	50
539	11309	Delta River Placer	PC				Pebble gravel from east side of river	<5	1	2	<0.2	56
540.1	10417	Delta River - Garrett Creek	PC				Float/soil: sc, basalt, granite, qz; 1 fg Au, little magnetite	<5	3	1595	<0.2	32
540.2	10416	Delta River - Garrett Creek	PC				Float/soil: basalt, chert, chl sc, metafelsic ints; 1 v fine bright Au flake	5	4	985	<0.2	29
541	10067	Antler	R	OC	G	7	Variably serp'zd perid w/dissem po & minor cpy	46.1	101	4	0.2	368
541	10214	Antler	R	RC	Rep		Perid	36.2	91	9	1	599
541	10215	Antler	R	OC	Rep	15	Gbo	26.2	52	9	0.6	584
541	10216	Antler	R	RC	Rep	15	Gbo w/ minor sulfs (cpy, po)	13.6	25	6	0.6	1015
543	6992	Fish Lake Complex	R	OC	G		Alt gbo dike w/ minor sulfs	38	27	10	<0.2	27
544	2877	Fish Lake Complex	R	OC	G		Gbo dike - fest	15	19	4	<0.2	387
544	6989	Fish Lake Complex	R	OC	G		Alt gbo & serp w/ minor cpy, po	37	34	4	<0.2	167
544	6990	Fish Lake Complex	R	OC	G		Alt dun?	<5	4	1	<0.2	35
544	6991	Fish Lake Complex	R	OC	G		Fg gbo	29	13	3	<0.2	29
545	10182	Fish Lake Complex	R	OC	C	5	Blood red perid w mag vnlets	0.7	2	<1	1	312
545	10354	Fish Lake Complex	R	OC	C	4	Fest perid at contact w/ leucogbo	19.5	48	6	0.4	228
545	10355	Fish Lake Complex	R	OC	C	1	Fest contact on hanging wall of gbo dike	26.6	60	11	<0.2	286
546	2649	Fish Lake Complex	R	OC	S		Dun	31	48	11	<0.2	189
547	2647	Fish Lake Complex	R	OC	S	3	Dun	32	16	2	<0.2	102
547	2648	Fish Lake Complex	R	OC	S		Dun	54	67	4	<0.2	50

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
519	10419	4	45	1	30	92	1.16	6	350	2	1.21	0.5	13	4.69	10	0.38	0.1	10	0.84	358	0.06	3	4	22	0.07	166	<10
520	1031	5	50	1	54	60	1.56	9	265	<5	0.99	<0.2	17	2.62	<2	0.066	0.16	7	1	525	0.12	<5	6	110	0.059	49	<20
520	1032	20	79	<1	19	26	1.23	6	148	<5	1.7	0.2	14	3.28	<2	0.092	0.09	10	0.89	611	0.07	<5	6	81	0.02	31	<20
521	1033	5	70	<1	31	46	1.4	5	131	<5	1.57	0.3	18	3.73	<2	0.07	0.07	8	1.11	673	0.08	<5	7	73	0.056	46	<20
522	1034	5	61	<1	85	70	1.37	6	135	<5	0.68	<0.2	21	3.35	<2	0.13	0.07	7	0.97	522	0.04	<5	5	51	0.055	67	<20
522	1035	5	67	<1	26	51	1.31	15	169	<5	1.69	0.3	16	4.16	<2	0.094	0.1	10	1.05	599	0.07	<5	7	62	0.046	80	<20
523	1037	7	50	<1	32	43	1.36	13	63	<5	0.6	0.3	15	2.62	<2	0.11	0.08	8	0.61	464	0.03	<5	<5	44	0.054	72	<20
524	1038	<2	30	2	14	21	0.99	20	42	<5	7.8	<0.2	11	1.99	<2	0.102	0.1	6	3.29	619	0.03	<5	<5	85	0.08	49	<20
525	11121	3	50	<1	19	29	0.36	298	90	<2	22.7	<0.5	5	1.72	<10	0.14	0.05	<10	0.63	450	0.04	2	7	97	<0.01	34	<10
526	10551	12	40	1	6	27	1.1	16	300	<2	0.63	<0.5	5	1.62	<10	<0.01	0.27	20	0.27	291	0.18	<2	4	<1	0.07	15	<10
527	10619	12	33	<1	4	20	0.94	4	310	<2	1.12	<0.5	4	1.1	<10	<0.01	0.36	20	0.3	238	0.13	<2	3	242	0.09	14	<10
528.1	10255	2	42	<1	68	96	1.68	10	290	<2	1.74	<0.5	17	4.7	10	1.94	0.11	10	1.09	414	0.07	<2	6	50	0.15	186	<10
528.2	10505	6	48	<1	101	92	1.54	9	100	<2	0.93	<0.5	19	4.26	10	1.17	0.1	10	1.25	470	0.07	<2	5	80	0.13	149	<10
528.3	10448	7	46	1	94	110	1.54	8	100	<2	0.96	<0.5	20	5.36	10	0.35	0.1	10	1.36	409	0.07	<2	5	46	0.13	213	<10
529	10447	8	33	<1	59	77	1.51	3	100	<2	1.18	<0.5	18	5.73	10	0.1	0.08	10	1.17	350	0.08	<2	5	48	0.14	255	<10
530	10257	3	36	<1	51	87	1.41	3	420	<2	1.32	<0.5	23	6.8	10	0.16	0.07	<10	0.96	353	0.06	<2	4	55	0.12	316	<10
531	10449	9	47	<1	23	75	1.32	4	120	4	1.66	<0.5	17	6.2	10	0.36	0.11	10	0.78	350	0.09	<2	5	30	0.09	244	<10
532	10256	9	45	<1	48	120	1.36	12	160	<2	1.64	<0.5	37	11.35	10	0.42	0.09	10	0.74	370	0.06	<2	5	64	0.13	556	<10
533	10188	33	273	1	6	38	2.68	130	**250**	<2	3.01	4	8	>15	20	0.03	0.01	<10	0.71	1505	0.02	3	12	32	0.75	484	**10**
534	10823	10	136	1	38	29	3.06	61	30	<2	9.54	<0.5	7	7.59	10	0.03	0.04	40	1.48	1350	0.01	2	7	27	0.01	54	<10
535	1029	3	59	3	92	47	1.97	59	131	<5	1.76	<0.2	48	5.78	<2	0.093	0.22	4	1.51	865	0.16	<5	8	117	0.096	87	<20
536	2656	2	48	<1	51	46	1.46	<5	119	<5	1.39	0.3	17	3.59	<2	0.271	0.08	2	1.19	381	0.06	<5	<5	55	0.094	105	<20
537	2657	3	64	<1	67	37	1.74	6	136	<5	0.88	<0.2	25	4.09	<2	0.157	0.04	2	1.6	656	0.02	<5	6	53	0.127	89	<20
538	10518	3	61	2	81	106	1.41	46	140	2	0.71	<0.5	16	3.16	10	0.16	0.12	<10	1.21	555	0.05	2	3	26	0.07	44	<10
539	11309	2	49	<1	88	69	1.88	7	40	<2	1.02	<0.5	18	3.19	<10	0.03	0.05	<10	1.28	497	0.04	<2	6	48	0.21	87	<10
540.1	10417	<2	42	1	81	94	1.42	6	60	<2	0.59	<0.5	14	2.58	10	0.02	0.06	<10	1.25	408	0.05	<2	3	25	0.11	64	<10
540.2	10416	2	39	1	83	116	1.45	6	60	2	0.64	<0.5	14	2.54	10	0.02	0.06	<10	1.17	427	0.06	<2	3	17	0.11	62	<10
541	10067	<2	45	<1	1085	336	0.37	<2	**10**	<2	0.07	1.4	112	8.43	50	<0.01	<0.01	10	13.15	996	0.01	<2	5	<1	0.02	26	**<10**
541	10214	<2	45	<1	1240	222	0.89	<2	**20**	<2	0.4	0.5	108	7.64	<10	0.01	0.01	<10	13 3	933	0.04	<2	3	17	0.01	36	**<10**
541	10215	2	34	1	695	259	1.28	<2	**70**	3	0.55	<0.5	77	5 55	<10	0.01	0.03	<10	7.91	588	0.06	<2	3	24	0.02	40	**<10**
541	10216	5	23	1	814	263	1.47	3	**120**	<2	0.92	<0.5	77	3.45	<10	0.01	0.07	<10	3.48	260	0.06	<2	2	52	0.03	32	**<10**
543	6992	<2	14	<1	501	149	0.09	33	8	<5	0.19	<0.2	41	3.52	<2	<0.01	<0.01	<1	6.7	519	<0.01	<5	<5	4	<0.01	4	<20
544	2877	3	26	<1	301	78	1.65	<5	24	<5	1.48	<0.2	47	5.01	3	0.052	0.06	3	4.92	546	0.13	<5	<5	48	0.103	86	<20
544	6989	4	32	<1	1033	338	0.23	18	14	<5	0.16	0.2	93	7.93	3	0.114	<0.01	<1	10	1059	<0.01	<5	<5	1	<0.01	9	<20
544	6990	<2	30	<1	56	75	3.01	<5	4	<5	7.29	<0.2	10	3.32	3	<0.01	<0.01	5	3.35	1218	<0.01	<5	<5	7	0.073	63	<20
544	6991	3	28	<1	1125	188	0.11	<5	4	<5	0.03	<0.2	97	8.08	<2	0.014	<0.01	<1	10	1012	<0.01	<5	<5	<1	<0.01	5	<20
545	10182	2	32	1	1400	166	0.29	<2	**10**	<2	0.18	1	125	9 53	<10	0.01	0.01	<10	15	1365	0.01	<2	4	9	0.02	14	**<10**
545	10354	2	37	1	1335	152	0.33	23	**10**	3	0.49	1.1	128	9.17	<10	0.01	0.01	<10	13 2	1555	0.02	<2	4	11	0.01	15	**<10**
545	10355	6	127	<1	2010	400	0.59	72	**<10**	<2	0.36	1.8	175	11.9	10	0.06	0.03	<10	1.51	2740	0.02	<2	18	32	0.02	51	**<10**
546	2649	3	28	<1	576	94	0.37	<5	8	<5	0.19	<0.2	86	7.81	<2	0.02	<0.01	<1	10	954	0.02	<5	<5	9	<0.01	5	<20
547	2647	4	27	<1	1255	95	0.02	<5	6	<5	0.04	<0.2	90	8.31	2	0.011	<0.01	<1	10	1018	<0.01	<5	<5	<1	<0.01	3	<20
547	2648	3	30	<1	1316	112	0.04	<5	6	<5	0.04	<0.2	94	8.96	2	0.013	<0.01	<1	10	1018	<0.01	<5	<5	1	<0.01	5	<20

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
547	9754	Fish Lake Complex	R	OC	G		Dun	22	14	4	<0.2	144
548	10350	Fish Lake Complex	R	OC	Rep		Ol-rich perid w/ v minor dissem po	57.7	62	5	1.2	86
550	10352	Wild One	R	OC	Rep		Perid	11.3	11	3	1.2	133
550	10353	Wild One	R	RC	Rep		Perid w/ minor po	50.4	25	9	1.1	275
550	10832	Wild One	R	RC	S		Perid, gossanous to simply fest, v minor evident sulf	63	36	9	0.6	1090
550	10833	Wild One	R	RC	S		Fest perid w/ v minor po	43	22	3	<0.2	211
550	10834	Wild One	R	RC	S		Serp dun w/ minor po	52	22	4	0.2	473
551	10181	MF1996C-70	R	FL	S		Gbo dike w/in perid	<0.5	<1	<1	1	606
551	10351	MF1996C-70	R	FL	G		Fest perid w/ minor po	55.3	114	37	1.2	1585
552	10079	Fish Lake Complex	R	OC	Rep		Variably serp'zd dun, minor perid	18	43	4	<0.2	230
553	6993	Fish Lake Complex	R	FL	G		Serp'zd dun, w/ seams of dissem sulfs & mag	112	91	6	<0.2	104
553	6994	Fish Lake Complex	R	OC	G		Gossan w/ mag & minor sulfs	59	22	6	<0.2	240
554	10935	Fish Lake Complex	R	OC	S	2	Fest weathered gbo(?) fg	<5	14	4	<0.2	201
555	10343	LFF	R	RC	C	2	Perid w/ net-textured po, fest	174.5	1470	34	1	1820
555	10763	LFF	R				Perid	8	8	3	0.3	248
555	11195	LFF	R	RC	G	1	Perid w/ net-textured sulf, pent(?)	9	1440	17	0.5	1685
555	11196	LFF	R	OC	C	2	Dun	11	19	1	<0.2	13
556	10342	Eb No. 4	R	FL	G		Coarse fest perid w/ po	149.5	288	49	1.4	1395
556	10725	Eb No. 4	R	RC	Rep		Fest gbo	85	101	16	0.5	502
556	10853	Eb No. 4	R	OC	Rep		Serp perid w/ minor po	49	112	5	0.5	285
556	10854	Eb No. 4	R	RC	S		Perid to pyrox'ite w/ ~5% po +/- cpy	58	75	13	0.8	631
557	10341	Eb No. 4 area	R	OC	Rep		Dun w/ trace po	16.6	27	3	1.4	112
558	10835	Eb No. 4 area	R	OC	SC	8	Glassy serp w/ minor Cu-st	103	32	8	0.2	276
558	10836	Eb No. 4 area	R	OC	Rep	70	Dark brown to black, glassy serp	96	22	<1	<0.2	226
559.1	10211	BM-75	R	OC	G		Perid w/ serp alt	11.9	6	3	0.9	304
559.2	10249	BM-75	R	OC	S		Pod/vn of troctolite in gbo	<5	<1	<1	<0.2	17
559.2	10849	BM-75	R	OC	Rep	30	Gbo to felds perid w/ minor po +/-cpy	12	21	3	0.2	362
559.2	10850	BM-75	R	OC	G		Leuco gbo w/ v minor sulf, mainly po	<5	7	4	<0.2	138
560	10340	MF1996C-45 area	R	OC	G		Perid w/ trace po	19.7	21	4	1.4	165
562	10726	Lucky 7	R	OC	S		Fest gbo	<5	2	2	<0.2	103
562	10727	Lucky 7	R	OC	S		Fest gbo	<5	2	<1	<0.2	125
562	10855	Lucky 7	R	OC	C	4.6	Gbo to melagbo w/ ~1% dissem po	10	2	3	0.2	202
564	1044	Tres Equis	R	OC	Rep		Fest fg black perid? w/ silvery sulfs (pent?, po?) & mag	259	325	19	0.3	2028
564	2681	Tres Equis	R	OC	C		Gbo dike	19	10	4	<0.2	110
564	10008	Tres Equis	R	OC	G		Anorthosite	<5	1	1	<0.2	50
564	11015	Tres Equis	R	OC	C	5	Melagbo	13	1005	116	3	**7.29%**
564	11158	Tres Equis	R	OC	C	3	Leucogbo w/ Ni stain on fract	41	14	11	0.4	1340
564	11159	Tres Equis	R	OC	G	1	Serp'zd perid w/ mag vnlets & tr sulf	11	28	2	<0.2	240
565	10764	Eureka Creek Head	PC				1 v fine flat rounded Au flake, minor mag	<5	1	162	<0.2	30
565	11197	Eureka Creek Head	SS				Float = garnet-chl sc	<5	3	21	<0.2	47
566	10026	WEG area	R	OC	G		Pyxite to perid w/ dissem cpy	6.3	4	61	0.7	1640
566	10027	WEG area	R	OC	G		Pyxite to perid w/ dissem & patches of cpy, po, pent?	20.4	40	6	0.2	359

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
547	9754	3	37	<1	891	113	0.04	<5	6	<5	0.03	<0.2	102	9.12	2	<0.01	<0.01	<1	10	1025	<0.01	<5	<5	<1	<0.01	4	<20
548	10350	9	46	1	1425	88	0.04	<2	**<10**	<2	0.04	0.7	126	8 88	<10	0.02	<0.01	<10	15	1390	0.01	<2	2	1	0.01	3	**<10**
550	10352	4	83	2	966	116	0.07	<2	**<10**	<2	0.03	1.9	149	10.6	<10	0.01	0.01	<10	15	1640	0.01	<2	3	<1	0.01	6	**<10**
550	10353	5	55	1	1340	113	0.04	<2	**<10**	<2	0.03	1.2	145	10.2	<10	0.01	<0.01	<10	15	1545	0.01	<2	3	<1	<0.01	5	**<10**
550	10832	<2	37	1	1780	166	0.16	2	10	<2	0.05	<0.5	176	11.65	<10	0.01	0.01	<10	15	1410	<0.01	<2	4	29	0.01	4	<10
550	10833	<2	45	2	1510	142	0.09	5	<10	2	0.12	<0.5	127	9.91	<10	0.01	<0.01	<10	15	1415	<0.01	<2	4	2	0.01	3	<10
550	10834	<2	75	1	1570	150	0.1	<2	<10	<2	0.04	<0.5	162	11.7	<10	0.01	<0.01	<10	15	1625	<0.01	<2	5	3	0.01	3	<10
551	10181	2	21	1	1555	183	0.28	<2	**<10**	4	0.23	<0.5	117	8 07	<10	0.03	<0.01	<10	14.65	1160	0.02	<2	2	8	0.02	15	**<10**
551	10351	16	37	1	1240	330	0.33	<2	**50**	<2	0.63	<0.5	111	8 84	<10	0.06	<0.01	<10	13.75	1070	0.01	<2	9	5	0.03	41	**<10**
552	10079	<2	35	2	1670	192	0.27	<2	20	2	0.1	1.8	133	8.5	<10	0.01	0.01	<10	15	1220	0.01	<2	3	3	0.02	6	<10
553	6993	<2	48	<1	1923	97	0.03	5	10	<5	0.03	0.2	96	9.02	2	0.048	<0.01	<1	10	1015	<0.01	<5	<5	2	<0.01	3	<20
553	6994	6	76	<1	1073	435	0.13	150	28	<5	0.71	0.5	121	>10	5	4.866	0.1	2	3.17	2499	0.02	<5	8	26	<0.01	38	<20
554	10935	<2	65	<1	83	108	2.84	16	20	<2	1.16	<0.5	29	5.04	10	0.01	0.03	<10	2.24	538	0.03	<2	7	6	0.25	150	<10
555	10343	3	35	1	**1.14%**	280	0.14	<2	**<10**	<2	0.13	<0.5	462	10.3	<10	0.02	<0.01	<10	9.65	857	0.01	<2	4	1	0.02	19	**<10**
555	10763	3	29	<1	365	177	2.9	2	40	<2	0.8	<0.5	64	6.09	<10	0.06	0.02	<10	10.05	1035	0.02	<2	4	80	0.03	26	<10
555	11195	3	44	1	**1.13%**	242	0.15	8	<10	<2	0.15	<0.5	442	12.2	<10	<0.01	<0.01	<10	10.85	1010	<0.01	<2	5	41	0.02	18	<10
555	11196	3	62	<1	1725	123	0.12	4	<10	<2	0.07	<0.5	142	9.89	<10	<0.01	<0.01	<10	20 8	1715	<0.01	<2	4	1	0.01	6	<10
556	10342	10	24	<1	1045	454	0.13	5	**30**	4	0.48	<0.5	82	3.45	<10	0.23	<0.01	<10	0.81	97	0.02	<2	3	4	0.04	55	**<10**
556	10725	3	16	<1	328	423	0.58	16	10	<2	0.63	<0.5	46	2.8	<10	0.11	0.01	<10	3.19	273	0.02	<2	5	30	0.06	40	<10
556	10853	<2	35	1	2350	206	0.26	<2	<10	<2	0.18	<0.5	154	8.29	<10	0.02	<0.01	<10	15	1215	<0.01	<2	7	101	0.02	12	<10
556	10854	4	21	<1	844	303	0.23	<2	10	<2	0.24	<0.5	106	4.62	<10	0.12	<0.01	<10	5.83	497	0.02	<2	3	3	0.04	32	<10
557	10341	4	45	1	1515	75	0.04	<2	**<10**	<2	0.04	<0.5	132	8.45	<10	0.01	<0.01	<10	15	1390	0.01	<2	3	3	0.01	5	**<10**
558	10835	<2	26	<1	1605	140	0.07	<2	<10	<2	0.06	<0.5	119	8.01	<10	0.08	<0.01	<10	15	1120	<0.01	<2	5	2	0.01	4	<10
558	10836	<2	26	<1	1695	170	0.12	<2	<10	<2	0.12	<0.5	119	8.06	<10	0.09	<0.01	<10	15	1125	<0.01	<2	5	2	0.01	5	<10
559.1	10211	<2	52	2	1240	313	0.23	3	**20**	<2	0 3	0.5	127	8.5	<10	0.12	<0.01	<10	15	1225	0.01	<2	4	9	0.02	14	**<10**
559.2	10249	2	11	<1	44	35	7.35	<2	90	<2	7.39	<0.5	6	0.72	10	0.05	0.06	<10	1.2	100	0.22	<2	1	108	<0.01	4	<10
559.2	10849	2	31	<1	1055	96	1.12	<2	20	<2	0.98	<0.5	102	7.41	<10	0.08	0.01	<10	12.55	1010	0.08	<2	3	17	0.02	14	<10
559.2	10850	<2	13	<1	197	152	5.2	<2	20	<2	3.73	<0.5	26	1.77	10	0.08	0.02	<10	2.5	181	0.24	<2	2	31	0.02	19	<10
560	10340	9	78	1	1220	155	0.09	3	**<10**	<2	0.05	1.3	141	10.35	<10	0.01	0.01	<10	15	1605	0.01	<2	2	3	0.01	5	**<10**
562	10726	2	12	<1	93	28	3.86	2	30	<2	2.68	<0.5	22	1.08	10	0.04	0.03	<10	0.7	137	0.35	<2	4	10	0.06	30	<10
562	10727	<2	16	<1	79	36	4.95	<2	30	<2	3.45	<0.5	18	1.29	10	0.13	0.02	<10	1.06	167	0.38	<2	4	178	0.04	21	<10
562	10855	<2	9	<1	72	43	1.88	<2	20	<2	1.6	<0.5	17	1.8	<10	0.04	0.01	<10	1.1	142	0.11	<2	7	5	0.06	28	<10
564	1044	8	67	3	4964	342	0.22	<5	8	<5	0.02	0.4	359	>10	3	0.051	<0.01	<1	10	554	<0.01	<5	<5	<1	0.019	17	<20
564	2681	3	22	<1	932	248	3.79	<5	25	<5	3.25	0.2	49	1.73	3	0.024	0.11	<1	3.41	349	0.05	<5	7	80	0.038	32	<20
564	10008	<2	6	<1	15	14	0.19	2	**10**	6	0.93	<0.5	3	0 23	<10	0.01	0.01	<10	0.51	96	0.02	<2	<1	9	0.03	3	**<10**
564	11015	47	22	1	**4.80%**	<1	0.02	10	<10	<2	<0.01	<0.5	3020	46.4	<10	0.03	<0.01	<10	0.01	28	0.01	2	2	33	<0.01	5	10
564	11158	3	26	<1	279	116	3.77	<2	50	<2	3.89	<0.5	24	1.63	<10	0.07	0.16	<10	2.76	289	0.08	<2	8	46	0.04	28	<10
564	11159	4	36	<1	1285	579	0.46	6	<10	<2	0.05	<0.5	126	8.37	<10	<0.01	<0.01	<10	16 9	1230	<0.01	<2	9	133	0.03	27	<10
565	10764	4	60	1	49	122	1.86	4	110	<2	0.57	<0.5	11	3.26	<10	0.88	0.24	10	1.06	881	0.07	<2	6	60	0.17	53	<10
565	11197	4	63	<1	51	39	1.16	29	80	<2	0.59	<0.5	14	2.83	<10	0.41	0.16	10	0.92	456	0.01	2	4	2	0.07	40	<10
566	10026	<2	32	<1	760	1130	1.12	<2	**60**	<2	1.51	<0.5	50	2.45	30	0.3	0.03	10	3.69	368	0.01	<2	10	<1	0.08	55	**<10**
566	10027	<2	36	<1	1295	234	0.93	4	**20**	<2	0.6	<0.5	88	4.74	50	0.06	0.03	10	6.99	580	0.03	<2	4	<1	0.03	29	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
567	10025	WEG	R	OC	S		Pegmatitic gbo w/ minor sulf	<0.5	1	86	0.2	382
568	10983	Maclaren River (E Fork) area	R	OC	G		Black slate w/ 5-10% py	11	11	7	2.4	108
569	10699	Maclaren River (E Fork)	PC		PC		Barren sample, tr mag, mod ol	13	5	3	<0.2	110
570	10021	Azurite	R	TP	SC	23	Alt Nikolai basalt w/ dissem Cu sulfs	3.3	37	94	9.3	**2.44%**
570	10022	Azurite	R	TP	SC	8.5	Alt basalt w/ 3-5% Cu sulf & Cu oxide mins	3	69	68	8.6	**2.45%**
570	10023	Azurite	R	OC	SC	6	Alt basalt w/ v minor chrysocolla/azurite	2.7	19	8	0.6	1500
570	10024	Azurite	R	MD	S		Basalt w/ dissem, seams, & patches of Cu sulfs & oxides	1.1	64	323	49.3	**16.00%**
571	10422	Compass Creek	PC				No Au, tr mag	4.7	5	91	<0.2	70
571	10502	Compass Creek	PC				6 v fine flakes Au, mod black sand	2.8	6	47	<0.2	71
572	10423	Maclaren River (E Fork)	PC				No Au, tr mag	2.8	8	5140	<0.2	81
572	10424	Maclaren River (E Fork)	PC				No Au, tr mag	2.8	2	145	<0.2	34
573	11014	Maclaren River (E Fork)	PC				No visible Au	<5	1	37	0.3	38
574	10485	East Fork Maclaren Lode area	R	OC	RC	10	Msv gray-green basalt w/ minor py	<5	13	5	<0.2	98
575	10741	Maclaren River	PC		PC		Barren sample	<5	2	2420	0.4	72
577	10984	GP Anom 11a	R	OC	G		Propylitically alt basalt along probable fault	<5	12	3	<0.2	71
578	10486	Sunshine	R	OC	RC	20x20	Basalt w/ minor hematite stain & epid/qz vnlets	8	14	<1	<0.2	301
579	10164	Sunshine area	R	FL	S		Basalt w/ cc vesicles	5.2	12	5	0.8	4950
580	10504	Sunshine area	R	OC	C	1	Qz vn in basalt containing epid, qz, mal, azurite, chalcocite(?)	4.3	17	4	1.5	3570
581	10487	Greenstone	R	OC	S	0.3	Epid qz vn w/ chalcocite & chrysocolla	11	5	1210	**100**	**28.10%**
583.1	10564	Boulder Creek	PC				Fine seds	10	5	472	<0.2	54
583.1	10634	Boulder Creek	PC				Float: basalt	8	6	7	<0.2	47
583.2	11013	Boulder Creek	PC				2 v fine flakes Au	<5	6	9	<0.2	66
583.3	10698	Boulder Creek	PC		PC		Barren sample	<5	<1	29	<0.2	25
584	2650	Maclaren River	SS				Float - fg, dark gray crystalline rocks	5	2	6	<0.2	49
585	2651	Whistle Ridge	SS				Float - perid w/ ol	<5	3	3	<0.2	34
586	10396	Sevenmile Lake Vein	R	RC	G	0.3	~ 4" qz/cc/epid vn w/ small blebs of chalcocite & mal	<5	8	9	0.6	4390
586	10397	Sevenmile Lake Vein	R	RC	S		Dissem cpy in Cu-st basalt	<5	21	65	0.9	4520
587	10732	Amphitheater Mtns N	SS					10	10	7	<0.2	144
588	10731	Amphitheater Mtns N	SS					9	12	10	<0.2	214
589	11228	GP Anom A10	R	OC	Rep		Nikolai basalt	6	13	3	<0.2	180
590	10297	GP Anom R-7 Gabbro	R	OC	SC	25	Basaltic dike w/ py (up to 15%) +/- cpy (1%)	<5	<1	1	<0.2	14
590	10298	GP Anom R-7 Gabbro	R	OC	SC	15	Gbo dike w/cpy & py	<5	<1	2	<0.2	17
590	10299	GP Anom R-7 Gabbro	R	OC	G		Mineralized layer of sil mudstone in black shales	<5	<1	1	0.2	82
590	11000	GP Anom R-7 Gabbro	R	OC	SC	35	Gbo dike w/ py +/- cpy	<5	<1	1	<0.2	16
590	11229	GP Anom R-7 Gabbro	R	OC	Rep	12	Fg gbo w/ 10-15% po +/- cpy	7	43	3	<0.2	41
590	11230	GP Anom R-7 Gabbro	R	RC	Rep		Fg gbo w/ dissem po +/- cpy	<5	1	<1	<0.2	24
591.1	10535	Tv Bas	R	OC	RC	25@1	Ol basalt, picrite(?)	<5	4	8	<0.2	166
591.1	10593	Tv Bas	R	OC	G		Basaltic welded tuff w/ small dissem crystals of covellite & cpy	<5	5	8	<0.2	230
591.2	10594	Tv Bas	R	OC	G		Laminar banded basaltic tuff w/ ol crystals	6	7	8	<0.2	253
592	10296	Wildhorse Creek area	R	OC	G		Basalt	5	19	11	0.3	241
593	11117	Wildhorse Creek area	R	OC	Rep	10x10	Dark gray fg diabase w/dissem py	<5	<1	2	<0.2	61
594	10239	Wildhorse Canyon	R	OC	G		Clinopyx(?) peg	<5	1	1	0.3	102

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
567	10025	<2	8	2	18	24	0.85	<2	**180**	<2	1.18	<0.5	15	1 25	<10	0.05	0.02	10	0.21	68	0.11	<2	1	22	0.19	39	**<10**
568	10983	12	69	17	68	194	1.12	13	80	<2	0.45	1.2	13	3.09	<10	0.12	0.09	<10	1.16	172	0.08	2	5	35	0.26	98	<10
569	10699	6	52	<1	48	65	2.11	12	40	<2	1.12	<0.5	19	3.93	10	0.08	0.06	<10	1.2	518	0.05	<2	7	27	0.39	149	<10
570	10021	<2	129	<1	88	141	3.61	<2	**130**	<2	0.73	<0.5	49	5 87	20	0.75	<0.01	10	3.84	958	0.01	3	4	<1	0.4	145	**<10**
570	10022	<2	60	<1	49	97	1.7	<2	**130**	<2	0.72	<0.5	22	3.2	10	0.65	<0.01	<10	1.68	454	0.01	<2	3	16	0.31	83	**<10**
570	10023	<2	87	<1	87	143	2.64	<2	**170**	<2	0.95	<0.5	35	5.1	20	0.04	<0.01	10	2.68	674	0.01	2	3	16	0.43	122	**<10**
570	10024	<2	167	<1	46	96	2.03	<2	**100**	<2	0.37	<0.5	24	3 31	10	4.86	<0.01	<10	1.97	556	0.01	2	5	<1	0.21	91	**<10**
571	10422	8	66	1	54	66	1.96	20	210	3	1.05	<0.5	19	4.48	10	2.45	0.1	10	1.74	621	0.03	<2	5	40	0.22	92	10
571	10502	7	65	1	52	66	1.83	10	100	<2	0.89	<0.5	18	4.34	10	2	0.09	10	1.71	604	0.03	<2	5	23	0.2	92	10
572	10423	6	55	<1	50	94	2.03	27	50	<2	0.85	<0.5	19	3.72	10	6.04	0.09	10	1.57	557	0.03	<2	6	35	0.25	90	10
572	10424	4	47	<1	43	49	1.37	20	80	2	0.65	<0.5	13	2.91	10	1.29	0.06	10	1.12	360	0.03	<2	5	27	0.1	56	<10
573	11014	5	52	<1	55	58	1.4	20	80	<2	0.56	<0.5	14	3.22	<10	2.76	0.12	10	1.04	731	0.03	<2	4	32	0.15	51	10
574	10485	<2	44	<1	47	100	2.79	3	20	<2	1.68	<0.5	19	4.06	10	0.03	0.06	<10	1.5	499	0.17	<2	3	32	0.56	142	<10
575	10741	10	126	1	57	71	1.57	21	230	<2	0.92	0.5	17	3.43	<10	0.1	0.12	10	1.16	525	0.03	2	4	20	0.12	68	<10
577	10984	2	31	<1	71	90	3.24	4	10	<2	4.66	<0.5	17	3.73	10	0.01	<0.01	<10	1.3	475	0.02	<2	11	23	0.55	151	<10
578	10486	<2	74	<1	40	23	2.87	3	20	<2	1.7	<0.5	30	5.97	10	0.02	0.07	<10	1.75	681	0.15	<2	5	40	0.62	186	<10
579	10164	207	263	<1	62	65	1.52	5	**110**	<2	2.19	1.3	16	2.13	10	0.12	<0.01	<10	1.08	391	0.01	5	7	47	0.52	99	**<10**
580	10504	<2	9	1	22	93	1.25	2	**70**	5	2.37	<0.5	6	1.43	<10	0.02	<0.01	<10	0.24	201	0.01	<2	6	23	0.43	97	**10**
581	10487	8	208	1	4	12	0.49	2	<10	<2	0.72	<0.5	1	0.75	<10	1.57	<0.01	<10	0.06	77	<0.01	<2	6	40	0.14	37	30
583.1	10564	5	48	<1	35	142	2.66	2	60	<2	2.69	<0.5	15	5.16	10	0.38	0.12	20	1.04	882	0.16	<2	9	20	0.7	210	<10
583.1	10634	<2	47	<1	36	70	2.05	2	40	<2	1.71	<0.5	16	3.82	10	0.04	0.07	10	1.04	529	0.07	<2	5	35	0.44	150	<10
583.2	11013	<2	45	<1	31	45	1.62	4	40	<2	1	<0.5	13	3.2	<10	0.02	0.08	<10	0.93	422	0.06	<2	5	26	0.28	116	<10
583.3	10698	2	38	<1	26	42	1.06	11	50	<2	0.56	<0.5	9	2.11	<10	0.31	0.1	10	0.63	281	0.04	<2	3	63	0.14	51	<10
584	2650	<2	85	<1	34	44	1.36	18	131	<5	0.64	<0.2	14	3.01	<2	0.079	0.3	5	0.91	444	0.02	<5	<5	26	0.072	54	<20
585	2651	7	64	<1	35	39	2.1	<5	67	<5	0.42	<0.2	19	3.26	3	0.08	0.1	5	0.77	623	0.02	<5	<5	27	0.168	80	<20
586	10396	<2	4	1	21	114	0.6	6	<10	<2	0.73	<0.5	4	1.36	<10	0.03	0.01	<10	0.23	106	<0.01	<2	2	38	0.09	51	<10
586	10397	<2	96	<1	26	39	2.4	<2	10	<2	1.8	<0.5	27	4.65	10	0.02	0.08	<10	1.29	544	0.12	<2	6	37	0.48	131	<10
587	10732	4	80	<1	49	76	3.05	7	80	<2	0.79	<0.5	22	4.17	10	0.05	0.05	10	1.3	555	0.02	<2	7	71	0.31	132	<10
588	10731	6	67	1	49	77	2.94	7	60	<2	1.44	<0.5	23	4.5	10	0.04	0.03	<10	1.46	597	0.02	<2	7	52	0.58	159	<10
589	11228	3	20	<1	18	48	1.72	<2	20	<2	1.91	<0.5	8	1.88	<10	<0.01	0.05	<10	0.65	274	0.24	<2	5	3	0.46	78	<10
590	10297	4	90	2	5	10	1.96	<2	70	<2	1.57	<0.5	20	5.68	10	0.09	0.92	10	1.42	418	0.07	3	7	27	0.25	201	<10
590	10298	2	75	2	3	7	1.54	<2	300	<2	1.15	<0.5	18	3.65	10	0.89	0.41	10	0.81	282	0.07	<2	4	31	0.24	121	<10
590	10299	3	49	1	25	9	2.61	161	20	<2	0.5	<0.5	31	6.69	10	1.49	0.57	<10	1.74	749	0.05	<2	14	21	0.25	220	<10
590	11000	2	93	3	6	10	1.96	4	80	<2	1.02	<0.5	26	5.23	10	0.79	0.65	10	1.24	341	0.06	<2	6	42	0.23	192	<10
590	11229	<2	87	3	12	36	1.72	7	270	<2	1.52	<0.5	27	4.53	10	0.29	0.44	10	1.1	540	0.15	<2	6	37	0.3	146	<10
590	11230	<2	73	2	5	55	2.05	3	30	<2	1.46	<0.5	25	5.39	10	0.02	0.89	10	1.28	397	0.15	<2	7	30	0.38	197	<10
591.1	10535	<2	45	<1	133	175	1.17	<2	80	<2	0.77	<0.5	20	3.26	<10	<0.01	0.09	20	1.19	260	0.26	<2	2	14	0.3	188	10
591.1	10593	3	48	<1	114	188	1.07	<2	60	<2	0.84	<0.5	16	3.33	<10	<0.01	0.09	30	0.98	234	0.23	<2	1	87	0.24	208	<10
591.2	10594	2	44	<1	93	194	1.36	<2	70	<2	0.97	<0.5	15	3.04	10	<0.01	0.08	20	0.71	202	0.28	<2	1	77	0.27	213	<10
592	10296	5	57	1	65	67	2.11	4	220	<2	1.59	<0.5	26	3.09	10	0.53	0.13	<10	0.79	226	0.13	2	4	41	0.29	87	<10
593	11117	<2	36	3	16	45	1.56	<2	100	<2	1.14	<0.5	29	5.01	10	0.05	0.26	10	0.95	441	0.14	<2	6	30	0.37	144	<10
594	10239	3	67	3	22	29	0.94	<2	10	<2	15	0.8	2	0.81	<10	0.05	0.04	<10	1.83	778	0.01	<2	<1	400	0.04	40	<10

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
595	10238	Wildhorse Canyon	R	FL	G		Ol tholeiite	10	5	24	<0.2	275
596	11001	GP Anom M4 in R9	R	OC	Rep	35x35	Sil seds w/ minor py	<5	2	1	<0.2	26
596	11231	GP Anom M4 in R9	R	OC	Rep		Basalt w/ 10-15% po/py	<5	14	<1	<0.2	44
597	11269	GP Anom 11G area	R	OC	Rep		Mg gbo	<5	17	3	<0.2	321
598	10314	GR 19-3 area	PC	FL	G		Mg basalt (dark green) w/ epid alt & dissem cpy & po (<<1%)	10	14	6	0.3	464
599	10901	GR 19-3	R	OC	S	0.3	Cu-st basalt	5	16	14	1.3	3010
600	10902	GR 19-4	R	OC	Rep	5x10	Fest black shale	<5	4	9	2.6	64
601	11268	GP Anom 11F area	R	OC	G		Amygdaloidal basalt w/ seams, dissem, & patches of po +/- cpy	<5	14	6	<0.2	449
602	11316	GP Anom 11F area	R	OC	S	0.3	Sil qz vn zone w/in meta basalt & chert	<5	14	5	<0.2	188
603	11265	LTLW Vein	R	RC	S		Epid-qz vn w/ bn & native Cu	<5	7	36	34.6	**8.89%**
604	11391	LTLW Vein area	R	F	S	10X10	Sulf-bearing qz, epid vns crosscutting greenstone	<5	16	14	4.3	9150
605	10315	LTLW Vein area	R	RC	Rep		Alt basalt w/ strong epid & qz vns, alt along faults	<5	14	12	0.4	205
605	10316	LTLW Vein area	R	RC	S		Cu-st, qz-epid, alt basalt	<5	15	10	3.2	5650
606	11266	GP Anom 11E	R	RC	S		Basalt w/ dissem & seams of po/py	7	14	1	<0.2	292
606	11267	GPAnom 11E area	R	OC	S		Alt basalt/gbo w/ patches & dissem py	<5	19	1	<0.2	273
607	11315	GP Anom 11E area	R	RC	S	3X3	Metagbo	<5	13	2	<0.2	215
608	10317	Landmark Vein	R	RC	G		Qz-epid veined basalt	<5	12	7	1.8	**2.33%**
609.1	10234	Landmark Gap Copper	R	OC	S	2	High grade cpy-rich vn in basalt	6	22	19	1	**10.80%**
609.1	10318	Landmark Gap Copper	R	OC	C	5	Fest basalt, covered w/ copper moss, semi-msv cpy	<5	24	4	0.6	**1.22%**
609.1	10319	Landmark Gap Copper	R	OC	C		Basalt w/ copper moss	<5	21	11	0.8	**4.86%**
609.1	10320	Landmark Gap Copper	R	OC	G	0.3	Qz vns	<5	13	2	0.8	**2.00%**
609.1	10721	Landmark Gap Copper	R	OC	C	20	Cu-st qz	7	16	<1	<0.2	2840
609.2	10285	Landmark Gap Copper	R	O	S	2	Qz vn	7	10	15	1.9	**1.87%**
609.2	10286	Landmark Gap Copper	R	OC	Rep	6	Basalt w/ black inclusions & cpy	9	21	6	0.8	6440
609.2	10595	Landmark Gap Copper	R	OC	S	1	Msv sulf in qz vn hosted in basalt	7	25	10	2.3	**2.68%**
609.2	10934	Landmark Gap Copper	R	OC	C	5	Basalt w/ qz vns & up to 30% sulf in lenses, pods, dissem	9	60	15	2.8	**1.78%**
610	11004	Landmark Gap SE	R	OC	SC	12	Basalt w/ py	<5	1	7	<0.2	126
610	11118	Landmark Gap SE	R	OC	C	2	Dark gray basalt w/ fest fracs & dissem py	<5	1	2	<0.2	151
610	11119	Landmark Gap SE	R	OC	G	1	Lithic basaltic welded tuff w/dissem py	<5	1	2	<0.2	132
611	11120	Landmark Gap SE	R	RC	Rep	6x6	Fest fract basalt w/ dissem py	14	15	2	0.4	116
612	10531	S Landmark Gap Lake	R	OC	Rep		Basalt	19.1	21	5	0.2	171
614	2652	Rock Creek	SS				Float - some cg int (poss bly hbld & gbo), fg with epid?	<5	8	7	<0.2	47
615	2653	Tangle River	SS					<5	4	2	<0.2	59
616	10361	W Fourteenmile Lake	R	RC	Rep		Gbo	4.4	3	5	<0.2	89
617	10365	GR 19-1	R	RC	Rep		Perid w/ 10% mag & some phlog	16.2	8	2	0.3	74
619	10362	Norel	R	OC	G		Fest gbo w/ po	11.2	18	9	<0.2	455
619	10363	Norel	R	OC	Rep		Fest perid w/ po	26.8	56	23	0.5	758
619	10574	Norel	R	OC	Rep		Perid or meta gbo	25	44	4	0.2	365
619	10575	Norel	R	OC	Rep		Gbo, near perid contact, minor po, < 0.5%	<5	1	7	<0.2	550
619	10903	Norel	R	OC	C	10	Fest gbo d ke w/ sulf; intruded perid	11	16	7	0.2	491
619	10904	Norel	R	OC	C	2	Serp'zd perid just above gbo dike	30	41	8	<0.2	152
620	10364	Norel area	R	OC	Rep	20	Perid w/ minor po	16.7	8	7	0.8	173

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
595	10238	<2	47	1	98	192	1.92	4	80	<2	1.31	<0.5	15	2.98	10	<0.01	0.11	30	0.76	217	0.38	<2	1	138	0.29	213	<10
596	11001	<2	63	10	7	17	1.32	6	100	<2	0.58	<0.5	14	4.13	10	0.02	0.28	10	0.85	221	0.05	<2	5	20	0.23	127	<10
596	11231	<2	67	11	9	50	1.34	2	100	<2	1.14	<0.5	24	4.45	10	<0.01	0.29	10	0.73	297	0.14	<2	5	42	0.34	139	<10
597	11269	<2	46	<1	15	7	2.23	<2	60	<2	1.54	<0.5	19	4.6	10	<0.01	0.31	10	0.92	444	0.14	<2	3	27	0.51	170	<10
598	10314	4	32	<1	159	82	1.05	5	**120**	<2	0.73	<0.5	15	1 94	<10	0.03	<0.01	<10	1	313	0.03	4	1	13	0.12	51	**<10**
599	10901	3	54	<1	58	102	3.35	<2	20	<2	1.72	<0.5	24	4.3	10	0.16	0.05	<10	1.68	558	0.18	2	3	81	0.59	143	<10
600	10902	12	116	12	45	60	1.06	14	130	<2	3.64	1	6	2.49	<10	0.15	0.31	10	0.76	238	0.02	3	4	53	0.14	39	<10
601	11268	5	64	1	68	67	3.27	<2	10	<2	1.95	<0.5	42	8.16	10	0.01	0.03	<10	1.9	607	0.08	<2	5	92	0.62	122	<10
602	11316	<2	58	1	62	44	3.08	<2	10	<2	1.44	<0.5	17	6.82	10	0.01	0.03	<10	1.62	537	0.1	<2	2	32	0.48	92	<10
603	11265	<2	12	1	12	98	1.24	<2	<10	<2	1.86	<0.5	4	2.1	<10	0.12	<0.01	<10	0.22	124	<0.01	<2	4	10	0.35	76	<10
604	11391	<2	17	1	27	70	1.58	<2	<10	6	2.25	<0.5	10	2.21	<10	0.02	0.01	<10	0.64	236	0.01	<2	3	64	0.6	122	<10
605	10315	4	26	1	80	74	0.76	4	**170**	3	0.74	<0.5	12	1 38	<10	0.01	<0.01	<10	0.75	224	0.01	4	2	25	0.21	48	**<10**
605	10316	8	36	<1	47	64	1.05	6	**180**	8	1.65	<0.5	13	1 95	<10	0.02	<0.01	<10	1.01	323	0.01	<2	2	27	0.22	51	**<10**
606	11266	2	52	5	55	68	2.33	2	10	<2	1.69	<0.5	13	4.74	10	0.02	0.03	<10	1.46	458	0.13	<2	3	90	0.53	112	<10
606	11267	<2	66	11	122	148	3.94	3	10	<2	1.68	<0.5	160	8.43	10	0.02	<0.01	<10	3.02	706	<0.01	<2	6	30	0.58	142	<10
607	11315	<2	230	<1	140	45	2.24	4	360	<2	1.24	15.9	21	4.15	10	0.01	0.02	<10	1.26	337	0.22	<2	9	78	0.13	75	<10
608	10317	4	16	<1	9	37	0.35	55	**150**	3	0.84	<0.5	2	0 56	<10	0.19	<0.01	<10	0.11	135	0.01	<2	4	22	0.19	39	**<10**
609.1	10234	18	42	66	65	93	1.47	38	10	<2	0.6	1.7	37	12	<10	0.3	<0.01	<10	0.98	354	0.01	3	6	14	0.39	89	<10
609.1	10318	6	86	14	118	150	3.71	17	**290**	6	0.43	5.5	52	8.8	10	0.15	0.02	<10	3.43	942	0.03	<2	13	7	0.34	204	**<10**
609.1	10319	4	82	17	100	96	2.05	26	**210**	<2	0.44	5	21	9.62	<10	0.08	0.02	<10	1.95	652	0.03	<2	6	9	0.19	95	**<10**
609.1	10320	3	50	10	51	94	1.29	10	**40**	7	0.92	1.4	17	4 21	<10	0.05	<0.01	<10	1.27	357	0.01	4	4	9	0.18	53	**<10**
609.1	10721	<2	75	2	78	108	4.12	8	30	<2	1.36	9.8	41	6.62	10	0.02	0.05	<10	2.93	1075	0.06	<2	10	46	0.68	216	<10
609.2	10285	19	20	1	60	99	1.16	82	<10	<2	1.3	8.3	13	1.89	<10	0.02	0.01	<10	0.63	246	0.02	<2	1	24	0.24	44	<10
609.2	10286	4	81	7	137	124	3.12	5	10	3	1.02	0.8	39	5.47	10	0.01	0.01	<10	2.83	735	0.04	<2	4	13	0.51	147	<10
609.2	10595	15	52	35	75	71	2.11	19	20	9	0.81	5.2	24	11.55	10	0.61	0.02	<10	1.58	596	0.03	<2	8	85	0.5	149	<10
609.2	10934	16	47	38	118	179	3.21	41	10	<2	0.58	6.7	49	18.1	10	0.5	0.01	<10	2.65	844	0.03	<2	20	29	0.54	232	<10
610	11004	<2	59	<1	100	193	3.02	<2	140	<2	1.14	<0.5	34	6.29	10	0.09	0.02	<10	2.65	699	0.05	<2	6	19	0.27	134	10
610	11118	5	72	1	118	235	3.86	<2	10	2	3.12	<0.5	39	6.57	10	0.08	0.01	<10	2.23	591	0.05	2	9	49	0.34	160	<10
610	11119	5	74	1	111	245	5.08	<2	10	<2	6.04	<0.5	37	6.61	10	0.04	0.03	<10	5.18	1135	0.06	3	21	7	0.21	237	<10
611	11120	4	81	1	156	111	5.84	4	50	2	4.14	<0.5	41	6.87	10	0.01	0.08	<10	5.64	1180	0.2	<2	16	38	0.12	223	<10
612	10531	3	66	<1	95	77	4.67	<2	**140**	6	1.92	0.6	32	5 08	10	0.01	0.05	<10	2.55	591	0.32	<2	3	26	0.19	101	**10**
614	2652	6	71	<1	48	60	2.02	9	99	<5	0.97	<0.2	22	3.41	2	0.056	0.04	4	1.11	622	0.03	<5	5	39	0.266	116	<20
615	2653	8	63	<1	62	58	1.6	19	92	<5	0.87	<0.2	19	3.68	<2	0.063	0.07	4	1.15	1041	0.05	<5	<5	40	0.157	114	<20
616	10361	<2	16	<1	35	77	3.71	6	**100**	8	2.16	<0.5	13	1 59	10	<0.01	0.04	<10	0.82	175	0.63	5	2	116	0.07	47	**<10**
617	10365	2	49	<1	861	200	1.95	<2	**130**	6	0.68	0.5	71	6 04	<10	<0.01	0.11	<10	9.62	768	0.13	<2	3	20	0.06	31	**<10**
619	10362	<2	26	<1	431	693	2.44	<2	**<10**	3	1.04	<0.5	60	3.42	<10	<0.01	<0.01	<10	3.8	312	0.03	<2	3	8	0.04	43	**<10**
619	10363	4	34	1	2110	498	0.55	<2	**<10**	<2	0.09	<0.5	172	8.2	<10	0.01	0.01	<10	12.85	729	0.01	<2	7	<1	0.02	30	**<10**
619	10574	<2	59	<1	1445	708	0.88	3	10	<2	0.1	<0.5	134	8.94	<10	0.02	0.01	<10	14 2	986	<0.01	<2	10	38	0.04	30	<10
619	10575	<2	55	<1	229	343	3.81	<2	<10	2	2.6	<0.5	46	3.66	10	0.03	<0.01	<10	3.24	558	<0.01	<2	4	1	0.02	23	<10
619	10903	4	38	<1	537	811	3.89	<2	10	<2	1.44	<0.5	81	4.54	<10	0.04	<0.01	<10	5.11	571	0.01	2	7	76	0.07	55	<10
619	10904	3	40	<1	850	569	0.74	<2	10	<2	0.39	<0.5	96	5.99	<10	0.02	0.01	<10	10 2	943	<0.01	<2	11	4	0.03	34	<10
620	10364	3	62	1	1070	139	0.22	<2	**<10**	<2	0.08	0.8	129	8.61	<10	<0.01	0.04	<10	15	1315	0.01	<2	3	1	0.02	12	**<10**

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Official Location	Sample Type	Sample Site	Sample Method	Sample Dim (ft)	Sample Description	Pt ppb	Pd ppb	Au ppb	Ag ppm	Cu ppm
621	10191	MF1996C-87	R	OC	Rep		Mag & chromite stringer (3-5%)	9.9	14	<1	1	27
622.1	10028	Dunite Hill	R	OC	G		Serp'zd dun	7.8	4	2	<0.2	19
622.2	10066	Dunite Hill	R	RC	G		Variably serp'zd dun	29.5	46	4	<0.2	105
622.2	10213	Dunite Hill	R	OC	Rep		Dun to perid	34.6	76	2	1.2	70
623	10064	Amphi	R	OC	G		Perid w/ minor cpy, po	68.8	69	71	0.5	1465
623	10065	Amphi	R	OC	G		Perid w/ minor cpy	4.2	3	<1	<0.2	73
623	10212	Amphi	R	FL	G		Perid w/ minor sulfs, cpy	61.8	35	13	0.9	799
624.1	10200	Chitti Stain	R	RC	S		Qz vns & lenses w/ cpy, bn, chrysocolla in vesicular basalt	<5	16	1	0.9	3470
624.2	10000	Chitti Stain	R	RC	G	20	Cu-sulf mins in vesicular basalt	5	22	18	2.2	4670
624.2	10001	Chitti Stain	R	RC	G		Cpy, bn, covelite in alt vesicular basalt	<5	11	19	6.2	**1.16%**
624.2	10042	Chitti Stain	R	TP	Rep	3.3	Basalt w/ Cu alt mins in qz pods	4.1	10	5	0.4	2710
624.2	10043	Chitti Stain	R	TP	Rep		Alt basalt w/ mal & azurite + v minor cpy	3	8	5	3.4	7500
624.2	10044	Chitti Stain	R	TP	CC	3	Alt basalt w/ dissem cpy & bn, + mal/chrysocolla/azurite	4.7	13	9	2.7	4990
624.2	10045	Chitti Stain	R	OC	CC	2.3	Alt basalt w/ minor cpy, bn, + Cu alt mins	4.2	11	1	2.4	5700
624.2	10046	Chitti Stain	R	MD	S		Basalt w/ patches & seams of bn, chalcocite, cpy & Cu alt mins	4	10	2	4.3	**1.11%**
624.2	10047	Chitti Stain	R	TP	CC	2.4	Amygdaloidal basalt w/ cpy & bn + Cu alt mins	2.6	12	9	1.1	2670
624.2	10201	Chitti Stain	R	RC	G		Qz vn w/ Cu sulf in vesicular basalt	<5	14	1	0.4	534
624.2	10202	Chitti Stain	R	RC	Rep		Basalt	<5	12	5	3.2	5530
624.2	10203	Chitti Stain	R	RC	Rep		Basalt	<5	12	20	3.1	6200
625	10002	GR 13-9	R	OC	SC	10.0	Cu-st basalt w/ minor cpy	<5	16	16	6.7	**1.22%**
625	10003	GR 13-9	R	RC	S		Minor bn & epid in alt basalt	<5	21	7	8.1	**1.74%**
627	10366	GR 13-7	R	OC	G	0.5	Basalt w/ thin qz-cc-epid vnlets, ~0.05 to 0.2" w/ bn	3.8	15	3	0.6	1485
628	2654	Gulkana River	SS				Float - till	<5	3	138	<0.2	31
629	10204	GR 13-6	R	RC	G		Alt vesicular basalt w/ minor chrysocolla & mal	<5	8	2	0.5	3120
630	10120	GR 13-3	R	OC	C	13	Vesicular basalt	<5	17	14	12.2	**5.79%**
630	10121	GR 13-3	R	OC	S	1x1x1	Vesicular basalt	<5	18	69	19.3	**7.44%**
636.1	10206	One-mile Creek	PC				No magnetite in pan	<5	8	7	<0.2	28
636.2	10119	One-mile Creek	PC				Mod magnetite in pan, no visible gold	<5	3	19	<0.2	32
636.3	10501	One-mile Creek	PC				1 fine, 1 v fine Au flake, abundant black sand	7.6	8	5010	<0.2	24
636.4	10500	One-mile Creek	PC				3 v fine flakes Au, significant mag, garnet, lots of clay	2.8	3	230	2.1	36
637	10697	Gakona River Trib	PC	Stream	PC		Barren sample, tr mag	<5	2	3	<0.2	47

Table B-2. Analytical results of samples from mines, prospects, occurrences, and reconnaissance investigations.

Map No	Sample No	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Cr ppm	Al %	As ppm	Ba ppm (XRF)	Bi ppm	Ca %	Cd ppm	Co ppm	Fe %	Ga ppm	Hg ppm	K %	La ppm	Mg %	Mn ppm	Na ppm	Sb ppm	Sc ppm	Sr ppm	Ti ppm	V ppm	W ppm (XRF)
621	10191	4	66	1	1180	220	0.41	<2	<10	<2	0.06	0.5	129	8.72	<10	<0.01	0.03	<10	15	1395	0.01	<2	5	6	0.02	14	<10
622.1	10028	<2	41	<1	1055	152	0.09	<2	10	<2	0.05	1.3	111	7.47	50	<0.01	<0.01	10	15	1230	0.01	<2	4	<1	0.01	5	<10
622.2	10066	<2	45	<1	1455	262	0.14	3	<10	<2	0.05	1.6	146	8 09	60	<0.01	<0.01	10	15	1170	0.01	<2	4	<1	0.01	8	<10
622.2	10213	2	50	<1	1745	247	0.13	<2	<10	<2	0.08	0.6	131	8.69	<10	<0.01	0.01	<10	15	1350	0.01	<2	3	4	0.01	8	<10
623	10064	<2	61	<1	2850	684	0.13	15	<10	<2	0.61	1.7	176	10.95	<10	<0.01	0.01	<10	15	1620	0.01	<2	7	<1	0.03	26	<10
623	10065	<2	31	<1	1805	846	0.13	19	<10	<2	0.15	1.7	132	9 99	<10	<0.01	0.01	<10	15	1155	0.01	<2	7	<1	0.03	28	<10
623	10212	2	31	1	600	378	0.82	<2	120	<2	0.17	<0.5	82	5.9	<10	<0.01	0.18	<10	9.27	630	0.01	<2	3	7	0.04	25	<10
624.1	10200	2	13	<1	61	84	2.1	6	130	9	2.25	0.6	12	1 56	<10	0.02	0.01	<10	0.6	142	0.03	<2	3	10	0.13	74	<10
624.2	10000	4	54	1	73	122	2.51	14	260	5	1.49	<0.5	35	3 99	10	0.04	0.02	<10	1.36	448	0.05	<2	3	17	0.2	79	<10
624.2	10001	2	55	<1	72	119	3.17	6	180	10	1.34	<0.5	22	4 58	10	0.06	0.01	<10	2.27	655	0.03	<2	6	11	0.22	112	<10
624.2	10042	<2	100	<1	90	133	2.73	15	120	<2	1.38	0.5	37	4.7	<10	0.01	0.01	<10	2.67	717	0.03	<2	9	42	0.38	100	<10
624.2	10043	<2	92	<1	72	186	2.63	10	110	<2	1.1	0.6	32	4 92	10	0.02	0.01	<10	2.31	773	0.04	<2	9	28	0.37	157	<10
624.2	10044	<2	50	1	84	119	1.82	14	170	3	1.59	1.1	22	2.66	<10	0.02	0.01	<10	1.62	322	0.02	<2	4	42	0.35	77	<10
624.2	10045	<2	107	<1	82	38	2.88	14	100	<2	1.67	0.6	35	5 29	10	0.01	0.01	<10	2.44	934	0.04	<2	8	23	0.43	118	<10
624.2	10046	<2	87	2	84	120	3.08	17	120	<2	1.66	0.9	28	5.42	10	0.03	0.01	<10	2.58	812	0.04	<2	8	14	0.46	151	<10
624.2	10047	<2	68	1	43	114	2.84	8	80	<2	3.69	<0.5	16	2 22	10	0.01	<0.01	<10	0.92	376	0.02	<2	5	40	0.38	111	<10
624.2	10201	2	36	<1	46	95	2.29	5	130	10	2.41	<0.5	14	1 83	10	0.01	0.01	<10	0.81	305	0.02	2	3	11	0.2	78	10
624.2	10202	<2	70	<1	76	63	2.89	6	140	5	0.93	<0.5	29	4.62	10	0.01	<0.01	<10	2.38	667	0.05	<2	5	14	0.23	84	10
624.2	10203	2	42	<1	42	107	2.15	6	130	9	1.93	0.5	16	2.19	<10	0.01	0.03	<10	0.94	287	0.04	<2	4	28	0.2	78	<10
625	10002	2	45	<1	71	220	2.88	8	130	12	1 8	1.9	21	3.61	10	0.14	<0.01	<10	1.87	457	0.01	<2	5	14	0.19	97	<10
625	10003	3	43	1	47	120	2.21	4	110	7	1.97	1.3	17	2 58	<10	0.08	<0.01	<10	1.21	317	0.02	<2	4	13	0.2	78	<10
627	10366	2	62	<1	49	31	2.18	9	160	5	1.77	0.5	24	4 29	10	0.06	0.05	<10	1.41	544	0.09	2	5	33	0.37	156	<10
628	2654	6	47	<1	59	58	1.22	<5	68	<5	0.83	0.2	15	4.19	<2	0.03	0.06	4	1.02	366	0.04	<5	<5	45	0.122	153	<20
629	10204	2	15	<1	22	63	2.57	3	100	9	3.65	<0.5	7	1.78	10	0.01	<0.01	<10	0.42	201	0.01	<2	6	31	0.21	77	<10
630	10120	<2	109	<1	74	143	2.55	17	150	8	0.96	<0.5	36	5 09	10	0.32	0.01	<10	2.17	531	0.03	<2	11	22	0.25	150	<10
630	10121	4	137	<1	76	151	2.95	7	130	3	0.72	<0.5	39	5.9	10	0.2	0.01	<10	2.66	525	0.03	<2	12	23	0.27	174	<10
636.1	10206	2	43	1	40	63	1.43	8	70	<2	0.76	<0.5	12	3.1	10	0.06	0.08	<10	0.95	364	0.07	2	3	36	0.11	107	<10
636.2	10119	<2	41	1	38	76	1.43	10	70	<2	0.78	<0.5	13	3.54	10	0.05	0.07	<10	0.94	438	0.08	<2	3	37	0.11	129	<10
636.3	10501	8	36	<1	52	128	1.17	6	40	<2	0.9	1	26	11.3	10	0.24	0.05	10	0.73	443	0.06	<2	3	47	0.22	563	10
636.4	10500	5	40	1	53	67	1.51	3	60	<2	1.02	<0.5	13	3.51	10	0.68	0.08	10	1.15	358	0.08	<2	4	18	0.18	130	<10
637	10697	6	65	<1	62	100	2.1	<2	50	<2	1.18	<0.5	20	6.02	10	0.62	0.07	<10	1.2	516	0.05	<2	6	47	0.22	278	<10

Analytical methods and detection limits for samples from mines, prospects, occurrences, and reconnaissance investigations, Table B-2.

Table B-2 presents the main analytical results from the BLM mineral assessment. The samples include rock chip, stream sediment, pan concentrate, soil, and placer concentrates. Analytical methods include fire assay, ICP, AA, XRF, and mercury by cold vapor AA. The numbers in bold in Table B-2 correspond to the analytical methods shown in bold in the table below.

Element	Units Reported	Lower Detection Limit	Upper Detection Limit	Analytical Method
Pt	ppb	5	10000	FA
Pt	**ppb**	**30**	**100,000**	**FA**
Pd	ppb	1	10,000	FA
Pd	**ppb**	**30**	**100,000**	**FA**
Au	ppb	1	10,000	FA
Au	**ppm**	**0.05**	**1000**	**FA**
Ag	ppm	0.2	100	ICP
Cu	ppm	1	10,000	ICP
Cu	**pct**	**0.01**	**30.00**	**AA**
Pb	ppm	2	10,000	ICP
Pb	**pct**	**0.01**	**30**	**AA**
Zn	ppm	2	10,000	ICP
Zn	**pct**	**0.01**	**30**	**AA**
Mo	ppm	1	10,000	ICP
Ni	ppm	1	10,000	ICP
Ni	**pct**	**0.01**	**50**	**AA**
Cr	ppm	1	10,000	ICP
Al	pct	.01	15	ICP
As	ppm	2	10,000	ICP
Ba	ppm	10	10,000	ICP
Ba	**ppm**	**10**	**10,000**	**XRF**
Ba	**pct**	**0.01**	**50**	**XRF**
Bi	ppm	2	10,000	ICP
Ca	pct	0.01	15	ICP
Cd	ppm	0.5	500	ICP
Co	ppm	1	10,000	ICP
Fe	pct	0.01	15	ICP
Ga	ppm	10	10,000	ICP
Hg	ppm	0.01	100	AA
K	pct	0.01	10	ICP
La	ppm	10	10,000	ICP
Mg	pct	0.01	15	ICP
Mn	ppm	5	10,000	ICP
Na	ppm	0.01	10	ICP
Sb	ppm	2	10,000	ICP
Sc	ppm	1	10,000	ICP
Sr	ppm	1	10,000	ICP
Ti	pct	0.01	10	ICP
V	ppm	1	10,000	ICP
W	ppm	10	10,000	ICP
W	**ppm**	**10**	**10,000**	**XRF**

Table B-3. Whole rock analyses for selected rock chip samples

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
48	10399	Tourmaline	16.65	0.06	0.62	0.01	0.27	1.83	0.01	0.30	2.77	0.13	74.35	0.01	0.05	1.61	98.67
48	11009	Tourmaline	15.03	0.02	14.91	0.08	8.81	0.15	11.36	0.16	1.10	0.02	46.95	0.05	0.36	0.79	99.8
48	11010	Tourmaline	11.25	0.02	0.56	0.01	0.65	0.17	0.08	0.09	0.75	0.01	83.69	<0.01	0.04	1.17	98.51
48	11011	Tourmaline	18.91	0.02	0.12	<0.01	0.17	10.67	0.03	0.01	2.20	0.02	65.79	<0.01	0.04	0.39	98.38
48	11139	Tourmaline	17.92	0.02	1.51	0.04	3.10	0.79	0.41	0.09	5.43	0.05	68.11	0.01	0.10	0.63	98.21
48	*11140*	*Tourmaline*	*14.55*	*<0.01*	*0.13*	*0.02*	*0.21*	*5.24*	*0.01*	*0.14*	*1.78*	*<0.01*	*64.50*	*<0.01*	*0.01*	*1.54*	*88.1*
48	*11141*	*Tourmaline*	*27.50*	*<0.01*	*1.34*	*0.02*	*4.08*	*1.66*	*0.20*	*0.41*	*3.63*	*0.26*	*51.00*	*0.01*	*0.06*	*2.86*	*93*
113	*10075*	*Compass Creek*	*13.30*	*0.02*	*9.15*	*0.02*	*12.20*	*1.26*	*6.06*	*0.19*	*3.41*	*0.17*	*48.80*	*0.01*	*1.71*	*3.2*	*99.5*
116	*10010*	*Bird's Beak area*	*5.06*	*0.01*	*5.46*	*0.50*	*11.45*	*0.08*	*26.80*	*0.15*	*0.42*	*0.12*	*41.20*	*0.01*	*0.44*	*5.68*	*97.3*
118.1	11242	Bird's Beak	5.80	0.02	8.53	0.47	11.23	0.10	22.36	0.16	0.34	0.04	42.57	0.02	0.55	6.82	99.02
118.1	11244	Bird's Beak	4.73	0.02	6.42	0.40	13.77	0.21	26.10	0.18	0.36	0.03	41.14	<0.01	0.50	6.07	99.92
118.1	11355	Bird's Beak	4.75	0.02	8.30	0.50	12.14	0.17	25.81	0.17	0.48	0.04	42.10	0.01	0.66	4.6	99.76
118.2	11241	Bird's Beak	3.44	0.01	5.19	0.66	12.30	0.06	32.64	0.17	0.30	0.03	39.45	0.01	0.29	5.31	99.86
118.2	11354	Bird's Beak	4.89	0.02	4.96	0.62	12.52	0.15	32.44	0.17	0.57	0.03	39.19	0.01	0.37	3.91	99.85
120	*10031*	*Bird's Beak area*	*5.92*	*0.01*	*6.60*	*0.41*	*10.70*	*0.13*	*22.30*	*0.15*	*<0.01*	*0.12*	*42.20*	*0.01*	*0.57*	*10.65*	*99.8*
121	10195	Bird's Foot	2.19	0.01	2.35	0.67	13.21	0.11	38.49	0.21	0.24	0.04	36.92	0.01	0.30	5.26	99.99
121	10196	Bird's Foot	4.54	0.01	3.74	0.67	11.99	0.10	31.15	0.16	0.22	0.02	39.26	<0.01	0.34	7.46	99.65
121	10226	Bird's Foot	2.31	0.01	2.57	0.67	12.34	0.09	37.50	0.22	0.26	0.03	39.45	0.01	0.30	4.06	99.82
122	10982	Bird's Foot area	4.19	0.01	3.96	0.66	12.61	0.16	32.50	0.17	0.48	0.04	39.20	<0.01	0.43	5.47	99.89
126	11147	BOS	5.86	0.02	6.70	0.48	12.04	0.17	24.77	0.16	0.36	0.04	42.00	0.01	0.45	6.89	99.95
127	10081	Mini U Landslide area	3.48	0.01	3.76	0.72	13.48	0.05	36.01	0.22	0.17	<0.01	37.34	0.02	0.20	4.4	99.84
127	10601	Mini U Landslide area	5.17	<0.01	4.90	0.61	11.70	0.06	31.49	0.19	0.56	0.01	40.76	0.05	0.29	3.37	99.16
128	10600	Mini U Landslide	0.82	0.01	1.10	0.91	13.60	0.03	43.60	0.21	0.10	0.01	35.14	0.04	0.19	4.06	99.82
129.1	11271	New Boot Flap	7.58	0.03	6.60	0.31	13.24	0.35	23.59	0.17	1.06	0.08	43.50	0.03	0.78	2.27	99.6
129.2	10700	Boot Flap	1.03	<0.01	4.99	0.63	28.97	0.04	3.90	0.49	0.12	<0.01	36.96	0.03	0.08	21	98.24
129.3	10701	Boot Flap	0.26	<0.01	0.05	0.59	13.75	0.01	40.28	0.21	0.04	0.01	30.85	<0.01	0.06	13.75	99.87
131	*10015*	*5550 Peak*	*3.94*	*0.02*	*1.40*	*0.65*	*10.75*	*0.12*	*32.40*	*0.15*	*0.28*	*0.13*	*39.80*	*0.01*	*0.22*	*9.01*	*98.9*
132	10534	FLF	12.80	0.09	1.32	0.01	11.01	0.86	5.13	0.21	2.31	0.11	60.55	0.03	0.50	4.03	98.97
135.1	*10007*	*Dunite Diatreme*	*1.61*	*<0.01*	*<0.01*	*0.63*	*11.65*	*0.02*	*33.40*	*0.14*	*0.03*	*0.11*	*35.80*	*<0.01*	*0.10*	*15.55*	*99.1*
135.2	*10073*	*Dunite Diatreme*	*1.93*	*<0.01*	*<0.01*	*0.52*	*9.88*	*0.02*	*35.50*	*0.13*	*0.08*	*0.12*	*36.80*	*<0.01*	*0.15*	*15.45*	*100.5*
135.3	*10072*	*Dunite Diatreme*	*1.69*	*<0.01*	*<0.01*	*0.71*	*12.60*	*0.03*	*34.30*	*0.13*	*<0.01*	*0.12*	*38.00*	*<0.01*	*0.12*	*12.7*	*100.5*
135.4	*10074*	*Dunite Diatreme*	*2.40*	*<0.01*	*<0.01*	*0.67*	*11.45*	*0.04*	*30.80*	*0.15*	*<0.01*	*0.11*	*37.50*	*<0.01*	*0.12*	*16.95*	*100.5*
140.1	10198	Lower Crash	3.10	0.01	2.44	0.60	11.51	0.14	35.38	0.16	0.19	0.04	38.75	<0.01	0.33	6.97	99.61
140.1	10199	Lower Crash	8.10	0.02	9.71	0.26	12.62	0.11	21.37	0.19	0.80	0.03	45.82	0.01	0.40	-0.01	99.43
140.1	10227	Lower Crash	5.75	0.01	0.80	0.41	11.21	0.01	32.16	0.58	<0.01	0.06	32.26	<0.01	0.42	12.45	96.13

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
140.1	10228	Lower Crash	4.86	0.01	4.74	0.45	12.80	0.21	29.34	0.20	0.27	0.06	38.21	0.01	0.56	6.75	98.48
140.2	10800	Lower Crash	4.20	0.01	4.15	0.47	12.99	0.17	31.87	0.20	0.19	0.04	37.67	0.01	0.46	6.98	99.42
140.2	10801	Lower Crash	3.79	0.01	3.88	0.49	14.20	0.13	31.70	0.20	0.18	0.05	36.43	0.01	0.45	7.21	98.74
142	10603	West Crash	10.10	0.01	11.39	0.20	10.79	0.10	15.91	0.21	0.53	<0.01	44.59	0.04	0.33	4.08	98.27
143	10096	Crash	6.45	0.01	8.39	0.36	14.27	0.13	21.21	0.25	0.38	0.03	41.75	0.03	0.47	6.06	99.78
143	10542	Crash	2.15	0.01	9.78	0.57	11.57	0.04	27.50	0.20	0.17	0.01	41.65	<0.01	0.28	4.85	98.76
143	10543	Crash	6.83	0.01	8.91	0.33	13.72	0.12	20.48	0.23	0.39	0.02	41.85	0.01	0.38	5.46	98.75
148	10098	Notar area	4.30	0.01	4.19	0.44	13.30	0.14	30.82	0.20	0.19	0.04	37.10	0.01	0.53	7.4	98.68
150	10097	Notar	0.26	<0.01	0.14	0.64	12.07	0.02	43.86	0.20	0.11	0.01	32.00	0.03	0.09	10.5	99.92
150	10544	Notar	0.32	<0.01	0.08	0.65	14.74	0.01	38.32	0.19	0.10	0.01	33.10	<0.01	0.03	12.25	99.82
150	10545	Notar	0.61	0.02	0.20	0.78	11.89	0.01	41.13	0.16	0.15	0.02	37.26	<0.01	0.03	7.64	99.92
150	10546	Notar	0.36	<0.01	0.29	0.68	12.77	0.02	44.18	0.20	0.09	0.01	33.13	0.01	0.06	7.74	99.53
150	10547	Notar	0.27	<0.01	0.15	0.70	13.42	0.01	44.75	0.21	0.06	<0.01	34.27	0.01	0.05	5.81	99.72
151	10858	GR 20-3 area	15.41	0.04	9.84	0.02	14.35	0.82	6.53	0.20	2.42	0.10	44.94	0.04	1.46	2.79	98.95
158	10807	GR 14-18	2.73	<0.01	9.29	0.02	44.71	0.03	3.53	0.08	<0.01	0.06	18.85	0.01	0.21	18.9	98.42
158	11284	GR14-18	8.22	0.02	16.77	0.17	11.82	0.23	14.15	0.15	0.73	0.12	43.25	0.02	0.95	2.49	99.08
160	10804	Broxson Ridge Magnetite	2.04	0.01	10.81	0.02	53.11	0.04	6.61	0.11	0.12	0.14	23.88	0.02	0.22	1.53	98.64
160	10805	Broxson Ridge Magnetite	7.62	0.01	20.42	0.17	13.79	0.05	12.79	0.18	0.12	0.10	42.60	0.03	0.81	1.09	99.77
162	11037	GR14-18 area	6.35	0.01	22.09	0.01	13.03	0.05	7.89	0.33	0.03	0.11	45.79	0.02	0.22	1.64	97.58
163	11042	GR14-18 area	8.06	0.02	20.28	0.13	15.80	0.21	10.63	0.14	0.10	0.05	41.83	0.01	0.89	1.18	99.32
165	10863	Broxson Ridge	0.29	<0.01	0.16	0.77	13.99	0.01	47.76	0.23	0.08	0.01	35.50	0.03	0.09	0.94	99.85
166	10867	GR 14-19	9.54	0.02	11.42	0.13	15.10	0.21	9.71	0.12	1.02	0.15	42.38	0.04	1.02	9.01	99.87
173	10905	BGM	4.83	<0.01	22.63	0.18	8.55	0.02	12.11	0.50	0.20	0.06	47.63	0.04	0.29	1.16	98.2
179	11366	Green Wonder	8.41	0.02	32.19	3.77	7.60	0.02	6.33	1.73	0.12	0.15	35.26	<0.01	1.55	2.08	99.2
190	10498	GR 14-15	8.52	0.01	16.33	0.04	14.15	0.07	3.91	0.22	0.01	0.10	53.51	0.02	0.53	1.01	98.43
190	10499	GR 14-15	4.95	0.01	10.73	0.02	13.19	0.07	2.51	0.18	0.01	0.05	64.10	0.03	0.34	0.4	96.61
198.2	10482	Moneta Porcupine	8.92	<0.01	23.05	0.02	9.74	0.04	7.07	0.28	0.07	0.16	47.52	0.06	0.34	1.4	98.67
199.1	*10032*	*Ghezzi*	*16.45*	*0.01*	*12.10*	*0.06*	*9.40*	*0.30*	*7.99*	*0.15*	*2.30*	*0.08*	*48.10*	*0.03*	*0.91*	*2.78*	*100.5*
199.1	*10069*	*Ghezzi*	*13.80*	*0.01*	*9.85*	*0.01*	*4.81*	*0.18*	*3.67*	*0.04*	*5.50*	*0.41*	*53.90*	*0.03*	*3.00*	*2.4*	*97.6*
199.1	*10070*	*Ghezzi*	*13.95*	*0.02*	*11.15*	*0.01*	*8.79*	*0.43*	*6.69*	*0.11*	*3.13*	*0.25*	*49.30*	*0.04*	*1.77*	*2.15*	*97.9*
199.1	*10222*	*Ghezzi*	*13.95*	*0.02*	*12.30*	*0.03*	*8.18*	*0.37*	*7.39*	*0.10*	*3.14*	*0.28*	*51.00*	*0.04*	*1.90*	*2.14*	*101*
199.1	*10431*	*Ghezzi*	*12.90*	*0.01*	*12.45*	*0.21*	*7.41*	*0.22*	*9.52*	*0.08*	*2.46*	*0.24*	*47.80*	*0.03*	*1.21*	*2.69*	*97.2*
199.1	11272	Ghezzi	10.77	0.02	8.96	0.19	12.27	0.27	15.59	0.17	1.58	0.11	46.40	0.02	1.06	2.49	99.88
199.2	*10019*	*Ghezzi*	*14.45*	*0.02*	*11.90*	*0.02*	*8.44*	*0.35*	*6.26*	*0.09*	*2.97*	*0.28*	*48.20*	*0.05*	*2.28*	*2.63*	*98*
199.2	*10219*	*Ghezzi*	*14.05*	*0.01*	*10.60*	*0.01*	*11.35*	*0.24*	*5.29*	*0.10*	*3.19*	*0.15*	*48.90*	*0.04*	*2.28*	*2.38*	*98.6*

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
199.2	*10220*	*Ghezzi*	*13.95*	*0.02*	*13.45*	*<0.01*	*6.77*	*0.35*	*5.43*	*0.08*	*3.82*	*0.38*	*51.20*	*0.04*	*3.07*	*2*	*100.5*
199.2	*10221*	*Ghezzi*	*14.30*	*0.02*	*12.25*	*0.01*	*9.45*	*0.25*	*5.88*	*0.12*	*3.41*	*0.31*	*50.30*	*0.04*	*2.59*	*1.95*	*101*
199.2	11273	Ghezzi	10.71	0.02	9.29	0.20	12.22	0.29	16.17	0.17	1.77	0.11	45.25	0.02	0.98	2.44	99.65
201.1	*10146*	*Rainy Creek Skarn*	*8.85*	*<0.01*	*7.67*	*0.28*	*11.50*	*0.06*	*20.40*	*0.15*	*1.02*	*0.14*	*43.70*	*<0.01*	*1.01*	*4.36*	*99.1*
201.1	10532	Rainy Creek Skarn	8.19	0.03	7.71	0.25	12.15	0.22	20.43	0.18	0.85	0.09	43.55	0.04	1.05	3.65	98.37
205	10380	West Rainy Skarn	15.16	0.03	9.09	0.05	13.95	0.68	5.39	0.11	1.52	0.08	45.92	0.05	0.56	6.39	98.97
205	10612	West Rainy Skarn	16.11	0.05	9.58	0.02	10.50	0.98	5.43	0.15	2.81	0.14	49.57	0.03	0.80	2.73	98.91
206	10820	West Rainy Skarn area	10.30	<0.01	25.86	0.03	14.87	0.13	3.13	0.50	0.40	0.16	40.07	0.02	0.43	2.25	98.15
212.1	*10153*	*GR 14-9*	*13.65*	*0.03*	*10.40*	*0.09*	*12.50*	*0.67*	*7.51*	*0.11*	*1.18*	*0.09*	*45.70*	*0.03*	*0.57*	*6.33*	*98.9*
213	10818	Picrite Hill West	7.86	0.01	7.97	0.28	12.25	0.05	20.63	0.23	0.39	0.09	41.78	0.01	1.07	5.61	98.22
214	*10068*	*Picrite Hill West*	*8.42*	*<0.01*	*7.04*	*0.29*	*10.80*	*0.02*	*21.10*	*0.12*	*0.63*	*0.14*	*43.20*	*<0.01*	*0.97*	*5.82*	*98.6*
214	*10078*	*Picrite Hill West*	*10.25*	*0.01*	*7.88*	*0.21*	*12.20*	*0.08*	*17.00*	*0.17*	*1.60*	*0.14*	*46.30*	*0.02*	*1.07*	*4*	*101*
216.2	10390	GR 14-4	10.57	0.01	9.26	0.28	13.36	0.36	17.77	0.19	1.11	0.07	43.20	0.01	0.56	3.06	99.8
218	10719	N of GR 20-2	10.68	0.02	9.62	0.14	11.16	0.29	13.46	0.16	2.00	0.11	45.91	0.04	1.30	3.14	98
219	10989	East Peak South Ridge	6.75	0.02	6.65	0.35	14.96	0.16	26.08	0.21	0.96	0.08	41.76	0.01	0.58	1.31	99.87
219	10991	East Peak South Ridge	12.77	0.03	10.82	0.08	9.79	0.52	9.30	0.16	2.60	0.23	49.58	0.02	2.20	1.72	99.83
220	10987	East Peak	5.67	0.01	4.61	0.28	17.76	0.06	26.00	0.18	0.56	0.02	41.92	<0.01	0.25	2.58	99.9
222	10985	East Peak, N side	15.17	0.03	11.58	0.02	14.05	0.17	5.92	0.19	1.93	0.14	48.10	0.02	1.93	0.58	99.81
226	11363	East Canyon area	10.56	0.03	9.51	0.20	12.36	0.31	16.02	0.17	1.77	0.09	47.21	0.02	1.14	0.49	99.88
227	11005	East Broxson Gold	13.63	0.26	2.16	<0.01	11.48	2.98	2.84	0.26	1.09	0.16	58.81	0.02	0.69	5.33	99.71
229	10862	West Bowl	7.65	<0.01	37.10	0.04	4.51	0.02	5.60	0.09	0.04	0.02	37.04	0.03	0.43	7.11	99.68
229	11068	West Bowl	4.06	0.01	37.01	<0.01	5.74	0.01	6.25	0.13	0.02	0.02	37.49	0.01	0.28	7.23	98.26
229	10859	West Bowl area	0.96	<0.01	0.15	0.69	13.88	0.02	41.29	0.20	0.09	0.02	33.79	0.04	0.12	8.66	99.93
229	10860	West Bowl area	2.54	0.01	1.83	0.74	11.54	0.13	38.63	0.21	0.36	0.05	39.61	0.03	0.44	3.65	99.76
229	10861	West Bowl area	0.32	<0.01	0.19	0.66	13.41	0.01	45.75	0.21	0.09	0.01	33.19	0.01	0.07	5.87	99.8
232	10908	North Rainy area	2.74	0.01	2.82	0.44	13.72	0.25	37.37	0.22	0.37	0.04	38.44	0.01	0.39	2.99	99.82
233.3	11262	North Rainy	1.22	0.01	1.33	0.62	15.00	0.11	41.80	0.21	0.30	0.02	37.50	<0.01	0.13	1.46	99.71
233.4	11261	North Rainy	0.45	0.02	0.19	0.67	13.80	0.02	44.48	0.18	0.15	0.01	35.25	<0.01	0.07	4.13	99.42
234	10977	Hail Creek area	0.73	0.01	0.55	0.67	14.07	0.03	45.45	0.19	0.17	0.01	36.35	<0.01	0.08	0.38	98.7
236	10978	Hail Creek area	13.62	0.04	5.81	0.01	3.49	0.08	2.03	0.03	4.00	0.08	67.50	0.03	0.36	1.24	98.32
237	*10034*	*Hail Creek*	*1.23*	*<0.01*	*<0.01*	*0.79*	*9.38*	*0.01*	*36.00*	*0.08*	*0.08*	*0.14*	*38.00*	*<0.01*	*0.02*	*13.65*	*99.4*
238	*10060*	*Foley's*	*16.55*	*0.02*	*13.75*	*0.06*	*8.36*	*0.23*	*7.59*	*0.15*	*1.96*	*0.09*	*48.50*	*0.04*	*0.39*	*1.89*	*99.6*
238	*10180*	*Foley's*	*14.25*	*<0.01*	*14.45*	*0.07*	*9.67*	*0.07*	*10.45*	*0.17*	*1.31*	*0.07*	*48.40*	*0.02*	*0.30*	*1.06*	*100.5*
240	*10039*	*White Band area*	*12.05*	*<0.01*	*15.60*	*0.04*	*12.25*	*0.05*	*10.85*	*0.26*	*0.32*	*0.22*	*38.90*	*0.01*	*1.88*	*6.79*	*99.3*
240	*10040*	*White Band area*	*13.45*	*0.02*	*11.35*	*0.04*	*12.95*	*0.47*	*7.51*	*0.20*	*2.47*	*0.20*	*45.80*	*0.03*	*2.08*	*2.22*	*98.9*

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
240	*10330*	*White Band area*	*13.60*	*0.01*	*11.45*	*0.05*	*13.90*	*0.30*	*7.24*	*0.21*	*2.62*	*0.24*	*47.90*	*0.03*	*2.22*	*1.23*	*101*
240	*10331*	*White Band area*	*0.42*	*<0.01*	*<0.01*	*0.67*	*10.25*	*0.02*	*39.10*	*0.12*	*0.48*	*0.02*	*36.70*	*<0.01*	*0.02*	*12.9*	*100.5*
241.1	*10038*	*Rainy Complex*	*0.45*	*<0.01*	*<0.01*	*0.78*	*11.60*	*0.03*	*45.10*	*0.15*	*<0.01*	*0.11*	*40.00*	*<0.01*	*0.03*	*1.33*	*99.6*
242	*10076*	*Picrite Hill*	*10.70*	*0.01*	*8.94*	*0.20*	*11.10*	*0.08*	*15.95*	*0.15*	*1.56*	*0.13*	*45.50*	*0.01*	*1.09*	*3.6*	*99.1*
242	*10077*	*Picrite Hill*	*13.50*	*0.01*	*11.05*	*0.03*	*14.20*	*0.24*	*7.31*	*0.20*	*2.21*	*0.12*	*48.30*	*0.01*	*0.94*	*2.4*	*100.5*
244	10856	Southeast Rainy	7.87	<0.01	8.08	0.37	12.15	0.19	26.11	0.20	0.52	0.03	42.05	0.05	0.37	1.9	99.9
246	*10056*	*Ann Fork*	*5.29*	*0.01*	*5.93*	*0.42*	*19.65*	*0.05*	*21.10*	*0.15*	*0.02*	*0.13*	*37.30*	*0.01*	*0.29*	*9.62*	*100*
248	*10322*	*East Rainy*	*15.70*	*0.01*	*13.40*	*0.09*	*5.91*	*0.15*	*10.65*	*0.11*	*2.28*	*0.21*	*47.20*	*0.07*	*1.04*	*3.18*	*100*
249	11128	North Star Ann	6.69	0.02	5.63	0.53	12.51	0.28	27.22	0.17	0.97	0.08	41.83	0.01	0.63	3.25	99.83
251	*10037*	*Rainy br area*	*0.73*	*<0.01*	*<0.01*	*0.58*	*12.15*	*<0.01*	*37.20*	*0.08*	*0.05*	*0.10*	*37.20*	*<0.01*	*0.03*	*12.45*	*100.5*
252	*10328*	*Rainy br*	*14.05*	*0.01*	*15.30*	*0.13*	*8.71*	*0.12*	*10.95*	*0.14*	*0.93*	*0.11*	*43.70*	*0.02*	*0.79*	*3.86*	*98.9*
256	10374	Marsha area	4.13	0.01	3.53	0.49	13.31	0.09	30.77	0.18	0.22	0.04	36.25	0.07	0.54	8.63	98.25
256	10376	Marsha area	11.78	0.04	8.19	0.11	10.75	0.51	11.81	0.19	1.49	0.10	44.99	0.06	1.03	6.98	98.04
256	10378	Marsha area	12.37	0.07	8.50	0.08	10.45	0.91	8.96	0.18	1.43	0.12	47.55	0.07	1.04	6.56	98.28
256	*10524*	*Marsha area*	*6.09*	*0.01*	*3.49*	*0.38*	*12.45*	*0.18*	*27.90*	*0.17*	*0.41*	*0.15*	*40.50*	*0.01*	*0.59*	*7.54*	*99.9*
256	10539	Marsha area	5.29	0.01	4.02	0.37	13.01	0.14	28.82	0.21	0.20	0.06	37.45	0.03	0.58	8.27	98.45
256	10540	Marsha area	7.57	0.01	6.58	0.29	11.41	0.14	23.50	0.26	0.46	0.08	41.09	0.01	0.80	6.14	98.35
266.1	*10347*	*Ann Creek*	*1.58*	*<0.01*	*<0.01*	*0.53*	*15.90*	*0.02*	*35.90*	*0.20*	*<0.01*	*0.12*	*34.10*	*<0.01*	*0.15*	*12.2*	*100.5*
266.1	*10507*	*Ann Creek*	*1.85*	*<0.01*	*0.05*	*0.57*	*14.30*	*0.02*	*38.50*	*0.18*	*0.08*	*0.14*	*35.80*	*<0.01*	*0.11*	*8.32*	*99.9*
266.2	10761	Ann Creek	2.20	<0.01	2.99	0.43	13.96	0.03	35.52	0.18	0.24	<0.01	38.45	0.01	0.22	5.16	99.39
266.2	11189	Ann Creek	0.58	<0.01	0.46	0.59	12.78	0.01	40.25	0.17	0.10	0.01	36.06	<0.01	0.07	8.5	99.58
266.3	10090	Ann Creek	15.12	0.08	12.51	0.09	6.49	0.58	9.93	0.11	1.85	0.08	47.53	0.09	0.61	3.1	98.15
266.3	10607	Ann Creek	4.77	0.01	4.97	0.31	14.96	0.09	29.55	0.24	0.27	0.02	38.44	0.02	0.31	4.37	98.32
266.3	10608	Ann Creek	4.85	<0.01	5.89	0.31	15.13	0.10	28.33	0.24	0.25	0.03	38.99	0.02	0.33	4.2	98.68
266.3	10609	Ann Creek	4.46	0.01	4.84	0.33	15.12	0.09	29.71	0.24	0.26	0.03	38.66	0.03	0.31	4.25	98.34
266.3	10610	Ann Creek	5.33	0.01	5.62	0.41	14.08	0.16	27.09	0.22	0.33	0.04	38.75	0.01	0.41	6.12	98.59
266.3	10611	Ann Creek	5.17	0.01	6.53	0.31	14.62	0.10	27.56	0.23	0.31	0.03	39.34	0.02	0.34	4.13	98.69
266.3	10710	Ann Creek	4.71	0.01	8.76	0.28	16.15	0.19	19.30	0.23	0.26	0.04	38.22	0.02	0.42	9.74	98.32
266.4	11188	Ann Creek	14.62	0.02	9.24	0.02	13.75	0.16	6.72	0.19	1.93	0.13	47.98	0.01	1.11	3.95	99.84
272	11252	Glacier Lake	17.85	0.02	23.27	0.01	7.24	0.05	4.83	0.12	0.09	0.03	40.16	0.01	0.24	5.71	99.63
272	11380	Glacier Lake	9.99	0.02	13.69	0.04	32.03	0.03	4.58	0.09	0.05	0.04	24.86	0.01	0.29	6.09	91.8
272	11381	Glacier Lake	13.75	0.02	18.36	<0.01	25.13	0.03	3.34	0.11	0.04	0.02	29.62	0.02	0.28	5.48	96.2
272	11382	Glacier Lake	12.95	0.02	14.67	0.01	31.30	0.04	2.88	0.09	0.04	0.02	25.29	0.01	0.27	7.14	94.72
277.1	*10130*	*Emerick*	*12.95*	*0.04*	*13.45*	*0.03*	*13.80*	*0.44*	*8.46*	*0.21*	*0.94*	*0.10*	*43.50*	*0.02*	*0.95*	*3.99*	*98.8*
277.1	*10131*	*Emerick*	*8.51*	*<0.01*	*10.55*	*0.36*	*9.93*	*0.06*	*19.35*	*0.27*	*0.22*	*0.24*	*40.50*	*0.01*	*0.60*	*6.84*	*97.5*

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al_2O_3	% BaO	% CaO	% Cr_2O_3	% Fe_2O_3	% K_2O	% MgO	% MnO	% Na_2O	% P_2O_5	% SiO_2	% SrO	% TiO_2	% LOI	% Total
277.1	11149	Emerick	10.41	0.02	12.39	0.17	11.13	0.10	16.27	0.18	0.48	0.03	41.28	0.03	0.56	5.97	99.04
277.1	11371	Emerick	12.69	0.02	18.86	0.11	9.49	0.03	12.46	0.19	0.14	0.01	40.88	<0.01	0.35	4.38	99.63
277.2	*10133*	*Emerick*	*11.75*	*0.02*	*9.95*	*0.13*	*11.40*	*0.30*	*12.80*	*0.22*	*2.11*	*0.15*	*43.80*	*0.02*	*1.14*	*4.41*	*98.2*
277.2	*10136*	*Emerick*	*14.05*	*0.01*	*15.20*	*0.04*	*12.50*	*0.13*	*9.56*	*0.22*	*1.04*	*0.12*	*41.30*	*0.01*	*0.90*	*5.12*	*100*
277.3	*10137*	*Emerick*	*12.65*	*0.03*	*13.00*	*0.05*	*11.80*	*0.28*	*9.01*	*0.19*	*3.31*	*0.19*	*41.10*	*0.02*	*0.99*	*6.54*	*99.1*
280	11016	GR 2-1	13.86	0.12	0.89	<0.01	9.18	1.66	3.57	0.24	2.43	0.08	62.64	0.02	0.46	4.16	99.34
298	10086	Upper Glacier	2.18	<0.01	6.60	0.38	12.39	0.10	23.31	0.23	0.19	0.03	49.24	0.02	0.57	3.02	98.28
298	*10306*	*Upper Glacier*	*6.86*	*0.01*	*3.65*	*0.65*	*13.85*	*0.09*	*22.90*	*0.17*	*0.48*	*0.14*	*42.50*	*0.01*	*0.65*	*5.63*	*97.5*
298	10606	Upper Glacier	2.70	0.01	2.82	0.79	13.28	0.03	38.55	0.23	0.14	0.02	36.36	0.03	0.23	4.52	99.71
299	*10305*	*Odie*	*2.85*	*<0.01*	*0.80*	*0.47*	*16.55*	*0.07*	*35.40*	*0.22*	*<0.01*	*0.13*	*39.90*	*0.01*	*0.12*	*1.93*	*98.5*
299	*10460*	*Odie*	*7.87*	*<0.01*	*7.60*	*0.36*	*13.25*	*0.09*	*20.20*	*0.17*	*0.40*	*0.16*	*43.60*	*0.01*	*0.80*	*5.35*	*99.9*
299	10975	Odie	4.15	0.01	5.77	0.43	15.33	0.06	31.14	0.23	0.20	0.03	38.23	0.01	0.19	4.06	99.84
300.1	10085	Canwell Glacier	12.20	0.03	11.78	0.05	14.21	0.37	7.63	0.20	1.03	0.07	39.38	0.10	0.70	2.52	90.27
300.1	10705	Canwell Glacier	4.79	0.01	4.63	0.38	19.23	0.13	22.85	0.20	0.06	0.05	36.95	0.02	0.34	8.62	98.27
300.2	10084	Canwell Glacier	5.22	0.01	5.83	0.28	18.25	0.15	21.08	0.20	0.19	0.04	38.96	0.03	0.42	7.56	98.23
300.2	10704	Canwell Glacier	0.71	<0.01	0.52	0.95	14.78	0.02	42.01	0.19	<0.01	<0.01	32.34	0.03	0.15	8.14	99.82
301.1	10707	GR 2-B4EC	6.23	0.01	8.36	0.46	11.25	0.07	22.75	0.16	0.29	0.03	42.93	0.01	0.40	5.83	98.76
329	10828	Cony Mountain area	18.40	0.06	9.88	0.01	7.79	1.13	6.19	0.17	1.52	0.03	49.32	0.03	0.47	3.41	98.41
330	10235	Cony Mountain area	5.74	0.01	5.17	0.46	12.39	0.19	26.73	0.20	0.62	0.07	41.25	0.04	0.69	4.74	98.29
330	10825	Cony Mountain area	6.64	0.02	5.38	0.43	12.51	0.32	25.87	0.20	0.76	0.08	41.91	0.03	0.75	3.36	98.26
331	*10156*	*Cony Mountain*	*6.36*	*0.01*	*3.63*	*0.66*	*13.45*	*0.21*	*25.10*	*0.16*	*0.66*	*0.24*	*41.10*	*0.01*	*0.71*	*4.96*	*97.3*
331	*10157*	*Cony Mountain*	*6.80*	*<0.01*	*5.01*	*0.47*	*12.00*	*0.12*	*23.30*	*0.15*	*1.00*	*0.11*	*42.80*	*0.01*	*0.72*	*5.46*	*98*
331	*10158*	*Cony Mountain area*	*19.20*	*0.03*	*10.70*	*0.01*	*8.46*	*0.23*	*4.02*	*0.13*	*2.14*	*0.07*	*51.00*	*0.04*	*0.70*	*3.75*	*100.5*
334.1	10236	Cony East	19.93	0.02	9.83	<0.01	12.78	0.23	4.48	0.17	3.05	0.17	44.24	0.06	1.10	2.74	98.8
334.1	10237	Cony East	21.97	0.03	10.99	0.01	7.60	0.34	5.00	0.09	2.51	0.07	45.42	0.08	0.65	3.54	98.3
334.2	10829	Cony East	7.21	0.02	7.51	0.35	12.20	0.32	21.35	0.19	0.84	0.08	43.99	0.05	0.95	3.29	98.36
334.3	10830	Cony East	5.38	0.01	4.79	0.50	12.55	0.24	28.50	0.20	0.67	0.08	40.69	0.01	0.71	4.39	98.72
334.4	11332	Cony East	5.90	0.01	8.93	0.33	12.00	0.19	21.36	0.17	0.80	0.04	45.94	0.01	0.62	2.39	98.69
334.4	11333	Cony East	5.72	0.01	8.74	0.37	11.21	0.21	21.71	0.16	0.86	0.05	45.73	0.01	0.66	2.88	98.3
336	11334	Moore Icefall, NW edge	11.82	<0.01	12.86	0.01	15.09	0.11	4.23	0.22	0.86	0.25	49.33	0.04	1.62	2.52	98.94
337	11260	Canwell Slide	20.51	0.03	7.99	<0.01	14.52	0.12	4.47	0.22	2.66	0.26	43.24	0.07	1.01	4.6	99.71
339	11024	Pegmatite Glacier	15.23	0.03	9.74	0.02	11.92	0.32	6.09	0.26	3.01	0.17	49.31	0.03	0.98	2.5	99.6
341	11294	Pegmatite Glacier	13.33	0.04	7.40	0.01	17.39	0.34	6.52	0.20	1.43	0.18	47.65	0.02	1.32	3.7	99.52
343	11050	Pegmatite Glacier	17.90	0.02	11.69	<0.01	11.65	0.37	4.59	0.16	1.72	0.25	47.00	0.07	0.80	3.61	99.82
343	11051	Pegmatite Glacier	11.38	0.02	12.49	0.02	20.87	0.80	10.76	0.19	1.30	0.15	38.28	0.05	1.69	1.75	99.74

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
343	11292	Pegmatite Glacier	16.84	0.05	11.30	<0.01	14.60	1.09	6.49	0.14	2.21	1.01	41.67	0.08	1.21	2.79	99.48
344	10997	W College Glacier	12.17	0.02	13.75	<0.01	19.74	0.68	9.82	0.18	0.93	0.23	38.46	0.05	1.53	1.5	99.07
344	10998	W College Glacier	15.17	0.03	11.11	<0.01	16.41	0.79	7.23	0.18	1.59	0.30	42.33	0.05	1.17	2.79	99.16
345	10996	East College Ridge	16.40	0.05	9.03	0.01	11.75	1.31	4.60	0.15	2.60	0.50	47.50	0.08	0.81	4.71	99.5
346	10994	East College Ridge	18.47	0.11	3.79	<0.01	6.02	5.17	1.90	0.08	4.21	0.39	56.75	0.10	0.64	1.86	99.48
349	11054	Backslide Glacier	8.62	0.03	11.11	0.01	19.74	0.69	10.04	0.19	1.44	0.09	41.82	0.05	1.38	4.02	99.22
349	11297	Backslide Glacier	10.42	0.02	10.83	0.01	17.72	0.67	8.88	0.17	1.86	0.23	43.54	0.08	1.29	4.02	99.74
349	11298	Backslide Glacier	6.15	0.01	13.43	0.01	19.06	0.40	10.83	0.21	0.91	0.19	45.20	0.03	1.14	1.99	99.55
351	11209	Upper Gakona Glacier	14.89	0.02	12.87	0.01	14.42	0.49	7.35	0.20	1.22	0.62	44.50	0.15	0.90	2.26	99.91
351	11210	Upper Gakona Glacier	9.47	0.04	8.03	0.16	9.36	3.01	17.25	0.17	1.05	0.19	48.20	0.03	0.39	2	99.37
352	10992	Upper Gakona Glacier	13.59	0.03	14.19	0.04	16.44	0.48	8.23	0.22	1.09	0.72	41.70	0.14	1.24	1.6	99.71
353	10891	Upper Gakona Glacier	13.00	0.03	11.46	0.02	16.56	1.10	7.15	0.27	1.65	0.85	43.21	0.10	1.33	1.79	98.53
353	10913	Upper Gakona Glacier	7.16	0.02	15.27	0.03	28.23	0.29	11.36	0.23	0.38	0.06	34.10	0.04	1.76	0.72	99.66
353	11212	Upper Gakona Glacier	22.75	0.04	11.29	0.01	6.77	0.82	3.31	0.09	3.12	0.59	47.50	0.23	0.45	2.66	99.62
354	11213	Upper Gakona Glacier	18.40	0.06	8.85	0.02	14.06	1.55	5.73	0.14	1.66	0.23	43.09	0.14	0.63	3.88	98.43
356	11215	Upper Gakona Glacier	15.15	0.05	12.21	0.02	8.88	1.21	7.54	0.11	1.93	0.38	48.21	0.05	0.64	3.35	99.75
361	11062	WF-G Saddle, NE	13.39	0.01	10.40	0.04	13.88	0.30	6.08	0.21	2.42	0.23	47.70	0.03	2.49	2.34	99.52
363	11296	Spire Creek Cirque	15.58	0.01	11.83	0.01	13.40	0.53	7.20	0.20	3.10	0.49	43.39	0.07	1.15	2.95	99.91
364	11295	Spire Creek Cirque	12.61	<0.01	9.69	0.02	12.84	0.10	6.88	0.19	3.29	0.07	49.39	0.02	0.98	2.26	98.34
369	10875	Ram Ridge	5.56	0.02	13.11	0.01	18.00	0.36	13.00	0.19	0.76	0.05	44.11	0.04	1.22	3.18	99.6
370	10880	W Foot of Ram Ridge	6.81	0.04	15.90	0.02	17.90	1.63	13.18	0.17	0.45	0.03	40.62	0.03	1.10	0.49	98.36
372	10873	Ram Ridge	2.47	0.01	16.62	0.13	14.60	0.04	15.52	0.22	0.21	0.02	42.98	0.02	0.40	4.97	98.21
372	10874	Ram Ridge	3.47	0.02	17.06	0.06	24.44	0.10	11.49	0.23	0.37	0.05	40.11	0.03	1.25	1.28	99.97
374	10244	JS	1.69	0.01	21.52	0.15	5.77	0.06	17.67	0.12	0.18	0.01	50.40	0.01	0.17	1.02	98.79
374	10869	JS	1.31	0.01	19.97	0.14	6.99	0.03	18.90	0.15	0.01	0.02	48.64	0.02	0.19	1.94	98.32
374	10870	JS	1.32	0.01	20.90	0.19	7.61	0.02	18.07	0.14	0.11	0.02	49.85	0.02	0.19	1.51	99.96
374	10871	JS	1.35	<0.01	22.22	0.15	6.05	0.03	16.17	0.12	0.06	0.01	51.25	0.03	0.22	0.64	98.31
374	10872	JS	13.82	0.04	23.27	0.01	9.32	0.54	6.15	0.15	0.98	0.54	33.44	0.16	0.59	9.95	98.96
374	10848	Ram Ridge	3.91	0.02	16.77	0.02	26.94	0.10	11.69	0.19	0.22	0.03	38.22	0.06	1.67	-0.01	99.82
375	10243	GR 28-1	13.80	0.04	10.89	0.02	14.60	0.79	8.47	0.20	2.52	0.10	44.01	0.02	1.01	2.2	98.66
375	10846	GR28-1	13.00	0.02	10.64	0.02	19.40	0.52	9.63	0.24	1.64	0.22	36.97	0.04	2.36	3.62	98.33
375	10847	GR28-1	8.29	0.02	16.39	0.02	17.81	0.22	9.02	0.29	1.05	0.44	42.00	0.05	0.88	1.91	98.39
376	11048	Magnetite Cirque	12.13	0.01	11.14	0.01	18.81	0.83	10.99	0.26	1.84	0.03	40.04	0.03	1.49	1.54	99.14
376	11324	Magnetite Cirque	6.42	0.01	15.40	0.01	20.42	0.34	12.41	0.24	0.74	0.09	40.72	0.02	1.16	1.84	99.8
376	11326	Magnetite Cirque	20.21	0.01	14.39	<0.01	12.88	0.58	5.38	0.15	1.54	0.93	38.59	0.16	0.93	2.97	98.7

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
377	11328	Magnetite Cirque	4.37	<0.01	16.67	0.01	23.53	0.11	13.80	0.19	0.28	<0.01	38.70	0.01	1.33	0.48	99.47
378	11329	Magnetite Cirque	14.34	0.04	7.25	0.01	6.91	1.10	3.96	0.10	6.15	0.43	55.73	0.18	0.51	1.5	98.19
378	11330	Magnetite Cirque	10.29	0.01	15.89	0.01	22.08	0.81	8.89	0.21	1.37	2.34	35.60	0.10	1.40	0.79	99.79
380	11056	UWF occurrence	9.48	0.01	15.80	<0.01	19.06	0.34	9.65	0.26	0.83	0.28	40.79	0.03	1.15	1.86	99.54
380	11057	UWF occurrence	12.03	<0.01	12.91	0.01	22.00	0.43	9.41	0.24	1.30	0.33	37.72	0.04	1.70	1.65	99.77
380	11058	UWF occurrence	16.27	0.01	13.81	<0.01	16.48	0.41	7.07	0.20	1.46	0.91	38.89	0.07	1.26	2.52	99.36
380	11335	UWF Occurrence	5.90	0.01	18.91	<0.01	14.22	0.12	11.15	0.25	0.55	0.22	44.50	0.02	0.89	1.57	98.29
380	11336	UWF Occurrence	10.66	0.01	19.86	<0.01	10.62	0.11	8.25	0.27	0.79	0.76	45.34	0.04	0.59	2.65	99.94
380	11338	UWF Occurrence	3.65	<0.01	17.76	0.01	22.04	0.04	10.70	0.32	0.28	0.04	42.34	0.01	1.48	0.96	99.63
380	11344	UWF Occurrence	13.53	<0.01	13.77	0.01	15.17	0.09	8.08	0.24	1.29	0.09	44.73	0.01	1.18	1.66	99.84
381	11258	Magnetite Cirque, E	9.61	0.03	11.53	0.02	19.59	0.59	9.42	0.19	2.08	0.13	43.37	0.04	0.91	2.06	99.58
385	11255	Magnetite Cirque, E	11.65	0.05	11.18	0.01	19.44	1.55	9.75	0.22	1.63	1.02	39.05	0.05	1.65	1.77	99
385	11257	Magnetite Cirque, E	4.23	0.02	17.33	0.06	19.82	0.24	11.88	0.17	0.34	0.04	40.77	0.01	0.85	2.81	98.57
385	11384	Magnetite Cirque, E	7.62	0.02	13.45	0.01	25.59	0.72	9.12	0.27	1.07	1.21	36.04	0.04	1.58	1.96	98.71
385	11385	Magnetite Cirque, E	8.36	0.02	15.48	0.01	19.34	0.93	10.86	0.22	1.00	0.74	39.46	0.03	1.35	1.19	98.97
386	11221	Magnetite Cirque	4.16	0.03	19.90	0.10	9.06	0.49	16.25	0.17	0.49	0.04	47.50	0.02	0.45	1.14	99.79
387	11222	Magnetite Cirque	4.25	0.01	18.03	0.01	24.01	0.03	11.40	0.21	0.26	0.02	39.70	0.01	1.32	-0.12	99.14
388	10290	Magnetite Cirque	5.16	0.03	16.51	0.01	26.14	0.47	11.49	0.21	0.69	0.07	37.01	0.02	1.50	0.15	99.46
388	11218	Magnetite Cirque	4.85	0.02	16.72	0.01	25.44	0.38	11.50	0.22	0.40	0.06	38.26	0.02	1.39	0.31	99.57
388	11219	Magnetite Cirque	5.07	0.02	17.14	0.01	26.06	0.41	11.45	0.22	0.52	0.06	36.16	0.02	1.45	0.19	98.79
389	11217	Magnetite Cirque	7.24	0.04	4.91	0.32	9.53	3.32	24.01	0.17	0.54	0.23	45.51	0.01	0.36	3.34	99.53
390	11216	Magnetite Cirque	4.36	0.02	14.91	<0.01	25.09	0.19	13.57	0.24	0.36	0.03	37.85	0.02	1.19	1.25	99.07
424	10910	MF1996C-129 area	15.55	0.05	9.93	0.02	11.68	1.72	5.71	0.20	2.15	0.34	50.21	0.07	0.77	0.67	99.07
428	10845	GR 28-20 area	3.89	0.01	16.82	0.04	24.15	0.03	12.85	0.22	0.21	<0.01	38.54	0.01	1.44	-0.1	98.12
429	10241	GR 28-20	9.52	0.03	8.94	0.04	38.73	0.34	6.58	0.14	0.45	0.02	25.86	0.04	1.47	6.46	98.62
429	10242	GR 28-20	13.83	0.02	11.53	0.04	23.69	0.75	7.95	0.18	0.61	0.07	34.25	0.07	1.20	4.13	98.34
429	10843	GR 28-20	12.61	0.03	11.75	0.04	23.55	0.52	8.63	0.16	0.66	0.06	35.05	0.11	1.53	3.64	98.35
429	10844	GR 28-20	18.05	0.03	12.38	0.02	12.14	0.99	6.89	0.16	1.31	0.24	41.56	0.12	0.85	5.04	99.79
430	10240	GR 28-19	2.69	0.02	11.96	0.12	23.35	0.04	18.57	0.29	0.09	0.01	37.59	0.02	0.99	2.52	98.26
430	10839	GR 28-19	2.73	0.01	19.60	0.21	10.01	0.08	16.42	0.23	0.24	0.02	47.96	<0.01	0.41	0.93	98.84
430	10840	GR 28-19	18.33	0.30	2.79	<0.01	3.44	8.75	1.31	0.03	2.69	0.23	57.65	0.06	0.51	2.36	98.44
430	10841	GR 28-19	3.86	0.02	11.65	0.09	15.82	0.25	12.68	0.31	0.07	0.04	47.32	<0.01	0.85	3.28	96.25
436	10492	GR 28-16	13.14	0.02	10.04	0.01	12.09	0.53	6.42	0.20	1.80	0.08	51.36	0.04	1.01	1.98	98.73
457.2	10816	Miller Gulch Dikes	8.80	0.03	10.42	0.17	11.64	0.36	15.13	0.19	1.29	0.16	44.99	0.04	0.63	4.37	98.22
458.1	10815	Miller Gulch Dikes	14.23	0.03	11.55	0.01	11.86	0.59	5.23	0.18	1.49	0.35	47.95	0.11	0.76	4.27	98.62

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
458.3	10233	Miller Gulch Dikes	19.02	0.15	6.72	<0.01	7.20	2.47	3.16	0.11	3.29	0.40	52.48	0.10	0.55	3.48	99.12
458.3	10817	Miller Gulch Dikes	6.11	0.02	14.77	0.06	16.93	0.50	11.92	0.22	0.32	0.09	43.55	0.03	0.99	2.72	98.23
458.4	10813	Miller Gulch Dikes	16.62	0.09	5.58	0.01	8.60	3.20	4.38	0.16	2.71	0.44	52.79	0.10	0.80	3.11	98.6
458.4	10814	Miller Gulch Dikes	6.53	0.01	10.71	0.24	11.37	0.17	18.52	0.23	0.38	0.13	44.03	0.03	0.51	5.35	98.22
481.1	11203	Quartz Creek Head	6.02	0.05	15.93	0.01	21.62	1.28	12.72	0.17	0.41	0.03	39.86	0.01	1.12	0.66	99.9
481.2	11200	Quartz Creek Head	3.83	0.03	12.35	0.14	16.30	0.81	21.25	0.21	0.27	0.03	40.75	0.01	0.64	3.13	99.75
481.2	11201	Quartz Creek Head	5.43	0.05	15.10	0.01	21.97	1.54	13.53	0.17	0.23	0.03	39.04	0.01	1.39	0.55	99.05
481.2	11205	Quartz Creek Head	6.62	0.07	17.09	0.02	18.05	1.34	13.45	0.16	0.24	0.01	40.85	0.01	1.20	0.54	99.64
507	10852	Circular Anomaly area	17.50	0.08	8.13	<0.01	8.23	2.30	3.61	0.14	3.58	0.40	53.89	0.13	0.63	1.26	99.89
508	10479	Circular Anomaly area	5.29	0.02	16.77	0.01	18.40	0.36	11.74	0.24	0.74	0.04	42.80	0.03	1.05	0.77	98.25
509	10480	Circular Anomaly area	18.16	0.09	5.54	<0.01	5.28	2.98	1.63	0.12	3.59	0.25	60.20	0.12	0.38	1.04	99.39
511	10231	Summit Hill	15.69	0.02	14.07	0.01	12.17	1.53	6.84	0.19	1.12	0.04	44.13	0.10	0.60	2.15	98.66
511	10232	Summit Hill	17.83	0.04	13.90	0.01	11.83	1.81	6.59	0.17	0.76	0.04	41.99	0.11	0.68	2.34	98.1
511	10808	Summit Hill	14.29	0.03	13.15	0.01	15.30	1.08	8.13	0.25	1.34	0.62	40.85	0.11	1.06	1.9	98.12
511	10809	Summit Hill	4.37	0.03	15.45	0.02	26.33	0.39	10.86	0.26	0.49	0.04	38.38	0.01	1.31	0.52	98.46
512	10810	Circular Anomaly area	4.05	0.02	18.07	0.01	22.08	0.17	12.10	0.27	0.37	0.06	39.63	0.02	1.06	0.41	98.3
513	10851	Summit Lake	14.50	0.03	11.10	0.02	13.14	0.74	7.08	0.21	1.76	0.15	48.13	0.05	1.77	1.08	99.77
541	*10214*	*Antler*	*4.69*	*<0.01*	*3.39*	*0.48*	*14.35*	*0.07*	*32.00*	*0.18*	*0.28*	*0.12*	*39.80*	*0.01*	*0.18*	*4.99*	*100.5*
541	*10215*	*Antler*	*7.49*	*0.01*	*8.48*	*0.33*	*11.95*	*0.18*	*22.90*	*0.15*	*0.87*	*0.01*	*42.50*	*0.01*	*0.21*	*4.92*	*100*
548	*10350*	*Fish Lake Complex*	*0.68*	*<0.01*	*<0.01*	*0.85*	*15.20*	*0.01*	*40.10*	*0.19*	*0.25*	*0.03*	*36.90*	*<0.01*	*0.06*	*4.09*	*98.3*
550	*10352*	*Wild One*	*0.45*	*<0.01*	*0.08*	*0.18*	*17.25*	*0.01*	*41.00*	*0.21*	*0.07*	*<0.01*	*38.40*	*<0.01*	*0.04*	*2.47*	*100*
550	*10353*	*Wild One*	*0.52*	*<0.01*	*<0.01*	*0.58*	*17.65*	*0.02*	*40.90*	*0.21*	*<0.01*	*0.04*	*37.70*	*<0.01*	*0.04*	*2.06*	*99.7*
550	10832	Wild One	0.72	<0.01	2.65	0.77	20.44	0.03	36.41	0.26	0.16	0.01	35.65	<0.01	0.12	2.47	99.68
550	10833	Wild One	0.66	0.01	2.62	0.69	17.43	0.03	40.34	0.27	0.12	<0.01	35.60	0.02	0.16	1.88	99.82
550	10834	Wild One	0.30	<0.01	0.35	0.46	20.51	0.02	41.41	0.30	0.09	0.02	34.35	<0.01	0.05	2.05	99.9
551	*10181*	*MF1996C-70*	*2.66*	*<0.01*	*3.65*	*0.42*	*14.35*	*0.02*	*34.30*	*0.19*	*0.22*	*0.14*	*40.80*	*0.01*	*0.23*	*3.55*	*100.5*
552	10079	Fish Lake Complex	1.14	0.01	1.22	0.50	16.14	0.03	40.04	0.24	0.19	0.02	34.98	0.03	0.21	5.03	99.79
555	11196	LFF	0.72	<0.01	0.65	0.33	14.83	0.01	38.02	0.23	0.12	<0.01	37.00	<0.01	0.09	7.88	99.88
556	10853	Eb No. 4	0.60	<0.01	1.34	0.43	14.80	0.03	37.00	0.23	0.11	0.02	32.50	0.03	0.17	12.55	99.81
556	10854	Eb No. 4	1.66	0.01	14.96	0.44	9.63	0.03	23.43	0.17	0.21	0.01	45.53	0.01	0.43	1.63	98.15
557	*10341*	*Eb No. 4 area*	*0.63*	*<0.01*	*<0.01*	*0.78*	*14.25*	*0.01*	*37.10*	*0.19*	*0.62*	*0.01*	*36.80*	*<0.01*	*0.06*	*9.92*	*100.5*
558	10835	Eb No. 4 area	0.53	<0.01	0.24	0.98	14.86	0.02	38.52	0.23	0.06	0.01	29.29	<0.01	0.08	14.9	99.72
558	10836	Eb No. 4 area	0.57	<0.01	0.36	0.83	14.78	0.02	38.32	0.23	0.05	0.01	30.98	<0.01	0.08	13.75	99.98
559.1	*10211*	*BM-75*	*1.17*	*<0.01*	*1.77*	*0.35*	*14.40*	*0.01*	*35.80*	*0.19*	*<0.01*	*0.13*	*38.20*	*<0.01*	*0.15*	*6.9*	*99.1*
559.2	10249	BM-75	29.89	0.01	15.13	0.02	1.32	0.29	2.44	0.01	2.02	0.02	42.51	0.06	0.06	6.03	99.81

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
559.2	10849	BM-75	5.87	0.01	7.47	0.22	14.42	0.08	29.61	0.22	0.49	0.02	40.02	0.04	0.23	1.17	99.86
559.2	10850	BM-75	15.12	0.01	16.35	0.27	5.33	0.13	12.13	0.10	0.84	0.01	45.43	0.03	0.23	2.36	98.34
560	*10340*	*MF1996C-45 area*	*0.68*	*<0.01*	*0.47*	*0.25*	*16.65*	*0.02*	*39.30*	*0.21*	*0.01*	*0.03*	*38.50*	*<0.01*	*0.08*	*3.31*	*99.5*
562	10726	Lucky 7	14.45	<0.01	16.46	0.03	6.15	0.22	8.77	0.14	1.36	0.02	48.89	0.04	0.51	1.72	98.74
562	10727	Lucky 7	16.11	<0.01	14.72	0.03	6.28	0.10	9.32	0.14	1.25	0.02	47.81	0.04	0.28	2.26	98.35
562	10855	Lucky 7	10.88	0.02	17.57	0.05	7.72	0.06	11.85	0.16	0.88	<0.01	48.45	0.05	0.36	1.92	99.96
564	*10008*	*Tres Equis*	*3.02*	*<0.01*	*24.80*	*0.01*	*2.80*	*0.02*	*16.15*	*0.16*	*0.36*	*0.05*	*52.20*	*0.01*	*0.18*	*1.17*	*101*
564	11158	Tres Equis	16.36	0.03	16.30	0.05	6.19	0.45	11.69	0.11	0.57	0.01	43.27	0.05	0.18	3.69	98.94
566	*10027*	*WEG area*	*4.78*	*<0.01*	*10.55*	*0.14*	*10.20*	*0.09*	*25.60*	*0.14*	*0.43*	*0.09*	*43.60*	*<0.01*	*0.32*	*4.03*	*100*
570	*10023*	*Azurite*	*13.50*	*<0.01*	*11.75*	*0.04*	*15.15*	*0.02*	*7.51*	*0.19*	*<0.01*	*0.03*	*45.70*	*0.05*	*2.49*	*3.93*	*100.5*
578	10486	Sunshine	13.76	0.03	9.20	0.01	13.53	0.54	6.40	0.19	2.31	0.15	47.46	0.04	1.86	2.97	98.45
589	11228	GP Anom A10	13.69	0.03	11.90	0.03	12.87	0.25	6.65	0.18	1.99	0.15	49.01	0.03	1.71	0.98	99.46
590	10298	GP Anom R-7 gbo	14.47	0.10	6.24	<0.01	12.35	1.06	3.45	0.17	2.97	0.38	54.25	0.06	2.95	1.46	99.93
590	11000	GP Anom R-7 gbo	16.71	0.21	2.43	<0.01	7.60	2.85	1.74	0.10	3.10	0.09	58.97	0.03	0.60	4.33	98.77
590	11230	GP Anom R-7 gbo	14.56	0.17	5.51	0.01	10.21	1.38	3.13	0.14	2.94	0.37	55.20	0.05	2.65	3.56	99.88
591.1	10535	Tv Bas	15.04	0.08	7.14	0.03	10.20	1.91	6.70	0.12	2.48	0.25	53.57	0.05	1.95	0.2	99.73
591.2	10594	Tv Bas	14.36	0.09	7.49	0.03	11.42	1.85	6.57	0.14	2.58	0.32	52.06	0.06	2.32	-0.16	99.13
592	10296	Wildhorse Creek area	14.63	0.08	9.77	0.03	12.97	0.92	5.96	0.19	1.94	0.23	48.51	0.02	2.21	2.07	99.52
594	10239	Wildhorse Canyon	2.19	<0.01	30.01	<0.01	1.59	0.08	13.85	0.16	0.06	0.34	27.79	0.05	0.13	21.9	98.16
595	10238	Wildhorse Canyon	14.26	0.08	7.27	0.03	11.00	1.87	6.73	0.14	2.34	0.32	51.91	0.05	2.22	0.01	98.21
596	11231	GP Anom M4 in R9	12.98	0.16	5.29	0.01	9.72	0.73	2.67	0.15	3.35	0.34	59.42	0.05	2.24	2.83	99.93
597	11269	GP Anom 11G area	12.35	0.04	8.81	0.01	16.74	0.62	4.86	0.23	2.23	0.24	48.67	0.03	2.69	2.08	99.59
599	10901	GR 19-3	14.20	0.03	9.87	0.02	12.56	0.27	6.29	0.18	2.20	0.16	48.00	0.03	1.90	2.43	98.15
601	11268	GP Anom 11F area	14.32	0.03	9.49	0.03	15.23	0.39	5.35	0.15	1.71	0.14	44.91	0.02	1.77	6.07	99.61
606	11266	GP Anom 11E	14.00	0.02	10.24	0.03	12.50	0.22	6.51	0.18	3.05	0.16	48.26	0.03	1.76	2.72	99.66
609.1	*10319*	*Landmark Gap Copper*	*10.55*	*0.02*	*5.85*	*0.03*	*16.60*	*0.20*	*4.29*	*0.14*	*1.07*	*0.68*	*46.00*	*0.01*	*1.03*	*5.97*	*92.1*
610	11118	Landmark Gap SE	15.56	0.02	10.78	0.05	11.75	0.05	5.51	0.15	2.38	0.09	46.82	0.01	0.83	5.03	99.03
610	11119	Landmark Gap SE	13.82	0.02	9.92	0.04	10.69	0.20	9.12	0.16	1.79	0.09	43.89	0.01	0.66	7.65	98.07
612	*10531*	*S Landmark Gap Lake*	*16.85*	*0.01*	*10.10*	*0.04*	*11.90*	*0.32*	*7.90*	*0.19*	*2.31*	*0.11*	*44.30*	*0.03*	*0.77*	*3.26*	*98.1*
616	*10361*	*W Fourteenmile Lake*	*15.85*	*0.01*	*12.60*	*0.04*	*8.09*	*0.13*	*7.84*	*0.14*	*2.19*	*0.03*	*50.10*	*0.03*	*0.53*	*1.56*	*99.1*
619	*10362*	*Norel*	*8.35*	*<0.01*	*17.40*	*0.26*	*8.27*	*0.02*	*16.35*	*0.15*	*0.67*	*<0.01*	*44.50*	*0.01*	*0.24*	*4.14*	*100.5*
619	10574	Norel	1.98	<0.01	2.38	0.51	16.50	0.04	33.05	0.22	0.06	0.02	34.42	0.01	0.22	10.4	99.8
619	10575	Norel	14.87	<0.01	23.81	0.12	7.34	0.03	10.22	0.25	<0.01	0.01	39.15	<0.01	0.14	3.17	99.13
619	10903	Norel	7.84	<0.01	16.63	0.26	8.97	0.02	17.54	0.23	0.13	0.02	41.60	0.01	0.27	4.65	98.17
619	10904	Norel	1.88	<0.01	8.52	0.35	11.41	0.02	27.31	0.23	0.11	0.02	40.50	0.02	0.26	7.68	98.3

italics indicate ICP-AES analysis

Table B-3. Whole rock analyses for selected rock chip samples.

Map no.	Sample no.	Location	% Al2O3	% BaO	% CaO	% Cr2O3	% Fe2O3	% K2O	% MgO	% MnO	% Na2O	% P2O5	% SiO2	% SrO	% TiO2	% LOI	% Total
620	*10364*	*Norel area*	*0.79*	*<0.01*	*0.90*	*0.21*	*14.40*	*0.06*	*36.80*	*0.18*	*0.09*	*0.02*	*36.50*	*<0.01*	*0.10*	*9.62*	*99.6*
622.1	*10028*	*Dunite Hill*	*0.71*	*<0.01*	*<0.01*	*0.53*	*14.10*	*<0.01*	*40.10*	*0.21*	*<0.01*	*0.13*	*33.60*	*<0.01*	*0.11*	*11.55*	*101*
622.2	*10066*	*Dunite Hill*	*0.84*	*<0.01*	*<0.01*	*0.77*	*14.40*	*<0.01*	*38.80*	*0.19*	*<0.01*	*0.11*	*34.90*	*<0.01*	*0.13*	*9.45*	*99.6*
622.2	*10213*	*Dunite Hill*	*0.77*	*<0.01*	*<0.01*	*0.50*	*14.35*	*0.02*	*38.20*	*0.18*	*0.33*	*0.03*	*36.20*	*<0.01*	*0.10*	*6.55*	*97.3*
623	*10064*	*Amphi*	*0.81*	*<0.01*	*<0.01*	*0.65*	*17.35*	*0.05*	*36.80*	*0.22*	*0.07*	*0.01*	*36.60*	*<0.01*	*0.13*	*4.94*	*97.7*
623	*10065*	*Amphi*	*0.87*	*<0.01*	*<0.01*	*0.64*	*16.40*	*0.05*	*36.50*	*0.16*	*0.21*	*0.05*	*35.50*	*<0.01*	*0.13*	*9.02*	*99.5*
623	*10212*	*Amphi*	*2.92*	*0.01*	*8.97*	*0.55*	*12.00*	*0.25*	*25.40*	*0.16*	*0.38*	*0.04*	*43.50*	*<0.01*	*0.39*	*4.16*	*98.8*
624.2	*10045*	*Chitti Stain*	*13.70*	*<0.01*	*10.45*	*0.04*	*12.45*	*0.06*	*7.06*	*0.20*	*2.57*	*0.14*	*46.40*	*0.02*	*1.66*	*3.97*	*98.8*
625	*10002*	*GR 13-9*	*13.10*	*<0.01*	*13.35*	*0.06*	*11.50*	*0.01*	*6.49*	*0.17*	*0.26*	*0.39*	*46.90*	*0.02*	*1.59*	*4.39*	*98.2*
625	*10003*	*GR 13-9*	*12.15*	*<0.01*	*12.85*	*0.04*	*9.43*	*0.02*	*5.04*	*0.13*	*0.56*	*0.44*	*51.40*	*0.02*	*1.42*	*3.72*	*97.3*
627	*10366*	*GR 13-7*	*13.65*	*0.01*	*11.00*	*0.03*	*12.45*	*0.34*	*6.51*	*0.19*	*2.97*	*0.17*	*49.10*	*0.04*	*1.58*	*2.89*	*101*
629	*10204*	*GR 13-6*	*14.05*	*<0.01*	*18.15*	*0.04*	*7.85*	*0.04*	*1.87*	*0.08*	*<0.01*	*0.12*	*52.50*	*0.03*	*0.75*	*3.49*	*99*

italics indicate ICP-AES analysis

Analytical methods and detection limits for whole rock samples, Table B-3.

Whole rock samples were analyzed by XRF and ICP-AES methods.

Element	Units Reported	Lower Detection Limit	Upper detection Limit	Analytical Method
Al2O3	pct	0.01	100	XRF
Al2O3	*pct*	*0.01*	*100*	*ICP*
BaO	pct	0.01	100	XRF
BaO	*pct*	*0.01*	*100*	*ICP*
CaO	pct	0.01	100	XRF
CaO	*pct*	*0.01*	*100*	*ICP*
Cr2O3	pct	0.01	100	XRF
Cr2O3	*pct*	*0.01*	*100*	*ICP*
Fe2O3	pct	0.01	100	XRF
Fe2O3	*pct*	*0.01*	*100*	*ICP*
K20	pct	0.01	100	XRF
K20	*pct*	*0.01*	*100*	*ICP*
MgO	pct	0.01	100	XRF
MgO	*pct*	*0.01*	*100*	*ICP*
MnO	pct	0.01	100	XRF
MnO	*pct*	*0.01*	*100*	*ICP*
Na2O	pct	0.01	100	XRF
Na2O	*pct*	*0.01*	*100*	*ICP*
P2O5	pct	0.01	100	XRF
P2O5	*pct*	*0.01*	*100*	*ICP*
SiO2	pct	0.01	100	XRF
SiO2	*pct*	*0.01*	*100*	*ICP*
SrO	pct	0.01	100	XRF
SrO	*pct*	*0.01*	*100*	*ICP*
TiO2	pct	0.01	100	XRF
TiO2	*pct*	*0.01*	*100*	*ICP*

Table B-4. Full suite PGE analyses for selected rock chip samples

Table B-4. Full suite PGE analyses for selected rock chip samples.

Map no.	Sample no.	Location	Pt ppb	Pd ppb	Ir ppb	Os ppb	Rh ppb	Ru ppb
116	10010	Bird's Beak area	188	169	18	18	10	31
120	10031	Bird's Beak area	228	105	13	11	6	15
121	10196	Bird's Foot	20	18	<2	<2	<2	3
121	10197	Bird's Foot	446	385	47	57	26	80
121	10226	Bird's Foot	20	22	<2	<2	<2	5
127	10081	Mini U Landslide area	30	26	5	2	2	5
127	10601	Mini U Landslide area	42	46	4	<2	3	8
128	10600	Mini U Landslide	24	29	3	<2	2	6
129.3	10082	Boot Flap	38	40	5	<2	2	3
129.3	10701	Boot Flap	47	60	3	<2	2	4
131	10015	5550 Peak	22	18	<2	<2	<2	4
135.2	10073	Dunite Diatreme	74	56	6	<2	3	6
135.3	10072	Dunite Diatreme	24	36	3	<2	3	8
135.4	10074	Dunite Diatreme	57	45	6	<2	3	7
140.1	10198	Lower Crash	18	24	<2	<2	<2	5
140.1	10199	Lower Crash	11	13	<2	<2	<2	<2
140.1	10228	Lower Crash	25	27	<2	<2	<2	5
140.2	10801	Lower Crash	99	88	8	7	5	14
142	10083	West Crash	13	22	3	4	2	5
142	10603	West Crash	11	11	<2	<2	<2	<2
142	10604	West Crash	118	182	2	5	5	4
143	10096	Crash	31	40	<2	2	<2	5
143	10542	Crash	311	415	22	26	14	40
143	10543	Crash	24	27	<2	<2	<2	4
148	10098	Notar area	25	19	2	<2	<2	5
150	10097	Notar	20	13	2	<2	2	4
150	10544	Notar	94	58	5	3	3	4
150	10545	Notar	27	23	3	<2	2	6
150	10547	Notar	80	50	6	4	4	10
151	10859	West Bowl area	33	29	3	2	4	8
158	10230	GR 14-18	<2	<2	<2	<2	<2	<2
158	10807	GR 14-18	<2	8	<2	<2	<2	<2
160	10802	Broxson Ridge Magnetite	4	4	<2	<2	<2	<2
160	10805	Broxson Ridge Magnetite	9	11	<2	<2	<2	<2
160	10806	Broxson Ridge Magnetite	6	7	<2	<2	<2	<2
165	10863	Broxson Ridge	53	53	4	4	2	9
166	10866	GR 14-19	9	17	<2	<2	<2	<2
166	10867	GR 14-19	17	22	<2	<2	<2	3
166	10868	GR 14-19	<2	10	<2	<2	<2	<2
173	10905	BGM	11	9	<2	2	<2	3
176	10576	MF1996C-52 area	40	29	5	9	2	7
190	10498	GR 14-15	<2	10	<2	<2	<2	<2
190	10499	GR 14-15	<2	2	<2	<2	<2	<2
198.2	10482	Moneta Porcupine	<2	15	<2	<2	<2	<2
199.1	10069	Ghezzi	<2	<2	<2	<2	<2	<2
199.2	10019	Ghezzi	13	11	<2	<2	<2	<2
201.1	10146	Rainy Creek Skarn	10	13	<2	2	<2	3
201.1	10532	Rainy Creek Skarn	13	13	3	4	<2	4
201.2	10369	Rainy Creek Skarn	<2	<2	<2	<2	<2	<2
205	10380	West Rainy Skarn	7	27	<2	<2	<2	<2

bold numbers indicate a lead collection fire assay method,
all other samples utilized a nickel sulfide collection fire assay method

Table B-4. Full suite PGE analyses for selected rock chip samples.

Map no.	Sample no.	Location	Pt ppb	Pd ppb	Ir ppb	Os ppb	Rh ppb	Ru ppb
205	10381	West Rainy Skarn	35	50	<2	<2	2	<2
212.1	10153	GR 14-9	38	236	3	5	14	18
216.2	10390	GR 14-4	15	19	<2	<2	<2	4
218	10719	N of GR 20-2	11	11	<2	<2	<2	<2
229	10862	West Bowl	<2	8	<2	<2	<2	<2
229	10860	West Bowl area	8	8	<2	3	<2	4
229	10861	West Bowl area	20	9	3	<2	3	5
232	10908	North Rainy area	26	29	<2	<2	<2	4
237	10034	Hail Creek	23	20	3	<2	<2	4
238	10060	Foley's	<2	6	<2	<2	<2	<2
238	10180	Foley's	6	11	<2	<2	<2	<2
240	10040	White Band area	6	22	<2	<2	<2	<2
241.1	10038	Rainy Complex	148	100	10	4	7	11
242	10077	Picrite Hill	<2	5	<2	<2	<2	<2
243	10061	Picrite Hill Skarn	7	7	<2	<2	<2	<2
244	10858	GR 20-3 area	9	11	<2	<2	<2	<2
244	10856	Southeast Rainy	17	13	<2	<2	<2	2
246	10056	Ann Fork	15	52	<2	<2	<2	4
248	10322	East Rainy	739	578	<2	<2	<2	<2
251	10037	Rainy br area	86	64	5	3	2	4
252	10328	Rainy br	12	8	<2	<2	<2	<2
256	10375	Marsha area	11	35	2	<2	<2	4
256	10377	Marsha area	26	28	3	3	2	6
256	10378	Marsha area	7	9	<2	<2	<2	<2
256	10524	Marsha area	31	31	4	3	3	8
256	10540	Marsha area	13	15	3	2	<2	3
266.1	10347	Ann Creek	54	61	7	4	5	8
266.1	10507	Ann Creek	59	53	5	3	3	7
266.3	10608	Ann Creek	118	209	6	6	6	10
266.3	10609	Ann Creek	113	171	7	4	6	12
266.3	10610	Ann Creek	70	117	6	5	4	8
266.3	10710	Ann Creek	240	368	14	10	15	23
277.1	10130	Emerick	7	14	<2	<2	<2	<2
277.1	10131	Emerick	9	9	<2	<2	<2	2
277.2	10133	Emerick	127	171	7	6	6	14
277.2	10136	Emerick	<2	4	<2	<2	<2	<2
298	10086	Upper Glacier	265	265	12	13	9	21
298	10306	Upper Glacier	16	25	<2	4	2	5
298	10606	Upper Glacier	77	75	7	4	4	11
298	10709	Upper Glacier	164	223	75	55	22	79
299	10305	Odie	138	179	11	18	8	24
299	10460	Odie	15	15	<2	<2	<2	3
300.1	10085	Canwell Glacier	**1165**	903	59	55	49	76
300.1	10705	Canwell Glacier	914	892	21	20	27	34
300.2	10084	Canwell Glacier	**1005**	884	33	26	35	38
300.2	10703	Canwell Glacier	***12850***	***12650***	251	302	241	386
300.2	10704	Canwell Glacier	109	294	31	24	27	42
301.1	10707	GR 2-B4EC	16	14	<2	<2	<2	2
330	10235	Cony Mountain area	38	43	4	<2	2	5
330	10825	Cony Mountain area	25	21	<2	<2	<2	3

bold numbers indicate a lead collection fire assay method,
all other samples utilized a nickel sulfide collection fire assay method

Table B-4. Full suite PGE analyses for selected rock chip samples.

Map no.	Sample no.	Location	Pt ppb	Pd ppb	Ir ppb	Os ppb	Rh ppb	Ru ppb
331	10156	Cony Mountain	360	849	29	30	21	60
331	10157	Cony Mountain	139	213	13	12	9	30
331	10158	Cony Mountain area	<2	9	<2	<2	<2	<2
334.1	10236	Cony East	<2	11	<2	<2	<2	<2
334.1	10237	Cony East	24	54	3	5	2	7
334.2	10829	Cony East	324	382	35	44	19	66
334.3	10830	Cony East	43	54	5	4	3	8
353	10891	Upper Gakona Glacier	<2	14	<2	<2	<2	<2
353	10913	Upper Gakona Glacier	40	147	<2	<2	<2	<2
369	10875	Ram Ridge	5	14	<2	<2	<2	<2
369	10876	Ram Ridge	51	132	<2	<2	<2	<2
372	10874	Ram Ridge	49	83	<2	<2	<2	3
373	10877	W Foot of Ram Ridge	8	38	<2	<2	<2	<2
374	10244	JS	19	11	<2	<2	<2	<2
374	10869	JS	61	361	<2	<2	2	<2
374	10870	JS	61	223	<2	<2	2	<2
374	10871	JS	35	149	<2	<2	<2	<2
374	10872	JS	<2	11	<2	<2	<2	<2
374	10848	Ram Ridge	13	25	<2	<2	<2	<2
375	10243	GR 28-1	8	15	<2	<2	<2	<2
375	10846	GR28-1	20	38	<2	<2	2	<2
375	10847	GR28-1	11	18	<2	<2	<2	<2
424	10910	MF1996C-129 area	4	9	<2	<2	<2	<2
428	10845	GR 28-20 area	60	75	<2	<2	<2	<2
429	10241	GR 28-20	18	25	<2	<2	<2	<2
429	10242	GR 28-20	17	24	<2	<2	<2	<2
429	10842	GR 28-20	<2	<2	<2	<2	<2	<2
429	10843	GR 28-20	14	16	<2	<2	<2	<2
429	10844	GR 28-20	9	17	<2	<2	<2	<2
430	10839	GR 28-19	10	16	<2	<2	<2	<2
430	10840	GR 28-19	9	13	<2	<2	<2	<2
430	10841	GR 28-19	19	30	<2	<2	<2	<2
432	10838	GR28-18	321	413	<2	<2	9	<2
457.2	10816	Miller Gulch Dikes	<2	<2	<2	<2	<2	<2
458.1	10815	Miller Gulch Dikes	<2	<2	<2	<2	<2	<2
458.3	10233	Miller Gulch Dikes	<2	7	<2	<2	<2	<2
458.3	10817	Miller Gulch Dikes	21	23	<2	<2	<2	<2
458.4	10813	Miller Gulch Dikes	4	10	<2	<2	<2	<2
458.4	10814	Miller Gulch Dikes	4	7	<2	<2	<2	<2
508	10479	Circular Anomaly area	<2	11	<2	<2	<2	<2
511	10231	Summit Hill	4	25	<2	<2	<2	<2
511	10232	Summit Hill	6	15	<2	<2	<2	<2
511	10808	Summit Hill	6	23	<2	<2	<2	<2
512	10810	Circular Anomaly area	<2	13	<2	<2	<2	<2
541	10214	Antler	40	80	3	3	3	3
541	10215	Antler	22	41	<2	<2	2	2
548	10350	Fish Lake Complex	52	50	4	3	3	7
550	10352	Wild One	19	9	<2	<2	2	2
550	10353	Wild One	57	28	4	4	3	5
550	10832	Wild One	50	33	5	4	2	6

bold numbers indicate a lead collection fire assay method,
all other samples utilized a nickel sulfide collection fire assay method

Table B-4. Full suite PGE analyses for selected rock chip samples.

Map no.	Sample no.	Location	Pt ppb	Pd ppb	Ir ppb	Os ppb	Rh ppb	Ru ppb
550	10833	Wild One	31	18	3	<2	<2	4
550	10834	Wild One	48	26	4	4	2	5
551	10181	MF1996C-70	39	71	3	3	3	3
552	10079	Fish Lake Complex	22	56	3	3	2	5
556	10725	Eb No. 4	63	76	5	<2	4	4
556	10853	Eb No. 4	43	108	3	2	4	4
556	10854	Eb No. 4	47	68	3	2	3	3
557	10341	Eb No. 4 area	20	25	<2	<2	2	4
558	10835	Eb No. 4 area	83	31	3	<2	<2	6
558	10836	Eb No. 4 area	58	23	2	<2	3	6
559.1	10211	BM-75	16	9	<2	<2	<2	2
559.2	10249	BM-75	<2	<2	<2	<2	<2	<2
559.2	10849	BM-75	10	21	<2	<2	<2	<2
560	10340	MF1996C-45 area	27	23	3	<2	2	4
562	10727	Lucky 7	<2	6	<2	<2	<2	<2
562	10855	Lucky 7	9	6	<2	<2	2	<2
564	10008	Tres Equis	<2	<2	<2	<2	<2	<2
566	10027	WEG area	22	46	<2	<2	<2	3
567	10025	WEG	<2	<2	<2	<2	<2	<2
594	10239	Wildhorse Canyon	<2	4	<2	<2	<2	<2
616	10361	W Fourteenmile Lake	8	6	<2	<2	<2	<2
619	10362	Norel	15	19	<2	<2	2	3
619	10574	Norel	30	51	<2	<2	3	6
619	10575	Norel	<2	4	<2	<2	<2	<2
619	10903	Norel	14	22	<2	<2	<2	2
619	10904	Norel	31	51	<2	<2	<2	3
620	10364	Norel area	19	13	<2	<2	<2	<2
622.1	10028	Dunite Hill	8	4	<2	<2	2	<2
622.2	10066	Dunite Hill	30	40	3	<2	2	2
622.2	10213	Dunite Hill	29	63	3	<2	2	2
623	10064	Amphi	63	61	6	6	3	12
623	10065	Amphi	36	34	5	3	2	8

bold numbers indicate a lead collection fire assay method,
all other samples utilized a nickel sulfide collection fire assay method

Analytical methods and detection limits for PGE samples, Table B-4.

Analyses for full suite PGE utilized fire assay nickel sulfide collection of a 30g sample with an ICP-MS finish. Over detection limits (bold) were determined by fire assay lead collection with ICP-AES finish.

Element	Units Reported	Lower Detection Limit	Upper detection Limit	Analytical Method
Pt	ppb	2	1000	FA
Pt	**ppb**	**5**	**10000**	**FA**
Pt	**ppb**	**30**	**100000**	**FA**
Pd	ppb	2	1000	FA
Pd	**ppb**	**30**	**100000**	**FA**
Ir	ppb	2	1000	FA
Os	ppb	2	1000	FA
Rh	ppb	2	1000	FA
Ru	ppb	2	1000	FA

Table B-5. REE and other trace element analyses for selected rock chip samples

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Sample Description	Ce ppm	Cs ppm	Dy ppm	Er ppm	Eu ppm	Ga ppm	Gd ppm	Hf ppm	Ho ppm	La ppm
19.3	10997	W College Glacier	V cg gbo to pyxite w/ cpy, po/py(?)	8.1	--	2.8	1.5	0.9	--	3	--	0.6	2.7
48	10399	Tourmaline	Peg w/ tourmaline & lepidolite	9.1	--	2.1	0.2	<0.1	--	4	--	0.1	3.7
48	11009	Tourmaline	Gbo	5.4	0.37	1.7	1	0.8	12.3	1.6	0.4	0.4	2.2
48	11010	Tourmaline	Watermelon tourmaline	6.9	326	0.2	<0.1	<0.1	53.4	1	<0.1	<0.1	3.2
48	11011	Tourmaline	Spodumine w/ qz	1.6	500	0.1	<0.1	<0.1	47.4	0.1	<0.1	<0.1	1.1
48	11139	Tourmaline	Dark gray white banded peg (biotite)	102	5.11	39.9	20	0.5	27	33	0.9	7.4	39.2
48	11140	Tourmaline	Lepidolite-rich peg	1.2	500	0.5	0.1	<0.1	68.4	0.5	0.1	<0.1	<0.5
48	11141	Tourmaline	Schorl tourmaline-rich peg	102.5	500	42.7	21.9	0.3	81.5	36.9	0.7	7.3	37.9
113	10075	Compass Creek	Nikolai basalt w/ v minor cpy & py	19.3	0.4	4.3	2.4	1.4	19	4.1	3	0.9	10.1
116	10010	Bird's Beak area	Melagbo w/ 1-2% cpy, po, pent(?)	5.7	0.4	1.3	0.7	0.4	7	1.3	1	0.3	6
120	10031	Bird's Beak area	Partially serp'zd perid w/ 1-2% sulf, minor cpy	8.3	0.4	1.7	0.9	0.5	8	1.7	1	0.4	5.8
121	10226	Bird's Foot	Pegmatitic(?) vns in perid	4.2	--	0.6	0.3	0.2	--	0.6	--	0.1	1.9
131	10015	5550 Peak	Gbo w/ 1% po, cpy, & pent(?)	5.2	0.4	0.7	0.4	0.2	6	0.7	<1	0.2	3.1
135.1	10007	Dunite Diatreme	Matrix from dun diatreme	2.5	0.1	0.3	0.2	0.1	3	0.3	<1	0.1	4
135.2	10073	Dunite Diatreme	Serp matrix br from diatreme	2.9	0.2	0.4	0.2	0.1	3	0.4	<1	0.1	3.5
135.3	10072	Dunite Diatreme	Hematite matrix br from "diatreme"	1.6	0.2	0.3	0.2	0.1	3	0.3	<1	0.1	3.3
135.4	10074	Dunite Diatreme	Fest matrix of diatreme	2.8	0.1	0.4	0.3	0.1	3	0.4	<1	0.1	3.8
199.1	10032	Ghezzi	Light to medium colored gbo, no evident sulf	9.8	0.1	2.8	1.6	0.8	17	2.3	1	0.6	6.1
199.1	10069	Ghezzi	Alt leuco gbo w/ minor cpy	58	0.1	7.2	4.1	3.7	19	7.5	7	1.5	36.7
199.1	10070	Ghezzi	Medium grained fest leuc gbo w/ v minor cpy	33.1	0.1	5.4	2.9	1.9	20	5.3	3	1.1	17.2
199.1	10222	Ghezzi	Leucogbo, gbo (fg to med gr)	30.1	<0.1	5.2	3.1	1.9	19	5.1	3	1.1	15.5
199.1	10431	Ghezzi	Leuco gbo	28.6	<0.1	4.4	2.6	1.4	16	4.6	2	0.9	12.3
199.2	10019	Ghezzi	Med to cg leuco gbo w/ dissem & patchy cpy	31.9	0.1	5.1	2.8	1.9	21	5	3	1	17.8
199.2	10219	Ghezzi	Leucogbo	28.3	<0.1	5.7	3.2	1.6	23	5.3	3	1.1	14.4
199.2	10220	Ghezzi	Gbo, leucogbo	56.7	<0.1	6.7	3.7	3.2	20	7.1	4	1.4	30.5
199.2	10221	Ghezzi	Gbo, leucogbo	43.5	<0.1	5.7	3.4	2.4	21	5.7	4	1.2	21.4
201.1	10146	Rainy Creek Skarn	Ol-rich um	14.5	0.2	2.5	1.4	0.9	13	2.5	2	0.5	8.3
212.1	10153	GR 14-9	Gbo	8.1	0.2	2	1.1	0.6	15	1.8	1	0.4	3.6
214	10068	Picrite Hill West	Andesitic to dacitic pyroclastic w/ sulfs (po, cpy) py?	14.8	0.3	2.5	1.4	0.9	12	2.7	2	0.5	9.9
214	10078	Picrite Hill West	Pyroclastic picritic basalt, minor py	13.6	0.2	3.1	1.8	0.9	13	2.9	2	0.7	6.6
229	10859	West Bowl area	Micaceous peg(?) vn in dun, w/ Cu-st	0.8	--	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	<0.5
237	10034	Hail Creek	Fest, serp'zd dun	0.9	0.3	0.1	<0.1	<0.1	2	0.1	<1	<0.1	2.8
238	10060	Foley's	phlog-bearing mela gbo	9.5	1.3	1.8	1.1	0.5	14	1.5	1	0.4	5.1
238	10180	Foley's	Gbo	2.2	0.4	1.4	1	0.3	12	0.9	<1	0.3	1.4
240	10039	White Band area	Br gbo dike at dun contact	21.2	0.2	5.1	3	1.5	19	4.9	3	1.1	10.8
240	10040	White Band area	Fg gbo dike at contact w/ dun	22.8	0.5	5.5	3.1	1.6	20	4.9	3	1.1	11.6
240	10330	White Band area	Gbo, from contact w/ dun	24.3	0.2	5.7	3.3	1.7	20	5.5	4	1.2	10
240	10331	White Band area	Dun at contact w/ gbo dike?	<0.5	<0.1	<0.1	<0.1	<0.1	2	0.1	<1	<0.1	0.8
241.1	10038	Rainy Complex	Dun w/ copper moss	0.8	0.1	<0.1	<0.1	<0.1	2	<0.1	<1	<0.1	2.7
242	10076	Picrite Hill	Picritic basalt w/ minor py, cpy	12.6	0.2	3.1	1.7	0.9	14	2.7	2	0.6	7.6
242	10077	Picrite Hill	Fg gbo w/ ~1% cpy + py	6.7	0.1	4.8	3.4	0.8	16	3	1	1.1	3.1
246	10056	Ann Fork	Mainly perid, variably serp & mineralized w/ cpy, po, pent	4.1	0.4	0.9	0.6	0.3	6	0.7	1	0.2	2.3
248	10322	East Rainy	Leucogbo (dike?) in perid w/ blebs of cpy & minor bn?	12.3	0.1	2.4	1.4	0.9	15	2.3	1	0.5	6.1
251	10037	Rainy Breccia area	Serp dun at contact w/ gbo dike	1.1	0.1	0.2	0.1	<0.1	3	0.1	<1	<0.1	3.2

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Lu ppm	Nb ppm	Nd ppm	Pr ppm	Rb ppm	Sm ppm	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Tl ppm	Tm ppm	Th ppm	U ppm	Y ppm	Yb ppm	Zr ppm
19.3	10997	W College Glacier	0.2	--	8.2	1.5	--	2.8	--	--	--	0.5	--	0.2	<1	<0.5	14.6	1.2	--
48	10399	Tourmaline	<0.1	--	4.6	1.1	--	5.1	--	--	--	0.7	--	<0.1	5	7.8	7.1	0.2	--
48	11009	Tourmaline	0.1	0.5	4.3	0.8	2.4	1.5	<0.2	438	0.07	0.3	<0.02	0.1	<1	<0.5	8.9	0.9	11.6
48	11010	Tourmaline	<0.1	9	2.6	0.8	129.5	2	20.5	6	12	0.1	0.61	<0.1	1	1.2	0.5	<0.1	0.9
48	11011	Tourmaline	<0.1	9.4	<0.5	0.1	500	0.1	21.1	6.6	7.92	<0.1	24.2	<0.1	<1	<0.5	<0.5	<0.1	<0.5
48	11139	Tourmaline	3	28.3	61.3	15.3	42	31.5	5.7	9.8	4.6	7.5	0.27	3.1	52	54.7	240	21.6	11
48	11140	Tourmaline	<0.1	88.1	0.6	0.1	500	0.6	87.5	2	100	0.1	22.8	<0.1	<1	4.2	2.3	0.1	<0.5
48	11141	Tourmaline	5	500	68.9	16	500	44	27.4	5.5	39.4	8.3	4.75	4	51	65	257	31.7	6.7
113	10075	Compass Creek	0.3	9	13.2	2.7	21.2	3.7	2	91.7	0.6	0.7	<1	<0.5	1	<0.5	23.7	2.2	88.1
116	10010	Bird's Beak area	0.1	2	4	0.9	2.7	1.1	1	102	<0.5	0.2	<1	<0.5	<1	<0.5	6.9	0.6	15.9
120	10031	Bird's Beak area	0.1	3	5.5	1.2	3.4	1.5	2	53.1	<0.5	0.3	<1	<0.5	<1	<0.5	9	0.8	27.1
121	10226	Bird's Foot	0.1	--	2.1	0.4	--	0.5	--	--	--	0.1	--	<0.1	<1	<0.5	3.3	0.4	--
131	10015	5550 Peak	0.1	1	2.6	0.6	4.7	0.6	1	68.7	<0.5	0.1	<1	<0.5	1	<0.5	4.3	0.5	17.9
135.1	10007	Dunite Diatreme	<0.1	1	1.2	0.3	1.4	0.2	1	4	<0.5	0.1	<1	<0.5	<1	<0.5	2	0.2	8.3
135.2	10073	Dunite Diatreme	<0.1	1	1.3	0.3	1.3	0.3	1	6	<0.5	0.1	<1	<0.5	<1	<0.5	2.4	0.3	9.4
135.3	10072	Dunite Diatreme	<0.1	<1	1	0.2	1.2	0.3	1	2.5	<0.5	0.1	<1	<0.5	<1	<0.5	1.8	0.2	5.8
135.4	10074	Dunite Diatreme	<0.1	1	1.3	0.4	1.6	0.3	1	9	<0.5	0.1	<1	<0.5	<1	<0.5	2.5	0.2	8.3
199.1	10032	Ghezzi	0.3	4	6.9	1.4	6.9	2.1	2	240	<0.5	0.5	<1	<0.5	<1	<0.5	16.2	1.6	46.6
199.1	10069	Ghezzi	0.6	25	26.9	6.3	3.4	6.5	6	269	1.6	1.3	<1	0.6	4	5.2	41.7	3.7	234
199.1	10070	Ghezzi	0.4	11	20	4.4	7.6	5.1	2	355	0.7	0.9	<1	<0.5	2	1.4	28.1	2.6	105
199.1	10222	Ghezzi	0.4	11	18	4.1	5.8	4.9	2	306	0.7	0.9	<1	<0.5	2	1.7	27.9	2.5	101
199.1	10431	Ghezzi	0.3	7	17.2	3.9	3.1	4.4	2	255	<0.5	0.8	<1	<0.5	1	1	22.4	2	61.9
199.2	10019	Ghezzi	0.4	13	17.2	3.9	6.9	4.6	3	411	0.8	0.8	<1	<0.5	2	1.6	28	2.4	107.5
199.2	10219	Ghezzi	0.4	13	17.4	3.9	3.2	5	2	364	0.8	0.9	<1	0.5	2	1.1	29.6	2.6	106
199.2	10220	Ghezzi	0.5	15	26.3	6.6	5.9	6.3	5	306	0.9	1.1	<1	0.5	2	3.7	36.1	3.2	127.5
199.2	10221	Ghezzi	0.4	13	21.9	5.1	3.8	5.3	3	361	0.8	1	<1	0.5	2	2.2	31	2.8	120
201.1	10146	Rainy Creek Skarn	0.2	6	9.3	2	1.3	2.6	2	39.8	<0.5	0.5	<1	<0.5	1	<0.5	13.8	1.1	54.3
212.1	10153	GR 14-9	0.2	2	5.1	1	17.2	1.6	2	219	<0.5	0.3	<1	<0.5	1	0.5	11.2	1	27.7
214	10068	Picrite Hill West	0.2	6	9.7	2.1	1	2.3	2	26.5	<0.5	0.4	<1	<0.5	1	<0.5	13.6	1.2	53.4
214	10078	Picrite Hill West	0.2	5	8.6	1.9	1.3	2.6	2	136.5	<0.5	0.5	<1	<0.5	1	<0.5	15.9	1.5	54.6
229	10859	West Bowl area	<0.1	--	<0.5	<0.1	--	<0.1	--	--	--	<0.1	--	<0.1	<1	<0.5	<0.5	<0.1	--
237	10034	Hail Creek	<0.1	<1	<0.5	0.1	1.5	0.1	1	7.8	<0.5	<0.1	<1	<0.5	<1	<0.5	0.5	<0.1	2.3
238	10060	Foley's	0.2	2	5	1.2	5.7	1.2	2	349	<0.5	0.3	<1	<0.5	1	<0.5	10.5	1	22.6
238	10180	Foley's	0.2	1	1.8	0.4	1.5	0.7	2	130	<0.5	0.2	<1	<0.5	<1	<0.5	9.1	1.1	9.4
240	10039	White Band area	0.4	10	15	3.1	2.7	4.4	2	45.5	0.6	0.9	<1	<0.5	1	<0.5	27.2	2.7	106.5
240	10040	White Band area	0.4	11	16.2	3.3	15.7	4.7	2	272	0.7	0.9	<1	0.5	1	<0.5	29.8	2.7	112.5
240	10330	White Band area	0.4	11	16.2	3.6	8.5	4.9	2	209	0.7	1	<1	0.5	1	<0.5	31	2.9	118.5
240	10331	White Band area	<0.1	<1	<0.5	0.1	0.3	0.1	<1	2.3	<0.5	<0.1	<1	<0.5	<1	<0.5	<0.5	<0.1	2.4
241.1	10038	Rainy Complex	<0.1	<1	<0.5	0.1	0.9	<0.1	1	1.3	<0.5	<0.1	<1	<0.5	<1	<0.5	<0.5	<0.1	1.6
242	10076	Picrite Hill	0.2	6	8.7	1.8	1.9	2.7	2	123	<0.5	0.5	<1	<0.5	1	<0.5	16.7	1.5	58
242	10077	Picrite Hill	0.5	5	5.5	1	4.3	2	2	80.6	<0.5	0.7	<1	0.5	<1	<0.5	29.9	3.4	36.2
246	10056	Ann Fork	0.1	2	2.2	0.6	1.4	0.6	2	76.4	<0.5	0.2	<1	<0.5	<1	<0.5	5.2	0.5	15.4
248	10322	East Rainy	0.2	5	7.9	1.7	1.5	2.3	1	553	<0.5	0.4	<1	<0.5	1	<0.5	12.2	1.1	38.5
251	10037	Rainy Breccia area	<0.1	<1	0.5	0.1	1	0.1	1	19.2	<0.5	<0.1	<1	<0.5	<1	<0.5	1.2	0.1	2.4

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Sample Description	Ce ppm	Cs ppm	Dy ppm	Er ppm	Eu ppm	Ga ppm	Gd ppm	Hf ppm	Ho ppm	La ppm
252	10328	Rainy Breccia	Cs perid br intruded by white gbo (plag peg?)	12.3	<0.1	2.8	1.6	0.7	14	2.5	2	0.6	5.5
256	10524	Marsha area	Perid w/ dissem sulfs	8.8	0.4	1.5	0.9	0.5	9	1.5	1	0.3	6.5
266.1	10347	Ann Creek	Serp'zd perid w/ minor garnierite & minor fest	1.9	<0.1	0.3	0.2	0.1	3	0.3	<1	0.1	1.3
266.1	10507	Ann Creek	Perid	1.5	0.1	0.2	0.1	0.1	3	0.2	<1	<0.1	2.9
277.1	10130	Emerick	Dun(?)	6.5	0.8	3.9	3	0.7	15	2.7	1	0.9	3.6
277.1	10131	Emerick	Gbonorite d ke	12	0.8	1.7	0.9	0.5	10	1.9	1	0.4	7
277.2	10133	Emerick	Gbonorite d ke	13.2	3.1	3.1	1.7	0.9	14	2.9	2	0.6	8
277.2	10136	Emerick	Gbonorite d ke	6.4	1.2	4	2.7	0.8	12	2.7	1	0.9	5.3
277.3	10137	Emerick	Gbonorite d ke(?)	13.9	1.2	3.7	2.4	0.9	15	2.9	2	0.8	7.9
298	10306	Upper Glacier	Mostly fg perid dike, magnetic w/ minor sulf	6.3	0.5	3.2	2.2	0.6	11	2.1	1	0.8	3
299	10305	Odie	Melagbo or perid(?) dike w/ 1-3% sulf	2	0.1	0.4	0.2	0.1	4	0.3	<1	0.1	0.8
299	10460	Odie	Pyxite dike	9.1	0.2	1.9	1.1	0.6	10	2	1	0.4	6.4
331	10156	Cony Mountain	Fest mg perid dike, w/ dissem to net-textured cpy, pent, po, mag	12	0.2	1.8	1	0.6	9	2	1	0.4	5.9
331	10157	Cony Mountain	Serp	12.9	0.1	2	1.2	0.7	9	2	1	0.4	6.4
331	10158	Cony Mountain area	Banded lueco gbo	6.1	0.1	2	1.4	0.6	17	1.5	1	0.5	3.1
339	11291	Pegmatite Glacier	Qz-rich peg w/ cpy, py, & garnet(?)	0.7	--	0.1	<0.1	<0.1	--	0.1	--	<0.1	<0.5
349	11054	Backslide Glacier	Peg gbo w/ pods & dissem sulf	13.8	--	2.1	1.1	0.9	--	2.5	--	0.4	4.5
370	10879	W Foot of Ram Ridge	K-spar rich peg dike cutting perid to pyxite	11.8	--	0.5	0.4	0.2	--	0.8	--	0.1	6.3
374	10872	JS	Peg-textured gbo dike w/ po +/- py(?)	33.7	--	2.7	1.4	1.4	--	4	--	0.5	17.5
376	11326	Magnetite Cirque	Peg-textured gbo dike w/ tr cpy	16.1	--	2.9	1.7	1.2	--	3.5	--	0.6	5.2
481.1	11202	Quartz Creek Head	Fest pegmatoidal hbl gbb w/ 5% py	32.5	--	3.5	1.8	1.6	--	4.6	--	0.7	14.9
541	10214	Antler	Perid	2.2	<0.1	0.5	0.3	0.2	5	0.5	<1	0.1	1.4
541	10215	Antler	Gbo	2.7	0.1	0.7	0.4	0.3	7	0.7	<1	0.2	2
548	10350	Fish Lake Complex	Ol-rich perid w/ v minor dissem po	0.5	<0.1	0.1	0.1	<0.1	2	0.1	<1	<0.1	1
550	10352	Wild One	Perid	0.7	<0.1	0.1	0.1	<0.1	1	0.1	<1	<0.1	1.5
550	10353	Wild One	Perid w/ minor po	<0.5	<0.1	<0.1	0.1	<0.1	2	0.1	<1	<0.1	0.8
551	10181	MF1996C-70	Gbo dike w/in perid	1.6	0.3	0.7	0.4	0.2	4	0.6	<1	0.1	0.7
557	10341	Eb No. 4 area	Dun w/ trace po	0.7	0.1	0.1	0.1	<0.1	2	0.1	<1	<0.1	0.8
559.1	10211	BM-75	Perid w/ serp alt	2.3	0.2	0.5	0.3	0.1	2	0.5	<1	0.1	1.5
560	10340	MF1996C-45 area	Perid w/ trace po	1.2	<0.1	0.2	0.1	<0.1	2	0.2	<1	<0.1	0.8
564	10008	Tres Equis	Anorthosite	3.4	0.4	0.8	0.4	0.3	4	0.8	1	0.2	2.5
566	10027	WEG area	Pyxite to perid w/ dissem & patches of cpy, po, pent?	4.1	0.4	1	0.5	0.3	6	0.9	1	0.2	4.4
567	10025	WEG	Pegmatitic gbo w/ minor sulf	51.8	0.4	6.8	4.1	1.9	27	6.1	8	1.4	23.6
570	10023	Azurite	Alt basalt w/ v minor chrysocolla/azurite	31	0.1	5.9	3.2	1.8	20	5.9	4	1.2	15
594	10239	Wildhorse Canyon	Clinopyx(?) peg	6.7	--	1.5	1	0.3	--	1.4	--	0.3	4.4
609.1	10319	Landmark Gap Copper	Basalt w/ copper moss	12.4	0.3	2.9	1.7	0.9	13	2.8	2	0.6	5.4
612	10531	S Landmark Gap Lake	Basalt	7.5	0.5	3.4	2.2	0.8	16	2.4	1	0.7	5.7
616	10361	W Fourteenmile Lake	Gbo	4.9	0.1	1.5	0.9	0.6	16	1.3	1	0.3	2.9
619.1	10362	Norel	Fest gbo w/ po	2	<0.1	0.7	0.4	0.2	7	0.6	<1	0.2	1.9
620	10364	Norel area	Perid w/ minor po	1.8	0.1	0.3	0.2	0.1	2	0.3	<1	0.1	1.5
622.1	10028	Dunite Hill	Serp'zd dun	1.3	0.1	0.2	0.1	<0.1	2	0.2	<1	<0.1	3
622.2	10066	Dunite Hill	Variably serp'd dun	1.7	0.1	0.2	0.1	0.1	3	0.2	<1	<0.1	3.3
622.2	10213	Dunite Hill	Dun to perid	1.5	<0.1	0.2	0.1	0.1	2	0.3	<1	<0.1	1
623	10064	Amphi	Perid w/ minor cpy, po	1.4	0.1	0.2	0.1	0.1	2	0.2	<1	0.1	0.9

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Lu ppm	Nb ppm	Nd ppm	Pr ppm	Rb ppm	Sm ppm	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Tl ppm	Tm ppm	Th ppm	U ppm	Y ppm	Yb ppm	Zr ppm
252	10328	Rainy Breccia	0.2	4	8.2	1.8	0.6	2.2	1	190.5	<0.5	0.4	<1	<0.5	1	<0.5	14.8	1.4	47.8
256	10524	Marsha area	0.1	3	5.6	1.2	3.7	1.4	2	78.9	<0.5	0.3	<1	<0.5	1	<0.5	8.7	0.9	32.8
266.1	10347	Ann Creek	<0.1	1	1.3	0.3	0.9	0.3	1	6.4	<0.5	0.1	<1	<0.5	<1	<0.5	2	0.2	7.2
266.1	10507	Ann Creek	<0.1	<1	0.8	0.2	1.3	0.2	2	19.4	<0.5	<0.1	<1	<0.5	<1	<0.5	1.3	0.1	5.2
277.1	10130	Emerick	0.4	3	5.4	0.9	9.7	2	1	193	<0.5	0.6	<1	0.5	<1	<0.5	24.5	3	40.7
277.1	10131	Emerick	0.1	2	7.6	1.6	2	1.8	2	90.9	<0.5	0.3	<1	<0.5	1	<0.5	9.5	0.8	26.4
277.2	10133	Emerick	0.2	5	8.8	1.8	10	2.5	2	162.5	<0.5	0.5	<1	<0.5	1	<0.5	16.5	1.5	52.7
277.2	10136	Emerick	0.5	3	5	1	5.3	1.8	1	104	<0.5	0.5	<1	<0.5	<1	<0.5	25.5	2.9	34.9
277.3	10137	Emerick	0.4	3	8.7	1.8	8	2.3	2	176.5	<0.5	0.5	<1	<0.5	1	<0.5	22.4	2.4	45.1
298	10306	Upper Glacier	0.4	3	4.7	0.9	2	1.6	2	70.3	<0.5	0.4	<1	<0.5	<1	<0.5	20	2.2	30.3
299	10305	Odie	<0.1	1	0.9	0.2	1.3	0.3	1	38	<0.5	0.1	<1	<0.5	<1	<0.5	2.4	0.2	4.8
299	10460	Odie	0.1	4	6.8	1.4	1.6	1.9	2	55.3	<0.5	0.3	<1	<0.5	<1	<0.5	10.1	0.9	31.8
331	10156	Cony Mountain	0.1	5	6.9	1.6	4.1	1.8	2	114	<0.5	0.3	<1	<0.5	1	<0.5	9.6	0.9	38.7
331	10157	Cony Mountain	0.1	6	7.6	1.8	1.3	2	2	82.4	<0.5	0.3	<1	<0.5	1	<0.5	10.6	0.8	41.3
331	10158	Cony Mountain area	0.2	1	4.3	0.9	3.3	1.4	2	287	<0.5	0.3	<1	<0.5	1	<0.5	11.9	1.4	23.3
339	11291	Pegmatite Glacier	<0.1	--	<0.5	<0.1	--	<0.1	--	--	--	<0.1	--	<0.1	<1	<0.5	0.5	<0.1	--
349	11054	Backslide Glacier	0.1	--	10.8	2.1	--	2.7	--	--	--	0.4	--	0.1	<1	<0.5	11.4	0.9	--
370	10879	W Foot of Ram Ridge	0.1	--	4	1.1	--	0.8	--	--	--	0.1	--	0.1	12	2.5	3.4	0.4	--
374	10872	JS	0.2	--	18.7	4	--	4.2	--	--	--	0.5	--	0.2	1	0.6	13.9	1.1	--
376	11326	Magnetite Cirque	0.2	--	14	2.6	--	3.6	--	--	--	0.5	--	0.2	<1	<0.5	17.5	1.2	--
481.1	11202	Quartz Creek Head	0.2	--	21.1	4.8	--	5.2	--	--	--	0.6	--	0.2	1	<0.5	18	1.4	--
541	10214	Antler	<0.1	<1	1.5	0.4	1	0.4	<1	67.8	<0.5	0.1	<1	<0.5	<1	<0.5	2.7	0.3	6.2
541	10215	Antler	0.1	1	1.9	0.4	3.1	0.6	<1	108	<0.5	0.1	<1	<0.5	<1	<0.5	4	0.4	7.4
548	10350	Fish Lake Complex	<0.1	<1	<0.5	0.1	0.4	0.1	1	3.9	<0.5	<0.1	<1	<0.5	<1	<0.5	0.6	0.1	3.2
550	10352	Wild One	<0.1	<1	<0.5	0.1	0.2	0.1	<1	2.4	<0.5	<0.1	<1	<0.5	<1	<0.5	0.6	0.1	2.9
550	10353	Wild One	<0.1	<1	<0.5	0.1	0.2	0.1	<1	2.5	<0.5	<0.1	<1	<0.5	<1	<0.5	<0.5	<0.1	1.6
551	10181	MF1996C-70	<0.1	<1	1.5	0.3	0.5	0.5	2	34.7	<0.5	0.1	<1	<0.5	<1	<0.5	3.4	0.3	5.9
557	10341	Eb No. 4 area	<0.1	<1	0.5	0.1	0.5	0.1	1	3.6	<0.5	<0.1	<1	<0.5	<1	<0.5	0.7	0.1	6
559.1	10211	BM-75	<0.1	1	1.5	0.3	0.2	0.4	2	10.3	<0.5	0.1	<1	<0.5	<1	<0.5	2.5	0.2	8.5
560	10340	MF1996C-45 area	<0.1	1	0.7	0.2	0.4	0.2	<1	3.7	<0.5	<0.1	<1	<0.5	<1	<0.5	1.1	0.1	5.4
564	10008	Tres Equis	<0.1	1	2.9	0.6	1.1	0.7	1	79.3	<0.5	0.1	<1	<0.5	1	<0.5	4.1	0.4	25
566	10027	WEG area	0.1	1	2.8	0.5	2	0.8	1	34.5	<0.5	0.2	<1	<0.5	<1	<0.5	5.3	0.4	12.8
567	10025	WEG	0.6	27	23.1	6.3	3.4	5.8	1	296	1.7	1	<1	0.6	5	2.2	36.6	3.8	284
570	10023	Azurite	0.4	14	20.5	4.4	0.7	5.8	2	394	0.9	1	<1	0.5	1	<0.5	31.9	2.7	136.5
594	10239	Wildhorse Canyon	0.1	--	5.9	1.2	--	1.3	--	--	--	0.2	--	0.1	1	2.7	11.4	0.8	--
609.1	10319	Landmark Gap Copper	0.2	5	8.6	1.8	4.1	2.5	2	120.5	<0.5	0.5	<1	<0.5	1	<0.5	15.9	1.4	58.1
612	10531	S Landmark Gap Lake	0.3	1	5.6	1.1	6.9	1.9	1	300	<0.5	0.5	<1	<0.5	<1	<0.5	19.8	2.2	25.3
616	10361	W Fourteenmile Lake	0.1	1	3.5	0.8	1.3	1	1	271	<0.5	0.2	<1	<0.5	<1	<0.5	7.4	0.7	17.2
619.1	10362	Norel	0.1	1	1.6	0.4	0.3	0.6	1	91.7	<0.5	0.1	<1	<0.5	<1	<0.5	4.1	0.3	10.6
620	10364	Norel area	<0.1	1	1.2	0.3	1.3	0.3	1	4.5	<0.5	<0.1	<1	<0.5	<1	<0.5	1.6	0.1	7
622.1	10028	Dunite Hill	<0.1	1	0.6	0.2	0.7	0.1	1	1.9	<0.5	<0.1	<1	<0.5	<1	<0.5	1	0.1	7.7
622.2	10066	Dunite Hill	<0.1	1	0.9	0.2	0.9	0.3	1	2.7	<0.5	<0.1	<1	<0.5	<1	<0.5	1.2	0.1	6.6
622.2	10213	Dunite Hill	<0.1	<1	1.1	0.3	0.3	0.2	<1	2.6	<0.5	<0.1	<1	<0.5	<1	<0.5	1.2	0.2	6
623	10064	Amphi	<0.1	<1	1	0.2	1	0.3	2	4.1	<0.5	<0.1	<1	<0.5	<1	<0.5	1.3	0.1	5.3

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Sample Description	Ce ppm	Cs ppm	Dy ppm	Er ppm	Eu ppm	Ga ppm	Gd ppm	Hf ppm	Ho ppm	La ppm
623	10065	Amphi	Perid w/ minor cpy	1.4	0.1	0.3	0.1	<0.1	2	0.3	<1	0.1	1.1
623	10212	Amphi	Perid w/ minor sulfs, cpy	4.3	0.3	1.1	0.6	0.3	5	1.3	1	0.2	2.9
624.2	10045	Chitti Stain	Alt basalt w/ minor cpy, bn, + Cu alt mins	20.3	0.2	4.3	2.3	1.4	20	4.4	3	0.9	8.6
625	10002	GR 13-9	Cu-st basalt w/minor cpy	17.4	0.2	3.6	2.1	1.2	19	3.5	2	0.8	9.1
625	10003	GR 13-9	Minor bn & epid in alt basalt	16.3	0.3	3.4	1.9	1.2	20	3.3	2	0.7	9
627	10366	GR 13-7	Basalt w/ thin qz-cc-epid vnlets, ~0.05 to 0.2" w/ bn	18.8	0.2	4.5	2.6	1.4	19	4	3	0.9	8.3
629	10204	GR 13-6	Alt vesicular basalt w/ minor chrysocolla & mal	10	0.1	2.1	1.3	0.7	26	2	1	0.5	4.3

Table B-5. REE and trace element analyses for selected rock chip samples.

Map no.	Sample no.	Location	Lu ppm	Nb ppm	Nd ppm	Pr ppm	Rb ppm	Sm ppm	Sn ppm	Sr ppm	Ta ppm	Tb ppm	Tl ppm	Tm ppm	Th ppm	U ppm	Y ppm	Yb ppm	Zr ppm
623	10065	Amphi	<0.1	1	1	0.2	1.3	0.2	2	4.2	<0.5	<0.1	<1	<0.5	<1	<0.5	1.4	0.1	6.2
623	10212	Amphi	0.1	1	3.4	0.7	8	1.1	1	26.3	<0.5	0.2	<1	<0.5	<1	<0.5	6.1	0.5	18.3
624.2	10045	Chitti Stain	0.3	10	14.2	3	0.5	3.9	3	212	0.6	0.7	<1	<0.5	1	<0.5	22.5	2.1	91.3
625	10002	GR 13-9	0.3	8	12.1	2.4	0.6	3.3	2	202	0.5	0.6	<1	<0.5	1	<0.5	20.4	1.8	79
625	10003	GR 13-9	0.3	7	11.2	2.3	0.8	3.2	2	206	0.5	0.6	<1	<0.5	1	<0.5	18.5	1.7	73.6
627	10366	GR 13-7	0.4	8	12.3	2.7	6.2	3.7	2	293	0.5	0.8	<1	<0.5	1	<0.5	23.9	2.2	80.8
629	10204	GR 13-6	0.2	4	6.5	1.4	0.5	1.9	1	247	<0.5	0.4	<1	<0.5	<1	<0.5	12.2	1.1	40.6

Analytical methods and detection limits for REE samples, Table B-5.

Samples in Table B-5 were analyzed for rare earth and trace elements by ICP-MS.

Element	Units Reported	Lower Detection Limit	Upper detection Limit	Analytical Method
Ce	ppm	0.5	10000	ICP-MS
Cs	ppm	0.1	10000	ICP-MS
Dy	ppm	0.1	1000	ICP-MS
Er	ppm	0.1	1000	ICP-MS
Eu	ppm	0.1	1000	ICP-MS
Ga	ppm	1	1000	ICP-MS
Gd	ppm	0.1	1000	ICP-MS
Hf	ppm	1	10000	ICP-MS
Ho	ppm	0.1	1000	ICP-MS
La	ppm	0.5	10000	ICP-MS
Lu	ppm	0.1	1000	ICP-MS
Nb	ppm	1	10000	ICP-MS
Nd	ppm	0.5	10000	ICP-MS
Pr	ppm	0.1	1000	ICP-MS
Rb	ppm	0.2	10000	ICP-MS
Sm	ppm	0.1	1000	ICP-MS
Sn	ppm	1	10000	ICP-MS
Sr	ppm	0.1	10000	ICP-MS
Ta	ppm	0.5	10000	ICP-MS
Tb	ppm	0.1	1000	ICP-MS
Tl	ppm	0.5	1000	ICP-MS
Tm	ppm	0.1	1000	ICP-MS
Th	ppm	1	1000	ICP-MS
U	ppm	0.5	1000	ICP-MS
Y	ppm	0.5	10000	ICP-MS
Yb	ppm	0.1	1000	ICP-MS
Zr	ppm	0.5	10000	ICP-MS

Table B-6. Latitude and longitude coordinates for BLM samples.

Coordinates are expressed in decimal degrees and use the North American Datum of 1927 Alaska (NAD27 Alaska).

Sample no.	Latitude	Longitude
1021	63.3486	-145.70542
1022	63.34623	-145.70332
1023	63.31991	-145.967
1024	63.80151	-146.53581
1025	63.30118	-146.05137
1026	63.30577	-146.04094
1027	63.30598	-146.04115
1028	63.30407	-146.0427
1029	63.24031	-145.58789
1030	63.20944	-145.44743
1031	63.20271	-145.37045
1032	63.20312	-145.37074
1033	63.20333	-145.36832
1034	63.20398	-145.36475
1035	63.20441	-145.36554
1036	63.19447	-145.3383
1037	63.21874	-145.31852
1038	63.22708	-145.32235
1039	63.23397	-145.1762
1040	63.21442	-145.14291
1041	63.21499	-145.1443
1042	63.20166	-145.12449
1043	63.30179	-146.49166
1044	63.27975	-146.30967
1045	63.35238	-145.65888
1046	63.35223	-145.65928
1047	63.30561	-145.42825
1048	63.29045	-145.42042
1049	63.29044	-145.42042
2647	63.23194	-146.05127
2648	63.23193	-146.05186
2649	63.2337	-146.05237
2650	63.12045	-146.52932
2651	63.09021	-146.3298
2652	63.0707	-146.10429
2653	63.04508	-146.0241
2654	63.06786	-145.51169
2655	63.17039	-145.52998
2656	63.21214	-145.63751
2657	63.22409	-145.64829
2658	63.37422	-145.72918
2659	63.31938	-146.26496
2660	63.31357	-145.98547
2661	63.3134	-145.98255
2662	63.31365	-145.98238
2663	63.3324	-146.49234
2664	63.33148	-146.49325
2665	63.30951	-146.49672
2666	63.30661	-146.49505
2667	63.30299	-146.49759
2668	63.29561	-146.4618
2669	63.30823	-146.38188
2670	63.31919	-146.32574
2671	63.2963	-146.30652
2672	63.29665	-146.29235
2673	63.31494	-146.28312
2674	63.31532	-146.28242
2675	63.29666	-146.22721
2676	63.3057	-146.19171
2677	63.33864	-146.181
2678	63.35737	-146.1733
2679	63.30027	-146.09953
2680	63.30209	-146.49182
2681	63.27975	-146.30967
2877	63.21717	-145.95788
2878	63.31851	-146.00135
2879	63.31861	-146.00268
2880	63.31357	-145.96433
2881	63.31421	-145.96482
2882	63.30007	-145.76888
2883	63.33333	-145.84434
2884	63.34151	-145.85201
2885	63.34158	-145.85295
2886	63.34167	-145.85298
2887	63.27391	-145.5596
2921	63.1903	-145.05735

Sample no.	Latitude	Longitude
2922	63.2006	-145.00141
2923	63.21595	-144.99103
2924	63.18907	-144.96598
2925	63.16977	-145.00585
2926	63.18605	-144.81995
2927	63.21338	-144.84229
2928	63.21459	-144.84076
2929	63.21092	-144.83432
2930	63.1689	-144.88209
2931	63.21266	-145.04008
6962	63.356309	-145.698716
6963	63.3563	-145.69862
6964	63.35377	-145.70019
6965	63.34648	-145.70337
6966	63.34473	-145.70381
6967	63.59757	-146.24929
6968	63.59936	-146.24909
6969	63.59934	-146.24897
6970	63.5985	-146.24792
6971	63.59879	-146.24823
6972	63.7131	-146.74221
6973	63.68665	-146.55192
6974	63.33067	-145.59248
6975	63.32851	-145.58858
6976	63.17593	-144.82328
6977	63.17592	-144.82332
6978	63.17397	-144.82525
6979	63.32038	-145.97254
6980	63.32042	-145.97256
6981	63.32059	-145.96698
6982	63.32071	-145.96582
6983	63.31704	-145.99034
6984	63.31799	-145.99197
6985	63.72409	-145.47318
6986	63.59206	-145.23866
6987	63.8015	-146.5358
6988	63.8072	-146.51679
6989	63.21714	-145.95783
6990	63.21718	-145.95781
6991	63.21692	-145.95803
6992	63.21608	-145.95554
6993	63.24176	-146.05909
6994	63.24294	-146.05966

Sample no.	Latitude	Longitude
6995	63.34101	-145.77825
6996	63.3413	-145.77889
6997	63.33614	-145.77179
6998	63.33597	-145.77173
6999	63.32289	-145.89287
7000	63.3524	-145.65901
9274	63.33504	-145.63039
9275	63.30604	-145.42908
9276	63.29024	-145.42135
9752	63.34868	-145.70564
9753	63.34339	-145.7053
9754	63.232	-146.05008
9755	63.59938	-146.24385
9756	63.5984	-146.24852
9757	63.59806	-146.24592
9758	63.71295	-146.73777
9759	63.31958	-146.26497
9760	63.31107	-146.18861
9761	63.31359	-145.98495
9762	63.31358	-145.98495
9763	63.31342	-145.98659
9764	63.31372	-145.98632
10000	63.09049	-145.62929
10001	63.09021	-145.629
10002	63.08622	-145.6421
10003	63.08612	-145.64221
10004	63.34226	-145.70688
10005	63.34214	-145.70659
10006	63.31703	-146.24906
10007	63.30523	-146.28254
10008	63.27933	-146.30932
10009	63.13163	-145.47169
10010	63.31604	-146.39223
10011	63.3186	-146.39055
10012	63.31266	-146.38246
10013	63.30893	-146.43883
10014	63.30718	-146.43686
10015	63.31092	-146.31383
10016	63.31088	-146.3121
10017	63.29303	-145.55739
10018	63.29269	-145.55565
10019	63.31336	-145.9826
10020	63.31347	-145.9827

Sample no.	Latitude	Longitude
10021	63.26199	-146.40695
10022	63.26199	-146.40689
10023	63.26196	-146.40683
10024	63.26199	-146.40695
10025	63.28818	-146.37008
10026	63.28959	-146.37048
10027	63.28948	-146.37008
10028	63.06829	-145.75284
10029	63.3209	-146.39839
10030	63.32065	-146.39749
10031	63.32093	-146.39399
10032	63.3133	-145.98533
10033	63.32761	-145.93011
10034	63.3281	-145.92923
10035	63.33516	-145.89867
10036	63.33368	-145.89842
10037	63.33118	-145.89633
10038	63.32568	-145.90226
10039	63.32086	-145.91008
10040	63.32089	-145.91035
10041	63.32089	-145.91031
10042	63.09	-145.62819
10043	63.08982	-145.62812
10044	63.08984	-145.62823
10045	63.09013	-145.628
10046	63.0903	-145.62904
10047	63.0905	-145.62981
10048	63.33583	-145.73133
10049	63.63296	-145.85884
10050	63.52588	-145.84276
10051	63.71779	-145.77296
10052	63.71884	-145.76921
10053	63.71872	-145.76878
10054	63.32998	-145.86063
10055	63.32905	-145.86179
10056	63.32804	-145.86223
10057	63.32816	-145.8623
10058	63.32865	-145.86125
10059	63.32159	-145.84778
10060	63.31641	-145.92137
10061	63.31808	-145.86908
10062	63.3179	-145.8679
10063	63.3388	-145.9749

Sample no.	Latitude	Longitude
10064	63.05801	-145.74858
10065	63.05782	-145.74826
10066	63.06762	-145.74516
10067	63.20944	-145.90441
10068	63.3053	-145.95666
10069	63.31423	-145.98485
10070	63.31404	-145.98402
10071	63.31385	-145.98539
10072	63.30903	-146.28041
10073	63.3072	-146.27872
10074	63.30931	-146.26505
10075	63.29928	-146.4189
10076	63.31557	-145.87787
10077	63.31552	-145.87772
10078	63.30541	-145.9569
10079	63.237448	-146.068255
10080	63.322407	-146.282123
10081	63.324609	-146.284866
10082	63.32322	-146.31884
10083	63.316671	-146.245238
10084	63.329025	-145.58712
10085	63.330644	-145.592433
10086	63.338423	-145.617963
10087	63.34114	-145.778421
10088	63.341101	-145.77847
10089	63.341065	-145.778462
10090	63.341039	-145.778461
10091	63.341072	-145.778556
10092	63.341088	-145.778695
10093	63.341074	-145.77825
10094	63.341143	-145.7782
10095	63.341184	-145.778071
10096	63.316837	-146.221544
10097	63.318494	-146.201926
10098	63.317244	-146.202876
10099	63.316042	-146.202565
10100	63.52479	-145.82379
10101	63.5248	-145.82397
10102	63.52483	-145.82397
10103	63.52482	-145.82395
10104	63.52483	-145.82393
10105	63.52555	-145.81945
10106	63.32708	-145.68726

Sample no.	Latitude	Longitude
10107	63.17618	-144.997
10108	63.17537	-144.99684
10109	63.33356	-145.72455
10110	63.3341	-145.72672
10111	63.52548	-145.84823
10112	63.52501	-145.8244
10113	63.17042	-145.53191
10114	63.16989	-145.53597
10115	63.18107	-145.53777
10116	63.18105	-145.53777
10117	63.32191	-145.72555
10118	63.32239	-145.72504
10119	63.01793	-145.49155
10120	63.03728	-145.56208
10121	63.0373	-145.562
10122	63.21614	-145.11132
10123	63.21455	-145.11278
10124	63.2266	-145.41879
10125	63.14079	-144.81336
10126	63.14114	-144.81361
10127	63.14149	-144.81467
10128	63.14155	-144.81441
10129	63.14135	-144.81423
10130	63.35669	-145.69868
10131	63.35655	-145.69869
10132	63.35629	-145.69878
10133	63.35599	-145.69881
10134	63.35593	-145.69899
10135	63.35591	-145.69871
10136	63.35488	-145.7003
10137	63.35457	-145.70031
10138	63.35382	-145.70031
10139	63.35382	-145.70033
10140	63.35377	-145.70031
10141	63.30933	-146.0755
10142	63.30829	-146.08078
10143	63.30868	-145.98445
10144	63.30416	-145.98205
10145	63.30345	-145.98154
10146	63.30474	-145.98239
10147	63.3209	-146.03242
10148	63.32076	-146.03419
10149	63.32325	-146.06698

Sample no.	Latitude	Longitude
10150	63.32197	-146.06499
10151	63.31632	-146.05218
10152	63.29369	-145.94638
10153	63.29251	-145.94106
10154	63.28983	-145.41588
10155	63.29006	-145.42078
10156	63.29033	-145.421
10157	63.29038	-145.42125
10158	63.29106	-145.42131
10159	63.30975	-145.63067
10160	63.32805	-146.08824
10161	63.32146	-145.65209
10162	63.32162	-145.65248
10163	63.32169	-145.65242
10164	63.23174	-146.43624
10165	63.62237	-145.76985
10166	63.61639	-145.72221
10167	63.29898	-145.67275
10168	63.33121	-145.73129
10169	63.34576	-145.69829
10170	63.34631	-145.69934
10171	63.6125	-146.17753
10172	63.71588	-146.56592
10173	63.71588	-146.56597
10174	63.7017	-145.43664
10175	63.72504	-145.47115
10176	63.33038	-145.86117
10177	63.32816	-145.86218
10178	63.32816	-145.86217
10179	63.32169	-145.84771
10180	63.31687	-145.92162
10181	63.23564	-146.06592
10182	63.23336	-146.03806
10183	63.3042	-145.99664
10184	63.30392	-145.99585
10185	63.30467	-145.99686
10186	63.30494	-145.99729
10187	63.29844	-145.98084
10188	63.23564	-145.5596
10189	63.27305	-145.59329
10190	63.26342	-145.56471
10191	63.10026	-145.74147
10192	63.26279	-145.56669

Sample no.	Latitude	Longitude
10193	63.302201	-146.080936
10194	63.3016	-146.08356
10195	63.324183	-146.386264
10196	63.323722	-146.385116
10197	63.324226	-146.384263
10198	63.316204	-146.259775
10199	63.316574	-146.260757
10200	63.09121	-145.62648
10201	63.09074	-145.62945
10202	63.09016	-145.62805
10203	63.0905	-145.62984
10204	63.05577	-145.58443
10205	63.32162	-145.72574
10206	63.01982	-145.49015
10207	63.35494	-145.69268
10208	63.34221	-145.70658
10209	63.34221	-145.70658
10210	63.34217	-145.70638
10211	63.24881	-146.20432
10212	63.05783	-145.7487
10213	63.0678	-145.74536
10214	63.20964	-145.90551
10215	63.20956	-145.90476
10216	63.20951	-145.90524
10217	63.31372	-145.98196
10218	63.31365	-145.98194
10219	63.31343	-145.98231
10220	63.31343	-145.98231
10221	63.31353	-145.98233
10222	63.31414	-145.98532
10224	63.29548	-145.96125
10225	63.29548	-145.96145
10226	63.324119	-146.386259
10227	63.316285	-146.260397
10228	63.316644	-146.260649
10229	63.350017	-146.059422
10230	63.349025	-146.050656
10231	63.132116	-145.473187
10232	63.13181	-145.472822
10233	63.175814	-144.823408
10234	63.138166	-146.096725
10235	63.289203	-145.422809
10236	63.29799	-145.413185
10237	63.29797	-145.41324
10238	63.211722	-146.146591
10239	63.2136	-146.143807
10240	63.200147	-144.87589
10241	63.1957	-144.87662
10242	63.195486	-144.87669
10243	63.232004	-145.092916
10244	63.229928	-145.094284
10245	63.104994	-144.802788
10246	63.104952	-144.803941
10247	63.026344	-144.85715
10248	63.068283	-144.901874
10249	63.249241	-146.209222
10250	63.175975	-144.821348
10251	63.099115	-144.789989
10252	63.092383	-144.782313
10253	63.092077	-144.782394
10254	63.058251	-144.836796
10255	63.2189	-145.43621
10256	63.23231	-145.47187
10257	63.223717	-145.487164
10258	63.176265	-144.818076
10259	63.099072	-144.789962
10260	63.071489	-144.821093
10261	63.708816	-145.591091
10262	63.696965	-145.52907
10263	63.699259	-145.553383
10264	63.716715	-145.763927
10265	63.686575	-146.55273
10266	63.686703	-146.552766
10267	63.68784	-146.54573
10268	63.687971	-146.545645
10269	63.686717	-146.567319
10270	63.686559	-146.567719
10271	63.597314	-146.232408
10272	63.736756	-145.623945
10273	63.570317	-145.938274
10274	63.807459	-146.508782
10275	63.175975	-144.821348
10276	63.176265	-144.818076
10277	63.099072	-144.789962
10278	63.699259	-145.553383
10279	63.728811	-145.617925

Sample no.	Latitude	Longitude
10280	63.708572	-145.591077
10281	63.281383	-145.858289
10282	63.287487	-145.884918
10283	63.185519	-144.856001
10284	63.335693	-145.614359
10285	63.137227	-146.095344
10286	63.137227	-146.095344
10287	63.316473	-146.1999
10288	63.174998	-144.999855
10289	63.21467	-145.08017
10290	63.213523	-145.071992
10291	63.213637	-145.070135
10292	63.708743	-146.87701
10293	63.708575	-146.875304
10294	63.568065	-146.176019
10295	63.567973	-146.180532
10296	63.220113	-146.170831
10297	63.22471	-146.189154
10298	63.224684	-146.186676
10299	63.22479	-146.188941
10300	63.50871	-145.85216
10301	63.51389	-145.85047
10302	63.3505	-145.70292
10303	63.35377	-145.70027
10304	63.52596	-145.81851
10305	63.33568	-145.61416
10306	63.33875	-145.61848
10307	63.35453	-145.69272
10308	63.35158	-145.6926
10309	63.18581	-144.9701
10310	63.18582	-144.9701
10311	63.20293	-145.01176
10312	63.30723	-146.07975
10313	63.30722	-146.07973
10314	63.15228	-145.90835
10315	63.14679	-145.99473
10316	63.14745	-145.9961
10317	63.14462	-146.10324
10318	63.13813	-146.09672
10319	63.13817	-146.09666
10320	63.13819	-146.09681
10321	63.33028	-145.88055
10322	63.33033	-145.88139
10323	63.33027	-145.88186
10324	63.33047	-145.88226
10325	63.33045	-145.88252
10326	63.33518	-145.89846
10327	63.33512	-145.8987
10328	63.33363	-145.89832
10329	63.33339	-145.89816
10330	63.32096	-145.91054
10331	63.32096	-145.91056
10332	63.3186	-145.91177
10333	63.32153	-145.65142
10334	63.32163	-145.65216
10335	63.3218	-145.65329
10336	63.32202	-145.65318
10337	63.34126	-145.69636
10338	63.34116	-145.69624
10339	63.34103	-145.6985
10340	63.25316	-146.21627
10341	63.24815	-146.18813
10342	63.25284	-146.18303
10343	63.25236	-146.16034
10344	63.29898	-145.67196
10345	63.34586	-145.69911
10346	63.70124	-145.44707
10347	63.33693	-145.76093
10348	63.35279	-145.77341
10349	63.34495	-145.84636
10350	63.22941	-146.05041
10351	63.23561	-146.06614
10352	63.22845	-146.06337
10353	63.22854	-146.0624
10354	63.23341	-146.03801
10355	63.23338	-146.038
10356	63.30225	-146.08033
10357	63.29444	-145.96462
10358	63.29444	-145.96468
10359	63.29539	-145.96213
10360	63.29567	-145.96077
10361	63.09478	-145.83061
10362	63.11439	-145.75349
10363	63.11444	-145.75367
10364	63.11624	-145.75243
10365	63.10915	-145.77135

Sample no.	Latitude	Longitude
10366	63.07211	-145.63563
10367	63.30468	-145.98338
10368	63.3039	-145.98198
10369	63.30391	-145.98193
10370	63.290343	-145.562973
10371	63.284839	-145.566857
10372	63.282302	-145.568842
10373	63.270881	-145.584952
10374	63.345132	-145.846256
10375	63.345304	-145.846186
10376	63.34524	-145.845993
10377	63.345379	-145.846186
10378	63.345535	-145.846712
10379	63.350573	-145.946874
10380	63.294383	-145.96458
10381	63.294426	-145.964607
10382	63.298831	-146.003959
10383	63.302453	-146.080362
10384	63.320308	-146.170477
10385	63.31882	-146.17027
10386	63.304675	-146.199969
10387	63.324208	-145.972216
10388	63.320855	-145.969091
10389	63.321387	-145.968317
10390	63.321344	-145.968403
10391	63.320599	-145.967107
10392	63.334948	-146.006451
10393	63.336924	-146.006113
10394	63.350516	-145.702997
10395	63.17445	-144.95278
10396	63.176658	-146.222063
10397	63.176577	-146.221292
10398	63.305897	-145.428634
10399	63.482744	-146.308094
10400	63.16981	-144.82502
10401	63.1735	-144.82526
10402	63.18386	-144.81512
10403	63.18582	-144.8229
10404	63.18404	-144.81932
10405	63.18468	-144.81684
10406	63.17068	-144.79257
10407	63.07161	-144.82136
10408	63.07166	-144.8231

Sample no.	Latitude	Longitude
10409	63.18628	-144.85455
10410	63.18387	-144.81514
10411	63.1755	-144.81028
10412	63.07188	-144.82277
10413	63.07513	-144.88108
10414	63.29134	-145.89595
10415	63.32761	-146.08959
10416	63.20176	-145.81143
10417	63.20396	-145.81228
10419	63.20166	-145.36697
10420	63.13223	-145.45095
10421	63.32824	-146.13433
10422	63.27467	-146.41341
10423	63.26855	-146.44556
10424	63.26859	-146.44671
10425	63.29265	-146.4292
10426	63.28471	-146.0497
10427	63.17886	-144.81986
10428	63.17582	-144.80728
10429	63.32034	-146.39754
10430	63.32147	-146.39432
10431	63.3131	-145.98638
10432	63.31665	-146.05333
10433	63.31611	-146.05191
10434	63.28364	-146.04924
10435	63.28929	-146.10462
10436	63.28281	-146.04936
10437	63.3161	-146.05187
10438	63.32762	-146.08282
10439	63.32507	-146.07274
10440	63.30917	-145.99312
10441	63.30913	-145.99305
10442	63.29556	-145.96897
10443	63.28787	-146.10592
10444	63.32518	-146.10332
10445	63.28743	-145.8848
10446	63.32693	-145.73189
10447	63.21801	-145.48269
10448	63.21735	-145.47876
10449	63.2302	-145.47889
10450	63.2176	-145.48072
10451	63.05949	-144.83584
10452	63.05808	-144.83615

Sample no.	Latitude	Longitude
10453	63.05722	-144.83951
10454	63.05826	-144.83737
10455	63.05892	-144.83831
10456	63.05949	-144.83875
10457	63.6567	-145.78512
10458	63.15106	-144.71733
10459	63.30566	-145.99713
10460	63.33579	-145.61263
10461	63.16981	-144.82502
10462	63.18582	-144.8229
10463	63.187	-144.855
10464	63.18387	-144.81514
10465	63.1755	-144.81028
10466	63.07188	-144.82277
10467	63.29134	-145.89595
10468	63.32761	-146.08959
10469	63.17886	-144.81986
10470	63.17582	-144.80728
10471	63.28929	-146.10462
10472	63.28281	-146.04936
10473	63.3161	-146.05187
10474	63.05826	-144.83737
10475	63.17426	-145.0106
10476	63.29166	-145.89512
10477	63.29091	-145.90175
10479	63.110299	-145.429775
10480	63.127057	-145.429484
10481	63.323346	-146.055594
10482	63.317058	-145.990386
10483	63.301464	-145.998772
10484	63.303996	-145.995263
10485	63.268187	-146.494992
10486	63.239632	-146.441984
10487	63.2279	-146.405546
10488	63.142073	-144.812253
10489	63.141381	-144.814328
10490	63.155443	-144.693023
10491	63.15678	-144.692647
10492	63.215618	-144.878587
10493	63.12393	-144.90178
10494	63.180523	-144.947516
10495	63.188439	-144.961878
10496	63.188483	-144.961949

Sample no.	Latitude	Longitude
10497	63.185891	-144.970005
10498	63.321142	-146.031598
10499	63.32116	-146.031558
10500	63.01687	-145.48393
10501	63.01913	-145.48714
10502	63.2739	-146.41373
10503	63.29008	-146.04547
10504	63.22943	-146.43564
10505	63.21733	-145.45766
10506	63.33686	-145.76107
10507	63.33684	-145.76059
10508	63.1755	-144.99919
10509	63.17502	-145.00008
10510	63.1745	-145.00016
10511	63.17426	-145.0106
10512	63.30823	-146.08277
10513	63.30479	-145.98343
10514	63.29166	-145.89512
10515	63.29091	-145.90175
10516	63.29102	-145.90217
10517	63.29286	-145.89458
10518	63.25023	-145.80568
10519	63.32926	-146.13185
10520	63.34372	-145.84697
10521	63.34375	-145.84706
10522	63.34381	-145.84739
10523	63.34381	-145.84739
10524	63.34613	-145.84656
10525	63.31809	-145.86908
10526	63.31809	-145.86908
10527	63.31767	-145.8687
10528	63.30163	-146.07839
10529	63.30152	-146.08204
10530	63.3021	-146.08123
10531	63.10421	-146.1064
10532	63.304924	-145.98432
10533	63.304029	-145.982021
10534	63.305804	-146.306214
10535	63.230541	-146.175048
10536	63.290101	-145.563278
10537	63.282972	-145.569153
10538	63.280789	-145.56675
10539	63.346121	-145.846284

Sample no.	Latitude	Longitude
10540	63.346127	-145.846252
10541	63.345234	-145.849905
10542	63.316628	-146.221753
10543	63.316734	-146.222036
10544	63.317957	-146.201402
10545	63.31786	-146.201267
10546	63.317713	-146.200591
10547	63.317947	-146.200139
10548	63.225296	-145.440661
10549	63.225357	-145.440223
10550	63.225342	-145.439985
10551	63.22455	-145.42001
10552	63.224968	-145.421504
10553	63.166243	-145.512374
10554	63.171077	-145.529179
10555	63.318023	-146.258623
10556	63.28611	-145.610428
10557	63.260618	-145.572169
10558	63.15475	-144.857474
10559	63.154601	-144.857657
10560	63.155183	-144.848576
10561	63.16116	-144.877018
10562	63.161261	-144.877348
10563	63.170194	-144.868687
10564	63.181428	-146.449227
10565	63.322638	-145.779824
10566	63.322075	-145.809236
10567	63.355462	-145.671546
10568	63.127623	-145.433646
10569	63.209737	-144.836374
10570	63.144819	-144.981582
10571	63.165392	-145.036536
10572	63.121636	-144.802934
10573	63.320856	-146.032226
10574	63.114423	-145.753735
10575	63.114365	-145.753797
10576	63.317993	-146.063618
10577	63.728763	-145.617818
10578	63.612436	-145.739856
10579	63.612541	-145.738676
10580	63.712931	-146.742297
10581	63.713069	-146.742323
10582	63.713109	-146.742269
10583	63.712949	-146.741442
10584	63.712759	-146.74128
10585	63.712706	-146.74097
10586	63.717096	-145.765246
10587	63.708106	-145.7691
10588	63.686856	-146.55195
10589	63.686545	-146.567721
10590	63.687668	-146.567002
10591	63.687564	-146.567266
10592	63.688043	-146.545593
10593	63.230755	-146.173224
10594	63.230771	-146.16949
10595	63.137265	-146.09525
10600	63.322903	-146.28175
10601	63.324673	-146.28485
10602	63.323563	-146.31873
10603	63.316473	-146.24588
10604	63.316603	-146.24554
10605	63.325727	-145.574973
10606	63.338746	-145.618711
10607	63.341329	-145.778296
10608	63.34137	-145.77834
10609	63.341265	-145.777883
10610	63.341177	-145.778062
10611	63.34126	-145.77788
10612	63.294628	-145.964459
10613	63.298913	-146.003898
10614	63.298913	-146.003898
10615	63.226149	-145.438063
10616	63.226005	-145.438595
10617	63.225531	-145.439179
10618	63.225533	-145.418862
10619	63.222882	-145.420924
10620	63.317903	-146.258016
10621	63.320246	-146.259611
10622	63.288258	-145.617753
10623	63.285241	-145.608347
10624	63.262815	-145.566681
10625	63.263866	-145.566799
10626	63.264487	-145.623203
10627	63.264671	-145.624964
10628	63.265589	-145.629713
10629	63.15586	-144.8556

Sample no.	Latitude	Longitude
10630	63.15472	-144.85747
10631	63.161173	-144.87981
10632	63.170196	-144.868724
10633	63.170187	-144.868645
10634	63.181409	-146.44926
10635	63.322735	-145.779739
10636	63.322198	-145.809247
10637	63.210514	-144.838497
10638	63.189712	-144.998257
10639	63.122463	-144.803246
10640	63.154425	-144.746171
10641	63.695156	-145.544452
10642	63.728814	-145.618022
10643	63.731618	-145.614297
10644	63.728811	-145.617925
10645	63.720719	-145.771112
10646	63.707267	-145.769678
10647	63.684527	-145.737087
10648	63.636248	-145.676706
10649	63.717443	-145.768536
10650	63.631541	-145.846465
10651	63.604177	-144.933265
10652	63.596491	-144.956017
10653	63.708572	-145.591077
10654	63.329264	-145.931495
10655	63.144944	-144.732363
10656	63.178542	-144.789683
10657	63.175229	-144.8814
10658	63.331233	-145.988246
10659	63.331986	-145.988363
10660	63.332563	-145.988815
10661	63.323892	-145.97394
10662	63.25774	-145.325652
10663	63.253062	-145.334019
10664	63.06926	-144.88534
10665	63.15316	-144.998359
10666	63.153787	-144.998151
10667	63.152245	-144.993265
10668	63.145635	-144.800449
10669	63.14563	-144.80045
10670	63.147729	-144.797781
10671	63.153944	-144.804763
10672	63.152396	-144.802412

Sample no.	Latitude	Longitude
10673	63.080253	-145.176157
10674	63.073816	-145.16611
10675	63.072517	-145.167259
10676	63.092232	-145.199409
10677	63.097947	-145.221819
10678	63.335719	-145.730898
10679	63.543547	-146.00881
10680	63.583896	-145.927747
10681	63.282204	-145.888267
10682	63.280117	-145.93129
10683	63.565659	-145.986456
10684	63.565411	-145.984425
10685	63.565568	-145.987097
10686	63.697174	-145.801621
10687	63.736676	-145.623809
10688	63.684808	-145.535356
10689	63.173599	-145.542159
10690	63.170021	-145.138583
10691	63.033959	-144.853744
10692	63.043724	-144.889052
10693	63.172555	-144.889667
10694	63.176443	-144.879915
10695	63.176342	-144.879928
10696	63.175233	-144.877653
10697	63.031027	-145.355742
10698	63.15965	-146.500642
10699	63.268232	-146.401602
10700	63.323028	-146.317022
10701	63.32337	-146.319671
10702	63.316696	-146.245747
10703	63.328861	-145.588927
10704	63.3293	-145.589246
10705	63.330614	-145.59243
10706	63.327376	-145.576008
10707	63.327461	-145.576879
10708	63.338848	-145.618491
10709	63.338809	-145.618537
10710	63.341122	-145.778349
10711	63.203356	-145.094641
10712	63.20403	-145.099652
10713	63.204743	-145.104526
10714	63.201497	-145.106388
10715	63.198043	-145.109558

Sample no.	Latitude	Longitude
10716	63.29391	-145.96738
10717	63.30118	-146.0808
10718	63.301987	-146.081556
10719	63.324058	-145.972484
10720	63.324037	-145.972466
10721	63.138075	-146.096801
10722	63.31706	-145.99039
10723	63.176071	-144.766075
10724	63.17628	-144.765838
10725	63.252832	-146.183682
10726	63.259954	-146.21394
10727	63.259954	-146.213934
10728	63.287487	-145.884918
10729	63.281383	-145.858289
10730	63.281652	-145.862037
10731	63.239488	-146.325417
10732	63.229607	-146.316253
10733	63.612945	-145.732734
10734	63.611388	-145.739492
10735	63.714832	-146.753016
10736	63.714735	-146.752957
10737	63.71496	-146.7525
10738	63.711852	-146.751107
10739	63.711599	-146.75552
10740	63.712961	-146.760064
10741	63.26073	-146.519308
10742	63.33847	-146.139395
10743	63.181857	-144.862445
10744	63.150948	-144.752898
10745	63.175311	-144.881498
10746	63.799642	-146.366133
10747	63.80138	-146.363653
10748	63.86684	-146.584673
10749	63.867365	-146.585002
10750	63.935757	-146.625545
10751	63.68315	-145.50411
10752	63.148238	-144.812463
10753	63.151247	-144.813352
10754	63.145738	-144.727167
10755	63.145837	-144.727888
10756	63.14747	-144.741828
10757	63.136138	-144.821218
10758	63.292465	-145.856502

Sample no.	Latitude	Longitude
10759	63.341285	-145.778757
10760	63.338318	-145.764977
10761	63.338162	-145.764515
10762	63.337903	-145.763342
10763	63.252432	-146.160777
10764	63.278177	-146.345
10765	63.335707	-145.771298
10766	63.336645	-145.760338
10767	63.188758	-144.802325
10768	63.18798	-144.799448
10769	63.185488	-144.85634
10770	63.06926	-144.88534
10771	63.175311	-144.881498
10772	63.185488	-144.85634
10773	63.328154	-146.087816
10774	63.092208	-145.199461
10775	63.06831	-144.901885
10776	63.185218	-144.861746
10800	63.31541	-146.256589
10801	63.315405	-146.256717
10802	63.349991	-146.059411
10803	63.349974	-146.059427
10804	63.349985	-146.059384
10805	63.34998	-146.059454
10806	63.350092	-146.058987
10807	63.348837	-146.050458
10808	63.132449	-145.473004
10809	63.131601	-145.471808
10810	63.129263	-145.481571
10811	63.185519	-144.856001
10812	63.179231	-144.804311
10813	63.176983	-144.812851
10814	63.177166	-144.814138
10815	63.177531	-144.815667
10816	63.176882	-144.821691
10817	63.175916	-144.823617
10818	63.298873	-145.947301
10819	63.295896	-145.96023
10820	63.295874	-145.960256
10821	63.295638	-145.96075
10822	63.257493	-145.626719
10823	63.237295	-145.56538
10824	63.289686	-145.420723

Sample no.	Latitude	Longitude
10825	63.28989	-145.422064
10826	63.279413	-145.432214
10827	63.291789	-145.440844
10828	63.292309	-145.427004
10829	63.29688	-145.41145
10830	63.295769	-145.409044
10831	63.26811	-145.388045
10832	63.229015	-146.061491
10833	63.229026	-146.061486
10834	63.228506	-146.061931
10835	63.249825	-146.192636
10836	63.249842	-146.192636
10837	63.201864	-144.873385
10838	63.20343	-144.873825
10839	63.200265	-144.875456
10840	63.200094	-144.876239
10841	63.200104	-144.876223
10842	63.195454	-144.876572
10843	63.195593	-144.876583
10844	63.195357	-144.876808
10845	63.194386	-144.88221
10846	63.232127	-145.093527
10847	63.232057	-145.093291
10848	63.230604	-145.093796
10849	63.24934	-146.20972
10850	63.2493	-146.20884
10851	63.11859	-145.51366
10852	63.10227	-145.40028
10853	63.253344	-146.182615
10854	63.252926	-146.183784
10855	63.259782	-146.215224
10856	63.304235	-145.834013
10857	63.304235	-145.834013
10858	63.315404	-146.174161
10859	63.338526	-145.973336
10860	63.338536	-145.973272
10861	63.338542	-145.973251
10862	63.338628	-145.974377
10863	63.347282	-146.075048
10864	63.349401	-146.078969
10865	63.349637	-146.079323
10866	63.34622	-146.082735
10867	63.346075	-146.082794
10868	63.346279	-146.084114
10869	63.22988	-145.09437
10870	63.229858	-145.094321
10871	63.229815	-145.094305
10872	63.229762	-145.094504
10873	63.225519	-145.099842
10874	63.224719	-145.100324
10875	63.217901	-145.110088
10876	63.217907	-145.110099
10877	63.227133	-145.103779
10878	63.224435	-145.106697
10879	63.220144	-145.113247
10880	63.219661	-145.11417
10881	63.612642	-145.732458
10882	63.611214	-145.743339
10883	63.713249	-146.741225
10884	63.713228	-146.741257
10885	63.712654	-146.739508
10886	63.71275	-146.739085
10887	63.712782	-146.739058
10888	63.712815	-146.7388
10889	63.712986	-146.739176
10890	63.712997	-146.739235
10891	63.27981	-145.25137
10892	63.712981	-146.739235
10893	63.713013	-146.738586
10894	63.712911	-146.737765
10895	63.713212	-146.737443
10896	63.713179	-146.735303
10897	63.713104	-146.736821
10898	63.605253	-146.254822
10899	63.606058	-146.262225
10900	63.321194	-146.031217
10901	63.15092	-145.911023
10902	63.134522	-145.912506
10903	63.11442	-145.753635
10904	63.114376	-145.753716
10905	63.321978	-146.065035
10906	63.31906	-146.061248
10907	63.318046	-146.063635
10908	63.342843	-145.93202
10909	63.195974	-144.913204
10910	63.193099	-144.916193

Sample no.	Latitude	Longitude
10911	63.215189	-144.893741
10912	63.206134	-144.875477
10913	63.279824	-145.251384
10914	63.728058	-145.597339
10915	63.733234	-145.606441
10916	63.729174	-145.617143
10917	63.71524	-146.76086
10918	63.69016	-146.65681
10919	63.689993	-146.657069
10920	63.690049	-146.657024
10921	63.691229	-146.655493
10922	63.613277	-146.1808
10923	63.688465	-146.658236
10924	63.68861	-146.659755
10925	63.689373	-146.658599
10926	63.69008	-146.657431
10927	63.690517	-146.656471
10928	63.690271	-146.65686
10929	63.693956	-146.66573
10930	63.686344	-146.553123
10931	63.687031	-146.551884
10932	63.687793	-146.567167
10933	63.688876	-146.56707
10934	63.137281	-146.095304
10935	63.245661	-146.055841
10936	63.316477	-146.199904
10937	63.301885	-146.491283
10938	63.16154	-144.863727
10939	63.157147	-144.852886
10940	63.158837	-144.857923
10941	63.329804	-145.682346
10942	63.326103	-145.67474
10943	63.32755	-145.67399
10944	63.325845	-145.662397
10945	63.309774	-145.671743
10946	63.199189	-145.026702
10947	63.199533	-145.022244
10948	63.198986	-145.021632
10949	63.199425	-145.021053
10950	63.605688	-146.265336
10951	63.604963	-146.264108
10952	63.604802	-146.263534
10953	63.597566	-146.26384

Sample no.	Latitude	Longitude
10954	63.597555	-146.264307
10955	63.597518	-146.264022
10956	63.597609	-146.263867
10957	63.704945	-146.742272
10958	63.701829	-146.748806
10959	63.701813	-146.748902
10960	63.701485	-146.75085
10961	63.70163	-146.750882
10962	63.721237	-146.764682
10963	63.721183	-146.764972
10964	63.721221	-146.765353
10965	63.69384	-146.666202
10966	63.694537	-146.665274
10967	63.71275	-146.727374
10968	63.712514	-146.728555
10969	63.712482	-146.727589
10970	63.712171	-146.723829
10971	63.712466	-146.724252
10972	63.720003	-146.766158
10973	63.719504	-146.766404
10974	63.718914	-146.76626
10975	63.335714	-145.614268
10976	63.335698	-145.614353
10977	63.33273	-145.927627
10978	63.328692	-145.934511
10979	63.302512	-146.452971
10980	63.297143	-146.480689
10981	63.326087	-146.384682
10982	63.325975	-146.385266
10983	63.269596	-146.391515
10984	63.242108	-146.49197
10985	63.330088	-145.994387
10986	63.330029	-145.987612
10987	63.329026	-145.986729
10988	63.329038	-145.986544
10989	63.325995	-145.979807
10990	63.325963	-145.979818
10991	63.325914	-145.97978
10992	63.279786	-145.256925
10993	63.261237	-145.324656
10994	63.255627	-145.329307
10995	63.25317	-145.333851
10996	63.253007	-145.333841

Sample no.	Latitude	Longitude
10997	63.263502	-145.378594
10998	63.263395	-145.376046
10999	63.162498	-144.718044
11000	63.224816	-146.189582
11001	63.209702	-146.118268
11002	63.209938	-144.921106
11003	63.195834	-144.890067
11004	63.12457	-146.07438
11005	63.347473	-146.001208
11006	63.347075	-145.999351
11007	63.341202	-145.997558
11008	63.341269	-145.99755
11009	63.483269	-146.307589
11010	63.483033	-146.307669
11011	63.483093	-146.307902
11012	63.328154	-146.087816
11013	63.171942	-146.488235
11014	63.268642	-146.480532
11015	63.27983	-146.309715
11016	63.34671	-145.696927
11017	63.153123	-144.796198
11018	63.145557	-144.798807
11019	63.144975	-144.803949
11020	63.580393	-144.944935
11021	63.594198	-144.958323
11022	63.634613	-145.160193
11023	63.627903	-145.269087
11024	63.27021	-145.382207
11025	63.579537	-146.271249
11026	63.595785	-146.273217
11027	63.595517	-146.274676
11028	63.592781	-146.246101
11029	63.593119	-146.246862
11030	63.593092	-146.246927
11031	63.592797	-146.246396
11032	63.592851	-146.246315
11033	63.592877	-146.246229
11034	63.590962	-146.241965
11035	63.34962	-146.051053
11036	63.348585	-146.051434
11037	63.348451	-146.053424
11038	63.348939	-146.054685
11039	63.348864	-146.054749

Sample no.	Latitude	Longitude
11040	63.348875	-146.054776
11041	63.348548	-146.056777
11042	63.347829	-146.058161
11043	63.347856	-146.057652
11044	63.801612	-146.535481
11045	63.801633	-146.53554
11046	63.803264	-146.531828
11047	63.807147	-146.516926
11048	63.234682	-145.088563
11049	63.299307	-145.401955
11050	63.265375	-145.381037
11051	63.265507	-145.381217
11052	63.237186	-145.121566
11053	63.240472	-145.108258
11054	63.270382	-145.284613
11055	63.233788	-145.089152
11056	63.235072	-145.05163
11057	63.23505	-145.051332
11058	63.235053	-145.051242
11059	63.28576	-145.216818
11060	63.286198	-145.211645
11061	63.287195	-145.211168
11062	63.276457	-145.049252
11063	63.209835	-145.093312
11068	63.33881	-145.974318
11100	63.199222	-145.01909
11101	63.175398	-145.000317
11102	63.175785	-144.998251
11103	63.168751	-144.95825
11104	63.174454	-144.952784
11105	63.183058	-144.94295
11106	63.205723	-145.016128
11107	63.051165	-144.895455
11108	63.145806	-144.800054
11109	63.169994	-144.856914
11110	63.170922	-144.859746
11111	63.170198	-144.868715
11112	63.170257	-144.86871
11113	63.209814	-144.921293
11114	63.197642	-144.889709
11115	63.182841	-144.83213
11116	63.310286	-146.499715
11117	63.217038	-146.145207

Sample no.	Latitude	Longitude
11118	63.124503	-146.074395
11119	63.124686	-146.074502
11120	63.12011	-146.071381
11121	63.240243	-145.414461
11122	63.350068	-145.871773
11123	63.350358	-145.871977
11124	63.349703	-145.873405
11125	63.34966	-145.873345
11126	63.348893	-145.875207
11127	63.333198	-145.890228
11128	63.333637	-145.885722
11129	63.348498	-145.948542
11130	63.347677	-145.95043
11131	63.324487	-145.633371
11132	63.325061	-145.634985
11133	63.32651	-145.637067
11134	63.327003	-145.639781
11135	63.327588	-145.639641
11136	63.327475	-145.638987
11137	63.352441	-145.658881
11138	63.717387	-145.536562
11139	63.482755	-146.308046
11140	63.483077	-146.307831
11141	63.482653	-146.308035
11142	63.36287	-146.070627
11143	63.323769	-145.973198
11144	63.323752	-145.973375
11145	63.31974	-145.97249
11146	63.319724	-145.972421
11147	63.331777	-146.288768
11148	63.356631	-145.698464
11149	63.356374	-145.698786
11150	63.356331	-145.698807
11151	63.353804	-145.700197
11152	63.353799	-145.700272
11153	63.353842	-145.700197
11154	63.354019	-145.700143
11155	63.354088	-145.700143
11156	63.354974	-145.699885
11157	63.27954	-145.630799
11158	63.279803	-146.309693
11159	63.279916	-146.309816
11160	63.346723	-145.697558

Sample no.	Latitude	Longitude
11161	63.152753	-144.796041
11162	63.151776	-144.795521
11163	63.150001	-144.793735
11164	63.148783	-144.792109
11165	63.146804	-144.794416
11166	63.145645	-144.799014
11167	63.145409	-144.801969
11168	63.144883	-144.803954
11169	63.600465	-145.058056
11170	63.600755	-145.056544
11171	63.594182	-144.958351
11172	63.648782	-145.044778
11173	63.649553	-145.043601
11174	63.635592	-145.160452
11175	63.642079	-145.2588
11176	63.280173	-145.618714
11177	63.279792	-145.620302
11178	63.674905	-145.4186
11179	63.147807	-144.813003
11180	63.148821	-144.811947
11181	63.149926	-144.81237
11182	63.151111	-144.813169
11183	63.151347	-144.813368
11184	63.151669	-144.813743
11185	63.213723	-144.841132
11186	63.213303	-144.84218
11187	63.214952	-144.84844
11188	63.34106	-145.783307
11189	63.338404	-145.76546
11190	63.338163	-145.764982
11191	63.33819	-145.76488
11192	63.337927	-145.764516
11193	63.337321	-145.761555
11194	63.336103	-145.771656
11195	63.25233	-146.160326
11196	63.252319	-146.161437
11197	63.278269	-146.345247
11200	63.162756	-144.717733
11201	63.162745	-144.717749
11202	63.163716	-144.719031
11203	63.163678	-144.719009
11204	63.164429	-144.720028
11205	63.162756	-144.717802

Sample no.	Latitude	Longitude
11206	63.163083	-144.71917
11207	63.284228	-145.263614
11208	63.284024	-145.263973
11209	63.281964	-145.257681
11210	63.281347	-145.256088
11211	63.280044	-145.255128
11212	63.278794	-145.251593
11213	63.278182	-145.245488
11214	63.276358	-145.229836
11215	63.278273	-145.221785
11216	63.215375	-145.08278
11217	63.214677	-145.080172
11218	63.213615	-145.071734
11219	63.213577	-145.071782
11220	63.213593	-145.069926
11221	63.21237	-145.063167
11222	63.214807	-145.060165
11223	63.711299	-146.8778
11224	63.708166	-146.875424
11225	63.56804	-146.176265
11226	63.568024	-146.179446
11227	63.568115	-146.179612
11228	63.235384	-146.278344
11229	63.22461	-146.18769
11230	63.224753	-146.189218
11231	63.20983	-146.118723
11232	63.206866	-145.060775
11233	63.208052	-145.056698
11234	63.207574	-145.058844
11235	63.207312	-145.059294
11236	63.335114	-146.29403
11237	63.335001	-146.294196
11238	63.331343	-146.300537
11239	63.332571	-146.298295
11240	63.322053	-146.39099
11241	63.321737	-146.391044
11242	63.320482	-146.391897
11243	63.320305	-146.392525
11244	63.320358	-146.392326
11245	63.321328	-145.632014
11246	63.321349	-145.629375
11247	63.321269	-145.629074
11248	63.321886	-145.628725

Sample no.	Latitude	Longitude
11249	63.322175	-145.630206
11250	63.349598	-145.669937
11251	63.3522	-145.659396
11252	63.352237	-145.659112
11253	63.352275	-145.659085
11254	63.352425	-145.65879
11255	63.208835	-145.064449
11256	63.208749	-145.064069
11257	63.208808	-145.063849
11258	63.2134	-145.041694
11259	63.296878	-145.341481
11260	63.2969	-145.344769
11261	63.33897	-145.929628
11262	63.340445	-145.928314
11263	63.34029	-145.932793
11264	63.340655	-145.935148
11265	63.145777	-145.990973
11266	63.150439	-146.063171
11267	63.150965	-146.061792
11268	63.152879	-145.966184
11269	63.174898	-145.92439
11270	63.321387	-146.308407
11271	63.321736	-146.308928
11272	63.31311	-145.985215
11273	63.313046	-145.983869
11274	63.580851	-146.272741
11275	63.598071	-146.275293
11276	63.592561	-146.246337
11277	63.592953	-146.246455
11278	63.592931	-146.246535
11279	63.592674	-146.246331
11280	63.590989	-146.241815
11281	63.352179	-146.052818
11282	63.349025	-146.050243
11283	63.348907	-146.050705
11284	63.348923	-146.050415
11285	63.801542	-146.535508
11286	63.803274	-146.53185
11287	63.803296	-146.531871
11288	63.806831	-146.525434
11289	63.807142	-146.516936
11290	63.267	-145.382826
11291	63.270186	-145.383947

Sample no.	Latitude	Longitude
11292	63.265396	-145.381013
11293	63.265331	-145.380911
11294	63.263776	-145.387133
11295	63.235808	-145.122006
11296	63.236777	-145.121542
11297	63.270372	-145.284568
11298	63.27048	-145.284536
11299	63.233881	-145.089166
11300	63.092208	-145.199461
11301	63.06831	-144.901885
11302	63.185218	-144.861746
11303	63.579129	-145.922287
11304	63.280896	-145.888773
11305	63.566427	-145.98762
11306	63.566818	-145.985657
11307	63.56657	-145.985
11308	63.368835	-145.689533
11309	63.238984	-145.792318
11310	63.748781	-145.646012
11311	63.615238	-145.725061
11312	63.352361	-145.65909
11313	63.352425	-145.658956
11314	63.352425	-145.658956
11315	63.150713	-146.068771
11316	63.151478	-145.966227
11317	63.32092	-146.30904
11318	63.321698	-146.306835
11319	63.321424	-146.307243
11320	63.181812	-144.862915
11321	63.138556	-144.632823
11322	63.138765	-144.632866
11323	63.799962	-146.366233
11324	63.234166	-145.08893
11325	63.234546	-145.088474
11326	63.234305	-145.088689
11327	63.231687	-145.078238
11328	63.231617	-145.078309
11329	63.229268	-145.070316
11330	63.22901	-145.070504
11331	63.226033	-145.068257
11332	63.29697	-145.408309
11333	63.297078	-145.408636
11334	63.295253	-145.384603

Sample no.	Latitude	Longitude
11335	63.234948	-145.051176
11336	63.234943	-145.051176
11337	63.234889	-145.051391
11338	63.234921	-145.051439
11339	63.234975	-145.051434
11340	63.285627	-145.2171
11341	63.285616	-145.21702
11342	63.286239	-145.211473
11343	63.285493	-145.211457
11344	63.235172	-145.050337
11345	63.276428	-145.04927
11346	63.276462	-145.049318
11347	63.274495	-145.138782
11348	63.274505	-145.138843
11349	63.206593	-145.06283
11350	63.208325	-145.057015
11351	63.33508	-146.29442
11352	63.33247	-146.29692
11353	63.3221	-146.3911
11354	63.3221	-146.3911
11355	63.3204	-146.39201
11356	63.32031	-146.39238
11357	63.50811	-145.850717
11358	63.499774	-145.85672
11359	63.333288	-145.890255
11360	63.333257	-145.884848
11361	63.347812	-145.950838
11362	63.346642	-145.990797
11363	63.342126	-146.002309
11364	63.17912	-145.13913
11365	63.043403	-144.890241
11366	63.307184	-146.079884
11367	63.323731	-145.9733
11368	63.323758	-145.973407
11369	63.319729	-145.972544
11370	63.331793	-146.288682
11371	63.356583	-145.698517
11372	63.356347	-145.698898
11373	63.356352	-145.698877
11374	63.353724	-145.700631
11375	63.353751	-145.70062
11376	63.353944	-145.700186
11377	63.35543	-145.69951

Sample no.	Latitude	Longitude
11378	63.280554	-145.617115
11379	63.280173	-145.618268
11380	63.352425	-145.658956
11381	63.352425	-145.658956
11382	63.352425	-145.658956
11383	63.208797	-145.064423
11384	63.208742	-145.064381
11385	63.208663	-145.064128
11386	63.208985	-145.064058
11387	63.34046	-145.92777
11388	63.340805	-145.931318
11389	63.340558	-145.933367

Sample no.	Latitude	Longitude
11390	63.340708	-145.935277
11391	63.146812	-145.990866
11392	63.801829	-146.363213
11393	63.802059	-146.360761
11394	63.866965	-146.586758
11395	63.869106	-146.58517
11396	63.869186	-146.585154
11397	63.86784	-146.584173
11398	63.683978	-145.50358
11399	63.689444	-145.511674

Table B-7. Analytical results for reanalyzed USGS stream sediment samples

Map numbers in Table B-7 refer to Plate 2 (in pocket).

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
1	MH476S	0.028			0.009	<0.05				<2	8.027	79	1.727	6.18	1.62	1.722	1.645	0.06	0.425	<8	945	1	<50	3
2	MH478S	0.056			<0.005	<0.05				<2	7.35	157	3.145	7.56	0.67	1.664	1.655	0.06	0.93	<8	503	1	<50	<2
3	MH479S	0.036			0.012	<0.05				<2	7.555	21	4.988	7.77	0.7	3.46	1.74	0.07	0.805	<8	954	1	<50	<2
4	MH480S	0.036			0.046	<0.05				<2	7.06	<10	3.58	8.5	0.66	2.525	2.305	0.05	0.78	<8	314	1	<50	<2
5	MH481S	0.026			0.078	<0.05				<2	7.11	13	3.79	6.33	0.77	2.599	2.105	0.12	0.835	<8	463	1	<50	2
6	MH671S	2.09			0.042	0.08				<2	7.625	22	3.465	8.39	0.67	1.953	1.865	0.045	0.835	<8	366	1	<50	<2
7	MH672S	0.165			0.073	<0.05				<2	7.64	46	3.625	8.09	0.68	2.273	2.41	0.055	0.92	<8	307	1	<50	<2
8	MH670S	0.046			0.048	<0.05				<2	7.1	16	3.845	7.55	0.49	2.352	1.855	0.08	0.855	<8	298	1	<50	<2
9	MH669S	0.1			0.063	0.09				<2	5.945	29	2.42	3.68	0.67	1.118	1.39	0.22	0.395	<8	378	<1	<50	<2
10	MH668S	0.151			0.147	<0.05				<2	6.66	<10	3.955	7.68	0.44	2.373	1.93	0.1	0.96	<8	295	1	<50	<2
11	MH673S	0.069			0.056	0.09				<2	7.315	<10	3.67	5.86	0.66	1.948	2.015	0.085	0.835	<8	371	1	<50	<2
12	MH667S	0.052			0.036	<0.05				<2	7.255	30	3.31	8.2	0.59	1.88	1.615	0.045	0.525	<8	375	1	<50	<2
13	MH666S	0.022			0.026	0.09				<2	7.39	11	3.625	6.44	0.64	2.053	2.11	0.055	0.855	<8	388	2	<50	<2
14	MH665S	0.065			0.052	<0.05				<2	7.07	<10	3.375	6	0.63	2.111	1.87	0.085	0.785	<8	429	1	<50	<2
15	MH222S	0.014			<0.005	<0.05				<2	7.655	21	5.88	7.49	0.43	3.234	1.49	0.055	0.78	<8	371	1	<50	<2
16	MH224S	0.019			<0.005	<0.05				<2	7.387	24	5.14	7.97	0.42	3.266	1.445	0.055	0.81	<8	151	1	<50	<2
17	MH225S	0.067			<0.005	<0.05				<2	7.786	<10	4.673	8.59	1.01	2.426	2.43	0.085	0.8	<8	429	1	<50	<2
18	MH226S	0.199			<0.005	<0.05				<2	7.355	64	3.554	9.82	0.61	2	1.765	0.06	1.32	<8	208	2	<50	<2
19	MH228S	0.019			<0.005	<0.05				<2	7.781	<10	5.544	8.45	0.38	2.935	1.855	0.05	0.83	<8	155	1	<50	<2
20	MH227S	0.023			<0.005	<0.05				<2	7.917	26	1.691	5.93	1.43	1.927	1.685	0.08	0.585	<8	579	1	<50	<2
21	MH229S	0.019			<0.005	<0.05				<2	8.043	80	4.499	8.7	0.4	2.389	1.76	0.05	0.845	<8	117	1	<50	<2
22	MH230S	0.023			<0.005	0.41				<2	8.111	27	3.98	6.4	1.19	1.864	1.995	0.075	0.61	<8	527	1	<50	<2
23	MH675S	1.33			0.036	<0.05				<2	6.29	24	8.115	9.19	0.89	1.344	1.21	0.085	0.445	<8	482	<1	<50	2
24	MH674S	0.085			0.073	<0.05				<2	7.135	12	3.99	7.53	0.47	2.452	1.71	0.065	0.845	<8	214	1	<50	<2
25	MH209S	0.019			0.015	<0.05				<2	6.945	53	3.07	4.86	1.16	1.695	1.96	0.085	0.405	<8	754	1	<50	<2
26	MH210S	0.025			<0.005	<0.05				<2	7.324	70	2.431	5.09	1.52	1.05	1.54	0.11	0.31	<8	1290	1	<50	3
27	MH208S	0.026			0.029	<0.05				<2	7.77	<10	6.55	7.94	0.33	3.185	1.645	0.05	0.8	<8	207	1	<50	<2
28	MH207S	0.024			0.046	<0.05				<2	7.515	<10	6.46	9.29	0.31	2.82	1.59	0.05	0.34	<8	160	1	<50	<2
29	MH206S	0.017			0.032	<0.05				<2	7.26	<10	7.45	9.17	0.16	3.18	1.275	0.035	0.78	<8	84	1	<50	<2
30	MH416S	0.03			0.069	<0.05				<2	7.09	<10	5.525	7.6	0.69	2.741	1.615	0.05	0.995	<8	152	1	<50	<2
31	MH417S	0.66			0.036	<0.05				<2	7.5	<10	5.375	9.16	0.28	3.318	1.76	0.045	0.92	<8	132	1	<50	3
32	MH205S	0.017			0.027	<0.05				<2	7.405	<10	4.905	7.5	0.44	2.51	1.865	0.06	0.74	<8	266	1	<50	<2
33	MH678S	0.128			0.066	0.12				<2	7.34	<10	5.595	9.28	0.3	3.082	2.11	0.05	0.635	<8	134	<1	<50	<2
34	MH338S	0.016			<0.005	<0.05				<2	6.778	<10	3.848	5.22	0.48	1.654	1.67	0.08	0.7	<8	286	1	<50	<2
35	MH677S	0.106			0.073	<0.05				<2	6.71	<10	5.325	10.11	0.57	2.662	1.77	0.06	0.87	<8	303	1	<50	<2
36	MH679S	0.013			0.009	<0.05				<2	7.005	10	4.375	6.56	0.64	2.237	1.84	0.095	0.835	<8	368	1	<50	<2
37	MH676S	0.04			0.027	<0.05				<2	7.045	25	3.215	5.01	0.79	1.68	1.985	0.08	0.595	<8	447	1	<50	<2
38	MH680S	0.03			0.02	<0.05				<2	6.51	12	3.105	4.4	0.65	1.57	1.77	0.065	0.58	<8	427	1	<50	<2
39	MH340S	0.029			0.008	<0.05				<2	7.618	<10	3.113	4.73	0.55	1.575	1.41	0.115	0.795	<8	364	1	<50	<2
40	MH341S	0.027			<0.005	<0.05				<2	7.644	<10	3.696	5.8	0.59	1.853	1.545	0.095	0.83	<8	381	1	<50	<2
41	MH681S	0.032			0.03	<0.05				<2	7.25	<10	2.765	4.57	0.75	1.36	1.87	0.095	0.685	<8	421	1	<50	<2
42	MH343S	0.015			<0.005	<0.05				<2	7.917	<10	6.148	8.01	0.33	2.809	1.32	0.045	0.75	<8	179	1	<50	<2
43	MH345S	0.022			0.006	<0.05				<2	7.529	14	3.974	6.2	0.53	2.394	1.33	0.09	0.805	<8	317	1	<50	<2
44	MH346D	<0.005			0.008	<0.05				<2	5.376	10	2.284	3.3	0.6	1.239	1.165	0.125	0.41	<8	462	<1	<50	<2
45	MH347S	0.016			0.007	<0.05				<2	6.914	<10	4.867	5.74	0.48	2.399	1.55	0.06	0.715	<8	512	1	<50	2
46	MH348S	0.032			0.017	<0.05				<2	7.445	17	3.644	6.01	0.64	2.662	1.365	0.12	0.695	<8	472	1	<50	<2
47	MH349S	0.018			0.011	<0.05				<2	7.665	<10	5.261	7.54	0.48	3.124	1.385	0.075	0.895	<8	329	1	<50	<2

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Ce ppm	Co ppm	Cr ppm	Cu ppm	Eu ppm	Ga ppm	Ho ppm	La ppm	Li ppm	Mn ppm	Mo ppm	Nb ppm	Nd ppm	Ni ppm	Pb ppm	Sc ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn ppm
1	MH476S	27	33	75	117	<2	13	<4	15	27	1220	6	9	15	44	146	23	<50	192	<40	<6	<100	210	17	3	256
2	MH478S	35	28	201	104	<2	12	<4	20	18	2070	2	19	18	53	<4	32	<50	251	<40	<6	<100	294	29	4	81
3	MH479S	16	36	106	167	<2	14	<4	9	16	1300	2	12	12	78	<4	36	<50	189	<40	<6	<100	328	22	3	99
4	MH480S	18	40	113	173	<2	13	<4	9	14	1370	3	10	13	73	<4	33	<50	203	<40	<6	<100	268	22	3	91
5	MH481S	47	25	107	78	2	15	<4	26	23	1260	3	19	25	48	6	27	<50	355	<40	<6	<100	291	24	3	111
6	MH671S	17	36	123	121	<2	14	<4	9	19	1160	4	12	12	73	<4	33	<50	202	<40	<6	<100	242	22	3	98
7	MH672S	17	40	119	127	<2	13	<4	9	11	1390	3	13	12	81	<4	32	<50	214	<40	<6	<100	340	22	3	89
8	MH670S	25	32	136	119	<2	14	<4	13	16	1310	3	12	15	63	<4	29	<50	239	<40	<6	<100	269	21	2	109
9	MH669S	23	16	177	50	<2	11	<4	12	18	826	3	7	14	28	7	16	<50	292	<40	<6	<100	169	17	2	113
10	MH668S	23	33	138	112	<2	12	<4	11	14	1690	3	18	15	64	<4	27	<50	236	<40	<6	<100	340	21	3	119
11	MH673S	25	20	84	72	2	14	<4	14	22	1160	3	13	15	46	<4	25	<50	333	<40	<6	<100	255	23	3	93
12	MH667S	21	30	131	100	<2	14	<4	12	21	1110	3	8	14	66	<4	32	<50	187	<40	<6	<100	153	21	3	105
13	MH666S	42	24	93	75	<2	14	<4	22	18	1230	2	12	20	51	<4	26	<50	315	<40	<6	<100	274	20	2	108
14	MH665S	29	24	142	74	<2	12	<4	15	21	1190	3	15	16	55	4	25	<50	293	<40	<6	<100	269	22	3	126
15	MH222S	18	39	160	202	<2	14	<4	9	14	1330	2	11	14	87	<4	36	<50	255	<40	<6	<100	281	23	3	86
16	MH224S	13	43	116	285	<2	14	<4	8	14	1380	3	13	12	67	4	38	<50	228	<40	<6	<100	320	22	3	91
17	MH225S	20	32	134	219	<2	15	<4	11	11	1410	7	12	15	44	<4	28	<50	322	<40	<6	<100	316	25	3	76
18	MH226S	16	54	195	629	<2	14	<4	9	16	1420	10	29	15	79	<4	35	<50	209	<40	<6	<100	379	25	3	89
19	MH228S	16	38	119	223	<2	15	<4	9	13	1310	<2	12	14	75	<4	38	<50	243	<40	<6	<100	249	24	3	87
20	MH227S	29	26	46	104	<2	15	<4	16	35	846	3	13	16	50	7	23	<50	191	<40	<6	<100	220	20	3	97
21	MH229S	17	44	88	225	<2	15	<4	9	12	1530	<2	11	14	83	<4	38	<50	250	<40	<6	<100	319	24	3	89
22	MH230S	20	30	51	194	<2	15	<4	12	18	1150	3	12	14	50	5	25	<50	327	<40	<6	<100	249	20	3	84
23	MH675S	18	19	47	125	<2	12	<4	11	17	1700	6	7	13	35	6	16	<50	264	<40	<6	<100	361	24	3	60
24	MH674S	18	37	95	249	<2	13	<4	9	17	1410	5	12	13	64	<4	31	<50	227	<40	<6	<100	306	22	3	85
25	MH209S	30	21	73	82	<2	12	<4	17	34	784	4	10	14	55	10	19	<50	249	<40	<6	<100	165	17	2	116
26	MH210S	26	17	84	70	<2	12	<4	18	25	655	10	5	18	51	7	23	<50	212	<40	<6	<100	206	28	4	213
27	MH208S	14	39	114	176	<2	15	<4	8	11	1250	3	11	18	80	<4	36	<50	236	<40	<6	<100	258	24	3	80
28	MH207S	18	36	115	248	<2	17	<4	12	11	1450	3	5	13	73	4	34	<50	266	<40	<6	<100	90	26	3	85
29	MH206S	18	37	158	142	<2	14	<4	8	8	1250	4	11	15	72	<4	37	<50	245	<40	<6	<100	275	25	3	83
30	MH416S	16	33	71	157	<2	14	<4	9	11	1220	3	14	14	56	5	32	<50	249	<40	<6	<100	256	24	3	75
31	MH417S	16	46	146	249	<2	14	<4	9	15	1630	4	14	13	84	<4	41	<50	187	<40	<6	<100	357	24	3	99
32	MH205S	26	30	104	120	<2	15	<4	12	16	1240	3	12	18	59	4	33	<50	223	<40	<6	<100	260	23	3	82
33	MH678S	16	40	86	161	<2	15	<4	9	14	1430	4	6	13	68	4	38	<50	194	<40	<6	<100	205	25	3	84
34	MH338S	28	22	100	69	<2	12	<4	15	16	1030	<2	13	16	49	5	23	<50	233	<40	<6	<100	186	19	2	68
35	MH677S	23	33	120	102	<2	13	<4	13	12	1450	4	11	16	60	<4	30	<50	251	<40	<6	<100	293	26	3	90
36	MH679S	24	24	89	88	<2	13	<4	13	16	1300	4	13	15	46	<4	27	<50	290	<40	<6	<100	282	24	3	92
37	MH676S	24	19	68	53	<2	13	<4	13	17	1030	2	11	14	37	<4	21	<50	323	<40	<6	<100	208	19	3	73
38	MH680S	25	17	64	56	<2	12	<4	14	19	844	3	11	13	36	<4	19	<50	290	<40	<6	<100	190	18	3	67
39	MH340S	37	16	156	46	<2	13	<4	20	14	753	<2	18	19	48	5	23	<50	240	<40	<6	<100	198	20	2	67
40	MH341S	36	25	142	53	<2	13	<4	20	16	1270	<2	18	19	52	5	25	<50	282	<40	<6	<100	243	20	2	92
41	MH681S	38	22	126	30	<2	12	<4	21	16	1390	3	15	19	38	5	21	<50	289	<40	<6	<100	186	23	3	70
42	MH343S	21	30	107	126	<2	15	<4	11	11	1040	<2	12	15	67	<4	33	<50	310	<40	<6	<100	233	22	3	73
43	MH345S	27	27	103	138	2	15	<4	15	15	975	<2	16	16	61	4	27	<50	275	<40	<6	<100	296	20	2	80
44	MH346D	27	17	92	53	<2	10	<4	17	11	976	<2	10	21	37	5	19	<50	206	<40	<6	<100	148	21	3	72
45	MH347S	26	26	143	62	<2	12	<4	14	12	960	<2	15	16	73	<4	28	<50	274	<40	<6	<100	203	22	3	81
46	MH348S	29	31	144	136	<2	13	<4	17	17	1120	<2	14	17	87	6	30	<50	244	<40	<6	<100	273	24	3	118
47	MH349S	26	33	199	127	<2	13	<4	14	15	1250	<2	13	17	98	<4	30	<50	296	<40	<6	<100	261	23	3	90

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
48	MH350S	0.024			0.01	<0.05				<2	7.34	<10	6.279	7.98	0.34	3.182	1.4	0.05	0.86	<8	312	1	<50	<2
49	MH328S	0.036			0.038	<0.05				<2	8.132	<10	4.898	6.98	0.58	2.793	1.395	0.08	0.885	<8	343	1	<50	<2
50	MH329S	0.019			0.045	0.05				<2	7.628	<10	4.988	7.52	0.39	3.323	1.075	0.08	0.7	<8	237	1	<50	<2
51	MH330S	0.022			0.034	0.08				<2	7.97	<10	7.77	8.18	0.23	3.119	1.21	0.05	0.785	<8	129	1	<50	<2
52	MH331S	0.024			0.033	<0.05				<2	7.844	<10	4.914	7.09	0.54	3.024	1.33	0.085	0.835	<8	316	1	<50	<2
53	MH344S	0.016			0.011	<0.05				<2	7.996	<10	5.99	7.79	0.38	2.777	1.29	0.05	0.75	<8	225	1	<50	<2
54	MH332S	0.017			0.016	<0.05				<2	7.733	10	3.465	5.75	0.68	2.368	1.44	0.115	0.665	<8	380	1	<50	<2
55	MH334S	0.022			0.024	<0.05				<2	7.712	<10	4.977	7.07	0.59	2.762	1.435	0.08	0.865	<8	322	1	<50	3
56	MH333S	0.019			0.027	<0.05				<2	7.97	<10	3.617	6.17	0.58	2.226	1.435	0.1	0.82	<8	338	1	<50	<2
57	MH335S	0.48			0.012	<0.05				<2	7.319	<10	4.363	6.33	0.61	2.263	1.685	0.07	0.845	<8	341	1	<50	<2
58	MH336S	0.061			0.012	<0.05				<2	6.995	<10	3.83	5.71	0.72	2.016	1.83	0.09	0.89	<8	403	1	<50	<2
59	MH339S	0.224			<0.005	<0.05				<2	7.114	<10	4.253	6.15	0.64	1.733	1.855	0.06	0.97	<8	339	1	<50	<2
60	MH337S	0.035			0.007	<0.05				<2	7.329	<10	5.586	6.95	0.43	2.436	1.57	0.065	0.99	<8	248	1	<50	<2
61	MH050S	0.022			0.082	0.1				<2	7.32	<10	6.04	8.56	0.34	3.31	1.27	0.06	0.86	<8	177	1	<50	<2
62	MH049S	0.052			0.21	0.2				<2	7.38	<10	5.055	7.5	0.52	2.51	1.46	0.055	0.69	<8	279	1	<50	<2
63	MH197S	<0.005			0.005	<0.05				<2	7.41	<10	5.405	7.83	0.44	2.425	1.35	0.06	0.7	<8	260	1	<50	<2
64	MH048S	<0.005			<0.005	<0.05				<2	7.295	<10	5.265	7.2	0.54	2.13	1.16	0.04	0.41	<8	847	1	<50	<2
65	MH047S	<0.005			<0.005	<0.05				<2	6.625	<10	3.175	6.27	0.78	2.13	1.01	0.07	0.78	<8	2100	2	<50	<2
66	MH046S	<0.005			<0.005	<0.05				<2	4.885	14	2.39	5.31	0.58	2.06	0.63	0.05	0.555	<8	638	1	<50	<2
67	MH198S	<0.005			<0.005	<0.05				<2	6.58	<10	5.65	8.65	0.42	3.1	1.02	0.035	0.265	<8	635	<1	<50	<2
68	MH045S	<0.005			<0.005	<0.05				<2	7.11	<10	6.51	8.73	0.29	3.48	1.195	0.04	0.45	<8	373	1	<50	<2
69	MH199S	0.013			<0.005	<0.05				2	6.345	16	3.395	5.77	0.63	3.12	1.57	0.08	0.755	<8	386	2	<50	<2
70	MH204S	0.014			0.017	<0.05				<2	7.205	46	1.91	3.72	0.82	0.97	2.67	0.045	0.265	<8	694	1	<50	<2
71	MH196S	<0.005			<0.005	<0.05				<2	7.32	24	2.97	5.06	1.1	1.955	2.22	0.065	0.495	<8	605	1	<50	<2
72	MH195D	<0.005			<0.005	<0.05				<2	6.84	34	2.58	3.86	0.96	1.585	2.225	0.08	0.455	<8	469	1	<50	<2
73	MH194D	<0.005			<0.005	<0.05				<2	7.42	37	1.45	4.42	1.35	1.05	2.005	0.175	0.685	<8	614	2	<50	<2
74	MH193S	0.013			0.005	0.07				<2	6.715	<10	2.675	3.58	0.86	1.895	2.38	0.085	0.4	<8	534	1	<50	<2
75	MH191S	<0.005			<0.005	<0.05				<2	6.65	25	2.31	5.1	0.99	2.86	2.085	0.055	0.34	<8	654	1	<50	<2
76	MH190S	0.024	0.9	3	0.01	0.009	4	1	4	<2	5.47	59	1.58	7.05	0.82	3.515	1.51	0.075	0.365	<8	894	<1	<50	<2
77	MH192S	<0.005			<0.005	<0.05				<2	7.425	14	3.515	7.4	1.4	2.755	2.065	0.12	0.475	<8	664	1	<50	<2
78	MH187S	0.007			0.01	<0.05				<2	6.915	32	1.125	5.55	1.25	2.13	1.95	0.095	0.4	<8	1120	1	<50	2
79	MH188S	0.04	0.8	8	0.008	0.01	<1	<1	2	<2	6.86	31	2.47	6.13	1.33	3.895	1.585	0.05	0.365	<8	616	<1	<50	<2
80	MH189S	0.007			<0.005	<0.05				<2	7.985	25	2.185	4.9	1.28	2.065	1.64	0.055	0.415	<8	687	1	<50	<2
81	MH183S	0.016			<0.005	<0.05				<2	6.195	114	1.43	5.47	0.93	0.975	1.6	0.19	1.59	<8	390	3	<50	<2
82	MH182S	0.015			<0.005	<0.05				<2	5.785	87	1.72	4.03	0.83	0.94	1.88	0.255	1.04	<8	323	2	<50	<2
83	MH177S	0.015	0.9	6	0.036	0.042	<1	<1	1	<2	6.635	<10	2.15	6.21	1.37	2.485	1.465	0.07	0.695	<8	799	2	<50	<2
84	MH178S	0.017	0.7	5	0.006	0.005	<1	<1	1	<2	7.69	25	2.705	6.34	1.04	4.33	2.295	0.05	0.44	<8	607	1	<50	<2
85	MH181S	0.302			<0.005	0.07				<2	6.145	23	1.43	3.82	0.99	1.115	1.735	0.175	0.68	<8	432	2	<50	<2
86	MH179S	0.006	3.9	13	0.016	0.016	<1	2	8	<2	3.615	<10	4.885	9.37	0.07	13.28	0.625	0.01	0.465	<8	70	<1	<50	<2
87	MH180S	<0.005			<0.005	<0.05				<2	6.68	27	1.995	3.92	1.01	1.28	2.03	0.185	0.68	<8	442	2	<50	<2
88	MH314S	0.013			0.008	<0.05				<2	7.492	27	3.26	4.2	1.02	1.092	1.805	0.21	1.06	<8	408	2	<50	<2
89	MH315S	0.013	3.6	16	0.018	0.018	<1	2	9	<2	2.683	<10	10.42	6.42	0.17	12.12	0.325	0.025	0.23	<8	94	<1	<50	<2
90	MH316S	0.025	6.8	23	0.05	0.058	<1	5	13	<2	2.084	11	1.99	13.97	0.11	15.65	0.325	0.015	0.145	<8	118	<1	<50	2
91	MH317S	0.017	1.1	9	0.01	0.012	<1	<1	3	<2	6.164	<10	6.027	7.61	0.24	7.891	1.075	0.045	0.675	<8	132	<1	<50	<2
92	MH312S	0.033			0.03	<0.05				<2	7.019	11	4.531	6.14	1	4.2	1.46	0.055	0.505	<8	399	1	<50	<2
93	MH202S	0.013	0.9	5	0.016	0.017	2	<1	2	<2	6.35	18	5.605	7.69	0.43	6.82	1.365	0.05	0.62	<8	303	<1	<50	<2
94	MH203S	0.029			0.039	<0.05				<2	6.84	<10	3.055	5.33	0.97	3.455	1.61	0.05	0.5	<8	582	1	<50	<2

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Ce ppm	Co ppm	Cr ppm	Cu ppm	Eu ppm	Ga ppm	Ho ppm	La ppm	Li ppm	Mn ppm	Mo ppm	Nb ppm	Nd ppm	Ni ppm	Pb ppm	Sc ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn ppm
48	MH350S	23	35	135	120	<2	14	<4	12	11	1290	<2	12	16	80	<4	37	<50	266	<40	<6	<100	281	25	3	84
49	MH328S	30	31	103	191	<2	16	<4	15	17	1200	<2	14	18	75	5	33	<50	325	<40	<6	<100	283	23	3	90
50	MH329S	20	38	148	261	<2	14	<4	11	13	1370	<2	11	14	95	<4	35	<50	225	<40	<6	<100	249	21	2	90
51	MH330S	19	34	100	160	<2	17	<4	10	9	1290	<2	11	15	74	<4	41	<50	277	<40	<6	<100	233	27	3	74
52	MH331S	25	35	118	267	<2	13	<4	13	13	1330	<2	15	15	77	<4	34	<50	272	<40	<6	<100	307	22	3	85
53	MH344S	23	33	114	161	<2	16	<4	13	12	1170	<2	12	16	71	5	35	<50	308	<40	<6	<100	265	23	3	77
54	MH332S	26	26	115	103	<2	16	<4	14	17	879	<2	14	15	68	6	25	<50	282	<40	<6	<100	265	18	2	87
55	MH334S	27	32	106	205	<2	14	<4	15	15	1170	<2	16	16	70	<4	33	<50	268	<40	<6	<100	294	23	3	84
56	MH333S	31	25	94	122	<2	15	<4	16	16	1100	<2	18	17	59	4	29	<50	237	<40	<6	<100	266	21	3	78
57	MH335S	30	29	169	83	<2	12	<4	17	15	1270	<2	13	17	75	<4	28	<50	274	<40	<6	<100	253	22	3	76
58	MH336S	34	22	130	60	<2	13	<4	19	18	1320	3	18	18	54	4	23	<50	309	<40	<6	<100	258	23	3	75
59	MH339S	32	19	127	36	2	12	<4	19	13	1570	<2	15	19	39	<4	26	<50	332	<40	<6	<100	200	26	3	68
60	MH337S	25	30	111	102	<2	15	<4	15	12	1310	<2	14	16	57	<4	33	<50	265	<40	<6	<100	297	24	3	76
61	MH050S	20	36	137	190	<2	16	<4	10	13	1380	3	11	17	72	<4	35	<50	233	<40	<6	<100	281	21	2	85
62	MH049S	25	35	165	127	<2	17	<4	15	21	1500	<2	9	23	84	5	31	<50	264	<40	<6	<100	212	24	3	93
63	MH197S	26	34	195	126	<2	16	<4	13	17	1430	3	9	15	82	6	31	<50	268	<40	<6	<100	200	23	3	91
64	MH048S	29	34	97	117	<2	15	<4	18	10	1620	<2	6	24	71	<4	31	<50	260	<40	<6	<100	99	29	3	110
65	MH047S	33	29	99	114	3	13	<4	19	19	2250	3	13	28	71	<4	24	<50	190	<40	<6	<100	206	24	3	129
66	MH046S	20	30	190	74	<2	10	<4	11	17	1300	3	9	13	121	<4	19	<50	133	<40	<6	<100	186	16	2	105
67	MH198S	23	38	334	103	<2	14	<4	13	9	2150	3	<4	17	116	8	32	<50	234	<40	<6	<100	75	29	3	102
68	MH045S	23	45	212	153	<2	17	<4	14	9	1640	3	6	20	113	<4	40	<50	247	<40	<6	<100	120	30	3	88
69	MH199S	31	29	601	62	2	13	<4	20	20	1300	3	12	23	209	8	21	<50	231	<40	<6	<100	201	20	2	91
70	MH204S	34	15	58	40	<2	13	<4	21	16	561	5	7	17	28	5	13	<50	193	<40	<6	<100	113	14	2	65
71	MH196S	29	21	79	61	2	13	<4	17	24	863	3	11	28	53	6	21	<50	246	<40	<6	<100	186	19	3	72
72	MH195D	34	18	162	41	<2	11	<4	18	22	819	2	11	19	64	6	17	<50	289	<40	<6	<100	140	17	2	62
73	MH194D	67	17	107	54	3	14	<4	38	37	869	3	19	33	50	9	16	<50	252	<40	8	<100	161	23	3	106
74	MH193S	37	15	103	66	2	11	<4	22	15	687	2	9	24	106	6	16	<50	288	<40	<6	<100	124	18	2	49
75	MH191S	18	28	407	59	<2	11	<4	12	19	791	6	6	16	225	6	15	<50	225	<40	<6	<100	132	14	2	86
76	MH190S	20	47	661	98	<2	9	<4	12	24	875	6	5	16	396	7	17	<50	169	<40	<6	<100	190	13	2	251
77	MH192S	43	28	254	117	<2	14	<4	22	16	1330	5	10	23	78	9	24	<50	507	<40	<6	<100	283	21	3	91
78	MH187S	31	31	274	91	<2	12	<4	20	30	866	8	7	26	209	10	18	<50	209	<40	<6	<100	201	20	3	302
79	MH188S	21	38	764	102	3	12	<4	12	17	1160	5	4	14	291	18	19	<50	182	<40	<6	<100	168	16	3	119
80	MH189S	28	23	140	115	<2	14	<4	16	22	878	4	7	19	74	15	21	<50	266	<40	<6	<100	164	18	3	118
81	MH183S	86	21	144	53	3	7	<4	52	33	3490	5	44	51	58	6	16	<50	223	<40	11	<100	119	59	7	80
82	MH182S	122	21	68	52	3	10	<4	68	31	1240	2	22	53	48	24	11	<50	258	<40	14	<100	106	28	3	78
83	MH177S	103	36	593	39	<2	14	<4	60	22	1200	3	11	43	404	8	15	<50	272	<40	13	<100	132	20	3	82
84	MH178S	17	42	322	105	<2	11	<4	10	15	1140	2	6	12	292	8	24	<50	204	<40	<6	<100	208	17	3	95
85	MH181S	84	17	87	40	3	9	<4	47	35	987	2	19	44	46	7	13	<50	229	<40	10	<100	126	25	3	81
86	MH179S	<5	92	1750	53	<2	4	<4	<2	7	1310	5	<4	13	1180	<4	27	<50	91	<40	<6	<100	222	9	2	65
87	MH180S	62	16	82	40	3	12	<4	37	34	750	3	17	37	52	8	18	<50	304	<40	7	<100	155	28	3	82
88	MH314S	106	14	128	44	3	16	<4	61	27	1320	<2	21	50	41	12	30	<50	469	<40	12	<100	178	46	5	69
89	MH315S	7	78	750	63	<2	<4	<4	6	3	893	<2	<4	<9	1070	<4	13	<50	115	<40	<6	<100	114	9	1	51
90	MH316S	<5	115	2750	297	<2	<4	<4	<2	8	1190	3	<4	<9	1640	33	15	<50	60	<40	<6	<100	116	5	2	88
91	MH317S	17	81	655	201	<2	10	<4	11	9	1090	<2	9	12	553	5	29	<50	205	<40	<6	<100	250	16	2	98
92	MH312S	28	33	328	77	<2	11	<4	17	19	900	<2	9	14	225	7	26	<50	272	<40	<6	<100	210	18	3	122
93	MH202S	20	64	689	141	<2	12	<4	14	11	1210	4	8	20	471	<4	27	<50	220	<40	<6	<100	260	19	2	126
94	MH203S	23	33	351	43	<2	11	<4	13	20	1070	2	7	17	200	6	20	<50	250	<40	<6	<100	185	16	2	78

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
95	MH664S	0.012			0.007	<0.05				<2	7.865	<10	3.21	6.36	0.78	2.048	1.6	0.05	0.605	<8	469	1	<50	<2
96	MH201S									<2	6.295	34	4.61	7.48	0.54	3.75	1.47	0.07	0.87	<8	413	1	<50	<2
97	MH200S	0.034			0.032	<0.05				<2	6.99	19	4.035	6.08	0.67	2.525	1.525	0.075	0.755	<8	776	1	<50	<2
98	MH042S	0.005	1.1	6	0.018	0.018	<1	1	1	<2	4.25	<10	3.64	8.73	0.29	10.58	0.925	0.03	0.465	<8	207	<1	<50	<2
99	MH043S	<0.005			<0.005	<0.05				<2	5.265	53	3.19	10.07	0.49	2.82	1.32	0.075	0.63	<8	811	1	<50	<2
100	MH044S	<0.005			<0.005	<0.05				<2	6.78	<10	4.855	6.63	0.68	2.695	1.69	0.055	0.815	<8	778	1	<50	<2
101	MH351S	0.021			0.008	<0.05				<2	7.492	<10	3.885	5.94	0.69	2.363	1.665	0.08	0.77	<8	470	1	<50	<2
102	MH351D	0.015			0.012	<0.05				<2	7.361	<10	4.242	6.06	0.64	2.378	1.675	0.07	0.82	<8	446	1	<50	<2
103	MH682S	0.064			0.045	<0.05				<2	6.84	<10	4.32	6.52	0.58	2.982	1.51	0.075	0.85	<8	638	1	<50	<2
104	MH685S	0.018			0.012	<0.05				<2	5.915	<10	3.56	6.07	0.57	4.499	1.555	0.065	0.665	<8	453	1	<50	<2
105	MH684S	0.091			0.053	0.17				<2	6.39	<10	3.71	5.89	0.67	2.846	1.39	0.085	0.68	<8	1570	1	<50	4
106	MH683S	0.042			0.027	<0.05				<2	7.41	<10	5.675	7.68	0.39	2.951	1.235	0.07	0.84	<8	262	1	<50	2
107	MH039S									<2	6.735	<10	4.505	6.35	0.54	3.035	1.71	0.06	0.92	<8	423	1	<50	<2
108	MH040S	<0.005			<0.005	<0.05				<2	6.515	<10	4.42	6.19	0.55	3.14	1.85	0.06	0.775	<8	416	1	<50	<2
109	MH041S	0.014			<0.005	<0.05				<2	6.495	27	3.945	6.72	0.52	4.195	1.76	0.065	0.62	<8	437	1	<50	<2
110	MH038S	<0.005			<0.005	<0.05				<2	7.065	<10	3.39	4.64	0.8	2.045	2.125	0.065	0.61	<8	434	1	<50	<2
111	MH037S	<0.005			<0.005	<0.05				<2	7.155	<10	2.875	4.32	0.85	1.7	2.22	0.065	0.54	<8	420	1	<50	<2
112	MH036S	<0.005			<0.005	<0.05				2	6.985	13	2.975	4.95	0.8	2.305	1.88	0.075	0.525	<8	457	1	<50	<2
113	MH661S	0.022			0.017	<0.05				<2	7.025	<10	4.405	6.3	0.56	2.951	1.665	0.065	0.6	<8	356	<1	<50	2
114	MH662S	0.021	0.4	<3	0.005	0.006	<1	<1	1	<2	6.24	21	2.76	4.84	0.75	3.024	1.545	0.07	0.495	<8	505	1	<50	<2
115	MH663S	0.043			0.036	<0.05				<2	6.3	51	3.655	6.39	0.71	4.279	1.005	0.07	0.465	<8	912	<1	<50	<2
116	MH313S	0.012			0.018	<0.05				<2	6.531	<10	4.489	6.43	0.73	4.877	1.435	0.055	0.585	<8	364	1	<50	<2
117	MH655S	0.029			0.034	0.07				<2	6.56	<10	3.485	6.4	0.83	3.749	1.59	0.07	0.615	<8	445	1	<50	<2
118	MH318S	0.01	2.2	6	0.025	0.062	<1	4	7	<2	5.99	<10	5.229	7.55	0.33	8.526	1.165	0.045	0.42	<8	259	<1	<50	<2
119	MH319S	0.013	1.2	4	0.012	0.012	<1	<1	2	<2	6.442	<10	5.387	7.87	0.53	6.463	1.33	0.075	0.535	<8	379	<1	<50	<2
120	MH320S	0.031	2.2	3	0.013	0.023	<1	<1	1	<2	6.725	13	4.935	7.36	0.95	4.925	1.445	0.055	0.48	<8	760	<1	<50	<2
121	MH321S	0.027			0.06	<0.05				<2	8.285	<10	5.864	8.01	0.4	3.413	1.615	0.055	0.595	<8	367	<1	<50	2
122	MH011S	<0.005			<0.005	<0.05				<2	7.64	<10	4.81	5.64	0.86	2.52	2.16	0.085	0.44	<8	475	<1	<50	<2
123	MH010S	<0.005			<0.005	<0.05				<2	7.22	<10	5.43	11.05	0.68	2.53	1.865	0.075	0.61	<8	569	<1	<50	<2
124	MH654S	0.033			0.034	<0.05				<2	7.25	<10	2.7	4.6	1.27	1.964	1.7	0.055	0.39	<8	665	1	<50	<2
125	MH009S	<0.005			<0.005	<0.05				<2	7.19	37	4.055	5.28	1.35	2.47	1.93	0.05	0.51	<8	1170	1	<50	<2
126	MH008S	<0.005			<0.005	<0.05				<2	5.94	<10	4.73	18.55	0.51	2.18	1.47	0.085	0.74	<8	566	<1	<50	<2
127	MH534S	0.064			0.041	0.07				<2	7.095	<10	3.05	5.15	0.93	2.226	1.505	0.045	0.535	<8	583	1	<50	<2
128	MH007S	<0.005			<0.005	<0.05				<2	7.885	27	5.59	5.71	1.01	2.29	1.97	0.065	0.47	<8	1060	<1	<50	<2
129	MH660S	0.021			0.018	<0.05				<2	7	<10	3.815	5.5	0.73	2.515	1.635	0.065	0.495	<8	420	<1	<50	2
130	MH657S	0.106			0.018	<0.05				<2	7.02	<10	2.54	5	0.81	2.651	1.645	0.065	0.475	<8	455	1	<50	<2
131	MH006S	<0.005			<0.005	<0.05				<2	8.005	<10	5.645	7.47	0.42	1.96	1.805	0.055	0.71	<8	817	1	<50	<2
132	MH659S	0.018			0.013	<0.05				<2	6.79	<10	3.845	5.18	0.64	2.41	1.775	0.045	0.55	<8	429	<1	<50	<2
133	MH035S	<0.005			<0.005	<0.05				<2	6.695	<10	3.72	5.07	0.64	2.935	1.94	0.055	0.58	<8	401	1	<50	<2
134	MH030S	<0.005			<0.005	<0.05				<2	7.13	<10	3.685	5.88	0.73	2.84	1.825	0.07	0.63	<8	434	1	<50	<2
135	MH034S	<0.005			<0.005	<0.05				<2	6.745	<10	3.85	5.55	0.63	3.185	1.76	0.065	0.625	<8	579	1	<50	<2
136	MH031S	<0.005			<0.005	<0.05				<2	6.655	<10	3.625	4.93	0.67	2.815	1.86	0.065	0.54	<8	409	1	<50	<2
137	MH032S	<0.005			<0.005	<0.05				<2	7.01	<10	4.3	5.99	0.68	3.07	1.905	0.045	0.775	<8	360	1	<50	<2
138	MH033S	<0.005			<0.005	<0.05				<2	6.53	<10	4.055	6.22	0.55	4.41	1.77	0.055	0.635	<8	444	1	<50	<2
139	MH687S	0.03			0.026	<0.05				<2	6.455	14	3.13	4.87	0.8	2.893	1.56	0.095	0.46	<8	453	1	<50	<2
140	MH686S	0.06	0.4	<3	0.007	0.008	<1	<1	1	<2	6.46	<10	3.8	5.99	0.53	4.825	1.49	0.05	0.585	<8	359	<1	<50	<2
141	MH690S	0.024			0.006	<0.05				<2	6.335	<10	3.325	4.85	0.66	2.956	1.61	0.075	0.495	<8	448	1	<50	<2

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map	Sample	Ce	Co	Cr	Cu	Eu	Ga	Ho	La	Li	Mn	Mo	Nb	Nd	Ni	Pb	Sc	Sn	Sr	Ta	Th	U	V	Y	Yb	Zn
no.	no.	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
95	MH664S	22	32	478	92	<2	15	<4	14	56	1030	3	7	14	183	<4	30	<50	307	<40	<6	<100	243	26	3	94
96	MH201S	37	39	777	77	<2	13	<4	25	26	1850	6	14	16	195	5	27	<50	247	<40	<6	<100	249	23	3	97
97	MH200S	31	31	219	118	2	14	<4	16	17	1300	10	13	24	96	4	25	<50	271	<40	<6	<100	245	21	3	99
98	MH042S	9	84	1180	138	<2	6	<4	6	21	1420	3	<4	10	741	6	23	<50	144	<40	<6	<100	183	11	2	96
99	MH043S	19	55	632	59	<2	6	<4	13	24	5880	4	6	19	334	7	19	<50	211	<40	<6	<100	217	18	3	125
100	MH044S	29	32	186	79	<2	13	<4	16	14	1630	3	13	22	104	5	27	<50	306	<40	<6	<100	228	24	3	91
101	MH351S	30	29	178	88	<2	14	<4	15	16	1150	<2	13	16	80	<4	27	<50	280	<40	<6	<100	239	20	3	79
102	MH351D	29	29	202	75	<2	13	<4	15	14	1170	<2	17	16	82	5	26	<50	295	<40	<6	<100	244	21	2	83
103	MH682S	27	29	199	105	<2	13	<4	15	15	1300	4	12	16	101	5	30	<50	259	<40	<6	<100	281	24	3	93
104	MH685S	27	37	726	56	3	10	<4	15	14	1190	2	7	15	241	4	23	<50	241	<40	<6	<100	200	19	3	80
105	MH684S	32	28	246	93	<2	10	<4	17	15	2040	5	12	17	115	12	25	<50	247	<40	<6	<100	244	24	3	172
106	MH683S	23	34	116	187	<2	16	<4	12	10	1230	3	11	16	72	<4	32	<50	285	<40	<6	<100	265	25	3	86
107	MH039S	24	31	367	80	3	15	<4	14	18	1150	2	13	20	109	<4	29	<50	242	<40	<6	<100	291	22	3	96
108	MH040S	25	29	508	62	3	12	<4	15	23	1160	2	10	22	142	<4	24	<50	289	<40	<6	<100	223	22	3	112
109	MH041S	24	43	444	94	<2	12	<4	15	27	1640	3	7	22	257	4	24	<50	250	<40	<6	<100	221	18	3	81
110	MH038S	28	21	270	53	<2	12	<4	17	26	871	<2	9	23	93	5	21	<50	318	<40	<6	<100	183	18	2	70
111	MH037S	30	21	249	53	2	12	<4	19	33	835	<2	10	21	117	6	19	<50	320	<40	<6	<100	163	18	3	71
112	MH036S	34	30	367	63	2	12	<4	20	34	1190	<2	9	21	188	8	21	<50	257	<40	<6	<100	182	18	3	83
113	MH661S	24	33	597	94	<2	14	<4	15	21	1250	3	7	15	178	<4	31	<50	254	<40	<6	<100	254	25	3	85
114	MH662S	27	27	327	36	<2	11	<4	16	38	966	3	9	15	186	8	20	<50	218	<40	<6	<100	177	20	2	102
115	MH663S	20	39	424	65	<2	10	<4	12	37	1170	3	5	11	267	6	29	<50	176	<40	<6	<100	253	19	2	124
116	MH313S	29	38	547	56	<2	10	<4	20	14	1090	<2	7	16	290	6	26	<50	282	<40	<6	<100	226	17	3	81
117	MH655S	32	32	807	37	3	12	<4	20	16	1270	3	10	17	227	6	24	<50	308	<40	<6	<100	250	23	3	80
118	MH318S	12	66	910	124	<2	8	<4	8	12	1230	<2	<4	9	603	8	26	<50	234	<40	<6	<100	203	14	3	94
119	MH319S	11	51	758	131	<2	10	<4	9	11	1310	<2	6	10	472	9	34	<50	250	<40	<6	<100	297	20	3	117
120	MH320S	17	44	617	86	<2	11	<4	11	13	1090	<2	6	11	389	6	28	<50	248	<40	<6	<100	262	18	2	85
121	MH321S	9	41	111	126	<2	14	<4	7	15	1210	<2	9	9	78	<4	42	<50	232	<40	<6	<100	315	25	3	89
122	MH011S	20	26	83	67	<2	12	<4	14	13	1070	2	7	22	63	7	27	<50	361	<40	<6	<100	234	20	3	71
123	MH010S	17	32	383	98	<2	14	<4	13	9	1280	3	8	21	72	5	29	<50	374	<40	<6	<100	510	22	4	80
124	MH654S	28	19	113	47	<2	13	<4	16	14	932	3	7	13	57	9	21	<50	232	<40	<6	<100	170	19	3	78
125	MH009S	17	22	51	86	<2	11	<4	11	17	969	3	9	16	42	12	24	<50	215	<40	<6	<100	200	19	3	84
126	MH008S	10	40	564	71	<2	14	<4	12	8	1350	9	7	19	79	7	24	<50	308	<40	<6	<100	866	20	5	80
127	MH534S	31	27	244	52	<2	13	<4	18	16	1110	3	8	16	138	5	23	<50	238	<40	<6	<100	186	20	3	72
128	MH007S	20	26	36	98	<2	13	<4	12	15	1060	<2	7	11	29	7	27	<50	319	<40	<6	<100	210	20	3	81
129	MH660S	25	26	313	60	<2	13	<4	14	24	1110	3	8	14	128	7	27	<50	256	<40	<6	<100	216	22	3	86
130	MH657S	32	25	555	52	<2	14	<4	16	23	887	2	8	17	183	<4	22	<50	240	<40	<6	<100	182	19	3	88
131	MH006S	21	32	561	162	<2	17	<4	14	5	1280	3	10	16	64	5	31	<50	425	<40	<6	<100	287	24	3	60
132	MH659S	32	23	489	39	<2	13	<4	20	11	958	2	8	16	136	6	23	<50	295	<40	<6	<100	202	19	3	69
133	MH035S	25	26	515	42	<2	12	<4	16	17	1110	2	7	22	145	6	22	<50	276	<40	<6	<100	179	18	2	76
134	MH030S	34	33	829	80	<2	13	<4	20	28	1420	3	8	23	223	5	24	<50	279	<40	<6	<100	208	21	3	98
135	MH034S	26	31	355	60	2	12	<4	15	21	1160	2	8	19	156	<4	25	<50	267	<40	<6	<100	207	19	3	93
136	MH031S	23	26	249	44	<2	11	<4	14	18	1300	<2	9	15	136	6	20	<50	274	<40	<6	<100	185	16	2	89
137	MH032S	27	30	438	40	3	12	<4	16	17	1210	2	11	13	121	<4	25	<50	316	<40	<6	<100	223	18	3	92
138	MH033S	22	37	566	55	2	11	<4	13	16	1630	2	7	16	216	<4	25	<50	266	<40	<6	<100	224	17	3	89
139	MH687S	25	26	247	63	<2	12	<4	15	19	930	4	9	13	154	8	20	<50	260	<40	<6	<100	184	15	2	71
140	MH686S	18	40	759	65	<2	11	<4	11	15	1170	3	6	11	272	<4	24	<50	247	<40	<6	<100	222	15	2	80
141	MH690S	24	30	395	56	<2	10	<4	14	16	975	3	8	13	183	6	21	<50	268	<40	<6	<100	173	18	2	82

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
142	MH691S	0.593			<0.005	<0.05				<2	6.88	<10	3.255	4.26	0.86	2.105	1.99	0.06	0.49	<8	491	1	<50	<2
143	MH021S	0.036			0.026	<0.05				<2	7.26	<10	4.38	8.2	0.48	2.389	1.67	0.05	0.65	<8	276	1	<50	<2
144	MH020S	3.82			0.035	<0.05				<2	6.87	<10	3.655	5.33	0.72	2.835	1.855	0.06	0.59	<8	431	1	<50	<2
145	MH484S	0.019			0.036	<0.05				<2	7.25	<10	3.15	4.84	0.86	2.095	1.885	0.07	0.565	<8	520	1	<50	<2
146	MH001S									<2	6.81	16	3.93	6.82	0.86	2.14	1.93	0.08	0.615	<8	473	1	<50	<2
147	MH002S	<0.005			<0.005	<0.05				<2	7.26	<10	4.425	6.75	0.81	2.405	2.05	0.07	0.6	<8	451	1	<50	<2
148	MH482S	0.026			0.035	<0.05				<2	7.025	<10	4.115	6.82	0.69	2.578	1.93	0.055	0.75	<8	410	1	<50	<2
149	MH022S	0.033			0.017	<0.05				<2	6.895	<10	3.47	4.43	0.88	1.864	2.055	0.06	0.59	<8	476	1	<50	<2
150	MH688S	0.04			0.013	0.2				<2	6.665	<10	3.715	5.6	0.66	2.741	1.755	0.075	0.69	<8	548	1	<50	<2
151	MH689S	0.021			<0.005	<0.05				<2	3.545	11	1.85	1.96	0.47	1.118	0.69	0.16	0.185	<8	284	<1	<50	<2
152	MH120S	0.016			<0.005	<0.05				<2	7.649	10	2.961	5.4	1.19	1.775	1.74	0.105	0.445	<8	562	1	<50	<2
153	MH725S	0.035			0.008	<0.05				<2	7.055	63	4.05	7.98	1.06	2.258	1.805	0.105	0.6	<8	494	1	<50	<2
154	MH003S	<0.005			<0.005	<0.05				<2	7.275	30	4.41	5.35	0.97	2.165	1.94	0.09	0.605	<8	462	1	<50	<2
155	MH726D	0.03			0.014	<0.05				<2	6.82	<10	3.975	9.48	0.84	2.636	1.725	0.085	0.665	<8	474	1	<50	<2
156	MH119S	0.015			<0.005	<0.05				<2	7.98	49	4.478	6.83	1.36	2.105	2.06	0.13	0.49	<8	546	1	<50	<2
157	MH115S	0.031			0.006	<0.05				<2	7.195	12	4.245	11.79	1.22	1.99	2.04	0.135	0.445	<8	454	1	<50	<2
158	MH117S	0.014			0.029	<0.05				<2	7.275	11	3.965	9.66	1.17	1.88	1.88	0.105	0.525	<8	501	1	<50	<2
159	MH118S	0.006			<0.005	<0.05				<2	7.896	<10	4.3	3.89	1.72	1.381	1.85	0.065	0.44	<8	927	1	<50	3
160	MH727D	0.215			0.006	<0.05				<2	6.97	<10	3.62	6.66	0.89	3.371	1.76	0.08	0.47	<8	542	<1	<50	<2
161	MH004S	<0.005			<0.005	<0.05				<2	7.125	<10	3.405	9.76	1.32	1.42	1.705	0.075	0.78	<8	712	2	<50	<2
162	MH309S	0.017			<0.005	<0.05				<2	7.366	<10	3.722	4.35	0.95	3.229	2.13	0.06	0.38	<8	632	<1	<50	<2
163	MH116S	0.015			0.036	<0.05				<2	7.325	<10	3.99	6.17	1.56	1.57	1.835	0.08	0.585	<8	1020	1	<50	<2
164	MH310S	0.014	0.5	4	0.005	0.01	<1	<1	<1	<2	7.067	<10	4.232	6.97	0.82	3.943	1.78	0.07	0.5	<8	516	<1	<50	2
165	MH656S	0.023	2.8	3	0.012	0.014	<1	2	11	<2	4.025	<10	2.365	7.62	0.36	12.24	0.565	0.025	0.325	<8	216	<1	<50	<2
166	MH311S	0.019			0.009	<0.05				<2	7.445	<10	4.174	5.88	1.39	2.137	1.55	0.05	0.575	<8	697	1	<50	<2
167	MH005S	<0.005			<0.005	<0.05				<2	7.875	<10	5.185	6.13	1.13	2.315	2.235	0.06	0.405	<8	494	<1	<50	<2
168	MH305S	0.018			0.016	<0.05				<2	7.324	<10	5.313	10.42	1.23	2.436	2.025	0.1	0.45	<8	539	<1	<50	2
169	MH304S	0.018			0.011	<0.05				<2	8.563	<10	6.279	5.59	0.42	2.882	1.915	0.04	0.45	<8	415	<1	<50	<2
170	MH299S	0.015			<0.005	<0.05				<2	8.111	<10	5.061	5.43	0.43	1.491	2.235	0.045	0.535	<8	544	<1	<50	<2
171	MH302D	0.02			<0.005	<0.05				<2	7.245	17	4.736	4.72	0.65	1.481	1.495	0.06	0.385	<8	531	<1	<50	<2
172	MH300D	0.016			<0.005	<0.05				<2	7.886	12	4.279	7.34	0.71	3.56	1.61	0.06	0.52	<8	461	<1	<50	<2
173	MH301D	0.018			0.01	<0.05				<2	7.791	<10	5.213	5.77	0.54	2.641	1.655	0.065	0.51	<8	514	<1	<50	2
174	MH306S	0.008			0.01	<0.05				<2	8.5	<10	4.82	5.35	0.51	1.628	2.68	0.06	0.48	<8	385	<1	<50	<2
175	MH308S	0.014			<0.005	<0.05				<2	7.917	28	1.985	4.06	2.1	1.496	2.595	0.06	0.38	<8	1280	1	<50	<2
176	MH658S	0.031			0.019	<0.05				<2	7.685	58	4.505	6.39	1.44	2.336	1.6	0.075	0.41	<8	611	1	<50	<2
177	MH307S	0.057			0.101	<0.05				<2	8.384	<10	2.94	4.89	1.26	2.037	2.11	0.045	0.4	<8	972	<1	<50	2
178	MH533S	0.015			0.021	1				<2	8.475	10	4.64	5	0.45	2.09	2.82	0.04	0.515	<8	332	<1	<50	<2
179	MH532D	0.018			0.023	0.06				<2	7.85	<10	4.525	6.5	0.55	2.945	1.655	0.065	0.475	<8	391	<1	<50	<2
180	MH531D	0.02			0.03	<0.05				<2	8.385	18	3.99	6.77	1.07	1.533	2.225	0.065	0.435	<8	500	<1	<50	2
181	MH530D	0.012			0.023	<0.05				<2	7.52	<10	3.61	6.09	0.72	4.048	1.595	0.05	0.445	<8	466	<1	<50	<2
182	MH303D	0.014			0.017	<0.05				<2	8.358	<10	5.423	6.58	0.49	2.982	1.92	0.045	0.465	<8	361	<1	<50	<2
183	MH443D	0.02			<0.005	<0.05				<2	9.555	21	0.777	5.4	3.16	1.722	0.97	0.105	0.61	<8	1810	3	<50	4
184	MH444D	0.015			0.014	0.05				<2	6.883	18	6.258	9.66	1.16	5.051	1.29	0.305	0.54	<8	392	<1	<50	<2
185	MH111S	<0.005			0.036	<0.05				<2	6.69	12	7.095	10.27	0.6	4.275	1.815	0.07	0.605	<8	487	<1	<50	<2
186	MH112S	0.007			0.028	<0.05				<2	7.81	<10	5.125	9.01	1.58	2.515	2.425	0.13	0.4	<8	507	1	<50	<2
187	MH110S	0.124			0.658	0.41				<2	2.885	<10	10.25	16.37	0.32	6.565	0.66	0.07	0.47	<8	167	<1	<50	<2
188	MH113S	0.018			0.026	<0.05				<2	7.23	<10	4.915	8.27	0.7	2.665	1.605	0.07	0.645	<8	423	1	<50	<2

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Ce ppm	Co ppm	Cr ppm	Cu ppm	Eu ppm	Ga ppm	Ho ppm	La ppm	Li ppm	Mn ppm	Mo ppm	Nb ppm	Nd ppm	Ni ppm	Pb ppm	Sc ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn ppm
142	MH691S	27	22	161	29	<2	12	<4	14	14	940	2	9	13	90	6	19	<50	329	<40	<6	<100	162	17	2	66
143	MH021S	23	30	182	130	<2	15	<4	12	16	1130	3	8	15	95	<4	31	<50	257	<40	<6	<100	171	22	3	86
144	MH020S	25	26	336	45	<2	12	<4	13	13	998	2	9	14	135	7	23	<50	306	<40	<6	<100	205	19	3	71
145	MH484S	27	20	161	43	<2	13	<4	16	17	1070	3	12	14	86	4	21	<50	304	<40	<6	<100	189	20	3	84
146	MH001S	24	24	170	34	<2	12	<4	16	18	1190	2	10	17	59	10	20	<50	375	<40	<6	<100	309	17	2	129
147	MH002S	25	26	250	36	<2	12	<4	15	12	991	3	9	19	94	4	22	<50	382	<40	<6	<100	284	17	2	77
148	MH482S	30	28	244	69	<2	14	<4	15	11	1120	3	10	17	98	<4	24	<50	327	<40	<6	<100	246	21	3	74
149	MH022S	28	18	91	21	<2	13	<4	15	22	804	2	11	14	48	4	19	<50	338	<40	<6	<100	180	17	2	65
150	MH688S	25	25	336	60	<2	12	<4	13	12	961	3	11	15	132	4	23	<50	286	<40	<6	<100	233	21	3	86
151	MH689S	16	9	98	92	<2	7	<4	12	11	330	<2	<4	13	33	5	16	<50	140	<40	<6	<100	82	25	2	50
152	MH120S	34	21	88	66	2	16	<4	21	21	967	<2	10	22	41	9	21	<50	410	<40	<6	<100	247	23	3	86
153	MH725S	24	25	393	27	<2	13	<4	16	20	1230	3	9	15	64	10	23	<50	441	<40	<6	<100	383	20	3	94
154	MH003S	25	19	197	25	<2	13	<4	13	19	1030	2	11	22	56	9	23	<50	445	<40	<6	<100	240	18	3	112
155	MH726D	22	30	744	38	<2	13	<4	14	17	1160	4	6	14	110	5	24	<50	369	<40	<6	<100	437	20	3	102
156	MH119S	28	23	127	38	<2	14	<4	17	17	1030	<2	9	17	39	6	23	<50	608	<40	<6	<100	318	19	3	78
157	MH115S	22	25	140	57	<2	13	<4	15	15	1050	3	6	13	39	4	18	<50	657	<40	<6	<100	540	16	3	69
158	MH117S	21	25	154	46	<2	13	<4	14	15	1010	3	7	15	41	5	20	<50	465	<40	<6	<100	442	17	3	66
159	MH118S	30	16	41	32	<2	14	<4	17	23	634	<2	10	14	34	6	17	<50	287	<40	<6	<100	121	17	2	68
160	MH727D	23	32	619	58	<2	13	<4	13	14	1080	4	6	13	225	6	23	<50	352	<40	<6	<100	270	18	2	91
161	MH004S	31	25	385	28	<2	16	<4	19	20	964	3	11	18	48	13	16	<50	294	<40	<6	<100	424	19	3	83
162	MH309S	18	26	246	59	<2	10	<4	10	13	814	<2	6	10	213	5	20	<50	359	<40	<6	<100	166	15	2	58
163	MH116S	35	20	143	36	<2	14	<4	21	27	764	2	12	15	40	8	17	<50	282	<40	<6	<100	237	18	3	71
164	MH310S	20	36	597	56	<2	13	<4	13	13	1000	<2	6	12	254	<4	26	<50	328	<40	<6	<100	285	17	2	73
165	MH656S	9	85	4850	40	<2	11	<4	7	14	1050	4	<4	<9	1170	5	18	<50	144	<40	<6	<100	150	11	2	97
166	MH311S	39	28	941	39	<2	14	<4	24	19	825	<2	9	18	124	7	21	<50	283	<40	<6	<100	227	17	3	75
167	MH005S	17	25	70	76	<2	13	<4	11	12	972	2	6	15	50	<4	24	<50	488	<40	<6	<100	266	17	2	62
168	MH305S	19	33	92	85	<2	12	<4	13	13	1100	2	6	15	42	8	26	<50	480	<40	<6	<100	463	19	3	176
169	MH304S	11	27	138	78	<2	12	<4	7	6	1080	<2	6	<9	97	<4	33	<50	312	<40	<6	<100	228	19	3	77
170	MH299S	16	16	27	80	<2	13	<4	10	5	928	<2	9	12	17	4	29	<50	332	<40	<6	<100	223	24	4	57
171	MH302D	17	19	19	63	<2	11	<4	11	16	925	<2	6	12	16	<4	28	<50	230	<40	<6	<100	190	25	3	52
172	MH300D	19	49	175	194	<2	14	<4	12	17	1200	<2	7	13	112	8	32	<50	247	<40	<6	<100	252	27	3	95
173	MH301D	18	27	96	105	<2	13	<4	11	9	1070	<2	8	13	62	<4	36	<50	264	<40	<6	<100	241	27	3	69
174	MH306S	16	21	26	104	<2	14	<4	10	4	1030	<2	7	12	15	5	30	<50	359	<40	<6	<100	212	23	3	54
175	MH308S	30	14	21	37	<2	13	<4	16	8	843	<2	9	15	16	8	18	<50	245	<40	<6	<100	105	23	3	72
176	MH658S	23	37	426	127	<2	13	<4	13	12	1060	5	5	13	111	5	25	<50	404	<40	<6	<100	205	20	3	86
177	MH307S	21	19	59	198	<2	13	<4	13	9	1110	<2	7	12	23	45	26	<50	246	<40	<6	<100	184	20	3	148
178	MH533S	17	17	23	102	<2	13	<4	10	3	967	3	7	10	20	13	36	<50	310	<40	<6	<100	237	23	3	87
179	MH532D	16	37	99	116	<2	14	<4	8	12	1080	3	5	12	86	5	30	<50	311	<40	<6	<100	218	23	3	69
180	MH531D	12	38	12	324	<2	15	<4	7	14	1430	3	5	11	9	11	30	<50	214	<40	<6	<100	248	21	2	134
181	MH530D	23	34	280	88	<2	13	<4	13	15	1090	2	6	14	198	5	28	<50	254	<40	<6	<100	206	20	3	77
182	MH303D	10	36	60	144	<2	14	<4	7	8	1190	<2	6	9	53	<4	38	<50	252	<40	<6	<100	258	22	3	65
183	MH443D	127	22	193	59	3	22	<4	71	44	461	8	21	53	74	20	20	<50	110	<40	18	<100	275	14	2	203
184	MH444D	29	40	183	150	<2	11	<4	17	21	1660	<2	6	22	123	7	33	<50	647	<40	<6	<100	478	21	3	102
185	MH111S	6	43	149	105	<2	11	<4	6	30	1270	3	6	<9	70	6	47	<50	267	<40	<6	<100	486	19	3	76
186	MH112S	24	24	110	66	<2	14	<4	16	11	1120	3	5	21	40	<4	24	<50	779	<40	<6	<100	419	18	3	59
187	MH110S	<5	60	351	28	<2	6	<4	2	8	1230	5	<4	10	101	4	73	<50	271	<40	<6	<100	671	8	2	60
188	MH113S	15	33	511	81	<2	13	<4	9	15	1180	4	7	18	113	<4	28	<50	310	<40	<6	<100	354	19	3	80

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
189	MH109S	<0.005			0.017	<0.05				<2	5.915	16	5.35	12.55	0.56	3.225	1.4	0.075	0.67	<8	327	<1	<50	<2
190	MH114S	0.005			0.029	<0.05				<2	7.515	15	4.155	8.53	1.19	2.285	1.84	0.125	0.485	<8	515	1	<50	<2
191	MH101S	0.055			0.08	<0.05				<2	6.585	<10	4.615	8.04	0.95	2.39	1.99	0.08	0.555	<8	501	1	<50	<2
192	MH102S	0.639			0.037	<0.05				<2	6.73	<10	5.655	9.49	0.85	3.125	1.875	0.09	0.615	<8	475	1	<50	<2
193	MH103S	0.008			0.037	<0.05				<2	7.2	11	3.715	5.53	1.05	2.16	1.965	0.085	0.54	<8	711	1	<50	<2
194	MH104S	0.044			0.022	0.11				<2	6.34	15	5.79	9.29	0.81	3.495	1.74	0.075	0.68	<8	422	1	<50	<2
195	MH108S	<0.005			0.066	<0.05				<2	7.445	16	2.75	4.29	1.02	1.66	1.895	0.095	0.42	<8	694	1	<50	<2
196	MH105S	<0.005			0.02	<0.05				<2	6.77	<10	4.385	6.82	0.88	2.705	1.86	0.085	0.55	<8	467	1	<50	<2
197	MH106S	0.029			0.038	<0.05				<2	7.2	17	3.05	6.11	0.93	2.245	1.635	0.125	0.525	<8	610	1	<50	<2
198	MH107S	0.007			0.043	<0.05				<2	6.47	22	5.5	7.4	0.84	3.085	1.765	0.09	0.605	<8	448	1	<50	<2
199	MH724S	0.038			<0.005	<0.05				<2	6.63	46	5.225	6.67	0.62	2.961	1.505	0.08	0.705	<8	397	1	<50	<2
200	MH382S	0.076			0.065	<0.05				<2	6.9	16	4.745	7.92	0.76	2.273	1.6	0.07	0.585	<8	452	<1	<50	<2
201	MH381S	0.434			0.042	<0.05				<2	5.79	20	6.24	10.15	0.71	3.885	1.495	0.055	0.52	<8	350	<1	<50	<2
202	MH380S	0.032			0.042	<0.05				<2	7.04	1840	4.715	7.65	1.27	2.861	2.035	0.095	0.51	<8	481	1	<50	<2
203	MH377S	0.034			0.056	<0.05				<2	7.13	23	3.305	6.38	0.84	2.378	1.54	0.075	0.63	<8	464	1	<50	5
204	MH379S	0.426			0.051	<0.05				<2	5.73	19	3.59	4.74	1.29	2.042	1.125	0.09	0.55	<8	1340	1	<50	3
205	MH378S	0.026			0.049	0.06				<2	7.255	55	4.77	6.58	0.98	3.176	1.575	0.065	0.5	<8	660	<1	<50	3
206	MH170S	0.02			0.055	<0.05				<2	6.025	89	1.69	6.06	1.84	1.41	0.86	0.125	0.365	<8	341	2	<50	5
207	MH169S	0.01			0.052	<0.05				<2	6.72	51	1.62	5.84	2.36	1.505	1.315	0.13	0.455	<8	2210	2	<50	2
208	MH171S	0.22			0.248	<0.05				<2	7.575	83	5.425	8.37	0.48	3.835	1.835	0.045	0.565	<8	258	<1	<50	<2
209	MH172S	0.023			0.039	<0.05				<2	6.73	<10	5.135	8.53	1.62	3.45	1.675	0.2	0.585	<8	394	2	<50	<2
210	MH175S	0.048			0.052	0.06				<2	7.44	29	2.42	5.43	1.66	1.74	2.16	0.075	0.405	<8	975	2	<50	<2
211	MH174S	0.033			0.037	<0.05				<2	6.48	16	4.215	7.36	0.9	2.84	1.555	0.085	0.475	<8	806	1	<50	<2
212	MH173S	0.018			0.04	<0.05				<2	7.48	15	2.92	6	1.15	2.245	1.79	0.085	0.485	<8	630	1	<50	<2
213	MH356S	0.192			0.005	<0.05				<2	7.255	<10	3.21	7.1	1.31	2.447	1.655	0.1	0.55	<8	576	1	<50	<2
214	MH357S	0.039			<0.005	<0.05				<2	7.85	37	1.62	7.45	1.23	2.058	1.175	0.05	0.3	<8	1250	1	<50	<2
215	MH164S	0.025			0.05	0.06				<2	8.12	28	1.42	5.41	1.6	1.87	1.885	0.1	0.435	<8	824	1	<50	<2
216	MH163S	0.025			0.033	<0.05				<2	7.185	24	3.09	9.12	1.21	2.465	1.645	0.09	0.54	<8	554	1	<50	<2
217	MH162S	0.04			0.036	<0.05				<2	6.99	23	4.17	8.11	1.33	3.315	1.585	0.095	0.535	<8	661	1	<50	<2
218	MH161S	0.019			0.008	<0.05				<2	7.088	12	3.806	7.52	1.09	2.882	0.995	0.08	0.67	<8	887	1	<50	<2
220	MH160S	0.016			0.009	<0.05				<2	7.55	20	3.491	6.73	1.31	2.657	1.505	0.085	0.51	<8	727	1	<50	<2
221	MH159S	0.02			0.008	<0.05				<2	7.686	86	0.651	6.09	1.7	1.67	1.025	0.05	0.4	<8	2850	<1	<50	3
222	MH158S	0.027			<0.005	<0.05				<2	7.607	31	1.712	6.21	0.92	1.381	2.025	0.05	0.32	<8	660	<1	<50	<2
223	MH355S	0.017			0.011	<0.05				<2	7.615	19	2.86	5.54	0.94	2.111	1.81	0.06	0.43	<8	738	1	<50	<2
224	MH354S	0.13			<0.005	<0.05				<2	5.755	22	0.935	2.02	2.14	0.751	2.205	0.015	0.135	<8	1250	1	<50	<2
225	MH176S	0.019			0.043	<0.05				<2	7.08	21	2.395	4.76	1.14	1.73	1.85	0.085	0.415	<8	749	1	<50	<2
226	MH352S	0.104			<0.005	<0.05				<2	7.534	24	3.239	5.53	0.92	2.767	2.035	0.065	0.45	<8	648	<1	<50	<2
227	MH157S	0.276			0.023	<0.05				<2	9.03	24	1.46	5.89	2.37	2.195	1.09	0.045	0.375	<8	1130	<1	<50	3
228	MH156S	0.014			0.012	<0.05				<2	7.791	17	2.772	5.66	1.38	2.063	1.78	0.055	0.465	<8	918	1	<50	<2
229	MH155S	0.018			0.01	<0.05				<2	7.466	<10	2.693	6.03	0.81	3.197	2.335	0.04	0.55	<8	546	<1	<50	<2
230	MH353S	0.077			0.005	<0.05				<2	7.37	12	2.845	6.04	1.25	2.231	1.74	0.065	0.49	<8	980	1	<50	3
231	MH153S	0.022			<0.005	<0.05				<2	6.899	16	6.494	4.84	1.31	2.184	1.44	0.05	0.415	<8	772	1	<50	<2
232	MH154S	0.012			0.014	<0.05				<2	7.098	<10	3.224	7.05	0.98	2.027	1.95	0.065	0.715	<8	697	1	<50	<2
233	MH369S	0.074			0.093	<0.05				<2	6.975	<10	2.56	4.97	1.25	2.384	1.92	0.065	0.475	<8	903	1	<50	<2
234	MH368S	0.032			0.068	<0.05				<2	7.29	16	1.965	4.16	1.55	2.132	1.59	0.075	0.39	<8	1020	1	<50	<2
235	MH367S	0.027			0.033	<0.05				<2	6.87	<10	2.67	3.73	1.16	1.628	1.745	0.105	0.395	<8	899	1	<50	<2
236	MH370S	0.016			0.056	<0.05				<2	7.22	<10	3.36	4.99	1.63	2.058	1.265	0.06	0.41	<8	609	1	<50	<2

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Ce ppm	Co ppm	Cr ppm	Cu ppm	Eu ppm	Ga ppm	Ho ppm	La ppm	Li ppm	Mn ppm	Mo ppm	Nb ppm	Nd ppm	Ni ppm	Pb ppm	Sc ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn ppm
189	MH109S	15	44	629	31	<2	12	<4	12	20	1430	4	5	19	94	4	37	<50	281	<40	<6	<100	559	16	3	92
190	MH114S	24	27	183	69	<2	13	<4	16	19	1130	4	7	20	53	7	22	<50	535	<40	<6	<100	407	18	3	91
191	MH101S	19	27	127	31	<2	13	<4	12	17	924	3	7	16	53	5	27	<50	353	<40	<6	<100	352	15	2	69
192	MH102S	17	38	132	45	<2	12	<4	11	16	1200	3	7	13	60	5	38	<50	350	<40	<6	<100	424	17	3	79
193	MH103S	26	23	104	52	2	13	<4	16	24	959	3	11	19	53	7	24	<50	314	<40	<6	<100	240	18	2	105
194	MH104S	26	34	206	25	<2	11	<4	16	21	1250	4	9	22	66	7	39	<50	340	<40	<6	<100	406	17	3	92
195	MH108S	29	20	74	41	<2	13	<4	16	30	943	6	9	29	44	8	19	<50	315	<40	<6	<100	169	17	3	105
196	MH105S	24	30	122	63	<2	11	<4	14	19	1070	3	8	22	61	7	30	<50	314	<40	<6	<100	295	17	2	77
197	MH106S	34	26	123	74	2	13	<4	17	26	1300	3	10	21	63	11	22	<50	285	<40	<6	<100	251	21	3	123
198	MH107S	19	31	128	22	<2	11	<4	13	19	1470	3	9	15	52	4	36	<50	344	<40	<6	<100	321	16	3	74
199	MH724S	25	30	761	27	<2	13	<4	15	17	1270	2	9	14	71	<4	36	<50	287	<40	<6	<100	279	22	2	82
200	MH382S	19	31	149	47	<2	12	<4	12	18	1260	4	9	13	57	6	34	<50	280	<40	<6	<100	391	24	3	82
201	MH381S	8	42	145	62	<2	10	<4	7	19	1210	4	5	<9	75	10	45	<50	218	<40	<6	<100	440	16	2	83
202	MH380S	21	36	43	237	<2	13	<4	12	46	1090	4	5	14	43	21	31	<50	285	<40	<6	<100	310	19	2	96
203	MH377S	26	30	262	69	<2	13	<4	14	35	1100	3	10	15	82	6	30	<50	199	<40	<6	<100	267	24	3	92
204	MH379S	41	25	70	76	<2	11	<4	23	29	840	5	9	21	65	9	21	<50	152	<40	<6	<100	211	18	2	121
205	MH378S	20	33	97	114	<2	12	<4	13	32	1080	4	7	14	66	5	36	<50	171	<40	<6	<100	288	22	3	117
206	MH170S	65	28	99	142	2	13	<4	38	44	790	11	10	33	113	19	16	<50	180	<40	6	<100	259	12	2	447
207	MH169S	78	26	90	102	2	14	<4	47	52	1060	10	13	53	90	19	16	<50	404	<40	8	<100	249	16	2	329
208	MH171S	6	48	114	145	<2	13	<4	5	21	1350	3	6	14	72	<4	43	<50	142	<40	<6	<100	325	26	3	117
209	MH172S	31	36	211	158	<2	11	<4	19	23	1300	4	10	20	58	7	34	<50	351	<40	<6	<100	355	24	3	92
210	MH175S	41	25	62	65	3	14	<4	25	21	1140	3	8	22	41	29	19	<50	217	<40	7	<100	188	22	3	141
211	MH174S	27	33	236	76	<2	11	<4	17	36	1170	4	7	21	80	11	33	<50	253	<40	<6	<100	282	21	3	90
212	MH173S	32	26	148	93	2	13	<4	20	35	1020	3	9	23	83	9	26	<50	255	<40	<6	<100	240	20	2	97
213	MH356S	36	31	140	115	<2	12	<4	23	41	1030	3	10	19	96	15	27	<50	313	<40	<6	<100	275	24	3	104
214	MH357S	33	33	43	1510	<2	12	<4	14	12	1320	8	<4	20	27	19	25	<50	144	<40	<6	<100	155	34	4	144
215	MH164S	30	26	97	96	2	14	<4	18	35	925	7	9	18	58	8	21	<50	221	<40	<6	<100	201	20	3	142
216	MH163S	32	35	227	83	<2	13	<4	23	31	1210	5	9	21	84	13	27	<50	302	<40	<6	<100	375	28	3	109
217	MH162S	24	33	154	102	<2	13	<4	16	29	1170	4	9	22	69	10	36	<50	306	<40	<6	<100	363	19	3	107
218	MH161S	23	39	265	83	<2	10	<4	15	25	1210	2	11	15	86	14	38	<50	256	<40	<6	<100	307	23	3	158
220	MH160S	23	30	146	84	<2	14	<4	13	26	1060	2	9	14	73	9	32	<50	288	<40	<6	<100	273	21	3	126
221	MH159S	19	24	22	260	<2	13	<4	9	9	1080	3	7	11	15	68	23	<50	120	<40	<6	<100	150	18	3	367
222	MH158S	29	31	60	141	<2	11	<4	15	12	1790	3	5	15	21	15	24	<50	151	<40	<6	<100	173	21	3	139
223	MH355S	29	21	93	98	<2	13	<4	16	14	1240	5	7	14	40	11	27	<50	213	<40	<6	<100	220	20	3	121
224	MH354S	30	6	30	15	<2	9	<4	16	6	584	2	<4	10	26	16	9	<50	74	<40	<6	<100	58	16	3	77
225	MH176S	39	27	106	57	2	13	<4	24	27	990	3	9	20	71	16	19	<50	206	<40	<6	<100	174	20	3	182
226	MH352S	26	23	102	62	<2	12	<4	13	15	1080	<2	8	14	60	12	26	<50	230	<40	<6	<100	207	22	3	105
227	MH157S	22	35	57	185	<2	14	<4	11	11	1410	2	6	12	38	83	33	<50	117	<40	<6	<100	227	20	3	249
228	MH156S	32	24	157	155	<2	13	<4	18	14	983	3	10	18	55	9	22	<50	248	<40	<6	<100	182	22	3	122
229	MH155S	22	29	260	73	<2	12	<4	11	13	1040	<2	9	13	110	11	29	<50	130	<40	<6	<100	235	20	3	119
230	MH353S	31	27	116	133	<2	12	<4	17	14	1170	4	8	16	56	16	24	<50	213	<40	<6	<100	229	21	3	141
231	MH153S	21	22	75	51	<2	10	<4	14	26	716	<2	9	11	51	10	25	<50	266	<40	<6	<100	176	17	2	103
232	MH154S	25	23	112	50	<2	12	<4	13	12	1080	<2	14	14	49	4	25	<50	272	<40	<6	<100	301	19	3	95
233	MH369S	28	21	83	68	<2	13	<4	15	14	1040	3	9	14	48	11	24	<50	213	<40	<6	<100	205	22	3	101
234	MH368S	37	20	66	46	<2	14	<4	20	16	984	3	8	17	44	15	20	<50	191	<40	<6	<100	142	26	3	91
235	MH367S	33	14	54	48	<2	13	<4	19	21	637	3	9	18	37	8	18	<50	295	<40	<6	<100	147	20	2	74
236	MH370S	25	23	93	48	<2	13	<4	12	34	595	4	9	12	69	8	22	<50	226	<40	<6	<100	173	17	2	140

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Au_FA ppm	Ir ppb	Os ppb	Pd ppm	Pt ppm	Re ppb	Rh ppm	Ru ppb	Ag ppm	Al pct	As ppm	Ca pct	Fe pct	K pct	Mg pct	Na pct	P pct	Ti pct	Au ppm	Ba ppm	Be ppm	Bi ppm	Cd ppm
237	MH366S	0.039			0.089	<0.05				<2	7.665	14	2.355	5.11	1.44	2.688	1.705	0.06	0.49	<8	832	1	<50	<2
238	MH152S	0.02			0.006	<0.05				<2	7.607	<10	2.258	4.99	1.31	1.78	1.72	0.07	0.325	<8	994	1	<50	<2
239	MH365S	0.033			0.062	<0.05				<2	7.5	<10	2.355	4.61	1.34	2.672	1.955	0.05	0.38	<8	728	<1	<50	<2
240	MH364S	0.033			0.053	<0.05				<2	7.84	<10	2.3	5.58	1.27	2.384	2.075	0.06	0.51	<8	800	1	<50	3
241	MH363S	0.031			<0.005	<0.05				<2	7.9	18	3.31	6.84	0.95	2.993	1.76	0.045	0.46	<8	575	<1	<50	<2
242	MH362S	0.028			<0.005	<0.05				<2	6.98	16	2.31	4.26	1.4	1.743	1.575	0.105	0.42	<8	890	1	<50	2
243	MH358S	0.053			<0.005	<0.05				<2	6.12	<10	5.545	9.95	0.98	4.19	1.14	0.125	0.605	<8	498	1	<50	<2
244	MH151S	0.021			0.02	<0.05				<2	7.623	11	5.402	7.19	1.71	2.368	1.925	0.085	0.475	<8	477	1	<50	<2
245	MH147S	0.032			0.01	<0.05				<2	6.017	73	2.179	5.86	2.02	1.281	0.695	0.08	0.42	<8	568	2	<50	<2
246	MH146S	0.011			0.028	<0.05				<2	6.893	14	3.964	5.64	1.5	2.237	1.29	0.075	0.445	<8	1020	1	<50	<2
247	MH143S	0.03			0.061	<0.05				<2	7.292	<10	4.772	7.46	1.17	3.617	1.99	0.07	0.485	<8	506	<1	<50	<2
248	MH371S	0.018			0.04	0.08				<2	6.645	11	8.335	5.64	1.02	3.05	1.5	0.05	0.42	<8	452	<1	<50	<2
249	MH372S	0.029			0.069	0.07				<2	7.17	<10	5.505	5.48	0.95	2.972	1.95	0.065	0.5	<8	693	1	<50	<2
250	MH373S	0.031			0.044	<0.05				<2	6.585	13	5.095	4.57	1.66	2.273	1.225	0.06	0.42	<8	573	2	<50	<2
251	MH374S	0.034			0.054	<0.05				<2	6.875	11	3.91	4.89	1.55	2.111	1.605	0.07	0.525	<8	851	1	<50	<2
252	MH375S	0.034			0.067	<0.05				<2	6.815	15	5.205	4.68	1.71	2.074	1.635	0.075	0.515	<8	1870	1	<50	<2
253	MH376S	0.036			0.052	<0.05				<2	6.81	16	3.64	4.85	1.31	2.042	1.84	0.07	0.52	<8	705	1	<50	<2
254	MH121S	0.008			<0.005	<0.05				<2	7.565	32	3.266	4.47	1.82	1.706	1.405	0.075	0.4	<8	952	2	<50	<2
255	MH122S	0.014			<0.005	<0.05				<2	7.308	<10	7.235	8.74	0.82	4.253	2.08	0.045	0.81	<8	203	<1	<50	<2
256	MH123S	0.039			<0.005	<0.05				<2	5.817	33	12.48	5.44	1.14	2.221	1.145	0.065	0.275	<8	337	<1	<50	<2
257	MH124S	0.014			<0.005	<0.05				<2	7.481	20	2.825	6.02	1.54	3.638	1.635	0.1	0.42	<8	750	1	<50	2
258	MH140S	0.034			<0.005	0.08				<2	7.649	28	3.397	7.37	0.98	3.035	1.435	0.055	0.41	<8	717	<1	<50	<2
259	MH139S	0.008			<0.005	<0.05				<2	7.35	<10	5.707	7.64	1.05	4.148	1.785	0.08	0.62	<8	387	1	<50	3
260	MH134S	0.018			<0.005	<0.05				<2	7.66	17	4.636	5.81	1.39	2.657	1.42	0.095	0.445	<8	805	1	<50	<2
261	MH135S	0.014			0.018	<0.05				<2	7.56	18	2.284	4.89	1.76	1.685	1.635	0.09	0.465	<8	876	1	<50	<2
262	MH138S	0.019			<0.005	<0.05				<2	7.539	<10	4.352	6.25	1.39	2.882	1.75	0.09	0.55	<8	706	1	<50	<2
263	MH137S	0.005			<0.005	<0.05				<2	8.174	37	2.079	5.28	1.59	2.132	1.91	0.1	0.49	<8	675	2	<50	<2
264	MH136S	0.016			<0.005	<0.05				<2	7.403	39	1.444	4.81	2.09	1.281	1.245	0.125	0.43	<8	2300	2	<50	5

Table B-7. Analytical results for reanalyzed USGS stream sediment samples.

Map no.	Sample no.	Ce ppm	Co ppm	Cr ppm	Cu ppm	Eu ppm	Ga ppm	Ho ppm	La ppm	Li ppm	Mn ppm	Mo ppm	Nb ppm	Nd ppm	Ni ppm	Pb ppm	Sc ppm	Sn ppm	Sr ppm	Ta ppm	Th ppm	U ppm	V ppm	Y ppm	Yb ppm	Zn ppm
237	MH366S	31	25	105	58	<2	13	<4	16	18	971	3	9	15	73	9	25	<50	198	<40	<6	<100	179	25	3	86
238	MH152S	28	25	73	92	<2	12	<4	15	8	1060	3	6	16	30	15	19	<50	351	<40	<6	<100	167	24	3	99
239	MH365S	24	21	86	48	<2	13	<4	12	13	935	2	6	12	57	7	21	<50	177	<40	<6	<100	148	19	3	114
240	MH364S	22	22	73	73	<2	13	<4	11	14	1110	3	8	12	41	41	26	<50	195	<40	<6	<100	220	19	3	187
241	MH363S	16	33	94	115	<2	14	<4	9	16	1220	4	6	10	57	14	31	<50	172	<40	<6	<100	274	19	3	112
242	MH362S	35	20	80	84	<2	15	<4	19	32	617	4	9	18	60	11	20	<50	266	<40	<6	<100	238	18	2	122
243	MH358S	20	42	354	93	<2	11	<4	13	21	1550	5	6	16	120	6	42	<50	422	<40	<6	<100	472	20	3	123
244	MH151S	20	25	72	60	<2	14	<4	11	26	1240	2	9	13	41	<4	24	<50	421	<40	<6	<100	309	21	3	97
245	MH147S	65	28	294	102	<2	13	<4	38	31	514	9	13	30	85	36	14	<50	202	<40	9	<100	157	13	2	210
246	MH146S	56	28	63	104	3	12	<4	30	24	985	4	10	26	63	9	24	<50	152	<40	7	<100	191	14	2	94
247	MH143S	14	38	129	110	<2	11	<4	11	18	1210	4	7	11	90	5	32	<50	245	<40	<6	<100	302	21	3	95
248	MH371S	21	29	116	79	<2	11	<4	12	27	959	4	7	11	80	6	30	<50	269	<40	<6	<100	231	18	3	88
249	MH372S	22	35	137	77	<2	12	<4	12	15	1080	4	8	12	297	16	28	<50	319	<40	<6	<100	239	18	2	88
250	MH373S	35	22	117	40	<2	12	<4	18	26	570	5	10	16	63	11	22	<50	198	<40	<6	<100	174	18	2	112
251	MH374S	41	22	109	42	<2	12	<4	21	20	795	3	12	18	63	11	22	<50	273	<40	6	<100	207	20	2	95
252	MH375S	38	21	69	34	<2	12	<4	21	17	840	3	10	18	53	11	21	<50	304	<40	<6	<100	192	21	3	80
253	MH376S	37	21	71	37	<2	12	<4	19	21	833	3	11	17	48	8	22	<50	307	<40	<6	<100	206	20	3	80
254	MH121S	59	20	55	43	<2	13	<4	30	26	783	<2	13	25	46	17	20	<50	299	<40	10	<100	145	25	3	93
255	MH122S	9	37	138	100	<2	13	<4	6	15	1020	3	9	10	97	<4	37	<50	217	<40	<6	<100	335	23	3	72
256	MH123S	18	22	58	214	<2	9	<4	11	9	1090	14	<4	11	42	7	19	<50	508	<40	<6	<100	182	14	2	106
257	MH124S	24	39	120	161	<2	14	<4	14	29	1160	6	8	16	179	6	22	<50	310	<40	<6	<100	205	22	3	106
258	MH140S	13	40	117	189	<2	12	<4	8	19	1200	3	5	10	55	13	34	<50	162	<40	<6	<100	257	19	2	116
259	MH139S	16	35	287	99	<2	13	<4	10	23	1070	3	9	12	97	<4	34	<50	335	<40	<6	<100	288	20	2	90
260	MH134S	33	25	113	81	<2	15	<4	21	38	945	3	9	20	64	4	31	<50	460	<40	<6	<100	247	19	2	96
261	MH135S	29	20	50	86	<2	14	<4	16	70	690	2	11	17	46	8	22	<50	213	<40	<6	<100	204	15	2	146
262	MH138S	25	25	177	91	<2	13	<4	16	45	958	2	11	16	69	6	29	<50	311	<40	<6	<100	268	18	2	103
263	MH137S	28	24	54	85	<2	14	<4	16	34	827	2	11	16	50	10	21	<50	280	<40	<6	<100	204	20	3	113
264	MH136S	43	24	43	88	2	14	<4	25	65	766	6	12	23	86	15	18	<50	179	<40	<6	<100	259	11	1	322

Sampling and analytical procedures for USGS stream sediment samples, Table B-7.

The USGS collected stream sediment samples from the active channels of streams. Sample material ranged in size from fine sand and silt to coarse sand and gravel (O'Leary and others, 1982).

Samples were prepared as described by O'Leary and others (1982). This included drying and sieving the samples to yield a minus-80-mesh fraction. These fractions have been stored as pulps at the USGS facilities in Denver, Colorado since their original analyses in the early 1980's (O'Leary and others, 1982). The pulps were pulled from storage, shipped, and analyzed by a laboratory under contract to the USGS.

Gold, platinum, and palladium were determined in stream sediment samples by atomic absorption spectroscopy (AA) after collection by fire assay. An assay fusion consists of heating a mixture of the finely pulverized sample with a flux until the product is molten. One of the ingredients of the flux is a lead compound which is reduced by other constituents of the flux or sample to metallic lead. The latter collects all the gold, together with silver, platinum metals, and small quantities of certain base metals present in the sample and falls to the bottom of the crucible to form a lead button. The gangue of the ore is converted by the flux into a slag sufficiently fluid so that all particles of lead may fall readily through the molten mass. The choice of a suitable flux depends on the character of the ore. The lead button is cupelled to oxidize the lead leaving behind a dore bead containing the precious metals. The dore bead is then transferred to a test tube, dissolved with aqua regia, diluted to a specific volume and the precious metal concentrations determined by AA.

The detection limits for elements analyzed by fire assay are 5 to 10,000 ppb.

Seventeen samples were analyzed for the full suite of platinum group elements (PGE) using a nickel-sulfide (NiS) fusion fire assay preconcentration with an inductively coupled plasma-mass spectroscopy (ICP-MS) finish. A pulverized, 25-gram sample is fused with nickel, sulfur, and a borax-soda ash-silica flux to form a NiS button. The button is digested in concentrated hydrochloric acid, filtered, and digested again in nitric and hydrochloric acids. The resultant solution is then analyzed by ICP-MS.

The lower detection limits for samples analyzed by NiS fusion, ICP-MS are:

Element		Lower Detection Limit
Rhodium Rh		1 ppb
Rhenium Re		1 ppb
Ruthenium Ru		1 ppb
Iridium Ir		0.1 ppb
Osmium Os		3 ppb
Platinum Pt		1 ppb
Palladium Pd		1 ppb

Forty major, minor, and trace elements were determined in stream sediment samples by inductively coupled plasma-atomic emission spectroscopy (ICP-AES). The sample was decomposed using a mixture of hydrochloric, nitric, perchloric, and hydrofluoric acids at low temperature. The digested sample was aspirated into the ICP-AES discharge where the elemental emission signal was measured simultaneously for the forty elements. Calibration was performed by standardizing with digested rock reference materials and a series of multi-element solution standards.

Detection limits for elements analyzed by ICP-AES:

Element	Range	Element	Range
Aluminum, Al	0.005 - 50%	Holmium, Ho	4 - 5,000 ppm
Calcium, Ca	0.005 - 50%	Lanthanum, La	2 - 50,000 ppm
Iron, Fe	0.02 - 25%	Lithium, Li	2 - 50,000 ppm
Potassium, K	0.01 - 50%	Manganese, Mn	4 - 50,000 ppm
Magnesium, Mg	0.005 - 5%	Molybdenum, Mo	2 - 50,000 ppm
Sodium, Na	0.005 - 50%	Niobium, Nb	4 - 50,000 ppm
Phosphorous, P	0.005 - 50%	Neodymium, Nd	9 - 50,000 ppm
Titanium, Ti	0.005 - 25%	Nickel, Ni	3 - 50,000 ppm
Silver, Ag	2 - 10,000 ppm	Lead, Pb	4 - 50,000 ppm
Arsenic, As	10 - 50,000 ppm	Scandium, Sc	2 - 50,000 ppm
Barium, Ba	1 - 35,000 ppm	Tin, Sn	50 - 50,000 ppm
Beryllium, Be	1 - 5,000 ppm	Strontium, Sr	2 - 15,000 ppm
Bismuth, Bi	50 - 50,000 ppm	Tantalum, Ta	40 - 50,000 ppm
Cadmium, Cd	2 - 25,000 ppm	Thorium, Th	6 - 50,000 ppm
Cerium, Ce	5 - 50,000 ppm	Uranium, U	100 - 100,000 ppm
Cobalt, Co	2 - 25,000 ppm	Vanadium, V	2 - 30,000 ppm
Chromium, Cr	2 - 25,000 ppm	Yttrium, Y	2 - 25,000 ppm
Copper, Cu	2 - 15,000 ppm	Ytterbium, Yb	1 - 5,000 ppm
Europium, Eu	2 - 5,000 ppm	Zinc, Zn	2 - 15,000 ppm
Gallium, Ga	4 - 50,000 ppm		

Appendix C – Isotopic Age Date Discussion and Data

Discussion of individual samples

The following section presents a brief discussion of the petrography and age spectra of each of the samples analyzed for $^{40}Ar/^{39}Ar$ isotopic age dating. For some samples petrographic thin sections and/or samples were not available for examination. Where examined, the petrography of the sample may provide input to the interpretation of the age spectra plots. The plots are discussed to provide an explanation of the authors' interpretation of the analytical data.

The isotopic age dating was conducted by Dr. Paul Layer and Dr. Jeff Drake of the Geochronology Laboratory of the University of Alaska Fairbanks in 2002, 2004, and 2005. A summary of their analytical methodology is presented at the end of this appendix.

A summary of the discussion of samples is presented in the tables near the end of this appendix. The annotated age spectra plots may be found after each sample summary table. Tabular data from the isotopic dating is available from the BLM office in Juneau.

Abbreviations used in Appendix C

Abbreviation	Description
Ma	million annum (years)
Ca/K	calcium – potassium ratio
Cl/K	chlorine – potassium ratio
LOI	loss on ignition
LOI/H_2O+	alteration index
MSWD	mean square weighted deviation
An#	anorthite content – An100 = pure anorthite or Ca-rich plagioclase
XRD	x-ray diffraction
CIPW	normative chemical classification of Cross and others, (1902)

AREA WEST OF DELTA RIVER

These rock samples are located in the western part of the area and exhibit modal mineralogies and major oxide chemical affinities typical of western calcic suite rocks.

Sample AK25515 – SE Rainy complex, near mouth of Rainy Creek

(Figure 11, no. 2)

Petrography
This rock is reported to be a biotite gabbro from a dike or sill. No thin section or whole rock chemistry is available. A hand sample description of the rock describes a biotite-rich, pyroxene-plagioclase cumulate with poikilitic biotite including olivine.

Age Spectra Plot
A biotite mineral separate was made from this sample and submitted for isotopic dating. Narrowly constant isotopic argon ratios released during incremental heating formed a plateau age of 228.3+/-1.1 Ma. The integrated age for this sample turned out slightly younger at 226.0+/-1.1 Ma. There is a small amount of argon loss initially and some degree of alteration of biotite is suggested by the increase in the Ca/K ratio at some step heating temperatures. The Ca/K ratio varies only narrowly between 0.3 and just above 0.06, which is in the typical range for biotite. The lowest Ca/K ratios occur through the middle heating steps and may represent minor chloritization of the biotite, but apparently not enough to affect the age plateau developed over 8 sequential heating steps. The **plateau age of 228.1+/-1.1 Ma** (early Late Triassic), the time of closure of the biotite, is interpreted as a **magmatic age**.

Sample HBD-2003-29 (200329) - West Bowl area, Rainy complex, N Fork Rainy Creek

(Figure 11, no. 1)

Petrography
This rock, collected by Larry Hulbert of the Canadian Geological Survey, is reported to be olivine basalt. No petrography or whole rock data are available. The x-ray diffraction pattern of the dated mineral separate shows numerous hornblende peaks and the presence of some chlorite and possibly some minor plagioclase.

Age Spectra Plot
The age spectra of this predominantly hornblende mineral separate from olivine basalt defines a good **plateau age of 225.7+/-2.0 Ma** or early Late Triassic. The Ca/K ratio varies only narrowly between 30 and 40 across all the incremental heating steps and is in the range characteristic for amphibole. The higher ratios of Ca/K may indicate the amphibole dated was actinolitic in composition. The integrated age of this sample, 226.4+/-2.0 Ma overlaps the plateau age within the 1 sigma deviation of the dates calculated. This plateau age is considered

a good amphibole date for a coincident **magmatic event** related to the eruption of this volcanic rock.

Sample HBD-2003-53 – West Bowl area, Rainy complex, N Fork Rainy Creek

(Figure 11, no. 1)

Petrography

This rock, collected by Larry Hulbert of the Canadian Geological Survey, is reported to be olivine basalt. No petrography or whole rock data are available. The x-ray diffraction pattern of the mineral separate shows numerous amphibole peaks and presence of minor serpentine and plagioclase.

Age Spectra Plot

The age spectra indicate some argon loss in the initial heating steps. The “hornblende” separated for dating from this olivine basalt defines a radiogenic 40Ar/39Ar **pseudo-plateau age of 219.3+/-4.5 Ma** or mid-Late Triassic. The "noise" shown by the age spectra pattern is reflected in the jumpy Ca/K ratios between sequential heating steps, which may be due to multiple grain sizes in the dated material and/or the presence of actinolite (The high Ca/K ratios of 60 to 70 are interpreted to represent actinolitic composition of the amphibole. Actinolite may be an acquired metamorphic product, which has a different closure temperature.) In addition, chlorine loss documented by the initial, low temperature, Cl/K ratios may be indicative of hydrothermal alteration of hornblende. This is reflected in the very young initial calculated ages at the low temperature end of the sequential heating steps. Some of the argon loss could also be attributed to a post magmatic hydrothermal event. An integrated age of 204.1+/-2.4 Ma shows even more sensitivity to the metamorphism/alteration that has affected this rock. The pseudo-plateau age is interpreted to represent a **partial reset or minimum age** for the true volcanic age.

AREA FROM RAINBOW MOUNTAIN TO CONY MOUNTAIN

These rock samples are located in the central part of the area and exhibit modal mineralogies and major oxide chemical affinities typical of western calcic suite rocks.

Sample 10156 (reprocessed) – Cony Mountain

(Figure 11, no. 5)

Petrography

This sample is classified as a variably altered, olivine pyroxenite, and is composed principally of olivine, clinopyroxene, biotite, and amphibole. The olivine is cut by chrysotile veinlets and magnetite. The clinopyroxene is associated with chlorite, biotite and accessory plagioclase. X-ray diffraction confirms amphibole, serpentine, and talc. The minor opaque mineralogy includes chalcopyrite, pyrrhotite, ilmenite, and limonite. Normative mineralogy calculated from major oxide chemistry confirms a pyroxenite. The loss on ignition is reported at 4.96%, which for a pyroxenite would return an alteration index (LOI/H2O+) of 6.61.

Age Spectra Plot

This sample was first dated by the BLM in 2004 and subsequently re-dated in 2005. X-ray diffraction of the originally dated material indicated that the mineral separate was a mixture of amphibole and biotite. The pulp from the first dating run was reprocessed to a purer hornblende separate and re-dated.

The step heating spectra for the reprocessed hornblende separate indicates the presence of excess argon resulting in much older ages than the low temperature releases. The integrated age, calculated at 270.1+/-1.5 Ma, is much older than the isochron age and is heavily influenced by the excess argon, which makes it unreliable. The alteration mineral phase, most likely chlorite based on the low Ca/K initial ratios, contains the excess argon. Higher temperature releases of argon are characterized by stepped increases in the Ca/K ratio, more into the range that would be expected of hornblende. An isochron plot shows a well constrained **isochron age of 199.5+/-2.1 Ma** though the initial 40Ar/39Ar ratio is significantly higher (343) than atmospheric (295.5). This isochron age, however, agrees with the biotite high temperature age of 202.0+/-8.9 Ma determined during the 2004 dating. Based on this information this Early Jurassic age is interpreted to be an **alteration age or partially reset** magmatic age.

Sample 10825 (reprocessed) – Cony Mountain

(Figure 11, no. 5)

Petrography

Mineralogically this sample is best described as a lherzolite or plagioclase bearing peridotite. Serpentinized olivine, fresh plagioclase, amphibole and biotite/talc(?) comprise the modal mineralogy with a minor amount of opaques identified as pyrite, chalcopyrite, limonite, and chromite. Wormy intergrowths (myrmakite), presumably of plagioclase, are found in the clinopyroxene. This texture is attributed to a rapid change in the melt chemistry usually by magma mixing or assimilation of wall rock. From major oxide chemistry the LOI is somewhat elevated; it is reported at 3.36%, which for a peridotite would return an alteration index (LOI/H_2O+) of 4.48.

X-ray diffraction of the mineral separate dated by the BLM in 2004 identified plagioclase, hornblende, clinopyroxene, and biotite(?), but principally plagioclase. In thin section the plagioclase is altered to sericite and the whole rock chemistry produces a large alteration index. The mineral separate pulp was reprocessed into a hornblende mineral separate and re-dated in 2005.

Age Spectra Plot
The 2004 dating results produced saddle shaped argon loss spectra with a saddle age of 206.0+/-1.0 Ma. The spectra plot from the second round of dating, in 2005, again produced a saddle shaped graph. The hornblende took on excess (inherited) Ar during cooling and defines a saddle age of 336.8+/-7.1 Ma with a corresponding Ca/K ratio of 22, more characteristic of hornblende. The Ca/K ratios for most of the run varied between 5 and 22, indicating there was still a mixture of mineral phases in the separate. The Ca/K ratio jumped dramatically at the highest temperature step to 43, which is more characteristic of pyroxene.

An isochron plot of the 2005 data calculates an isochron age of 188.4+/-4.4 Ma. This isochron age includes 6 fractions with a somewhat higher than atmospheric initial argon intercept of 589+/-5 but an acceptable MSWD of 1.6. An integrated age of 699.3+/-2.4 Ma is significantly older than the saddle or isochron ages and is clearly influenced by the presence of excess argon in the dated mineral phases.

Interpretation of these conflicting data is difficult and unreliable. One might suggest a magmatic age younger than 337 Ma, the saddle age, and older than 188 Ma, the isochron age. Alternatively, the minimum age could possibly be the 206 Ma date from the first, 2004, saddle age. Suggesting a partially reset or alteration age leaves a wide range of ages to choose from. In this instance the best that can be said is that the saddle age of **336.8+/-7.1 Ma** represents a magmatic age that is **older than the true age** of the rock.

Sample 10830 – Cony Mountain

(Figure 11, no. 6)

Petrography
Mineralogically this sample is an olivine peridotite composed of olivine, clinopyroxene, hornblende, plagioclase, and serpentine. The olivine is serpentinized, the hornblende and biotite are replacing clinopyroxene, and there is sericitic alteration of the plagioclase. Opaques include low iron chromite, pyrite, and limonite-goethite. Major oxide chemistry reports a LOI of 4.39%, which for a pyroxenite would return an alteration index (LOI/H2O+) of 5.85.

A mineral separate comprised primarily of hornblende was made for dating. X-ray diffraction of material remaining after the dating run detected some biotite, clinopyroxene, and plagioclase in addition to the hornblende.

Age Spectra Plot
The scatter of Ca/K ratios across the incremental heating spectrum confirms the dated sample to be a multi-mineral separate. Excess (inherited) argon resulted in older than true age calculations at the low temperature end of the heating spectra. Low temperature Ca/K ratios indicate argon was released variously from hornblende, plagioclase, and biotite. The mid-temperature heating stages released argon from hornblende (Ca/K ratio around 40). Clinopyroxene (Ca/K ratios of 75 and higher) released its argon at the high temperature end of the spectra. Due to the multiple minerals releasing argon isotopes upon incremental heating and the excess argon complication, a calculated **isochron age of 225+/-6.5 Ma** is considered

the best age for these data. Petrography and major oxide chemistry confirm alteration has occurred. At best the isochron date is interpreted to indicate a maximum age for a Late Triassic **reset (alteration) event** and not a magmatic age.

Sample 03JS06B - Upper McCallum Creek

(Figure 11, no. 4)

Petrography

The BLM did not examine a thin section for petrographic analysis of this sample. Field notes describe the sample as a hornblende andesite(?) porphyry, with 5% hornblende phenocrysts to 1 centimeter and 10% feldspar phenocrysts less than 3 millimeters, in an aphanitic to fine grained, granular matrix, possibly a flow(?). Major oxide chemistry indicates a LOI of 2.85 and H2O+ of 2.72, which results in a near zero alteration index for this sample.

Age Spectra Plot

A hornblende mineral separate was made for dating. The resulting step heating spectra describe an argon loss curve with very young ages calculated initially, leveling off at higher temperatures and rising abruptly at the end. From the Ca/K ratios the low temperature mineral in which the argon loss occurred was most likely biotite. The mid-heating ranges describe a well defined hornblende/biotite plateau age of 141.4+/-1.0 Ma. The Ca/K ratios are too low to be attributed to hornblende alone, but a mixture containing both hornblende and biotite. At the high temperature end of the spectra the Ca/K ratio jumps and the older age fractions suggest an age of **169.0+/-3.5 Ma**, which is attributable to hornblende alone. The best from this sample is the middle Jurassic **high temperature age** representing a **minimum age of magmatism**, which more closely approximates the true age of magmatism than the younger mixed mineral date.

Sample 03JS07E – Ridgeline east of Rainbow Mountain

(Figure 11, no. 3)

Petrography

The BLM did not examine a thin section for petrographic analysis of this sample. Field notes describe the sample as a very dark green, massive homogeneous mafic tuff(?) possibly containing hornblende. The sample was collected from an area mapped as Pennsylvanian to Permian volcanics (Nokleberg and others, 1992b). The geochronology lab report described the sample as quite heterogeneous and very altered. Major oxide chemistry reports a LOI of 3.5%. With an H_2O+ of 3.24 the alteration index is calculated at 1.08.

Age Spectra Plot

Separation of a mineral phase was not possible so the sample was run as a whole rock. The resulting age spectra are mostly indicative of an argon loss pattern of dubious geologic significance. The Ca/K and Cl/K ratios vary irregularly and cannot be interpreted particularly in the case of a whole rock analysis. A pseudo-plateau age of 142.8+/-7.9 Ma, an integrated age of 145.5+/-1.0 Ma, which most likely dates an alteration event, or a **high temperature**, minimum age of **241.4+/-2.0 Ma** can all be extracted from the spectral data. Perhaps the best choice is the early Triassic **minimum age that more closely approximates the older, true magmatic age** for this sample.

GULKANA GLACIER TO CHISTOCHINA GLACIER AREA - CALC-ALKALINE SUITE

These rock samples are located in the eastern part of the area and exhibit modal mineralogies and major oxide chemical affinities typical of eastern calc-alkaline suite rocks. Other samples from this area exhibit more alkalic affinities.

Sample 10240 – Chistochina Glacier area

(Figure 11, no. 13)

Petrography

This rock is identified as an olivine pyroxenite (websterite) composed principally of serpentinized olivine and clinopyroxene with interstitial chlorite. Minor opaques include magnetite, ilmenite, and green spinel. X-ray diffraction of the sample confirms the presence of serpentine and indicates the presence of amphibole, which is difficult to see in the polished thin section. The LOI is reported at 2.52%, which for a pyroxenite would return an alteration index (LOI/H2O+) of 4.13. One question is what is the origin of the biotite that was separated and analyzed?

Age Spectra Plot

A mineral separate was made from this rock containing mainly biotite, but x-ray diffraction of the dated material indicates the presence of some hornblende and clinopyroxene as well. From the age spectra plot the extremely young, low temperature ages are attributed to incremental argon loss most likely from plagioclase (Ca/K ratio 0.05 – 0.45).

Mid-temperature incremental heating steps define a biotite pseudo-plateau age of 123.1+/-3.1 Ma over 10 fractions and a large MSWD of 7.8. This age is not a true plateau, however, because even though the 3 increment plateaus fall within error limits of each other, they do not account for greater than 50% of the argon release.

Mica, when heated, may exhibit a loss of ^{39}Ar by recoil, when the ^{39}K loses a proton during irradiation. This is particularly evident with potassium-bearing minerals of small size. If recoil loss has occurred, the ^{40}Ar/^{39}Ar ratio is increased and suggests an older age than geologically reasonable. A recoil loss of argon in sample 10240 is suggested by the higher ^{40}Ar/^{39}Ar ratio in the lower temperature heating steps. After dropping the first 3 fractions of the 10240 age spectra pseudo-plateau, the weighted average of the 7 fractions beyond the argon recoil calculates an age of 121.5+/-1.1 Ma and accounts for the release of 48% of the total argon with a MSWD of 0.7.

Even after discounting the first three heating steps, the remaining spectra do not define a plateau. Chlorite alteration of the biotite may account for this departure. The **integrated age,**

123.3+/-1.3 Ma, for this sample is statistically the same as the pseudo-plateau age. The pseudo-plateau age is interpreted to represent a minimum magmatic age **partially reset by an alteration event**. The alteration event may be attributed to the proximity of the sample to a Cretaceous to late Tertiary granitic intrusion.

Sample 10994 – College Glacier area

(Figure 11, no. 7)

Petrography

This rock sample is classified as a hornblende-biotite syenite. It was collected and dated with the expectation that it would give an age for the alkalic plutonism in the area. Modal mineralogy is hornblende and actinolite, white and dark mica, plagioclase (An36) and potassium feldspar. Opaque mineralogy consists of pyrite, chalcopyrite, and chromite. The plagioclase is moderately sericitized and the dark mica is associated with carbonate. The LOI from major oxide chemistry is 1.86%, which translates into an alteration index of 2.2.

Age Spectra Plot

A hornblende mineral separate was made from this sample for isotopic dating. Two runs were made on this separate. The resulting spectra do not have any sort of consistent plateau; only one shows a poorly defined **errorchron age** of **118.8+/-1.2 Ma**. Both spectra show argon loss patterns that are attributable to the alteration seen in the thin section. Irregular swings in the Ca/K and Cl/K ratios across the heating steps are indicative of a multi-mineral separate. The relatively low Ca/K ratios are attributed to actinolite. The integrated age, 111.2+/-0.3 Ma, is also very young. The errorchron age is selected as the most meaningful date and is thought to represent an **alteration age** of questionable geologic significance rather than any kind of magmatic age.

Sample 11200 – Quartz Creek Head, upper Chistochina area

(Figure 11, no. 14)

Petrography

This rock is an olivine-biotite-hornblende lherzolite. Mineralogically poikilitic biotite encloses clinopyroxene with accessory hornblende attached. Accessory, secondary minerals include chlorite and serpentine. The LOI is 3.13%, which translates to an alteration index of 5.13.

Age Spectra Plot

A biotite mineral separate was made from this rock for isotopic dating. The lowest heating step shows argon loss, however, the remainder of the spectra defines a well developed **plateau age** of **123.1+/-0.6 Ma**. Five fractions are responsible for releasing 93% of the total argon, with an MSWD of 0.5. The Ca/K ratios are very low, characteristic of biotite. Though this age is slightly older than the hornblende Cretaceous ages it is interpreted as a good date for the **magmatic event** that formed this rock.

Sample 11324 – Ram Ridge, Gakona Glacier area

(Figure 11, no. 9)

Petrography

This rock is a hornblende clinopyroxenite and consists principally of these two minerals. There are some pyroxene inclusions in the hornblende. A LOI of 1.84% is used to calculate an alteration index of 3.02.

Age Spectra Plot

A hornblende mineral separate was made from this sample for isotopic dating. The step heating spectra produced a hornblende **plateau age** of **123.4+/-0.6 Ma**. Six fractions produced 68% of the total argon released with a MSWD of 3.5. This age is similar to the biotite age of sample11200 from Quartz Creek to the east and slightly older than the other Cretaceous hornblende ages (e.g., samples 10290 & 11048). The Ca/K ratios are consistently low for hornblende. The increase in Ca/K ratio at the highest temperature step is attributed to pyroxene inclusions in the amphibole. This age is interpreted to represent a **magmatic age**, albeit an **imprecise** one, due to the elevated MSWD of 3.5.

Sample 03JS16A - Ram Ridge, Gakona Glacier area

(Figure 11, no. 10)

Petrography

This sample is classified as a very coarse-grained pyroxenite with one to two-centimeter crystals of pyroxene and pockets of coarse grained phlogopite. The BLM did not examine a hand sample or thin section of this sample. Major oxide chemistry reports a LOI of 1.3%, which calculates an alteration index of 1.10.

Age Spectra Plot

A biotite/phlogopite mineral separate was made from this sample for isotopic dating. The resulting step heating spectra yielded a plateau age of 124.8+/-0.8 Ma. Five fractions released 93% of the total argon with an MSWD of 1.9. The Ca/K ratios are very low, which is characteristic of biotite/phlogopite. The ratios step up with increasing temperatures. This may be attributable to minor chlorite alteration of the biotite/phlogopite. The integrated age of this sample is 123.6+/-0.8 Ma, which agrees closely with the other biotite ages in the area. The **plateau age of 124.8+/-0.8 Ma** is interpreted as a **magmatic age**. The integrated age is interpreted as a possible alteration age or minimum magmatic age for the rock.

GULKANA GLACIER TO CHISTOCHINA GLACIER AREA - ALKALIC SUITE

These rock samples are located in the eastern part of the area and exhibit modal mineralogies typical of alkalic suite rocks. Other samples from this area exhibit more calc-alkaline affinities.

Sample 10910 – Chistochina Glacier area

(Figure 11, no. 12)

Petrography

This sample is classified as a hornblende-biotite gabbronorite. Large grains of late magmatic biotite include finer grains of accessory hornblende. Mineralogy includes 2:1 clinopyroxene to orthopyroxene and modal alkali feldspar. As such this rock is classified as a member of the eastern alkalic sub-suite. The plagioclase exhibits minor sericite alteration. Major oxide chemistry reports a LOI of 0.15%, which calculates an alteration index of 0.2.

Age Spectra Plot

A biotite mineral separate was made from this sample for isotopic dating. The initial, low temperature age spectrum suggests an extremely young age, but subsequent steps rise to a near plateau around 120 Ma. However, with an MSWD greater than 2.5, it does not meet the criteria for a plateau age. Ca/K ratios are low, as would be expected for biotite. Spikes in the Ca/K ratios, particularly in the low temperature spectra, may be attributed to the accessory hornblende in the biotite. There are two ages to choose from, a pseudo-plateau age of 121.2+/-0.8 Ma and an **isochron age** of **119.7+/-0.6 Ma**. The integrated age of 199.5+/-0.4 Ma is thought to be insignificant due to the lack of alteration evident in thin section and consistent Ca/K and Cl/K ratios that suggest little alteration. The spectra curve degrades somewhat at higher temperatures implying there has been some argon loss. The most appropriate age is probably the Early Cretaceous isochron age describing a **minimum magmatic age** due to minor alteration.

Sample 10290 – East Magnetite Cirque, Gakona Glacier area

(Figure 11, no. 11)

Petrography

This sample is classified as a hornblende-magnetite pyroxenite. The sample contains nearly 20% opaques including magnetite, ilmenite, pyrrhotite, chalcopyrite, and pyrite. The LOI of 0.15 determines an alteration index of 0.24.

Age Spectra Plot

An amphibole mineral separate was made from this sample for isotopic dating. The step heating spectra produced a well defined **plateau age** of **121.2+/-0.3 Ma**. Four fractions accounted for the release of 89% of the total argon with an MSWD of 0.5. The Ca/K ratios are too low in general for hornblende (5.5 to 7). At higher temperature the Ca/K ratio came up to that which would be expected for amphibole giving a high temperature, minimum age of 168.8+/-2.5 Ma. Alteration is not in evidence in thin section or major oxide chemistry. So we interpret the plateau age is from a low Ca-amphibole and represents a good **magmatic age**.

Sample 10913 – Upper Gakona Glacier (landslide)

(Figure 11, no. 8)

Petrography
This hornblende clinopyroxenite contains principally clinopyroxene, hornblende, and a little chlorite. There is accessory plagioclase and the opaques, which make up less than 10% of the rock, consist of magnetite, pyrite, ilmenite, bornite, chalcopyrite, and hematite. The rock contains large crystals of clinopyroxene with included hornblende and chlorite. The chlorite commonly forms reactions rims on the hornblende. From major oxide chemistry the loss on ignition is reported at 0.72%, which for a pyroxenite would return an alteration index (LOI/H2O+) of 1.18.

Age Spectra Plot
A hornblende separate, which unavoidably included some clinopyroxene, was made for isotopic dating. Two analyses were made on this mineral separate. The first analysis (10913#1) was on a mineral separate containing plagioclase, hornblende, clinopyroxene, and chlorite based on x-ray diffraction patterns and the Ca/K ratios from the age spectra chart. The first run had a large amount of excess (inherited) argon producing a saddle shaped spectra (129.3+/-1.9 Ma.) and Ca/K ratios indicative of a multi-mineral separate. The second analysis, on a cleaner separate, produced a flatter spectra and a **pseudo-plateau age** of **120.4+/-1.2** Ma. This represents a pseudo-plateau because only two steps aligned, but they accounted for 50% of the total argon release. Mid-range heating steps produced ages from a low calcium hornblende, whereas a much younger high temperature age came from a high calcium mineral, probably clinopyroxene. The isochron age for the second run is 117+/-2.4 Ma, whereas an integrated age is 124.9+/-1.2 Ma. Major oxide chemistry and petrography confirm there has been significant alteration. Isochron and integrated ages most likely represent an alteration age. The pseudo-plateau is interpreted as an Early Cretaceous **minimum magmatic age**.

Sample 11048 – Northwest Magnetite Cirque, Gakona Glacier area

(Figure 11, no. 9)

Petrography
This sample is classified as a hornblendite containing approximately 85% modal hornblende and minor amounts of biotite, carbonate, epidote(?), and chlorite. Accessory minerals include magnetite and apatite. The apatite is embedded in the large hornblende grains whereas chlorite and epidote(?) are interstitial. The chlorite in particular is an alteration product of the hornblende. Major oxide chemistry reports a LOI of 1.54% which for a hornblendite represents an alteration index of 1.36.

Age Spectra Plot
A hornblende mineral separate was made from this sample for isotopic dating. The age spectra plot defines a flat age curve and correspondingly flat Ca/K ratio. Ten steps accounted for 84% of the total argon release with an MSWD of 2.4. These data are interpreted to define a hornblende **plateau age** of **121.2+/-0.3 Ma**. An isochron age calculated for this run gave a slightly smaller MSWD (1.9), but the resulting age of 121.3+/-0.3 is nearly identical to the plateau age. Along with the relative lack of alteration the plateau age is considered a good Early Cretaceous **magmatic age** for this sample.

AREA EAST OF SUMMIT LAKE

These rock samples are located in the southern part of the area, but exhibit modal mineralogies and major oxide chemical affinities typical of eastern calc-alkaline suite rocks.

Sample 10810 – Circular Anomaly, Summit Lake area

(Figure 11, no. 16)

Petrography
Modal mineralogy suggests that this is a pyroxene hornblendite or hornblende bearing pyroxenite. The rock consists principally of hornblende and clinopyroxene with some minor plagioclase heavily clouded with white mica (sericite). The minor opaque mineralogy consists of magnetite, ilmenite, chalcopyrite, and pyrrhotite. The LOI is reported at 0.41%, which for a pyroxenite would return an alteration index (LOI/H2O+) of 0.67, or 1.85 for a hornblendite.

Age Spectra Plot
A hornblende mineral separate was made from this sample for isotopic dating. The argon release of nearly constant isotopic ratio across the incremental age spectra defines a **plateau age** of **123.4+/-1.3 Ma**. Six fractions were responsible for the release of 99% of the total argon with a MSWD of 0.6. The Ca/K ratios across the mid range of the plateau are consistent, but on the low side for hornblende. At the extreme, high temperature end of the spectra the argon release is attributed to clinopyroxene, which is signaled by the jump in the Ca/K ratio, and produces a high temperature age of 132.2+/-7.2 Ma. This age could be interpreted as a total reset of a magmatic age, but the petrography indicates only minor chloritization and the major oxide chemistry indicates a low alteration index. Accepting that the subject mineral is a low Ca amphibole, these factors support the interpretation of an Early Cretaceous **magmatic age**.

Sample PB03-01 – Circular Anomaly, Summit Lake area

(Figure 11, no. 15)

Petrography
This rock is classified as a biotite diorite, quite different from the other rocks dated. The mineralogy includes plagioclase (An35), clinopyroxene, hornblende, biotite, and chlorite. The

biotite is moderately chloritized and hematite is exsolving along the biotite cleavages (a late magmatic or secondary phenomenon). The hornblende and biotite appear to be a late magmatic product of the clinopyroxene. Opaque minerals include magnetite, ilmenite, pyrrhotite, and pyrite. Major oxide chemistry is not available for this sample.

Age Spectra Plot

The chloritized biotite mineral separate from this diorite pluton produced a **plateau age** of **123.2+/-1.1 Ma** with 10 sequential steps releasing 92% of the total argon and an MSWD of 0.2 The Ca/K ratio for this biotite is very low (0.04 – 0.13) and is a different biotite (and rock type) than occurs in the mafic/ultramafic rocks dated. Because the plateau is very stable and covers most of the heating increments, it is felt that this represents a **good magmatic age**. The stable plateau, particularly for biotite, which is very sensitive to thermal events, indicates the absence of thermal disturbance since crystallization.

Table C-1. SE Rainy complex, near mouth of Rainy Creek.

Sample	Dated Material	Age Ma	Type Age	Ca/K Ratio	Confidence interpretation	Petrography whole rock chemistry*
AK25515 Gabbro (Fig. 10 #2)	**Biotite** Mineral separate	**228.3+/-1.1** 226.0+/-1.1	**Plateau** 5 fractions 81% Ar release MSWD 0.25 Integrated age	0.1 0.2	**Age of mafic magmatism and coincident volcanism**	Described as a biotite-rich, pyroxene-plagioclase cumulate with poikilitic biotite including olivine, major oxide chemistry not available, thin section unavailable
HBD-2003-29 Olivine basalt (Fig. 10 #1)	**Hornblende** Mineral separate	**225.7+/-2.0** 226.4+/-2.0	**Plateau** 8 fractions 97% Ar release MSWD 0.2	33-34	**Age of mafic volcanism and coincident magmatism**	(Thin section unavailable) XRD shows hornblende, minor chlorite & plagioclase
HBD-2003-53 Olivine basalt (Fig. 10 #1)	**Amphibole** Mineral separate	**219.3+/-4.5** 204.1+/-2.4	**Pseudo-plateau** 5 fractions 64% Ar release MSWD 3.3 Integrated age	65	**Partial reset (minimum) age of mafic volcanism / magmatism, or alteration age** some Ar loss	(Thin section unavailable) XRD shows amphibole (actinolite?), minor plagioclase & serpentine

*Alteration Index LOI/$H_2$0+ >2 indicates significant alteration has occurred.

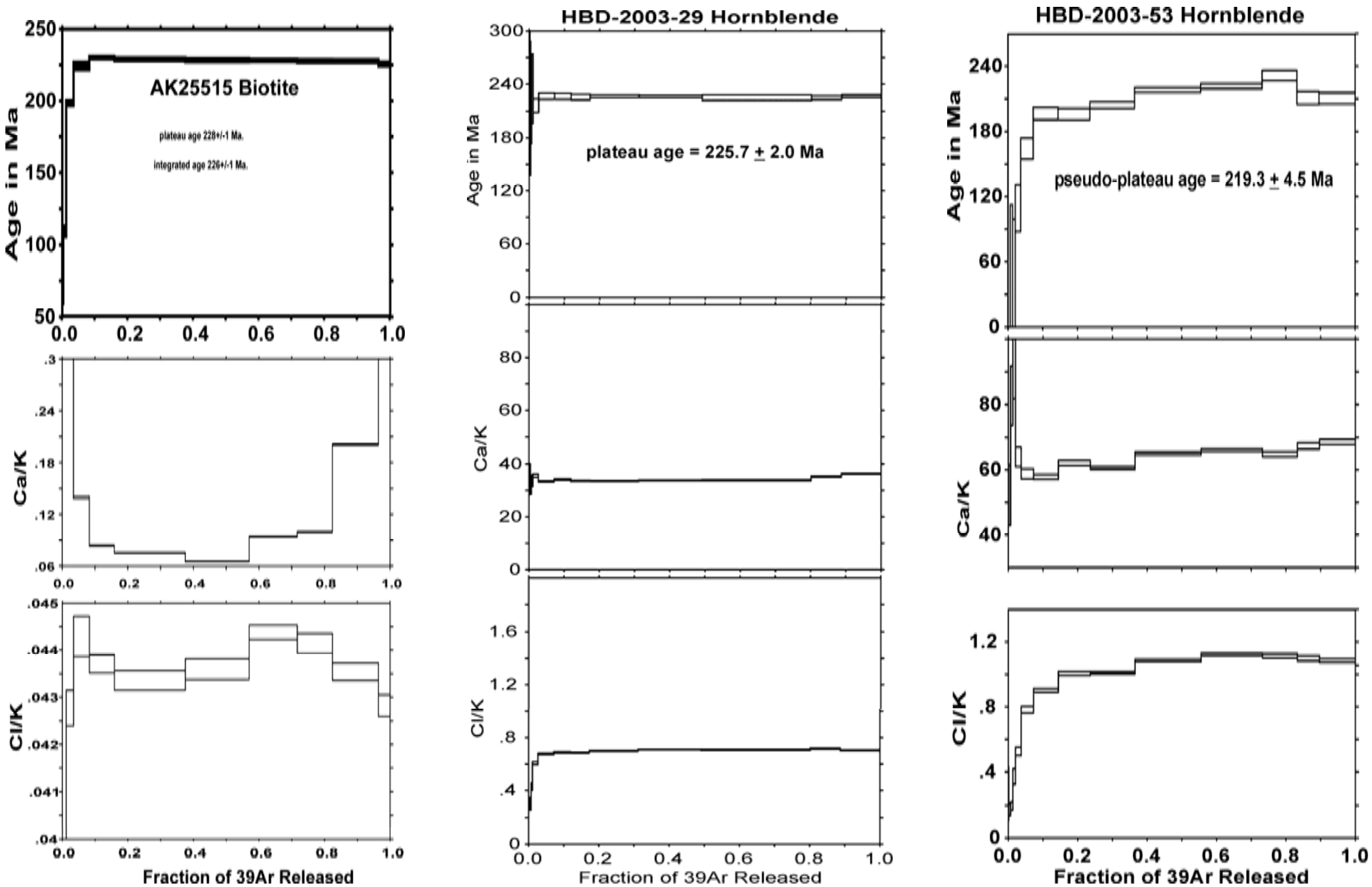

Figure C-1. Age spectra for $^{40}Ar/^{39}Ar$ dates in Table C-1, SE Rainy complex, near mouth of Rainy Creek.

Table C-2. Area from Rainbow Mountain to Cony Mountain.

Sample	Dated Material	Age Ma	Type Age	Ca/K Ratio	Confidence interpretation	Petrography whole rock chemistry*
10156	**Hornblende**	**199.5 +/- 2.1**	**Isochron**	18	**Alteration age**	Clinopyroxene altering to chlorite
Olivine	Mineral				Initial excess Ar and steadily rising Ca/K	and biotite
pyroxenite	separate	270.1+/-1.5	Integrated		implies some alteration phase contains	6.61 alteration index
(Fig. 10 #5)					the excess Ar, agrees with high	
					temperature biotite age	
10825	**Hornblende**	188.4 +/- 4.4	Isochron		Alteration age	Sericite alteration of plagioclase
Lherzolite	Mineral		Init=589/n=6	22		4.5 alteration index
(Fig. 10 #5)	separate		MSWD 1.6			
		336.8+/- 7.1	**Saddle**		**Excess Ar gives age older than true age**	
10830	**Hornblende**	**222.5+/-6.5**	**Isochron**	40 +/-	Alteration age	Strongly altered
Olivine	Mineral		Init=601		Impure separate, excess Ar	Hornblende and biotite replacing
peridotite	separate with				**Maximum age for a reset event**	clinopyroxene, sericite on
(Fig. 10 #6)	biotite,					plagioclase
	clinopyroxene,					5.8 alteration index
	plagioclase					
03JS06B	**Hornblende**	141.4 +/-1.0	Plateau	8	Biotite and hornblende mix	No thin section available
Hornblende	Mineral		3 fractions 66%		Ca/K ratio too low for hornblende	Ca/K spectra indicates alteration
andesite	separate		Ar release		Mixed age, partial reset event	**Not a mafic-ultramafic rock**
porphyry			MSWD 0.3		Ar loss event	
(Fig. 10 #4)		142 w/ 5% Ar loss	Model age			
				1 - 21	Too young – Ar loss	
		133.1+/- 1.3	Integrated	21		CIPW norm – Dacite
		169.0+/-3.5	**High temperature (hornblende)**		**Minimum age of magmatism**	LOI = 2.85
03JS07E	**Whole Rock**	142.8+/-7.9	Pseudo-plateau	0.6-1.5	Poorly defined – large MSWD	No thin section available
Mafic tuff (?)					Ar loss spectra	Hand sample heterogeneous and
(Fig. 10 #3)		145.5+/-1.0	Integrated	0.5-2.8		very altered
					Alteration age?	**Not a mafic-ultramafic rock**
		241.4+/-2.0	**High-temperature age**		**Minimum magmatic age** of questionable geologic significance	CIPW norm – andesite LOI = 3.5

*Alteration Index LOI/$H_2$0+ >2 indicates significant alteration has occurred.

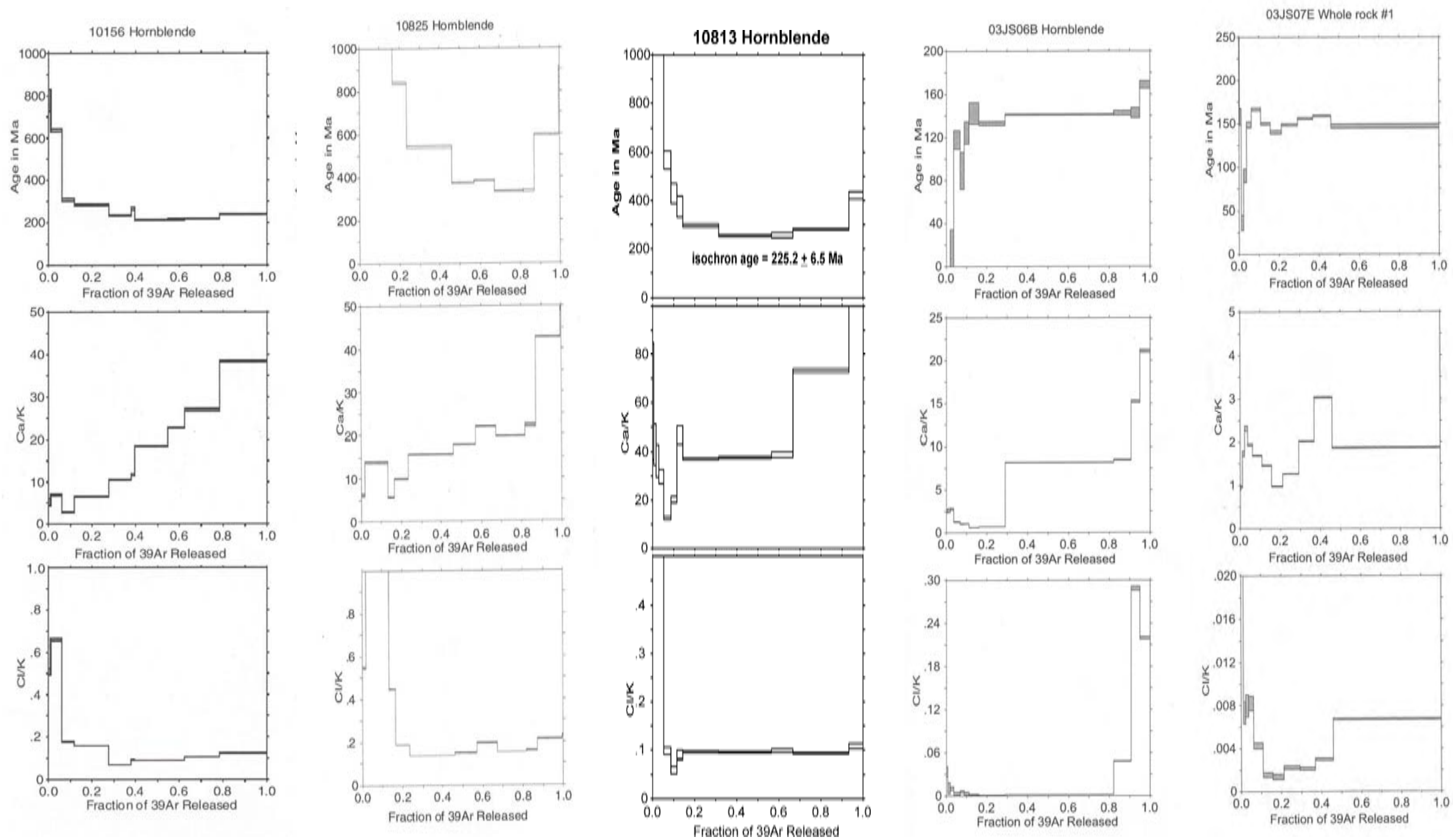

Figure C-2. Age spectra for $^{40}Ar/^{39}Ar$ dates in Table C-2, area from Rainbow Mountain to Cony Mountain.

Table C-3. Gulkana Glacier to Chistochina Glacier area - calc-alkaline suite.

Sample	Dated material	Age Ma	Type age	Ca/K ratio	Confidence interpretation	Petrography whole rock chemistry*
10240 Olivine pyroxenite (Fig. 10 #13)	**Biotite** Mineral separate some hornblende & clinopyroxene	123.1+/-3.1	Pseudo-plateau 10 fractions 84% Ar release MSWD 7.8	0.02	Combination age of biotite & hornblende younger than true age (Ar loss)	Minor alteration, biotite to chlorite 4.13 alteration index
		121.5+/-1.1	Pseudo-plateau 7 fractions 48% Ar release MSWD 0.7			
		123.3+/-1.3	**Integrated age**		**Partial reset age**	
10994 Hornblende-biotite syenite (Fig. 10 #7)	**Hornblende** Mineral separate	**118.8 +/- 1.2**	**Errorchron**	2 to 16	Mix of biotite & amphibole Alteration of the hornblende or introduction of actinolite through metamorphism **Alteration age** Geologic significance?	Altered, sericitized plagioclase, hornblende grains enclose other grains including biotite, **Not a mafic-ultramafic rock**
11200 Olivine-biotite-hornblende Lherzolite (Fig. 10 #14)	**Biotite** Mineral separate	**123.1 +/- 0.6**	**Plateau** 5 fractions 93% Ar release MSWD 0.5	0.02 to 2.3	Well defined plateau, but older than hornblende ages **Good magmatic age**	Coarse grained, poikilitic biotite enclosing clinopyroxene with accessory hornblende attached
11324 Hornblende clinopyroxenite (Fig. 10 #9)	**Hornblende** Mineral separate	**123.4 +/- 0.6**	**Plateau** 6 fractions 86% Ar release MSWD 3.5	8 to 17	Acceptable hornblende plateau age, relatively high MSWD, **Imprecise magmatic age**	Pyroxene inclusions in the hornblende
		120.9+/-1.0	Isochron age			
03JS16A Pyroxenite (Fig. 10 #10)	**Biotite** Mineral separate	**124.8+/-0.8**	**Plateau** 5 fractions 93% Ar release MSWD 1.9	0.1-0.85	**Magmatic age** Minor chlorite alteration?	No thin section available CIPW norm – Websterite LOI = 1.3%
		123.6+/-0.8	Integrated age		Minor Ar loss	2.1 alteration index

*Alteration Index LOI/H_20+ >2 indicates significant alteration has occurred.

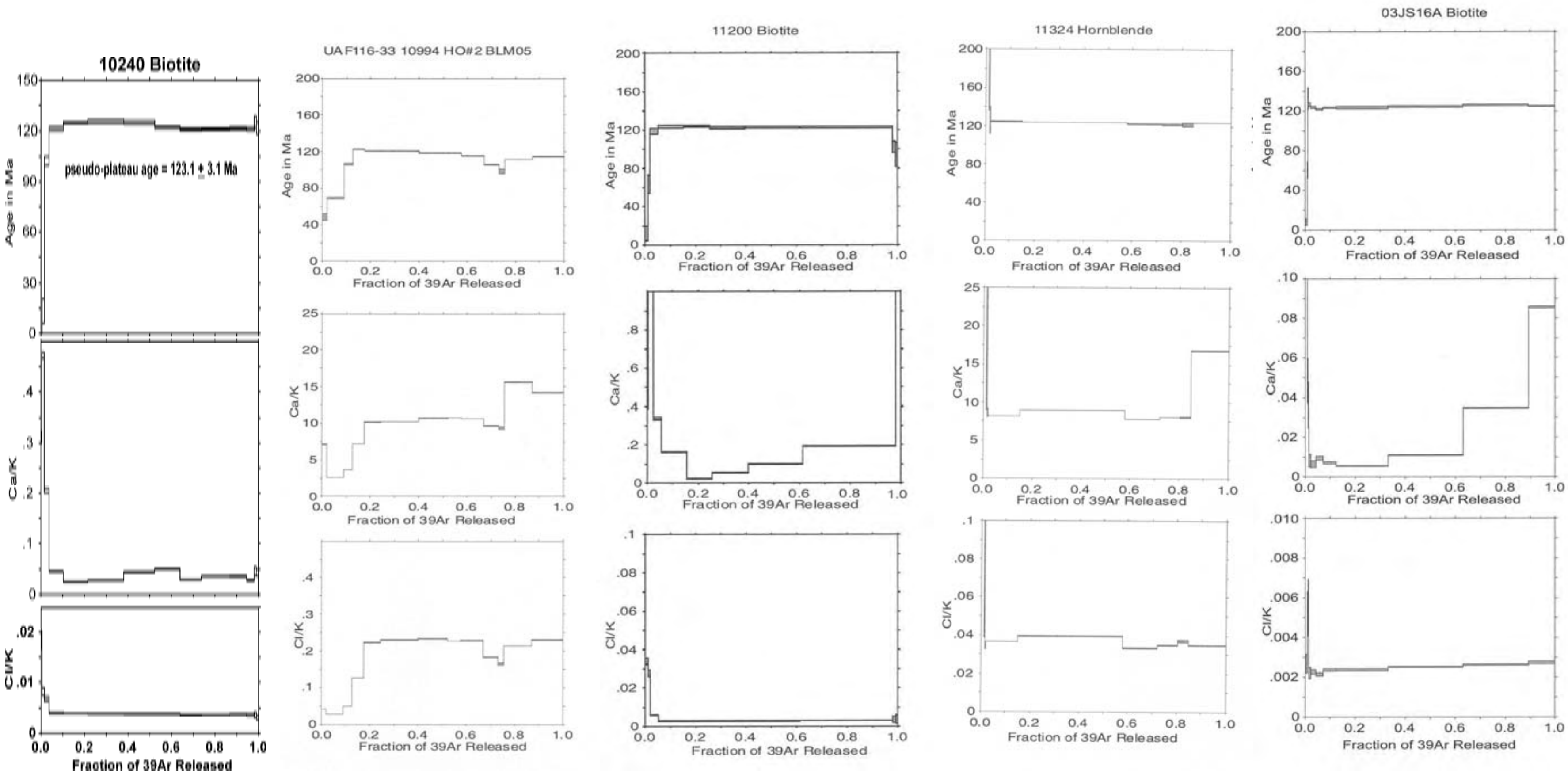

Figure C-3. Age spectra for $^{40}Ar/^{39}Ar$ dates in Table C-3, Gulkana Glacier to Chistochina Glacier area - calc-alkaline suite.

Table C-4. Gulkana Glacier to Chistochina Glacier area - alkalic suite.

Sample	Dated Material	Age Ma	Type Age	Ca/K Ratio	Confidence interpretation	Petrography whole rock chemistry*
10910 Hornblende-biotite gabbronorite (Fig. 10 #12)	**Biotite** Mineral separate	121.2 +/- 0.8	Pseudo-plateau	0.035	Minor alteration, does not meet criteria for plateau age	Late magmatic biotite is growing hornblende, plagioclase has minor sericite alteration
		119.7+/-0.6	**Isochron age**		**Minimum magmatic age**	
		121 Ma	Model age		Model age with 2% Ar loss	LOI = 0.67% 0.9 alteration index
10290 Hornblende-magnetite pyroxenite (Fig. 10 #11)	**Hornblende** Mineral separate	**121.2 +/-0.3**	**Plateau** 4 fractions 89% argon release MSWD 0.5	6	Well defined plateau Low Ca/K ratio for hornblende **Good magmatic age**	Low Ca amphiboles present Cummingtonite/anthophyllite LOI = 0.15% 0.2 alteration index
10913 Hornblende pyroxenite (Fig. 10 #8)	**Hornblende** Mineral separate	**120.4+/-1.2**	Pseudo-plateau 2 fractions 50% Ar release	9.8	**Minimum magmatic age** Age older than true reset age Excess Ar	Lots of plagioclase & chlorite alteration
		124.9+/-1.2	MSWD 0.1 Integrated age		Age older than true	
		117.7+/-2.4	Isochron		Reset age (of chloritization)	
11048 Hornblendite (Fig. 10 #9)	**Hornblende** Mineral separate	**121.2 +/- 0.3**	**Plateau** 10 fractions 84% Ar release MSWD 2.4	10	**Good plateau age** Consistent Ca/K ratios	Primarily hornblende with accessory biotite

*Alteration Index LOI/H_20+ >2 indicates significant alteration has occurred.

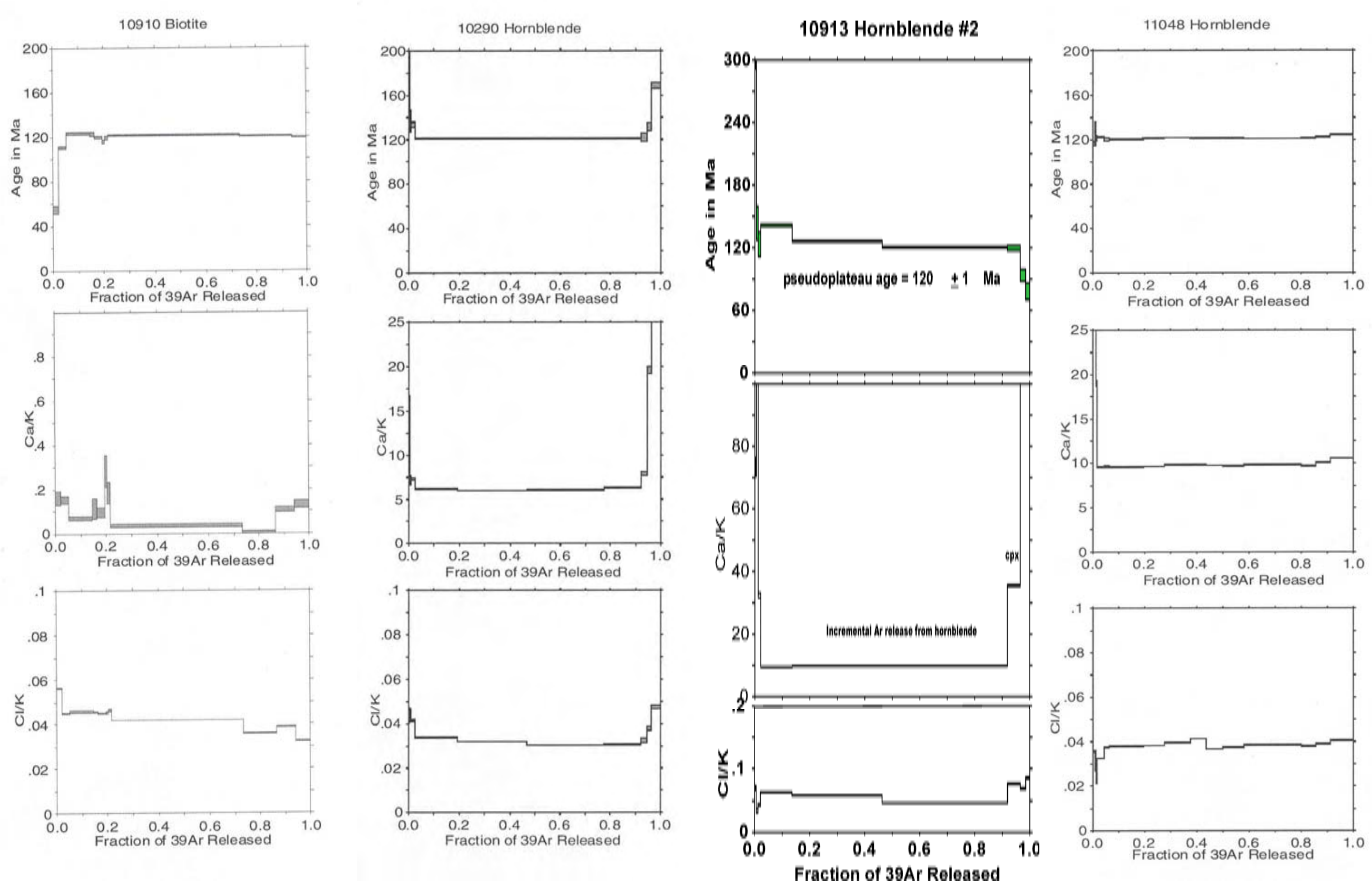

Figure C-4. Age spectra for $^{40}Ar/^{39}Ar$ dates in Table C-4, Gulkana Glacier to Chistochina Glacier area - alkalic suite.

Table C-5 – Area East of Summit Lake.

Sample	Dated Material	Age Ma	Type Age	Ca/K Ratio	Confidence interpretation	Petrography whole rock chemistry*
10810 Pyroxene hornblendite (Fig. 10 #16)	**Hornblende**, Mineral separate some muscovite	**123.4+/-1.3**	**Plateau** 6 fractions 99% Ar release MSWD 0.6	10.9	**Magmatic age** or possibly a total reset of mafic plutonism	Minor chloritization 0.7 alteration index
PB03-01 Biotite diorite (Fig. 10 #15)	**Biotite** Mineral separate	**123.2+/-1.1**	**Plateau** 10 fractions 92% Ar release MSWD 0.5	0.02	**Magmatic age** for intermediate/granitic plutonism	Hornblende intergrown with clinopyroxene Biotite with chlorite rims **Not a mafic-ultramafic rock**

*Alteration Index LOI/$H_2$0+ >2 indicates significant alteration has occurred.

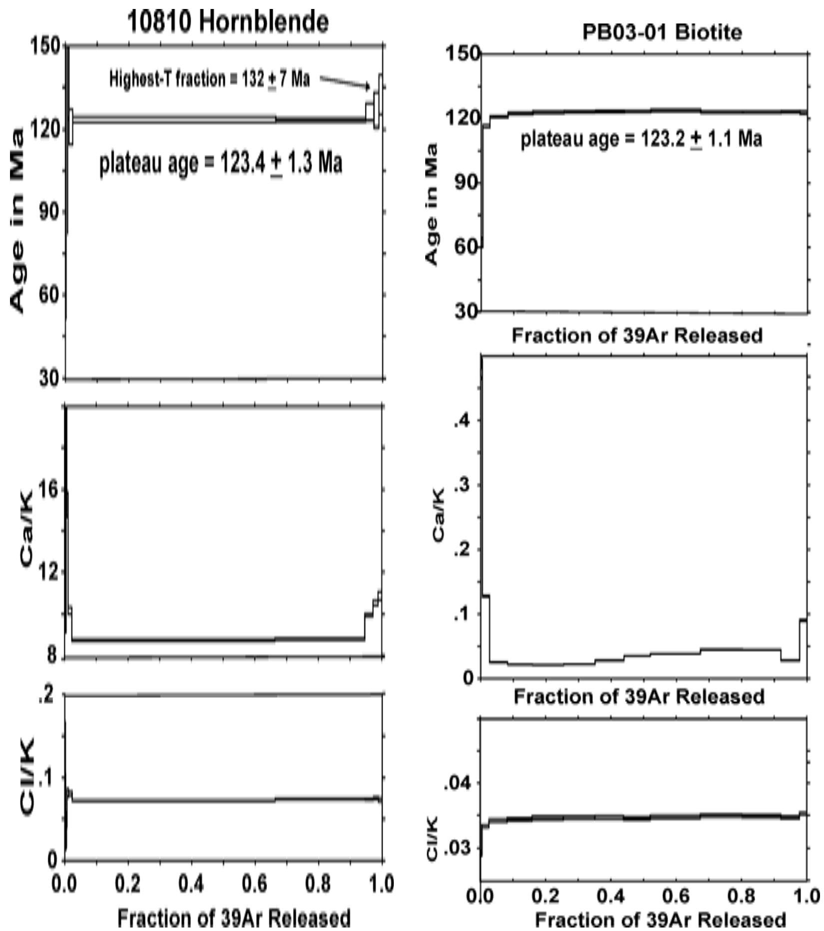

Figure C-5. Age spectra for $^{40}Ar/^{39}Ar$ dates in Table C-5, Summit Lake area.

Table C-6. Revised data (from Matteson, 1973, K/Ar data) recalculated using the constants of Steiger and Jaeger (1977) by Paul Layer, University of Alaska Fairbanks Geochronology Lab. (Eastern Suite)

Sample	K2O	Sample wt	40Ar*	mol K	mol 40K	40Ar rad / 40K	40Ar rad / 40Ar tot	age	1 sig. err.	REMARKS
72067 Hornblende granodiorite	1.182	2.5411	1.82E-10	0.000251	2.93E-08	6.20E-03	0.809	103.6	3.1	Minimum age
72068 Biotite pyroxenite	8.806	0.1442	1.61E-09	0.00187	2.18E-07	7.40E-03	0.692	**123.1**	**3.7**	Agrees with hornblende age
72069 **Hornblende pyroxenite**	1.325	2.6552	2.49E-10	0.000281	3.28E-08	7.58E-03	0.924	**125.9**	**3.8**	Agrees with biotite age

Table C-7. Coordinates of isotopic age date samples.

Fig. 10 Map no.	Sample	Latitude	Longitude
1	03JS23B	63.340	-145.972
1	HB03-29	63.339683	-145.959901
1	HB03-53	63.339683	-145.959901
2	AK25515	63.304690	-145.832732
3	03JS07E	63.309	-145.623
4	03JS06B	63.270	-145.408
5	10156	63.29033	-145.42100
5	10825	63.289890	-145.422064
6	10830	63.295769	-145.409044
7	10994	63.255627	-145.329307
8	10913	63.279824	-145.251384
9	11048	63.234682	-145.088563
9	11324	63.234166	-145.08893
10	03JS16A	63.230	-145.094
11	10290	63.213523	-145.071992
12	10910	63.193099	-144.916193
13	10240	63.200147	-144.875890
14	11200	63.162756	-144.717733
15	PB03-01	63.134070	-145.470580
16	10810	63.129263	-145.481571

Summary of isotopic age dating analysis

– From P. Layer and J. Drake, report to the BLM on
$^{40}Ar/^{39}Ar$ step heat analysis of BLM05 Samples, July 27, 2004.

For $^{40}Ar/^{39}Ar$ analysis, samples were submitted to the Geochronology laboratory at University of Alaska Fairbanks. 100 – 250 micron-sized hornblende and biotite minerals were separated from the samples by Jim Deininger. The monitor mineral MMhb-1 (Samson and Alexander, 1987) with an age of 513.9 Ma (Lanphere and Dalrymple, 2000) was used to monitor neutron flux (and calculate the irradiation parameter, J). The samples and standards were wrapped in aluminum foil and loaded into aluminum cans of 2.5 cm diameter and 6 cm height. The samples were irradiated in position 5c of the uranium enriched research reactor of McMaster University in Hamilton, Ontario, Canada for 20 megawatt-hours.

Upon their return from the reactor, the samples and monitors were loaded into 2 mm diameter holes in a copper tray that was then loaded in a ultra-high vacuum extraction line. The monitors were fused, and samples heated, using a 6-watt argon-ion laser following the technique described in York et al. (1981), Layer et al. (1987) and Layer (2000). Argon purification was achieved using a liquid nitrogen cold trap and a SAES Zr-Al getter at 400C. The samples were analyzed in a VG-3600 mass spectrometer at the Geophysical Institute, University of Alaska Fairbanks. The argon isotopes measured were corrected for system blank and mass discrimination, as well as calcium, potassium and chlorine interference reactions following procedures outlined in McDougall and Harrison (1999). System blanks generally were $2x10^{-16}$ mol ^{40}Ar and $2x10^{-18}$ mol ^{36}Ar which are 10 to 50 times smaller than fraction volumes. Mass discrimination was monitored by running both calibrated air shots and a zero-age glass sample. These measurements were made on a weekly to monthly basis to check for changes in mass discrimination.

The detailed analyses are given on pages 10-14 while a summary of all the $^{40}Ar/^{39}Ar$ results is given in Table 1, with all ages quoted to the +/- 1 sigma level and calculated using the constants of Steiger and Jaeger (1977). The integrated age is the age given by the total gas measured and is equivalent to a potassium-argon (K-Ar) age. The spectrum provides a plateau age if three or more consecutive gas fractions represent at least 50 percent of the total gas release and are within two standard deviations of each other (Mean Square Weighted Deviation less than ~2.5).

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