CONTRACT REPORT

MINERAL INVESTIGATION

of the Iditarod-George Planning Block, Central Kuskokwim River Area, Alaska 1983

By Mark P. Meyer
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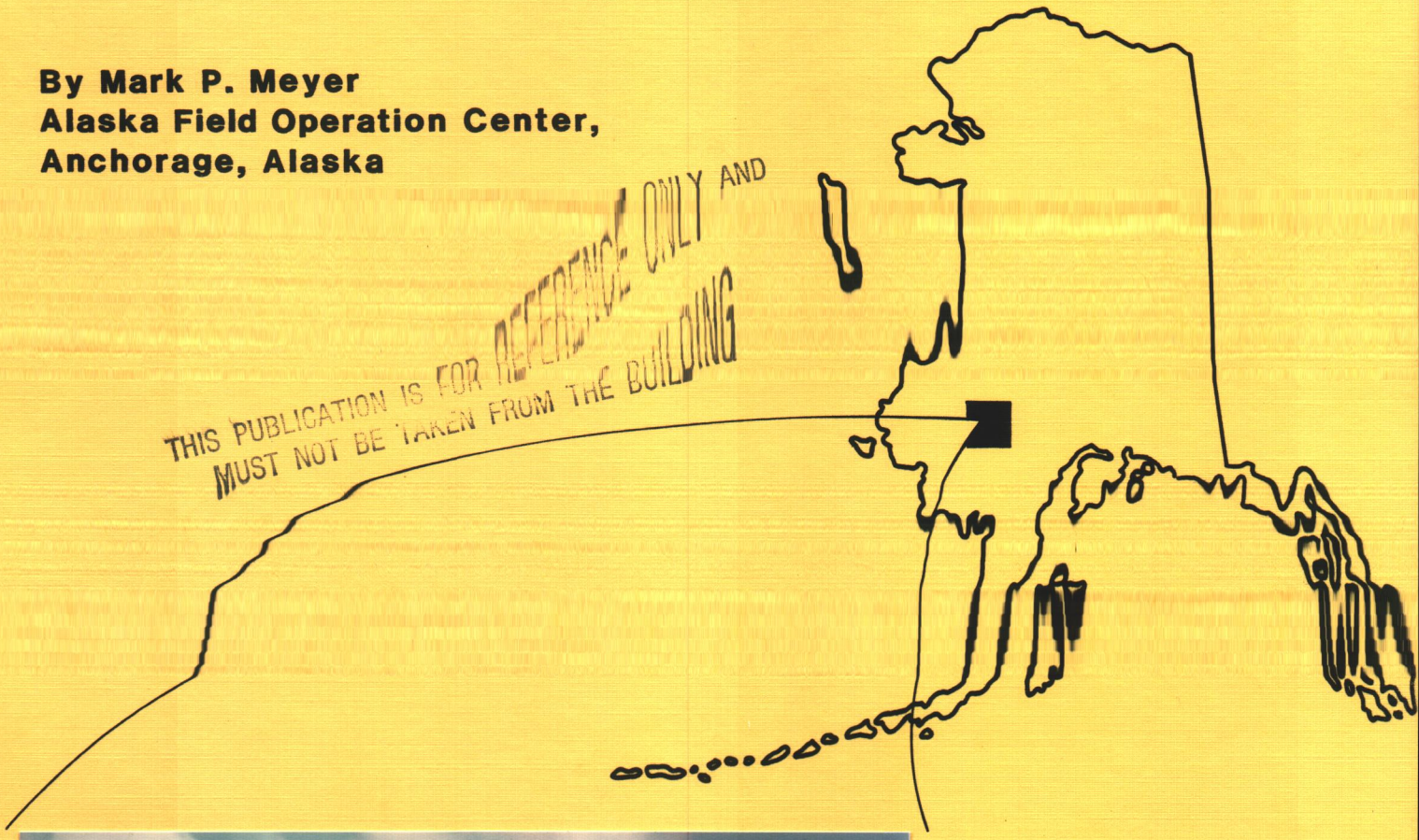

Prepared by the Bureau of Mines
for the
Bureau of Land Management

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
SAFETY EFFICIENCY
MINERAL INDUSTRIES

MINERAL INVESTIGATION OF THE IDITAROD-GEORGE PLANNING BLOCK, CENTRAL KUSKOKWIM RIVER AREA, ALASKA

by Mark P. Meyer
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UNITED STATES DEPARTMENT OF THE INTERIOR

William Clark, Secretary

BUREAU OF MINES

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CONTENTS

CONTENTS - Continued

CONTENTS - Continued

ILLUSTRATIONS

TABLES

MINERAL INVESTIGATION OF THE IDITAROD-GEORGE PLANNING BLOCK, CENTRAL KUSKOKWIM RIVER AREA, ALASKA

By Mark P. Meyer[1]/

ABSTRACT

In 1983 two Bureau of Mines geologists made a literature search supplemented by a 10-day field reconnaissance for the Bureau of Land Management to delineate mineralized areas in the Iditarod-George Planning Block, southwestern Alaska. Deposits described in the literature include: 1) lode mercury-antimony; 2) lode gold-silver; 3) lode antimony; 4) lode molybdenum; 5) lode copper-lead-zinc; 6) lode gemstone; 7) placer gold-silver; 8) placer tungsten; 9) placer mercury; 10) coal; 11) oil and gas; 12) sand and gravel and a 13) geothermally active area. Identified during the literature search were 7 lode mines, 15 placer mines, 10 lode prospects, 9 lode occurrences, 10 placer prospects, 12 placer occurrences, 2 coal prospects, 1 gemstone occurrence, and 1 sand and gravel pit.

Stream sediment and rock samples were taken to supplement data from the literature as an aid in verifying the presence of minerals and delineating the regionally mineralized areas. Fourteen mineralized zones contain anomalous concentrations of multiple elements; twelve areas have single elements; two areas contain coal deposits; two areas have been reported to have potential for oil and gas; one area is geothermally active; and all of the stream valleys contain sand and gravel. Metals of possible economic interest found in the 1983 samples from the study area include antimony, chromium, cobalt, copper, gold, lead, manganese,

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mercury, molybdenum, nickel, tin, titanium, and tungsten. Placer deposits include gold, mercury, and tungsten. Deposit grades and reserves were not estimated.

INTRODUCTION

The Federal Land Policy and Management Act (43 U.S.C. 1701) and the Alaska National Interest Lands Conservation Act (16 U.S.C. 3148) mandated that the Bureau of Land Management (BLM) identify the leasable, locatable, and salable minerals on public lands and to use that information in the development of land use plans and the subsequent use, disposition, or occupancy for multiple use purposes. To fulfill this mandate, the BLM made an interagency agreement with the Bureau of Mines (Bureau) to conduct a 4-month study of the Iditarod-George Planning Block, in the central Kuskokwim River area, Alaska (figures 1 and 2). The Bureau's work consisted primarily of literature research supplemented by limited field investigation that included stream sediment and rock sampling.

This report summarizes the pertinent general geology as described in the literature, shows the locations of mining claims and known mineral occurrences, and outlines the areas considered to be mineralized.

LAND STATUS AND STUDY AREA

The Iditarod-George Planning Block consists of BLM-administered public lands surrounded by other federal, state, and private lands. Some private lands occur in the planning block. The planning block totals approximately 3.5 million acres and extends from Black Mountain on the east to the Yukon River on the west; and from Henderson Mountain on the south to a

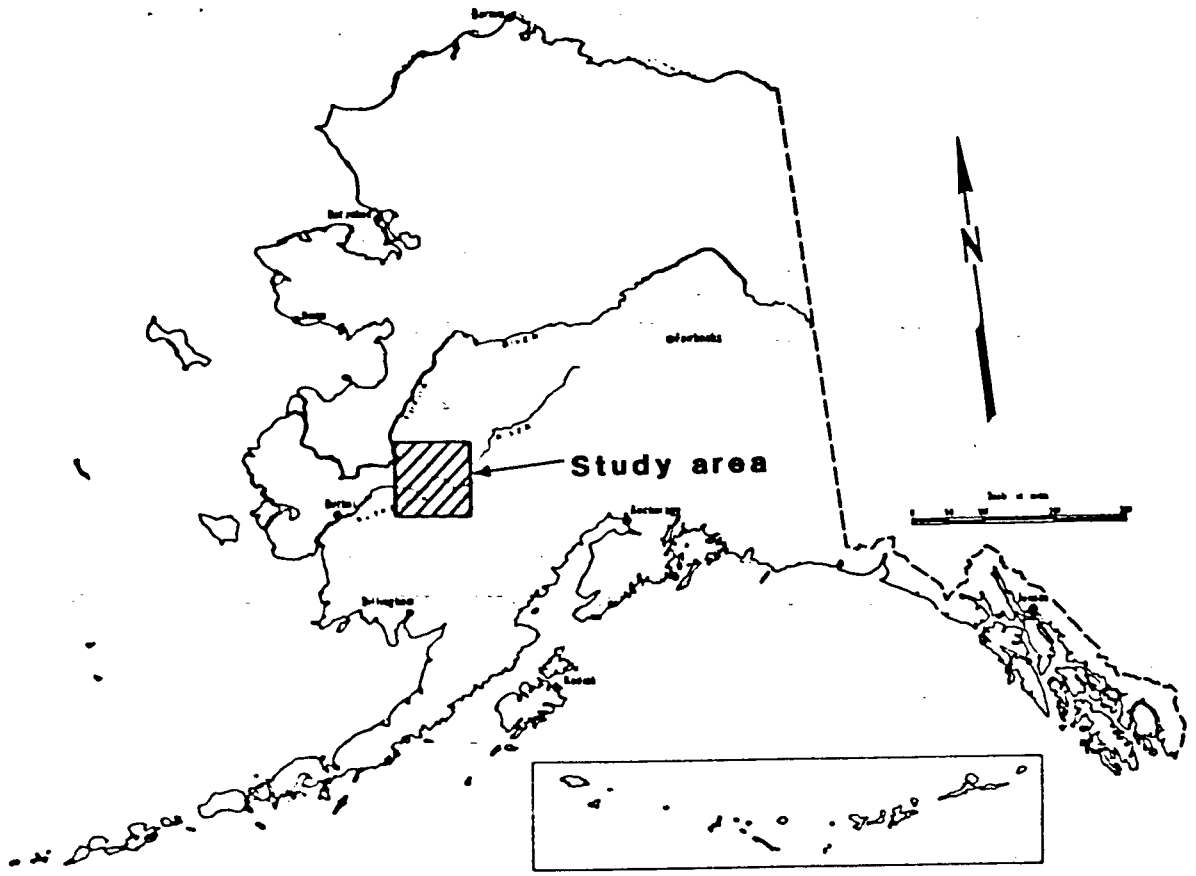
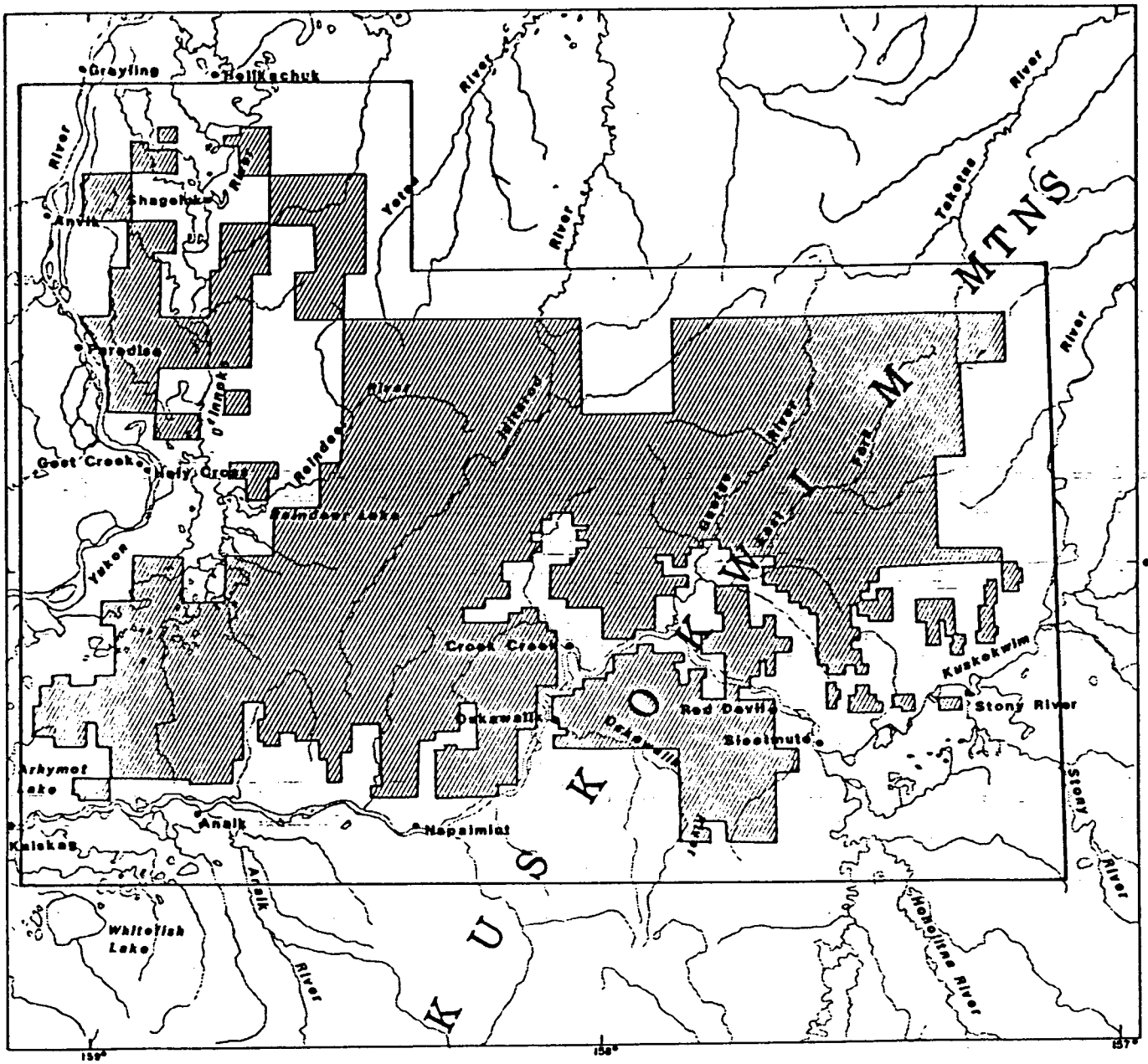


FIGURE 1. - Location of the Iditarod-George study area.



N

LEGEND

BOM study area boundary

Iditarod-George planning block

0 12 24 Miles

0 12 24 36 Kilometers

Scale

FIGURE 2. - Location Map of the Iditarod-George Planning Block

point approximately 25 mi north of the town of Flat (figure 2). Included in the study area are the Aniak and Iditarod Mining Districts (figure 3). The planning block is made up of a large central block with an erratic outline and numerous small, widely-scattered detached areas.

The study area is made up of a larger rectangular area which encompassed all of the planning block (figure 2). The portion of the study area which are not administered by BLM was also investigated because geologic trends with similar types of mineralization may extend into the planning block.

PHYSIOGRAPHY AND ACCESS

The study area, which is in the Kuskokwim Mountains Physiographic Province (Wahrhaftig, 1965), is characterized by rolling hills and isolated peaks. The Kuskokwim Mountains are dissected by streams and rivers, including the gorge of the Kuskokwim River and the broad open valleys of the Iditarod and George Rivers. The higher elevations were glaciated during the last glacial advance. Elevations range from 50 ft above sea level along the Kuskokwim and Yukon Rivers to over 3,750 ft in the Horn Mountains. Westward, the rolling hills grade into the broad flood plain of the Yukon River.

Vegetation in the area includes extensive stands of spruce, willow, and alder in the floodplains; stands of spruce, alder, and ground cover of tundra vegetation on the hillslopes; stunted spruce, lichen, and dwarf alpine vegetation on the rounded ridge crests; and the lichen which cling to the rocks in the ridges and peaks.

Access to the area is via aircraft from Aniak, Bethel, and McGrath, or by riverboat along the Kuskokwim or Yukon Rivers. Most settlements and

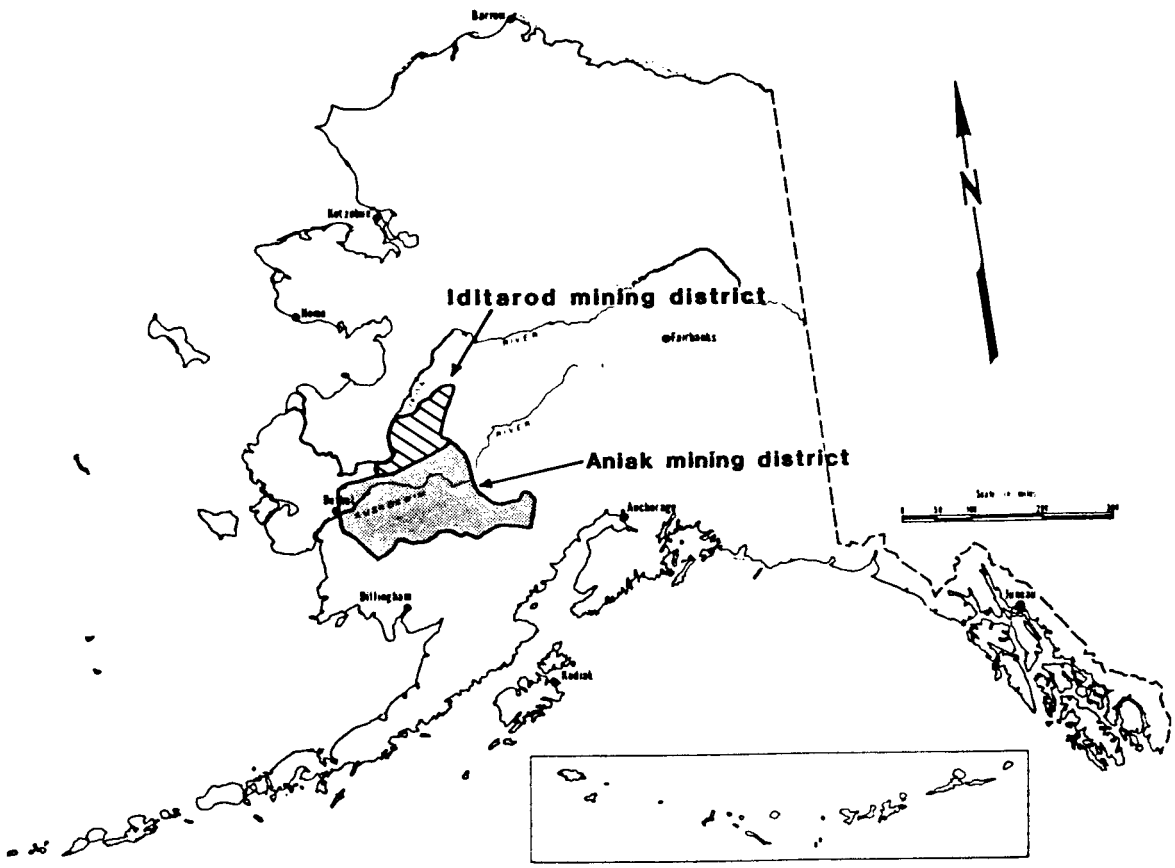


FIGURE 3. - Mining Districts in the Iditarod-George study area

mining camps in or near the area have landing fields suitable for light fixed-wing aircraft. The Kuskokwim River is navigable by tugboats and barges up to McGrath.

ACKNOWLEDGMENTS

Rodney Jeske, Bureau Geologist, participated in the literature search, fieldwork, and data compilation.

Helen Hankins, Geologist, Division of Minerals - BLM, Anchorage District Office, particpated in setting up and planning the project. The BLM provided logistical support for the field phase. Carl Persson, BLM McGrath Resource Area geologist, participated in the fieldwork.

Minerals Management Service (MMS) provided data on leasable minerals and BLM provided data on locatable minerals.

PREVIOUS INVESTIGATIONS

Systematic geologic studies in the Iditarod-George Planning Block area started in 1898 with a regional reconnaissance by the U. S. Geological Survey (USGS) (Cady, Wallace, Hoare, and Webber, 1955). Since that time USGS, Alaska Territorial Department of Mines (TDM), and Bureau personnel have made many studies of the regional geology, as well as the mercury, and gold placer occurrences. Most recent studies occurred during the 1950's and 1960's. The regional geologic interpretation (figure 4) is used in this report (Cady, Wallace, Hoare, and Webber, 1955). Since then little has been published on the geologic work in the area.

Prior to 1898, little was known about the geology in the Kuskokwim River area. During 1898, USGS personnel made a regional geologic reconnaissance along the Kuskokwim River (Spurr, 1900). In 1914, USGS

personnel conducted geologic studies of the area including a detailed investigation of the Alice and Bessie mercury mine (Smith, 1917; Smith and Maddren, 1915). During the summer of 1915, USGS personnel investigated mineral localities including placer gold deposits on Donlin, Crooked, and New York Creeks, the Kolmakof mercury deposit, and copper lodes in the Russian Mountains (Maddren, 1915; Smith and Maddren, 1915). During 1922 and 1924, TDM personnel investigated the placer operations of the area (Wimmler, 1922, 1924). In 1926, TDM personnel reported on mining activity and coal occurrences near Flat (Holzheimer, 1926). From 1937 to 1940, TDM personnel reported on the mercury mines near Sleetmute (Roehm, 1937, 1939, 1940). In 1942, TDM personnel reported on the strategic mineral occurrences (Joesting, 1942). From 1942 to 1946, Bureau personnel trenched and sampled mercury deposits (Webber and others, 1947). During 1950, TDM personnel reported on the placer operations near Flat (Williams, 1950). In 1955, a detailed description of the geology and the mineral resources was published by the USGS (Cady, Wallace, Hoare, and Webber, 1955). From 1955 through 1956, Bureau personnel made a reconnaissance of the Flat district as part of the Bureau's investigation of mercury and other strategic mineral resources. In 1956, this information led to a program of trenching, sampling, and mapping of deposits of mercury, gold, and other strategic minerals (Maloney, 1956). During 1957 and 1958, USGS personnel mapped the Red Devil mercury Mine (Sainsbury and MacKevett, 1965). From 1956 to 1963, TDM personnel reported on the mercury deposits (Jasper, 1955, 1956, 1962, 1963). In 1962, Bureau personnel wrote a detailed report on mercury occurrences in Alaska which includes history, geology, mineralization, mining methods, and maps of the mercury deposits (Malone, 1962). Bureau

personnel completed a reconnaissance sampling program to find methods for delineating and evaluating lode-gold deposits known to be the sources of placer gold deposits in the Iditarod Mining District (Kimball, 1969). Bureau personnel compiled a list of active placer mines in Alaska, including those in the study area, which were in operation during the 1975 mining season (Carnes, 1976). Private mineral investigations may have been conducted in the region but the results of few, if any, are published.

MINING HISTORY

Mining has occurred in and near the Iditarod-George Planning Block from at least 1898 to the present. Placer gold and lode mercury mines were the largest mineral producers (table 1), with minor amounts of lode antimony, gold, silver, lead, and zinc mined.

In 1838, the Russian explorers reported the occurrence of mercury at Kolmakof. Mercury was noted at the Kolmakof occurrence in a regional geologic reconnaissance in 1898 (Spurr, 1900). The first mercury deposit, the Alice and Bessie Mine (figure 5) on the Kuskokwim River, was staked in 1906 by E. W. Parks (Jasper, 1956).

During the same year fine gold was discovered in the gravels of the Innoko River. The first major placer gold discovery was made on Otter Creek in 1908 (Maddren, 1911) and in the spring of 1909 that the Iditarod-Flat gold rush started with the arrival of more than 2,000 people with equipment (Brooks, 1910). Most of the placer operations were worked by hand until 1912 when the first bucket-line dredge was installed on Flat Creek (Eakin, 1913). One of the most productive years for mining on Flat Creek was in 1912, when more than 130,000 oz of gold was recovered.

TABLE 1. - Production data from the Iditarod-George study area

Name	Years reported	Gold troy ounces[1]	Silver troy ounces	Lead lbs	Zinc lbs	Mercury flasks
		LODE MINES				
Golden Horn Mine (9)[2]	1925-1937	2,706	2,620	9,336	653	
Red Devil Mine (28)	1933-1971					35,000
Barometer Mine (29)	1921-1943					16
Willis and Fuller Mine (32)	1914-1918					2
Alice and Bessie Mine (33)	1906-1961					174.2
DeCourcy Mountain Mine (55)	1921-1965					1,534
Kolmakof Mine (62)	1909-1910					2
Totals		2,706	2,620	9,336	653	36,728.2
		PLACER MINES				
Otter Creek Mine (4)	1910-1969	296,557	31,418			
Malamute Pup Mine (6)	up to 1952	1,907	241			
Granite Creek Mine (7)	up to 1956	4,004	614			
Flat Creek Mine (8)	1915-1966	255,086	NAP			
Willow Creek Mine (10)	1910-1934	Not reported	NAP			
Happy Creek Mine (11)	1926-1966	106,486	1,735			
Chicken Creek Mine (13)	up to 1956	12,755	2,024			
Slate Creek Mine (14)	1915-1940	Not reported	NAP			
Prince Creek Mine (15)	1929-1956	Not reported	NAP			
Julian Creek Mine (19)	1910-1982	Not reported	NAP			
Quartz Gulch Mine (44)	1910-1914	1,761	NAP			
Donlin Creek Mine (46)	up to 1955	$125,000.00	119			
Ruby Gulch Mine (47)	1911	145.14	NAP			
Snow Gulch Mine (52)	1910-1912	237.06	NAP			
Murray Gulch Mine (60)	up to 1955	$ 2,000.00	NAP			
Totals		678,938.20 plus$127,000.00	36,151			
Total reported production of placer gold from the Iditarod Mining District (Kimball, 1969)		1,329,404 oz				

NAP - Not applicable

1/ Unless noted in dollar value. Dollar value given when gold price fluctuated over the time period reported

2/ Numbers in parentheses refer to map numbers on figure 5 and appendix B.

Reported total gold production from the Iditarod Mining District from 1910 to 1966, was 1,329,404 oz (table 1) which represents more than 6 pct of Alaska's placer gold production (Kimball, 1969). From 1942 to 1946, the gold mining industry was deemed not critical to the war effort, and was closed by the War Production Board Order L-208. Since 1968 a small dredge and three mechanized operations with portable washing plants have been active near Flat. Local production for the last few years can only be estimated since gold production figures have been listed by regions and districts instead of by individual mine or streams.

Mercury lodes were staked and operated intermittently when mercury prices were high. From 1909 up to 1971, production totaled 36,728 flasks of mercury from the Red Devil, DeCourcy Mountain, Alice and Bessie, Barometer, Willis and Fuller, and Kolmakof Mines (table 1). The Red Devil Mine, staked in 1933 by Hans Halverson (Roehm, 1939), was the largest U.S. producer of mercury during 1957 with a recovery of over 5,000 flasks of mercury (Sainsbury and MacKevett, 1965). Between 1952 and 1958 the Defense Minerals Exploration Administration (DMEA) loans to the Red Devil Mine and DeCourcy Mountain Mines were used to explore for new ore bodies (MacKevett and Berg, 1963). By 1964, ore reserves at the Red Devil Mine were exhausted and renewed exploration, funded by a loan from the Office of Mineral Exploration (OME), failed to disclose further minable deposits. Since 1964 only minor amounts of mercury have been produced and none has been reported since 1971 because mercury prices have been too low to generate economic mineral development.

Currently placer gold is mined in the vicinity of Chicken Mountain, Snow Gulch, Julian Creek, Spruce Creek, Murray Creek, and New York Creek. The operations use large mechanized equipment (bulldozers, loaders, backhoes, and draglines) to feed sluice boxes and processing plants.

Several operations near Flat use hydraulic methods to strip the overburden, most of which is permanently frozen, and overlies the pay gravels.

Details on specific mines, prospects, and occurrences are given in appendix B.

CLAIM AND MINERAL DISTRIBUTION

Placer (primarily gold with some silver) and lode (primarily mercury) claims exist in the area (figure 5, table 2). Several large areas and some individual drainages have been staked as placer claims. The largest concentration of placer claims is in the George River (16-21)2/ and East George River (22-23) area. Other large claim blocks are near Flat (4, 8), Discovery (6-7), and Willow Creek (10-11, 13, 15) all located immediately to the north of but outside the planning block. Long segments of the Oskawalik River (43) and Crooked Creek (51) [including Queen Gulch (48), Snow Gulch (52), Quartz Gulch (44), and Lewis Gulch (50)], both tributaries of the Kuskokwim River, and some segments of shorter creeks such as Fuller (35), Eightmile (37), California (38), and Central (42), all located between Red Devil and Crooked Creek, have been staked for placer mineral rights. Individual small creeks with placer claims include New York Creek (60), Murray Gulch (60), an unnamed tributary near Napaimiut (61), Return Creek (54) near DeCourcy Mountain, Little Creek (56), an unnamed creek near Saddle Mountain (57), a short segment of an unnamed tributary (58) to Kolmakof River where the tributary drains the west flank of the Horn Mountains, and the lower portion of the Stony River (24).

2/ Number in parentheses references mines, prospects, or occurrences shown on the Mines, Prospects, and Occurrence overlay (figure 5) and tabulated in appendix B.

TABLE 2. - Mines, prospects, and occurrences in the Iditarod-George study area (see figure 5 for location)

Map no.	Name	Commodity
1.	Innoko River Occur.	Coal
2.	Old Town Occur.	Sand and Gravel
3.	Unnamed Prospect	Coal
4.	Otter Ck. Mine - Placer	Au, Ag, Hg, Sb, Pb, Sn, W, Cr
5.	Malamute Gulch Prospect	Au, Hg, Sn, W, Cr, Rare Earths (RE)
6.	Malamute Pup Mine - Placer	Au, Ag, Hg, Sn, W, Cr, U, RE
7.	Granite Ck. Mine - Placer	Au, Ag, Cr
8.	Flat Ck. Mine - Placer	Au, Ag, Hg, Sb, W
9.	Golden Horn Mine	Au, Ag, Hg, Zn, W, Pb, Sb
10.	Willow Ck. Mine - Placer	Au
11.	Happy Ck. Mine - Placer	Au, Ag, Hg, Sb, Sn, W, Cr, U
12.	Chicken Ck. Dome Occur.	Au, Ag, Hg, Zn, Cr, W, Sb, Co, RE
13.	Chicken Ck. Mine - Placer	Au, Ag, Hg, Sb, W, Cr, Co, Zn, RE
14.	Slate Ck. Mine - Placer	Au, Ag, Hg, W
15.	Prince Ck. Mine - Placer	Au, Ag, Hg
16.	Michigan Ck. Occur. - Placer	Au
17.	Big Three Mining Occur. - Placer	Au
18.	Spruce Ck. Prospect - Placer	Au
19.	Julian Ck. Mine - Placer	Au, Hg, Sn, U, RE, Ce
20.	George River Prospect - Placer	Au
21.	Granite-Willow Ck. Occur. - Placer	Au
22.	Moose Ck. Occur. - Placer	Au
23.	Glenn Bass Occur. - Placer	Au
24.	Stony River Occur. - Placer	Au, Ag

TABLE 2. - Mines, prospects, and occurrences - Continued

Map no.	Name	Commodity
25.	Mellick's Occur.	Hg
26.	Landru Occur.	Hg
27.	McCally Ck. Prospect	Hg, Sb
28.	Red Devil Mine	Hg, Sb
29.	Barometer Mine	Hg, Sb
30.	No. 1 Discovery Claim Occur.	Unknown (Hg?)
31.	Two Genevieves Occur.	Hg
32.	Willis and Fuller Mine	Hg
33.	Alice and Bessie Mine	Hg
34.	Fairview Prospect	Hg, Sb
35.	Fuller Ck. Prospect - Placer	Au, Ag
36.	Cinnabar Chief Prospect	Hg
37.	Eightmile Ck. Prospect - Placer	Au, Ag
38.	California Ck. Prospect - Placer	Au, Ag
39.	Harvison Prospect	Hg
40.	R & H Mining Occur.	Hg (?)
41.	Egnaty Ck. Prospect	Hg
42.	Central Ck. Prospect - Placer	Au, Ag
43.	Oskawalik River Prospect - Placer	Au, Ag
44.	Quartz Gulch Mine - Placer	Au
45.	Quartz Prospect	Au, Ag
46.	Donlin Ck. Mine - Placer	Au, Ag, Hg, Sb, Sn, W
47.	Ruby Gulch Mine - Placer	Au
48.	Queen Gulch Prospect - Placer	Au
49.	Queen Occur.	Sb

TABLE 2. - Mines, prospects, and occurrences - Continued

Map no.	Name	Commodity
50.	Lewis Gulch Prospect - Placer	Au
51.	Crooked Ck. Prospect - Placer	Au
52.	Snow Gulch Mine - Placer	Au
53.	Rhyolite Prospect	Hg, Sb
54.	Return Ck. Occur. - Placer	Hg
55.	DeCourcy Mountain Mine	Hg, Sb
56.	Little Ck. Occur. - Placer	Au, Ag, Hg
57.	James L. Walker Occur. - Placer	Au
58.	Horn Mountains Occur. - Placer	W
59.	Frank Lee Occur. - Placer	Au
60.	Murray Gulch Mine - Placer	Au, Ag
61.	Fishwheel 1-8 Occur. - Placer	Au
62.	Kolmakof Mine	Hg
63.	Ptarmigan Occur.	Gemstone
64.	Mission Prospect	Au, Ag, Cu, Pb, W, U, Sb
65.	Cobalt Ck. Prospect	Cu, Au, Pb, Sn, Ag, Zn, Ni
66.	Brink Occur.	Mo
67.	Black Mountain Occur.	Sb, Au, Ag

Seven lode mines and twenty prospects are present in the study area (figure 5). Mercury is the most common type of lode deposits in the study area. Sixteen lode mercury deposits are centered near Red Devil. A total of 16 lode mercury deposits (25-34, 36, 39-41, 53, 55) occur along a trend from Red Devil (28) to DeCourcy Mountain (55) and including Juninggulra Mountain (53). Another lode mercury deposit (62) is located northwest of Kolmakof on the north side of the Kuskokwim River.

Other lode mineral occurrences include copper-lead-zinc (65), gold-silver (64), and gemstone (63) at Russian Mountains; antimony (67) and molybdenum (66) at Molybdenum Mountain; three lode gold occurrences [two near Flat (5, 9) and one on Chicken Mountain (12)] between Flat and Chicken Mountain south of Flat. Coal outcrops at a site about 2.2 mi north of Flat (3) and along the Innoko River (1) about 11 mi north of Shageluk. One previously productive sand and gravel pit (2) is near Iditarod.

Antimony (49) and lode gold (45) showings are present near the headwaters of Crooked Creek. The antimony showing is in the headwaters of Queen Gulch, a tributary of Crooked Creek. The lode gold showing is on the south side of the drainage to Dome Creek.

PRESENT INVESTIGATION

The Bureau compiled and evaluated existing data on the regional mineralization of the Iditarod-George Planning Block from June 1 to September 1, 1983.

The investigation was primarily a literature search that reviewed USGS publications and maps; published and unpublished Bureau reports; State of Alaska "Kardex" microfiche files; TDM published and unpublished reports; State of Alaska Division of Geological and Geophysical Survey (DGGS)

reports; BLM mining claim records and plans of operations; MMS oil and gas and coal location maps; U.S. Energy Research and Development Administration's, National Uranium Resource Evaluation (NURE) reports and maps; published articles from journals and magazines on mining; and unpublished oil and mining company reports.

A reconnaissance level field investigation was conducted from July 5 to 15, 1983 to gain familiarity with the Iditarod-George Planning Block. The Bureau attempted to obtain uniform sample coverage of the entire study area but this attempt was constrained by several factors: 1) budget; 2) helicopter availability (3 crews working with one ship); 3) short field season; 4) large acreage involved (3.5 + million); and 5) weather. During this time, 172 stream sediment samples and 5 rock "grab" samples were collected for analysis. The sample distribution is shown on figure 6. The samples are described in appendix A. Stream sediment samples are a collection of silt, sand, and clay taken from stream beds. A rock grab sample is a collection of mineral and rock fragments taken at random from an outcrop or float. The samples were analyzed for 31 elements (antimony, arsenic, barium, beryllium, bismuth, boron, calcium, chromium, cobalt, copper, gallium, germanium, gold, iron, lanthanum, lead, manganese, magnesium, mercury, molybdenum, niobium, nickel, scandium, silver, strontium, tin, titanium, tungsten, vanadium, yttrium, zinc, and zirconium) using semiquantitative emission spectrographic techniques by Skyline Labs., Inc., Wheat Ridge, CO. Selected elements, those of economic and historic mining in the area (antimony, copper, gold, lead, tungsten, and zinc), were determined quantitatively by atomic absorption spectrophotometric techniques and mercury was analyzed using a mercury vapor detection instrument by Rainbow Resource Labs., Inc., Anchorage, Alaska. These

results were used to help delineate mineralized areas. Analytical results are listed in appendix A.

The mean value and standard deviation of each element were determined by using statistical techniques. In this report, anomalous element values in the samples are defined as values of the mean plus 2 standard deviations. The values were rounded to reflect the proper significant figures for each analysis. Table 3 lists the elements, mean values, and standard deviations of the 1983 samples.

REGIONAL GEOLOGY

The following discussion of the geology and geologic setting of the central Kuskokwim region, Alaska, is excerpted from USGS Prof. Paper 268 (Cady, Wallace, Hoare, and Webber, 1955). More recent interpretations stressing the tectonostratigraphic influence on the geologic setting exist, but are not readily available in current publications.

The central Kuskokwim region is near the center of a mobile belt of mountain building and volcanic activity that borders the Pacific Ocean and includes all but northern Alaska. A more stable platform of ancient crystalline rocks is buried beneath younger strata in the northern regions and in the adjacent portion of the Arctic Ocean Basin.

The formations that crop out in the study area range from the Cretaceous to Quaternary age (table 4). Sedimentary, igneous (both intrusive and extrusive), and metamorphic rocks are present (figure 4).

LITHOLOGY

The description of the major rock types of Cady et al, 1955 are described in more detail in the following section. Their time relationships are

TABLE 3. - Mean and standard deviation of 1983 samples, Iditarod-George study area

Element	Mean (ppm)	Standard Deviation (ppm)
EMISSION SPEC. ANALYSIS		
Barium	743.98	448.80
Boron	95.66	751.32
Chromium	95.30	72.13
Cobalt	1.39	1.30
Copper	9.95	6.00
Gallium	9.44	10.41
Lanthanum	23.65	18.16
Lead	4.11	5.29
Manganese	432.95	329.80
Molybdenum	1.10	0.50
Nickel	24.16	12.53
Scandium	2.77	4.37
Strontium	35.47	90.36
Titanium	3254.59	1714.79
Vanadium	92.84	36.75
Yttrium	6.17	10.80
Zirconium	163.76	103.44
ATOMIC ABSORPTION (GEOCHEM) ANALYSIS		
Antimony	1.99	2.61
Copper	22.70	11.16
Lead	16.73	5.26
Tungsten	1.51	2.07
Zinc	67.10	16.03
VAPOR DETECTION		
Mercury	0.35	0.40

TABLE 4. - Lithology of the Iditarod-George study area
(Cady, Wallace, Hoare, and Webber, 1955)

Quaternary and Tertiary(?)	Pleistocene and Recent		Qal - Flood-plain deposits. Gravel, sand, silt, and intermixed wood, peat, and other vegetal matter.
			Qg - Glacial deposits. Morainal till and outwash gravel.
		Pliocene(?)	Qc - Gravel deposits. Gravel and associated small quantities of sand and silt that lie on the rock benches and form terraces; they extend beneath the other surficial deposits as buried gravels.
Tertiary	Miocene(?), Oligocene(?) and Eocene(?)		Th - Holokuk Basalt. Basalt flows and interbedded basaltic detritus, undifferentiated.
			Tgl/Tgt - Getmuna Rhyolite Group. Tgl, rhyolite lava; and Tgt, tuff.
			Tqm - Quartz monzonite. Forms Stocks, chiefly of quartz monzonite, but which range from granodiorite to granite; minor facies include basalt, quartz diabase, granite pegmatite, and aplite.
			Tqd - Quartz diabase. Forms dikes, sills, and small stocklike bodies of quartz diabase and related rocks, which range from basalt to grano diorite.
			Tba - Biotite basalt. Forms dikes and sills, some of which are columnar.
			Tr - Albite rhyolite. Forms sheets, dikes, and sills; large bodies are porphyritic, small bodies are find-grained.
Cretaceous	Lower(?) and Upper Cretaceous		Ki - Iditarod Basalt. Basalt flows, underlain by thin sedimentary breccia, may include some basalt sills.
			Kk/Kkh - Kuskokwim Group. Kk, interbedded graywacke and shale, intraformational breccia and conglomerate, and local zones of basal breccia and conglomerate; Kkh, altered to hornfels, in contact-metamorphic zones adjacent to stocks of igneous rock.

shown on table 4. The abbreviations of the rock types shown in the headings represent the map symbols used on figure 4.

KUSKOKWIM GROUP (Kk/Kkh)

The Kuskokwim Group consists of interbedded graywacke and shale are the principal rocks of the Kuskokwim Mountains. The rocks typically are exposed in the bluffs and cut-banks along the Kuskokwim River. The Kuskokwim Group is believed to be of Early Cretaceous age and terminates upward at a disconformity with the overlying Iditarod Basalt.

The group is estimated to be between 40,000 and 65,000 ft thick. The rocks near the base are nearly all massive and include local basal conglomerate and breccia. The upper nine-tenths is composed almost entirely of interbedded graywacke and shale. The graywacke beds, ranging in thickness from a few inches to 1 or 2 ft, are commonly separated from the thinner beds of shale by sharply defined bedding planes. Sedimentary breccias and conglomerates are present in a few localities and are altered to hornfels in the contact-metamorphic zones adjacent to stocks. Seams of coal, from a fraction of an inch up to 30 in thick, are associated with the shale in several localities. Near mercury deposits, where hydrothermal alteration has been most active, the graywacke is carbonatized, as well as silicified and sericitized.

IDITAROD BASALT (Ki)

It is estimated to be between 2,000 and 3,000 ft thick. The Iditarod Basalt is believed to be of late Late Cretaceous age in the time interval between the deposition of the lower Upper Cretaceous strata of the

Kuskokwim Group and strong folding in earliest Tertiary. The Iditarod Basalt comprises chiefly massive basalt flows underlain by a comparatively thin but widely distributed basal zone of sedimetary breccia, which lies disconformably on the uppermost strata of the Kuskokwim Group in the northwest portion of the study area.

ALBITE RHYOLITE (Tr)

The albite rhyolite is inferred to be of earliest Tertiary age and is composed of sheets, sills, and dikes. It intrudes folded bedded rocks whose uppermost beds are of middle or late Late Cretaceous age.

Albite rhyolite is not widespread and has been mapped at Barometer Mountain, along Fuller Creek, Snow Gulch, the junction of Michigan Creek and the George River, Moose Creek, and the Oskawalik River.

BIOTITE BASALT (Tba)

The intrusive relations of the biotite basalt suggest that it was emplaced near the close of the episode of folding in earliest Tertiary time. Biotite basalt sills and dikes, commonly less than 5 ft thick, are exposed in mines, stream bluffs, and cut-banks. The hydrothermally altered basaltic rocks which weathers to a yellowbrown and form the "yellow rock" of the mercury prospectors. This is the principal country-rock formation associated with mercury ore bodies, such as the DeCourcy Mountain Mine, the Red Devil Mine, the Alice and Bessie Mine, and the Willis and Fuller Mine.

QUARTZ DIABASE (Tqd)

The quartz diabase and related dike rocks, probably of middle or late Tertiary age, consist of numerous dikes, a few sills and small stock-like bodies of quartz diabase and related mafic and intermediate igneous rocks. The dikes crosscut folds formed in the earliest Tertiary. Their petrographic character and field relationships indicate that they are probably related to the Tertiary quartz monzonite and other stocks. Quartz diabase map units crops out at Granite Mountain, Chicken Mountain, Swinging Dome, and north of Flat.

QUARTZ MONZONITE (Tqm)

The quartz monzonite and other stocks of related composition form the largest bodies of intrusive rock. The relationships of the stocks to the sedimentary geology show that they were intruded after cessation of folding that took place in the earliest Tertiary. Hornfels is associated with the stocks of quartz monzonite and related rocks. Quartz monzonite outcrops occur at Horn Mountains, Russian Mountains, and Molybdenum Mountain.

GETMUNA RHYOLITE GROUP (Tgl/Tgt)

The Getmuna Rhyolite Group is believed to have intruded near the close of the Tertiary period in which the Kuskokwim Group, Iditarod Basalt, and older rocks were folded. The Getmuna Rhyolite Group extends beneath the Holokuk Basalt exposed nearby and occupy the area along Getmuna Creek north of the Horn Mountains. The Getmuna Rhyolite Group of volcanic rocks, are probably extrusive phases of the albite rhyolite sheets, sills, and dikes. The Getmuna Rhyolite Group is at least 500 ft and

possibly 1,500 ft thick, with allowance for repetition by warping or possible faulting.

HOLOKUK BASALT (Th)

The Holokuk Basalt is of Tertiary age and lies unconformably on the Kuskokwim Group. The Holokuk Basalt flows, now disconnected are believed to have been formed as a widespread and rather continuous plateau before stream dissection. The rocks mapped as the Holokuk Basalt are at least 3,000 ft thick and occur in the vicinity of the Horn Mountains.

GRAVEL DEPOSITS (Qc)

Gravel and smaller quantities of interbedded sand and silt derived from erosion of the underlying rocks and light-colored volcanic ash occur on rock benches and in terraces that overlook the flood plains of the streams. Gravels also lie on bedrock buried beneath flood-plain deposits. The gravel deposits are probably of pre-Wisconsin age.

GLACIAL DEPOSITS (Qg)

Glacial till and outwash gravel are considered to be of Wisconsin age. Ground, terminal, and lateral moraines occur in glaciated valleys and on piedmont slopes of the higher mountains. The outwash deposits comprise short valley trains and outwash plains that extend out from the mountains. Few morainal deposits are more than 100 ft thick. The thickness of outwash deposits are less than 100 ft.

FLOOD-PLAIN DEPOSITS (Qal)

Flood-plain deposits of Recent age in the existing stream valleys consist of various quantities of silt, sand, and gravel, with intermixed wood, peat, and other vegetal material, and, locally, placer mineral concentrates. The flood-plain deposits, usually less than 25 ft thick, comprise widespread blankets of silt, with interlayered gravel and sand bars, laid down and redissected by meandering streams.

STRUCTURAL GEOLOGY

Regional and local structural features, such as folds and faults are mapped in the area (figure 4). The following discussion of structural geology is excerpted from USGS Prof. Paper 268 (Cady, Wallace, Hoare, and Webber, 1955).

FOLDS

The folds are believed to have been produced in earliest Tertiary time by horizontal compression of the structurally weak sediment accumulations between the more competent structural framework.

Folds formed during the Kuskokwim orogeny occur most commonly in the late Mesozoic deposits of the Kuskokwim Group. Chevron folds are most typical of the Kuskokwim Group.

FAULTS

The major regional fault mapped in the study area consists of the Iditarod Fault. Second order local faults generally parallel these major first order faults. First and second order faults are chiefly

of Quaternary age and apparently are still active. The faults are either normal faults or high-angle reverse faults, although thrust faults have been recognized.

MINERAL RESOURCES

A mineral resource is defined by the Bureau and the USGS (Bureau/USGS, 1980) as ". . . a concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such a form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible, [and extended] . . . to comprise all materials, including those only surmised to exist."

Locatable, leasable, and salable minerals are present in the Iditarod-George study area (figure 5, table 2). Locatable minerals include all of the metallic minerals and some of the nonmetallics, such as asbestos, gypsum, gemstones, mica, and others. Leasable minerals include oil and gas, coal, phosphates, oil shale, potash, sodium, and geothermal energy. Salable minerals include common varieties of sand, stone, gravel, pumice, pumicite, and cinders.

Lode mineral deposits in the study area include: mercury-antimony, gold-silver, antimony, molybdenum, copper-lead-zinc, and a gemstone deposit. Placer mineral deposits include: gold-silver, tungsten, and mercury. Other mineral resources include: coal deposits, oil and gas, geothermal energy, and sand and gravel deposits.

The mineralized areas were delineated by using geologic environment, inferred geologic processes, reported mineral occurrences and known deposits, historic data, and the 1983 geochemical values.

LOCATABLE MINERALS

In this report locatable minerals are divided into lode deposits and placer deposits which are described separately.

Lode Deposits

Lode deposits include mercury-antimony, gold-silver, antimony, molybdenum, copper-lead-zinc, and gemstone.

Mercury-Antimony

Mercury was historically the chief lode mineral product of the Kuskokwim area. The total reported production is 36,728 flasks (table 1). The mercury mineral cinnabar, commonly associated with the antimony mineral stibnite, occurs most frequently in fracture zones and joints in and near the borders of silica-carbonate rich sedimentary rocks which were formed by the hydrothermal alteration of biotite basalt sills and dikes during the late Mesozoic through the early Cenozoic. Graphite, and the arsenic mineral realgar, are associated with mercury deposits at several locations. The mercury deposits, which reportedly diminish in size with depth, are located on or a little beneath the rolling surface terrain characteristic of the region but have not been found in areas of more sharply dissected topography. The greatest concentration of mercury deposits occurs in a northwestern trend from Barometer Mountain towards DeCourcy Mountain. Most deposits have been located in the vicinity of Barometer Mountain. The principal mines along this trend are the Red Devil Mine (28), Decourcy Mountain Mine (55), Alice and Bessie Mine (33), Barometer Mine (29), Willis & Fuller Mine (32), and Kolmakof Mine (62). Other mercury prospects and occurrences along this trend include

Mellicks (25), Landru (26), McCallay Creek (27), No. 1 Discovery (30), Two Genevieves (31), Fairview (34), Cinnabar Chief (36), Harrison (39), R & H Mining (40), Egnathy Creek (41), and Rhyolite (53). While the deposits listed occur along a general trend, fault zones and joints in silica-carbonate altered sedimentary rocks may have possible mercury-antimony mineralization. Based upon available data, further exploration is warranted in the vicinity of Crooked Creek, the head of Fuller Creek, and the junction of Michigan Creek and the George River.

Gold-Silver

Gold-silver occur in both quartz veins and thin layers of sedimentary breccia zones at or near the contact of early Cenozoic quartz-monzonite intrusions and basaltic dikes in late Mesozoic graywackes, sandstones, and shales. Minerals and elements associated with the gold-silver-bearing quartz veins include cinnabar, antimony, tin, tungsten, chromium, lead, zinc, and uranium. Gold ores are genetically related to the intrusions of albite rhyolite in the early Cenozoic. Gold-silver lode deposits occur on Chicken Mountain, Snow Gulch, and the Russian Mountains. The Golden Horn Mine (9) was the principal gold-silver mine and produced 2,706 oz gold, 2,620 oz silver, 9,336 lbs lead, and 653 lbs zinc. Smaller prospects and occurrences include Malamute Gulch (5), Chicken Creek Dome (12), Quartz (45), and Mission (64). Production records from these have not been located.

Areas with quartz-monzonite intrusions are favorable for gold-silver mineralization. Based on available data, exploration for these types of deposits is warranted throughout the entire study area where these rocks crop out especially near Chicken Mountain, Horn Mountains, Russian

Mountains, along Crooked Creek, along the Oskawalik River, and the northeastern portion of the study area (figure 6).

Antimony

Antimony, in the form of the antimony mineral stibnite, occurs in early Cenozoic quartz veins and granitic sills and dikes associated with albite rhyolite intrusion into the late Mesozoic shaley sandstones and interbedded graywackes and shales. Minerals and elements associated with antimony deposits include cinnabar, gold, and silver. Two antimony occurrences, Queen (49) and Black Mountain (67), occur in the vicinity of Donlin Creek and Molybdenum Mountain, respectively. Records of antimony production have not been located.

Exploration for antimony should be concentrated near albite rhyolite intrusions such as at the head of Fuller Creek, near Crooked Creek, along George River and Michigan Creek, in the Russian Mountains and at Barometer Mountain (figure 7).

Molybdenum

Molybdenum, in the form of the mineral molybdenite, occurs in quartz veins associated with an early Cenozoic granitic plutons intruding late Mesozoic graywackes, sandstones, and shales at the molybdenum occurrence, Brink (66), occur on Molybdenum Mountain. Production records from the prospect have not been located. Powellite (a molybdenite oxidation product) was reported as an associated mineral (Smith, 1942).

Favorable evironments for molybdenum mineralization exist in the vicinities of granitic intrusives and similar geologic environments, as

at Molybdenum Mountain, Horn Mountains, Russian Mountains, Swinging Dome, Chicken Mountain, and Granite Mountain (figure 7).

Copper-Lead-Zinc

Copper-lead-zinc sulfide minerals occur in early Cenozoic quartz veins and breccia zones within a fissure zone which cuts a quartz monzonite-granitic stock that has intruded into late Mesozoic graywackes, sandstones, and shales. Elements associated with the copper-lead-zinc mineralization include gold, silver, tin, and nickel. One copper-lead-zinc prospect, the Cobalt Creek Mine (65), occurs in the Russian Mountains. Production from the prospect was not reported. Assay of samples taken in 1954 show values containing up to 11.0 pct copper, <0.25 oz/ton gold, trace silver, and 1.22 to 1.4 pct tin (West 1954).

Favorable environments for copper-lead-zinc mineralization exist in areas of quartz monzonite intrusions as in the vicinity of Horn Mountains, Russian Mountains, and Molybdenum Mountain (figure 7).

Gemstone

A gemstone deposit identified in the literature as semiprecious silicate (Cady, Wallace, Hoare, and Webber, 1955), the Ptarmigan occurrence (63), occurs in the Russian Mountains. Production from the prospect is not known.

Placer Deposits

Gold-silver, tungsten, and mercury placer deposits have been identified in the study area.

Gold-Silver

Placer gold-silver occur in stream gravels, bench gravels, and buried gravels, mainly in drainages containing quartz monzonite intrusions near their headwaters and sheets and dikes of silicified and sericitized albite rhyolite in contact with the adjacent graywackes and shales. Minerals and elements associated with the gold-silver placer deposits include antimony, tungsten, tin, cinnabar, pyrite, zircon, lead, chromium, cobalt, nickel, and uranium. The largest concentrations of placers are in paystreaks immediately above bedrock. Smaller concentrations occur on false bedrock which is commonly formed by a hardpan of interlayered clayey silt beneath the deposits of existing streams and above buried gravel. The most productive placers occur in areas of rolling topography where gentle stream gradients have prevented dissipation of the gold downstream. These areas include the central and northeastern portion of the planning block. Placer gold was deposited along stream channels in the early Cenozoic by weathering and erosion of the bedrock and either covered by late Cenozoic sediments or uplifted and redissected to form bench deposits during the late Cenozoic to Recent times.

Production from the gold-silver placer deposits was at least 1,329,404 oz gold and 36,151 oz silver (table 1)(Kimball, 1969). The principal placer gold mines are along Otter Creek (4), Malamute Pup (6), Granite Creek (7), Flat Creek (8), Happy Creek (11), Chicken Creek (13), Quartz Gulch (44), Donlin Creek (46), Ruby Creek (47), Snow Gulch (52), and Murray Gulch (60). Placer prospects and occurrences are Willow Creek (10), Slate Creek (14), Prince Creek (15), Michigan Creek (16), Big Three Mining Co. (17), Spruce Creek (18), Julian Creek (19), George River (20), Granite-Willow Creek (21), Moose Creek (22), Glenn Bass

(23), Stony River (24), Fuller Creek (36), Eightmile Creek (37), California Creek (38), Central Creek (42), Oskawalik River (43), Queen Gulch (48), Lewis Gulch (50), Crooked Creek (51), Little Creek (56), James Walker (57), Frank Lee (59), and Fishwheel 1-8 (61).

Gold placers may exist in drainages containing quartz monzonite intrusives, particularly in the central and northeastern portions of the study area (figure 7).

Mercury

Mercury, in the form of the mineral cinnabar, is commonly found associated with the gold-silver placer deposits of the region. One mercury placer occurrence, Return Creek (54) is located on DeCourcy Mountain. Production from the prospect has not been reported.

Placer mercury mineralization may occur in any of the streams that drain the areas having mercury lode occurrences (figure 7).

Tungsten

One tungsten placer occurrence, containing the mineral scheelite, in the Horn Mountains (58), is reported by Harry Brink (Cady, Wallace, Hoare, and Webber, 1955). Production from the placer deposit is not known.

Favorable areas for placer tungsten mineralization exist along the Horn Mountains, Russian Mountains, and Chicken Mountain (figure 7).

LEASABLE MINERAL RESOURCES

Leasable mineral commodities in the study area include coal, oil and gas, and geothermal energy.

Coal Deposits

Two coal deposits occur in the central Kuskokwim River area. An unnamed anthracite coal prospect (3) is located north of Flat and a bituminous coal occurrence (1) is located northwest of the Innoko River (figure 5). Both are reported to occur in up to 30 in wide seams. In the past coal has been mined for local use. Production figures are not available.

Coal could be used locally and by those living in the northern portion of the study area (figure 7).

Oil and Gas

The Holitna and Bethel sedimentary basins with geology favorable for oil and gas accumulations occur within the study area (figure 7). The Holitna Basin is in the southeast part of the study area along the Kuskokwim and Stony Rivers. The Bethel Basin is in the southwest part of the study area on the Kuskokwim River delta. The DGGS conducted seismic surveys in the Holitna Basin for oil and gas structures in 1983.

Oil and gas deposits have not been identified in most of the study area. A section along the Hoholitna River and its tributary Door Creek and a section along the Holitna River and its tributary Taylor Creek have sediments favorable for oil and gas accumulation within the Holitna Basin.

Geothermal Energy

A geothermally active area has been identified along the north bank of Otter Creek approximately 1 mi north of Discovery (Waring, 1917) (figure

7). No interest has been shown in the use of geothermal energy by private or public groups in this area.

Geothermal energy exists along Otter Creek (Waring, 1917) and conceivably in other areas. More field work is needed before the geothermally active areas can be identified.

SALABLE MINERAL RESOURCES

Salable mineral resources identified in the study area consist of sand and gravel deposits which occur throughout the area in the stream and river valleys. They were deposited both by fluvial and glacial action. One sand and gravel pit, the Old Town (2), is located near the town of Iditarod (figure 5). The sand and gravel was used locally but production figures are not available. Sand and gravel deposits which are adequate for meeting local requirements exist along all streams and rivers.

MINERALIZED AREAS

Potential has been defined by Webster (1976) as "existing in possibility: having the capacity or a strong possibility for development into a state of actuality". Outlined here and shown in figure 7 are areas which show the capacity or possibility of being developed into actuality, either as multi-element areas containing more than one mineral or, single element areas containing one mineral having potential for development.

Based upon available historical data and the Bureau's 1983 sampling, 14 multi-element and 12 single element geochemically anomalous areas have been identified (figure 7). In addititon two areas may contain oil and gas, two may contain coal, and one contains geothermal energy. Stream and river valleys contain sand and gravel deposits.

MULTI-ELEMENT MINERALIZED AREAS

Fourteen multi-element mineralized areas occur in the study area (figure 7). The most extensive multi-element mineralized area occurs in the upper George River basin - Granite Mountain area. This area includes Michigan Creek, Beaver Creek, Eldorado Creek, Willow-Granite Creek, and the Little Waldren Fork of the Takotna River. This area extends northeast-southwest for about 40 mi and is nearly 30 mi wide. It is primarily a zone of placer gold mineralization within which are smaller zones of other elements. The vicinity of Granite Mountain contains copper, lead, zinc, antimony, chromium, molybdenum, nickel, tin, and titanium. A tributary to Beaver Creek and Eldorado Creek contains zinc. The upper reaches of the George River contains copper. Mercury has been identified along the George River approximately 10 mi downstream from Michigan Creek and also along Julian Creek. Julian Creek also contains tin.

The second largest multi-element mineralized area extends from Sleetmute to DeCourcy Mountain. This area extends northwest-southeast for about 60 mi and is nearly 16 mi wide in the area of Crooked Creek. It is primarily a zone of mercury deposits within which are smaller zones containing other elements. Barometer Mountain contains antimony and molybdenum. Nickel, titanium, and zinc have been identified in the area from Willis Creek to an unnamed creek approximately 2 mi west of Willis Creek. The ridge between Eightmile Creek and Downey Creek has molybdenum. Zinc has been identified along the ridge southeast of California Creek. The area between George River and Steamboat Creek contains copper, lead, and manganese. The area from Downey Creek to the unnamed creek southeast of Central Creek contains cobalt with an area of molybdenum and nickel.

Crooked Creek, including Donlin Creek, contains chromium and also antimony and tin along Donlin Creek from Lewis Gulch to approximately 1.5 mi north of Ophir Creek. Antimony has been identified at DeCourcy Mountain and Juninggulra Mountain. Placer gold of unknown grade occurs on Little Creek, Crooked Creek, Central Creek, California Creek, Eightmile Creek, and Fuller Creek.

The third largest multi-element mineralized area is in the vicinity from Horn Mountains to Oguohaydok Ridge. The area extends north-south for about 20 mi and is about 14 mi wide. The primary mineralization is titanium with zones containing lead along Getmuna Creek, Oguohaydok Ridge, and on the southeast portion of Horn Mountains. Manganese has been identified along the eastern portion of Horn Mountains from Whitewing Valley northeastward to Oguohaydok Ridge. Cobalt and nickel have been identified along the upper reaches of Sue Creek, where a small area also contains tungsten.

A multi-element mineralized area in the vicinity of Chicken Mountain and Flat (outside the Iditarod-George Planning Block) contains antimony, chromium, gold, mercury, and tungsten. The area trends north-south for about 16 mi and is 8 mi wide. A small area with cobalt occurs on Chicken Mountain and an area with lead occurs along Otter Creek. This trend of the anomalous mineralization may extend into the Iditarod-George Planning Block. Placer gold occurs in all the streams draining Chicken Mountain. Several creeks have active placer mines at present.

A multi-element mineralized area occurring on the Russian Mountains and Cobalt Creek contains antimony, chromium, gold, lead, titanium, tungsten, and zinc. The area trends north-south and is 12 mi long and 5 mi wide.

Molybdenum Mountain has a multi-element mineralized area that contains antimony, chromium, copper, molybdenum, nickel, and tungsten. This area is about 4 mi long and 4 mi wide.

Five multi-element mineralized areas have been identified from Portage Mountains to 6 mi northeast of Mosquito Mountain. Three of the areas contain primarily titanium with separate areas of chromium, cobalt, and lead. One area approximately 3 mi northwest of Molybdenum Mountain contains cobalt and copper. Saddle Mountain contains gold, mercury, and tungsten.

A multi-element mineralized area occurs along a northwestern tributary of Getmuna Creek contains lead and manganese. This area trends northwest-southeast for about 8 mi and is 5 mi wide.

The upper reaches of the North Fork George River, including Michigan Creek and Lookout Mountain, contain mineralized areas of nickel, with cobalt and zinc along Michigan Creek. This area trends north-south for about 16 mi and is about 14 mi wide.

A multi-element mineralized area along the South Fork George River and its tributaries contains copper and nickel. The area is approximately 12 mi long and up to 8 mi wide.

SINGLE ELEMENT MINERAL AREAS

Twelve single element mineralized areas occur throughout the study area (figure 7). Swinging Dome has chromium. Cobalt occurs in three areas including Ruby Creek, a tributary to the Innoko River, and the areas from Smith Creek to Haystack Butte. Mercury has been identified approximately 3 mi northwest of Kolmakof along the north side of the Kuskokwim River. The area between New York Creek and Sue Creek contains

titanium. Nickel occurs along a tributary to Owhat River and along an area west of Canoe Mountain. Northwest of Canoe Mountain is an area containing zinc. Placer gold occurs along New York Creek - Murray Gulch, the Oskawalik River, and the Stony River.

Coal occurs in the area between Flat (Brooks, 1914) and Iditarod and along the Innoko River (Maddren, 1910) approximately 12 mi northeast of Shageluk.

Two areas may contain oil and gas (Land Use Planning Commission, 1974), the Holitna Basin along the southeast portion of the study area, and the Bethel Basin along the southwest portion.

A geothermal energy area has been identified in the vicinity of Otter Creek approximately 1 mi north of the town of Discovery (Waring, 1917).

Sand and gravel occurs along all of the stream and river valleys throughout the study area which contain Pleistocene flood-plain, glacial, or gravel deposits (figure 4).

CONCLUSIONS

The mineral investigation of the Iditarod-George Planning Block revealed the presence of 7 lode mines, 15 placer mines, 10 lode prospects, 10 placer prospects, 9 lode occurrences, 12 placer occurrences, 2 coal deposits, 1 gemstone prospect, and 1 sand and gravel pit. The mineral resources can be classified into 13 types: 1) lode mercury-antimony; 2) lode gold-silver; 3) lode antimony; 4) lode molybdenum; 5) lode copper-zinc-lead; 6) lode gemstone; 7) placer gold-silver; 8) placer tungsten, 9) placer mercury; 10) coal; 11) oil and gas; 12) geothermally active areas; and 13) sand and gravel.

In 1983, Bureau personnel collected 172 stream sediment samples and 5 rock samples in and near the planning block to supplement the historic data. From these data it was possible to identify 14 areas having multi-element mineralization, 12 areas having single element mineralization, 2 areas that contain coal, 2 areas that may contain oil and gas, 1 geothermally active area, and sand and gravel deposits along all stream and river valleys.

Lode mercury and placer gold mining has occurred in and near the Iditarod-George Planning Block from 1898 to present. The first mercury mine was staked on the Kuskokwim River in 1906 and mercury had been mined up to 1971, when the operations became uneconomic. Placer gold mining started in 1908 when gold was first discovered on Otter Creek. Currently placer gold deposits are mined in several streams in the Iditarod River drainage and the George River drainage.

The geologic environments, inferred geologic processes, reported occurrences, historical data, and the values of stream sediment samples indicate numerous mineralized areas within the study area especially along the Portage Mountains, Saddle Mountain, Molybdenum Mountain, Russian Mountains, Horn Mountains, New York-Murray Creek, Oskawalik River, along the trend from Sleetmute to DeCourcy Mountain, Haystack Butte, North Fork George River, Swinging Dome, Chicken Mountain-Flat, Ruby Creek, George River, South Fork George River, Granite Mountain, and the Stony River.

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APPENDIX A. SAMPLE ANALYTICAL RESULTS

Explanation

Sample Number/Year : Refers to field sample number and year sample was taken.

Map Sample Number : Refers to sample location shown on figure ___.

Material Type : Refers to type of material collected at the sampling site. The following material types were collected.

Stream Sed - Stream sediment
SL/SS/CG - Slate, Sandstone, Conglomerate
Maf Volc - Mafic volcanic rock
Fel Plut - Felsic plutonic rock
Fel Plut/Q - Felsic plutonic rock with quartz veins

Rock Type : Refers to rock types in the area of sampling as shown on the geologic map (figure ___). The rock types mapped as being present are:

Qal - Unconsolidated deposits
Meta Sed - Metasedimentary rocks, including all non-igneous rocks
Maf Volc - Mafic volcanic rocks
Fel Int - Felsic intrusive rocks

Rock Age : Refers to the geologic age of the underlying rock groups as shown on the geologic map (figure ___).

Quad 4 mile/1 mile : Refers to the 1:250,000 and 1:63,360 scale USGS quadrangle maps covering the area.

Russian M.: Russian Mission

Sec/T/R/Mer : Refers to section, township, range, and meridian in which sample was collected.

Location : Refers to geographic location of sampling site.

Project Name : Refers to the Project the sample was taken for.

Sample Type : Refers to the type of sample taken. The following sample types were taken.

Rock Specimen - A sample taken as a specimen of a particular rock type.

Stream Sediment - A sample of silt, sand, and/or clay taken along a stream bed.

Rock Grab - A collection of mineral and rock fragments taken at random from an outcrop or float.

Rock Chip - A sample taken in a regular series of ore chips or rock chips taken in a continuous line or at uniformly spaced intervals.

E. Sp : Refers to semiquantitative emission spectrographic technique analysis. Given in parts per million (ppm) unless otherwise noted.

Geochem : Refers to quantitative atomic absorption spectrophotometric technique analysis for all elements except mercury which was analyzed by a mercury vapor detection instrument. Given in parts per million (ppm).

Sample Number/Year	6501/83		6502/83		6503/83	
Map Sample Number	16		15		17	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-2		Iditarod / B-2		Iditarod / B-2	
Sec/T/R/Mer	26/ 28N/ 41W/Sew		27/ 28N/ 41W/Sew		26/ 28N/ 41W/Sew	
Location	Little Waldren Fork		Trib. Little Waldren		Trib. Little Waldren	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	2	<100	4
Arsenic	<200		<200		<200	
Barium	300		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		100	
Calcium	0.1%		0.05%		0.1%	
Cadmium	<50		<50		<50	
Chromium	30		50		70	
Cobalt	<5		<5		<5	
Copper	7	30	10	25	10	25
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.0%		1.5%		1.5%	
Lanthanum	20		20		20	
Lead	<10	20	<10	25	<10	20
Manganese	150		700		200	
Magnesium	0.2%		0.2%		0.5%	
Mercury		0.54		0.5		0.41
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		20		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	1500		1500		3000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	50		50		100	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	100	<200	85
Zirconium	100		20		100	

Sample Number/Year	6504/83		6505/83		6506/83	
Map Sample Number	18		28		29	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-2		Iditarod / B-2		Iditarod / B-2	
Sec/T/R/Mer	26/ 28N/ 41W/Sew		13/ 27N/ 40W/Sew		18/ 27N/ 39W/Sew	
Location	Little Waldren Fork		Big Waldren Fork		Trib Big Waldren Fork	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream Sediment		Stream Sediment		Stream Sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		1000		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	150		100		50	
Calcium	0.15%		0.2%		0.2%	
Cadmium	<50		<50		<50	
Chromium	70		70		100	
Cobalt	5		5		5	
Copper	15	30	10	30	15	25
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		2%	
Lanthanum	20		20		20	
Lead	<10	20	<10	25	<10	15
Manganese	500		300		200	
Magnesium	1%		1%		1%	
Mercury		0.25		0.29		0.29
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		50		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	150		150		150	
Yttrium	<10		<10		<10	
Zinc	<200	110	<200	90	<200	85
Zirconium	100		100		100	

Sample Number/Year	6507/83		6508/83		6509/83	
Map Sample Number	26		27		42	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Iditarod / B-2		Iditarod / B-2		Iditarod / B-2	
Sec/T/R/Mer	01/ 26N/ 41W/Sew		01/ 26N/ 41W/Sew		29/ 26N/ 40W/Sew	
Location	Trib E.F. George R.		Trib Little EF George		Granite Mtn.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	8
Arsenic	<200		<200		<200	
Barium	500		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		<10	
Calcium	0.1%		0.05%		1.5%	
Cadmium	<50		<50		<50	
Chromium	50		50		200	
Cobalt	<5		<5		10	
Copper	5	40	2	20	20	80
Gallium	<10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		1%		5%	
Lanthanum	20		20		<20	
Lead	<10	25	<10	20	<10	30
Manganese	500		100		200	
Magnesium	0.3%		0.2%		2%	
Mercury		0.65		0.36		0.42
Molybdenum	<2		<2		2	
Niobium	<20		<20		<20	
Nickel	30		20		30	
Scandium	<10		<10		10	
Silver	<1		<1		<1	
Strontium	<100		<100		100	
Tin	<10		<10		<10	
Titanium	1000		1000		2000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	50		30		100	
Yttrium	<10		<10		<10	
Zinc	<200	110	<200	80	<200	60
Zirconium	20		50		50	

Sample Number/Year	6510/83		6511/83		6512/83	
Map Sample Number	104		103		89	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Tertiary		Tertiary	
Quad 4 mile/1 mile	Russian M./ C-4		Russian M./ C-4		Russian M./ C-4	
Sec/T/R/Mer	32/ 19N/ 60W/Sew		32/ 19N/ 60W/Sew		34/ 20N/ 59W/Sew	
Location	Trib. Arhymot Lake		Trib. Aryhmot Lake		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream Sediment		Stream Sediment		Stream Sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	4
Arsenic	<200		<200		<200	
Barium	200		500		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		50		20	
Calcium	0.07%		0.3%		0.3%	
Cadmium	<50		<50		<50	
Chromium	10		50		30	
Cobalt	<5		<5		<5	
Copper	2	20	10	20	10	20
Gallium	<10		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		1.5%		1.5%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	<10	20
Manganese	300		300		200	
Magnesium	0.2%		0.5%		0.5%	
Mercury		0.34		0.24		0.24
Molybdenum	<2		2		<2	
Niobium	<20		<20		<20	
Nickel	<5		20		10	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		100		<100	
Tin	<10		<10		<10	
Titanium	1000		2000		1500	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	30		70		50	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	55	<200	60
Zirconium	50		150		100	

Sample Number/Year	6513/83	6514/83	6515/83
Map Sample Number	90	109	39
Material Type	Stream Sed	Stream Sed	SL/SS/CG
Rock Type	Qal	Qal	Meta Sed
Rock Age	Tertiary	Tertiary	Tertiary
Quad 4 mile/1 mile	Russian M./ D-3	Russian M./ C-3	Iditarod / B-2
Sec/T/R/Mer	34/ 20N/ 59W/Sew	17/ 18N/ 59W/Sew	29/ 26N/ 40W/Sew
Location	Trib. Paimiut Slough	Trib. Kuskokwim R.	Granite Mtn.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Rock Grab

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	8
Arsenic	<200		<200		<200	
Barium	500		200		70	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		10000	
Calcium	0.3%		0.2%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		20		500	
Cobalt	<5		<5		<5	
Copper	7	20	7	25	5	15
Gallium	10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		3%	
Lanthanum	20		20		20	
Lead	<10	15	<10	20	10	20
Manganese	300		200		150	
Magnesium	0.5%		0.2%		3%	
Mercury		0.13		0.22		0.13
Molybdenum	3		<2		2	
Niobium	<20		<20		20	
Nickel	20		5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		30	
Titanium	3000		1500		7000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	50		50		200	
Yttrium	<10		<10		<10	
Zinc	<200	60	<200	70	<200	10
Zirconium	100		50		200	

Sample Number/Year	6516/83	6517/83	6518/83
Map Sample Number	40	43	41
Material Type	SL/SS/CG	Maf Volc	Fel Plut
Rock Type	Meta Sed	Maf Volc	Fel Int
Rock Age	Tertiary	Tertiary	Tertiary
Quad 4 mile/1 mile	Iditarod / B-2	Iditarod / B-2	Iditarod / B-2
Sec/T/R/Mer	29/ 26N/ 40W/Sew	29/ 26N/ 40W/Sew	29/ 26N/ 40W/Sew
Location	Granite Mtn.	Granite Mtn.	Granite Mtn.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Rock specimen	Rock specimen	Rock Specimen

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	NO ANALYSIS REQUESTED		NO ANALYSIS REQUESTED		NO ANALYSIS REQUESTED	
Arsenic						
Barium						
Beryllium						
Bismuth						
Boron						
Calcium						
Cadmium						
Chromium						
Cobalt						
Copper						
Gallium						
Germanium						
Gold						
Iron						
Lanthanum						
Lead						
Manganese						
Magnesium						
Mercury						
Molybdenum						
Niobium						
Nickel						
Scandium						
Silver						
Strontium						
Tin						
Titanium						
Tungsten						
Vanadium						
Yttrium						
Zinc						
Zirconium						

Sample Number/Year	6519/83		6520/83		6521/83	
Map Sample Number	140		141		142	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	18/ 20N/ 48W/Sew		17/ 20N/ 48W/Sew		17/ 20N/ 48W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		50		30	
Calcium	0.3%		0.3%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		50		100	
Cobalt	<5		<5		<5	
Copper	10	25	10	30	7	25
Gallium	15		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		1.5%	
Lanthanum	20		20		20	
Lead	10	15	<10	20	<10	15
Manganese	300		200		200	
Magnesium	0.7%		0.5%		0.5%	
Mercury		0.25		0.18		0.20
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		15	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		2000	
Tungsten	<50	<2	<50	2	<50	2
Vanadium	50		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	70	<200	100	<200	80
Zirconium	100		100		70	

Sample Number/Year	6522/83		6523/83		6524/83	
Map Sample Number	145		146		148	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	32/ 21N/ 47W/Sew		32/ 21N/ 47W/Sew		34/ 21N/ 47W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		200		150	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		15		10	
Calcium	0.2%		0.1%		0.1%	
Cadmium	<50		<50		<50	
Chromium	50		70		20	
Cobalt	<5		5		<5	
Copper	7	20	5	20	5	30
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		1.5%	
Lanthanum	20		<20		<20	
Lead	<10	15	<10	10	<10	15
Manganese	200		150		100	
Magnesium	0.5%		0.3%		0.2%	
Mercury		0.18		0.22		0.40
Molybdenum	<2		2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		10	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		1000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		50		30	
Yttrium	<10		<10		<10	
Zinc	<200	75	<200	70	<200	80
Zirconium	150		50		70	

Sample Number/Year	6525/83		6526/83		6527/83	
Map Sample Number	150		151		152	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	26/ 21N/ 41W/Sew		25/ 21N/ 47W/Sew		20/ 21 N/ 46 W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream Sediment		Stream Sediment		Stream Sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		300		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		20		70	
Calcium	0.5%		0.2%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		10		100	
Cobalt	5		<5		5	
Copper	10	20	7	30	10	20
Gallium	10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		1.5%		2%	
Lanthanum	50		20		20	
Lead	<10	15	<10	20	<10	15
Manganese	500		200		500	
Magnesium	1%		0.2%		0.7%	
Mercury		0.51		0.27		0.40
Molybdenum	3		<2		2	
Niobium	<20		<20		<20	
Nickel	50		15		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		50		100	
Yttrium	<10		<10		10	
Zinc	<200	80	<200	60	<200	55
Zirconium	100		50		150	

Sample Number/Year	6528/83		6529/83		6530/83	
Map Sample Number	156		157		159	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	21/ 21N/ 46W/Sew		26/ 21N/ 46W/Sew		35/ 21 N/ 46W/Sew	
Location	Trib. Kuskokwim R.		Downey Creek		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	700		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		50	
Calcium	0.3%		0.2%		0.15%	
Cadmium	<50		<50		<50	
Chromium	100		50		100	
Cobalt	5		<5		<5	
Copper	10	20	15	30	7	25
Gallium	15		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		2%	
Lanthanum	20		20		20	
Lead	<10	10	<10	15	<10	25
Manganese	200		200		200	
Magnesium	0.5%		0.5%		0.7%	
Mercury		0.13		0.40		0.15
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		70	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	80	<200	80
Zirconium	100		100		200	

Sample Number/Year	6531/83		6532/83		6533/83	
Map Sample Number	161		162		163	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	04/ 20N/ 46W/Sew		09/ 20N/ 46W/Sew		10/ 20 N/ 46 W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		70	
Calcium	0.2%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		70		100	
Cobalt	<5		<5		<5	
Copper	10	30	10	20	10	20
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	<10	15
Manganese	300		200		500	
Magnesium	0.3%		0.7%		0.7%	
Mercury		0.33		0.19		0.19
Molybdenum	<2		5		2	
Niobium	<20		<20		<20	
Nickel	10		50		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		3000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	70		70		100	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	65	<200	60
Zirconium	70		100		150	

Sample Number/Year	6534/83		6535/83		6536/83	
Map Sample Number	164		167		173	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-4	
Sec/T/R/Mer	10/ 20N/ 46W/Sew		13/ 20N/ 46W/Sew		26/ 20 N/ 45W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Fuller Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		200		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		10		20	
Calcium	0.3%		0.1%		0.1%	
Cadmium	<50		<50		<50	
Chromium	50		<10		30	
Cobalt	<5		<5		<5	
Copper	10	25	2	40	5	20
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		0.7%		2%	
Lanthanum	20		20		<20	
Lead	<10	15	<10	20	<10	15
Manganese	200		50		150	
Magnesium	0.5%		0.05%		0.3%	
Mercury		0.19		1.2		0.37
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		<5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		1000		2000	
Tungsten	<50	2	<50	2	<50	<2
Vanadium	100		50		70	
Yttrium	<10		<10		<10	
Zinc	<200	55	<200	60	<200	75
Zirconium	100		30		70	

Sample Number/Year	6537/83		6538/83		6539/83	
Map Sample Number	174		175		176	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-4		Sleetmute/ D-4		Sleetmute/ C-4	
Sec/T/R/Mer	06/ 19N/ 44W/Sew		06/ 19N/ 44W/Sew		15/ 19 N/ 44 W/Sew	
Location	McCally Creek		Red Devil Mine Creek		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	32	2000	3400	<100	7
Arsenic	<200		1000		<200	
Barium	1500		1000		200	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		100		10	
Calcium	0.5%		0.2%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		150		100	
Cobalt	<5		15		<5	
Copper	10	15	50	80	2	15
Gallium	15		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		1.5%	
Lanthanum	20		20		<20	
Lead	<10	15	100	80	<10	20
Manganese	500		1500		150	
Magnesium	0.5%		0.2%		0.2%	
Mercury		1.2		1850		0.60
Molybdenum	5		2		<2	
Niobium	<20		<20		<20	
Nickel	50		70		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		2000	
Tungsten	<50	<2	<50	3	<50	2
Vanadium	150		100		30	
Yttrium	<10		<10		<10	
Zinc	<200	75	<200	135	<200	55
Zirconium	100		70		150	

Sample Number/Year	6540/83		6541/83		6542/83	
Map Sample Number	178		177		172	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ C-4		Sleetmute/ C-4		Sleetmute/ D-4	
Sec/T/R/Mer	23/ 19N/ 44W/Sew		13/ 19N/ 44W/Sew		22/ 20 N/ 45 W/Sew	
Location	Vreeland Creek		Trib. Kuskokwim R.		Willis Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	5	<100	3
Arsenic	<200		<200		<200	
Barium	1000		700		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		30		50	
Calcium	0.3%		0.3%		0.7%	
Cadmium	<50		<50		<50	
Chromium	100		100		100	
Cobalt	<5		<5		<5	
Copper	15	30	15	30	15	10
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		3%		7%	
Lanthanum	<20		20		50	
Lead	<10	20	<10	20	10	10
Manganese	500		300		1000	
Magnesium	1.5%		0.7%		1.5%	
Mercury		0.29		0.24		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		20		30	
Scandium	<10		<10		15	
Silver	<1		<1		<1	
Strontium	100		100		100	
Tin	<10		<10		<10	
Titanium	3000		3000		10000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	70		70		100	
Yttrium	<10		<10		100	
Zinc	<200	80	<200	65	<200	70
Zirconium	100		300		700	

Sample Number/Year	6543/83		6544/83		6545/83	
Map Sample Number	171		170		169	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-4		Sleetmute/ D-4		Sleetmute/ D-4	
Sec/T/R/Mer	21/ 20N/ 45W/Sew		20/ 20N/ 45W/Sew		19/ 20N/ 45W/Sew	
Location	Willis Creek		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	4
Arsenic	<200		<200		<200	
Barium	500		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.15%		0.1%		0.7%	
Cadmium	<50		<50		<50	
Chromium	70		50		200	
Cobalt	<5		<5		<5	
Copper	20	35	10	35	15	30
Gallium	10		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		5%	
Lanthanum	20		20		<20	
Lead	<10	25	<10	20	10	10
Manganese	300		300		500	
Magnesium	0.7%		0.15%		1.5%	
Mercury		0.47		0.39		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		5000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	70		70		70	
Yttrium	10		<10		10	
Zinc	<200	100	<200	105	<200	80
Zirconium	150		100		500	

Sample Number/Year	6546/83		6547/83		6548/83	
Map Sample Number	168		166		165	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	23/ 20N/ 46W/Sew		11/ 20N/ 46W/Sew		11/ 20N/ 46W/Sew	
Location	Eightmile Creek		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	500		700		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		50	
Calcium	0.2%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		150		100	
Cobalt	<5		<5		<5	
Copper	15	30	15	30	15	30
Gallium	15		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		3%	
Lanthanum	<20		70		20	
Lead	10	20	10	15	10	20
Manganese	200		300		300	
Magnesium	0.3%		1%		0.7%	
Mercury		0.47		0.50		0.10
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	<10		10		10	
Zinc	<200	90	<200	80	<200	85
Zirconium	100		500		200	

Sample Number/Year	6549/83		6550/83		6551/83	
Map Sample Number	160		158		154	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	36/ 21N/ 46W/Sew		26/ 21N/ 46W/Sew		21/ 21N/ 46W/Sew	
Location	Trib. Kuskokwim R.		California Creek		George R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	5	<100	5	<100	3
Arsenic	<200		<200		<200	
Barium	500		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		20		50	
Calcium	0.2%		0.2%		0.07%	
Cadmium	<50		<50		<50	
Chromium	70		70		70	
Cobalt	<5		<5		<5	
Copper	15	30	10	30	20	25
Gallium	10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		3%	
Lanthanum	20		<20		<20	
Lead	10	25	<10	25	<10	20
Manganese	500		200		1500	
Magnesium	0.7%		0.3%		0.7%	
Mercury		0.24		0.26		0.38
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		3000	
Tungsten	<50	2	<50	<2	<50	2
Vanadium	100		70		70	
Yttrium	10		<10		<10	
Zinc	<200	100	<200	70	<200	75
Zirconium	100		100		100	

Sample Number/Year	6552/83		6553/83		6554/83	
Map Sample Number	153		155		149	
Material Type	Stream Sed		SL/SS/CG		Stream Sed	
Rock Type	Qal		Meta Sed		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-5		Sleetmute/ D-5		Sleetmute/ D-5	
Sec/T/R/Mer	20/ 21N/ 46W/Sew		21/ 21N/ 46W/Sew		26/ 21N/ 47W/Sew	
Location	Steamboat Creek		Georgetown		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Rock chip 2'		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		70		50	
Calcium	0.3%		7%		0.2%	
Cadmium	<50		<50		<50	
Chromium	70		150		100	
Cobalt	<5		<5		<5	
Copper	10	20	30	25	15	30
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		3%		2%	
Lanthanum	20		<20		20	
Lead	10	20	10	30	10	20
Manganese	300		200		200	
Magnesium	0.7%		3%		0.7%	
Mercury		0.19		1.0		0.72
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	3	<50	<2	<50	<2
Vanadium	70		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	60	<200	60
Zirconium	200		100		100	

Sample Number/Year	6555/83		6556/83		6557/83	
Map Sample Number	147		144		143	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	32/ 21N/ 47W/Sew		03/ 20N/ 48W/Sew		09/ 20N/ 48W/Sew	
Location	Central Creek		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		300		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		20	
Calcium	0.1%		0.2%		0.15%	
Cadmium	<50		<50		<50	
Chromium	70		20		70	
Cobalt	<5		<5		<5	
Copper	10	20	7	30	10	20
Gallium	<10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		1.5%		2%	
Lanthanum	<20		30		<20	
Lead	<10	25	<10	15	<10	10
Manganese	200		200		300	
Magnesium	0.3%		0.3%		0.5%	
Mercury		0.66		0.33		0.39
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	10		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	1500		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	50		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	85	<200	65
Zirconium	50		150		100	

Sample Number/Year	6558/83		6559/83		6560/83	
Map Sample Number	138		136		135	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	23/ 20N/ 49W/Sew		28/ 20N/ 49W/Sew		29/ 20N/ 49W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		1500		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		70		70	
Calcium	0.5%		1%		1.5%	
Cadmium	<50		<50		<50	
Chromium	100		150		200	
Cobalt	<5		<5		<5	
Copper	7	15	10	20	7	20
Gallium	10		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		5%		7%	
Lanthanum	20		70		100	
Lead	10	5	10	5	10	10
Manganese	300		1000		1500	
Magnesium	1%		2%		2%	
Mercury		0.30		0.33		0.18
Molybdenum	<2		<2		<2	
Niobium	<20		<20		20	
Nickel	10		30		30	
Scandium	<10		10		10	
Silver	<1		<1		<1	
Strontium	<100		200		200	
Tin	<10		<10		<10	
Titanium	3000		5000		7000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	10		15		20	
Zinc	<200	50	<200	50	<200	50
Zirconium	300		300		500	

Sample Number/Year	6561/83		6562/83		6563/83	
Map Sample Number	134		133		131	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	29/ 20N/ 49W/Sew		30/ 20N/ 49W/Sew		31/ 20N/ 49W/Sew	
Location	Trib. Kuskokwim R.		Jungyuk Creek		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		1500		2000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	100		70		70	
Calcium	2%		1%		1.5%	
Cadmium	<50		<50		<50	
Chromium	200		100		150	
Cobalt	<5		<5		<5	
Copper	10	45	7	20	10	20
Gallium	50		<10		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	7%		3%		7%	
Lanthanum	70		70		70	
Lead	20	5	<10	15	10	10
Manganese	700		500		1500	
Magnesium	3%		2%		3%	
Mercury		0.32		0.34		0.19
Molybdenum	<2		<2		<2	
Niobium	20		<20		20	
Nickel	30		20		30	
Scandium	20		10		20	
Silver	<1		<1		<1	
Strontium	200		100		200	
Tin	<10		<10		<10	
Titanium	7000		7000		7000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	200		150		150	
Yttrium	20		20		20	
Zinc	<200	50	<200	60	<200	55
Zirconium	300		300		300	

Sample Number/Year	6564/83		6565/83		6566/83	
Map Sample Number	129		128		127	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ C-6		Sleetmute/ C-6		Sleetmute/ C-7	
Sec/T/R/Mer	17/ 19N/ 49W/Sew		36/ 19N/ 50W/Sew		12/ 18N/ 50W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		300		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		20		50	
Calcium	0.5%		0.15%		0.7%	
Cadmium	<50		<50		<50	
Chromium	150		50		150	
Cobalt	<5		<5		<5	
Copper	7	15	5	15	15	15
Gallium	15		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		1.5%		5%	
Lanthanum	20		<20		50	
Lead	10	5	<10	10	<10	15
Manganese	500		150		500	
Magnesium	1.5%		0.3%		1.5%	
Mercury		0.15		0.24		0.19
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		20		20	
Scandium	10		<10		10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		1500		3000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	100		50		150	
Yttrium	15		<10		15	
Zinc	<200	50	<200	50	<200	50
Zirconium	200		100		200	

Sample Number/Year	6567/83		6568/83		6569/83	
Map Sample Number	126		125		124	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Sleetmute/ C-7		Sleetmute/ C-7		Sleetmute/ C-7	
Sec/T/R/Mer	23/ 18N/ 50W/Sew		32/ 18N/ 50W/Sew		01/ 17N/ 51W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Sue Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	2000		1500		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		70		100	
Calcium	1.5%		1.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	150		150		150	
Cobalt	<5		<5		<5	
Copper	15	15	20	25	15	20
Gallium	50		30		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	7%		7%		7%	
Lanthanum	50		50		30	
Lead	30	10	20	15	10	10
Manganese	2000		1500		500	
Magnesium	3%		2%		1.5%	
Mercury		0.14		0.32		0.33
Molybdenum	<2		<2		<2	
Niobium	20		20		20	
Nickel	30		30		30	
Scandium	20		20		10	
Silver	<1		<1		<1	
Strontium	200		200		100	
Tin	<10		<10		<10	
Titanium	7000		7000		5000	
Tungsten	<50	2	<50	<2	<50	5
Vanadium	200		200		150	
Yttrium	20		30		10	
Zinc	<200	65	<200	60	<200	60
Zirconium	200		300		150	

Sample Number/Year	6570/83		6571/83		6572/83	
Map Sample Number	123		110		105	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Sleetmute/ C-7		Sleetmute/ C-3		Sleetmute/ C-3	
Sec/T/R/Mer	10/ 17N/ 51W/Sew		17/ 18N/ 59W/Sew		31/ 19N/ 58W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		1500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		50		50	
Calcium	1%		1%		1%	
Cadmium	<50		<50		<50	
Chromium	150		150		50	
Cobalt	<5		<5		<5	
Copper	7	25	10	25	7	25
Gallium	15		20		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		5%		5%	
Lanthanum	70		30		30	
Lead	10	15	10	10	10	10
Manganese	500		700		500	
Magnesium	2%		1.5%		1%	
Mercury		0.22		0.22		0.14
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		10		20	
Scandium	10		<10		<10	
Silver	<1		<1		<1	
Strontium	200		<100		100	
Tin	<10		<10		<10	
Titanium	7000		5000		5000	
Tungsten	<50	5	<50	2	<50	<2
Vanadium	150		150		100	
Yttrium	30		20		<10	
Zinc	<200	70	<200	55	<200	50
Zirconium	300		300		300	

Sample Number/Year	6573/83		6574/83		6575/83	
Map Sample Number	106		107		108	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Tertiary		Tertiary	
Quad 4 mile/1 mile	Russian M./ C-3		Russian M./ D-2		Russian M./ D-2	
Sec/T/R/Mer	31/ 19N/ 58W/Sew		01/ 19N/ 58W/Sew		01/ 19N/ 58W/Sew	
Location	Trib. Kuskokwim R.		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	2000		700		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		50		70	
Calcium	5%		0.7%		1.5%	
Cadmium	<50		<50		<50	
Chromium	200		70		100	
Cobalt	<5		<5		<5	
Copper	15	15	10	20	10	15
Gallium	70		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		5%		7%	
Lanthanum	100		30		50	
Lead	20	15	<10	15	10	15
Manganese	700		500		700	
Magnesium	3%		1%		1.5%	
Mercury		0.17		0.20		0.12
Molybdenum	<2		<2		<2	
Niobium	20		<20		20	
Nickel	10		20		10	
Scandium	15		<10		<10	
Silver	<1		<1		<1	
Strontium	500		100		200	
Tin	<10		<10		<10	
Titanium	7000		3000		7000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	150		150		150	
Yttrium	50		20		30	
Zinc	<200	50	<200	50	<200	50
Zirconium	500		200		500	

Sample Number/Year	6576/83		6577/83		6578/83	
Map Sample Number	92		91		93	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-2		Russian M./ D-2		Russian M./ D-2	
Sec/T/R/Mer	35/ 20N/ 57W/Sew		35/ 20N/ 57W/Sew		08/ 20N/ 56W/Sew	
Location	Trib. Paimiut Slough		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		500		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		50		30	
Calcium	1%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	100		70		50	
Cobalt	5		<5		<5	
Copper	7	20	7	25	7	25
Gallium	15		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		3%		2%	
Lanthanum	20		20		20	
Lead	10	15	<10	20	<10	15
Manganese	700		700		500	
Magnesium	2%		1.5%		0.5%	
Mercury		0.22		0.21		0.25
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		20	
Scandium	10		10		<10	
Silver	<1		<1		<1	
Strontium	100		100		<100	
Tin	<10		<10		<10	
Titanium	7000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		100		70	
Yttrium	20		10		<10	
Zinc	<200	50	<200	55	<200	60
Zirconium	300		200		150	

Sample Number/Year	6579/83		6580/83		6581/83	
Map Sample Number	94		97		98	
Material Type	Stream Sed		SL/SS/CG		Fel Plut/Q	
Rock Type	Qal		Meta Sed		Fel Int	
Rock Age	Cretaceous		Tertiary		Tertiary	
Quad 4 mile/1 mile	Russian M./ D-2		Russian M./ D-1		Russian M./ D-1	
Sec/T/R/Mer	08/ 20N/ 56W/Sew		16/ 20N/ 55W/Sew		16/ 20N/ 55W/Sew	
Location	Trib. Paimiut Slough		Molybdenum Mtn.		Molybdenum Mtn.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Rock grab		Rock grab	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	3	<100	4
Arsenic	<200		<200		<200	
Barium	700		1000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		50		70	
Calcium	0.7%		0.03%		0.15%	
Cadmium	<50		<50		<50	
Chromium	100		300		200	
Cobalt	<5		5		<5	
Copper	10	30	50	80	50	90
Gallium	20		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		7%		1.5%	
Lanthanum	50		<20		20	
Lead	10	15	<10	20	10	15
Manganese	1000		150		200	
Magnesium	1%		1.5%		0.2%	
Mercury		0.22		0.65		0.72
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	15		70		30	
Scandium	<100		200		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		200	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	10
Vanadium	100		150		30	
Yttrium	10		10		<10	
Zinc	<200	60	<200	80	<200	20
Zirconium	300		150		150	

Sample Number/Year	6582/83		6583/83		6584/83	
Map Sample Number	130		132		137	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-6	
Sec/T/R/Mer	04 / 19N/ 49W/Sew		32/ 20N/ 49W/Sew		33/ 20N/ 49W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	700		1500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		30	
Calcium	0.3%		0.7%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		150		70	
Cobalt	<5		<5		<5	
Copper	7	20	7	20	15	40
Gallium	10		15		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		2%	
Lanthanum	<20		30		30	
Lead	10	15	10	10	<10	20
Manganese	300		1000		700	
Magnesium	0.7%		1.5%		1%	
Mercury		0.23		0.18		0.43
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		50		30	
Scandium	<10		10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	3
Vanadium	100		150		150	
Yttrium	10		20		10	
Zinc	<200	70	<200	55	<200	70
Zirconium	300		150		300	

Sample Number/Year	6585/83		6586/83		6587/83	
Map Sample Number	139		122		121	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ C-7		Sleetmute/ C-8	
Sec/T/R/Mer	14/ 20N/ 49W/Sew		19/ 17N/ 51W/Sew		28/ 17N/ 52W/Sew	
Location	Trib. Kuskokwim R.		New York Creek		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.3%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	50		70		70	
Cobalt	<5		<5		<5	
Copper	5	25	10	25	7	15
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		2%	
Lanthanum	20		<20		20	
Lead	<10	15	<10	20	<10	15
Manganese	300		300		300	
Magnesium	0.5%		0.5%		0.7%	
Mercury		0.46		0.37		0.22
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	8
Vanadium	70		100		70	
Yttrium	<10		<10		<10	
Zinc	<200	70	<200	75	<200	80
Zirconium	100		150		150	

Sample Number/Year	6588/83		6589/83		6590/83	
Map Sample Number	119		117		116	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Russian M./ C-1		Russian M./ C-1		Russian M./ C-1	
Sec/T/R/Mer	02/ 17N/ 54W/Sew		02/ 17N/ 54W/Sew		14/ 17N/ 55W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	200		700		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	10		20		20	
Calcium	0.2%		0.7%		0.15%	
Cadmium	<50		<50		<50	
Chromium	10		50		70	
Cobalt	<5		<5		<5	
Copper	<2	30	7	20	10	25
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	0.7%		2%		2%	
Lanthanum	20		50		<20	
Lead	<10	25	<10	25	<10	20
Manganese	150		500		300	
Magnesium	0.1%		0.5%		0.5%	
Mercury		0.25		0.26		0.19
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	<5		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	1500		5000		2000	
Tungsten	<50	3	<50	<2	<50	<2
Vanadium	50		100		70	
Yttrium	<10		10		<10	
Zinc	<200	80	<200	80	<200	60
Zirconium	200		300		150	

Sample Number/Year	6591/83		6592/83		6593/83	
Map Sample Number	115		118		120	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ C-2		Russian M./ C-1		Sleetmute / C-8	
Sec/T/R/Mer	03/ 17N/ 56W/Sew		02/ 17N/ 54W/Sew		09/ 17N/ 53W/Sew	
Location	Trib. Kuskokwim R.		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	4	<100	2
Arsenic	<200		<200		<200	
Barium	300		500		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		10		30	
Calcium	0.1%		0.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		70		50	
Cobalt	<5		<5		<5	
Copper	5	25	7	30	10	35
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		2%	
Lanthanum	<20		20		<20	
Lead	<10	20	<10	25	<10	20
Manganese	200		700		500	
Magnesium	0.5%		0.7%		0.7%	
Mercury		0.32		0.15		0.35
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		2000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	50		70		100	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	65	<200	75
Zirconium	200		150		150	

Sample Number/Year	6594/83		6595/83		6596/83	
Map Sample Number	75		58		74	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-4		Iditarod / A-4		Iditarod / A-4	
Sec/T/R/Mer	17/ 23N/ 46W/Sew		35/ 24N/ 47W/Sew		02/ 23N/ 47W/Sew	
Location	N. F. George R.		Trib. N.F. George R.		Trib. N.F. George R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		20		50	
Calcium	0.15%		0.03%		0.15%	
Cadmium	<50		<50		<50	
Chromium	100		100		70	
Cobalt	<5		<5		<5	
Copper	10	30	7	30	10	30
Gallium	15		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		1.5%	
Lanthanum	20		<20		20	
Lead	<10	15	<10	20	<10	20
Manganese	300		150		200	
Magnesium	0.7%		0.3%		0.7%	
Mercury		0.19		0.22		0.27
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	50		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		50		100	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	80	<200	75
Zirconium	100		50		100	

Sample Number/Year	6597/83		6598/83		6599/83	
Map Sample Number	59		60		179	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-4		Iditarod / A-4		Iditarod / B-4	
Sec/T/R/Mer	05/ 24N/ 46W/Sew		05/ 24N/ 46W/Sew		05/ 25N/ 45W/Sew	
Location	N.F. George R.		Trib. N.F. George R.		Michigan Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	300		300		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		70	
Calcium	0.07%		0.15%		0.2%	
Cadmium	<50		<50		<50	
Chromium	50		50		150	
Cobalt	<5		<5		<5	
Copper	7	25	7	30	20	30
Gallium	<10		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		3%	
Lanthanum	<20		<20		30	
Lead	<10	20	<10	25	<10	25
Manganese	150		200		700	
Magnesium	0.3%		0.5%		0.7%	
Mercury		0.19		0.18		0.25
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		70		150	
Yttrium	<10		<10		10	
Zinc	<200	80	<200	80	<200	100
Zirconium	70		100		200	

Sample Number	6600/83		6601/83		6602/83	
Map Sample Number	180		35		36	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-4		Iditarod / B-3		Iditarod / B-3	
Sec/T/R/Mer	05/ 25N/ 45W/Sew		32/ 26N/ 44W/Sew		32/ 26N/ 44W/Sew	
Location	Trib. Michigan Creek		Trib. Doherty Creek		Doherty Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.2%		0.1%		0.05%	
Cadmium	<50		<50		<50	
Chromium	50		70		70	
Cobalt	<5		<5		<5	
Copper	7	25	7	30	7	25
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		2%	
Lanthanum	30		<20		<20	
Lead	<10	25	<10	20	<10	20
Manganese	200		150		200	
Magnesium	0.2%		0.3%		0.5%	
Mercury		0.25		0.19		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		2000	
Tungsten	<50	<2	<50	3	<50	<2
Vanadium	70		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	85	<200	90	<200	85
Zirconium	150		150		100	

Sample Number/Year	6603/83		6604/83		6605/83	
Map Sample Number	46		22		23	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-3		Iditarod / B-3		Iditarod / B-3	
Sec/T/R/Mer	11/ 25N/ 44W/Sew		30/ 27N/ 43W/Sew		19/ 27N/ 43W/Sew	
Location	Barnhard Creek		Beaver Creek		Trib. Beaver Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	500		500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		70	
Calcium	0.07%		0.1%		0.2%	
Cadmium	<50		<50		<50	
Chromium	150		50		100	
Cobalt	<5		<5		<5	
Copper	10	20	7	45	20	45
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		3%	
Lanthanum	<20		20		20	
Lead	<10	20	<10	25	<10	25
Manganese	200		200		700	
Magnesium	0.3%		0.5%		0.5%	
Mercury		0.31		0.31		0.41
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	<10		<10		10	
Zinc	<200	75	<200	85	<200	115
Zirconium	150		150		150	

Sample Number/Year	6606/83		6607/83		6608/83	
Map Sample Number	24		25		37	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-3		Iditarod / B-3		Iditarod / B-3	
Sec/T/R/Mer	26/ 27N/ 43W/Sew		26/ 27N/ 43W/Sew		16/ 26N/ 42W/Sew	
Location	George R.		Eldorado Creek		Willow-Granite Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		100	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		50		15	
Calcium	0.15%		0.15%		0.07%	
Cadmium	<50		<50		<50	
Chromium	70		50		10	
Cobalt	<5		<5		<5	
Copper	30	35	15	35	2	25
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		0.7%	
Lanthanum	<20		20		<20	
Lead	<10	25	<10	25	<10	25
Manganese	200		300		100	
Magnesium	0.5%		0.3%		0.05%	
Mercury		0.63		0.33		0.35
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		5	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		1000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		70		20	
Yttrium	<10		<10		<10	
Zinc	<200	85	<200	105	<200	60
Zirconium	100		150		30	

Sample Number/Year	6609/83		6610/83		6611/83	
Map Sample Number	38		47		49	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-3		Iditarod / B-3		Iditarod / A-2	
Sec/T/R/Mer	16/ 26N/ 42W/Sew		05/ 25N/ 42W/Sew		31/ 25N/ 41W/Sew	
Location	Bismark Creek		Little Moose Creek		Moose Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	700		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		20		70	
Calcium	0.2%		0.15%		0.2%	
Cadmium	<50		<50		<50	
Chromium	70		70		70	
Cobalt	<5		<5		<5	
Copper	10	25	7	25	10	20
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		3%	
Lanthanum	20		20		20	
Lead	<10	25	<10	20	<10	25
Manganese	300		150		500	
Magnesium	0.7%		0.5%		0.7%	
Mercury		0.25		0.26		0.28
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		1500		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		70		100	
Yttrium	<10		<10		<10	
Zinc	<200	85	<200	70	<200	70
Zirconium	150		100		200	

Sample Number/Year	6612/83	6613/83	6614/83
Map Sample Number	48	50	51
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / A-2	Iditarod / A-2	Iditarod / A-2
Sec/T/R/Mer	31/ 25N/ 41W/Sew	33/ 25N/ 41W/Sew	33/ 25N/ 41W/Sew
Location	E.F. George R.	Moose Creek	Trib. Moose Creek
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		700		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		150		20	
Calcium	0.2%		0.15%		0.15%	
Cadmium	<50		<50		<50	
Chromium	150		70		70	
Cobalt	<5		<5		<5	
Copper	10	15	7	15	7	15
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	<10	15
Manganese	300		300		200	
Magnesium	0.5%		0.5%		0.3%	
Mercury		0.40		0.27		0.40
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	150		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	75	<200	75
Zirconium	150		100		150	

Sample Number/Year	6615/83		6616/83		6617/83	
Map Sample Number	67		68		65	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-2		Iditarod / A-2		Iditarod / A-2	
Sec/T/R/Mer	15/ 24N/ 41W/Sew		15/ 24N/ 41W/Sew		34/ 24N/ 42W/Sew	
Location	Little S.F. George R		Trib Little SF George		Little SF George R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	3
Arsenic	<200		<200		<200	
Barium	200		300		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	15		20		20	
Calcium	0.05%		0.05%		0.2%	
Cadmium	<50		<50		<50	
Chromium	50		50		70	
Cobalt	<5		<5		<5	
Copper	7	15	5	15	30	15
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1%		3%	
Lanthanum	<20		20		20	
Lead	<10	5	<10	10	<10	10
Manganese	200		200		300	
Magnesium	0.2%		0.2%		0.5%	
Mercury		0.28		0.33		0.33
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		10		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	1500		1000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		50		150	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	80	<200	70
Zirconium	100		50		150	

Sample Number/Year	6618/83		6619/83		6620/83	
Map Sample Number	66		63		64	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-2		Iditarod / A-3		Iditarod / A-3	
Sec/T/R/Mer	34/ 24N/ 42W/Sew		34/ 24N/ 43W/Sew		34/ 24N/ 43W/Sew	
Location	Trib Little SF George		Trib EF George R.		Trib EF George R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	1000		700		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		20	
Calcium	0.3%		0.3%		0.15%	
Cadmium	<50		<50		<50	
Chromium	150		70		50	
Cobalt	<5		<5		<5	
Copper	15	10	7	20	10	25
Gallium	15		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		1.5%	
Lanthanum	20		20		20	
Lead	<10	15	<10	20	<10	20
Manganese	300		300		200	
Magnesium	0.5%		0.7%		0.3%	
Mercury		0.22		0.31		0.31
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		2000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		150		70	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	65	<200	80
Zirconium	150		300		150	

Sample Number/Year	6621/83		6622/83		6623/83	
Map Sample Number	61		62		45	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-4		Iditarod / A-4		Iditarod / B-4	
Sec/T/R/Mer	04/ 23N/ 45W/Sew		04/ 23N/ 45W/Sew		15/ 25N/ 47W/Sew	
Location	Trib. George R.		George R.		Little Eldorado Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	1000		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		20	
Calcium	0.15%		0.15%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		100		70	
Cobalt	<5		<5		<5	
Copper	7	15	15	20	10	15
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		3%	
Lanthanum	<20		20		20	
Lead	<10	15	<10	25	<10	20
Manganese	300		300		300	
Magnesium	1%		0.5%		0.7%	
Mercury		0.35		1.2		0.34
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	50		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	150		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	75	<200	75	<200	70
Zirconium	150		150		150	

Sample Number/Year	6624/83		6625/83		6626/83	
Map Sample Number	34		21		8	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-4		Iditarod / B-4		Iditarod / C-5	
Sec/T/R/Mer	02/ 26N/ 46W/Sew		21/ 27N/ 45W/Sew		17/ 29N/ 47W/Sew	
Location	Moose Creek		Ruby Creek		Franklin Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	300		500		200	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		15	
Calcium	0.1%		0.1%		0.3%	
Cadmium	<50		<50		<50	
Chromium	30		70		30	
Cobalt	<5		5		<5	
Copper	7	20	7	20	7	25
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		2%		1.5%	
Lanthanum	20		20		20	
Lead	<10	25	<10	20	<10	15
Manganese	100		200		200	
Magnesium	0.2%		0.7%		0.3%	
Mercury		0.58		0.26		0.64
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		5	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		70		70	
Yttrium	15		<10		<10	
Zinc	<200	75	<200	80	<200	80
Zirconium	100		100		150	

Sample Number/Year	6627/83		6628/83		6629/83	
Map Sample Number	5		4		3	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / C-5		Iditarod / C-5		Iditarod / C-5	
Sec/T/R/Mer	30/ 30N/ 47W/Sew		11/ 30N/ 49W/Sew		19/ 30N/ 48W/Sew	
Location	Trib. Iditarod R.		Trib. Iditarod R.		Trib. Yetna R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	150		700		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	10		15		20	
Calcium	0.1%		0.7%		0.5%	
Cadmium	<50		<50		<50	
Chromium	20		70		100	
Cobalt	<5		<5		<5	
Copper	5	15	7	10	7	10
Gallium	<10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		2%		2%	
Lanthanum	<20		20		20	
Lead	<10	15	<10	20	<10	20
Manganese	50		300		300	
Magnesium	0.2%		0.7%		0.7%	
Mercury		0.49		0.20		0.27
Molybdenum	<2		<2		<2	
Niobium	<20		<20		20	
Nickel	10		10		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	1500		3000		3000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	30		15		100	
Yttrium	<10		<10		15	
Zinc	<200	40	<200	45	<200	50
Zirconium	100		150		200	

Sample Number/Year	6630/83		6640/83		6641/83	
Map Sample Number	14		7		2	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Tertiary		Tertiary	
Quad 4 mile/1 mile	Iditarod / C-5		Holy Cross/ C-1		Holy Cross/ D-1	
Sec/T/R/Mer	05/ 28N/ 48W/Sew		21/ 29N/ 54W/Sew		14/ 31N/ 54W/Sew	
Location	Julie Creek		Trib. Innoko R.		Trib. Innoko R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		700		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	15		15		15	
Calcium	0.5%		0.5%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		70		20	
Cobalt	<5		<5		<5	
Copper	7	10	7	15	3	5
Gallium	10		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		1%	
Lanthanum	20		20		20	
Lead	<10	20	<10	20	<10	10
Manganese	200		500		300	
Magnesium	0.5%		0.5%		0.2%	
Mercury		0.30		0.28		0.21
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		<5	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	100		100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		2000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	70		100		70	
Yttrium	<10		10		<10	
Zinc	<200	65	<200	80	<200	50
Zirconium	150		150		100	

Sample Number/Year	6642/83		6643/83		6644/83	
Map Sample Number	1		12		11	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Holy Cross/ D-1		Holy Cross/ B-1		Holy Cross/ B-1	
Sec/T/R/Mer	14/ 31N/ 54W/Sew		27/ 28N/ 54W/Sew		27/ 28N/ 54W/Sew	
Location	Trib. Innoko R.		Trib. Innoko R.		Trib. Innoko R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		500		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		15		15	
Calcium	0.5%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	100		30		50	
Cobalt	<5		<5		5	
Copper	7	5	2	10	10	10
Gallium	15		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		3%	
Lanthanum	30		20		20	
Lead	10	20	<10	15	<10	25
Manganese	300		500		1000	
Magnesium	0.7%		0.2%		0.7%	
Mercury		0.25		0.52		0.35
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		2000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		70		70	
Yttrium	10		<10		<10	
Zinc	<200	55	<200	65	<200	70
Zirconium	300		150		100	

Sample Number/Year	6645/83		6646/83		6647/83	
Map Sample Number	10		9		6	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Tertiary		Cretaceous	
Quad 4 mile/1 mile	Holy Cross/ B-1		Holy Cross/ B-1		Holy Cross/ B-1	
Sec/T/R/Mer	27/ 28N/ 55W/Sew		22/ 28N/ 55W/Sew		21/ 29N/ 54W/Sew	
Location	Trib. Innoko R.		Trib. Innoko R.		Trib. Innoko R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		700		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	15		20		20	
Calcium	0.3%		0.5%		0.3%	
Cadmium	<50		<50		<50	
Chromium	50		30		300	
Cobalt	<5		<5		<5	
Copper	7	10	7	10	10	10
Gallium	<10		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	10	10
Manganese	500		300		300	
Magnesium	0.3%		0.3%		0.3%	
Mercury		0.20		0.25		0.22
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	10		20		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	100		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	55	<200	60	<200	65
Zirconium	100		150		100	

Sample Number/Year	6648/83		6649/83		6650/83	
Map Sample Number	20		13		19	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-5		Iditarod / C-5		Iditarod / B-5	
Sec/T/R/Mer	33/ 27N/ 48W/Sew		05/ 28N/ 48W/Sew		25/ 27N/ 49W/Sew	
Location	Trib. Iditarod R.		Zimmerman Creek		Fairbanks Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		30	
Calcium	0.5%		0.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	300		50		100	
Cobalt	<5		<5		<5	
Copper	10	5	7	20	10	15
Gallium	20		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		2%	
Lanthanum	20		20		20	
Lead	10	15	<10	15	<10	15
Manganese	300		300		300	
Magnesium	0.7%		0.5%		0.7%	
Mercury		0.23		0.24		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	50		10		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		700		100	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	70	<200	60
Zirconium	100		150		150	

Sample Number/Year	6651/83		6652/83		6653/83	
Map Sample Number	33		31		32	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-5		Iditarod / B-6		Iditarod / B-6	
Sec/T/R/Mer	27/ 26N/ 49W/Sew		22/ 26N/ 51W/Sew		22/ 26N/ 51W/Sew	
Location	Pedro Creek		Reindeer R.		Trib. Reindeer R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		300		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		20	
Calcium	0.3%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		30		20	
Cobalt	<5		<5		<5	
Copper	10	20	5	15	7	15
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		2%	
Lanthanum	20		30		20	
Lead	<10	15	<10	20	<10	15
Manganese	200		500		300	
Magnesium	0.7%		0.3%		0.3%	
Mercury		0.20		0.32		0.21
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		5		10	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	55	<200	60	<200	50
Zirconium	150		100		150	

Sample Number/Year	6654/83		6655/83		6656/83	
Map Sample Number	30		44		54	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / B-6		Iditarod / B-6		Iditarod / A-6	
Sec/T/R/Mer	21/ 26N/ 51W/Sew		18/ 25N/ 51W/Sew		06/ 24N/ 52W/Sew	
Location	Trib. Reindeer R.		Trib. Reindeer R.		Trib. Reindeer R.	
Proj. Name -	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	500		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		20	
Calcium	0.5%		0.5%		0.3%	
Cadmium	<50		<50		<50	
Chromium	50		50		70	
Cobalt	<5		<5		<5	
Copper	5	10	7	15	7	15
Gallium	<10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	20	<10	15	<10	10
Manganese	300		200		300	
Magnesium	0.5%		0.5%		0.5%	
Mercury		0.19		0.25		0.21
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	5		5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	70		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	50	<200	45
Zirconium	150		150		150	

Sample Number/Year	6657/83		6658/83		6659/83	
Map Sample Number	55		113		114	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Iditarod / A-6		Sleetmute/ C-7		Sleetmute/ C-7	
Sec/T/R/Mer	06/ 24N/ 52W/Sew		24/ 18N/ 52W/Sew		19/ 18N/ 51W/Sew	
Location	Trib. Reindeer R.		Sue Creek		Sue Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	1000		1500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		70		30	
Calcium	0.3%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		150		150	
Cobalt	<5		5		<5	
Copper	5	10	15	15	7	15
Gallium	10		15		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		5%		2%	
Lanthanum	20		50		30	
Lead	<10	10	10	10	<10	15
Manganese	500		700		1500	
Magnesium	0.7%		2%		1%	
Mercury		0.17		0.20		0.21
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		50		10	
Scandium	<10		10		<10	
Silver	<1		<1		<1	
Strontium	100		100		<100	
Tin	<10		<10		<10	
Titanium	3000		7000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		150		100	
Yttrium	10		20		10	
Zinc	<200	50	<200	50	<200	55
Zirconium	100		200		150	

Sample Number/Year	6660/83		6661/83		6662/83	
Map Sample Number	87		88		86	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Tertiary	
Quad 4 mile/1 mile	Sleetmute/ D-6		Sleetmute/ D-6		Sleetmute/ D-7	
Sec/T/R/Mer	13/ 21N/ 49W/Sew		13/ 21N/ 49W/Sew		27/ 21N/ 50W/Sew	
Location	Bell Creek		Crooked Creek		Getmuna Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	3	<100	2
Arsenic	<200		<200		<200	
Barium	1500		1000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		70		70	
Calcium	0.3%		0.3%		3%	
Cadmium	<50		<50		<50	
Chromium	100		300		150	
Cobalt	<5		<5		<5	
Copper	10	20	15	20	10	15
Gallium	20		20		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		5%		5%	
Lanthanum	30		50		50	
Lead	10	10	10	15	20	20
Manganese	500		700		700	
Magnesium	1.5%		1.5%		2%	
Mercury		0.26		0.44		0.32
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		10	
Silver	<1		<1		<1	
Strontium	<100		<100		500	
Tin	<10		<10		<10	
Titanium	3000		3000		7000	
Tungsten	<50	3	<50	2	<50	<2
Vanadium	100		150		100	
Yttrium	<10		<10		10	
Zinc	<200	60	<200	80	<200	60
Zirconium	100		150		200	

Sample Number/Year	6663/83		6664/83		6665/83	
Map Sample Number	85		56		57	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Tertiary		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Sleetmute/ D-7		Iditarod / A-5		Iditarod / A-5	
Sec/T/R/Mer	21/ 21N/ 50W/Sew		35/ 24N/ 50W/Sew		35/ 24N/ 50W/Sew	
Location	Trib. Getmuna Cr.		Smith Creek		Smith Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	2000		1000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		70	
Calcium	0.5%		0.5%		1%	
Cadmium	<50		<50		<50	
Chromium	150		150		150	
Cobalt	<5		<5		5	
Copper	7	15	10	25	10	25
Gallium	30		15		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		3%		7%	
Lanthanum	50		50		30	
Lead	20	15	<10	10	10	10
Manganese	1500		1000		1000	
Magnesium	1.5%		1.5%		3%	
Mercury		0.48		0.34		0.29
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	10		30		30	
Scandium	<10		10		10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		5000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		100		150	
Yttrium	10		20		20	
Zinc	<200	45	<200	70	<200	65
Zirconium	150		150		150	

Sample Number/Year	6666/83		6667/83		6668/83	
Map Sample Number	72		73		70	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-6		Iditarod / A-6		Iditarod / A-6	
Sec/T/R/Mer	12/ 23N/ 52W/Sew		12/ 23N/ 52W/Sew		26/ 23N/ 53W/Sew	
Location	Little Creek		Little Creek		American Creek	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		1000		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		30		20	
Calcium	0.7%		0.3%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		100		70	
Cobalt	<5		<5		<5	
Copper	10	25	10	20	10	25
Gallium	30		20		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		5%		2%	
Lanthanum	50		20		50	
Lead	10	15	10	10	<10	15
Manganese	700		500		500	
Magnesium	1.5%		1.5%		0.5%	
Mercury		0.25		0.23		0.31
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	5		30		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	7000		7000		3000	
Tungsten	<50	3	<50	<2	<50	3
Vanadium	100		100		100	
Yttrium	20		<10		10	
Zinc	<200	50	<200	50	<200	50
Zirconium	300		150		100	

Sample Number/Year	6669/83		6670/83		6671/83	
Map Sample Number	71		53		52	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Iditarod / A-6		Holy Cross/ A-1		Holy Cross/ A-1	
Sec/T/R/Mer	35/ 23N/ 53W/Sew		25/ 24N/ 54W/Sew		25/ 24N/ 54W/Sew	
Location	American Creek		Trib. Reindeer R.		Trib. Reindeer R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		1500		200	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		50		50	
Calcium	0.3%		0.7%		1%	
Cadmium	<50		<50		<50	
Chromium	100		150		70	
Cobalt	<5		<5		<5	
Copper	10	20	15	20	7	10
Gallium	10		20		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		3%	
Lanthanum	20		30		50	
Lead	<10	10	10	15	15	15
Manganese	300		700		300	
Magnesium	0.5%		1%		1%	
Mercury		0.19		0.18		0.38
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		<5	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		500	
Tin	<10		<10		<10	
Titanium	2000		5000		3000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	70		150		100	
Yttrium	<10		10		<10	
Zinc	<200	55	<200	55	<200	55
Zirconium	150		150		150	

Sample Number/Year	6672/83		6673/83		6674/83	
Map Sample Number	69		79		80	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Holy Cross/ A-1		Holy Cross/ A-1		Holy Cross/ A-1	
Sec/T/R/Mer	02/ 23N/ 54W/Sew		03/ 22N/ 54W/Sew		10/ 22N/ 54W/Sew	
Location	Trib. Reindeer R.		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	70		2000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	<10		70		50	
Calcium	0.05%		1.5%		1%	
Cadmium	<50		<50		<50	
Chromium	<10		150		70	
Cobalt	<5		<5		5	
Copper	<2	20	15	15	15	15
Gallium	<10		30		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		5%		5%	
Lanthanum	20		50		50	
Lead	<10	20	15	15	10	15
Manganese	100		1000		1000	
Magnesium	0.03%		2%		1.5%	
Mercury		5.0		0.35		0.18
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	<5		30		30	
Scandium	<10		10		10	
Silver	<1		<1		<1	
Strontium	<100		500		300	
Tin	<10		<10		<10	
Titanium	300		7000		7000	
Tungsten	<50	25	<50	<2	<50	<2
Vanadium	30		150		150	
Yttrium	<10		20		20	
Zinc	<200	50	<200	60	<200	70
Zirconium	<20		300		150	

Sample Number/Year	6675/83		6676/83		6677/83	
Map Sample Number	78		77		76	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-1		Russian M./ D-1		Russian M./ D-1	
Sec/T/R/Mer	28/ 22N/ 54W/Sew		28/ 22N/ 54W/Sew		24/ 22N/ 55W/Sew	
Location	Trib. Paimiut Slough		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		700		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		30		30	
Calcium	0.3%		0.7%		0.7%	
Cadmium	<50		<50		<50	
Chromium	70		300		70	
Cobalt	<5		<5		<5	
Copper	7	20	7	15	7	15
Gallium	20		15		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		5%		3%	
Lanthanum	30		70		30	
Lead	10	15	10	20	10	15
Manganese	500		500		300	
Magnesium	1%		1.5%		1%	
Mercury		0.17		0.13		0.23
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		<5	
Scandium	<10		10		<10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		7000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	<10		30		<10	
Zinc	<200	60	<200	60	<200	50
Zirconium	150		300		150	

Sample Number/Year	6678/83		6679/83		6680/83	
Map Sample Number	84		83		81	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-1		Russian M./ D-1		Russian M./ D-2	
Sec/T/R/Mer	11/ 21N/ 55W/Sew		11/ 21N/ 55W/Sew		19/ 21N/ 55W/Sew	
Location	Trib. Paimiut Slough		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	<2	<100	3
Arsenic	<200		<200		<200	
Barium	700		700		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		20	
Calcium	0.5%		0.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	100		150		70	
Cobalt	<5		<5		<5	
Copper	10	15	7	20	7	25
Gallium	15		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		3%		2%	
Lanthanum	30		30		20	
Lead	<10	15	<10	15	<10	20
Manganese	300		300		500	
Magnesium	1%		0.7%		0.7%	
Mercury		0.26		0.16		0.35
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	10		20		10	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	100		70		100	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	55	<200	60
Zirconium	150		300		200	

Sample Number/Year	6681/83		6682/83		6683/83	
Map Sample Number	82		101		102	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-2		Sleetmute/ D-7		Sleetmute/ D-7	
Sec/T/R/Mer	19/ 21N/ 55W/Sew		04/ 20N/ 52W/Sew		04/ 20N/ 52W/Sew	
Location	Trib. Paimiut Slough		Kolmakof R.		Kolmakof R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.7%		0.2%		0.5%	
Cadmium	<50		<50		<50	
Chromium	150		20		100	
Cobalt	<5		<5		<5	
Copper	10	20	7	20	7	20
Gallium	15		<10		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		1.5%		3%	
Lanthanum	20		20		20	
Lead	10	15	<10	15	10	5
Manganese	700		1000		700	
Magnesium	1%		0.2%		0.7%	
Mercury		0.24		0.51		0.47
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		<5		20	
Scandium	10		<10		<10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		1500		5000	
Tungsten	<50	<2	<50	2	<50	2
Vanadium	150		70		100	
Yttrium	20		<10		<10	
Zinc	<200	55	<200	90	<200	65
Zirconium	150		70		150	

Sample Number/Year	6684/83		6685/83		6686/83	
Map Sample Number	99		100		95	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-1		Russian M./ D-1		Russian M./ D-1	
Sec/T/R/Mer	29/ 20N/ 54W/Sew		29/ 20N/ 54W/Sew		28/ 20N/ 55W/Sew	
Location	Cobalt Creek		Trib. Cobalt Creek		Trib. Owhat R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	5	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		1000		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	200		20		20	
Calcium	0.7%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	300		500		50	
Cobalt	<5		<5		<5	
Copper	10	35	10	15	3	10
Gallium	<10		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		5%		1%	
Lanthanum	20		20		<20	
Lead	<10	10	10	10	<10	10
Manganese	500		1000		200	
Magnesium	1%		1.5%		0.3%	
Mercury		0.73		0.39		0.27
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		50		5	
Scandium	10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	7000		3000		2000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	100		100		70	
Yttrium	15		<10		<10	
Zinc	<200	50	<200	70	<200	50
Zirconium	300		100		100	

Sample Number	6687/83		6688/83		6689/83	
Map Sample Number	96		112		111	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-1		Russian M./ C-2		Russian M./ C-2	
Sec/T/R/Mer	28/ 20N/ 55W/Sew		13/ 18N/ 57W/Sew		13/ 18N/ 57W/Sew	
Location	Owhat River		Trib. Kuskokwim R.		Trib. Kuskokwim R.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		50		30	
Calcium	0.3%		0.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	100		30		100	
Cobalt	<5		<5		<5	
Copper	10	20	7	15	10	15
Gallium	10		<10		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		1.5%		2%	
Lanthanum	20		20		30	
Lead	<10	15	<10	15	<10	10
Manganese	500		300		500	
Magnesium	0.7%		0.5%		1%	
Mercury		0.35		0.23		0.34
Molybdenum	<2		<2		<2	
Niobium	<20		<20		20	
Nickel	30		5		20	
Scandium	<10		<10		10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		3000		3000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	100		70		100	
Yttrium	<10		<10		20	
Zinc	<200	65	<200	50	<200	60
Zirconium	150		150		500	

APPENDIX B. - MINERAL PROPERTY SUMMARIES

Explanation

MINE : Ore shipments made and/or placer gold recovered over a period of several years.

PROSPECT : Development work done but no ore shipped.

OCCURRENCE : Mineralization exists but no signs of development.

LOCATION : Refer to figure 5 for location of the property identified by the "Map #".

QUADRANGLE : Refers to USGS quadrangle, scale 1:63,360.

REFERENCE NUMBERS : Several different reference numbers are used due to the fact that not all properties are catalogued under any single system. These are all referenced in the bibliography except Map #. The numbers are not cross-referenced to each other.

KX # (__)1/ : State of Alaska MinFile.

MAS # (__) : U.S. Bureau of Mines Minerals Availability System.

BLM # (__) : U.S. Bureau of Land Management History Analysis Report.

MAP # : U.S. Bureau of Mines project number designation for the property location on figure 5 map.

1/Underlined numbers in parentheses refer to items in the list of references preceding appendix A.

MINE NAME (other names): Innoko River Occurrence COMMODITIES: Coal

LOCATION: Quadrangle: Holy Cross D-1 SE 1/4 Sec 34 T 32N R 54W
Meridian: Seward
Geographic: Located on the northwest side of the Innoko River 6 miles above its confluence with Shageluk Slough.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
1	72-03	0020720003	

HISTORY AND PRODUCTION:

1925 - Examined by USGS and a sample taken (Gates, 1946).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Semiconsolidated beds of gray shales and sandstones, thought to be of Tertiary age, with some thin beds of lignite. The lignite is not very coaly, but rather woody in appearance. These beds extend as low bluffs along the right bank for about a mile, and in this distance no lignite beds of sufficient thickness to be worked for fuel were observed. Reportedly, in the hills back of this locality, lignite occurs in thicker beds (Maddren, 1910).

BUREAU WORK:

Analysis of coal by Gates showed coal to be anthracite. The Btu values ranged from 10,470 to 15,320 (Gates, 1946).

REFERENCES:

Maddren, 1910
Gates, 1946
Kx
MAS

MINE NAME (other names): Old Town Occurrence
Iditarod Slough Claim

COMMODITIES: Sand and Gravel

LOCATION: Quadrangle: Iditarod C-5 SW 1/4 Sec 01 T 28N R 48W
Meridian: Seward
Geographic: Located in the slough southwest of the town of Iditarod.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
2	73-62	0020730037	

HISTORY AND PRODUCTION:

1959 - Claims staked by Fred Demientieff (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quaternary flood-plain and gravel deposits (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): Unnamed Prospect COMMODITIES: Coal

LOCATION: Quadrangle: Iditarod B-5 SE 1/4 Sec 28 T 28N R 47W
Meridian: Seward
Geographic: Located along the tram road from Iditarod to Flat, about 4 miles from Iditarod.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
3	73-38	0020730033	

HISTORY AND PRODUCTION:

1913 - Development work done (Brooks, 1914).

1914 - Property was lying idle and excavations were filled with water (Smith, 1914). Coal has been used locally as fuel in the roadhouse but unsatisfactory in a blacksmith forge (Smith, 1914). A sample taken by USGS (Gates, 1946).

1914-1915 - During the winter another coal prospect was opened nearby. A 30 ft shaft was sunk. Additional work was to be done during the winter of 1915-1916 (Mertie and Harrington, 1924).

RESERVES:

No data available.

OPERATING DATA:

A 40 ft vertical shaft with a 30 ft incline on the coal bed and a 30 ft shaft at another locality a short distance away.

GEOLOGIC SETTING:

A coal bed strikes N60°E and dips 45° to 50°SE (Brooks, 1914, and Smith, 1914). It varies from 15 to 40 in thick with a shale roof and slate floor (Brooks, 1914, and Smith, 1914). The coal is normally a lignite or a subbituminous coal, similar to the other known Upper Cretaceous coals and it has been metamorphosed locally into an anthracite as a result of deformation and shearing (Smith, 1914). A short distance away another coal seam strikes N38°E and dips 80°SE and is up to 2 ft thick (Mertie and Harrington, 1924).

BUREAU WORK:

Analysis of coal by Gates in 1946 showed coal to be anthracite (Gates, 1946). The Btu values were not determined.

REFERENCES:

Brooks, 1914
Smith, 1914
P. Smith, 1917
Mertie and Harrington, 1924
Mertie, 1936
Gates, 1946
Cobb, 1974
Kx
MAS

MINE NAME (other names): Otter Creek Mine
Black Creek, Glen Gulch,
Boulder Creek,
Northern Alaska Dredge Co.,
Otter Dredging Co.

COMMODITIES: Au, Ag, Hg, Sb, Pb
Sn, W, Cr - Placer

LOCATION: Quadrangle: Iditarod B-4
Meridian: Seward

Sec.	06	T 27N	R 46W
Sec.	01, 02, 03, 04, 05, 06, 07	T 27N	R 47W
Sec.	01, 12	T 27N	R 48W

Geographic: A tributary of the Iditarod River, flowing north of Chicken Mountain and along the town of Flat.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
4	73-01	0020730003	AA031715-031795
	-02		AA032333-032334
	-04		AA036150-036153
	-05		AA36156
	-14		
	-19		
	-20		
	-23		
	-24		
	-27		
	-28		
	-46		
	-65		

HISTORY AND PRODUCTION:

1908 - First gold was discovered in the area on Christmas Day by W. A. Dikeman and John Beaton. It was discovered in a 12 ft deep hole to bedrock about 12 miles above the mouth of Otter Creek. They located several claims for about 1 mile along the creek (Maddren, 1911).

- The discovery consisted of a pay streak 4 ft thick and 50 to 60 ft wide which averaged 7 to 10 cents to the pan. The gold is fairly fine, of a uniform size, and evenly distributed (Maddren, 1910).

1909 - Thousands of prospectors flocked to the Otter Creek area (Brooks, 1910). Claims covered almost all of Otter Creek, its tributaries, and adjacent streams (Maddren, 1911).

1909-1910 - During the winter some gold was mined from small underground drifts (Maddren, 1911).

1910 - Claims staked by John and Richard Fullerton of Flat Creek Placers.

- A few thousand dollars worth of gold was mined from Black Creek, a tributary to Otter Creek (Maddren, 1911).

- The productive area on Otter Creek consisted of the area 1 1/2 miles downstream from the mouth of Granite Creek (Maddren, 1911). About 2,500 people entered the Iditarod district in 1910 (Eakin, 1914).

1911 - Claim staked by John and Richard Fullerton of Flat Creek Placers.

- Mining done on Otter Creek, Black Creek, and Glen Gulch (Brooks, 1912).

1912 - Three claims were worked, leased in small tracts to 10 operators. Heavy steam machinery was used in open-cut work. About 450 men were working. Otter Creek was the largest producer. A single plant worked on Black Creek. Considerable production was reported from Glen Gulch, but work was halted before end of season due to exhaustion of available placer ground (Eakin, 1913). The deposits of Glen Gulch are mainly in the area of a single claim (Eakin, 1914).

1913 - Mining done on Otter Creek, Black Creek, and Glen Gulch.

- Preparations for a dredge on Otter Creek were made (Brooks, 1914).

1914 - According to notes from A. G. Maddren, a gasoline-powered dredge was installed on Discovery Claim by Riley and Marston. It was a small flume washing-type that had been used in the Nome district previously. It had a capacity of 2,000 to 2,500 cubic yards in 24 hours on 250 to 300 gallons. Many of the water-front buildings of Discovery were removed because of its operation. A double shift of about 12 men were employed.

- Several open-cut scraping and hoisting plants were in operation on claims, Nos. 1 above and 1 below Discovery claim. The largest plant used a bottomless scraper of 2 1/2 cubic yards capacity. About 30 men were employed at these plants (Brooks, 1915).

- In Black Creek, 500 to 1,000 pounds of cinnabar pebbles are said to collect in the sluice boxes duing 3 to 4 days of shoveling-in operations (Smith and Maddren, 1915).

- Two men worked a small hydraulic plant at the mouth of Glen Gulch and six to eight men worked a plant on Black Creek (Brooks, 1915).

- According to unpublished notes by Maddren, quartz-stibnite bearing veins were uncovered on Glen Gulch and Black Creek. These veins occupied fissures in the monzonite and range in width from 2 to 12 in. Some cinnabar and pyrite also occurs with the vein and scheelite has been found in the placer concentrates (Brooks, 1916).

1915 - Mining continued on Otter Creek and Glen Gulch and two plants were working on Black Creek (Mertie and Harrington, 1916).

1916 - Mining continued (S. Smith, 1917). A new 2 1/2 cubic ft revolving-screen flume dredge built by the Union Construction Company was installed by the Otter Creek Dredging Co. at the mouth of Black Creek (Brooks, 1918).

1917 - Mining continued on Otter Creek but the dredge had continued breakdowns (Martin, 1919). Beaton and Mathieson of North American Dredging Co. moved their stocker type 3 1/2 cubic ft bucket-line dredge from Black Creek to Otter Creek where it operated through 1931 (Mertie, 1936).

1920 - The dredges were operated on Otter Creek from May to Mid-November and worked on ground about 13 ft deep (Brooks, 1922).

1921 - Beatson and Donnelly, and J. E. Riley Investment Co. both operated their dredges for 140 days (Brooks, 1923).

1922 - The two dredges continued mining and worked 163 and 167 days (Brooks and Capps, 1924).

- J. Warren discovered gold quartz at the head of Glen Gulch and a stamp mill was installed with considerable ore mined (Brooks and Capps, 1924).

1923 - Northern Alaska Dredging Co. and J. E. Riley Investment Co. operated dredges (Brooks, 1925).

1924 - North American Dredge Co. and J. E. Riley Investment Co. operated dredges (Smith, 1926).

1925 - The two dredges continued operating (Moffit, 1927).

1926 - Dredging continued (Smith, 1929).

1927 - Dredging continued (Smith, 1930).

1928 - Dredging continued. Peter Miskovich was mining with a hydraulic elevator and employed 4 men (Smith, 1930).

1929 - One dredge was 2 miles from Flat and the other was operating on the old town site of Flat. Peter Miskovich and Martin W. Roslund were both hydraulicking (Smith, 1932).

1930 - Two dredges continued operating and three placer camps were hydraulicking (Smith, 1933).

1931 - Two dredges continued working and four placer camps were hydraulicking (Smith, 1934).

1932 - The J. E. Riley Investment Co. dredge continued working along with several camps hydraulicking, including Peter Miscovich being one of the largest (Smith, 1934).

1933 - The J. E. Riley Investment Co. dredge continued working and Miscovich and Roslund were hydraulicking (Smith, 1934).

- Peter Miscovich's deposit on Glen Gulch is worked by 3 hydraulic giants, with a hydraulic lift that elevates the gravel 12 ft from the bottom of the cut to the top of the dump box. One nugget over 6 ounces has been found (Mertie, 1936).

- The Riley Investment Co's. dredge has operated every year since it was installed in 1914, working up and down Otter Creek several times (Mertie, 1936).

1934 - The J. E. Riley Investment Co. dredge continued working and Miscovich and Roslund were hydraulicking (Smith, 1937).

1935 - The dredge continued working and 5 other camps were operating (Smith, 1937).

1936 - Dredging continued and at least a dozen other outfits were mining Otter Creek and its tributaries. Peter Miscovich had 10 men employed and used two bulldozers (Smith, 1938).

1937 - Dredging continued by the Riley Investment Co. and the North American Dredging Co. was back on Otter Creek with their dredge. A new dragline plant of Peter Miscovich was in operation (Smith, 1939).

1938 - Dredging continued by North American Dredging Co. and Riley Investment Co.

- In the early part of the season, the Riley Investment Co.'s dredge underwent a major overhaul and a new diesel power plant was installed. Another mine started work April 24 and had a 175 day season (Smith, 1941).

- The USGS did extensive drilling in the western parts of Otter Creek under the management of the Strandbergs.

1939 - The two dredges continued working and Peter Miscovich continued his operation (Smith, 1939).

1940 - Mining continued (Smith, 1942).

1947 - Field investigations were conducted in the area by White and Killeen of the USGS (White and Killeen, 1953).

1955 - Reconnaissance made by Bureau engineer R. P. Maloney and placer concentrate samples were taken (Maloney, 1962).

1956 - Mining continued by North American and Otter Dredging Co's. and by Miscovich's brothers.

- The Bureau prospected for lode sources of cinnabar found in Otter Creek. A short adit on a quartz vein near the head of Black Creek was caved. Reports indicate none was encountered. (Maloney, 1962) .

- The Bureau exposed over 10,000 ft of bedrock by bulldozer trenches in the Glen and Black Gulch areas. Several veins showing fair gold values were uncovered (Maloney, 1962).

1961 - Claims staked by John Stevens.

1975 - John A. Moscovich was mining on Otter Creek (Carnes, 1975).

1980 - Mining done by Miscovich and Walsh.

1982 - Mining has continued on Otter Creek from 1909 to the present. In 1982 General Crude and Union Carbide Minerals lost their lease and option. John Miscovich had 81 claims (Kx).

- The estate of John Stevens and Robert W. Browne had some claims in the area along with John E. and Richard S. Fullerton of Flat Creek Placers (BLM).

1983 - In 1983 active claims were owned by the estate of John Stevens and Robert W. Browne; John E. and Richard S. Fullerton of Flat Creek Placers; and John Miscovich (BLM). Mining was done by Otter Creek Co. which is owned by Miscovich and family. Mr. Walsh lost his partnership at the end of this season.

PRODUCTION

Year	Troy Oz Gold	Oz Silver	$ Gold Produced	
1910	?	?	$200,000 (Otter Creek)	(Maddren, 1911)
prior to 1916		149 (Black Creek)		(MAS)
1915-1966	265,125 (Otter Creek) 21,011 (Black Creek)			(Kimball, 1969)
prior to 1959	10,421 (Glen Creek)	1,231 (Glen Creek)		(MAS)
prior to 1969		30,028 (Otter Creek)		(MAS)
TOTAL (from Otter Creek area)	296,557	31,408		

RESERVES:

No data available.

OPERATING DATA:

Two dredges have operated on Otter Creek along with mechanical steam scrapers, hydraulicking plants, sluice boxes, and some shafts and drift mining (Brooks, 1915; and Mertie and Harrington, 1916). Current methods include use of a bulldozer, front-end loader, backhoe, and a Misco-Giant with a 4-inch diameter nozzle (State of Alaska, 1983).

GEOLOGIC SETTING:

A Tertiary quartz monzonite underlies most of the Otter Creek drainage area and has intruded steeply, northward, dipping Cretaceous sandstone and shale of the Kuskokwim Group. The productive ground forms a 1/4 to 1/2 mile wide paystreak south of the present channel. The placers are mainly shallow stream placers, but the bench placers grade imperceptibly into those on the valley floor, so both ancient and recent placers may be present.

In the center of the valley, overburden is 10 to 18 ft thick and it gets thinner on the bench gravels to the south. The gravel consists of monzonite and basalt with considerable sandstone and shale. The gold occurs near or at bedrock and within the highly altered monzonite. The gold is both fine and coarse. Assays show a decrease in fineness downstream from 854 to 825 parts gold per thousand. Concentrates contain gold, cinnabar, arsenopyrite, pyrite, scheelite, stibnite, chromite, ilmenite, magnetite, galena, garnet, and cassiterite.

During placer mining two types of veins were uncovered. One type contained quartz stringers in or near the monzonite pluton with high grade gold and scheelite. The other type consisted of stibnite-cinnabar-bearing quartz veins with lower gold fineness values within the country rock at greater distances from the intrusive (Maddren, 1911; Mertie, 1936; White and Killeen, 1953; and Maloney, 1962).

BUREAU WORK:

Placer concentrate, bedrock, and float samples on Otter and Black Creeks and Glen Gulch were collected in 1955. Samples contained 0.08 to 59.9 percent mercury, <0.05 to 30.2 percent antimony, nil to 0.48 percent WO_3, nil to 4.57 oz per ton gold, and nil to 4.63 oz per ton silver (Maloney, 1962).

Trenching and sampling for lode cinnabar was conducted during 1956. No significant cinnabar mineralization was found in place (Malone, 1965).

REFERENCES:

Maddren, 1910
Brooks, 1910
Maddren, 1911
Brooks, 1912
Eakin, 1913
Eakin, 1914
Brooks, 1914
Brooks, 1915
Smith, 1915
Smith and Maddren, 1915
Brooks, 1916
Mertie and Harrington, 1916
P. Smith, 1917
S. Smith, 1917
Brooks, 1918
Martin, 1919
Brooks, 1922
Brooks, 1923
Mertie, 1923
Mertie and Harrington, 1924
Brooks and Capps, 1924
Brooks, 1925
Smith, 1926
Moffit, 1927
Smith, 1929
Smith, 1930
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith, 1939
Smith, 1941
Smith, 1942
Joesting, 1942
White and Killeen, 1953
Malone, 1962
Maloney, 1962
Malone, 1965
Koschmann and Bergendahl, 1968
Kimball, 1969
Cobb, 1972
Carnes, 1975
State of Alaska, 1983
Kx
MAS
BLM

MINE NAME (other names): Malamute Gulch Prospect
Weco Mining Co.

COMMODITIES: Au, Hg, Sn, W, Cr, Rare Earths

LOCATION: Quadrangle: Iditarod B-4 NW 1/4 Sec 01 T 27N R 47W
Meridian: Seward
Geographic: Located about 400 ft west of the mouth of Malemute Gulch.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
5	73-47 73-72	0020730028	

HISTORY AND PRODUCTION:

1926 - Staked by Fred Lusher (Smith, 1929).

1929 - Mining reported (Smith, 1932).

1930 - Mining reported (Smith, 1933).

1931 - Mining reported (Smith, 1933).

1933 - Mining reported (Smith, 1934).

1934 - Mining reported (Smith, 1936).

1972 - Restaked by Weco Mining Co. (Kx).

RESERVES:

No data available.

OPERATING DATA:

70-ft adit (caved) (Mertie, 1936).

GEOLOGIC SETTING:

Bedrock is decomposed monzonite overlain by about 35 ft of poorly sorted material that is largely vesicular basalt fragments. The adit followed quartz stringers with arsenopyrite, and gold (Mertie, 1936). Cinnabar was reported by local prospectors to be associated with the quartz veins (Maloney, 1962).

The vein appears to have the same strike as the lode at the head of Glen Gulch, N25°E (Mertie, 1936).

REFERENCES:

Smith, 1929
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
White and Killeen, 1953
Malone, 1962
Maloney, 1962
Malone, 1965
Kimball, 1969
Cobb, 1972
Cobb, 1976
Kx
MAS

MINE NAME (other names): Malachute Pup Mine
Malamute Gulch,
Malamute Creek

COMMODITIES: Au, Ag, Hg, Sn, W, Rare Earths, Cr, U - Placer

LOCATION: Quadrangle: Iditarod B-4 NW 1/4 Sec 01 T 27N R 47W
Meridian: Seward
Geographic: Malamute Gulch is a tributary of Otter Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
6	73-21	0020730006	

HISTORY AND PRODUCTION:

1922 - Three men were ground sluicing (Wimmler, 1922).

1924 - H. Galneck and partner ground-sluiced on Malamute Pup (Wimmler, 1924).

1926 - Some production reported (Smith, 1929).

1930- Mining reported (Smith, 1933).

1931 - Mining reported (Smith, 1933).

1933 - Hydraulic plant in operation by Lusher on Malamute Creek (Smith, 1934). Mining being done on Virgin Association. A line of 20 sluice boxes being used (Mertie, 1936).

1934 - Hydraulic plant in operation by Lusher (Smith, 1936).

1956 - Field investigations were conducted by the Bureau (Maloney, 1962).

PRODUCTION

Year	Oz of Au	Oz of Ag	
Up to 1952	1,907	241	(MAS)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant with a line of 20 sluice boxes (Mertie, 1936).

GEOLOGIC SETTING:

Bedrock is decomposed monzonite overlain by about 35 ft of poorly sorted material that is largely vesicular basalt fragments. Cobbles up to 15 in across are common and large boulders are rare. The placer gold occurs mainly on or near bedrock (Mertie, 1936). Placer concentrates contained gold, scheelite, ferberite, chromite (probably derived from small ultramafic dikes), realgar, cinnabar, allanite, and cassiterite (Maloney, 1962).

BUREAU WORK:

Two placer concentrate samples taken in 1956 contained 0.25 to 1.76 percent mercury, <0.05 to 0.05 percent antimony, 0.32 to 1.8 percent tungsten, 0.34 to 3.37 oz per ton gold, and 0.84 to 2.05 oz per ton silver (Maloney, 1962).

REFERENCES:

Wimmler, 1922
Wimmler, 1924
Smith, 1929
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
White and Killeen, 1953
Malone, 1962
Maloney, 1962
Malone, 1965
Kimball, 1969
Cobb, 1972
Kx
MAS

MINE NAME (other names): Granite Creek Mine COMMODITIES: Au, Ag, Cr - Placer

LOCATION: Quadrangle: Iditarod B-4 NE 1/4 Sec 01 T 27N R 47W
Meridian: Seward W 1/2 Sec 36 T 36N R 47W
Geographic: Tributary to Otter Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
7	73-21	0020730005	

HISTORY AND PRODUCTION:

1910 - Claims are on lower part of Granite Creek (Maddren, 1911).

1920 - Salen working on Granite Creek (Smith, 1934; and Mertie, 1936).

1922 - The Finn boys were hydraulicking (Wimmler, 1922).

1924 - Yielded placer gold (Smith, 1926).
Salen with 6 men hydraulicked (Wimmler, 1924).

1925 - Frank Salen hydraulicked (Wimmler, 1925).

1926 - Open cut mine on Granite Creek (Smith, 1929).

1930 - Camp on Granite Creek (Smith, 1933).

1931 - Camp on Granite Creek (Smith, 1933).

1933 - Hydraulic plant in operation by Salen (Smith, 1934). Work has been from the mouth upstream to the present cut, on claim 2 above Discovery and a 10,000 square ft cut along the east bench was worked some years ago. Open-cut methods are mainly used and an automatic dam has been built. A hydraulic jet is in operation and a line of 24 sluice boxes are used. The present operator has worked on Granite Creek since 1920 (Mertie, 1936).

1934 - Hydraulic plant in operation by Salen (Smith, 1936).

1935 - Considerable placer gold recovered (Smith, 1937).

1937 - Frank Salen and Associates hydraulicking (Smith, 1939).

1940 - One of largest producing camps in the Iditarod district (Smith, 1942).

PRODUCTION

Year	Oz of Au	Oz of Ag
Up to 1956	4,004	614 (MAS)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant using a hydraulic jet and 24 sluice boxes (Mertie, 1936).

GEOLOGIC SETTING:

Granite Creek valley is mainly Cretaceous sandstone and argillite with some granite dikes in the upper part. At the site of the operations in 1933 the bedrock consisted of fine-grained dark gray sandstone which strikes N45°E and dips steeply northwest. The gravel is 8 to 12 ft thick and consists mainly of angular to subangular fragments with a few boulders up to 18 in across. About 2 ft of bedrock must be mined for good gold recovery. The gold is fine-grained but shotty and somewhat iron-stained. The pay streak is 130 ft wide (Mertie, 1936). Some chromite probably derived from small ultramafic dikes, has been reported from Granite Creek (Cobb, 1972).

Gold-bearing quartz veins occur in the upper part of Granite Creek (White and Killeen, 1953).

Gold fineness values from 3 assays averaged 853 parts gold and 134 parts silver (Mertie, 1936).

REFERENCES:

Maddren, 1911
Wimmler, 1922
Wimmler, 1924
Wimmler, 1925
Smith, 1926
Smith, 1929
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1939
Smith, 1942
White and Killeen, 1953
Kimball, 1969
Cobb, 1972
Kx
MAS

MINE NAME (other names): Flat Creek Mine
Yukon Gold Company

COMMODITIES: Au, Ag, Hg, Sb, W - Placer

LOCATION: Quadrangle: Iditarod B-5 Sec 09, 16, 21, 28 T 27N R 47W
Meridian: Seward
Geographic: A southern tributary to Otter Creek about 2 1/2 miles below Discovery

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
8	73-07	0020730008	AA025141-025151
	73-09		
	73-31		
	73-33		
	73-39		
	73-41		

HISTORY AND PRODUCTION:

1910 - Claims located and staked by E. M. Carroll, M. S. Collins of the Spruce Creek Mining Co. (Kx).

- Prospecting done with steam drill on upper Flat Creek and some ground tested near the mouth by groundsluicing or washing out open-cuts into the frozen deposits (Maddren, 1911).

1911 - Largest producer of gold in region (Brooks, 1912).

1912 - Yukon Gold Dredging installed the first dredge in the district on the Marietta claim group near the head of the creek. Eight other claims were worked by steam plants using open-cut methods and hoisting in buckets to the sluice boxes. Above the head of Flat Creek five claims were worked by five plants doing groundsluicing and shoveling into sluice boxes. A total of about 400 men were employed (Eakin, 1913).

1913 - Dredging continued and a second dredge was built and also operated (Brooks, 1914). Two placer mines were operating on a bench claim using open-cut scraping and hoisting methods (Brooks, 1915).

1914 - The large electrically driven dredge of Yukon Gold Co. continued operating with about 60 men employed (Brooks, 1915).

1915 - Mining continued (S. Smith, 1917).

1916 - Mining continued (Brooks, 1918).

1917 - Mining continued (Mertie, 1936).

1918 - Last year the Yukon Gold Co. dredge operated (Mertie, 1936).

1920 - Mining continued (Brooks, 1921).

1921 - Mining continued (Brooks, 1922).

1922 - Mining continued (Brooks, 1924).

1923 - Mining continued (Brooks, 1925).

1924 - The Alpha Mining Co. was in operation (Smith, 1926).

1926 - Mining continued (Smith, 1929).

1928 - Mining continued (Smith, 1930).

1929 - North American Dredge Co. had a dredge mining on the site of the old town of Flat and Strandberg and Son had a hydraulic plant near the head of the creek (Smith, 1930).

1930 - The dredge and 3 other outfits including Strandberg and Son were mining (Smith, 1933).

1931 - Mining continued (Smith, 1934).

1932 - Dredging continued. David Strandberg, and Yost and Nash operated hydraulic plants and a dragline scraper was also mining (Smith, 1934).

1933 - Dredging continued. Strandberg and Sacco and Scott operated hydraulic plants and Northland Development Co. operated a mechanical shovel or scraper (Smith, 1934).

- Charles Yost and partner operated a hydraulic plant on the Idaho association (Mertie, 1936).

- Two men worked on an open-cut mine at the Hilltop association (Mertie, 1936).

- Strandberg and Co. operated a dragline scraper plant on the Wildcat association (Mertie, 1936).

- Northland Development Co. operated a dragline excavator plant on the Bonanza association (Mertie, 1936).

- North American Dredging Co. operated their dredge on the lower end of Flat Creek (Mertie, 1936).

1934 - Mining continued (Smith, 1936).

1935 - Mining continued by dredge and by five other outfits (Smith, 1937).

1936 - Dredging continued and four other operators including Uotila and Scott, and the Stuver Bros. each employed a crew of 4 men. One crew was mining with a bulldozer and the other three were piping into sluice boxes (Smith, 1938).

- The dredges of Riley Investment Co. and North American Dredging Co. were in operation.

1937 - A new dragline plant of Awe and Durant was operating as were the hydraulic plants of Stuver Bros., Walter Sakow, and Pat Savage (Smith, 1941).

1939 - Mining continued (Smith, 1941).

1940 - Mining continued (Smith, 1942).

1947 - Field investigations conducted in area by USGS (White and Killeen, 1953).

1955 - Field reconnaissance were conducted by the Bureau (Maloney, 1962).

1956 - Field investigations were continued by the Bureau (Malone, 1962 and Maloney, 1962).

- North American Dredging Co. operated a floating dredge and Gus Backstrom and Julian Stuver were hydraulicking (Maloney, 1962).

1957 - Dredging terminated about in 1957 (Eberlein and others, 1977).

1967 - A Bureau sampling program was conducted (Kimball, 1969).

1975 - Richard S. Fullerton of Flat Creek Placers was operating a hydraulic plant, bulldozer, and dragline (Carnes, 1975).

1983 - Ellen M. O'Carroll of Spruce Creek Mining Company, and Mary Savage Collins; and John E. and Richard S. Fullerton of Flat Creek Placers had active claims on Flat Creek (BLM).

PRODUCTION

Year	Troy ounces of gold	Gold produced	
1910		$300,000	(Maddren, 1911)
1918		$ 84,000 (claim at head of hill)	(Martin, 1920)
1915-66	240,572		(Kimball, 1969)

RESERVES:

No data available.

OPERATING DATA:

Mining consisted of two dredges, drag-line hydraulic plants, ground-sluicing or washing out open-cuts, open-cut scraping and hoisting methods, and using bulldozers and sluice boxes.

GEOLOGIC SETTING:

The bedrock at the head of Flat Creek is a deeply weathered Tertiary monzonite stock which intrudes Cretaceous sandstone shale and argillite of the Kuskokwim Group which occupies the rest of the valley. Contact metamorphism has occurred and locally there are quartzites, and argillites or slates. Considerable alteration has occurred along the contact and 6 to 12 in gold-bearing quartz stringers occur in the monzonite as well as the sedimentary rocks. Some cinnabar, stibnite, and scheelite also occurs in these veins. Some of the weathered monzonite and gold-bearing quartz veins were mined.

The placer deposits constitute residual placers which grade into eluvial bench and stream placers. The gravels composed of pebbles, sand/silt, and boulders, are 10 to 25 ft deep. The richest concentrations of gold are 3 to 4 miles above the mouth where it rests on and within the hard blocky fractured sedimentary bedrock. The best paystreak is the lowermost 1 to 3 ft thick layer of gravel and up to 6 ft down in the fractures of the sedimentary rocks (Maddren, 1911; Eakin, 1914; Mertie and Harrington, 1916; Mertie, 1936; Kimball, 1969; and Eberlein and Others, 1977).

BUREAU WORK:

One sample taken in 1955 contained 31.2 percent mercury, 0.41 oz per ton gold, and 0.15 oz per ton silver. Prospected for lode sources of cinnabar in 1956. No significant cinnabar mineralization was found in place (Malone, 1956).

Sampling was done in 1967. Sampling was done by auger. Samples contained from nil to 0.03 oz per ton gold, nil to 0.38 oz per ton silver (Kimball, 1967).

REFERENCES:

Maddren, 1911
Brooks, 1912
Eakin, 1913
Eakin, 1914
Brooks, 1914
Brooks, 1915
Smith, 1915
Mertie and Harrington, 1916
S. Smith, 1917
Brooks, 1918
Martin, 1920
Brooks, 1921
Brooks, 1922
Brooks, 1924
Brooks, 1925
Smith, 1926
Smith, 1929
Smith, 1930
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith and Mertie, 1941
Smith, 1941
Smith, 1942
Webber and Others, 1947
White and Killeen, 1953
Malone, 1956
Malone, 1962
Maloney, 1962
Malone, 1965
Kimball, 1967
Koschmann and Bergendahl, 1968
Kimball, 1969
Cobb, 1972
Carnes, 1975
Eberlein and Others, 1977
Kx
MAS
BLM

MINE NAME (other names): Golden Horn Mine
Claims: Comstock, North Star, Murie, Divide, Golden Horn, Victor

COMMODITIES: Au, Ag, Hg, Zn, W, Pb, Sb

LOCATION: Quadrangle: Iditarod B-4 NW 1/4 Sec 12 T 27N R 47W
Meridian: Seward
Geographic: Located 3 miles east of Flat, south of Otter Creek, upon a flat bench between Slate Creek and Glen Gulch.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
9	73-25	0020730027	
	30		
	32		
	34		

HISTORY AND PRODUCTION:

1910 - Discovered a few years after discovery of placer gold on Otter Creek in 1908, by placer miners mining in Glen Gulch (Roehm, 1937).

1912 - Mining done (Roehm, 1937).

1914 - Mohawk Claim is located on the flat summit between Glen Gulch and Slate Creek. Shaft and pits not accessible. Shaft reported to be 35 ft deep (Brooks, 1916).

1914 - Several small quartz-stibnite-cinnabar veins on lower part of Glen Gulch. Another zone occurs at the head of Glen Gulch. Open-cut work was done, but it was abandoned as the mineralization was not very continuous (Smith and Maddren, 1915).

1921 - Rasmus Nielson drove a short prospect tunnel and discovered the vein upon which the recent development has been done. With his partner Jerome Warren they sank a 50 ft shaft, and had 280 ft of drifts and a 50 ft adit (Roehm, 1937).

1922 - Second shaft to a depth of 128 ft and 67 ft of drifts (Roehm, 1937).

- Mining continued (Roehm, 1937).

1923 - N. L. Wimmler of USGS made a detailed report (Holzheimer, 1926).

- Mining continued (Roehm, 1937).

1924 - Mining continued.

1925 - Mining continued (Roehm, 1937).

- 10 1/2 tons of ore shipped to Tacoma Smelter with a return of $4,159.75 (Roehm, 1937).

1926 - Property is idle.

1933 - The property has changed owners and the main shaft extended 35 ft. Justis Johnson and Patty Savage are the present owners. A new mill is planned. A 6 x 7 in Dodge crusher with a No. 1 Straub ten-stamp mill were used before plate amalgamation. 11 tons were shipped to smelter during present season. The workings below the main level were filled with water and ice (Holzheimer, 1926).

1934 - W. E. Dunkie optioned the property and formed the Golden Horn Mining Co. The operation started August 1 with B. B. Neiding managing it. The 128 ft shaft was sunk to a depth of 228 ft. Over 500 ft of drifting was done, a raise put in and considerable stoping between the four levels (Roehm, 1937). A stamp mill was shipped to Flat in the fall of 1934 (Mertie, 1936).

- A hoist and compressor were installed along with other equipment (Smith, 1936).

1935 - Development and mining continued until the option was dropped on July 1 (Roehm, 1937). Considerable ore was mined, but the quantity of free gold was found insufficient to make the work profitable (Mertie, 1936). Pumps were removed from the mine (Maloney, 1962). 250 tons of ore shipped to smelter that averaged 5 to 6 oz gold/per ton (Roehm, 1937).

1936 - Mine owners were Gustus Johnson, P. Savage, R. Nielson, and Minnie Warren Engquist (Roehm, 1937). Two shipments of ore to the smelter. One of 15 tons and one of 6 tons.

1937 - 40 ton ore shipment made. A owner disagreement suspended operations in the summer. On August 23 the mine was filled with water to 50 ft level (Roehm, 1937).

1955 - Workings were inaccessible but samples were taken from the mine dump by Bureau engineer R. P. Maloney (Maloney, 1962).

1956 - Robert F. Lyman and Roger Markle of Red Devil, Alaska are the owners. Trenching and sampling was conducted in the area by the Bureau (Maloney, 1962).

PRODUCTION

Date	Ore Mined	Returns	
1925	10 1/2 tons	$ 4,159.75	(Roehm, 1937)
1926	11 tons	?	(Holzheimer, 1926)
1934-35	250 tons	50,000.00	(Roehm, 1937)
1936	15 tons	2,927.16	(Roehm, 1937)
	6 tons	707.35	(Roehm, 1937)
1937	40 tons	?	(Roehm, 1937)
	332.5 tons	$ 55,164.26	

Maloney mentions ore shipments made in 1922, 1935, 1936, and 1937 (Maloney, 1962).
A total of 528 tons contained: 2,706 oz gold
2,620 oz silver
9,336 lbs lead
653 lbs zinc

RESERVES:

No data available.

OPERATING DATA:

Golden Horn Claim: Two shafts - total 303 ft
Drifts - total 1,025 ft
Crosscuts - total 300 ft
Raise and stopes - total 180 ft

Divide Claim old workings: 25 ft and 40 ft shaft, and several pits now filled.

Mining equipment includes a 6 x 7 in Dodge crusher, No. 1 Straub Ten-stamp mill, amalgamation plates, 60 hp Erie boiler, Atlas 10 x 12 in single steam engine, American Hoist and Derrick Company double drum hoist, Blacksmith shop with tools, bunk house, and mess hall (Roehm, 1937).

GEOLOGIC SETTING:

Irregularly distributed quartz veins occur at or near the contact of early Tertiary quartz monzonite stock with late Cretaceous sandstone and shale. Mineralization includes arsenopyrite, stibnite, cinnabar, gold, silver, pyrite, chalcopyrite, galena, sphalerite, scheelite, and an oxide of nickel (Roehm, 1937).

A smelter assay (Tacoma) of a 29,272 lb shipment of ore in 1935 contained 6.29 oz per ton gold, 6.59 oz per ton silver, 1.0 percent lead, trace zinc, 10.33 percent arsenic, and 0.24 percent antimony (Holzheimer, 1926).

BUREAU WORK:

Bureau personnel trenched and sampled the property in 1955. Samples taken from the ore dump contained from nil to 0.07 percent mercury, <0.05 to 0.52 percent antimony, <0.02 to 0.15 percent tungsten, <0.02 to 0.07 percent copper, <0.02 to 0.26 percent lead, trace to 2.8 oz per ton gold, and 0.02 to 5.16 oz per ton silver (Maloney, 1962).

REFERENCES:

Smith, 1915
Smith and Maddren, 1915
Mertie and Harrington, 1916
Brooks, 1916
Smith, 1917
Mertie and Harrington, 1924
Holzheimer, 1926
Mertie, 1936
Smith, 1936
Roehm, 1937
Smith, 1937
Smith, 1939
Joesting, 1942
Maloney, 1962
Berg and Cobb, 1967
Kimball, 1969
Cobb, 1972
Cobb, 1976
Kx
MAS

MINE NAME (other names): Willow Creek Mine
Gold Creek

COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod B-5

Sec 06	T 26N	R 47W
Sec 01, 09, 10, 11, 12, 14, 15	T 26N	R 48W
Sec 29, 31, 32	T 27N	R 47W

Meridian: Seward
Geographic: Located 6 miles southeast of Flat, a tributary to Iditarod River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
10	73-15	0020730031	AA032343-032358
	-29	0020730032	AA032366
	-73		

HISTORY AND PRODUCTION:

1910 - Mining and testing done by ground-sluicing. A few thousand dollars worth of gold mined during the course of preliminary development work (Maddren, 1911).

1911 - Mining continued.

1912 - Considerable production. Two plants, 20 men, and a drill were on Willow Creek (Eakin, 1913).

1913 - Mining continued.

1914 - Mining continued.

1915 - The first drag-line excavator used in Alaska was operated on Willow Creek. It had a 60 ft boom, 1 1/2 cubic ft bucket and a 60 hp boiler. The average daily capacity was expected to exceed 1,000 cubic yards (Brooks, 1916). Another plant was operating underground with a bucket hoist (Mertie and Harrington, 1916).

1916 - Mining continued.

1917 - Mining continued.

1918 - Mining continued.

1919 - Mining continued.

1920 - Mining continued.

1921 - Willow Creek was one of the chief producers along with Otter, Flat, and Chicken Creek (Brooks, 1923).

1922 - Willow Creek was one of chief producers in the district (Brooks and Capps, 1924). Hanley and Olson conducted drifting operations in ground 24 ft deep. Three outfits operated hydraulic plants. Loranger and Co. operated their steam scraper plant. Karry Johnson and Mentchler Bros. operated their drag line excavator (Wimmler, 1922).

1923 - Mining continued.

1924 - Bolanger and Co. operated a small hydraulic elevator. J. Laranger operated a Bogley scraper. Frank Manley's dragline excavator was not operated (Wimmler, 1924).

1925 - Loranger and Co. wheeled to a self-dumper. Frank Manley constructed a 10 mile long water ditch from Bonanza Creek to Willow Creek and did some drilling on Willow Creek (Wimmler, 1925).

1926 - Mining continued.

1917 - Mining continued.

1928 - Several camps working with Frank Manley and Joseph Loranger having the largest one (Smith, 1930).

1929 - Several camps working with Frank Manley and Joseph Loranger having the largest one (Smith, 1932).

1930 - Several camps working with Frank Manley and Joseph Loranger having the largest one (Smith, 1933).

1931 - Two drag-line scrapers were operating, the larger by Manley and Loranger (Smith 1933).

1932 - LaChance and Thibault had a large hydraulic plant operating (Smith, 1934).

1933 - LaChance and Thibault operated their hydraulic plant and Loranger and Jensen their scraper (Smith, 1934).

- The three main claim groups are the Wildcat Association, White Star Fraction and the Fine Gold Association. The Manley estate owns the White Star Fraction and the Fine Gold Association. The Wildcat Association consisting of eight claims is the site of the original discovery on Willow Creek. One hydraulic plant, operated by four partners, was working on the upper end of the Wildcat Association, and another plant with a drag-line operated further downstream.

- The present operators have worked here since 1919 and have mined both the creek and bench placers. The creek placers are now about worked out (Mertie, 1936).

1934 - Several thousand dollars worth of gold were recovered. The Iditarod Mining Co. was using a scraper. Hydraulic plants were operated by Loranger and Jensen, Belanger, and Thibault and LaChance (Smith, 1936).

1935 - Considerable gold was recovered by three outfits. A mechanical shovel with a 100 ft boom and 3 cubic yard bucket was set up (Smith, 1937).

1936 - Northland Development Co. employed 12 men and was mining bench placers with a bulldozer and using a dragline scraper to stack tailings.

Pete Jensen was mining below Northland with a dragline scraper with a 100 ft boom (Smith, 1938).

1937 - Northland Development Co. and the Iditarod Mining Co. were mining with draglines (Smith, 1939).

1938-1939 - Northland Development Co. and Iditarod Mining Co. were mining (Smith, 1941).

1940 - Mining continued (Smith, 1942).

1961 - Claims staked by John and Richard Fullerton (BLM).

1966 - Claims staked by John and Richard Fullerton (BLM).

1970 - Claims staked by John and Richard Fullerton (BLM).

1983 - Claims staked by John and Richard Fullerton are active (BLM).

PRODUCTION

Year	Oz of Au	Income from Sale	
1910	?	A few thousand dollars	(Maddren, 1911)
1912	?	Considerable production	(Eakin, 1913)
1921	?	Chief producer	(Brooks, 1923)
1922	?	Chief producer	(Wimmler, 1922)
1934	?	Several thousand dollars	(Smith, 1936)

RESERVES:

No data available.

OPERATING DATA:

The mining is done using hydraulic methods, using giants with 1 1/2 in or 3 in nozzles. Giants are used to move the gravel towards the sluice box and one is used for stacking tailings. A Bucyrus drag-line excavator is also used. It has a 1 1/2 cubic yard bucket and power for it is furnished by a 60 hp steam boiler (Mertie, 1936). Also another operator had a drag-line excavator with a 100 ft long boom and 3 cubic yard bucket (Smith, 1937). Bogley scraper, a small hydraulic elevator, steam scraper plant, bucket hoist, and a bulldozer were used.

GEOLOGIC SETTING:

The main placer area is along the southeast side of the creek between 3 to 4 miles from its head. The alluvium averages 16 to 18 ft thick (Eakin, 1914).

The bedrock is Cretaceous slate with a few basaltic dikes. The gravels are mainly sandstone and slate with minor amounts of monzonite, basalt and vein quartz. About 10 to 14 ft of frozen silts and clays, muck, overlie the 3 to 10 ft thick gravels. The muck thins rapidly towards the creek where the gravels are more rounded. The gold occurs mainly on or within 1 to 2 ft of bedrock (Mertie and Harrington, 1916).

Possible gold sources include a monzonite intrusive that outcrops in the upper part of Happy Gulch, a tributary, where the sedimentary rocks are altered and numerous quartz veinlets occur within a mile of the contact. Another source may be a ridge of altered sedimentary rocks that extends between Willow and Gold Creek (Maddren, 1911).

Four assays of gold show an average fineness of 877.5 parts gold and 115 parts silver (Mertie, 1936).

REFERENCES:

Maddren, 1911
Eakin, 1913
Eakin, 1914
Brooks, 1914
Brooks, 1915
Brooks, 1916
Mertie and Harrington, 1916
S. Smith, 1917
Brooks. 1922
Wimmler, 1922
Brooks. 1923
Brooks and Capps, 1924
Mertie and Harrington, 1924
Wimmler, 1924
Wimmler, 1925
Smith, 1926
Smith, 1929
Smith, 1930
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith, 1939
Smith, 1941
Smith, 1942
White and Killeen, 1953
Koschmann and Bergendahl, 1968
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): Happy Creek Mine
Happy Gulch
Happy Association

COMMODITIES: Au, Ag, Hg, Sb, Sn, W, Cr, U - Placer

LOCATION: Quadrangle: Iditarod B-5 Sec 31, 32, 33 T 27N R 47W
Meridian: Seward
Geographic: A headwater tributary of Willow Creek, a tributary of Iditarod River, south of Flat.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
11	73-18	0020730001	
	-58		
	-59		
	-60		
	-70		

HISTORY AND PRODUCTION:

1910 - Claims staked by Cassidy and Dettouse.

- Open-cut, ground sluice, pick and shovel mining during August and September (Maddren, 1911).

1912 - 5 claims worked 2 creek placers, and 3 on ground of residual placer type. Used open-cut methods without steam machinery. Approximately 50 men employed (Eakin, 1913).

1913 - Mining done (Brooks, 1914).

1914 - Open-cut pit mining (Eakin, 1914). Work done on Hilltop Association Group (Brooks, 1915).

1915 - Open-cut hydraulic mining done at the head of the creek (S. Smith, 1917).

1916 - Mining done (Brooks, 1918).

1920 - Mining done (Brooks, 1922).

1922 - One of chief producers (Brooks and Capps. 1924).

1923 - Mining done (Brooks, 1925).

1924 - Mining done (Smith, 1926).

1926 - Mining done with production reported (Smith, 1929).

1929 - Mining done with production reported (Smith, 1932).

1930 - Drag-line scraper installed in creek, six men employed Olson and Co. (Smith, 1933).

1931 - Largest output of placer gold (other than the dredges). 10 men employed. (Smith, 1933).

1932 - Mining proceeding, gold production (Smith, 1934).

1933 - Mining proceeding, gold production. Prospecting with a Keystone drill (Mertie, 1936).

1934 - Mining proceeding (Smith, 1936).

1935 - Mining proceeding (Smith, 1937).

1936 - Mining, 12 men employed, bulldozer, two drag-line scrapers (Smith, 1938).

1937 - Mining continued (Smith, 1939).

1939 - Mining continued (Smith, 1941).

1940 - Mining continued (Smith, 1942).

PRODUCTION

Year	Au Recovered	Ag Recovered	
1926	Production reported		
1929	Production reported		
1931	Largest output of Au		
1932	Production reported		
1933	Production reported		
up to 1966	106,486 oz Au	1,735 oz Ag	(Kimball, 1969)

RESERVES:

No data available.

OPERATING DATA:

Methods and equipment used were open-cuts, ground-sluicing, pick and shovel, hydraulicking, drag-line scraper with 1 cubic yard bucket and 55 ft beam, caterpillar shover with 1/2 cubic yard capacity and a dump box with sluice box.

GEOLOGIC SETTING:

In the upper part of Happy Gulch Cretaceous shales and sandstones are intruded by a quartz monzonite intrusive. Contact metamorphism extends out to one mile from the contact. The sedimentary rocks have been silicified and contain numerous quartz veinlets (Maddren, 1911).

The iron-stained monzonite is sheared and mineralized. Several quartz veinlets from 1/8 to 2 in wide cut the monzonite and carry free gold. Several iron-stained joint planes are possible gold sources also. The monzonite is deeply weathered, often to a depth of 5 to 10 ft and greater in places (Mertie and Harrington, 1916). Residual placers grade downward into stream placers (Mertie, 1936). Gold doesn't occur at the mouth of Happy Creek (Mertie and Harrington, 1916).

The gold is rough and angular and is concentrated in more or less discontinous layers of gravels and sands from 6 to 24 in thick, mixed with boulders, near the bottom of 5 to 10 ft thick unconsolidated deposits (Maddren, 1911).

These deposits increase in thickness upstream to 50 ft deep in some places. The gravel consists of sandstone, argillite, slate and monzonite. Cinnabar occurs in some of the residual placers (Mertie, 1936).

Assays of eight samples contained average fineness values of 864 parts gold and 126 parts silver (Mertie, 1936).

BUREAU WORK:

Three placer concentrate samples taken in 1955 contained 0.49 to 17.9 percent mercury, <0.05 to 0.05 percent antimony, 0.1 to 0.8 percent tungsten, 6.63 to 38.89 oz per ton gold, and 1.64 to 7.35 oz per ton silver (Malone, 1962).

REFERENCES:

Maddren, 1911
Eakin, 1913
Eakin, 1914
Brooks, 1914
Brooks, 1915
Smith, 1915
Smith and Maddren, 1915
Brooks, 1916
Mertie and Harrington, 1916
P. Smith, 1917
S. Smith, 1917
Brooks, 1918
Brooks, 1922
Mertie and Harrington, 1924
Brooks and Capps, 1924
Brooks, 1925
Smith, 1926
Smith, 1929
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith, 1939
Smith, 1941
Smith, 1942
Joesting, 1942
Webber and Others, 1947
White and Killeen, 1953
Malone, 1962
Maloney, 1962
Kimball, 1969
Cobb, 1972
Kx
MAS

MINE NAME (other names): Chicken Creek Dome Occurrence

COMMODITIES: Au, Ag, Hg, Zn, Cr, W, Sb, Co, Rare Earths

LOCATION: Quadrangle: Iditarod B-4 SW 1/4 Sec 34 T 27N R 47W
Meridian: Seward
Geographic: Located at the head of Chicken Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
12	73-34	0020730025	AA030069-030171
	-43		AA036150
	-44		
	-57		
	-61		
	-69		

HISTORY AND PRODUCTION:

1926 - Neilson staked lode claim (Kx).

1956 - The Bureau collected 279 soil samples from upper Chicken Creek area (Maloney, 1962).

1958-60 - James A. Walper and L. C. Johns had lode claims in area (Kx).

1971 - Weco Mining Corporation staked claims (BLM).

1971-81 - James A. Walper had claims in area (Kx).

1983 - Weco Mining Corporation claims are active (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quartz-cinnabar-stibnite veins occur along the border of a monzonite stock at the head of Chicken Creek (Brooks, 1916) intruding Cretaceous graywacke and slate country rock.

BUREAU WORK:

Soil sampling in 1956 contained from 5 to >1,000 ppm antimony (Maloney, 1962).

REFERENCES:

Brooks, 1916
Mertie and Harrington, 1916
Maloney, 1962
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): Chicken Creek Mine
Chicken Mountain

COMMODITIES: Au, Ag, Hg, Sb, W, Cr, Co, Zn, Rare Earths - Placer

LOCATION: Quadrangle: Iditarod B-4 Sec 03, 10, 15, 20 T 26N R 47W
Meridian: Seward
Geographic: Located 7 miles east of the junction of Bonanza Creek and Iditarod River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
13	73-06	0020730002	
	08	0020730026	
	16		
	69		

HISTORY AND PRODUCTION:

1911 - Mining done (Brooks, 1911).

1912 - Mining done and prospecting with a drill. Two plants were operating with a total of 12 men (Eakin, 1914).

1913 - Mining done (Brooks, 1914).

1914 - Steam derricks installed to handle large residual granitic boulders (Brooks, 1915).

1915 - Mining continued with open-cut hydraulicking (S. Smith, 1917).

1916 - One of the richest placer mines in the district (S. Smith, 1917).

1917 - Mining continued (Brooks, 1921).

1918 - Mining continued.

1919 - Mining continued.

1921 - One of major producers along with Otter, Flat and Willow Creeks (Brooks, 1922).

1923 - Mining continued.

1924 - Chicken Creek Mining Co. was one of 4 largest mines out of 21 mines that operated in 1924 (Smith, 1926).

1925 - Mining continued.

1926 - Mining done by open-cut method (Smith, 1929).

1928 - Black Bear Mining Co. had one of the largest camps with over 12 men (Smith, 1930).

1929 - Chicken Creek Mining Co., with William Duffy and about 20 men was the largest hydraulic and open-cut placer mine in the district (Smith, 1932).

1930 - Chicken Creek Mining Co., operating with about 15 men employed (Smith, 1933).

1931 - Chicken Creek Mining Co., operating with about 12 men employed (Smith, 1933).

1932 - Several camps were hydraulicking and doing well (Smith, 1934).

1933 - Mining continued (Smith, 1934). A hydraulic plant located at the head of the creek is working the semiresidual placers. The operators have been mining at the site since 1924. 10 to 20 men are employed (Mertie, 1936).

- At the lower end of the creek there is an open-cut shoveling operation. A dam has been built 2,200 ft above the mouth. Three men were working (Mertie, 1936).

1934 - Mining continued (Smith, 1936).

1935 - Mining continued (Smith, 1937).

1936 - Mining continued.

1937 - Duffy & Co. were using a Bulldozer pushing the gravel to the boxes and downstream Captain Becker and associates were hydraulicking (Smith, 1939).

1940 - One of the largest producers in the district along with Otter, Flat, Slate, Black, Granite, Happy and Willow Creek (Smith, 1942).

1956 - The Bureau collected 279 soil samples from upper Chicken Creek area (Maloney, 1962).

PRODUCTION

Year	Oz. Au	Oz. Ag	
up to 1956	12,755	2,024	MAS

RESERVES:

No data available.

OPERATING DATA:

Placer mining methods consisted of open-cut pits, shafts, hydraulic plants, giants with 2 to 3 in nozzles, steam derricks, sluice boxes and a bulldozer.

GEOLOGIC SETTING:

Chicken Creek heads in the same monzonite intrusive as Flat and Happy Creeks. The monzonite intrudes Cretaceous shales and sandstones which have been metamorphosed to argillite and quartzite. Several veins and veinlets occur, with some having fair gold values (Malone, 1955). Residual placer at the headwaters grade downward to alluvial placers. At the upper end the bedrock is decomposed monzonite with overburden averaging 18 ft on the bench and up to 47 ft in the center of the valley. The gold is mainly in the lower 4 to 5 ft of overburden. The gold is fine, angular and equidimensional with nuggets not common (Mertie, 1936).

At the lower end of Chicken Creek the bedrock is sandstone and argillite. The gravel is mainly sandstone and argillite with minor monzonite. Overburden is up to 90 ft deep here at the mouth (Mertie, 1936).

Based on five assays from 1929 production the average fineness was 862 parts gold and 128 parts silver in a thousand (Mertie, 1936).

BUREAU WORK:

Soil samples taken in 1956 contained from 5 to <1,000 ppm antimony (Maloney, 1962).

REFERENCES:

Brooks, 1911
Brooks, 1912
Eakin, 1913
Eakin, 1914
Brooks, 1914
Brooks, 1915
Smith, 1915
Brooks, 1916
Mertie and Harrington, 1916
S. Smith, 1917
Brooks, 1918
Brooks, 1921
Brooks, 1922
Mertie and Harrington, 1924
Brooks, 1925
Smith, 1926
Smith, 1929
Smith, 1930
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1939
Smith, 1942
White and Killeen, 1953
Cady, Wallace, Hoare, and Webber, 1955
Malone, 1962
Maloney, 1962
Malone, 1965
Kimball, 1969
Cobb, 1972a
Cobb, 1972b
Kx
MAS

MINE NAME (other names): Slate Creek Mine
Ogritz-Slate Creek

COMMODITIES: Au, Ag, Hg, W - Placer

LOCATION: Quadrangle: Iditarod B-4 Sec 12, 13, 24, 25, 35, 36 T 27N R 47W
Meridian: Seward
Geographic: North flowing tributary to Otter Creek, which it enters 4 miles above Flat.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
14	73-45A	0020730029	
	-45B	0020730030	

HISTORY AND PRODUCTION:

1915 - Small placer operations on lower end of Slate Creek (Mertie and Harrington, 1916).

1932 - Mining done.

1933 - Utilla and Ogris established a new drag-line plant (Smith, 1934). 8 men employed (Mertie, 1936).

1934 - Mining continued (Smith, 1936).

1935 - Mining continued (Smith, 1938).

1936 - Mining continued by Uotila and Ogris with a crew of 12 men (Smith, 1938).

1937 - Gus Uotila got a new drag-line plant (Smith, 1939).

1939 - Mining continued (Smith, 1941).

1940 - Slate Creek was one of largest producing camps along with Otter, Flat, Black, Granite, Happy, Willow, and Chicken Creeks (Smith, 1942).

RESERVES:

No data available.

OPERATING DATA:

In use was a caterpillar drag-line excavator with a 55 ft boom and 1 cubic yard bucket. Sluice boxes and a giant were used to wash the gravels (Mertie, 1936).

GEOLOGIC SETTING:

The bedrock is mainly Cretaceous slate, but the west fork heads in monzonite. Some granitic dikes and quartz veins occur, with one quartz vein containing stibnite. Placer gold occurs in the lower part of the gravel, which may be as much as 10 ft thick under another 20 ft of muck; very little gold occurs on bedrock. The paystreak is up to 600 ft wide and ranges in tenor from 20 to 45 cents per square foot of bedrock (Mertie, 1936).

Analyses of concentrate samples showed up to 8.51 oz gold and 2.61 oz silver per ton with enough mercury and tungstic oxide to suggest very small amounts of cinnabar and scheelite (Mertie, 1936).

BUREAU WORK:

Two placer concentrates taken in 1955 by Bureau personnel contained 0.08 to 0.28 percent mercury, <0.05 percent antimony, <0.02 to 0.03 percent tungsten, 0.82 to 8.51 oz per ton gold, and 0.35 to 2.61 oz per ton silver (Maloney, 1962).

REFERENCES:

Mertie and Harrington, 1916
Mertie and Harrington, 1924
Smith, 1934
Mertie, 1936
Smith, 1936
Roehm, 1937
Smith, 1938
Roehm, 1939
Smith, 1939
Roehm, 1940
Smith, 1941
Smith, 1942
Williams, 1950
Williams, 1951
White and Killeen, 1953
Maloney, 1962
Kimball, 1969
Cobb, 1972
Cobb, 1976
Kx
MAS

MINE NAME (other names): Prince Creek Mine
Upper Prince Creek
Lower Prince Creek

COMMODITIES: Au, Ag, Hg - Placer

LOCATION: Quadrangle: Iditarod B-4 Sec 02, 11, 12, 13, 24 T 26N R 47W
Meridian: Seward
Geographic: South flowing tributary to Bonanza Creek on southeast side of Chicken Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
15	73-3A	0020730023	AA032284-032294
	73-3B	0020730024	

HISTORY AND PRODUCTION:

1929 - Mining done (Mertie, 1936).

1930 - Mining done (Mertie, 1936).

1931 - Mining done (Mertie, 1936).

1932 - Mining done (Mertie, 1936).

1933 - Small hydraulic plant on Discovery Claim, on the west fork, operated by one man. Prince Creek has never been a large producer of placer gold (Mertie, 1936).

1937 - Claims staked by Alvin Agoff of Prince Creek Mining Company (BLM).

- Small hydraulic plant being operated at the head of Prince Creek (Smith, 1939).

1955 - Examined by Bureau personnel (Maloney, 1962).

1956 - Mining done (Cobb, 1976).

1975 - Alvin H. Agoff of Prince Creek Mining Company was mining (Carnes, 1975).

1983 - Alvin H. Agoff had active mining claims (BLM).

RESERVES:

No data available.

OPERATING DATA:

A hydraulic plant was in operation and a gin pole, boom, and hand hoist were constructed to move boulders up to 10 tons (Mertie, 1936). In later years a bulldozer and non-float plant were used (Carnes, 1975).

GEOLOGIC SETTING:

Prince Creek flows southward from the same monzonite intrusion that heads Flat, Happy, Chicken, and Slate Creeks where residual placers containing gold had developed on decomposed monzonite. Adjacent to the monzonite is banded agrillite. Overburden is up to 30 ft thick in places. The gravel is coarse and angular and consists of argillite, sandstone, and monzonite. In one cut a clay layer acts as a false bedrock (Mertie, 1936). Placer cinnabar occurs in upper Prince Creek (Maloney, 1962).

BUREAU WORK:

One grab sample of stream float containing 1/16 in cinnabar stringers in fine-grained basalt, taken in 1955 (Maloney, 1962) contained 2.1 percent mercury, <0.1 percent antimony, and <0.01 oz per ton gold.

REFERENCES:

Mertie, 1936
Roehm, 1939
Smith, 1939
Maloney, 1962
Maloney, 1967
Kimball, 1969
Cobb, 1972
Carnes, 1975
Cobb, 1976
Kx
MAS
BLM

MINE NAME (other names): Michigan Creek Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-3
Meridian: Seward

Sec 19, 29, 30, 31	T 25N	R 43W
Sec 02, 04, 05, 08-11, 13-22, 24, 25, 28-30, 36	T 25N	R 44W
Sec 20, 23, 24, 26, 29, 32, 35	T 26N	R 44W
Sec 25,36	T 25N	R 44W

Geographic: Tributary to the George River

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
16	73-88	0020730012	AA024715-024719
			AA024732-024742
			AA026237
			AA027029-027040
			AA027393-027398
			AA040975-040987
			AA042763-042810
			AA047575-047578

HISTORY AND PRODUCTION

1911 - Prospects located (Brooks, 1912).

1974 - Claims restaked (Kx).

1976 - Six claims staked by Glenn Bass (BLM).

1979 - Claims staked by L. Marshall, J. Sumpter, and L. D. Anderson of Big Three Mining (BLM).

1980 - Claims staked by Glenn Bass (BLM).

1981 - Claims staked by Glenn Bass and Alburn Anderson (BLM).

- Claims staked by Larry E. Bass and Kenneth Dennison (BLM).

1983 - Claims staked by L. Marshall, J. Sumpter, and L. D. Anderson inactive (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Bedrock consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur along the divide between Michigan Creek and Julian Creek. The source of gold is probably from quartz fracture fillings in breccia zones near the sedimentary rocks and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Brooks, 1912
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1976
Kx
MAS
BLM

MINE NAME (other names): Big Three Mining Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-3 Sec 01, 02, 11, 13, 14, 23, 24, 24 T 24N R 45W

Meridian: Seward Sec 32, 33 T 25N R 44W

Geographic: Located along the George River including several tributaries.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
17	73-93		AA027018-027028 AA028473-028484

HISTORY AND PRODUCTION:

1979 - Claims staked by L. D. Anderson, L. Marshall, R. Eckert, and J. Sumpter of the Big Three Mining Co. (BLM).

1983 - Claims are active (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur in the vicinity. The source of gold is probably from quartz fracture fillings in breccia zones near the sedimentary rocks and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
BLM

MINE NAME (other names): Spruce Creek Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-3 Sec 05, 06, 07, 08, 17, 18 T 24N R 44W
Sec 13 T 24N R 45W
Sec 34 T 25N R 44W

Meridian: Seward
Geographic: Tributary to the George River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
18	73-74	0020730011	AA024720-022724
	83		AA027362-027371
	86		AA030175-030177
	87		AA032408-032411
			AA037924-037931
			AA040777-040782
			AA040895-040896
			AA046169-046172
			AA046451-046462

HISTORY AND PRODUCTION:

1911 - Mining done (Brooks, 1912).

1920 - Hydraulic plant installed (Brooks, 1912).

1974 - Claims staked by L. E. Wyrick (BLM).

1979 - Claims located and staked by K. McCracken (BLM).

- Claims located and staked by K. McCracken inactive (BLM).

- 3 claims staked by Betty Ballard (BLM).

- 4 claims staked by Charlton Webb and Barbara Wyrick (BLM).

- 8 claims staked by L. E. Wyrick (BLM).

1980 - 6 claims staked by Leona Cornwall, Mary Myhr, and Betty Ballard (BLM).

- 2 claims staked by J. P. Russell (BLM).

1981 - 4 claims staked by Leona Cornwall, Mary Myhr, and Betty Ballard (BLM).

- Claims staked by L. E. Wyrick (BLM).

1983 - Mining done on 10 claims by L. E. Wyrick (BLM).

- Ballard claims are active (BLM).

RESERVES:

No data available.

OPERATING DATA:

Washing plant, sluice box, bulldozer, and front-end loader used (State of Alaska, 1983).

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur at the head of the creek. The source of gold is probably from quartz fracture fillings in breccia zones near the sedimentary rocks and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

Average depth of overburden is 12 ft.

REFERENCES:

Brooks, 1912
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1976
State of Alaska, 1983
Kx
MAS
BLM

MINE NAME (other names): Julian Creek Mine

COMMODITIES: Au, Hg, Sn, U, Rare Earth, Cerium - Placer

LOCATION: Quadrangle: Iditarod A-3
Meridian: Seward

Sec 26, 27, 35, 36 T 25N R 44W
Sec 04, 05 T 24N R 44W

Geographic: Located approximately 26 miles southeast of Flat. It is an eastward flowing tributary of the Main Fork of the George River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
19	73-48	0020730010	AA024725-024731
	-89		29880-029913
	-90		32412-032423
			37847-037848
			45190-045222
			47816-047850

HISTORY AND PRODUCTION:

1910 - Prospects reported (Maddren, 1911).

1911 - Mining done (Brooks, 1912).

1911-39 - Mining occurred sporadically (Cobb, 1972).

1914 - No one permanently settled on creek (Smith, 1915).

1917 - Mining occurred (Koschmann and Bergendahl, 1968).

1924 - Anderson and Remus mined (Wimmler, 1924).
Robert, Richard, Ronald, and Raymond Vanderpool, Richard Wilmarth and Ted Maining owned claims (kx).

1931 - Mining done (Smith, 1933).

1932 - Especially productive with 7 or 8 men working (Smith, 1934).

1933 - An open-cut hydraulic plant was operated with 5 men (Mertie, 1936).

1934 - Mining continued with 7 men employed (Smith, 1936).

1935 - A camp of 8 men was the principal producing camp in the Georgetown district (Smith, 1936).

1936 - Mining done (Smith, 1938). Miscovich and Rodman owned claims (Kx).

1937 - Miscovich and Rodman operated the principal producing camp in the Georgetown district (Smith, 1939).

1938 - One large camp continued mining (Smith, 1939).

1939 - Mining continued (Smith, 1941).

1947 - One half mile upstream from the mouth the mining operation is owned by Harry Steen and operated along with Sture Stenberg in partnership (White and Killeen, 1953).

1959 - No gold production reported from Georgetown district (Koschmann and Bergendahl, 1968).

1955? - Placer mines have been operated intermittently for 20 to 30 years (Cady, Wallace, Hoare, and Webber).

1979 - Earle Foster, Larry Anderson, James Sumpter, Lynwood Marshall, and Kenneth McCracken staked claims (Kx).

- Claims staked by Richard Wilmarth (BLM).

1924-82 - Various activity years (Kx).

1982 - Claims staked by David L. Wilmarth, Richard Wilmarth, and Virgil Wilmarth (BLM).

1983 - Mining done on 8 claims by Richard Wilmarth and Buckstock Mining Co.

- Claims staked by Foster, Anderson, Sumpter, Marshall, and McCracken are closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

Open-cut hydraulic plant with sluice-box, front-end loader, bulldozer, and hydraulic giant with a 3 in nozzle (State of Alaska, 1983).

GEOLOGIC SETTING:

Bedrock consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes (White and Killeen, 1953). Rhyolite intrusive bodies occur along the divide at the head of Julian Creek. The source of gold and other heavy minerals is probably quartz fracture fillings in breccia zones near sedimentary rocks and altered intrusives. Concentrates contain gold, cinnabar, pyrite, cassiterite and traces of monzonite (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1911
Brooks, 1912
Smith, 1915
Wimmler, 1924
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Roehm, 1939
Smith, 1939
Smith, 1941
Wedow and Others, 1952
White and Killeen, 1953
Cady, Wallace, Hoare, and Webber, 1955
Overstreet, 1967
Koschmann and Bergendahl, 1968
Cobb, 1972a
Cobb, 1972b
Cobb, 1976
State of Alaska, 1983
Kx
MAS
BLM

MINE NAME (other names): George River Prospect
George Creek,
Beaver Creek,
Marietta Creek
Troy Resources Corporation

COMMODITIES: Au-Placer

LOCATION: Quadrangle: Iditarod B-3
Meridian: Seward

Sec 03, 04, 07, 08, 09	T 25N	R 40W
Sec 01, 03, 04, 05, 08, 09, 10, 12, 13, 14, 15, 16, 17, 20, 21, 22, 28, 29, 30, 31, 32, 33	T 25N	R 41W
Sec 26, 34, 35	T 26N	R 40W
Sec 04, 09, 10, 15, 22, 27, 28, 29, 30, 33	T 26N	R 41W

Geographic: Located along lower part of Beaver Creek and junction with George River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
20	73-55	0020730021	AA037932-037992
	-56		AA037994-038064
	-100		
	-102		

HISTORY AND PRODUCTION:

1911 - Mining done on Beaver and Marietta Creeks (Brooks, 1912).

1920 - Mining done on George River (Brooks, 1922).

1924 - Kirk and Riley were owners of George River, George Creek, Beaver Creek and Marietta Creek claims (Kx).

1979 - Troy Resources Corporation located several claims (BLM).

1983 - Mining done with 2 people. Troy Resources has 108 claims (BLM).

RESERVES:

No data available.

OPERATING DATA:

1 to 5 in floating suction dredge (State of Alaska, 1983).

GEOLOGIC SETTING:

The region geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. The source of gold is quartz fracture fillings in breccia zones near sedimentary rocks and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Brooks, 1912
Brooks, 1922
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1976
State of Alaska, 1983
Kx
MAS
BLM

MINE NAME (other names): Granite-Willow Creek Occurrence

COMMODITIES: Au-Placer

LOCATION: Quadrangle: Iditarod B-3
Meridian: Seward

Sec 06,	T 26N	R 41W
Sec 01, 10, 11, 12, 15, 16, 17, 18	T 26N	R 42W
Sec 13	T 26N	R 43W
Sec 31	T 27N	R 41W

Geographic: Located along upper part of Willow Creek, a tributary to George River, where it branches into Bismark, Homestake and Granite Creeks.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
21	73-82 -84	0020730022	AA031927-031940

HISTORY AND PRODUCTION:

1974-75 - Richard Wilmarth staked Willow Creek 1-5 claims (Kx).

1976 - Jack and Clyde Hayden staked claims (Kx).

1983 - Jack and Clyde Hayden's claims are active (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The source of gold is quartz fracture filling in breccia zones near sedimentary rocks and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS
BLM

MINE NAME (other names): Moose Creek Occurrence
Big Three Mining

COMMODITIES: Au-Placer

LOCATION: Quadrangle: Iditarod B-2
Meridian: Seward
Geographic: Located on the East Fork George River and its tributaries, including Moose Creek and Munther Creek

Sec 03, 04, 07, 08, 09 T 25N R 40W
Sec 01, 03-05, 08-10
12-17, 19-22, 28-33 T 25N R 41W
Sec 26, 34, 35 T 26N R 40W
Sec 04, 09, 10, 15 T 26N R 40W
Sec 22, 27-30, 33 T 26N R 41W

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
22			AA026818-026847
			AA026919-026944
			AA027122-027153
			AA027175-027182
			AA044082-044116
			AA044179

HISTORY AND PRODUCTION:

1979 - Claims located by L. D. Alderson, Lynwood Marshall, James Sumpter, Richard A. Pellett, Richard J. Pellett, Walter Yates, Earle C. Foster, Big Three Mining (BLM).

1981 - Claims located by Kelly R. Dolphin of Munther Creek Mining Co. (BLM).

1983 - Claims of Anderson, Marshall, Sumpter, Pellett, Yates, Foster (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The source of gold is quartz fracture fillings in breccia zones near sedimentary and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
MAS
BLM

MINE NAME (other names): Glenn Bass Occurrence COMMODITIES: Au-Placer

LOCATION: Quadrangle: Iditarod A-3 NW 1/4 Sec 24 T 23N R 44W
Meridian: Seward
Geographic: Located on a tributary along East Fork of the George River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
23			AA030790

HISTORY AND PRODUCTION:

1979 - Glenn Bass located claim (BLM).

1983 - Glenn Bass's claim is active (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The gold is from quartz fracture fillings in breccia zones near sedimentary and altered intrusives (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
BLM

MINE NAME (other names): Stony River Occurrence COMMODITIES: Au, Ag-Placer

LOCATION: Quadrangle: Sleetmute C-2 Sec 05-07, 17, 18, 20,
Meridian: Seward 21, 27-29, 34-36 T 19N R 40W
Geographic: Located along the lower end of Stony River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
24	82-35	0020820035	

HISTORY AND PRODUCTION:

1970 - Stony River claims 1-32 staked by Dan Shaklovitz, Zelma Monroe, M. S. Dismuke (Kx).

1970-76 - Various activity years (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional stream sediments consist of Quaternary age deposits derived from Lower Paleozoic and Cretaceous rocks (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): Mellick's Occurrence COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-4 SE 1/4 Sec 35 T 19N R 44W
Meridian: Seward
Geographic: Located behind Mellick's Trading Post near Sleetmute.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
25		0020820024	AA033570-033579

HISTORY AND PRODUCTION:

1952 - Located and staked by Nick Mellick and George H. Willis (BLM).

1983 - Claims located and staked by Mellick and Willis are closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

A small amount of cinnabar occurs in the Cretaceous graywackes and shales behind Mellick's Trading Post near Sleetmute (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Sainsbury and MacKevett, 1965
Cobb, 1972
MAS
BLM

MINE NAME (other names): Landru Occurrence COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-4 W 1/2 Sec 25 T 19N R 44W
Meridian: Seward
Geographic: Located approximately 1/4 mile below Sleetmute near the Kuskokwim River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
26		0020820023	

HISTORY AND PRODUCTION:

Before 1942 - Prospect is known about and owned by Herschell and Hortense Landru (Joesting, 1942).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Rich float has not been found containing cinnabar and metacinnabarite, but it has not been traced to its source. The country rock and dike are similar to those at Red Devil (Joesting, 1942).

REFERENCES:

Joesting, 1942
Cobb, 1972
MAS

MINE NAME (other names): McCally Creek Prospect COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute C-4 SE 1/4 Sec 13 T 19N R 45W
Meridian: Seward
Geographic: Located near the mouth of McCalley Creek between Red Devil and Barometer Mines.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
27	82-25	0020820006	

HISTORY AND PRODUCTION:

1955 - Mention of Vermillion and Mercury claims (Cady, Wallace, Hoare, and Webber).

1965 - Dorr Holloway staked Mercury 1-5 placer claims near the mouth of McCally Creek (kx).

RESERVES:

No data available.

OPERATING DATA:

Several trenches noted.

GEOLOGIC SETTING:

The country rocks are Cretaceous graywacke and shale of the Kuskokwim group on the southwest limb of the Sleetmute anticline.

The prospects have been trenched and small amounts of cinnabar found, chiefly as stringers along bedding in the shale (Sainsbury and MacKevett, 1965; and Cady, Wallace, Hoare, and Webber).

REFERENCES:

Holzheimer, 1926
Cady, Wallace, Hoare, and Webber, 1955
Sainsbury and MacKevett, 1965
Cobb, 1972
Kx
MAS

MINE NAME (other names): Red Devil Mine COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-4 SE 1/4 Sec 06 T 19N R 44W
Meridian: Seward
Geographic: Located on the south side of the Kuskokwim River, 8 miles downstream from Sleetmute, near the mouth of Red Devil Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
28	82-11	0020820005	AA029596-029599
	-17		AA033584-033587
	-18		

HISTORY AND PRODUCTION:

1933 - Discovered and staked by Hans Halverson (Roehm, 1939).

- Examined by Roehm of the Territorial Department of Mines.

- A few years after 1933 - A half interest was acquired by Nick Mellick and more claims staked making a total of 9 claims (Wright and Rutledge, 1947).

1939 - Groundsluicing into bank was still carried on. A 95 ft long tunnel was driven with a short crosscut. The retort from the Parks property was to be moved and rebuilt at Red Devil (Roehm, 1939).

Before 1940 - 11 flasks of mercury, from the creek float and overburden, were retorted with several used Johnson McKay tubes (Wright and Rutledge, 1947).

1940 - Mellick and Halverson took out enough ore during development work to keep two retorts busy for 3 months. Each had a 1 ton per day capacity (Smith, 1942).

- The 2 "D" retorts produced 158 flasks of mercury (Wright and Rutledge, 1947).

1941 - Mapping was done from 1941-1946 by the USGS (Cady, Wallace, Hoare, and Webber).

1941 - A second adit, was driven 135 ft. It had two crosscuts 50 ft and 40 ft long. The Red Devil shaft was started and sunk to a depth of 30 ft on a 59° incline.

- In the fall Harold Schmidt and L. J. Stampe leased the property. The New Idria Quicksilver Mining Co. sub-leased it forming the New Idria-Alaska Quicksilver Mining Co. with Harold Schmidt as superintendent. 135 flasks of mercury were produced (Wright and Rutledge, 1947).

1942 - Examined by Bureau personnel. Trenching and sampling were done. Mining continued with 117 flasks of mercury produced (Wright and Rutledge, 1947).

1940-42 - Mercury ore was mainly obtained from ground-sluicing overburden above the ore zone (Wright and Rutledge, 1947).

1942-43 Winter - Norman Ebbley of the Bureau supervised underground exploration amounting to 204 ft of drifting and crosscutting and 25 ft of shaft sinking (Wright and Rutledge, 1947).

1941-44 - Mining and furnacing equipment was brought in and a 40 ton rotary kiln and condensing system were installed. 760 ft of drifting and 250 ft of crosscutting was done on two levels along with stoping.

1944 - 1,096 flasks of mercury were recovered from 2,652 tons of ore by June 30. Then operations were curtailed due to poor market conditions for the remainder of the year (Wright and Rutledge, 1947).

1945 - In February a contract to extend the shaft was granted to Kuskokwim Mining Co., consisting of Harold Schmidt, L. J. Stampe, Earl Ellington and Glen Franklin. They extended the shaft 44 ft. In the summer they obtained a sub-lease to mine ore and use the furnacing equipment (Wright and Rutledge, 1947).

1945-46 - The mine was operated for two 4 month seasons. Development work consisted of 499 ft of drifting, 155 ft of crosscuts and 112 ft of shafts/winzes (Wright and Rutledge, 1947).

1946 - The company suffered a loss because of the unforeseen low mercury price at the end of the year, so operations were shut down (Wright and Rutledge, 1947). Robert F. Lyman held a lease on the property and produced about 500 flasks (Jasper, 1962).

1947 - On January 21, Harold Schmidt and L. J. Stamp bought all mining and furnacing equipment. They continue to hold their lease on the property. Examined by Bureau personnel (Wright and Rutledge, 1947).

1947-51 - Work was limited to annual assessment requirements (Jasper, 1962).

1949 - New Idria-Alaska sold all mining and furnacing equipment to Robert F. Lyman (Malone, 1962).

1952 - Claims located and staked by Hans Halverson, Nick Mellick, of Alaska Research Company (BLM).

- DeCoursey Mountain Mining Company acquired lease on the property (Jasper, 1962). It was aided by a loan from the Defense Minerals Exploration Administration (DMEA) (MacKevett and Berg, 1963).

1953 - DeCoursey Mountain Mining Co. dewatered mine and started operations (Jasper, 1962).

1953-54 - They produced 1,084 flasks of mercury from 2,500 tons of ore (Jasper, 1962).

1954 - Mine and mill equipment destroyed by fire in October. A controlling interest was sold to Brewis and White, a Canadian mining company. The name became DeCoursey Brewis (Lund, 1969).

1955 - Rebuilt the plant (Jasper, 1962).

1956 - Claims staked by Hans Halverson (BLM).

1957 - The Dolly series of ore bodies was discovered and the Dolly shaft was sunk 1,082 ft northwest of the main shaft (Mackevett and Berg, 1963). The mine produced more than 5,000 flasks of mercury and became one of the largest producers in the United States (Sainsbury and MacKevett, 1965).

1959 - DeCoursey Mountain Mining Co. changed its name to Alaska Mines and Minerals, Inc. (Mackevett and Berg, 1963). The DeCoursey Brewis name was changed to Consolidated Brewis (Lund, 1969).

1961 - The mine consists of 9 unpatented claims (Kusko No. 1-5) held by Alaska Mines and Minerals, Inc. and (Red Devil Nos. 1-4) owned by Halverson and Mellick and leased to the mining company. Robert F. Lyman, manager; Roger A. Markle, resident engineer; and Gordon Herreid, geologist are all of Alaska Mines and Minerals, Inc. (Malone, 1962).

1963 - September 1 - the property was shut down for an indefinite period. All known ore was mined and processed and all equipment was removed from the mine and the workings allowed to flood.

- By September 19, water was at the 300 ft level, the shaft was sealed, and all portals closed.

- In October, Don Holloway and Mariano Juancorena obtained a one-year lease. Jack Neubauer joined them and miners were hired. They drove a 100 ft adit in Red Devil Gulch and have 40 tons of high-grade ore stockpiled (Jasper, 1963).

1964 - The known ore bodies were exhausted and further exploration financed by an Office of Mineral Exploration (OME) loan failed to disclose minable ore. Production was limited to that from small lease holders.

1964-69 - Inactive (Lund, 1969).

1966 - The price of mercury rallied to $780 per flask and the company decided to seek financing to start up operations. They own over 50 claims, but only 4 have been worked (Lund, 1969).

1968 - Plans were made to put in a flotation plant at a cost of $300,000 with assistance from Matanuska Valley Bank. Nissho-Iwai Co. Ltd. and Nomura Mining Co. Ltd., Japanese companies agreed to add $225,000 for opening and exploration. They were to buy the cinnabar concentrate and ship it to Japan (Lund, 1969).

1969 - Open pit mining was to begin in July. Ray Wolfe was president of Alaska Mines and Minerals (Lund, 1969).

1970 - No. 1 producer in Alaska, where production was from both open pit and underground. The mill operated at maximum capacity most of the year. Stibnite was recovered in flotation. A crew of 34 was at work (Alaska Division of Geological Survey, 1971).

1971 - The first of June the mine shut down because of the drop in the mercury price (Alaska Division of Geological Survey, 1972).

1972 - The mine was still shut down as the mercury price dropped to a 20 year low at $150 per flask in February (Alaska Division of Geological Survey, 1973).

1981 - The mine is closed and flooded (DGGS, 1981).

1982 - Approximately 35,000 flasks of mercury produced from 1940-1972 (Eakins and Others, 1983).

PRODUCTION

Year	Flasks of Mercury	Tons of Ore	Income from Sale	
1933-40	11	---	---	
1940	158	---	---	
1941	135	---	---	
1942	117	---	---	
1943-44	1,096	2,652	$ 171,717.70	
1945	962	1,514	114,825.49	
1946	491	872	40,156.28	(Wright and Rutledge, 1947)
1953-54	1,084	2,500	---	
1956-60	19,800	47,250	---	
1961	3,200 (approx.)	---	---	(Jasper, 1962)
1962-63	4,800	---	---	(Lund, 1969)
1969-71	3,146 (approx.)	---	---	(Eakins, 1983)
Total	35,000 (approx.)			(Eakins, 1983)

RESERVES:

March 1943 - Estimated that seven leases had 11,360 tons of ore containing 45.3 lbs of mercury per ton plus 15,900 tons containing 36.7 lbs of mercury per ton. The ore contained antimony in almost equal amount and a small percentage of arsenic (Bain, 1946).

OPERATING DATA:

In the early years development consisted of surface trenching and hydraulic sluicing of the overburden. Up to 1947 development consisted of 139 ft of shafts and 2,170 ft of drifting and crosscutting on four levels. The main shaft is 99 ft deep (Wright and Rutledge, 1947).

By 1958, the underground workings consisted of a total of about 9,600 ft of shafts, adits, crosscuts, drifts, winzes, and raises. The main shaft is inclined at 63° for a distance of 507 ft downslope and 143 ft vertically. Five main levels connect with the main shaft (MacKevett and Berg, 1963)

By 1969, the mine consisted of an airfield, and a well equipped camp with a modern furnacing plant consisting of a retort plant with 40 tons per day capacity, two 650 kw Ingersoll-Rand light plants, several 340,000 gallon fuel oil tanks, machine shops, offices, dormitories, apartments and a flotation plant that will process 100 tons of ore per day (Lund, 1969).

GEOLOGIC SETTING:

The Red Devil deposit is on the southwest flank of the Sleetmute anticline and occurs along the Red Devil Fault zone, a wrench (strike slip) fault with right lateral displacement.

The country rock is a well-bedded, graded graywacke-mudstone-shale typical of the upper Cretaceous Kuskokwim formation. The average strike is N38°W dipping 63°S.

Altered biotite basalt, andesite and diabasic(?) dikes and sills occur at the mine. The dikes are altered to quartz, chalcedony, carbonate, and sericite. They contain quartz blotches and veinlets. The dike rocks are reddish-yellowish tan in the surface alteration zone. Contacts with shale or mudstone are sharp, but often the adjacent graywacke is argillized. The dikes carry disseminated cinnabar locally within a few feet of the ore shoots. The most striking feature of the deposit structure is the series of steplike offsets of the crosscutting dikes along the many Red Devil Fault planes.

The Red Devil Fault zone parallels bedding for the most part, but in many places it laces from one bedding plane to another along steep fault planes. The zone is complex and ore shoots are difficult to follow.

Ore production is mainly from the footwall of the Red Devil Fault zone, where ore shoots are localized at the intersections of bedding-plane wrench faults with crosscutting dikes. Ore shoots also occur along the steep facing faults.

Stibnite and cinnabar are the only sulfides found throughout the deposit with small amounts of orphiment and realgar occurring locally. Occasional grains and veinlets of authigenic pyrite are present. The major gangue minerals are quartz and white clay.

The ore shoots are composed of stibnite-cinnabar-quartz. The dimensions of the shoots are 1 in to 1 ft wide and and 5 to 30 ft long. Cinnabar may constitute from 0 to 40 percent of the ore shoot, quartz from 1 to 10 percent, and stibnite the rest. Adjacent to the ore shoots, cracks in the host rock carry 1/16 to 1/4 in wide vuggy veinlets of quartz, white clay, and cinnabar. This halo may extend out to 50 ft before cinnabar disappears, but the quartz-clay veinlets continued on (Malone, 1962).

Ore Genesis Sequence (Malone, 1962)

1. Beds folded and conjugate joints perpendicular to the beds formed.
2. Right lateral Red Devil wrench fault movement began.
3. Dikes intruded the joints.
4. More movement occurred along the Red Devil Fault and ore solutions were introduced near the end of faulting. The ore minerals were deposited contemporaneously.
5. Post-mineral cross faults formed.
   The oldest probable date of mineralization is late Miocene.

BUREAU WORK:

Sampled and trenched in 1942. Samples contained 2.96 to 32.0 percent mercury and 0.98 to 26.5 percent antimony.

Norman Ebbley supervised underground exploration during the winter of 1942-43.

Examined by Bureau personnel in 1947 (Wright and Rutledge, 1947).

REFERENCES:

Holzheimer, 1926
Roehm, 1939
Smith, 1942
Joesting, 1942
Joesting, 1943
Bain, 1946
Webber and Others, 1947
Wright and Rutledge, 1947
Cady, Wallace, Hoare, and Webber, 1955
Erspamer and Wells, 1956
Wells, Johnson, and Sterling, 1958
Pennington, 1959
Sainsbury and MacKevett, 1960
Chapman and Shacklette, 1960
Malone, 1962
Jasper, 1962
MacKevett and Berg, 1963
Jasper, 1963
USGS Staff, 1964
Baily and Smith, 1964
Sainsbury and MacKevett, 1965
Shacklette, 1965
Malone, 1965
Berg and Cobb, 1967
Hawley, Martinez, and Marinenko, 1969
Lund, 1969
Cobb, 1972
Alaska Division of Geological Survey, 1972
Eakins and Others, 1983
Kx
MAS
BLM

MINE NAME (other names): Barometer Mine COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-4 NW 1/4 Sec 06 T 19N R 44W
Meridian: Seward
Geographic: Located approximately 1 mile from the south bank of the Kuskokwim River and about 1 3/4 miles northwest of the Red Devil deposit at the 400 ft elevation.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
29	82-09	0020820004	AA027399-027436

HISTORY AND PRODUCTION:

1921 - Cinnabar discovered and located the Barometer Nos. 1-6 by Hans Halverson (Malone, 1962).

1922 - 122 ft tunnel driven (Roehm, 1939).

1923 - Sold to E. W. Parks for $1,000. Surface trenching and stripping were done (Roehm, 1939).

- A Johnson-McKay pipe retort was installed and a small amount of production was made mainly from the detrital material below the deposit (Webber and Others, 1947).

1931 - Dr. Carter optioned the property and drove a 40 ft crosscut (Roehm, 1939).

- Examined by Otto Rohlphs (Mining Engineer, Seattle) (Webber and Others, 1947).

1932 - Option was dropped by Dr. Carter (Roehm, 1939).

1938 - Leased to A. C. Skidmore and 10 flasks of mercury were retorted from float ore and ore in a pit at the lower deposit. The lease lapsed at the end of the season (Webber and Others, 1947).

1939 - Assessment work done (Webber and Others, 1947).

1940 - 6 flasks of mercury produced (Cady, Wallace, Hoare, and Webber, 1955).

1942 - Exploration by the Bureau with trenching and sampling done (Malone, 1962).

1943 - Exploration continued by the Bureau (Jasper, 1962).

1954 - Claims staked by Frederick Woelkers III (BLM).

mid-1950's - Leased by Alaska Mines and Minerals Inc. and property now consists of Barometer Nos. 1-10 unpatented claims (Jasper, 1962 and Malone, 1962).

1956 - Claims staked by Frederick Woelkers III (BLM).

1957 - Claims staked by Frederick Woelkers III (BLM).

1957 and 1958 - Trenching and sampling done by the DMEA program failed to find new ore (Malone, 1965).

1961 - During assessment work by John Murphy and George Willis, they mined 50 to 75 tons of ore exposed in 1959 stripping (Jasper, 1962).

1962 - Claims staked by Frederick Woelkers III (BLM).

PRODUCTION

Year	Flasks of Mercury	Tons of Ore	
1923	small amount produced		(Webber and Others, 1947)
1938	10	25	(Webber and Others, 1947)
1940	6		(Cady, Wallace, Hoare, and Webber, 1955)
1961	not known	50-75	(Jasper, 1962)

RESERVES:

No data available.

OPERATING DATA:

Development consists of a 122 ft adit, 80 ft of crosscuts, pits and trenches. Single-tube Gould D and Johnson-McKay retort furnaces were used (Cady, Wallace, Hoare, and Webber, 1955) and a Pacific Foundry retort (Roehm, 1939).

GEOLOGIC SETTING:

The country rock is mainly Cretaceous shale with some graywacke and sandstone. The sediments strike between N. 20° to 60°W at the upper deposit and N. 10°W at the lower deposit. Hydrothermally altered intrusives are associated with mineralization. Cinnabar occurs along bedding joints and in fault and fracture zone openings. The cinnabar occurs irregularly and realgar and stibnite also occur (Cady, Wallace, Hoare, and Webber, 1955).

BUREAU WORK:

Trenching and sampling was done in 1942 and 1943. Sample results contained 0.1 to 16.5 lbs per ton mercury, trace to 2.5 percent antimony, and 0.01 to 0.67 percent arsenic (Webber and Others, 1947).

REFERENCES:

Brooks, 1922
Holzheimer, 1926
Roehm, 1939
Joesting, 1942
Bain, 1946
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Jasper, 1962
Malone, 1962
Shacklette, 1965
Malone, 1965
Berg and Cobb, 1967
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): No. 1 Discovery Claim COMMODITIES: Unknown (Hg?)
Occurrence

LOCATION: Quadrangle: Sleetmute D-4 SW1/4 Sec 30 T 20N R 44W
Meridian: Seward
Geographic: Located approximately 1 1/2 miles southeast of Parks along the north side of the Kuskokwimm River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
30	82-34	0020820034	AA20837735

HISTORY AND PRODUCTION:

1970 - Located and staked by Carl R. Henery (BLM).

1978 - Thomas L. Roehmer, owner (Kx).

1983 - Claim located by Henery is closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke, sandstone, and shale intruded by andesite dikes and sills (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS
BLM

MINE NAME (other names): Two Genevieves Occurrence COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute D-4 NE 1/4 Sec 19 T 20N R 44W
Meridian: Seward
Geographic: Located on the north side of the Kuskokwim River, southwest of Cribby Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
31		0020820026	

HISTORY AND PRODUCTION:

No data available.

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The country rock consists of Cretaceous graywacke and shale of the Kuskokwim Group. Cinnabar occurs in a breccia zone and vugs near the upper contact of a silica-carbonate-altered sill. Localized graphite fragments occur also in altered biotite basalt (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Sainsbury and MacKevett, 1965
Cobb, 1972
MAS

MINE NAME (other names): Willis & Fuller Mine COMMODITIES: Hg
Willis Prospect

LOCATION: Quadrangle: Sleetmute D-4 NW 1/4 Sec 24 T 20N R 45W
Meridian: Seward
Geographic: Located 1 1/4 miles north of the Kuskokwim River 12 miles downstream from Sleetmute at the 600 to 750 ft elevation

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
32	82-14	0020820003	AA033580-033583 AA033604-033609

HISTORY AND PRODUCTION:

1909 - Discovered by Oswald Willis and Jack Fuller (Holzheimer, 1926) who staked 15 claims (Jasper, 1962).

1910 - After being idle, property was restaked (Holzheimer, 1926).

1914 - Development work done (Smith and Maddren, 1915)

1914-18 - 2 flasks of mercury were produced in a retort made from galvanized sheet iron and oil drums (Cady, Wallace, Hoare, and Webber, 1955).

1921 - Development work done (Brooks, 1922).

1926 - Development work done (Smith, 1929).

1940 - W. G. Culver and Associates leased the property (Smith, 1942).

1942-58 - Assessment work only done (Sainsbury and MacKevett, 1965).

1942 - Examined by Bureau personnel and they excavated 6 bulldozer trenches and exposed 4 dikes (Sainsbury and Mackevett, 1965).

1943 - After Fuller's death (Jasper, 1955) George H. Willis, nephew, acquired half interest. The Bureau continued their trenching and sampling program (Jasper, 1962).

1951 - 9 of the original claims were dropped (Jasper, 1962).

1952 - Claims staked by Nick Mellick and George H. Willis (BLM).

1953 - The 6 claims left were amended and relocated (Jasper, 1962).

1953-54 - Extensive stripping done with bulldozer equipment by George Willis (Jasper, 1962).

1954 - Claims staked by George H. Willis (BLM).

- Examined by Jasper of the Territorial Department of Mines. Samples contained nil to 13.4 lbs per ton mercury (Jasper, 1955).

1957 - Alaska Mines and Mineral Co. acquired property (Jasper, 1962).

1958 - Willis excavated trenches in an area 1,300 ft by 1,000 ft and stockpiled some ore (Sainsbury and MacKevett, 1965).

1959 - Property leased to Alaska Mines and Minerals Inc. by current owner George Willis, nephew of Oswald Willis (Sainsbury and Mackevett, 1965).

- USGS mapped the property (Sainsbury and MacKevett, 1965). Sample results include 34.53 ppm Hg in one sample.

PRODUCTION

Year	Flasks of Mercury	
1914-1918	2	(Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

Development consists of several trenches, open cuts, and eight adits. Four adits are less than 50 ft long, one is 100 ft long, and one is 200 ft long (Jasper, 1962).

GEOLOGIC SETTING:

The country rock consists of graywacke, sandstone, and shale of Cretaceous age. The sediments have been intruded by andesite dikes and sills.

Cinnabar and stibnite occur along the hanging-wall side of the sills and in the adjacent sediments. The shales and brecciated argillite are the most productive. Some mineralization occurs along fractures in the dikes also (Webber and Others, 1946 and Jasper, 1955). Very minor amounts of disseminated pyrite occur also (Jasper, 1955).

The dikes strike N 30°W and dip 55 to 80° to the southwest. The sedimentary rocks strike N 60°W and dips 45 to 80°southwest (original bedding overturned) (Cady, Wallace, Hoare, and Webber, 1955). One sample of shale contained 75 lbs per ton mercury (Jasper, 1955).

BUREAU WORK:

Trenched and sampled in 1942 and 1943. Samples contained nil to 13.4 lbs per ton of mercury (Webber and Others, 1947).

REFERENCES:

Smith and Maddren, 1915
Brooks, 1922
Holzheimer, 1926
Smith, 1929
Smith, 1942
Joesting, 1942
Bain, 1946
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Jasper, 1955
Jasper, 1962
Malone, 1962
MacKevett and Berg, 1963
Sainsbury and MacKevett, 1965a
Sainsbury and MacKevett, 1965b
Malone, 1965
Berg and Cobb, 1967
Hawley, Martinez, and Marinenko, 1967
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): Alice & Bessie Mine COMMODITIES: Hg
Parks Prospect

LOCATION: Quadrangle: Sleetmute D-4 NE 1/4 Sec 25 T 20N R 45W
Meridian: Seward
Geographic: Located on the north bank of the Kuskokwim River approximately 15 miles above Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
33	82-10 82-20	0020820002	

HISTORY AND PRODUCTION:

1906 - E. W. Parks made discovery and located the Alice & Bessie lode claims (Jasper, 1956)

1906-1914 - Development work done (Brooks, 1925).

1914 - A 200 ft adit had been driven (Jasper, 1956)
700 lbs of mercury have been produced (Smith and Maddren, 1915)

1916 - Development continued (Brooks, 1918).

1919 - Retort plant was installed and 30 men were employed and some cinnabar ore was retorted (Brooks and Martin, 1921).

1920 - Productive mining continued (Brooks, 1922)

1921 - No productive operations, underground development work done (Brooks, 1923)

1923 - Operations were shut down with a total of 120 flasks of mercury produced since 1906 (Bain, 1946).

1926 - Mining continued (Smith, 1929).

1929 - Mining continued and ore recovered was retorted in a home-made furnace that was in operation for about 2 weeks (Smith, 1932).

1930 - Mining continued and a small amount of ore retorted in a home-made furnace for a short time (Smith, 1932).

1931 - Approximately 60 tons of ore mined and milled (Smith, 1933). Property examined by a private mining engineer and samples taken. No results were released.

1932 - Approximately 35 tons of ore mined and milled (Smith, 1934).

1933 - Mining continued (Smith, 1934).

1934 - Negotiations were entered into for starting new developments on an enlarged scale (Smith, 1936).

1935 - Work was started on extensive prospecting by a mining engineer and small crew (Smith, 1937).

1936 - Following the death of Parks, W. E. Dunkle leased the property and extended the cross-cut to 525 ft. 450 ft from the portal was the main ore zone and a 240 ft drift was driven in it (Jasper, 1956). Five men were employed (Smith, 1938).

- Property examined by S. R. Capps of USGS (Smith, 1938).

1937 - Following Dunkle's work, annual assessment work was done by Mr. Park's estate and/or his associates (Jasper, 1956).

1942 - Sampled and trenched by Bureau personnel (Webber and Others, 1947).

- George H. Willis acquired a half interest (Jasper, 1956).

1954 - Robert F. Lyman bought the remaining half interest from Nick Mellick and Willis and Lyman staked 8 more claims (Jasper, 1956).

1955 - Examined by Jasper of the Territorial Department of Mines (Jasper, 1956).

1957 - Cordero Mining Co. optioned the property and extended trenches, sank an inclined shaft and explored the main underground dike with percussion long-hole drilling (Sainsbury and MacKevett, 1965).

1958 - Cordero dropped their option (Sainsbury and MacKevett, 1965).

1959 - Sainsbury and C. M. Taylor of USGS mapped the property (Sainsbury and Mackevett, 1965).

1960 - Owned by Nick Mellick and George Willis; Mellick's interest was under purchase contract to Robert Lyman (Sainsbury and MacKevett, 1965).

1961 - Total production to date is about 175 flasks of mercury (Malone, 1965).

PRODUCTION

Year	Flasks of Mercury	
1906-1914	9.2	(Jasper, 1956)
1915-1923	110.8	(Bain, 1946)
1924-1961	64.2	(Malone, 1965)
TOTAL	174.2	(Malone, 1965)

RESERVES:

No data available.

OPERATING DATA:

Development consists of trenches, open cuts, shafts, a 525 ft adit, a 240 ft drift, and a 45 ft deep inclined shaft. A Johnson-McKay furnace, and a small Scott furnace were used for retorting. A small monitor was used for ground sluicing (Jasper, 1956).

GEOLOGIC SETTING:

The property is located on the northeast limb of the Sleetmute anticline. The country rock consists of graywacke and shales of the Kuskokwim Group of Cretaceous age. The sediments have been intruded by andesite, diabase, and granitic sills and dikes (Jasper, 1956).

Cinnabar mineralization is associated with altered andesite dikes and sills. The ores occur in brecciated zones near the contacts, with cinnabar and stibnite the principle ore minerals. A few narrow stringers of pyrite also occur. Quartz and ferruginous carbonates occur as gangue minerals (Mertie, 1936).

BUREAU WORK:

Trenching and sampling was done in 1942. The samples contained trace to 39 lbs per ton mercury, trace to 0.36 percent antimony, and trace to 0.048 percent arsenic (Webber and Others, 1947).

REFERENCES:

Brooks, 1915
Smith and Maddren, 1915
Mertie and Harrington, 1916
Brooks, 1916
Smith, 1917
Brooks, 1918
Brooks, 1919
Brooks, 1921
Brooks and Martin, 1921
Brooks, 1922
Brooks, 1923
Mertie, 1923
Mertie and Harrington, 1924
Brooks, 1925
Holzheimer, 1926
Smith, 1929
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith, 1942
Joesting, 1942
Bain, 1946
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Jasper, 1956
Pennington, 1959
Jasper, 1962
Malone, 1962
Jasper, 1963
MacKevett and Berg, 1963
Malone, 1965
Sainsbury and MacKevett, 1965
Berg and Cobb, 1967
Hawley, Martinez, and Marinenko, 1969
Cobb, 1969
Cobb, 1972
Kx
MAS

MINE NAME (other names): Fairview Prospect COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-4 N 1/2 Sec 02 T 19N R 45W
Meridian: Seward
Geographic: Located approximately 1 1/4 miles south of the Kuskokwim River near the headwaters of McCally Creek at an elevation of approximately 900 ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
34	82-19 82-32	0020820022	

HISTORY AND PRODUCTION:

1935 - First staked (Webber and Others, 1947).

1942 and 1943 - Trenching and sampling done by Bureau personnel (Webber and Others, 1947).

1965 - Owned by Alaska Mines and Minerals Inc. (Malone, 1962).

1969 - Claims staked by R. Saunders, International Nuclear Mines (Kx).

RESERVES:

No data available.

OPERATING DATA:

Development consists of pits and trenches. The 3 longest trenches, 125, 130, and 175 ft long were hand dug by the Bureau in 1943 (Sainsbury and MacKevett, 1965)

GEOLOGIC SETTING:

The country rock consists of Cretaceous graywackes and shales of the Kuskokwim Group which have been intruded by a rhyolite dike that strikes N 60°W and dips northeast. The dike is at least 1,000 ft long and 120 ft wide (Webber and Others, 1947). Cinnabar and stibnite occur in a fracture zone cutting across the dike (Malone, 1962).

This occurrence is unique in that mercury is rarely found in association with the albite rhyolite (Cady, Wallace, Hoare, and Webber, 1955).

BUREAU WORK:

Trenched and sampled in 1942 and 1943. Samples contained up to 8 lbs per ton mercury (Webber and Others, 1947).

REFERENCES:

Bain, 1946
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Malone, 1962
Sainsbury and MacKevett, 1965
Malone, 1965
Cobb, 1972
Kx
MAS

MINE NAME (other names): Fuller Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-4 Sec 03, 09, 10, 16, 17, 20, 29, 32 T 19N R 45W
Meridian: Seward Sec 27, 34 T 20N R 45W

Geographic: Located on Fuller Creek approximately 4 miles west of Red Devil.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
35		0020820013	

HISTORY AND PRODUCTION:

Some reported production in early days (Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous shale and graywacke cut by rhyolite dikes (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
MAS

MINE NAME (other names): Cinnabar Chief Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-4 SW 1/4 Sec 09 T 19N R 45W
Meridian: Seward
Geographic: Located approximately 4 miles west of Red Devil near Fuller Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
36	82-16	0020820033	

HISTORY AND PRODUCTION:

1926 - G. C. Bettles of the Kuskokwim Mercury Co. did prospecting, but development work failed to find economic amounts of ore and work was suspended in August (Smith, 1929).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Bedrock consists of Cretaceous graywacke and shale intruded by rhyolite dikes (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Smith, 1929
Joesting, 1942
Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): Eightmile Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-5 Sec 04, 05 T 19N R 46W
Meridian: Seward Sec 13, 23, 24, 26, 27, 33, 34 T 20N R 46W

Geographic: Located approximately 3 miles up Eightmile Creek, a tributary on the southside of the Kuskokwim River

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
37		0020820017	

HISTORY AND PRODUCTION:

Some reported production in early days (Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous shale and graywacke cut by rhyolite dikes (Cady, Wallace, Hoare, and Webber, 1955)

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
MAS

MINE NAME (other names): California Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-5 Sec 19, 20, 21 T 21N R 45W
Meridian: Seward Sec 24, 25 T 21N R 46W

Geographic: Located approximately 2 miles up California Creek, a tributary on the north side of the Kuskokwim River

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
38		0020820014	

HISTORY AND PRODUCTION:

Some reported production (Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

A sheet of porphyritic rhyolite outcrops across the headwaters of California Creek dipping steeply to the north-northwest across the bedding. Basaltic and dioritic bodies occur nearby also (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
MAS

MINE NAME (other names): Harvison Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute D-5 SW 1/4 Sec 25 T 22N R 46W
Meridian: Seward
Geographic: Located on a ridge crest on the east side of the George River approximately 3 miles south of the East Fork junction.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
39	82-23	0020820007	

HISTORY AND PRODUCTION:

1963 - John Harvison, Dorr Holloway, and R and H Mining Co. staked 11 claims (Kx).

1963 - Soil sampling, panning, and trenching were done before this discovery of interest was made. A 30 ft open cut was timbered and lagged and a winze started to sink on the ore-shoot. During excavating 5 to 6 tons of 12 to 15 percent mercury was sorted out (Jasper, 1963).

RESERVES:

No data available.

OPERATING DATA:

Trenching was done with a John Deere tractor. There is a 30 ft long open cut with a 3.5 ft deep winze started (Jasper, 1963).

GEOLOGIC SETTING:

Small lenses and pods of cinnabar occur in brecciated silicified Cretaceous shaly sandstone. The sandstone is cut by a dike or sill (Berg and Cobb, 1967).

REFERENCES:

Jasper, 1963
Berg and Cobb, 1967
Cobb, 1972
Kx
MAS

MINE NAME (other names): R and H Mining Occurrence COMMODITIES: Unknown (Hg?)

LOCATION: Quadrangle: Sleetmute D-5 NW 1/4 Sec 33 T 22N R 46W
Meridian: Seward
Geographic: Located approximately 4 1/2 miles north of Georgetown.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
40			AA033505-033509 AA038778-038781

HISTORY AND PRODUCTION:

1968 - Located and staked by R and H Mining (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and slates of the Kuskokwim Group (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
BLM

MINE NAME (other names): Egnaty Creek Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute D-5 SW 1/4 Sec 34 T 21N R 47W
Meridian: Seward
Geographic: Located on the south side of the Kuskokwim River approximately 9 miles down river from Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
41	82-26 82-27	0020820001	

HISTORY AND PRODUCTION:

1966 - John Murphy and George Willis staked claims (Kx).

1966-1967 - Reconnaissance work done by the Bureau included augering, trenching, diamond drilling, and soil sampling (Maloney, 1968).

1974 - Active (Kx).

RESERVES:

No data available.

OPERATING DATA:

Augering, trenching, diamond drilling, and soil sampling were done (Maloney, 1968).

GEOLOGIC SETTING:

Country rock consists of Cretaceous sandstone and graywacke with shale interbeds of the Kuskokwim Group. Bedding strikes approximately S 35°W and dips 45 to 50°S. Disseminated cinnabar occurs and a few select samples assayed about 1 percent mercury. Arsenic and antimony were found in trace amounts (Maloney, 1968).

BUREAU WORK:

Soil sampling done in 1966-67. No analysis of sample results was completed besides plotting on a map (Maloney, 1968).

REFERENCES:

Maloney, 1968
Cobb, 1972
Kx
MAS

MINE NAME (other names): Central Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-6 Sec 18, 19, 20, 28, 29, 32 T 21N R 47W
Meridian: Seward
Geographic: Located approximately 7 miles west of Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
42		0020820015	

HISTORY AND PRODUCTION:

Some reported production (Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous shale and graywacke of the Kuskokwim Group cut by rhyolite dikes (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
MAS

MINE NAME (other names): Oskawalik River Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute C-5

Sec 18, 19, 30, 31	T 18N	R 46W
Sec 05, 06, 08, 09, 10, 13, 14, 15	T 18N	R 47W
Sec 31	T 19N	R 47W
Sec 19, 20, 21, 25, 26, 27, 30, 36	T 19N	R 46W
Sec 15, 16, 22, 23, 24, 25	T 19N	R 49W

Meridian: Seward
Geographic: A tributary to the Kuskokwim River approximately 9 miles south of Crooked Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
43	82-40	0020820036	

HISTORY AND PRODUCTION:

Some production reported in early days near Henderson Mountain (Cady, Wallace, Hoare, and Webber, 1955).

1980-1982 - Staked by Tim Pearia, Sumeck Mining Co., Buckstock Mining Co., Hall Green, Gil Green, and Oskawalik Enterprises (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock consists of Cretaceous shale and graywacke of the Kuskokwim Group with several rhyolite intrusions in the area (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
Kx
MAS

MINE NAME (other names): Quartz Gulch Mine COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 19 T 23N R 48W
Meridian: Seward Sec 13, 24 T 23N R 49W
Geographic: Located on Quartz Gulch, a tributary to Donlin Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
44			

HISTORY AND PRODUCTION:

1910 - $1400 worth of gold was mined from claim No. 1 near the mouth (Maddren, 1915).

1912 - Produced $29,000 worth of gold. $23,000 of it was mined from the stream gravels in the summer and the rest from short drifts in the bench gravels during winter (Maddren, 1915).

1913 - Two men mined on the claim and produced about $3000 worth of gold (Maddren, 1915).

1914 - Two men mined on the claim and produced about $3000 worth of gold (Maddren, 1915).

PRODUCTION

Year	Production of Placer Gold	
1910	$ 1,400	
1912	29,000	
1913	3,000 ±	
1914	3,000 ±	
TOTAL	$ 36,400 ±	(Maddren, 1915)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (Cady, Wallace, Hoare, and Webber, 1955) and short drifts into the bench gravels (Maddren, 1915).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955). The open-cut mining was done in stream gravels 6 to 7 ft deep and the bench gravels were 20 to 25 ft deep (Maddren, 1915).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972

MINE NAME (other names): Quartz Prospect COMMODITIES: Au, Ag

LOCATION: Quadrangle: Iditarod A-5 SE 1/4 Sec 19 T 23N R 48W
Meridian: Seward
Geographic: Located on the southern side of a high hill between Dome Creek and Quartz Gulch.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
45		0020730017	

HISTORY AND PRODUCTION:

Before 1955 - The lode is known in the area but has not been mined (Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some of the rhyolite bodies. Assays show gold values of about $10.00 per ton and a small amount of silver (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Berg and Cobb, 1967
Cobb, 1972
Cobb, 1976
MAS

MINE NAME (other names): Donlin Creek Mine
Dome Creek
Ophir Creek

COMMODITIES: Au, Ag, Hg, Sb, Sn, W - Placer

LOCATION: Quadrangle: Iditarod A-5
Meridian: Seward

Sec 06, 07 T 23N R 48W
Sec 13, 14, 22, 23, 27, 33, 34 T 23N R 49W

Geographic: Located approximately 13 miles north of the village of Crooked Creek. A tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
46	73-22	0020730007	AA029244-029252

HISTORY AND PRODUCTION:

1909 - Gold first discovered on Crooked Creek (Maddren, 1915).

1910 - Prospecting was done (Maddren, 1911).

1911 - Mining done (Brooks, 1912).

1914 - Placers examined by Maddren of USGS (Maddren, 1915).

1920 - Some reported production (Brooks, 1922).

1924 - Mining done (Smith, 1926).

1926 - Mining done by open-cut methods (Smith, 1929).

1927 - Mining done (Smith, 1930).

1928 - Two miners operated a small hydraulic plant on bench gravel (Smith, 1930).

1929 - Mining bench gravels by means of a hydraulic plant.

- Small amount of gold recovered (Smith, 1932).

1930 - Mining bench gravels by means of a hydraulic plant.

- Small amount of gold recovered (Smith, 1933).

1931 - Small amount of gold recovered (Smith, 1933).

1932 - Mining continued (Smith, 1934).

1933 - Mining continued by two camps. On camp consisted of two men with a hydraulic plant working just below Snow Gulch (Smith, 1934).

1934 - Mining continued (Smith, 1936).

1935 - Mining continued (Smith, 1937).

1936 - Mining continued (Smith, 1938).

1937 - Mining done by one or two camps that employed 8 to 10 men.

- One camp produced some gold (Smith, 1939).

1938 - Three or four camps were mining (Smith, 1939).

1939 - Mining continued (Smith, 1941).

1956 - Mining from 1910 to 1956 (Cobb, 1976).

1969 - Claims located by Robert E. Lyman (BLM).

1983 - Claims located by Robert E. Lyman are closed (BLM).

PRODUCTION

Year	Oz Au Recovered	Oz Ag Recovered
prior to 1932	4170	119
up to 1955	$125,000 (approximately)	(Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant and open-cut methods.

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dips southwest and has several rhyolite intrusions. Several small quartz and calcite veins occur in the rocks next to the rhyolite and pyrite occurs locally. The source of gold appears to be quartz fracture fillings in breccia zones at the contacts of silicified and sericitized rhyolite and the sedimentary rocks. Richest deposits occur where bench gold has been concentrated by gulches cutting through the benches. Minerals found in the concentrates include magnetite, garnet, scheelite, cassiterite, pyrite, cinnabar, and stibnite. (Cady, Wallace, Hoare, and Webber, 1955).

Float specimens of rhyolite breccia containing quartz and stibnite were found at one locality (Berg and Cobb, 1967).

REFERENCES:

Maddren, 1911
Brooks, 1912
Smith, 1915
Maddren, 1915
Brooks, 1922
Smith, 1926
Smith, 1929
Smith, 1930
Smith, 1932
Smith, 1933
Smith, 1934
Mertie, 1936
Smith, 1936
Smith, 1937
Smith, 1938
Smith, 1939
Smith, 1941
Smith, 1942
Cady, Wallace, Hoare, and Webber, 1955
Berg and Cobb, 1967
Roschmann and Bergendahl, 1968
Hawley, Martinez, and Marinenko, 1969
Cobb, 1972
Cobb, 1976
Kx
MAS
BLM

MINE NAME (other names): Ruby Gulch Mine COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 SW 1/4 Sec 23 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek approximately 1/2 mile below Snow Gulch

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
47	73-22 73-28	0020730016	

HISTORY AND PRODUCTION:

1911 - Mining done near its mouth (Maddren, 1915).

1953 - Claims staked by R. Lyman and Tom Belanger (Kx).

PRODUCTION

Year	Au Recovered
1911	$3,000.00 (Maddren, 1915).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955). Both stream and bench gravels are mined (Maddren, 1915). Gold values range from 5 cents to $3.00 per square foot near the mouth and seven assays ranged from 902 to 910 fine (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1973
Kx
MAS

MINE NAME (other names): Queen Gulch Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 25, 26 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
48	73-22	0020730015	
	73-78		

HISTORY AND PRODUCTION:

1910-1911 - Approximate time when mining started (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
Kx
MAS

MINE NAME (other names): Queen Occurrence COMMODITIES: Sb

LOCATION: Quadrangle: Iditarod A-5 SW 1/4 Sec 25 T 23N R 49W
Meridian: Seward
Geographic: Located in the Donlin Creek area near the western edge of the top of the hill between Queen and Snow Gulches.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
49		0020730018	

HISTORY AND PRODUCTION:

The lode is known in the area but has not been mined (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quartz and stibnite float was found over an area of about 20 by 40 ft, near the apparent contact of rhyolite and interbedded Cretaceous graywacke and shale. Quartz and stibnite blades fill openings in brecciated rhyolite (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Berg and Cobb, 1967
Cobb, 1972
Cobb, 1976
MAS

MINE NAME (other names): Lewis Gulch Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 26, 27 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
50	73-22	0020730014	

HISTORY AND PRODUCTION:

1910-1911 - Approximate time when mining started (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
Kx
MAS

MINE NAME (other names): Crooked Creek Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5

Sec 19, 29, 30, 32	T 21N	R 48W
Sec 02, 03, 11, 12, 13, 24	T 21N	R 49W
Sec 03, 04, 09, 10, 16, 21, 28, 33	T 22N	R 49W

Meridian: Seward
Geographic: Tributary to Kuskokwim River. Located approximately 18 miles below Georgetown.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
51	73-78	0020730013	
	73-79		
	73-80		

HISTORY AND PRODUCTION:

1909 - Placer gold discovered (Maddren, 1915).

1953 - Claims staked by R. Lyman and T. Belanger (Kx).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955).

Prospects of placer gold occupy about 7 miles of Crooked Creek's middle length (Maddren, 1915).

The productive mining is practically confined to the lower courses of three tributaries, Quartz, Snow, and Ruby Creeks. The gold occurs in bench gravels that lie along the east side of Crooked Creek, which have been entrenched by the lower courses of the side streams. Also the gold occurs in the stream gravels of these streams, where the gold has been reworked from the bench gravels (Maddren, 1915).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
Kx
MAS

MINE NAME (other names): Snow Gulch Mine COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 30, 31, 32 T 23N R 48W
Meridian: Seward Sec 14, 23, 24, 25 T 23N R 49W
Geographic: Tributary to Donlin Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
52	73-22		AA029244-29248 AA029252

HISTORY AND PRODUCTION:

1910 - First mining in Crooked Creek Valley was done here at about 1000 ft above the mouth of Snow Gulch (Maddren, 1915).

1911 - Mining done (Maddren, 1915).

1912 - Mining done (Maddren, 1915).

1983 - Mining reported to have been done the last several years and preparations being made this summer for start-up of mining again next year (personal communication by a former employee).

PRODUCTION

Year	Recovery of Placer Gold
1910	$2,000
1911	$ 600
1912	$2,300
TOTAL	$4,900 (Maddren, 1915)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite with pyrite abundant near some rhyolite bodies (Cady, Wallace, Hoare, and Webber, 1955).

The eastern contact of the igneous intrusive cuts across Snow Gulch about 1 1/4 miles above its mouth (Maddren, 1915).

For about 1 1/4 miles above its mouth the stream gravels yielded appreciable prospects of gold (Maddren, 1915).

REFERENCES:

Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Kx
BLM

MINE NAME (other names): Rhyolite Prospect COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-7 NW 1/4 Sec 36 T 22N R 50W
Meridian: Seward
Geographic: Located on the southern flank of Juninggulra Mountain 35 miles southwest of Flat at 500 ft elevation

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
53	82-22 82-29 82-31	0020820008	AA031213-031230

HISTORY AND PRODUCTION:

1953 - Small stringers of cinnabar in rhyolite were found 3 miles from Juninggulra Mountain (Maloney, 1962).

1956 - Discovered by Robert Lyman and Joe Stuver (Maloney, 1962).

1957 - Owners did bulldozer trenching, stream panning, and dug several pits (Maloney, 1962).

- Optioned to the Cordero Mining Co. (Sainsbury and Mackevett, 1965).

1958 - Property was briefly examined by Bureau personnel (Maloney, 1962).

1959 - Exploration by bulldozer trenching was done by Bureau personnel (Maloney, 1962).

- Mapped by Sainsbury and Taylor of USGS.

1960 - No production had been recorded yet (Sainsbury and Mackevett, 1965).

1971 - Claims staked by Henry W. Waterford (BLM).

RESERVES:

No data available.

OPERATING DATA:

Development consists of several bulldozer trenches and prospect pits.

GEOLOGIC SETTING:

The country rock consists of interbedded graywacke and shale of the Cretaceous Kuskokwim Group. The sedimentary rocks srike N70°E and dip 80°N.

These are intruded by several basalt and rhyolite dikes and sills. Cinnabar is usually associated with basalt dikes and sills that have been hydrothermally altered to silica-carbonate rock. The dikes are from a few inches to over 50 ft thick. Cinnabar occurs as small and erratic lenses or 1/4 to 1/2 in wide stringers several feet or less in length.

Mineralization occurs within the dikes and sills or along the contact. Sometimes a few feet of the altered sedimentary rock contained erratic lenses and blebs. Only trace amounts of antimony and arsenic occur with the cinnabar (Maloney, 1962).

BUREAU WORK:

Trenched and sampled in 1959. Sample results contained <0.02 to 54.0 percent mercury, <0.05 to 66.3 percent antimony, and <0.05 to 0.06 percent arsenic (Maloney, 1962).

REFERENCES:

Maloney, 1962
Sainsbury and Mackevett, 1965
Malone, 1965
Berg and Cobb, 1967
Hawley, Martinez, and Marinenko, 1969
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): Return Creek Occurrence COMMODITIES: Hg - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 27, 28, 31, 32 T 23N R 50W
Meridian: Seward Sec 36 T 23N R 51W
Geographic: Located on the south side of DeCourcy Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
54	73-12	0020730020	

HISTORY AND PRODUCTION:

1953 - Claims staked by R. Lyman, DeCourcy Mining Co. (Kx).

1953-1908 - Various activity years (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quaternary alluvium derived from Cretaceous sedimentary rocks (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): DeCourcy Mountain Mine COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Iditarod A-5 SW 1/4 Sec 21 T 23N R 50W
Meridian: Seward
Geographic: Located at the head of Return Creek on DeCourcy Mountain, 35 miles south of the town of Iditarod at an elevation of about 900 ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
55	73-11	0020730019	AA027467-027469
	73-13		AA027471-027475

HISTORY AND PRODUCTION:

1910-1911 - Discovered in the winter by Matt DeCourcy (Cady, Wallace, Hoare, and Webber, 1955).

1919 - Staked by Matt DeCourcy (Cady, Wallace, Hoare, and Webber, 1955).

1920 - Claims under development by Fidelity-Kuskokwim Quicksilver Co. which shipped in 60 tons of supplies including retorts. Underground development consists of a 50 ft shaft (Brooks, 1922).

1921 - The Thrift Mining Co. installed a four-tube retort and some mercury was produced (Brooks, 1923).

1923 - Mining done (Brooks, 1925).

1924 - Incomplete records show 45 flasks of mercury produced from 14 tons of hand-sorted ore between 1921-1924 by the Thrift Mining Co. (Malone, 1962).

1924-1926 - C. F. Lindfors and associates retorted ore from the upper vein system, but production was small (Bjorklund, 1944).

- The Johnson and Lindfors adits were driven.

- The old 4-tube retort broke down in 1924, but a 12 tube mill was planned to be installed with a rated capacity of 5 tons a day next season (Smith, 1926).

- The mine was called the Corona during this period (Malone, 1962).

1925 - Largest producer of mercury in the region (Mertie, 1936) with 38 flasks of mercury produced from 45 tons (Malone, 1962).

1926 or 1927 - Lindfors died and deposit reverted to open ground (Malone, 1962).

1927 - John Brink located three claims, Last Chance 1, 2, and 3 (Bjorklund, 1944).

- Frederick J. Woeklers III located 3 claims (BLM).

- About 157 flasks of mercury produced prior to 1927 from open cuts (Joesting, 1942).

1928 - Harry Brink located 5 claims, Snowbird Nos. 1 to 5 (Bjorklund, 1944).

1929 - Frederick J. Woelkers III located 5 claims (BLM).

1932 - Mining continued intermittently from 1920-1932 with about 150 flasks of mercury produced (Cady, Wallace, Hoare, and Webber, 1955).

1942 - Examined by Cady and Webber of USGS and previous production was less than 200 flasks of mercury (Webber and Others, 1947).

- An engineer of the Reconstruction Finance Corporation visited the property. 80 flasks of mercury were produced from surface float.

- In May, Robert F. Lyman acquired a lease and option on the 8 claims for $20,000.

- In August, he formed a partnership, DeCourcy Mountain Mining Co. (Malone, 1962) with Kenneth M. Johnston and Frank C. Rocheleau.

- In October, Lyman and Rocheleau purchased Johnston's interest for $15,000 (Bjorklund, 1944).

1943 - Examined by the Bureau who did trenching and mapping. The New DeCourcy adit was started and driven 160 ft and 1 high-grade stope was mined. 109 tons of hand-sorted ore contained approximately 600 pounds of mercury per ton and 212 flasks of mercury were retorted from it this year. A 1,038 ft long airstrip was completed with the Bureau assistance. Amended locations were filed during October by Harry Brink (Bjorklund, 1944).

- Operations were financed by a loan from Reconstruction Finance Corporation and 700 flasks of mercury were produced. Hand-sorted ore treated in a small furnace ran 30 percent mercury (Bain, 1946).

1944 - DeCourcy Mountain Mining Co. did trenching and stripping exploration (Webber and Others, 1947).

- Contract with Metals Reserve Co. terminated (Pennington, 1959).

1945 - No mining done (Webber and Others, 1947).

1946 - Lyman bought Rocheleau interest and now is the sole owner of the property (Webber and Others, 1947).

1949 - Operations resumed in 1942 and continued through 1949 raising the total production to over 1,200 flasks of mercury. The ore was treated in a wood-burning 2-tube Gould D - retort furnace (Cady, Wallace, Hoare, and Webber, 1955).

1951 - Lyman sold the property to DeCourcy Mountain Mining Co. who explored the deposit under a Defense Minerals Exploration Administration (DMEA) loan of $368,920.00 (Pennington, 1959 and Malone, 1962).

1953-1954 - DeCourcy Mountain Mining Co. drilled 2,614 ft of diamond drill hole logged by Gordon Herreid of Alaska Mines and Minerals, Inc. (Malone, 1962).

1957 - During exploration work, 1953-1957, observations were made by MacKevett and R. S. Velikanje of the USGS (Sainsbury and MacKevett, 1965).

1959 - Trenches were caved and underground workings were full of ice (Sainsbury and MacKevett, 1965).

1961 - The mine was inactive and owned by Alaska Mines and Minerals Co., owners of the Red Devil Mine (Sainsbury and MacKevett, 1965).

1962 - No production since 1949.

- Alaska Mines and Minerals Inc., a successor to DeCourcy Mountain Mining Co. (through DeCourcy-Brewis Minerals, Ltd.) now holds the property (Malone, 1962).

- The property comprises 14 unpatented claims, Last Chance Nos. 1-3, Snowbird Nos. 1-5, Tunnel lode, Swextu, Swexde, Nexto, Nexde, and Swexa (Malone, 1962).

- There has been no recorded production since 1949 and Frederick Woelkers III claims are active (BLM).

PRODUCTION

Year	Tons of Ore	Flasks of Mercury	
1921-1924	14	45	(Malone, 1962)
1925	45	38	(Malone, 1962)
prior to 1927	--	157	(Joesting, 1942)
prior to 1942	--	200	(Webber and Others, 1947)
1943	109	212	(Bjorklund, 1944)
1942-1949	--	1,200	(Malone, 1962)
prior to 1965	--	1,366	(Malone, 1965)
TOTAL		1,534	(Eberlein and Others, 1977)

RESERVES:

1943 - Estimated at 6,970 tons containing 32.3 lbs mercury per ton with additional inferred tonnage of 7,600 tons containing 31.4 lbs mercury per ton (Bjorklund, 1944).

1959 - Inferred reserves amount to several thousand flasks of mercury (Pennington, 1959).

OPERATING DATA:

Development consists of 2,614 ft of diamond drill holes, trenches, open-cuts, and underground workings consisting of adits, drifts, crosscuts, shafts, and stopes. The adits are 910 ft long, 200 ft long, 175 ft long, a caved 85 ft long adit, and another short adit (Sainsbury and MacKevett, 1965). The shaft is 50 ft deep (Brooks, 1922).

GEOLOGIC SETTING:

Interbedded Cretaceous graywacke and shale of the Kuskokwim Group are intruded by Tertiary sills and dikes of basalt - diabase - andesite. These intrusives have been hydrothermally altered into a silicified silica-carbonate rock that weathers to a yellowish-brown color.

The cinnabar mineralization is associated with this alteration. Cinnabar occurs in joints, fractures, fault zones, breccias, along the igneous-sedimentary contacts, and along bedding surfaces. The ore bodies generally parallel the strike or are within 20 degrees of it and dip conformably or unconformably with bedding, generally dipping 55 to 80°. The ore bodies pinch and swell from a few inches to over a foot and are up to 15 ft long. Fissures and pore space filling were the dominant processes in ore formation, but these have been modified by replacement in localized areas. Mineralization consists of cinnabar; and minor stibnite, cervantite, and arsenopyrite, in a gangue of quartz-silica, carbonate and clay minerals. The main ore shoots occur in a zone 2,000 ft long by 250 ft wide by a 360 ft vertical range.

The largest producer was the Tunnel vein. It averaged 3.2 ft thick, was 200 ft long at the surface, and was 130 ft in depth. It occurs in a shale zone and strikes N 10° to 15° E and dips 65°E across the strata. Bedding here is N5°E and dips 65°W.

A high grade sample contained 654 lbs of mercury and 17.2 lbs of antimony per ton (Bain, 1946; Bjorklund, 1944; Webber and Others, 1947; and Cady, Wallace, Hoare, and Webber, 1955).

BUREAU WORK:

Trenched and sampled in 1943. Samples contained nil to 653.6 lbs per ton mercury and nil to 0.86 percent antimony (Bjorklund, 1944).

REFERENCES:

Brooks, 1922
Brooks, 1923
Brooks, 1925
Holzheimer, 1926
Smith, 1926
Mertie, 1936
Smith, 1942
Joesting, 1942
Joesting, 1943
Bjorklund, 1944
Bain, 1946
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Pennington, 1959
Malone, 1962
Sainsbury and MacKevett, 1965
Malone, 1965
Berg and Cobb, 1967
Cobb, 1972a
Cobb, 1972b
Cobb, 1973
Cobb, 1976
Eberlein and Others, 1977
Kx
MAS
BLM

MINE NAME (other names): Little Creek Occurrence COMMODITIES: Au, Ag, Hg - Placer

LOCATION: Quadrangle: Iditarod A-6 Sec 06, 07, 08, 17, 20, 21, 29, 32 T 20N R 51W
Meridian: Seward
Geographic: A tributary to the Iditarod River 7 miles east of Mosquito Mountain

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
56	73-10	0020730009	AA029286-029288
	73-81		AA029290-029309
			AA042100-042115

HISTORY AND PRODUCTION:

1910 -- Prospects were found (Maddren, 1911).

1910-1911 - Prospects yielded pans showing 1 to 2 cents worth of fine gold from some of the gravels (Maddren, 1915).

1949 - 4 claims staked by Douglas P. Lyman (BLM).

1951 - 4 claims staked by Douglas P. Lyman (BLM).

Before 1955 - Assays from a few cents to $1.00 a square foot of bedrock are reported to have been taken (Cady, Wallace, Hoare, and Webber, 1955).

1972 - 15 claims staked by Douglas P. Lyman (BLM).

1981 - 16 claims staked by Lyman Mining Co. (BLM).

1983 - Claims staked by Douglas P. Lyman are closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

Several 12 ft deep test shafts were sunk to bedrock and several crosscuts have been made (Cady, Wallace, Hoare, and Webber, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that strikes N40°E and dips 70°NE. The Iditarod basalt overlies the sedimentary rocks. Sills and dikes of basalt, altered to silica-carbonate rock, intrudes the sedimentary rocks. Gold occurs as an evenly distributed pay streak. Cinnabar also is associated with the gold (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1911
Maddren, 1915
Cady, Wallace, Hoare, and Webber, 1955
Hawley, Martinez, and Marinenko, 1969
Cobb, 1972
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): James L. Walker Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Holy Cross A-1 Sec 01, 02 T 23N R 54W
Meridian: Seward
Geographic: Located on the northwest side of Saddle Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
57	72-08		AA039361-039366

HISTORY AND PRODUCTION:

1979 - James L. Walker located 6 claims - Lucky Lady 1-6 (Kx).

1980 - Active (Kx).

1983 - Claims staked by James L. Walker are closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and shales intruded by quartz monzonite stocks (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
BLM

MINE NAME (other names): Horn Mountains Occurrence COMMODITIES: W - Placer

LOCATION: Quadrangle: Sleetmute C-7 Sec 17, 18, 20 T 19N R 51W
Meridian: Seward Sec 12, 13 T 19N R 52W
Geographic: Located along west side of Horn Mountains.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
58		0020820031	

HISTORY AND PRODUCTION:

1955 - Placer scheelite is reported by Harry Brink of Aniak (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and shales intruded by quartz monzonite stocks (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
MAS

MINE NAME (other names): Frank Lee Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Sleetmute C-7 Sec 08,17 T 17N R 51W
Meridian: Seward
Geographic: Northern tributary to New York Creek approximately 3 miles northeast of Napaimiut.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
59	82-38		AA026737-026740

HISTORY AND PRODUCTION:

1973 - Located by Frank Lee (BLM).

1983 - Claims staked by Frank Lee are closed (BLM).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywackes and shales intruded by quartz monzonite (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
BLM

MINE NAME (other names): Murray Gulch Mine
New York Creek
Dobnik Mining

COMMODITIES: Au, Ag – Placer

LOCATION: Quadrangle: Sleetmute C-7 Sec 07, 17, 18, 20 T 17N R 51W
Meridian: Seward Sec 02, 11, 12, 24 T 17N R 52W

Geographic: Located approximately 2 1/2 miles northeast of Napaimiut.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
60	82-05	0020820011	AA026731-026736
	82-28		AA026741-026746
	82-33		

HISTORY AND PRODUCTION:

1910 - Placer gold discovered (Maddren, 1915).

1910-1914 - Prospecting was done along lower three-fourths of a mile of Murray Gulch and near the mouth in valley of main stream (New York Creek). Good coarse gold prospects were found in stream gravels and bench gravels but no systematic mining has begun yet (Maddren, 1915).

1911 - First shaft was sunk about 15 ft to bedrock. Two buckets of gravel from the bottom contained coarse gold valued at $30; with the largest nugget valued at $3.65 and the smallest piece at 30 cents (Maddren, 1915).

1912 - Small drifts yielded 75 cents to the square foot (Maddren, 1915).

1914 - A. G. Maddren (USGS) investigated placer deposits on New York Creek. One man prospected bench gravels along left side of Murray Gulch by digging trenches. The gravels show 75 cents of gold to the square foot of bedrock. Plans are to ground-sluice the gravels by digging a 4,000 ft long water ditch (Maddren, 1915).

1915 - One small plant operated on New York Creek (Brooks, 1916).

1916 - A hydraulic plant was installed on New York Creek near end of season. A placer mine was worked on Mary (Murray ?) Creek. This was the first production on Mary Creek (Brooks, 1918).

1920 - Reports of production from New York Creek (Brooks, 1922).

1938 - Claims staked by Rudolph Dobnik and Alta Jacoby (BLM).

1971 - Claims staked by Adolph Dobnik (BLM).

1983 - Mining done by Alta Jacoby, Rudy and Adolph Dobnik on 12 claims (BLM).

PRODUCTION

Year	Gold Produced	
1911	$30 (hand picked)	(Maddren, 1915)
1912	$300	(Maddren, 1915)
1914	$80 (hand picked)	(Maddren, 1915).
1910-1915	$1000	(Maddren, 1915)
1910-1955	A few thousand dollars	(Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

Development consisted of shafts, trenches, and drifts. A hydraulic plant also operated. A small prospecting boiler was used to thaw frozen ground with steam (Maddren, 1915). Current methods include use of a drag-line, bulldozer, front-end loader, and sluice box (State of Alaska, 1983).

GEOLOGIC SETTING:

The country rocks in the area consist of interbedded Cretaceous graywacke and shale that dips northwest with rhyolite dikes striking northwest across upper Murray Gulch.

All the placer gold found in Murray Gulch has been found downstream from these dikes. The gold is probably closely related to these intrusives.

Unconsolidated sediments along the stream consist mainly of silt overlying gravels resting on bedrock. The deposits are about 35 ft deep at the mouth and become less upstream. A large part of the sediments are frozen.

Bench gravels were also prospected at two levels. A lower one 15 ft above and 50 ft back from present flood plain and one 70 ft above and 260 ft back from the creek. The gold found here is rough with little wear by stream washing (Maddren, 1915; Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Maddren, 1915
Brooks, 1916
Brooks, 1918
Brooks, 1922
Cady, Wallace, Hoare, and Webber, 1955
Cobb, 1972
State of Alaska, 1983
Kx
MAS
BLM

MINE NAME (other names): Fishwheel 1-8 Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Sleetmute C-8 Sec 23, 26 T 17N R 52W
Meridian: Seward
Geographic: Located along the north side of the Kuskokwim River just north of Napaimiut

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
61	82-33B	0020820019	

HISTORY AND PRODUCTION:

1970 - Claims staked (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of interbedded Cretaceous graywacke and shale intruded by rhyolite dikes (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): Kolmakof Mine COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-8 NW 1/4 Sec 01 T 17N R 54W
Meridian: Seward
Geographic: Located on a bluff along the north side of the Kuskokwim River 5 miles downstream from Kolmakof.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
62	82-02	0020820012	AA033443-033504
	82-04		
	82-13		AA038777
	82-24		AA038782-038787

HISTORY AND PRODUCTION:

1829 - It is believed that cinnabar specimens were from the Kuskokwim River region, an area explored by the Russians as early as 1829 (Malone, 1962).

1838 - Russians knew of cinnabar at this locality as early as 1838 (Cady, Wallace, Hoare, and Webber, 1955).

1870 - The Russians reported to Dall that cinnabar exists in the Cretaceous strata of the Alexander Archipelago. Possibly reported incorrectly by the Russians to cover up true location along the Kuskokwim (Dall, 1870; and Smith and Maddren, 1915).

1884 - Petrof reported occurrences of cinnabar veins with antimony along the Kuskokwim River and assays showed a valuable discovery (Petrof, 1884).

1890 - Cinnabar veins are exposed at various points along the river, but their remoteness has so far prevented a thorough examination or development (Smith and Maddren, 1915).

1898 - Noted by Spurr, who mentions a trader, Mr. Lind, found a cinnabar vein several years ago. Mr. Lind spent about $2000 in mining some of the ore and getting it to San Francisco, but lost money on the venture because of the small quantity and low price (Spurr, 1900).

? - Mr. Rabideau reported to have held property for many years and he produced a small amount of mercury in his homemade retort (Jasper, 1955).

1907 or 1908 - Property optioned or relocated by Gordon Bettles of Nome and Bettle adit was driven (Jasper, 1955).

1909 or 1910 - Two flasks of mercury recovered (Cady, Wallace, Hoare, and Webber, 1955).

1914 - Examined by Maddren (USGS), who found the indications of cinnabar were obscure. No work was being done (Smith and Maddren, 1915).

1944 - Examined by Webber of the Bureau. Twenty-nine trenches and open cuts totalling 600 ft in length were dug over a 350 ft strike length (Webber and Others, 1947).

Before 1953 - Held by Willie Rabideau, son of the oldtimer, for several years (Jasper, 1955).

1954 - Relocated by Western Alaska Mining Co. (Jasper, 1955).

- The Territorial Department of Mines laid out a surface exploration program and the company excavated 8 trenches (Jasper, 1955).

1958 - A Bureau engineer sampled the trenches using a 3 in posthole auger and 145 samples were taken (Malone, 1962).

1960 - Property owned by Western Alaska Mining Co. of Spenard, Alaska (Sainsbury and Mackevett, 1965).

1965 - Claims located and staked by R and H Mining Company (BLM).

1966 - Claims located and staked by R and H Mining Company (BLM).

1967 - Claims located and staked by R and H Mining Company (BLM).

1969 - Claims staked by R and H Mining Company (BLM).

1970 - Claims staked by R and H Mining Company (BLM).

PRODUCTION

Year	Flasks of Mercury	
1890's	? (small shipment made)	(Spurr, 1900)
1909 or 1910	2	(Cady, Wallace, Hoare, and Webber, 1955)

RESERVES:

No data available.

OPERATING DATA:

Development consisted of one adit, now caved; one shaft, destroyed by a dozer cut; one 80 ft deep inclined shaft, filled with water; and over 21 trenches, sloughed in (Jasper, 1955).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale of the Kuskokwim Group striking an average of N 30°E and dipping 35 to 60°NW.

Altered andesite sills are associated with the cinnabar mineralization. The largest is 25 to 30 ft thick and is exposed 400 ft along strike. The sills are altered to a silica-carbonate rock. Quartz is the principal gangue mineral. Cinnabar ore occurs as fracture fillings in brecciated zones, mainly on the hanging wall and is disseminated in both the sill and adjacent graywacke. Some pyrite occurs also in the sill. A 1/2 in thick cinnabar veinlet is at least 250 ft long within the sill. Pods of ore are up to 6 in thick and 6 ft long. No stibnite was found to be present (Smith and Maddren, 1915; Webber and Others, 1947; Cady, Wallace, Hoare, and Webber, 1955; and Jasper, 1955).

BUREAU WORK:

Examined and trenched in 1944. Samples contained from 12 to 404 lbs per ton mercury (Webber and Others, 1947).

Examined and sampled in 1958 by R. P. Malone. The work was not conclusive but did indicate the possibility of mineralization away from the crest of the river bluff (Malone, 1965).

REFERENCES:

Dall, 1870
Petroff, 1884
Spurr, 1900
Brooks, 1911
Smith and Maddren, 1915
Joesting, 1942
Webber and Others, 1947
Cady, Wallace, Hoare, and Webber, 1955
Jasper, 1955
Malone, 1962
Jasper, 1962
Sainsbury and MacKevett, 1965
Malone, 1965
Berg and Cobb, 1967
Cobb, 1972
Kx
MAS
BLM

MINE NAME (other names): Ptarmigan Occurrence COMMODITIES: Gemstone

LOCATION: Quadrangle: Russian Mission C-1 NW1/4 Sec 25 T 18N R 55W
Meridian: Seward
Geographic: Located on the south side of Russian Mountains.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
63	81-33	0020810006	

HISTORY AND PRODUCTION:

1960 - Located and staked by C. Abruska, N. Philip, and S. Tom (Kx).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Semiprecious silicates in Cretaceous graywacke and shale sedimentary rocks (Cady, Wallace, Hoare, and Webber, 1955).

REFERENCES:

Cady, Wallace, Hoare, and Webber, 1955
Kx
MAS

MINE NAME (other names): Mission Prospect
Konechney Prospect

COMMODITIES: Au, Ag, Cu
Pb, W, U, Sb?

LOCATION: Quadrangle: Russian Mission C1 NW 1/4 Sec 17 T 18N R 54W
Meridian: Seward
Geographic: Located 20 miles below Kolmakof at the headwaters of Mission Creek at an elevation of 2,000 to 2,350 ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
64	81-17	0020810005	

HISTORY AND PRODUCTION:

1914 - Prospects of placer gold reported on Mission Creek, but no activity shown in the creek during 1914 (Maddren, 1915).

- A deposit of gold-bearing antimony (stibnite) is reported to occur in the upper part of Mission Creek (Maddren, 1915).

1920 - Discovered and staked by Joe Konechney of Aniak (West, 1954).

1944 - R. E. Wallace and E. J. Webber of the USGS examined the property (West, 1954).

1952 - W. S. West and G. M. Haselton of the USGS examined property (Wedow and Others, 1952; Wedow and Others, 1953; and West, 1954).

1954 - Developed almost continuously since its discovery in 1920 (West, 1954).

RESERVES:

No data available.

OPERATING DATA:

Development consisted of two adits with a total of about 900 ft of underground workings. The portal of the upper adit is caved and the lower adit is iced shut. Several surface pits and trenches are slumped in also (West, 1954).

GEOLOGIC SETTING:

The country rock at the prospect is a Tertiary quartz monzonite probably of Oligocene or early Miocene age. This stock has intruded Cretaceous graywacke and slate.

The ore deposit consists of fissure veins and breccia filling within the quartz monzonite and nearly vertical basalt dikes striking N25°W.

A mineralized zone paralleling the strike of the dikes extends 1,000 ft and is 200 ft wide. It consists of quartz veins and thin breccia and gouge layers.

Mineralization includes arsenopyrite, chalcopyrite, pyrite, pyrrhotite, malachite, azurite, chrysocolla, galena, hematite, ilmenite, limonite, magnetite, metazeunerite, and scheelite.

Assays show 1.0 percent copper, 0.1 oz of gold per ton, and 1.0 oz of silver per ton (Wedow and Others, 1953; West, 1954).

REFERENCES:

Maddren, 1915
Brooks, 1916
Wedow and Others, 1952
Wedow and Others, 1953
West, 1954
Cady, Wallace, Hoare, and Webber, 1955
Hoare and Coonrad, 1959
Berg and Cobb, 1967
Cobb, 1972
Cobb, 1977
Kx
MAS

MINE NAME (other names): Cobalt Creek Prospect COMMODITIES: Cu, Au, Pb, Sn Ag, Zn, Ni

LOCATION: Quadrangle: Russian Mission C1 NE 1/4 Sec 08 T 18N R 54W
Meridian: Seward
Geographic: Located on the northeast side of the Russian Mountains in upper Cobalt Creek at an elevation of 1,550 to 1,750 ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
65	81-18	0020810001	

HISTORY AND PRODUCTION:

1899 - Discovered by Indians who told white men. It was staked but abandoned soon afterward (Maddren, 1915).

1900 - Discovered by 1900 by Gordon Bettles (Cady, Wallace, Hoare, and Webber, 1955).

1913 - 4 claims known as the February group were staked and a log cabin was built nearby (Maddren, 1915).

1914 - Examined by A. G. Maddren of USGS.

- A shaft was sunk to 25 ft during the first of the year then continued to 40 ft during the 1914-1915 winter (Maddren, 1915).

1952 - Examined by W. S. West and G. M. Haselton of the USGS. The workings consisted of 3 shallow shafts and several trenches and pits, most of them caved (West, 1954).

RESERVES:

No data available.

OPERATING DATA:

Development consists of 3 shallow shafts and several trenches and pits, most of them are caved in (West, 1954).

One shaft was 40 ft deep (Maddren, 1915).

GEOLOGIC SETTING:

The mineral deposit occurs in a porphyritic quartz monzonite. A fissure quartz vein strikes N20°W and dips 80 to 85° to the SW and is traceable for about 4,000 ft. Its width averages about 3 ft with a maximum width of 5 ft and minimum of 30 in occurring in a 40 ft deep shaft at the north end. Associated breccia zones occur mainly in the hanging wall.

Mineralization consists of chalcopyrite, arsenopyrite, pyrite, malachite, and stibnite. A dump sample assayed 11.0 percent copper, <0.25 oz of gold per ton, and traces of silver. Two samples from a shallow shaft about 1,000 ft west of the fissure vein are reported to assay 1.40 and 1.22 percent tin. A trace of nickel is also reported (Brooks, 1915; Maddren, 1915; West, 1954).

REFERENCES:

Brooks, 1915
Maddren, 1915
Brooks, 1921
Brooks, 1922
Wedow and Others, 1952
West, 1954
Cady, Wallace, Hoare, and Webber, 1955
Hoare and Coonrad, 1959
Berg and Cobb, 1967
Cobb, 1972
Kx
MAS

MINE NAME (other names): Brink Occurrence COMMODITIES: Mo

LOCATION: Quadrangle: Russian Mission D1 SE 1/4 Sec 21 T 20N R 55W
Meridian: Seward
Geographic: Located on the upper Owhat River about one mile east of Black Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
66	81-03	0020810009	

HISTORY AND PRODUCTION:

1918-1919 - D. E. Stubbs sent the USGS float specimens that contained molybdenite and powellite (?) in quartz. Location unknown (Smith, 1942).

1939 - Claims staked by H. Brink, D. Leach, and R. Strassel (Kx).

1955 - Molybdenite reported by Harry Brink on upper Owhat River (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is part of a small granitic pluton. Float specimens contained molybdenite and powellite (?) in quartz (Smith, 1942; Cady, Wallace, Hoare, and Webber, 1955; and Hoare and Coonrad, 1959).

REFERENCES:

Smith, 1942
Cady, Wallace, Hoare, and Webber, 1955
Hoare and Coonrad, 1959
Berg and Cobb, 1967
Cobb, 1972
Cobb, 1977
Kx
MAS

MINE NAME (other names): Black Mountain Occurrence COMMODITIES: Sb, Au, Ag

LOCATION: Quadrangle: Russian Mission D1 NE 1/4 Sec 30 T 20N R 55W
Meridian: Seward
Geographic: Located near the summit of Black Mountain south of Molybdenum Mountain

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
67	81-30	0020810010	

HISTORY AND PRODUCTION:

1944 - Examined by Webber of the Bureau. Two claims were located, Discovery Claim No. 1 and Black Mountain No. 2 (Ebbley and Wright, 1948).

1955 - Claims recorded at Aniak (Cady, Wallace, Hoare, and Webber, 1955).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

A 200 ft long, 2 in wide stibnite vein occurs within a shaly Cretaceous sandstone roughly paralleling a granite contact about 50 ft to the northeast (Ebbley and Wright, 1948).

BUREAU WORK:

Examined by Webber in 1944. A sample along the 50 ft central section of the vein assayed 48.9 percent antimony, 0.02 oz of gold per ton, and 0.2 oz of silver per ton (Ebbley and Wright, 1948).

REFERENCES:

Ebbley and Wright, 1948
Cady, Wallace, Hoare, and Webber, 1955
Hoare and Coonrad, 1959
Berg and Cobb, 1967
Cobb, 1972
Cobb, 1977
Kx
MAS