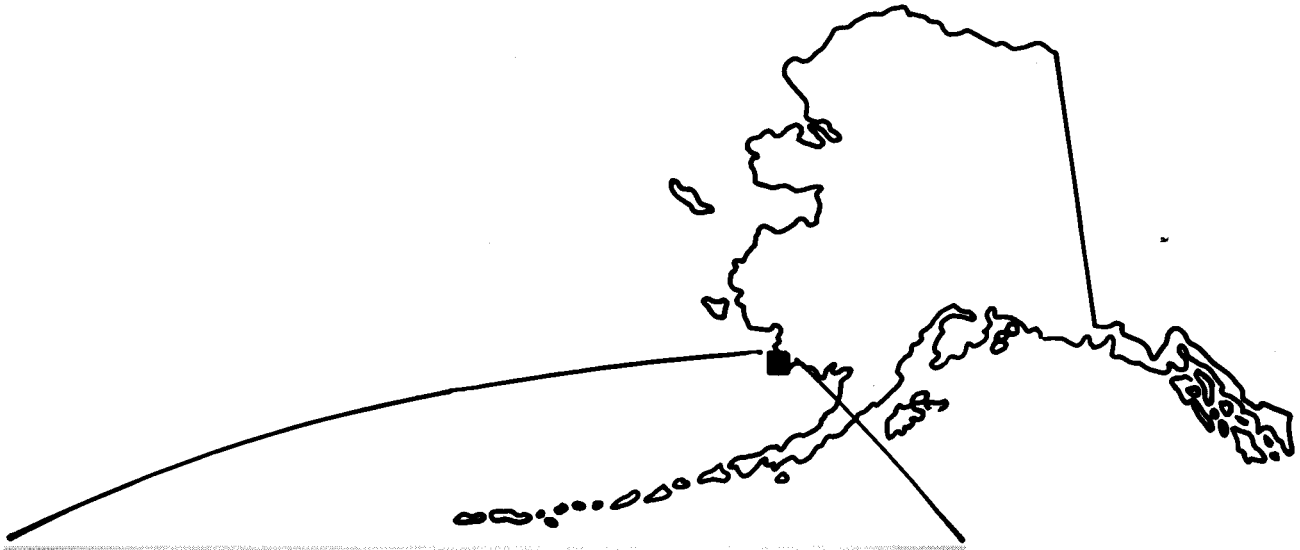
Bureau of Mines Mineral Investigation of the Goodnews Bay Mining District, Alaska

By Steven A. Fechner



UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
David S. Brown, Acting Director

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot
ft^2	square foot
ft^3	cubic foot
gpm	gallon per minute
hp	horsepower
in	inch
mi	mile
my	million year
oz	troy ounce
ppb	part per billion
ppm	part per million
%	percent
st	short ton
wt	weight
yd^3	cubic yard

BUREAU OF MINES MINERAL INVESTIGATION OF THE GOODNEWS BAY MINING DISTRICT, ALASKA

By Steven A. Fechner[1/]

ABSTRACT

The Bureau of Mines conducted site specific mineral investigations and reconnaissance sampling in the Goodnews Bay Mining District in 1986. The results indicate that approximately 70% of the mineral deposits in the district are located in two areas: Slate-Wattamuse Creek and Red Mountain. Placer deposits with high mineral development potential are located on Wattamuse and Cascade Creeks. Gold was found in rocks associated with the intrusive at the head of Wattamuse Creek.

In the Red Mountain area, platinum-group metals (PGM) and gold were found in the Salmon River and its tributaries and along the beach from Platinum to Chagvan Bay. All of the eastern tributaries of the Salmon River that drain Red Mountain and the beach along Kuskokwim Bay from Platinum to the Salmon River have high mineral development potential for small placer mining operations. The Salmon River has a high mineral development potential for a large operation. PGM and gold were found in the weathered dunite on Red Mountain and in the glacial deposits that comprise the bluffs along the beach.

Microprobe platinum-group element analyses of placer PGM grains identified twenty-three platinum-group minerals.

INTRODUCTION

The Bureau of Mines started a mineral evaluation of the Goodnews Bay Mining District in 1985 in order to assess the mineral development potential of the district. This project was undertaken under the Bureau's mining district studies program. This program is designed to determine the mineral development potential of mineral deposits in the district, identify mineral resources and reserves, and evaluate economic feasibility of mining.

Field work was conducted in 1986 and included both site specific mineral investigations and reconnaissance sampling. The district contains placer and lode gold, copper, and one of the two primary platinum producing mines in the United States.

This report summarizes the mineral development potential of identified mineral deposits in the Goodnews Bay Mining District and the data obtained from the 1986 sampling program. A feasibility study has not been conducted for the deposits in the district.

ACKNOWLEDGMENTS

The author would like to thank Calista Corporation, and especially Mike Neimeyer (Vice President) and Tom Turner (Geologist) for allowing access to their mineral data. Pat Jennings (Manager, Platinum Commercial Co. store) and Joe Ramirez of Platinum are also

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acknowledged for their logistical and supply support during the field portion of the study. Raymond Hanson (owner of the Hanson Properties, Spokane, WA) and Ron Dowers (mining engineer for Hanson Properties) provided housing at the Goodnews Bay Mine site and information about and access to the Salmon River placer deposits. Betty Huffman (claim owner on Wattamuse Creek) is thanked for her information. The author was aided in the field by the following Bureau employees: Bill Roberts who has subsequently left the Bureau, Tony Dunn and Dennis Southworth (temporary employees), Robert Hoekzema (Anchorage Branch Chief), and Al Clough (Physical Scientist, Juneau, AK). Robert Forbes, State Geologist for the Alaska Division of Geological and Geophysical Surveys also contributed to the understanding of the deposits in the Red Mountain area.

STUDY AREA

The Goodnews Bay Mining District is located in southwest Alaska (fig. 1). The district boundary was defined by Ransome and Kerns (71)2/ and encompasses approximately 1.1 million acres from Cape

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

Newenham on the south to Indian River on the north and Kuskokwim Bay on the west to Ungluayagat Mountain on the east (fig. 2). Access to the district is either by scheduled air service from Bethel and Dillingham to Platinum or Goodnews Bay, or via chartered aircraft to airstrips at Cascade Creek or at the Goodnews Bay mining camp. A gravel road spans the 10 mi between Platinum and the mining camp. Boats can be used to access the coastline.

Figure 3 is a land status map (109). Land status boundaries are not precise and conveyance is incomplete; therefore, specifics should be checked with the Bureau of Land Management. The district consists of both private and federal land. Most of the private land is owned by the Arviq Corporation around the community of Platinum; the Kuitcarak Corporation around the community of Goodnews Bay; and the Calista Corporation around both of the communities. The Bureau of Land Management manages the federal land that surrounds the corporation lands. Over half of the area is in the Togiak National Wildlife Refuge managed by the U.S. Fish and Wildlife Service, which is closed to mineral entry.

PREVIOUS STUDIES

The earliest geological investigation in the Goodnews Bay Mining District was by Martin (59) and Brooks (9-10) who reported on the mineral resources of the Slate-Wattamuse Creek area in 1916-17 and 1920. In 1921 and 1926, the geology and mineral resources of the Slate-Wattamuse Creek area were described by Harrington (39) and Holzheimer (56). In 1931 and 1933, Reed (72-75) described in detail the early placer mining efforts in the district and the ultramafic rocks at Red Mountain. J. C. Roehm (76-80) reported on the mineral

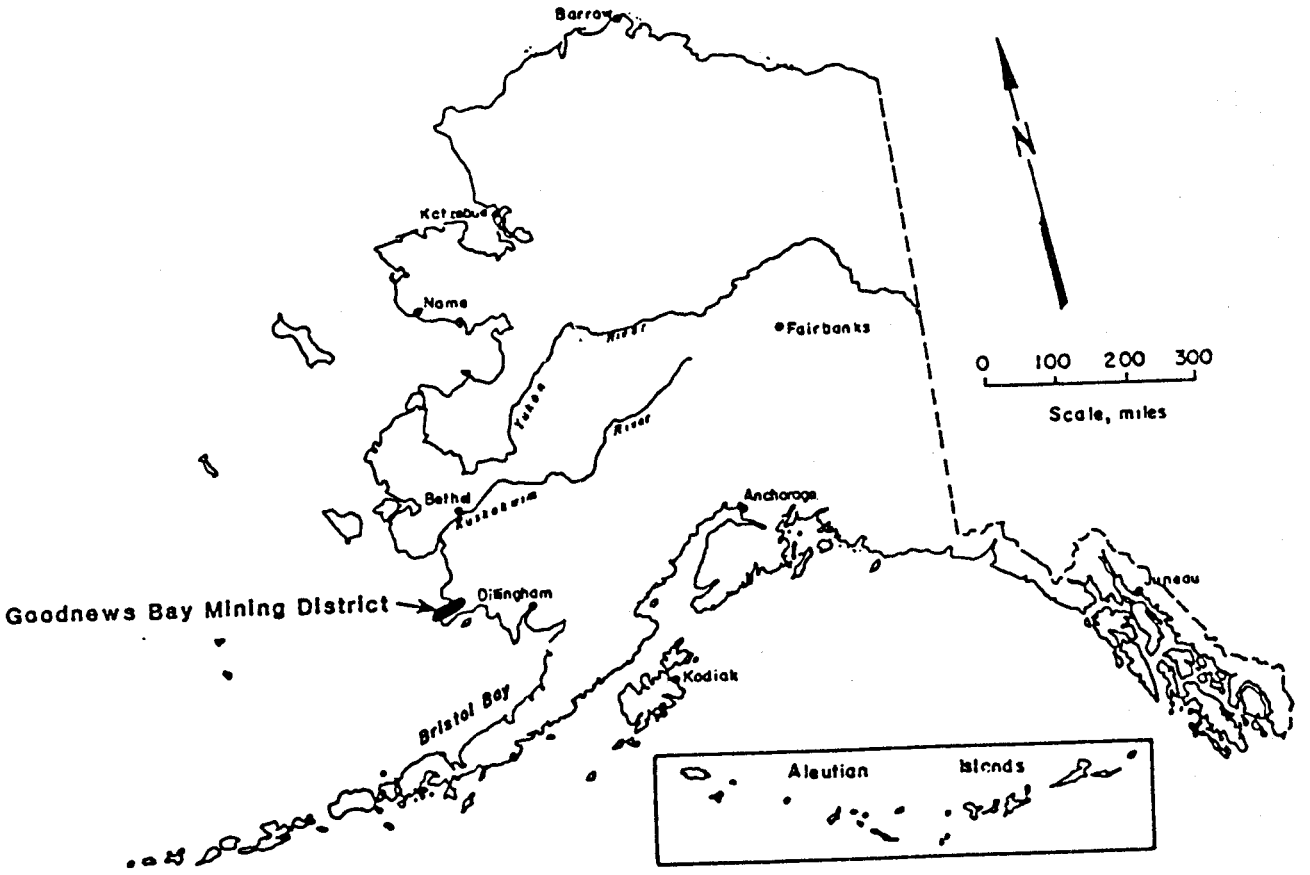
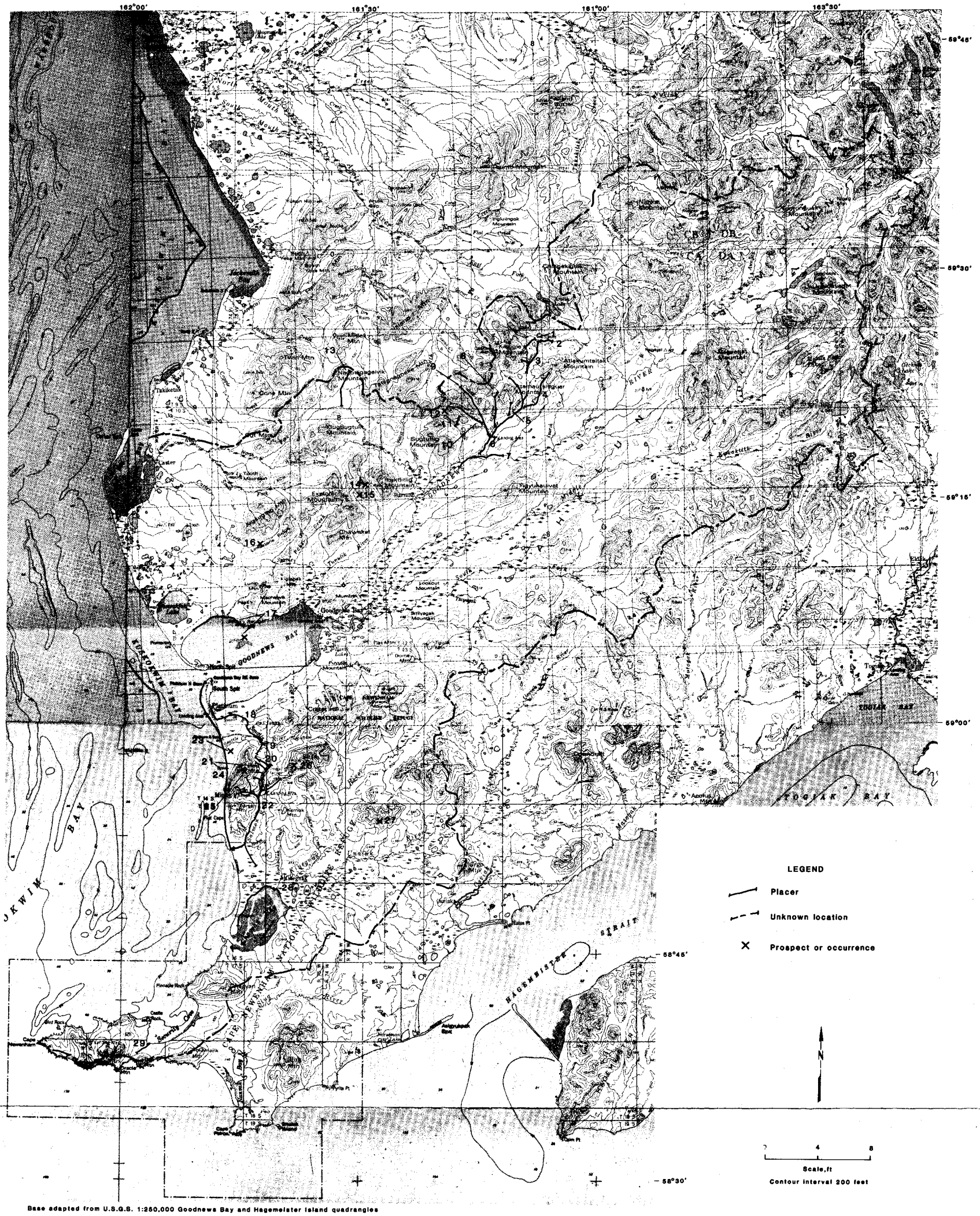


FIGURE 1. — Location map of the Goodnews Bay Mining District, Alaska.



Base adapted from U.S.G.S. 1:250,000 Goodnews Bay and Hagemeister Island quadrangles

Figure 2. -- Property location map for the Goodnews Bay Mining District, Alaska.

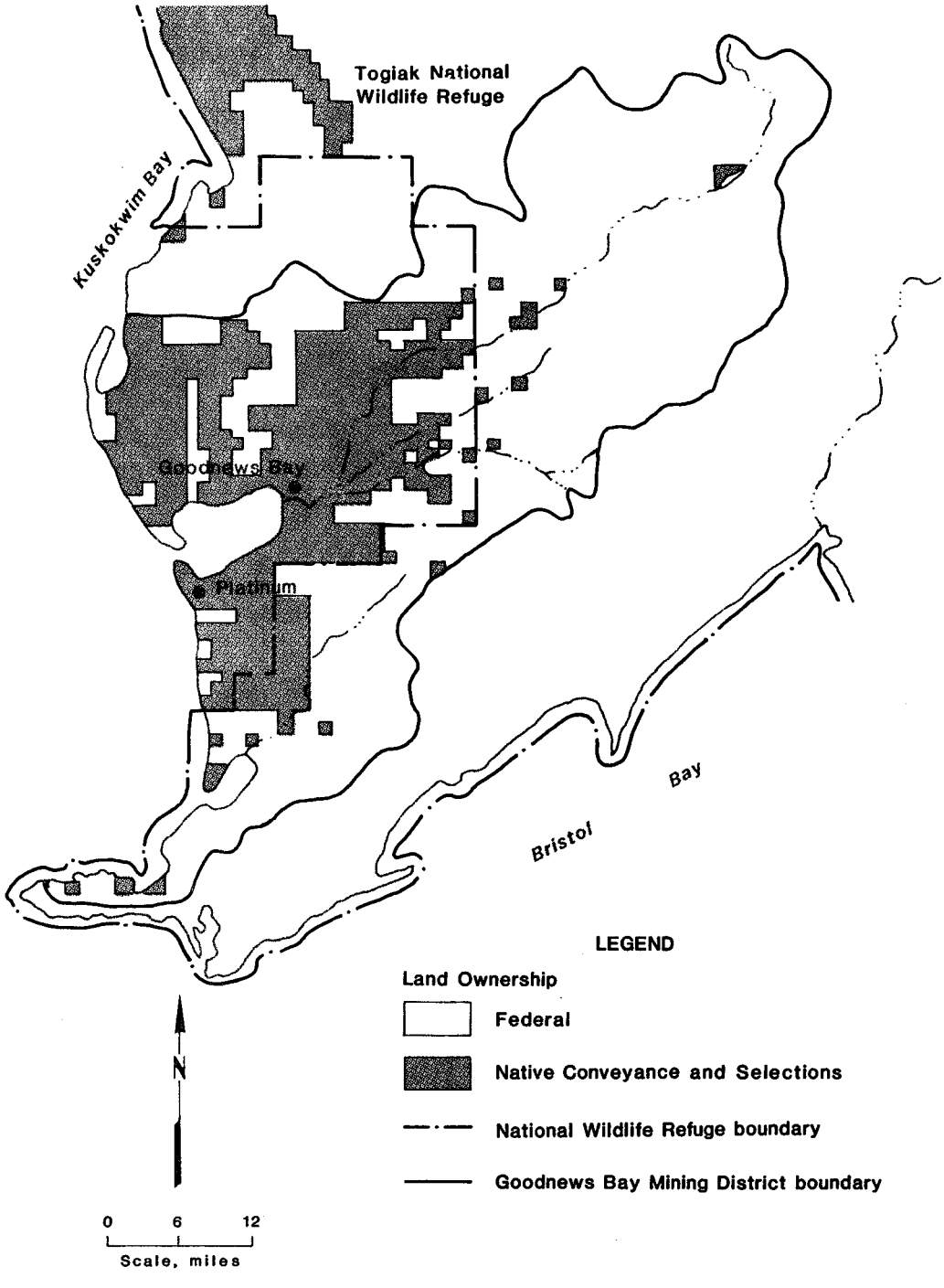


FIGURE 3. Land status map of the Goodnews Bay Mining District.

activity within the district in 1937-39 for the territory of Alaska. P. S. Smith (83-98) reported annually on the mineral activity in the district from 1926 to 1940. J. B. Mertie (60-64) published the most comprehensive descriptions of the platinum deposits in the Red Mountain area in 1937, 1940, 1969, and 1976. Joesting (58) and Fowler (35), for the Territory of Alaska Department of Mines, reported on the mineral activity at the Goodnews Bay Mining camp in 1942 and 1950. Hoare and Coonrad (49, 51-55) of the U.S. Geological Survey (USGS) mapped and described the geology of the central Kuskokwim region. Bird and Clark (5) reported results of electron-microprobe analyses of olivine chromitites from Red Mountain and suggested a similarity between Red Mountain and the Alaska-type zoned complexes. Berryhill (4), of the Bureau, investigated the placer potential of beach sands along much of the Bristol Bay coastline in 1963. In 1967, Porter (70) described the glacial history of the Goodnews Bay area. Results of an Alaska Mineral Resource Assessment Program (AMRAP) study conducted by the USGS were published in 1978 (24-25, 37, 40-48, 102-103). Cobb, Eberlein, and others (16-23, 31-32, 50) have summarized the mineral deposits of the Goodnews Bay and Hagemeister Island quadrangles. The Universities of Wisconsin and Texas reported on the offshore sedimentary processes active in the Goodnews and Chagvan Bay area (6, 65, 105, 110-112). Southworth and Foley (100-101) and Carlson (15) reported on the lode PGM potential of the Red Mountain ultramafic complex. Stephen Box (7-8), of the USGS, has recently reported on the tectonic setting of southwestern Alaska.

MINING HISTORY

Mining has occurred at two locations in the Goodnews Bay Mining District: Slate-Wattamuse Creek and Red Mountain areas (figs. 4-6).

In the Slate-Wattamuse Creek area gold was found on Bear Creek in 1916 (9). A year later gold was discovered on Wattamuse Creek. Hand mining occurred on Wattamuse Creek from 1917 until 1937 when the Bristol Bay Mining Co. installed a dredge on the creek. The company subsequently worked Wattamuse Creek and Cascade Creek downstream from the confluence of Wattamuse Creek until 1947.

In the Red Mountain area, platinum was discovered in 1926 at the mouth of Fox Gulch, a tributary of Platinum Creek, by an Eskimo named Walter Smith. Charles Thorsen a local resident and miner in the district went to the site of the discovery, panned some of the metal and sent it to the Bureau's office in Fairbanks, where it was analyzed and identified as platinum. In 1928, Thorsen discovered platinum in the gravels of Clara Creek, and in the same year Edward St. Clair made the first discovery of platinum on Squirrel Creek.

From 1927 to 1934, small scale placer mining operations were conducted on Platinum, Squirrel, and Clara Creeks, and on Fox and Dry Gulches. By 1934, most of the mining claims had been consolidated into two mining companies: the Clara Creek Mining Co. and the Goodnews Bay Mining Co.

The Clara Creek Mining Co. operated in the valleys of Clara Creek and the Salmon River between Clara and Platinum Creeks. Mining operations by the company were terminated in 1940.

The Goodnews Bay Mining Co. began work with a dragline excavator on Squirrel Creek in 1934 and continued mining for 7 years until most of the placers of Platinum Creek, Fox Gulch, and Squirrel Creek were worked out. The company built a dredge in 1937, which was used to mine an average of over 1 million yd^3 of gravel per year in the Salmon River valley until 1975 (36). The dredge worked intermittently from 1976 to 1986. Hanson Properties of Spokane, WA, acquired the Salmon River holdings in 1980 and at the time of the Bureau's investigation in 1986, was still the owner.

In 1936 and 1937 considerable exploratory drilling was done in a triangular-shaped area on the northwest side of Red Mountain, bounded by the Smalls River, Red Mountain, and Kuskokwim Bay. A dozen or more holes were drilled by various operators to depths ranging from 30 to 110 ft; bedrock was reached in only a few of these. A hole drilled in the valley of the Smalls River along the north side of the gravel road, about 2.6 mi S52°E of Platinum, reached bedrock at a depth of 192 ft and yielded both platinum and gold (63). No economic quantities of platinum were defined by any of the drilling.

PRODUCTION

Wattamuse and Cascade Creeks were the biggest producers in the Slate-Wattamuse Creek area (table 1). Approximately 6,000 oz of gold were mined by hand placer methods from 1917 to 1935. The Bristol Bay Mining Co. built a dredge on Wattamuse Creek in 1938 and mined 7,000 oz from Wattamuse Creek, and over 9,000 oz from Cascade Creek below Wattamuse Creek by 1947. Nearly 2,500 oz of placer gold were recovered from hand operations on Slate, Olympic, Bear, and Fox Creeks.

The early small-scale mining operations in the Red Mountain area from 1927 to 1937 yielded about 15,000 oz of platinum-group metals (PGM) (table 2). From 1937-1984, the total production was over 600,000 oz PGM and gold (table 2), with a maximum annual yield of about 30,000 oz of PGM and gold in 1944. Gold comprised less than 3% of the total ounces of precious metals recovered.

TABLE 1. Gold production from Slate-Wattamuse Creek area

Drainage	Years	Ounces of gold produced
Wattamuse Creek (39, 59, 80, 106)...	1917-1947	18,260
Cascade Creek (106)..	1940-1941	9,286
Slate Creek (106)....	1941	1,763
Bear Creek (106).....	1921-1941	559
Olympic Creek (106)..	1923-1929	169
Fox Creek (106).....	1941	4
TOTAL.....		30,041

TABLE 2. PGM production from Red Mountain area

Drainage	Years	Ounces of PGM produced
Clara Creek.....	1928-1937	10,000 1/
Dowry Creek.....	ND	1,800 1/
Salmon River tributaries..	1927-1931	5,000 1/
Salmon River, dredged.....	1937-1984	529,512 2/
Salmon River, draglined...	ND	100,000 (33)
TOTAL.....		646,312

1/Estimated by author
2/Total ounces PGM and gold (36)
ND No data

GEOLOGY

Bedrock geology in the Goodnews Bay Mining District consists predominantly of Paleozoic and Mesozoic age metavolcanic and metasedimentary rocks, which have been intruded by Jurassic age gabbros and ultramafic rocks and Cretaceous-Tertiary age felsic igneous rocks. These rocks were previously classified as the Gemuk Group, but recent work by Stephen Box (7-8) has subdivided the group into the Togiak and Goodnews terranes. Bedrock is overlain by unconsolidated Quaternary age deposits. The mineral deposits in the district are spacially and in some cases, genetically related to some of the ultramafic and felsic intrusives.

TOGIAK TERRANE

The Togiak terrane consists of Mesozoic age volcanic and volcaniclastic rocks that Box separated aerially into the Kulukak and Hagemeister subterranes (fig. 7, 7). The Kulukak subterrane is exposed to the southeast outside of the Goodnews Bay Mining District. The Hagemeister subterrane comprises a northeast-striking belt of rocks with its southwest end at Cape Newenham. The subterrane consists of Upper Triassic through Lower Cretaceous age rocks separated into three units by angular unconformities. The lowest unit is comprised of a mafic igneous suite intercalated with Upper Triassic age chert, which grades upward into lower Jurassic age shallow marine volcaniclastic rocks (7-8). The middle and upper units consist of intermediate composition volcanic and volcaniclastic rocks deposited in rapidly varying subaerial to deep marine environments. The upper unit (Lower Cretaceous) also contains detritus from the adjacent Kulukak subterrane and overlaps the Goodnews terrane.

GOODNEWS TERRANE

Box subdivided the Goodnews terrane into the Cape Peirce, Platinum, and Nukluk subterranes (fig. 7, 7-8). The Cape Peirce subterrane outcrops around Security Cove and between Chagvan and Goodnews Bays. It consists of Late Triassic or Early Jurassic age foliated volcanic and sedimentary rocks of transitional blueschist-greenschist metamorphic facies (7). The Red Mountain ultramafic complex is in this subterrane.

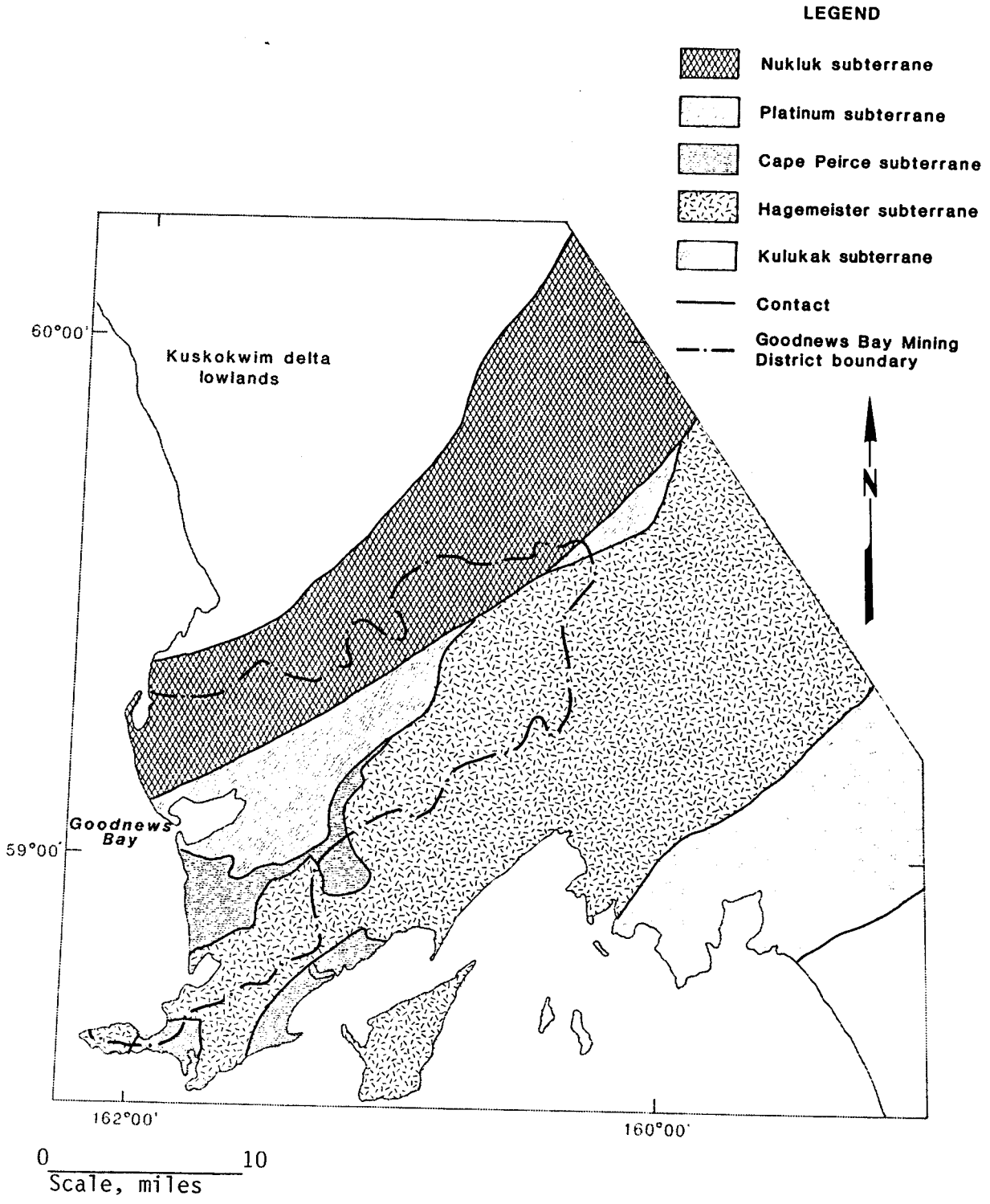


FIGURE 7. Tectonostratigraphic terrane map of the Goodnews Bay Mining District.

The Platinum subterrane is exposed in the Goodnews Bay area and in the upper Goodnews River drainage basin. It consists of nonfoliated Permian age basalts, limestones, and volcanic conglomerate.

The Nukluk subterrane's western edge is mapped from Goodnews Bay to Carter Bay, and is approximately 18 mi wide and trends northeast. The subterrane consists of a matrix-poor melange composed of limestone, radiolarian cherts, volcaniclastic rocks, and polymictic clastic rocks (7). Box (7) mapped a linear fault at the contacts of the Nukluk subterrane and the Platinum and Hagemeister subterranes. Pre-Middle Jurassic amalgamation of the Platinum, Cape Peirce, and Hagemeister subterranes is indicated by a crosscutting belt of early Middle Jurassic age mafic and ultramafic plutons (55).

INTRUSIVES

Intrusive rocks in the Goodnews Bay Mining District consist of Paleozoic and Jurassic age mafic and ultramafic rocks and Cretaceous-Tertiary age felsic rocks.

The mafic intrusives (mainly gabbro) are exposed as discrete bodies, such as at Explorer and Chagvan Mountains, the upper Unaluk River, and Cape Newenham; and as portions of mafic-ultramafic complexes, such as at Tatlignagpeke Mountain. Copper, gold, and arsenic mineralization have been noted or reported in some of the mafic intrusives in the area.

The ultramafic intrusives (dunite) are of Jurassic age and are located at Tatlignagpeke, Red and Suzie Mountains, Chagvan Mountain, and Cape Newenham, and in the Unaluk River drainage. PGM, copper, and chromium mineralization have been noted in some of these intrusives.

Cretaceous-Tertiary age felsic intrusives are exposed in the Explorer Mountain area, Wattamuse Creek, Slate Creek, and Tukaktlik River. Gold, silver, arsenic, antimony, and copper mineralization have been noted in some of these intrusives (104).

UNCONSOLIDATED QUATERNARY DEPOSITS

Unconsolidated Quaternary age deposits in the district consist of marine, glacial and fluvial deposits.

Marine Deposits

The marine deposits in the district consist of unconsolidated beach sands and gravels along Kuskokwim, Goodnews, and Chagvan Bays. The beach (foreshore region) is composed of unconsolidated, poorly sorted, and mostly glacially derived sediments. The sediment is derived from erosion of the bluffs that are prominent along the bays and from transportation by littoral drift. Landforms resulting from littoral drift include the spits at the mouths of Chagvan and Goodnews Bay and the Salmon River. The sediments have been reworked by surf action and ice-push. The beaches average 100 ft wide and range from 1/4 in deep at the base of the bluffs to an unknown depth (possibly 20 ft) in the active low tide level swash zone. The beach widths and depths are greater in the Platinum and Chagvan Bay areas where deposition of material due to littoral drift and barrier-inlet formation is active.

Bedrock consists of glacial clay, whose surface steepens seaward in a stairstep fashion. This study found that black sands which are generally composed of magnetite, ilmenite, chromite, PGM, and gold, are concentrated on the bedrock surface up to 75 ft from the bluffs. In the area between 30 ft from the bluffs and the ocean, the less than 1-in-thick black sand layers are intercalated with relatively unmineralized sand layers over the lower 3 ft depth. Placer PGM and gold were noted or reported in the marine deposits along Kuskokwim Bay from Platinum to Chagvan Bay and along and in Goodnews Bay (4, 21).

Glacial Deposits

Glaciation has had a prominent effect on the morphology of the mining district. The district contains broad U-shaped valleys filled with glacial material. Benches composed of glacial debris were noted along Fox, Olympic, and Wattamuse Creeks and in the Salmon River.

Porter (70) theorized that glaciers originating in the mountains around the Goodnews River spread over the coastal lowlands at least four times as broad piedmont lobes. The oldest drift, deposited during the Kemuk Glaciation, is deeply weathered and completely buried by younger drift. Massive morainal embankments of the Clara Creek Glaciation, the second oldest and most extensive ice advance, have been greatly modified by erosion and mass-wasting. Moraines built during the successively less extensive Chagvan and Unaluk glaciations exhibit less modified constructional topography characterized by low arcuate ridges and numerous kettle lakes. Radiocarbon dates provide a minimum age for the Unaluk Drift of 8,910 years and for the Chagvan Drift of greater than 45,000 years (70). Porter (70) theorized that there was a late Tertiary submergence of the Bering Shelf followed by eustatic changes related to fluctuations of Pleistocene glaciers.

Placer PGM is present in the till and glaciofluviatile deposits along the Salmon River and on the west side of Red Mountain. Placer gold is found in the glacial deposits along Kuskokwim Bay and along some of the creeks in the Slate-Wattamuse Creek area.

Fluvial Deposits

Unconsolidated fluvial gravel deposits are found along the streams of the area. Most of the gold produced in the district has come from the alluvial gravels on Cascade Creek. Placer PGM has been produced from alluvial/colluvial and glaciofluvial gravels along the Salmon River and its tributary streams draining Red Mountain.

Gravel deposit widths are up to 600 ft and thicknesses range from 15 to 200 ft in the Salmon River valley (63). In the tributary valleys the depths range from 6 to 20 ft (63).

BUREAU OF MINES INVESTIGATION

The Bureau initiated a mining district study of the Goodnews Bay Mining District in 1985 with field work conducted in 1986. A one year study was sufficient because of the districts' relatively small size, limited number of known mineral deposits, and the availability of data previously collected during the Bureau's on-going critical and

strategic minerals program. A literature search began in 1985, with field investigations in 1986.

LITERATURE SEARCH

A literature search was initiated in 1985. Data compilation on geology, production, and mining history included the review of USGS bulletins and reports, Alaska Territorial Department of Mines reports, ADGGS reports, university theses, company data, claim maps (1), and MAS (108) locations. Twenty-nine mineral properties were identified by the search (fig. 2, appendix A).

FIELD INVESTIGATIONS

Field investigations were conducted in May and June of 1986. Reconnaissance placer sampling was conducted in the drainages of the district. Detailed mapping and sampling of the identified mineral properties and geochemical anomalies were attempted. The Bureau collected 335 samples, which consisted of 234 reconnaissance placer, 87 rock, 7 stream sediment, 5 pan concentrate, and 2 soil samples (appendix B).

The procedure for reconnaissance placer sampling consisted of hand digging a pit and processing 0.1 yd^3 of unconsolidated material through a portable mini sluice box or hydraulic concentrator. The sluice box measured 34 in long by 10 in wide and had 0.38-in high transverse riffles resting on expanded metal on indoor-outdoor carpeting. The portable sluice box was used to process material adjacent to stream channels. The hydraulic concentrator consisted of a small grizzly attached to an aluminum mini sluice box similar to the one described above. Two mini sluice boxes were added onto the end of the concentrator's sluice box to enhance fine-grained heavy mineral recovery. Water was pumped to the concentrating unit by a 150-gpm-rated pump coupled with a 5-hp engine. The concentrator was used to process beach and glacial material and mine tailings. Wherever possible, channel samples of unconsolidated material were taken from the surface to bedrock. The 234 reconnaissance placer samples were taken from the following material types: 142 samples from stream material, 74 samples from beach sand, and 18 samples from glacial till.

Detailed reconnaissance placer sampling of beach and glacial sediments at 23 sample sites (177-183, 219-234, fig. 6, appendix B), was conducted from approximately 2 mi north of Red Mountain to 1.5 mi south of the Salmon River. A maximum spacing of one site per 0.5 mi was accomplished, with some spacings at 0.25 mi intervals. Samples of material from the bluff, the base of the bluff, and at 25-, 50-, and 75-ft intervals from the base of the bluff were taken at each site if possible. The actual number of samples taken was dependent on tidal conditions and the width of the beach. For the bluff samples, a representative sample was collected from a channel cut from near the surface to beach level. For the beach samples, a representative sample was collected from a channel cut in the material from the surface to the underlying glacial (bedrock) material, or to a 5 ft depth, whichever was reached first.

The sluice box concentrates were saved. One hundred thirty-seven concentrates were processed in Anchorage to separate the gold and PGM by using gravity separation techniques. The rest of the concentrates did not contain enough visible gold or PGM (less than 0.0001 grams) to warrant physical separation; therefore, they were sent directly to a commercial laboratory for inductively coupled plasma (ICP) and atomic absorption (AA) chemical analyses. The separated gold and PGM particles were measured, counted, described, weighed, and sent to a commercial laboratory for fineness determinations for the gold and electron microprobe analyses for PGM. The size distribution of the grains, recorded in this report as percent, was determined by dividing the number of grains of a certain size by the total number of grains in the sample and multiplying by 100. Fineness determinations are listed in table 3. Results of the microprobe analyses are listed in appendix C.

MINERAL DEVELOPMENT POTENTIAL AND RESOURCE ESTIMATES

Sample results and site specific mineral examinations were used to give each property a mineral development potential rating: "high", "moderate", "low", "unevaluated", and "unknown". These ratings are estimates based on an evaluation of grades and extent of mineralization. A deposit with a high mineral development potential would have both high grades and probable continuity of mineralization. In the case of a placer gold or PGM deposit, grades would exceed 0.01 oz/yd^3. A deposit of moderate mineral development potential would have either a high metal content or continuous mineralization identified, but not both. A deposit with a low mineral development potential rating would contain uneconomic grades and/or show little evidence of continuity of mineralization. An unevaluated mineral development potential would be given to a deposit that was not located or visited in the field. An unknown mineral development potential rating has been assigned to properties on which insufficient work was done to properly evaluate.

Resource estimates were made for the properties that had sufficient geologic information to calculate average grade and tonnage or yardage.

RESULTS

Detailed descriptions of the twenty-nine identified mineral properties in the Goodnews Bay Mining District are in appendix A. Twenty-three mineral properties (map nos. 1-4, 6, 8-13, 17, 19-25, 27-29, fig. 2, appendix A) were investigated. Evan's Pup (map no. 5, fig. 2, appendix A) could not be found and the the Bureau was not permitted to investigate the other properties (map nos. 7, 14-15, 18, 26, fig. 2, appendix A). The mineral development potential ratings for the properties are summarized on table 4.

Sample site locations for all of the samples taken by the Bureau are plotted on figures 4-6 and sample results are tabulated in appendix B.

Two areas in the district have had mineral development and contain nearly 70% of the known mineral deposits: the Slate-Wattamuse Creek and Red Mountain areas. They will be discussed in greater detail. Some miscellaneous deposits and the investigation of geochemical anomalies, outside of these two areas, will also be discussed.

TABLE 3. - Fineness values for samples taken in the Goodnews Bay Mining District

Map no. 1/	Sample no.	Location (map no.)2/	Fineness
50	6715	Slate Creek (6)	551
51	6716	...do	794
53	6718	Caribou Creek (6)	823
54	6696	Fox Creek (4)	817
55	6697	...do	604
56	6719	Slate Creek (6)	739
57	6720	...do	829
60	6723	Olympic Creek (8)	727
61	6736	...do	809
63	6734	...do	747
65	6732	...do	786
67	6725	Slate Creek (6)	718
69	6831	Wattamuse Creek (10)	781
70	6830	...do	757
71	6757	Cascade Creek (9)	847
72	6829	Wattamuse Creek (10)	799
73	6783	...do	780
74	6782	...do	825
75	6714	...do	734
78	6713	...do	745
83	6752	Cascade Creek (9)	646
84	6751	...do	784
117	6539	Barnum Creek trib (13)	816
118	6665	...do	779
121	6664	...do	424
123	6558	...do	745
127	6817	Beach	798
128	6816	...do	859
130	6814	...do	517
131	6813	...do	815
133	6810	...do	821
143	6543	Poker Creek	671
175	6789	McCann Creek (19)	918
177	6652	Beach (25)	758
178	6581	Beach till (24)	775
178	6582	...do	606
179	6586	Beach (25)	864
179	6587	...do	642
179	6588	...do	720
179	6589	...do	489
180	6622	...do	733
180	6623	...do	700
182	6641	...do	588
182	6642	...do	548
183	6634	...do	823
184	6827	Red Mountain (25)	807
191	6738	Dowry Creek (21)	824
195	6761	...do	738
213	6575	Platinum Creek (22)	774

See footnotes at end of table.

TABLE 3. - Fineness values for samples taken in the Goodnews Bay Mining District -- Continued

Map no. 1/	Sample no.	Location (map no.)2/	Fineness
218	6826	Red Mountain (25)	798
219	6698	Beach (25)	789
219	6699	...do	655
219	6700	...do	592
220	6726	...do	723
220	6727	...do	804
220	6728	...do	797
221	6729	...do	792
221	6741	...do	835
221	6742	...do	844
223	6743	Beach till (25)	900
223	6744	Beach (25)	840
223	6745	...do	736
224	6746	...do	856
224	6762	...do	812
225	6799	...do	857
225	6800	Beach till (25)	746
225	6809	Beach (25)	848
226	6763	Beach till (25)	781
226	6764	Beach (25)	846
226	6765	...do	811
227	6797	Beach till (25)	801
227	6798	Beach (25)	863
227	6801	...do	773
228	6767	...do	777
228	6768	...do	822
229	6795	...do	852
230	6707	...do	784
230	6708	...do	763
230	6769	...do	761
230	6770	...do	792
231	6709	Beach till	688
231	6711	Beach	697
232	6771	...do	710
235	6836	...do	827
236	6837	...do	856
249	6803	Security Cove (29)	781
250	6670	...do	834

1/Map no. refers to sample sites plotted on figures 4, 5, and/or 6.

2/Map no. refers to property location number on figure 2.

TABLE 4. - Mineral development potential ratings for properties in the Goodnews Bay Mining District

Property (map no.) 1/	Mineral Development Potential
JFM and Associates (1)	Unknown
Canyon Creek (2)	Unknown
Bear Creek (3)	Low
Fox Creek (4)	Low
Evans Pup (5)	Unevaluated
Slate Creek (6)	Low
Goodnews River (7)	Unevaluated
Olympic Creek (8)	Moderate
Cascade Creek (9)	High
Wattamuse Creek (10)	High
Malaria Creek (11)	Unevaluated
Wattamuse - Granite Creek (12)	Moderate
Barnum Creek Tributary (13)	Moderate
Ikuk (14)	Unevaluated
Tunulik (15)	Unevaluated
Kigsugtag (16)	Low
Goodnews Bay (17)	Unknown
Smalls Creek (18)	Unevaluated
McCann Creek (19)	Moderate
Clara Creek (20)	High
Dowry Creek (21)	Moderate
Salmon River (22)	High
Red Mountain (west side) (23)	Low
Platinum Salmon River Beach (24)	High
Red Mountain (25)	Low
Susie Mountain (26)	Low
Unnamed (27)	Low
Chagvan Bay (28)	Unknown
Security Cove (29)	Moderate

1/Map no. refers to property location number on figure 2.

SLATE-WATTAMUSE CREEK AREA

The Slate-Wattamuse Creek area is shown on figure 5. Bear, Canyon, Cascade, Fox, Malaria, Olympic, Slate, and Wattamuse Creeks, Evan's Pup, and Goodnews River contain placer gold (map nos. 2-11, fig. 2). Most production in the area came from Wattamuse, Cascade and Olympic Creeks (table 1). Most of the drainages are approximately 4 mi long, range from 200 to 2,000 ft wide and contain gravels up to 8 ft thick. They have similar physiographic profiles, with broad U-shaped valleys at the heads and middle portions of the creeks, and canyons in the lower portions. Benches composed of gold-bearing glaciofluvial material are found along Wattamuse, Olympic, and Fox Creeks. Bedrock is composed of Paleozoic to Mesozoic age metavolcanic and metasedimentary rocks, which strike northeast. Felsic intrusives outcrop at the head of most of the drainages. Samples of quartz float (91, 95-96, fig. 5, appendix B) with values up to 2 oz/st Au were taken from the headwaters of Wattamuse and Granite Creeks. Soil samples (85, 87, fig. 5, appendix B) taken from the head of Wattamuse Creek contained up to 6.55 ppm Au. A sample (96, fig. 5, appendix B) of a mafic intrusive rock near the contact of the Wattamuse intrusive contained 3.3 ppm Au.

Bureau placer sampling recovered gold values ranging from trace to 0.7583 oz/yd^3. The highest values were found in Wattamuse Creek. High platinum and palladium values were found in the placer concentrates from Bear Creek (44-46, fig. 5, appendix B) but no PGM grains were noted visually. Wattamuse and Cascade Creeks have high mineral development potential (table 4). Gold finenesses were from 551 to 829 (table 3).

Identified Resources

Identified resources in the area were determined for Cascade and Wattamuse Creeks. In Cascade Creek, the dredge mined approximately 800,000 yd^3 of material, with an average recovered grade of 0.025 oz/yd^3 Au. The average reported grade of the paystreak was 0.04 oz/yd^3 Au (73). Therefore, there may be 800,000 yd^3 of tailings which contains grades of 0.015 oz/yd^3 Au.

In Wattamuse Creek, it was determined that an area at least 100 ft long by 100 ft wide by 6 ft deep is present. This is an identified resource of 60,000 yd^3 of material. The average reported mined grade for the Wattamuse gravels was between 0.015 and 0.018 oz/yd^3 Au (39). This grade therefore is reasonable for the remaining yardage.

RED MOUNTAIN AREA

The Red Mountain area is shown on figure 6. Placer PGM was found in Fox Gulch in 1926, and since then PGM has been produced from the Salmon River, Fox Gulch, Platinum Creek, Dry Gulch, Squirrel Creek, Clara Creek, McCann Creek, and Dowry Creek. All of the reported PGM production has come from the Salmon River and its tributaries that drain the east side of Red Mountain. PGM was also reported in drill holes from the Smalls River (63); in the glacial deposits on the west

side of Red Mountain; in beach deposits along the beach from Platinum to the Salmon River; and in the weathered bedrock on Red Mountain.

Red Mountain Ultramafic Complex

The geology of the Red Mountain area is dominated by the Jurassic age Goodnews Bay ultramafic complex which comprises Red and Susie Mountains. Southworth and Foley (100-101) of the Bureau examined the bedrock geology of the area in detail from 1982 to 1984. They concluded that the intrusive is an Alaskan-type concentrically zoned ultramafic body, that consists of a dunite core surrounded by werhlite, magnetite clinopyroxenite, hornblende clinopyroxenite, and hornblendite. Southworth and Foley (100-101) also concluded that the Goodnews Bay complex is the bedrock source of placer PGM and some of the gold in the area. The workers noted anomalous PGM contents in chromitite bedrock and in magnetite nuggets in the tailings. PGM was also noted in the rocks on Red Mountain by earlier workers (5, 93, 105). Ulrich (105), identified cooperite and a platinum-iron alloy in the dunite, but no economic concentrations have been noted. During this study the Bureau took three 0.1 yd^3 samples of weathered dunite from the top of the Red Mountain (184-185, 218, fig. 6, appendix B). The samples were processed through the hydraulic concentrator and found a trace to 0.0011 oz/yd^3 PGM and trace to 0.0002 oz/yd^3 Au. The highest PGM and Au values were in the sample (218, fig. 6, appendix B) from the headwaters of Fox Gulch. Gold fineness values in two samples (184, 218) were 807 and 798, respectively (table 3).

Although PGM and gold have been noted in the complex and the complex is a source of the placer PGM and gold found in the creeks of the area, all of the work which has been done on the complex so far indicates that it has a low mineral development potential for lode PGM and gold.

Placer Deposits

PGM has been found in placer deposits within the Red Mountain area. The deposits have been subdivided into four categories for further discussion: (1) Salmon River deposits; (2) Red Mountain stream deposits; (3) marine deposits; and (4) west side of Red Mountain deposits.

Salmon River Deposits

The PGM-bearing placer deposits of the Salmon River occur in two distinct paystreaks; one in the present valley floor and the other in the bench channel on the east side of the valley. The Salmon River was mined by using a dredge with 8 ft^3 capacity buckets from between Last Chance and Boulder Creeks downstream to within a mile of the mouth of the Salmon River. The bench gravels on the east side of the creek were mined with a dragline from Clara Creek to Medicine Creek. Mining occurred continuously from 1937 to 1976 and sporadically from 1976 to the present. The average recovery grade for the dredge was 0.012 oz/yd^3 PGM.

The valley paystreak is from 300 to 600 ft wide and extends for 6 mi. The paystreak is covered by 30 to 80 ft of overburden. The gravels range up to 2 ft in diameter, with no clay and are from 30 to 75 ft thick. PGM occurs mainly on bedrock, in the overlying 2 ft of gravel and in the uppermost 2 ft of shattered bedrock. The bedrock is unweathered. Mertie (63) reported that the mean sizes by weight of the recovered PGM grains varied by claim, but averaged 16.5% +20 mesh, 13.7% -20/+30 mesh, 31.6% -30/+35 mesh, 16.3% -35/+45 mesh, 20.5% -45/+60 mesh, 1.5% -60 mesh (fig. 8). The mean composition of the recovered PGM grain analyses also varied by claim, but averaged 1.32% Rh, 0.19% Ru, 83.07% Pt, 12.52% Ir, 2.51% Os, and 0.39% Pd (63). Platinum-group minerals including cooperite, osmiridium, laurite, sperrylite, an iridium-palladium sulfide, mertieite, and bowieite have been identified by past workers (26-27, 63).

The bench paystreak extends for 10 mi along the east side of the Salmon River valley from Clara Creek to Happy Creek. The paysteak extends south of Happy Creek to Chagvan Bay. The paystreak is from 600 to 1,200 ft wide and from 10 to 200 ft thick. The paystreak consists largely of clay with about 20% gravel, which is irregularly distributed vertically. PGM occurs mainly on the surface of the bedrock and in the overlying 10 ft of clay and gravel. The bedrock is weathered to a depth of 5 ft. The grain sizes by weight of the PGM recovered on the bench paystreak varied by claim, but averaged 14.6% +20 mesh, 13.7% -20/+30 mesh, 20.3% -30/+35 mesh, 33.6% -35/+45 mesh, 16.1% -45/+60 mesh, and 1.5% -60 mesh (63). The mean composition of the recovered PGM also varied by claim but averaged 1.32% Rh, 0.15% Ru, 86% Pt, 10.15% Ir, 1.97% Os, and 0.41% Pd (63).

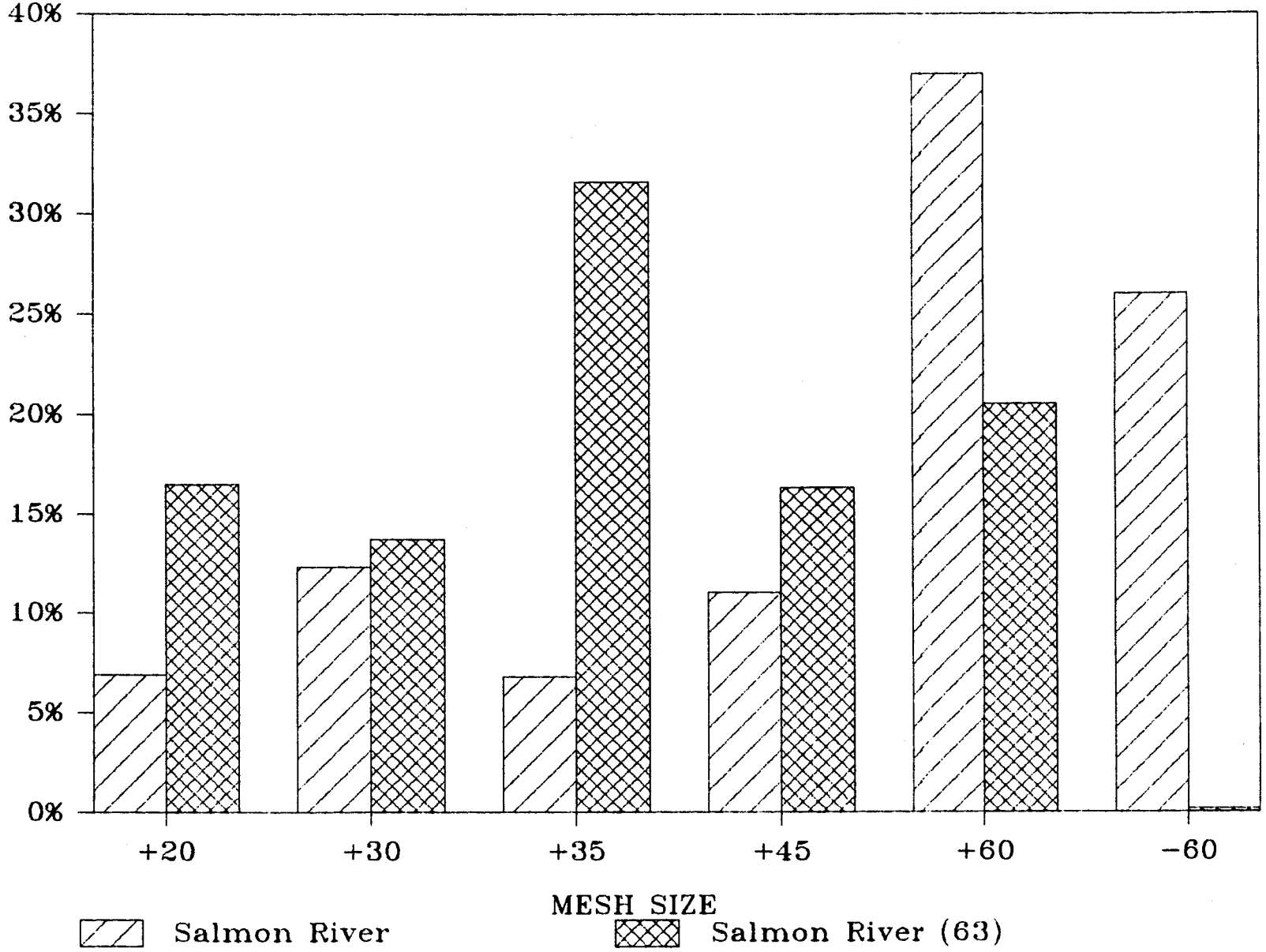
The Bureau did not extensively sample the Salmon River deposits during this study because the necessary equipment (drills and/or backhoes) was unavailable. The Bureau collected 10 0.1 yd^3 placer samples from 9 sample sites (197-205, fig. 6, appendix B) from dredge tailings in the Salmon River near Medicine Creek. The samples contained from 0 to 0.0037 oz/yd^3 PGM. PGM grain sizes by volume were 6.9% +20 mesh, 12.3% -20/+30 mesh, 6.8% -30/+35 mesh, 11% -35/+45 mesh, 37% -45/+60 mesh, 26.0% -60 mesh (fig. 8). This study recovered from the dredge tailings PGM grains which were the same mesh sizes as PGM grains reported by Mertie (63) from the dredge. This data suggests that the dredge was losing PGM from each size fraction. Microprobe analyses of the recovered PGM grains contained from 0.6 to 1.1% Rh, 0.4 to 0.7% Ru, 60.3 to 85.5% Pt, 3.8 to 25.6% Ir, 1.2 to 6.3% Os, and 5.9 to 8.9% Fe (appendix C). The recovered grains consist of iron-platinum alloy with 8 to 30% iron, ferroan platinum with minor osmiridium inclusions, osmiridium (iridium with minor osmium), sperrylite, and tetraferroplatinum (appendix C).

Red Mountain Stream Deposits

The PGM-producing streams that drain Red Mountain are from 1 to 2 mi long, have gradients of approximately 600 ft/mi, and are predominantly located on the east side of the mountain. The streams include McCann, Clara, Dowry, Boulder, Last Chance, and Platinum Creeks (fig. 6). Platinum Creek includes Squirrel Creek, and Dry and Fox Gulches. Mertie (63) described the geology and workings of the streams in detail. PGM-bearing alluvial and colluvial material is found in stream and bench deposits in the drainages. The deposits are 200 to

Figure 8. – PGM Size Distribution

for Salmon River.



400 ft wide, 10 to 25 ft thick, and extend from the headwaters to the mouths of the streams. The platinum metals are found in the lower few ft of the gravels, on the surface of the bedrock, and in the upper few ft of bedrock. The PGM grains in the east draining valleys are small, but overall are larger than those found in the Salmon River. Nuggets are uncommon, with the largest nugget weighing 4 oz (63). The streams were mined by hand and dragline excavator from 1926 to 1941. Platinum Creek was worked by the Goodnews Bay Mining Co. in the late 60's and early 70's. Mertie (63) found that the platinum-group element contents of the PGM grains recovered from the Red Mountain streams changed from south to north: the Pt content increases, and the Ir, Os, Ru, and Rh contents decrease. This study found the same relationship as shown on figure 9.

The Bureau sampled McCann, Clara, Dowry, Squirrel, and Platinum Creeks and Fox Gulch during this study. One placer sample (175, fig. 6, appendix B) taken from McCann Creek contained 0.0018 oz/yd^3 PGM and 0.0008 oz/yd^3 Au. The sizes of the PGM grains by volume were 6.6% +20 mesh, 20% -20/+35 mesh, 40% -35/+60 mesh, and 33.3% -60 mesh (fig. 10). Microprobe analyses of the recovered PGM grains were 2.1% Rh, 0.8% Ru, 81.4% Pt, 1.9% Ir, 0.9% Os, and 8.1% Fe (appendix C). The grains consist of iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, osmium, and sperrylite (appendix C). The fineness value for the recovered gold was 918 (table 3).

Six placer samples taken from five sample sites (186-189, 193, fig. 6, appendix B) were taken from Clara Creek. The samples contained up to 0.034 oz/yd^3 PGM, with the highest values being taken from unworked ground at the head of the old mining cut at 500-ft elevation. Microprobe analyses indicated 1.6% Rh, 0.5% Ru, 83% Pt, 3.8% Ir, 1.0% Os, and 8.1% Fe (appendix C). Iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, hollingsworthite, and sperrylite were identified (appendix C).

Four placer samples (190-191, 194-195, fig. 6, appendix B) were taken from Dowry Creek. The samples contained from 0.0007 to 0.0215 oz/yd^3 PGM and up to 0.0006 oz/yd^3 Au. The sizes of the PGM grains by volume were 1.2% +20 mesh, 10% -20/+30 mesh, 14.3% -30/+35 mesh, 3.2% -35/+45 mesh, 63.3% -45/+60 mesh, and 8% -60 mesh (fig. 10). Microprobe analyses of the recovered PGM grains were from 0.8 to 1.5% Rh, 0.4 to 0.9% Ru, 63.4 to 80.2% Pt, 7.2 to 18% Ir, 1.2 to 6.8% Os, and 6.6 to 7.5% Fe (appendix C). The grains were iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with minor osmium), hollingsworthite, osmium, xingzhongite, iridarsenite, irarsite, sperrylite, and tulameenite (appendix C).

Six placer samples taken from five sample sites (209-213, fig. 6, appendix B) of virgin ground and tailings were collected in Platinum Creek. Samples contained from trace to 0.0039 oz/yd^3 PGM and up to 0.0006 oz/yd^3 Au. Microprobe analyses of the PGM grains recovered in the samples indicated from 0.8 to 1.6% Rh, 0.5 to 1.0% Ru, 45.6 to 77.8% Pt, 8.1 to 37.8% Ir, 3.2 to 13.4% Os, and 4.1 to 8.4% Fe (appendix C). The identified grains were iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with less ferroan platinum), hollingsworthite, prassoite, kashinite, sulrhodite, ehrlichmanite, iridosmine,

FIGURE 9. – Variation in composition

of PGM from Red Mountain area.

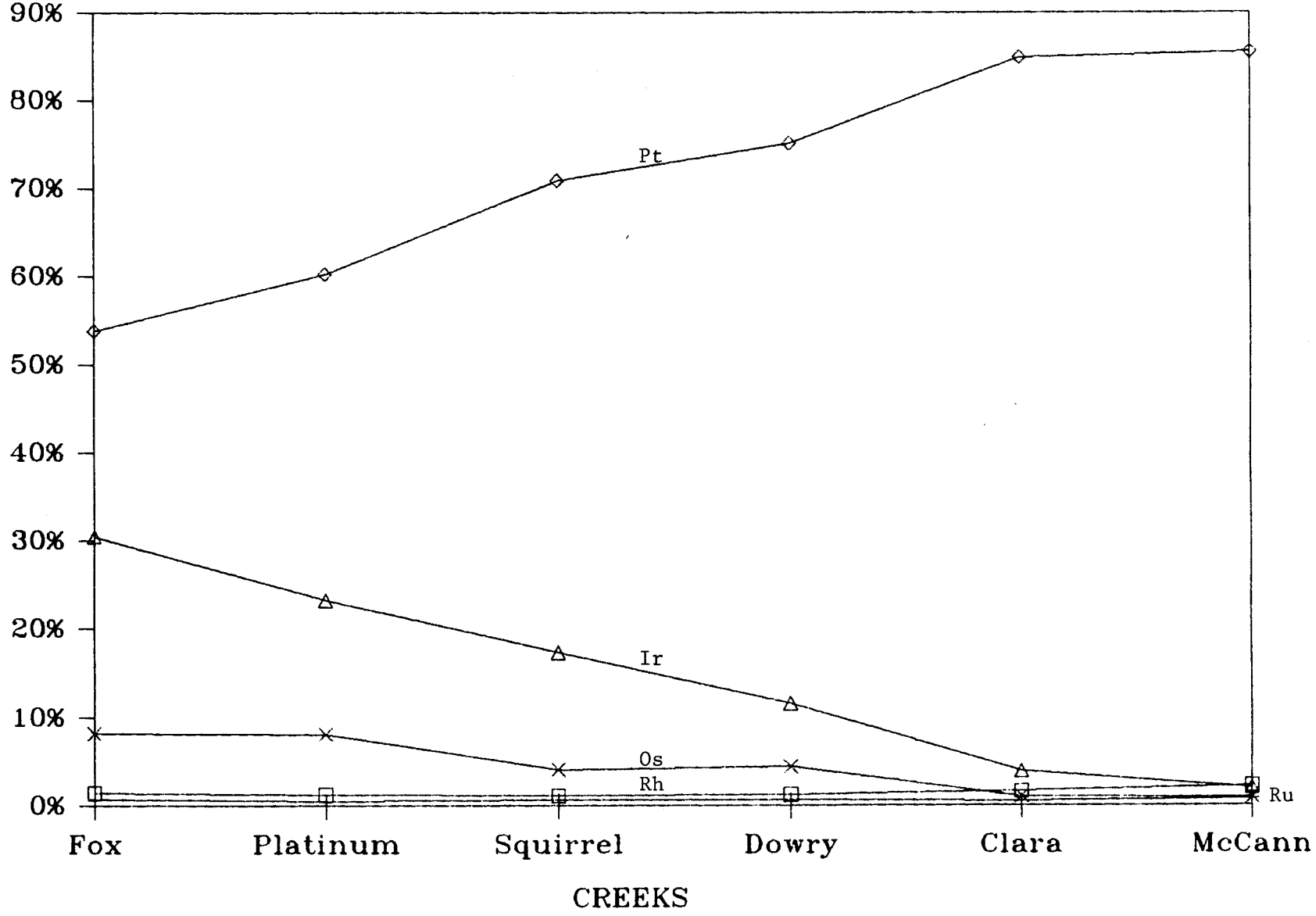
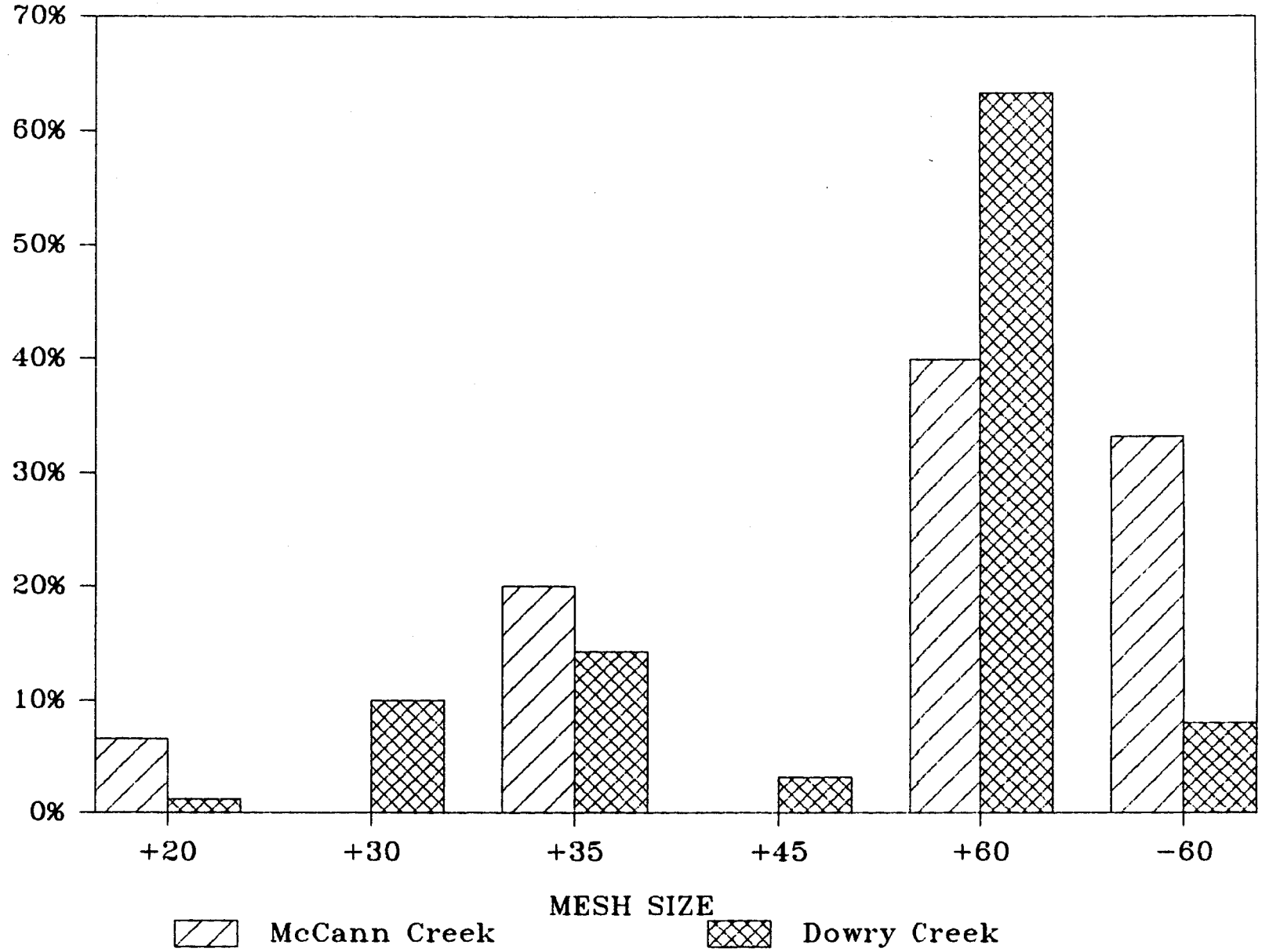


FIGURE 10. – PGM SIZE DISTRIBUTION

FOR RED MOUNTAIN STREAMS.



osmium, iridarsenite, iridium, sperrylite, and tulameenite (appendix C).

Four placer samples (214-217, fig. 6, appendix B) were taken from Fox Gulch. The samples contained from 0.0009 to 0.0378 oz/yd^3 PGM. Microprobe analyses of the PGM grains indicated from 1.3 to 1.9% Rh, 0.7 to 1.0% Ru, 37.7 to 48.6% Pt, 26.7 to 41.3% Ir, 9.8 to 13.4% Os, and 3.8 to 4.8% Fe (appendix C). The recovered grains consisted of iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, iridium with minor osmium, hollingsworthite, iridarsenite, irarsite, iridium, sperrylite, and platarsite (appendix C).

Three placer samples (206-208, fig. 6, appendix B) were taken from tailings in Squirrel Creek. The samples contained from 0 to 0.0037 oz/yd^3 PGM. Microprobe analyses of PGM grains indicated from 0.5 to 1.9% Rh, 0.3 to 0.9% Ru, 47.0 to 88.4% PGM, 0.7 to 37.4% Ir, 0.5 to 9.2% Os, and 4.1 to 9.0% Fe (appendix C). The grains consisted of iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with minor osmiridium inclusions, osmiridium with lesser iron-platinum alloy, and osmium (appendix C).

Beach Deposits

PGM has been previously reported (4, 6, 63, 105), and was found in this study, on the beaches along Kuskokwim Bay from the community of Platinum to Chagvan Bay. PGM and gold are enriched in black sand accumulations on the beaches; however the accumulations are spotty and discontinuous. Sixty-one placer samples of beach sands were taken from twenty-eight sample sites (176-183, 219-238, figs. 4 and 6, appendix B) between Platinum and Chagvan Bay during this study. The samples ranged in value from 0 to 0.26 oz/yd^3 PGM and 0 to 0.1029 oz/yd^3 Au. The highest values were obtained from samples collected in the Flat Cape area and the lowest values from samples collected north of Red Mountain and south of the Salmon River. The grain size distribution for gold by volume was 1% +20 mesh, 4.5% -20/+30 mesh, 11% -30/+35 mesh, 26.5% -35/+45 mesh, 20% -45/+60 mesh, and 37% -60 mesh (fig. 11). The grain size distribution by volume for PGM was 0.3% +20 mesh, 2.6% -20/+30 mesh, 6.7% -30/+35 mesh, 10.6% -35/+45 mesh, 4% -45/+60 mesh, and 75.8% -60 mesh (fig. 12). Microprobe analyses of the PGM grains indicate they contain from 0.5 to 4.5% Rh, 0.2 to 1.0% Ru, 32 to 89.1% Pt, 1.6 to 47.8% Ir, 0.8 to 15.9% Os, and 3.2 to 8.9% Fe (appendix C). The grains consisted of iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with minor osmium), iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, osmiridium with lesser iron-platinum alloy, rhodium, hollingsworthite, iridosmine, osmium, iridarsenite, irarsite, iridium, sperrylite, platarsite, tulameenite, and tetraferroplatinum (appendix C). Fineness values of the gold grains ranged from 548 to 863 (table 3).

Figure 11. – Au Size Distribution

for Beach.

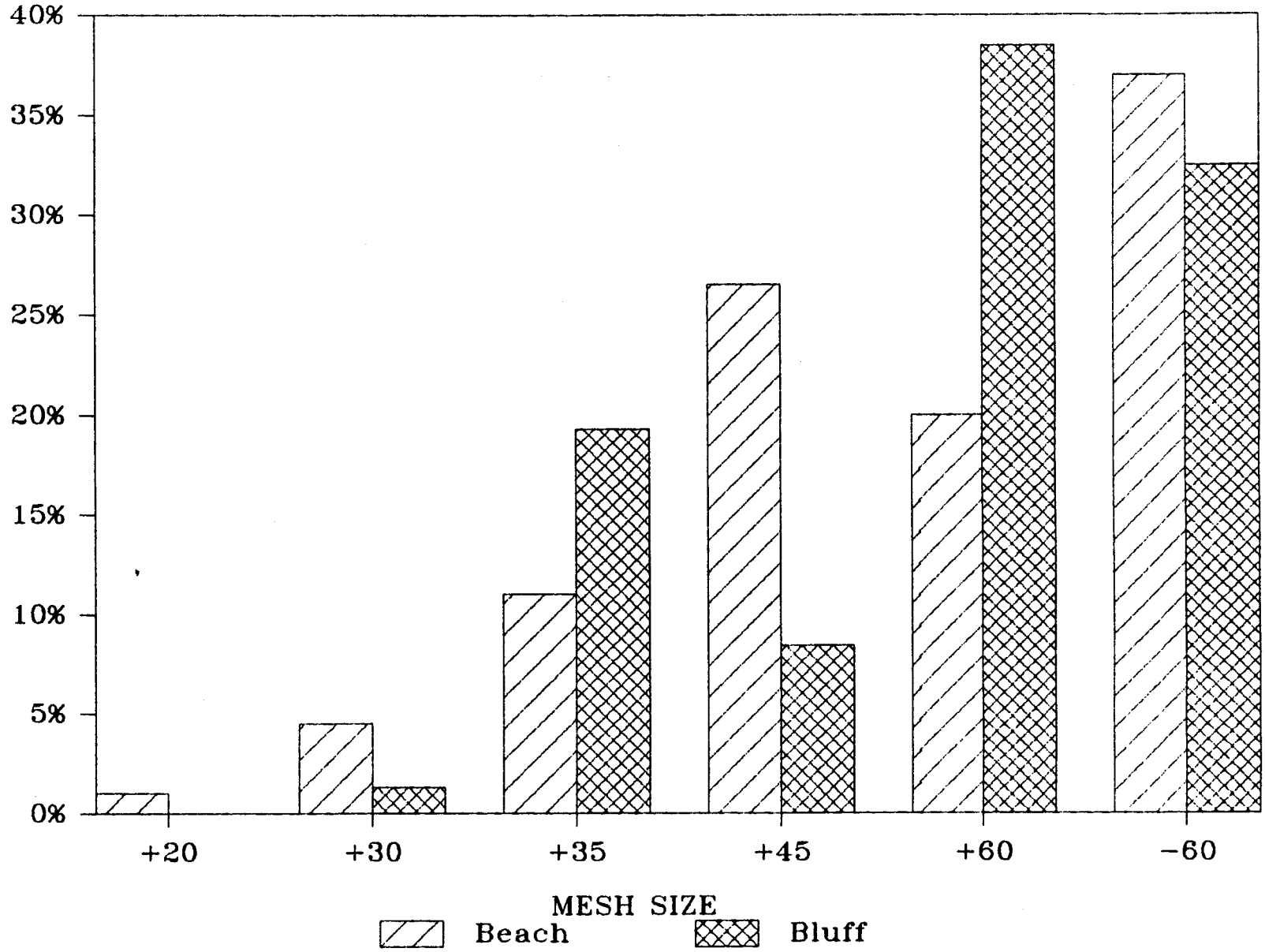
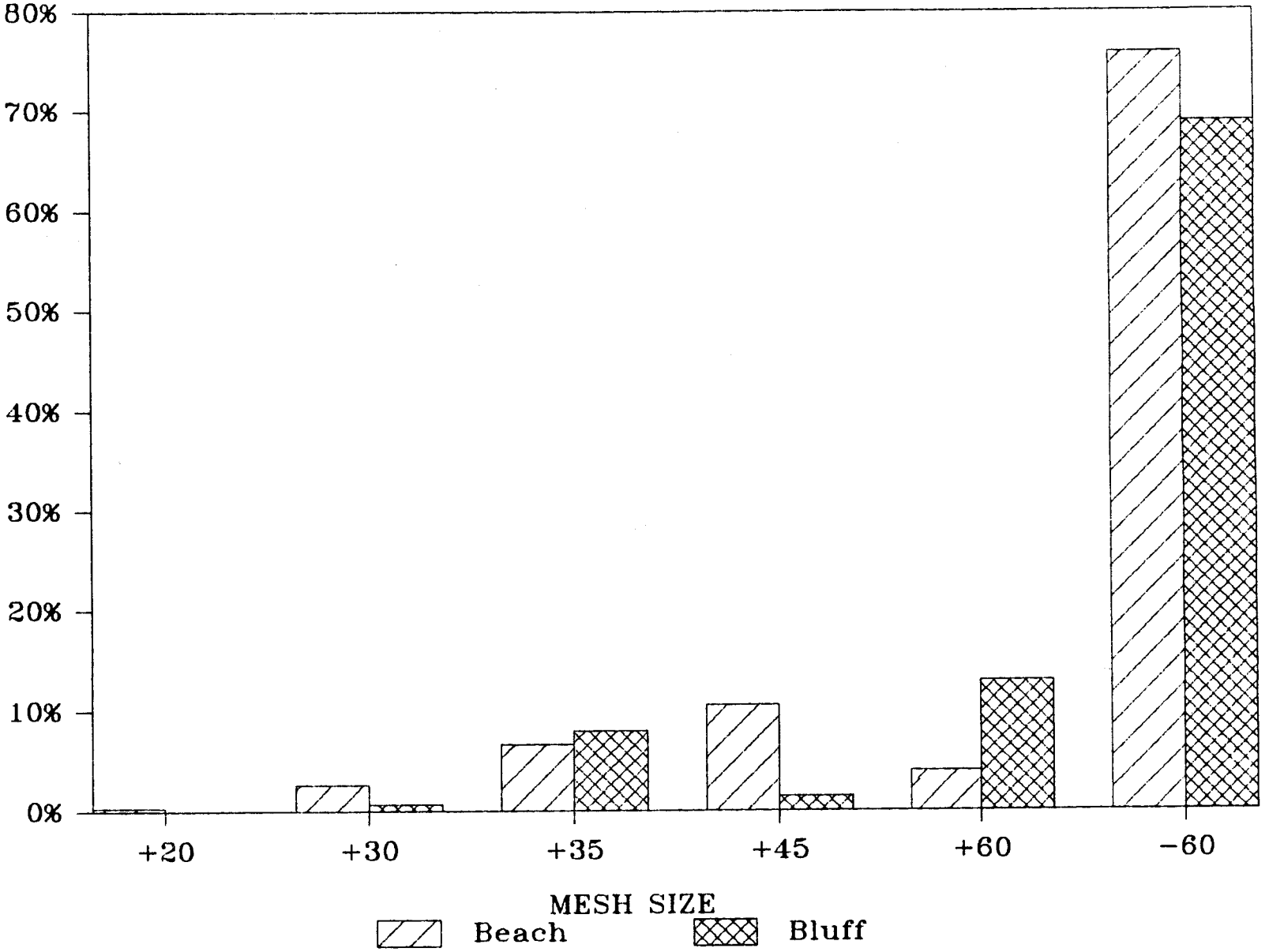


Figure 12. – PGM Size Distribution

for Beach.



West Side of Red Mountain Deposits

The placer deposits on the west side of Red Mountain are composed predominantly of glacial material from three glacial episodes. The glacial material is exposed in the bluffs along the beach. The bluffs north of Red Mountain are composed of more poorly sorted material than those south of Red Mountain, where glacio-fluvial gravel is more prominent. Holes drilled in 1937 and 1938 in the material on the northwest side of Red Mountain indicated that the material was up to 110 ft thick and contained uneconomic amounts of PGM and gold (78).

Sixteen placer samples (178, 180, 181-183, 220, 222-231, fig. 6, appendix B) were taken of the glacial material that composes the bluffs along the beach. The samples contained from 0 to 0.0013 oz/yd^3 PGM and 0 to 0.0005 oz/yd^3 Au. The best samples (225-226) were taken from the bluffs in the Flat Cape area where more glaciofluviatile material is exposed. The size distribution by volume for gold was 1.3% +30 mesh, 19.3% -30/+35 mesh, 8.4% -35/+45 mesh, 38.5% -45/+60 mesh, and 32.5% -60 mesh (fig. 11). The grain size distibution by volume for PGM was 0.7% +30 mesh, 8% -30/+35 mesh, 1.5% -35/+45 mesh, 13% -45/+60 mesh, and 68.8% -60 mesh (fig. 12). Microprobe analyses of the PGM grains found 0.7 to 1.7% Rh, 0.4 to 1.0% Ru, 7.2 to 86.2% Pt, 3 to 69.4% Ir, 0.6 to 20.2% Os, and 0.2 to 8.3% Fe (appendix C). The grains consisted of iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with minor osmium), iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, and hollingsworthite (appendix C). Fineness values for the gold ranged from 688 to 900 (table 3). The mesh sizes of the gold and PGM grains in the bluffs correlate well with those found on the beach. Sampling during Ulrich's (105) and this study indicate that the bluffs are the source for much of the PGM and gold found on the beach.

Identified Resources and Mineral Development Potential

A summary of identified resources for placer deposits in the Red Mountain area are listed in table 5. The unmined measured and indicated resources in the Salmon River have overall low average grades (0.0021 oz/yd^3 PGM, 33). These resources are in the lower sections of the bench deposit, which is up to 200 feet thick. Existing tailings are the largest available resource. Over 40 million yd^3 of material was mined by the dredge. The material ranged from 0.002 to 0.026 oz/yd^3 PGM. If it is assumed that the average recovery of the dredging operation was from 60% (28), there could be 40 million yd^3 of tailings that range from 0.0013 to 0.017 oz/yd^3 PGM. The average grade of the tailings would vary from claim to claim, and some of the claims with the highest original production grades have already been remined. The tailing samples taken during this study have low average grades (0 to 0.0037 oz/yd^3 PGM); however, samples were small and were taken from the sides of the tailings piles, which probably are not representative of the tenor of the whole tailings pile. Drilling or bulk sampling by trenching is needed to adequately assess the grade of the tailings.

TABLE 5. - Identified resources in the Red Mountain area

Drainage	Classification	Cubic Yards	Average grade oz/yd^3 PGM	Average grade oz/yd^3 Au
Salmon River bench.	Measured (33)...	37,882,300	0.0023	ND
Do.....	Indicated (33)..	24,530,000	0.0017	ND
Salmon River dragline.	Measured (33)...	496,000	0.0084	ND
Do.....	Indicated (33)..	500,000	0.0070	ND
Salmon River tailings.	Inferred.....	40,000,000	0.0013 to 0.017	ND
McCann Cr....	...do.....	500,000	0.0030	ND
Clara Cr.....	...do.....	5,000	0.0340	ND
Clara Cr tailings....	...do.....	500,000	0.0080	ND
Dowry Creek..	...do.....	7,000	0.0125	ND
Platinum Cr. tailings.	...do.....	50,000	0.0026	ND
Fox Gl.....	Measured (36)...	20,000	0.0200	ND
Fox Gl tailings.	Inferred (36)...	160,000	0.0120	ND
Squirrel Cr..	Measured (36)...	37,000	0.0135	ND
Squirrel Cr. tailings.	Inferred.....	50,000	0.0020	ND
Beach N of Red Mtn.	...do.....	27,000	0.0008	0.0001
Beach S of Red Mtn.	...do.....	39,000	0.0073	0.0033

ND - No data

The Salmon River has a high mineral development potential; however, much more sampling is needed as well as a high volume low cost mining operation, with an efficient recovery system, to economically work the Salmon River placer deposits.

The identified resources of the streams that drain Red Mountain are smaller than those of the Salmon River, but their average grades are higher (table 5). Clara Creek has high, Dowry Creek has moderate, and the Platinum Creek drainages have high mineral development potentials (table 4). A small or medium sized operation (less than 500 to 2,000 yd^3/day) could feasibly mine these deposits, but the operator would have to control more than one creek to assure multi-year operations.

PGM and gold values are extremely variable in the beach deposits from Platinum to the Salmon River. The highest values occur along the beach south of Red Mountain, where there are 39,000 yd^3 of inferred resources that average 0.0073 oz/yd^3 PGM and 0.0033 oz/yd^3 Au (table 5). More sampling is needed to increase resources. The beach has a high mineral development potential for a small operator who would concentrate on mining the high grade areas of the beach. Because of the high costs of transporting equipment and supplies to the area, an operator who controlled all of the PGM-bearing deposits in the area would have the best chance of economically mining the beach as part of the overall mining plan for the area.

Page, et. al. (69) reported identified resources of 1.3 million oz of platinum in lodes, 5.0 million oz of platinum in bays, and 0.5 million oz platinum in beaches around Goodnews Bay. Sampling during this study does not support these findings.

Building material (i.e. sand and gravel) is in short supply in southwest Alaska. The tailings in the creek on the east side of Red Mountain would be an excellent source of building material for the region.

MISCELLANEOUS DEPOSITS

The remaining 30% of the known mineral deposits in the Goodnews Bay Mining District are located in the western and southern portions of the district. These deposits are described in more detail in appendix A. Most of the deposits have low or unknown mineral development potentials; however, Barnum Creek Tributary and Security Cove have moderate mineral development potential because of their anomalous placer gold values and potential for the presence of significant resources.

Barnum Creek Tributary is a south flowing tributary of Barnum Creek near the divide between Barnum Creek and Faro Creek/Arolik River (map no. 13, fig. 2). The tributary is a slow moving stream with numerous beaver ponds and it cuts through glacial material. Four placer samples (117-118, 121-122, fig. 4, appendix B), taken from surface gravels, contained from 0.0002 to 0.0010 oz/yd^3 Au. Gold fineness ranged from 424 to 816 (table 3). Anomalous gold values from the surface gravels indicate further sampling is warranted. Drilling would be necessary to adequately evaluate the gravels.

Streams that drain into the southwest side of Security Cove are historically known to contain gold (78). The streams cut through

glacial material. The Bureau sampled three stream beds and the beach along Security Cove in the vicinity of the known gold occurrences (map no. 29, fig. 2). Four placer samples from the streams (249, 251-252, 254, fig. 4, appendix B) contained from trace to 0.0033 oz/yd^3 Au. The gold particles were rough, nuggety, and iron-stained. The sizes of the gold particles by volume were 33.4% +20 mesh, 20% -20/+35 mesh, and 26.6% -35 mesh. Finenesses for two samples were 781 and 834 (table 3). Three PGM grains were found in sample 249. Microprobe analyses of the PGM indicated a composition of 0.5% Rh, 0.2% Ru, 84% Pt, 3.2% Ir, 1.4% Os, and 7.7% Fe (appendix C). The grains were iron-platinum alloy with 8 to 30% Fe, iron-platinum alloys with minor osmiridium inclusions, and osmiridium (iridium with minor osmium) (appendix C). Only traces of gold were found in beach samples. The amount, character, and size of the recovered gold, and the lack of placer gold in the beach material and other streams in the area suggest a local source. The source may be the iron-stained Paleozoic rocks, which outcrop along the west side of the cove. The rocks appear to be sheared metavolcanics and argillaceous sediments. Shear zones strike N45° to 55°E, dip 60° to 75° NW, are from 4 to 15 ft wide, and contain abundant pyrite in pods, stringers, and disseminations. No gold was detected in the rock samples, but one sample (253, fig. 4, appendix B) from a pod contained 0.34% Pb.

The Ikuk and Tunulik deposits (map nos. 14 and 15, fig. 2, respectively), were not investigated during this study because the local village corporation would not grant the Bureau permission to sample on their land. Both deposits are characterized by the presence of sulfides located along fracture zones in intrusive complexes (104). Sulfide minerals reportedly contain chalcopyrite, arsenopyrite, pyrrhotite, and pyrite (104). Samples from the deposits reportedly ranged up to 2.4% Cu, 25.2 ppm Ag, 0.16 oz/st Au, and 0.99% As (104).

GEOCHEMICAL ANOMALIES

Geochemical anomalies have been identified in the Goodnews Bay Mining District by the USGS during the AMRAP studies and during studies by a geological consulting firm, under contract with Calista Corporation (24-25, 40-48, 103-104). The drainages having the highest geochemical anomalies, which did not contain identified mineral properties, and those not on local village corporation land were investigated and many of the streams were resampled during this study using placer sampling techniques.

The Bureau investigations did not locate any economically mineralized material in the drainages with geochemical anomalies. The anomalous chemical analyses from the Bureau's sampling and the USGS samples were low in comparison to anomalies from economically mineralized areas in the state. The Bureau therefore concluded from the investigations that it is unlikely that economically mineralized material exists in the drainages that contain these geochemical anomalies.

SUMMARY

The Bureau conducted site specific mineral investigations and sampling in the Goodnews Bay Mining District in 1986. The results indicate that approximately 70% of the mineral deposits in the district are located in two areas: Slate-Wattamuse Creek and Red Mountain. In the Slate-Wattamuse Creek area, Wattamuse and Cascade Creeks have high mineral development potential and sufficient resources to support a small to medium-size placer mining operation. Gold was found in the rocks associated with the intrusive that outcrops at the head of Wattamuse Creek. This area has a moderate mineral development potential for possible lode gold resources.

In the Red Mountain area, PGM and gold were found in the Salmon River and its tributaries that drain Red Mountain and along the beach from Platinum to Chagvan Bay. Bureau sampling and reports indicate that resources are sufficient to support small mining operations in the streams that drain Red Mountain and on selected sections of the beach between Red Mountain and the mouth of the Salmon River. The Salmon River has a high mineral development potential for a large operation. A large operation is needed because of the gravel depth and moderate grade of the remaining resources. Placer operators in this area would also have to be able to process and recover PGM from the large percentage of clay that is present in the deposits. Detailed drilling and/or trenching of the deposits is needed prior to a mining decision.

PGM and gold were found in the weathered dunite on Red Mountain proving that it is a source of the PGM and some of the gold found in the placer deposits. PGM and gold were also recovered from the glacial bluffs along the beach indicating the bluffs are a source of much of the PGM and gold found along the beach. Although these two deposits are sources for the PGM and gold in the streams and on the beach, the present data indicates that the average PGM and gold grades are too low to constitute mineable deposits using present technology. These deposits, however, have only been surficially sampled. Drilling is needed to properly define the extent and tenor of these mineral deposits.

Microprobe analyses identified trends which correlated well with the findings of Mertie (63) for placer PGM in the area. Twenty-three platinum group minerals were identified; whereas, only seven had been reported previously.

The tailings in the mined stream of the Red Mountain area would be excellent sources of building material (i.e. sand and gravel) for southwest Alaska.

Placer deposits with moderate mineral development potentials were found at Barnum Creek Tributary and Security Cove. Further exploration using drills is needed to properly evaluate these deposits. Sulfide minerals in fractured intrusives have been previously identified at the Ikuk and Upper Tunulik River prospects.

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APPENDIX A. -- Mineral Property Summaries

for the Goodnews Bay Mining District, Alaska

Explanation

Map Location No. - Location number of the property shown on figure 2.

Kardex No. - Location number of property in the Minfile Reference System (1).

Mineral Survey No.- Refers to the number assigned to a survey performed on an individual or group of mining claims. Mineral Surveys are available at U. S. Bureau of Land Management State Offices.

MAS No. - Number assigned to Bureau Mineral Availability System mineral property files (108).

NAME: JFM & Associates

Map Location No. 1
Kardex No. 37
Mineral Survey No.
MAS No. 9001

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6.NE 1/4 Sec 12 T 9S R71W Meridian: Seward.
Geographic: Tributary to Bear or Canyon Creeks.
Elevation: 900 ft.
Access: Float airplane to Canyon Lake or helicopter.

Deposit Type: Placer & Lode.
Commodities: Au.

HISTORY:
1981 - Staked by John Malone (1).
1984 - Assessment work done (1).

Production: None reported.

WORKINGS AND FACILITIES: Suction dredging reported (108).

GEOLOGIC SETTING: Paleozoic-Mesozoic sedimentary and volcanic rocks.

BUREAU INVESTIGATION: The Bureau investigated the area in 1986. No mineralized rocks were noted. A sample of chert breccia (43, fig. 5, appendix B) and a stream sediment sample (42, fig. 5, appendix B) were taken. No anomalous metal values were found in the samples.

RESOURCE ESTIMATE: No indications of economic minerals were found; therefore, a resource could not be calculated.

MINERAL DEVELOPMENT POTENTIAL: This property has an unknown mineral development potential because more work is needed.

RECOMMENDATIONS: More mapping and sampling is needed.

REFERENCES: 1, 108.

NAME: Canyon Creek

Map Location No. 2
Kardex No.
Mineral Survey No.
MAS No. 20

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6. S 1/2 Sec 5 T 9S R70W Meridian: Seward.
Geographic: Tributary to the Goodnews River.
Elevation: 600 ft.
Access: Float airplane to Canyon Lake or helicopter.

Deposit Type: Placer.
Commodities: Au.

HISTORY: Unknown.

Production: None reported.

WORKINGS AND FACILITIES: Unknown.

GEOLOGIC SETTING: Bedrock is mainly sedimentary and volcanic rocks of Paleozoic-Mesozoic age. Canyon Creek, in general, occupies a broad glacial valley. A steep canyon section is present 4.5 mi downstream of Canyon Lake and is approximately 1.5 mi long.

BUREAU INVESTIGATION: The Bureau did not specifically sample Canyon Creek near Bear Creek. Bedrock was sampled (40, fig. 4, appendix B) downstream from Bear Creek. No gold was noted in the sample. A 0.1 yd^3 placer sample (39, fig. 4, appendix B) was taken from Canyon Creek and contained 2 very fine pieces of gold.

RESOURCE ESTIMATE: A resource could not be calculated due to insufficient data.

MINERAL DEVELOPMENT POTENTIAL: Canyon Creek has an unknown mineral development potential because of insufficient sampling. The samples that were taken from Canyon and Bear Creeks, however, indicate that it is unlikely the creek contains significant values of placer gold.

RECOMMENDATIONS: More sampling is required to evaluate the property.

REFERENCES: 21, 31, 50, 52, 108.

NAME: Bear Creek

Map Location No. 3
Kardex No. 3
Mineral Survey No.
MAS No. 9

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6.
Geographic: Tributary to Canyon Creek.
Elevation: 700 ft.
Access: Float airplane to Canyon Lake or helicopter.

Deposit Type: Placer.
Commodities: Au.
T 9S R70 & 71W Meridian: Seward.

HISTORY:

	Production: Au(oz)	Ag(oz)
1916 - Gold was found on the creek (9).		
1917 - Few men working, but not much found. Wilkins, Smith and Danielson mined (73).		
1919 - Three of four men prospecting and two men working on claim No. 2 above Discovery (39).		
1920 - Mining occurred.		
1921 - Ryan and Hanson mined 600 yd^3 gravel (106).....	70	
1922 - 1500 yd^3 of gravel mined (106).....	120	
1923 - 1000 yd^3 of gravel mined (106).....	120	
1924 - James Ryan mined (106).....	60	
1925 - Mining occurred (106).....	11	
1926 - Minor production. Holzheimer visited the creek (56).		
1927 - Minor production.		
1928 - Minor production.		
1929 - Peter Roeser mined 600 ft^2 of bedrock (106).....	3	
1930 - Peter Roeser mined 1500 ft^2 of bedrock (106).....	10	
1931 - Peter Roeser was mining and prospecting on No. 1 above Discovery (73).		
1932 - Peter Roeser mined 259 yd^3 of gravel and cleaned 1400 ft^2 of bedrock (106).....	16	
1934 - Small outputs reported by Walter Culver on No. 1 and 2 Above claims (106).....	0.93	
1939 - Two men sank test pits (80).		
1941 - J.F. Brink mined (106).....	148.35	12.79
Total.....	559.28	12.79

WORKINGS AND FACILITIES: Tailings are present for approximately a 1 mi extent 1 mi above the mouth of Bear Creek. Approximately 12,000 yd^3 were mined.

GEOLOGIC SETTING: This creek is a tributary to Canyon Creek. The upper three miles of the creek have been prospected. The width of the valley where the work has been done is about 200 ft from rim to rim. The depth to bedrock is from 5 to 7 ft. The gravel is a coarse

subangular wash, with no large boulders. There is little to no overburden. The paystreak lies on the right side of the valley. The gold is reddish in color and fineness is 837 (73). In the middle of Discovery Claim, which is located at the confluence of the main western tributary to Bear Creek (Danielson Creek), a small pit about 100 ft^2 ran 0.002 oz/ft^2 Au (73). A pit 800 ft upstream from the upper line of Discovery claim ran 0.007 oz/ft^2 Au (73). On claim No. 1 above Discovery the pit ran 0.006 oz/ft^2 Au (73). On the right limit rim the ground was reported to run 0.011 oz/ft^2 Au (73).

BUREAU INVESTIGATION: The Bureau sampled (41, 44-46, fig. 5, appendix B) the drainage in 1986. A piece of float (44, fig. 5, appendix B) containing pyrite and arsenopyrite in a limonite stained intrusive (diorite?) contained 0.75 ppm Au. A sample (41, fig. 5, appendix B) of a volcanic rock (basalt?) from mine tailings (possibly a piece of bedrock) contained 20 ppb Pd.

Four 0.1 yd^3 placer samples (41, 44-46, fig. 5, appendix B) were taken from the drainage. No gold was recovered in the samples. Platinum and palladium were found in analyses of the concentrates. Sample 45 from Danielson Creek contained greater than 10 ppm Pt and anomalous As and Cu values (appendix B).

Measurements of the mine pits indicated that approximately 12,000 yd^3 were mined in Bear Creek.

RESOURCE ESTIMATE: Insufficient quantities of economic placer minerals were found to calculate resources.

MINERAL DEVELOPMENT POTENTIAL: No recoverable Au or Pt was found in samples taken in the Bear Creek drainage. The drainage has a low mineral development potential for placer deposits. Some rock samples did contain anomalous Au and Pd values. Placer concentrates also contained anomalous Pt, As, and Cu values. This drainage has an unknown lode mineral development potential for Au, Pt, As, and Cu.

RECOMMENDATIONS: More exploration for lode mineralization is needed.

REFERENCES: 1, 9, 10, 17, 19, 21-23, 31, 39, 50, 52, 56, 73, 78, 80, 84-89, 92, 106, 108.

NAME: Fox Creek (Gulch)

Map Location No. 4
Kardex No. 19
Mineral Survey No.
MAS No. 7

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6.
Geographic: Tributary to Slate Creek.
Elevation: 400 ft.
Access: Overland from Goodnews Bay or plane to Slate Creek.

Deposit Type: Placer.
Commodities: Au.
T09S R70 & 71W Meridian Seward.

HISTORY:

	Production:	Au(oz)	Ag(oz)
1935 - Culver and Saylor found gold on a bench (78).			
1936 - Small production reported (94). Shonbeck and Beaton of Anchorage leased the property and drilled with an airplane drill. Poor results were obtained and bedrock was not reached in the creek bed (78).			
1937 - W.W. Johnson leased the claims and hydrauliced a bench. Only a few ounces were recovered. Eight men were employed (78).			
1941 - R.D. Huff mined (106).....		3.98	0.97

WORKINGS AND FACILITIES: Small hydraulicking and drilling conducted. A mining cut is present on the east side of the creek approximately 2.5 miles upstream of its confluence with Slate Creek. Approximately 20,000 yd^3 of gravel were mined from the cut. A hillman airplane 4-in drill was found on a bench on the east side of the creek approximately 2 mi upstream of the confluence with Slate Creek.

GEOLOGIC SETTING: The creek is nearly 5 mi long. Two miles up Fox Creek from its junction with Slate Creek on the left limit, coarse placer gold was found in 1935 by Culver and Taylor on a small bench a few ft above the present creek bed (78). The pay was found to be confined to an area 100 by 200 ft and averaged 0.08 oz/yd^3 (77). Gravels ranged from 5 to 7 ft thick. Bedrock consists of folded argillites. The gold is very smooth and bright and found mainly on bedrock. Fineness is 885 (78). The creek contains beaver ponds within a mile of its mouth. The creek flows in a canyon the last mile of its course.

BUREAU INVESTIGATION: The Bureau took five 0.1 yd^3 placer samples (47-49, 54-55, fig. 5, appendix B) in 1986. Sample values ranged from trace to 0.0003 oz/yd^3 Au. Gold fineness values were 604 and 817.

RESOURCE ESTIMATE: No indications of economic placer minerals were found; therefore, a resource could not be calculated.

MINERAL DEVELOPMENT POTENTIAL: Sampling indicated low gold values in Fox Creek. This creek has a low mineral development potential.

RECOMMENDATIONS: None.

REFERENCES: 1, 22, 31, 50, 73, 77-78, 80, 94, 106, 108.

NAME: Evans Pup

Map Location No. 5
Kardex No.
Mineral Survey No.
MAS No.

LOCATION:
Deposit Type: Placer.
Mining District: Goodnews Bay.
Commodities: Au.
Recording District: Bethel
Quadrangle: Goodnews Bay B6?
Meridian: Seward.
Geographic: An unknown tributary of Slate Creek.
Elevation: Unknown.
Access: Airplane to Slate Creek or boat up the Goodnews River.

HISTORY:
Production: Minor.

1937 - Roehm reported that a native named Evan was taking out a few oz in a creek between Olympic and Fox Creeks (78).

WORKINGS AND FACILITIES: Unknown

GEOLOGIC SETTING: Alluvial-colluvial gravels are present in a small creek.

BUREAU INVESTIGATION: The property was looked for, but was not located.

RESOURCE ESTIMATE: A resource could not be estimated because the property was not evaluated.

MINERAL DEVELOPMENT POTENTIAL: This property has an unevaluated mineral development potential.

RECOMMENDATIONS: None.

REFERENCES: 77-78.

NAME: Slate Creek

Map Location No. 6
Kardex No. 8, 10
Mineral Survey No. ____
MAS No. 4

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6. T9 & 10S R71W Meridian: Seward.
Geographic: Tributary to the Goodnews River.
Elevation: 150 ft.
Access: Overland route via a trail from Goodnews Bay village and by plane to the airstrip on Cascade Creek.

HISTORY:

	Production:	Au(oz)	Ag(oz)
1931 - Negotiations for a drilling contract made. Upper section 0.5 mi upstream from Fox Creek was worked by Ivan Oldtrader, with minor production. John O'Malley mined about 1000 ft^2 of bedrock (73).			
1933 - Work done.			
1934 - Drilling done by New York Alaska above the mouth of Cascade Creek with poor results. Drilling was discontinued (78).			
1936 - Prospecting conducted at the head of Slate Creek (92).			
1937 - Exploration continued.			
1939 - Mining by hydraulicing and hand methods done (96).			
1941 - Bristol Bay Mining Co. mined(?) (106).....		1763.3	401.15
1954 - Two claims staked.			
1985 - Ron Wittom mined at mouth of Caribou Creek.			

WORKINGS AND FACILITIES: Hand mining conducted in the past on Discovery Claim is about 0.25 mi above the mouth of Fox Creek. Placer operation owned by Ron Wittom of Bethel is located at the mouth of Caribou Creek.

GEOLOGIC SETTING: Slate Creek is the main creek in the area and is a tributary to the Goodnews River. Cascade, Olympic, Caribou, and Fox Creeks are tributaries to Slate Creek. Slate Creek above the junction with Fox Creek has a narrow V-shaped canyon-like valley down to within 1/2 mi of the mouth of Fox Creek where it widens to about 300 ft from rim to rim. The grade of the valley is about 2%. The gravels are very coarse and contain large granitic boulders up to 5 ft in diameter. The depth to bedrock is from 6 to 8 ft. The gold is coarse and shotty with no large nuggets (73).

Slate Creek below the Fox Creek junction occupies a shallow fairly wide valley intrenched into the Goodnews River lowland. Rock bluffs 10 ft high outcrop on both limits of the flood plain near the mouth. Just below the mouth of Cascade Creek the valley is about 1/4 mi wide from rim to rim. Reed (73) reported that between the mouths of Olympic and Cascade Creeks, George Wickert sank a few holes to bedrock in unknown locations. Reed (73) also reported that the depth to bedrock is from 7 to 8 ft, and that good prospects were found. It was also stated that several men have run trenches into the rims of the valley all along lower Slate and found encouraging prospects (73).

BUREAU INVESTIGATION: The Bureau sampled the Slate Creek drainage in 1986 (50-53, 56-59, 67. fig. 5, appendix B). Seven 0.1 yd^3 placer samples contained from trace to 0.0014 oz/yd^3 Au. A 0.1 yd^3 sample from Caribou Creek (53, fig. 3, appendix B), a tributary of Slate Creek, contained 0.0015 oz/yd^3 Au, with the concentrate having 85 ppm W. Over 90% of the gold was less than 35 mesh in size. Gold fineness ranged from 551 to 829 (table 3). Bedrock was not reached in any of the samples.

RESOURCE ESTIMATE: No indications of economic placer minerals were found in the creek; therefore, a resource was not calculated.

MINERAL DEVELOPMENT POTENTIAL: The Bureau's samples of the creek contained low gold values; therefore, the creek should have a low mineral development potential above its confluence with Caribou Creek. The Creek may have a higher potential at the confluences of Cascade, Olympic, and Fox Creeks.

RECOMMENDATIONS: Detailed sampling to bedrock and/or drilling would be required to evaluate the drainage below the confluences of Cascade, Olympic, and Fox Creeks.

REFERENCES: 1, 19-22, 31, 50, 60, 73-74, 77-78, 89, 91, 94-96, 106, 108.

NAME: Goodnews River

Map Location No. 7
Kardex No. 26
Mineral Survey No.
MAS No.

LOCATION:
Deposit Type: Placer.
Mining District: Goodnews Bay. Commodities: Au.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6 & 7. T10S R71W Meridian: Seward.
Geographic: Main fork of the Goodnews River around the confluence of Slate Creek.
Elevation: 150 ft.
Access: Overland access via a trail from Goodnews Bay village or boat from Goodnews Bay.

HISTORY:
Production: None reported
1900 - Claims staked on river (1).

WORKINGS AND FACILITIES: Unknown.

GEOLOGIC SETTING: Quaternary alluvial gravels are present.

BUREAU INVESTIGATION: The Bureau could not sample the river because the surrounding land is owned by the Kuitcarak Corporation, which would not grant the Bureau permission to sample on their land.

RESOURCE ESTIMATE: A resource could not be calculated because of insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The river has an unevaluated mineral development potential. Placer gold should be present at the confluence of the Goodnews River and Slate Creek.

RECOMMENDATIONS: Drilling would be required to evaluate the potential for a placer gold resource.

REFERENCES: 1, 22, 50.

NAME: Olympic Creek

Map Location No. 8
Kardex No. 18
Mineral Survey No.
MAS No. 5

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B-6.
Geographic: Tributary to Slate Creek.
Elevation: 300 ft.
Access: Overland route via a trail from Goodnews Bay.

Deposit Type: Placer.
Commodities: Au.
Sec 3 T10S R71W Meridian: Seward.

HISTORY:

	Production: Au(oz)
1920 - Claims staked (1).	
1923 - George Wiechert mined 800 yd^3 of gravel and 4,000 ft^2 of bedrock (106).....	28
1925 - Peter Roeser mined (106).....	6
1926 - Shoveling in operation by Peter Roeser	
1927 - Minor work by Peter Roeser (106).....	100
1928 - Peter Roeser mined (106).....	20
1929 - Little sluicing done- Peter Roeser cleaned 3,000 ft^2 of bedrock (106).....	15
1930 - Minor work.	
1931 - Small amount of gold produced. Peter Roeser prospected (73).	
Total....	169

WORKINGS AND FACILITIES: Most of the work on Olympic Creek has been done on Discovery Claim, where a cabin is situated. The upper end of the main pit on Olympic Creek is about 1500 ft below the main tributary to Olympic Creek. About 10,000 ft^2 of bedrock were cleared. About 500 ft below the main pit, a small pit comprising about 4000 ft^2 was worked. A small ditch 0.25 mi long is on the right limit of the creek.

GEOLOGIC SETTING: This creek is a small north tributary to Slate Creek. The creek is wide at its mouth, narrowing to a canyon above the upper forks. The depth to bedrock on Discovery Claim averages about 6 ft. Bedrock is basalt. The gravel is coarse and subangular and contains many granitic boulders up to 2 ft in diameter.

The average value of the ground worked is 0.04 oz/yd^3 Au (73). The gold is distributed in a spotty manner. The gold is whitish in color and has a fineness of 820 (73).

BUREAU INVESTIGATION: The Bureau sampled the drainage in 1986. Seven 0.1 yd^3 placer samples (60-66, fig. 5, appendix B) were taken. The samples contained from trace to 0.0045 oz/yd^3 Au. Sample 65 taken from an alluvial fan, contained 0.0045 oz/yd^3 Au. The alluvial fan was approximately 600 ft long, 100 ft wide, with an unknown depth. Hydraulic mining cuts were noted on the west side of the creek approximately 1 mi above its confluence with Slate Creek. The cuts were in glaciofluvial bench deposits approximately 20 ft thick. It was estimated that approximately 100,000 yd^3 were mined from these cuts. A 0.1 yd^3 placer sample (62, fig. 5, appendix B) from the bench contained trace amounts of gold.

A 3 ft channel sample (61, fig. 5, appendix B) of a gravel bank along the creek contained 0.0041 oz/yd^3 Au. The concentrate contained 600 ppb Pt.

Over 95% of the gold particle sizes were less than 35 mesh. Fineness values of the gold ranged from 727 to 809 (table 3).

RESOURCE ESTIMATE: Not enough information is available to calculate a resource.

MINERAL DEVELOPMENT POTENTIAL: Bureau sampling indicated moderate gold values. Bedrock was not reached in any sample; therefore it is theorized that the average value of the gravels should be higher than indicated by the sampling. Sampling using a drill and/or trenching is needed to develop a resource. The property has a moderate mineral development potential.

RECOMMENDATIONS: The alluvial fan that contained gold should be sampled in greater detail. The bench deposits should be drilled. The alluvial gravels in the creek should be sampled to bedrock.

REFERENCES: 1, 21-22, 31, 50, 52, 73, 84-89, 106, 108.

NAME: Cascade Creek

Map Location No. 9
Kardex No. 17,26
Mineral Survey No. ____
MAS No. 6

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6 & B7. T9 & 10S R71W Meridian: Seward.
Geographic: Tributary to Slate Creek.
Elevation: 200 ft.
Access: Overland access via trail from Goodnews Bay village and by plane to the airstrip on Cascade Creek.

HISTORY:

	Production: Au(oz)	Ag(oz)
1931 - Reed visited property (73).		
1937 - Roehm visited property (78).		
1939 - Bristol Bay Mining Co. dredge mined Wattamuse and Cascade Creeks (80).		
1940 - Dredge continued to operate-mining 417,000 yd^3 (106).....	5218.62	1202
1941 - Dredge continued mining (106).....	4067.69	1098.07
Total.....	9,286.31	2,300.07

WORKINGS AND FACILITIES: Holes drilled upstream of the mouth of Wattamuse Creek with very poor results. Cascade Creek was dredged from the mouth of Wattamuse Creek downstream for approximately 1 mi.

GEOLOGIC SETTING: The section of the creek below Wattamuse Creek is 400 to 500 ft wide. Above the mouth of Wattamuse the valley is 200 ft wide. The gravel is coarse but finer than that on Wattamuse. No granite wash or boulders are present. The depth of the gravels above the mouth of Wattamuse is approximately 6 ft. Below the mouth the gravels are 8 to 10 ft deep. The bedrock is basalt. The main paystreak is just below the mouth of Wattamuse Creek, with values averaging 0.04 oz/yd^3 Au (73).

BUREAU INVESTIGATION: The Bureau sampled Cascade Creek in 1986. The Bureau took seven 0.1 yd^3 placer samples (68, 71, 76-77, 81, 83-84, fig. 5, appendix B) and one rock sample (82, fig. 5, appendix B). Gold values ranged from trace to 0.0017 oz/yd^3 Au. Mesh sizes of the gold particles were 3% +30, 68% -30/+60, and 29% -60. Gold fineness values ranged from 646 to 847 (table 3).

The Bristol Bay Mining Co. dredge worked Cascade Creek from the mouth of Wattamuse Creek downstream for approximately 1.0 mi. It was calculated that approximately 800,000 yd^3 were mined.

RESOURCE ESTIMATE: The dredge recovered an average of 0.025 oz/yd^3 Au. It was reported that the average grade of the paystreak was 0.04 oz/yd^3 Au (73); therefore, the 800,000 yd^3 of tailings may contain grades as much as 0.015 oz/yd^3 Au; This figure, however, would have to be substantiated by more sampling and drilling.

MINERAL DEVELOPMENT POTENTIAL: The creek has a high mineral development potential because of the high grades that were present during mining and the possibility that economic grades are still present in the tailings and unmined portions of the creek.

RECOMMENDATIONS: The area downstream of the confluence of Cascade and Wattamuse Creeks requires further sampling and drilling.

REFERENCES: 1, 50, 73, 77-78, 89, 106, 108.

NAME: Wattamuse Creek

Map Location No. 10
Kardex No. 1, 2, 4, 5, 6, 7, 9, 31
Mineral Survey No. 2272
MAS No. 3

LOCATION:

Deposit Type: Placer.
Commodities: Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B6 & B7. T9 & 10S R71W Meridian: Seward.
Geographic: Tributary to Cascade Creek.
Elevation: 200 to 750 ft.
Access: Overland access via a trail from Goodnews Bay village or by plane to an airstrip on Cascade Creek.

HISTORY:

	Production: Au (oz)	Ag (oz)
1915 - First claims staked.		
1916 - Assessment work filed.		
1917 - Placer gold discovered. Thorsen, Wilkins, and Jean bought claims (59).....	1,000?	
1918 - Work done (39).....	1,000?	
1919 - Work done on three claims by two plants. Discovery Mining Co employed 10-12 men. Thorsen-Everson-Wilkins produced from 13,983 yd^3 (106).....	910.14	148.66
Ryan & Wickert produced from No. 3 Above Discovery (39, 106).....	57.87	9.45
1920 - One mine operated		
1921 - Jean, Everson, Thorsen produced (106).....	559	
Another operator produced from 100 yd^3 (106).....	14	
1922 - Unidentified operator mined 7000 yd^3 (106).....	510	
1923 - Jean, Thorsen, Everson, Wilkins mined 2000 yd^3 (106).....	364	
1924 - Jean, J.L. mined 666 yd^3 and 18,000 ft^2 bedrock (106).....	674	
1925 - Jean, J.L. mined (106).....	385.25	
1926 - Minor work		
1927 - Smith, Schmidt, and Jean mined (106).....	111	
1928 - Mining and development work suspended due to high water		
1929 - No work done		
1930 - One man working-(Possibly J.L. Jean) (106).....	48.07?	7?
1931 - Minor work done by Edward "Slim" Smith		
1932 - Mining occurred, 1000 ft^2 of bedrock cleaned (106).....	230	
1933 - Gold found on benches, 3 to 4 men worked the ground		
1934 - Smith and Jean mined on No. 1 below, with 3,000 ft^2 bedrock worked (106).....	38.5	11
1935 - Smith and Jean mined (106).....	53.46	
1937 - Drilling and exploration conducted (78)		

History (continued).	Production.	Au (oz)	Ag (oz)
1938 - Bristol Bay Mining Co. built dredge, but it didn't begin work until September and ceased operating on October 8th (96).			
1939 - Roehm visited property. Union Construction Co. 2.5-ft dredge began operating on June 2. Operated for one month, employing 25 men. The dredge worked the lower part of Discovery claim at the mouth of Wattamuse Creek (80).....		7000?	
1946 - Bristol Bay Mining Co. mined on No. 2 Above claim with a dragline. 65,212 yd^3 mined (106).....		2713	657
1947 - Bristol Bay Mining Co. mined on Nos. 5-8 claims with a dragline (106) 105,195 yd^3 of gravel mined.....		2592	621
1953 - Claims staked.			
1956 - Claims staked.			
1968 - Claims staked.			
	Total.....	18,260.29?	1,054.11?

WORKINGS AND FACILITIES: Hand operations occurred until 1938, when a dredge was installed on the property. Draglines were also used. Joe Jean drilled the gravels in upper Wattamuse Creek at 500 ft elevation with subeconomic results (Betty Huffman, personal communication) Cabins are present.

GEOLOGIC SETTING: The creek is 3 mi long. The valley at the mouth is 300 ft wide and narrows to a canyon less than 200 ft wide 1,000 ft above the mouth. The canyon is present to within a mi of the head of the creek. The creek cuts slate argillites, sandstones, and basalt at nearly right angles. The formations strike N45°E. The gravels are between 5 and 7 ft deep. In 1919 the paystreaks ran 0.02 to 0.15 oz/ft^2 Au of bedrock (39). The gold fineness was approximately 800 (39). The grades of the mined gravels were from 0.015 to 0.18 oz/yd^3 Au (39). Gravels contain rocks from the bedrock plus granite pebbles. The creek has been glaciated.

BUREAU INVESTIGATION: In 1986, the Bureau took seven 0.1 yd^3 placer samples (69-70, 72-75, 78, fig. 5, appendix B). The samples were taken from the creek bed and gravel benches along the creek. The samples from the benches (72-75, fig. 5, appendix B) contained from 0.0053 to 0.0108 oz/yd^3 Au. The samples from the creek (69-70, 78, appendix B) contained from 0.0013 to 0.7583 oz/yd^3 Au. The richest samples were collected from Discovery Claim. Gold finenesses were from 734 to 825 (table 3).

RESOURCE ESTIMATE: Inferred Resource: 60,000 yd^3 which contain from 0.015 and 0.018 oz/yd^3 Au.

The resource was calculated by using an area 100 ft long by 100 ft wide by 6 ft thick. The grade was taken from average values reported from the original paystreak (39). Higher values were found during the Bureau sampling and the tailings could be reworked; therefore, the inferred resources are probably conservative.

MINERAL DEVELOPMENT POTENTIAL: The Bureau sampling indicates that the creek has a high mineral development potential for a small mining operation.

RECOMMENDATIONS: The high values found in the samples during the Bureau investigation, the presence of gold in the bench gravels along the creek, and the presence of unmined areas along the creek indicate that small scale placer mining is warranted.

REFERENCES: 1, 10, 17, 19-22, 31, 39, 50, 56, 59, 73-74, 77-78, 80, 83-93, 95-98, 106, 108.

NAME: Malaria Creek

Map Location No. 11
Kardex No. 24
Mineral Survey No.
MAS No. 8

LOCATION:
Deposit Type: Placer.
Mining District: Goodnews Bay.
Commodities: Au.
Recording District: Bethel.
Quadrangle: Goodnews Bay B7. SE 1/4 Sec 6 T10S R71W Meridian: Seward.
Geographic: Tributary to Granite Creek.
Elevation: 1000 ft.
Access: Overland by trail from Goodnews Bay to Granite Creek, then by foot up the creek.

HISTORY:
Production: None.
1900 - Claims staked.
1936 - Prospecting conducted (94).

WORKINGS AND FACILITIES: None noted.

GEOLOGIC SETTING: The creek is a northern tributary of Granite Creek. Bedrock consists of a Tertiary granodiorite-diorite intrusive, which is a possible source of the gold in Wattamuse Creek.

BUREAU INVESTIGATION: The Bureau took a 0.1 yd^3 placer sample (99, fig. 5, appendix B) from Granite Creek near its junction with Malaria Creek in 1986. A trace amount of gold was recovered. The concentrate contained anomalous molybdenum and tellurium values.

RESOURCE ESTIMATE: No indications of economic placer minerals were found; therefore, a resource could not be calculated.

MINERAL DEVELOPMENT POTENTIAL: The prospect has an unevaluated mineral development potential because of insufficient sampling.

RECOMMENDATIONS: Drilling would be needed to properly evaluate this prospect.

REFERENCES: 1, 22, 31, 50, 94, 106, 108.

NAME: Wattamuse-Granite Creek

Map Location No. 12
Kardex No.
Mineral Survey No.
MAS No.

LOCATION:

Deposit Type: Lode.
Commodities: Au, Ag, Sb, As.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B7. T9 & 10S R72W Meridian: Seward.
Geographic: Headwaters of Wattamuse and Granite Creeks.
Elevation: 1800 ft.
Access: Airplane to Cascade Creek airstrip or by boat up the Goodnews River, then by foot.

HISTORY:

Production: None.

1974- Mapped and sampled by a consulting firm for Calista Corp (104).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: The consulting firm (104) described the prospect as a granodiorite to diorite intrusive in contact with hornfelsed metasedimentary rocks, quartzites, and gabbros. The intrusive is cut by 1-in to 1-ft wide quartz veins, which contain arsenopyrite, pyrite, and chalcopyrite. Stibnite has been found in quartz float.

Samples from the consulting firm contained up to 9.5 ppm Au, 14.9 ppm Ag, 17% As, 22% Sb, and 1500 ppm Hg (104).

BUREAU INVESTIGATION: The Bureau mapped and sampled the area in 1986. Weather conditions prevented a detailed examination of the area. Nineteen samples (80, 85-97, fig. 5, appendix B) were taken from the headwaters of Wattamuse Creek. The highest gold value (2.18 oz/st) was found in a composite grab sample (91, fig. 5, appendix B) of quartz from the divide between Granite and Wattamuse Creek. The sample contained arsenopyrite. The sample also contained 6.6 ppm Ag, 2850 ppm As, 400 ppm Bi, 40 ppm Sb, and 184 ppm W. Other quartz grab samples (95, 96, fig. 5, appendix B) contained 1,000 to 10,000 ppm As, 1.25 to 5.3 ppm Au, up to 10 ppb Pd, and 30 and 190 ppm Sb.

A mafic igneous unit occurs near the contact of the intrusive with the hornfels unit. A sample (96, fig. 5, appendix B) from the outcrop contained arsenopyrite, pyrrhotite, and chalcopyrite. It had values of 17.4 ppm Ag, 3.3 ppm Au, 0.13% As, 30 ppm Bi, and 0.19% Cu. Gold was panned from a small creek that drains the saddle between the Wattamuse and Granite Creek drainages. A stream sediment sample (92, fig. 5, appendix B) from this creek contained 1.3 ppm Au and 0.23% As.

A soil sample (87, fig. 5, appendix B) taken from a saddle at the headwaters of Wattamuse Creek contained 15.4 ppm Ag, 0.5% As, 6.55 ppm Au, 65 ppm Bi, 550 ppm Cu, 784 ppm Pb, 10 ppb Pd, 70 ppm Sb, 30 ppm W, and 860 ppm Zn.

There is a positive correlation between anomalous bismuth values and anomalous gold values.

RESOURCE ESTIMATE: A resource can not be calculated at this time due to insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The high gold values found in some of the samples from the area suggest that the area has a high potential for discovery of a lode gold deposit. However, the lack of an identified resource indicates that the property has a moderate mineral development potential.

RECOMMENDATIONS: High gold values were found in quartz float from the headwaters of Wattamuse Creek. High gold values were also found associated with a mafic intrusive(?) unit at the contact of the intrusive. Therefore, this property needs more detailed mapping, sampling, and possibly drilling of the contact.

REFERENCES: 104.

NAME: Barnum Creek Tributary

Map Location No. 13
Kardex No.
Mineral Survey No.
MAS No.

LOCATION:

Deposit Type: Placer.
Mining District: Goodnews Bay. Commodities: Au.
Recording District: Bethel.
Quadrangle: Goodnews Bay B7. Secs 27, 34 T 9S R73W Meridian: Seward.
Geographic: North tributary to Barnum Creek near Nagotligageivik Moutain.
Elevation: 300 ft.
Access: 1.5 mi east of trail from Goodnews Bay to Arolik River.

HISTORY:

Production: Minor.

1938 - Roehm (79) reported that Christen and H. Oya discovered gold at the head of Barnum Creek. $11 of coarse gold was panned.

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: Glacial drift in a broad valley. Beaver ponds are located along the creek. The gravels along the tributary are well-sorted silt, sand, gravel and boulders.

BUREAU INVESTIGATION: The Bureau sampled (117-122, fig. 4, appendix B) the drainage in 1986. Four placer samples (117-118, 121-122, fig. 4, appendix B) contained from 0.0002 to 0.0010 oz/yd^3 Au. Gold fineness values ranged from 424 to 816 (table 3). The concentrate from sample 122 contained Pt and Pd values.

Nagotligageivik Mountain was mapped and samples were taken (119-120, fig. 4, appendix B) in order to try and determine the source of the placer gold. Chert was the only rock type found on the mountain. No gold was noted in the samples.

The gold in the drainage is probably of glacial origin.

RESOURCE ESTIMATE: A resource could not be calculated due to insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The creek has a moderate mineral development potential because of the anomalous placer samples taken from the gravels.

RECOMMENDATIONS: Further sampling and drilling are recommended.

REFERENCES: 79.

NAME: Ikuk Prospect

Map Location No. 14
Kardex No.
Mineral Survey No.
MAS No.

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B7.
Geographic: On a ridge between the Tunilik River and Camp Creek.
Elevation: 1600 ft.
Access: Helicopter.

Deposit Type: Lode.
Commodities: Cu, Au, As.
Sec 36 T10S R73W Meridian: Seward.

HISTORY:

Production: None.

1974 - Mapped and sampled by a consulting firm for the Calista, Corp (104).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: The consulting firm (104) described the prospect as in an area which is steep and hard to work. The geology consists of an intrusive complex which contains peridotite, diorite, granodiorite, and quartz monzonite. Mineralization is in a fractured fine to medium grained diorite intruded by at least 2 gabbroic dikes. The fractured zone is 800 ft wide and strikes N-S. Sulfide minerals consist of chalcopyrite, arsenopyrite, pyrrhotite, and pyrite. The chalcopyrite occurs as blebs, stringers, and disseminations in a silicified, chloritized, and biotite-altered diorite zone 100 ft wide. Gold values are associated with the silicified intrusive.

Samples from the prospect ranged up to 2.4% Cu, 25.2 ppm Ag, 0.16 oz/st Au, and 0.99% As (104).

BUREAU INVESTIGATION: The Bureau was unable to assess the property because the land is privately owned by the Kuitcarak Corporation, which would not grant the Bureau permission to sample the property.

RESOURCE ESTIMATE: A resource estimate could not be made due to insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The occurrence has an unevaluated mineral development potential because the Bureau was unable to gain access to the property.

RECOMMENDATIONS: Further work is needed on this property because of the small amount of time that has been spent evaluating the property. The creeks that drain the property should also be placer sampled because of the occurrence of gold in the rocks.

REFERENCES: 104.

NAME: Tunulik

Map Location No. 15
Kardex No.
Mineral Survey No.
MAS No.

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay B7.
Geographic: Small creek on the northeast side of the Tunulik River.
Elevation: 750 ft.
Access: Helicopter.

Deposit Type: Lode.
Commodities: Cu, Au.
Sec 1 T11S R73W Meridian: Seward.

HISTORY:

Production: None.

1974- Mapped, and sampled by a consulting firm for Calista Corp (104).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: The consulting firm (104) stated that the rocks consist of diorite and gabbro, with pods of 1-2% chalcopyrite. A vuggy quartz-orthoclase vein 2 in wide contained 3 ppm Au and 3,000 ppm As. The small creek draining the area contained 4.1 ppm Au in a stream sediment sample and flakes of gold were panned from the creek.

BUREAU INVESTIGATION: The Bureau was unable to investigate this occurrence because it was located on private land owned by Kuitcarak Corporation, which would not allow the Bureau to sample the property.

RESOURCE ESTIMATE: A resource could not be calculated due to lack of data.

MINERAL DEVELOPMENT POTENTIAL: The property has an unevaluated mineral development potential because the Bureau was unable to evaluate the ground.

RECOMMENDATIONS: More work is recommended, especially placer sampling of the Tunulik River downstream of the property for possible placer gold.

REFERENCES: 104.

NAME: Kigsugtag

Map Location No. 16
Kardex No. 9
Mineral Survey No.
MAS No.

LOCATION:
Deposit Type: Lode.
Mining District: Goodnews Bay. Commodities: Unknown.
Recording District: Bethel.
Quadrangle: Goodnews Bay A8. Secs 22, 24, 26, 27 T11S R74W
Meridian: Seward.
Geographic: Along Carter Creek on Kigsugtag Mountain.
Elevation: 300 ft.
Access: An all-terrain vehicle trail is present from Goodnews Bay.

HISTORY:
Production: None.
1971 - 9 lode claims staked by Abbott Findlay (1).

WORKINGS AND FACILITIES: None noted.

GEOLOGIC SETTING: The north side of Carter Creek consists of undivided volcanic and sedimentary rocks of Mesozoic and Paleozoic ages. The south side of Carter Creek is the upper portion of a thrust plate consisting of N50-65°E striking NW dipping interbedded Devonian micritic limestones, slates and quartzites, which have been intruded by three Jurassic gabbroic intrusions and one diabasic(?) intrusion.

BUREAU INVESTIGATION: The Bureau mapped and sampled the drainage in 1986. No outcrops were noted in the valley. On the south side of the valley (Limestone Ridge), no alteration was found at the contacts of the intrusives with the sedimentary rocks. Six rock samples were taken (136-137, 139-141, 144, fig. 4, appendix B). The most mineralized rock sample (141), a piece of massive vuggy limonite, found as float, contained 200 ppm As, 100 ppm Ga, 20 ppm Tl, and 475 ppm Zn (appendix B).

RESOURCE ESTIMATE: A resource was not calculated because no economic minerals were found.

MINERAL DEVELOPMENT POTENTIAL: The property has a low mineral development potential because the Bureau's examination indicates that it is unlikely that economic mineralization exists in the drainage.

RECOMMENDATIONS: None.

REFERENCES: 1.

NAME: Goodnews Bay

Map Location No. 17
Kardex No. 33
Mineral Survey No.
MAS No. 1, 2

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay A8 and Hagemeister Island D-6.
T12S R74, 75W Meridian: Seward.
Geographic: North shore and in Goodnews Bay.
Elevation: Sea level.
Access: Boat.

Deposit Type: Placer.
Commodities: Au, Fe, Cr, PGM.

HISTORY:

Production: None.

1963 - U.S. Bureau of Mines drilled and sampled the beach (4).
1969 - 239 claims staked.
1971-1972 - Inlet Oil drilled the claims (50).

WORKINGS AND FACILITIES: Drilling conducted by Inlet Oil in the mid-1970's.

GEOLOGIC SETTING: The bay consists of glaciofluvial outwash. Cobb (50) stated that in 1969 the unconsolidated deposits of Goodnews Bay were core sampled. Chemical analyses revealed detectable amounts of platinum in many of the samples (50). Platinum was concentrated in the clay layers rather than the sand layers (50). Most samples also contained both native mercury and cinnabar and a single tiny diamond was said to have been found (50). The best values were found along the north side of the bay, south of Beluga Peak. In 1970, a more elaborate sampling program was undertaken and an airborne magnetometer survey was made. The results of the sampling are unknown, but were rumored to be unfavorable.

BUREAU INVESTIGATION: Berryhill (4) found chromite, magnetite and traces of gold. The highest iron content was 6.1 lb per yd^3. In 1986, the Bureau took one 0.1 yd^3 placer sample (134, fig. 4, appendix B) from the beach. Trace amounts of platinum and gold were noted.

RESOURCE ESTIMATE: Not enough information is available to make a resource estimate.

MINERAL DEVELOPMENT POTENTIAL: It was not possible for the Bureau to sample the bay during this study; therefore, it has an unknown mineral development potential.

RECOMMENDATIONS: Drilling in Goodnews Bay is required to properly evaluate this property.

REFERENCES: 1, 4, 16-17, 19-21, 23, 50, 108, 110-111.

NAME: Smalls River

Map Location No. 18
Kardex No. 29
Mineral Survey No.
MAS No.

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay A8.
Geographic: Tributary to Goodnews Bay.
Elevation: Sea level to 100 ft.
Access: Overland access via road or off-road vehicle from Platinum.

Deposit Type: Placer.
Commodities: PGM, Au.
T13S R75W Meridian: Seward.

HISTORY:

Production: None.

1937 - Hole drilled (63).
1969 - Goodnews Bay Mining Co. staked 78 claims.

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: Holocene-Pleistocene glacial outwash. The river drains the north side of the Red Mountain ultramafic complex. PGM and gold were reported in a drill hole along the north side of the gravel road, about 2.6 mi S52°E of Platinum, from the saddle between the Smalls and Salmon Rivers (63).

BUREAU INVESTIGATION: The Bureau could not sample the river because the land is privately owned by Arviq Corporation, which would not grant the Bureau permission to sample.

RESOURCE ESTIMATE: A resource could not be calculated due to insufficient information.

MINERAL DEVELOPMENT POTENTIAL: The Smalls River has an unevaluated mineral development potential.

RECOMMENDATIONS: Drilling in the past and the presence of gold in the glacial deposits in the area indicate that gold and PGM exist in the area and could be reconcentrated by the Smalls River. Therefore, detailed sampling and drilling is recommended.

REFERENCES: 1, 30, 50, 62-63.

NAME: McCann Creek

Map Location No. 19
Kardex No. 9
Mineral Survey No.
MAS No. 9

LOCATION:

Deposit Type: Placer.
Commodities: PGM, Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. Sec 12 T14S R75W Meridian: Seward.
Geographic: North side of Red Mountain, approximately 3 mi south of Platinum.
Elevation: 150 ft.
Access: By road from Platinum.

HISTORY:

Production: None reported.

1931 - 8 claims staked by Edward McCann.
1953 - Claims drilled under a Defense Minerals Exploration Administration (DMEA) grant (57).

WORKINGS AND FACILITIES: 2 pits (150 ft long x 75 ft wide x 6 ft deep), approximately 5,000 yd^3 have been moved.

GEOLOGIC SETTING: This creek is a small tributary of Smalls River and heads against Clara Creek. The northwest side of the creek is composed of the Red Mountain dunite, while the southeast side of the creek is composed of metamorphosed sedimentary and volcanic rocks

A contractor for the DMEA drilled 20 churn holes in McCann Creek in 1953 (57). The holes were on the Discovery and No. 1 Above claims. On No. 1 Above the depths of the holes ranged from 23 to 48 ft. The depths of the holes on the Discovery claim ranged from 27 to 88 ft. Overburden depths ranged from 0 to 5 ft. PGM values ranged from 0.00011 to 0.01399 oz/yd^3 (57). The highest value was found in a 39 ft deep drill hole on No. 1 Above claim.

BUREAU INVESTIGATION: The Bureau sampled the creek in 1986. A 0.1 yd^3 placer sample (175, fig. 6, appendix B) was taken from gravel between two mining pits. The sample contained 0.0018 oz/yd^3 PGM and 0.0008 oz/yd^3 Au. The sizes by volume of the recovered PGM grains were 6.6% +20 mesh, 20% -20/+45 mesh, 40% -45/+60 mesh, and 33.3% -60 mesh (fig. 10). Microprobe analyses of the recovered PGM grains from sample 175 contained 2.1% Rh, 0.8% Ru, 81.4% Pt, 1.9% Ir, 0.9% Os, and 8.1% Fe (appendix C). These values are comparable with PGM found on Clara Creek. The grains consisted of iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, osmium, and sperrylite (appendix C). The fineness value for the recovered gold was 918 (table 3).

RESOURCE ESTIMATE: Inferred: 500,000 yd^3 averaging 0.003 oz/yd^3.

The resource was estimated using the drill hole data (57) and mean area method.

MINERAL DEVELOPMENT POTENTIAL: The creek has a moderate mineral development potential because of the moderate average PGM values, but isolated high PGM values and large resources..

RECOMMENDATIONS: More drilling is required to properly evaluate the property.

REFERENCES: 1, 16, 20, 23, 31, 57, 62-63, 72, 75, 108.

NAME: Clara Creek

Map Location No. 20
Kardex No. 1,3,6
7,10
Mineral Survey No. ____
MAS No. 3

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. Sec 13 T14S R75W Meridian: Seward.
Geographic: Tributary to Salmon River.
Elevation: 250 to 500 ft.
Access: Overland via road from Platinum

Deposit Type: Placer.
Commodities: PGM, Au, Cr.

HISTORY:

	Production: PGM (oz)
1928 - Charles Thorsen discovered platinum and started mining (72).....	71
1929 - Some platinum produced (72).....	224
1930 - Minor work (38).....	385
1931 - Reed visited the property. Six men (Charles Thorsen, Andrew Olson, Martin Garthe, O.J. Sampson, John Haralsen, and August Wicklund) mining (72).....	410
1932 - Mining continued.	
1933 - Mining continued.	
1934 - Mining continued.	
1935 - Dragline installed on property.	
1936 - Large scale mining started; 320,000 ft^2 of bedrock mined (78).....	1900
1937 - Dragline operation continued; recovered by July (77).....	600
1938 - Mining continued.	
1939 - 27 men employed at the dragline operation where 612,000 bedrock ft were mined (80).	
1940 - Mining continued.	
1941 - Mining terminated.	
Total...	3,590

10,000 oz production are estimated from amount of tailings present in the creek and average mined grades.

WORKINGS AND FACILITIES: Clara Creek Mining Co. operated a dragline, sluicebox operation on the property from 1936 to 1940 or 1941. The creek was mined from the Platinum road to approximately 500 ft elevation. Approximately 500,000 yd^3 have been moved. One cabin is still on the creek.

GEOLOGIC SETTING: Clara Creek, about 2 mi long, is a tributary of the Salmon River. The watershed area of the creek is about 1.5 square mi. Seven placer claims have been staked on Clara Creek. The overburden on Clara Creek is 10-12 ft deep; the upper 2 to 3 ft consists of tundra, peat, and dark-colored mossy material mixed with

sand. The underlying gravel is subangular and of small size, averaging about 3-4 in. in diameter. The gravel consists of rocks of locally derived bedrock fragments and other material derived from glaciofluvial deposits on the divide between the Salmon and Smalls Rivers. Bedrock consists of metamorphosed rocks of several types that includes sheared chert, quartzites derived from chert and graywacke, tuffaceous rocks, and chloritic siliceous schist. The bedrock floor rises steeply to the south and gradually to the north.

Two cuts, one on the north and one on the south side of the creek were used to mine the 200 to 250 ft wide Clara Creek pay streak. The pay streak was found to extend from the contact between the ultrabasic rocks and the metamorphosed sedimentary rocks downstream almost to the Salmon River. Early mining recovered as much as 0.08 oz/yd^3 Pt, but the overall tenor as determined by dragline mining was closer to 0.02 oz/yd^3 Pt (61).

The PGM grains on Clara Creek are fine-grained, although nuggets as large as 2 oz have been recovered (61). Most of the metals were found in the gravels close to bedrock. Roehm (78) reported that one cleanup contained 6.179 oz of Au, 36.098 oz of Ir, 440.421 oz of Pt, 4.221 oz of Os, 0.795 oz of Ru, and 2.569 oz of Rh.

BUREAU INVESTIGATION: The Bureau sampled Clara Creek in 1986. Six 0.1 yd^3 placer samples from five sample sites (186-189, 193, fig. 6, appendix B) were taken. The samples contained from trace to 0.034 oz/yd^3 PGM. The highest value was taken from the upstream end of the highest mining cut on the south side of the creek, where a +10 mesh nugget was recovered (sample 187). At this location a 2-ft thick section of clay and boulders is present on dunite bedrock. The sides of the creek were also sampled, with only minor PGM and Au recovered. Microprobe analyses of sample 187 contained 1.6% Rh, 0.5% Ru, 83% Pt, 3.8% Ir, 1.0% Os, and 8.1% Fe (appendix C). Iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, hollingsworthite, and sperrylite were identified.

RESOURCE ESTIMATE: Inferred: 5,000 yd^3 of 0.034 oz/yd^3 PGM.

The inferred resource is calculated from the exposure of unmined ground at the head of the creek, which has the following dimensions: 900 ft long by 75 ft wide by 2 ft thick.

Roehm (78) reported that recovery was approximately 70% with the dragline operation; therefore, there are possibly 500,000 yd^3 of tailings which average 0.008 oz/yd^3 PGM assuming an original average recovery grade of 0.02 oz/yd^3 PGM.

MINERAL DEVELOPMENT POTENTIAL: The unmined area at the head of Clara Creek has a high mineral development potential for a small operation because of the high grade found in the Bureau samples. The tailings may also contain a mineable quantity of PGM and/or be a good building material source for southwest Alaska.

RECOMMENDATIONS: Detailed sampling of the tailings and more extensive sampling of the virgin ground is needed.

REFERENCES: 1, 11, 16-20, 23, 31, 61-63, 72, 77-78, 80, 86-98, 108.

NAME: Dowry Creek

Map Location No. 21
Kardex No. 1c
Mineral Survey No.
MAS No.

LOCATION:

Deposit Type: Placer.
Commodities: PGM, Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. Sec 24 T14S R75W Meridian: Seward.
Geographic: East side of Red Mountain.
Elevation: 250 to 500 ft.
Access: By road from Platinum.

HISTORY:

Production: Estimated - 1800 oz PGM.

1931 - Reed reported two claims held by Fred Wolters and Neil Corrigal (72).
1935 - Mining occurred (93).
1984 - Material on creek is used for building material in Bethel.

WORKINGS AND FACILITIES: The creek has been mined from the road to 450 ft elevation, a distance of approximately 0.6 mi. Approximately 90,000 yd^3 were mined.

GEOLOGIC SETTING: Dowry Creek is approximately 1 mi long. It is a western tributary to the Salmon River. Bedrock consists of metamorphosed volcanic and sedimentary rocks. The creek is 200 ft wide at its mouth but it narrows rapidly. Gravels were originally 5 ft thick.

BUREAU INVESTIGATION: The Bureau mapped and sampled the creek in 1986. At the head of the creek a 120-ft wide by 2-ft deep area has been stripped for mining. Two ft of boulders, cobbles, and clay overlie a serpentinized dunite bedrock. Sample 191 was taken from this area and contained 0.0215 oz/yd^3 PGM and 0.0006 oz/yd^3 Au (fig. 6, appendix B). Sample 190 was taken from 3 ft of bank material at 600-ft elevation (fig. 6, appendix B). The material consisted of boulders, cobbles, and clay and contained 0.0035 oz/yd^3 PGM. Tailings were sampled (194-195, fig. 6, appendix B) and contained from 0.0007 and 0.0015 oz/yd^3 PGM. The sizes of the PGM particles by volume in the samples were 1.2% +20 mesh, 10% -20/+30 mesh, 14.3% -30/+35 mesh, 3.2% -35/+45 mesh, 63.3% -45/+60 mesh, and 8% -60 mesh (fig. 10). The sizes of the gold particles by volume were 6.3% +30 mesh, 31.3% -30/+35 mesh, 18.7% -35/+45 mesh, and 43.7% -45/+60 mesh. Microprobe analyses of the recovered PGM grains contained from 0.8 to 1.5% Rh, 0.4 to 0.9% Ru, 63.4 to 80.2% Pt, 7.2 to 18% Ir, 1.2 to 6.8% Os, and 6.6 to 7.5% Fe (appendix C). The grains consisted of iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with minor osmiridium inclusions, osmiridium (irdium with minor osmium), hollingsworthite, osmium, xingzhongite, iridarsenite, irarsite, sperrylite, and tulameenite (appendix C). Gold particle finenesses for samples 191 and 195 were 824 and 738, respectively (table 3).

RESOURCE ESTIMATE: Inferred: 7000 yd^3 of 0.0125 oz/yd^3 PGM.

The resource was calculated using a 600 ft length, a 120 ft width, and 2.5 ft depth. The average grade was the average value of samples 190 and 191.

MINERAL DEVELOPMENT POTENTIAL: Dowry Creek has a moderate mineral development potential for a small placer mining operation because of its small amount of available resource and high grades. The tailings are a readily available source of building material for southwest Alaska.

RECOMMENDATIONS: More sampling and possibly drilling is needed to increase reserves.

REFERENCES: 1, 16, 18-20, 31, 62-63, 72, 75, 93, 98.

NAME: Salmon River, Quartz Creek, Snow Gulch, Platinum Creek, Fox Gulch, Squirrel Creek, Medicine Creek, Dry Gulch, Boulder Creek, Last Chance Creek

Map Location No. 22
Kardex No. 2,4,8
19
Mineral Survey No.
MAS No. 4

LOCATION:

Deposit Type: Placer.
Commodities: PGM, Au, Cr.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. T14 & 15S R74 & 75W Meridian: Seward.
Geographic: Tributary to Kuskokwim Bay, located approximately 12 mi south of the town of Platinum.
Elevation: 10 to 250 ft.
Access: Overland via road from Platinum.

HISTORY:

	Production: PGM(oz)	Au(oz)
1926 - PGM found on Fox Gulch by Walter Smith. Charles Thorsen sent some of the PGM to the Bureau of Mines office at College, Alaska, where chemical analysis indicated high grade platinum.		
1927 - Mining on Platinum and Dry Creeks (72).....	17.5	
1928 - Two camps on Squirrel and one camp on Platinum Creek (72).....	73	
1929 - Work done on Squirrel, Platinum and Fox Creeks (72).....	197	
1930 - Work done on Squirrel, Dry, and Platinum Creeks and Fox Gulch (72).....	391	
1931 - Mining on Squirrel, Dry Creeks, and Fox Gulch (72).....	370	
1933 - Platinum produced from Squirrel, Fox, and Platinum Creeks. Andrew Olson and associates acquired extensive tracts of claims on the developed streams and 38 claims on the Salmon River (91).		
1934 - 60 claims controlled by the company, with 15 to 20 men employed. Drag-line scraper plant mining using open-cut and sluicing methods. Platinum mined on Squirrel, Fox, and Platinum Creeks (92).		
1935 - First mention of Goodnews Bay Mining Co. Squirrel, Fox, and Dowry Creeks mined. A basic dike rock from Squirrel Creek was analyzed by Paul Hopkins of the USGS and platinum metals were positively identified (93)		
1936 - Mining on Squirrel, Fox, and Platinum Creeks. Extensive test drilling was in progress. A large loan was granted from the Reconstruction Finance Corporation to build a dredge. Four holes drilled on lower Salmon River (78).		

History	Production.	PGM(oz)	Au(oz)
1937 - Dredge brought in and put into operation. Dredging conducted for 6 weeks before it was ended on December 20th. 351,078 yd^3 of gravel mined (106).....			4085.55
		6284.35 Pt + Os	
		1088.3 Iridium	
1938 - 45 men employed on dredging operation in Salmon River and dragline operations on Platinum and Fox Creeks. Roehm (79) reported that over 30 lbs of platinum were taken out from the left limit of Platinum Creek near its mouth in six days. Dredge mined from Discovery claim to 1 above Discovery claim to Discovery claim. Over 1 million yd^3 moved (36).....		29902.17	121.01
1939 - Dredge and dragline mining continued Dredge mined from Discovery claim to 3 Below Discovery claim (36).....		17899.65	64.06
1940 - Strandberg & sons mining on Dry Gulch Dredge mined from 3 Below Discovery claim to 5 Below Discovery (36).....		26730.39	53.67
1941 - Dredge mined 5 Below Discovery claim to 7 Below Discovery claim (total metals, 36)...		20066.4	
1942 - Dredge mined 7 Below Discovery claim to 8 Below to 7 Below to 6 Below Discovery claim (total metals (36).....		14696.77	
1943 - Dredge mined from 6 Below to 5 Below to 4 Below Discovery claim (36, 106).....		15781	107
		(7.36 oz Ag)	
1944 - Mining on 4 Below Discovery to Sarah 4 Below Discovery claim to Margaret 3 Below Discovery claim (total metals, 36).....		30654.6	
1945 - Mining on Margaret 3 Below Discovery claim to Pankin 2 Below Discovery claim to 1 Below Discovery claim to Discovery claim (total metals, 36).....		22577.34	
1946 - Mining on 1 above Discovery claim to Ethel 1 Above Discovery claim to Ethel 2 Above Discovery Claim (36, 106).....		18549.54	410
1947 - Mining from 2 Above Discovery claim to 3 Above Discovery claim to 4 Above Discovery claim (36, 106).....		9126.6	757
		(4 oz Ag)	
1948 - Mining from 5 Above Discovery claim to 4 Above Discovery claim to 3 Above Discovery claim to 2 Above Discovery claim to Ethel bench (36, 106).....		8405.66	356
1949 - Mining on Med Frac. Palladium B. claim Palladium B and Osmium B plus Med. Frac. Ethel B claim (total metals 36).....	bench-	5218.9	
	total -	10895.57	

History	Production PGM(oz)	Au(oz)
1950 - Fowler (35) conducted a mining safety check. The power unit was removed from the dredge to a shore unit. The power capacity of the dredge was doubled. Mining on Osmium, Ruthenium, and Rhodium bench claims (total metals, 36).....	17309.45	
1951 - Mining continued (total metals, 36).....	20119.8	
1952 - Mining continued (total metals, 36).....	20284.8	
1953 - Mining continued (total metals, 36)..... East side of Red Mountain was drilled under a DMEA contract (57).	15697.9	
1954 - Mining continued (total metals, 36).....	17569.5	
1955 - Mining continued (total metals, 36).....	14939.8	
1956 - Mining continued (total metals, 36).....	16811.4	
1957 - Mining continued (total metals, 36).....	13850.5	
1958 - Mining continued (total metals, 36).....	10253	
1959 - Mining continued (total metals, 36).....	10636.4	
1960 - Mining continued (total metals, 36).....	13318	
1961 - Mining continued (total metals, 36).....	16111.4	
1962 - Mining continued (total metals, 36).....	12471.3	
1963 - 39 claims staked from the Salmon River to Chagvan Bay (total metals, 36).....	12024.9	
1964 - 60 claims staked from Salmon River to Chagvan Bay (total metals, 36).....	12981.6	
1965 - Mining continued (total metals, 36).....	9973.3	
1966 - Mining continued (total metals, 36).....	8855.9	
1967 - Mining continued (total metals, 36).....	7237.7	
1968 - Mining continued (total metals, 36).....	7580.2	
1969 - Mining continued (total metals, 36).....	10484.7	
1970 - Mining continued (total metals, 36).....	6701.2	
1971 - Mining continued (total metals, 36).....	4495	
1972 - Mining continued (total metals, 36).....	4202.3	
1973 - Mining continued (total metals, 36).....	4707	
1974 - Mining continued (total metals, 36).....	2584.3	
1975 - Mining continued (total metals, 36).....	3086.4	
1976 - Mining continued (total metals, 36).....	3212	
1977 - Mining continued (total metals, 36).....	6892	
1978 - No mining.		
1979 - Geological investigations of claims.		
1980 - Claims sold to Hanson Properties- camp refurbished.		
1981 - Mined 200,066 yd^3 with the dredge (12).....	900	
1982 - Dredge sank in spring. Refloated by summer with minor production.		
1983 - Exploration with a backhoe (12).....	3000?	
1984 - Magnetometer survey and exploration using a drill, backhoe, and dragline.		
1985 - No activity.		
Total.....	530660	

An additional 100,000 oz were recovered from dragline operations on benches and creeks draining the east side of Red Mountain (33).

Production information from the Goodnews Bay Mining Co. files was provided to the Bureau by R. A. Hanson. Figures A-1 and 2 are graphs which depict the amount and type of material mined and average recovered PGM grade and by the Goodnews Bay Mining Co. from 1938 to 1975. The company mined approximately 40 million yd^3 of unmined material and 4 million yd^3 of tailings (fig. A-1). The average grade was 0.026 oz/yd^3 PGM in 1938 and it fell to as low as 0.002 oz/yd^3 PGM in 1974 (fig. A-2).

WORKINGS AND FACILITIES: A pontoon-hulled dredge weighing 1400 tons, electrically operated, drawing 1,000 horsepower is present in Salmon River. The dredge is 130 ft long by 60 ft wide by 9 ft draft. It has 94 eight ft^3 buckets. It operated at the rate of 31 buckets per minute. From 1938 to 1975, the dredge mined over 1 million yd^3 per season. Miscellaneous mining equipment, complete shops and bunkhouses.

Platinum Creek has been mined from the confluence of Fox Gulch to its mouth. An elevated sluicebox is located on the creek.

Fox Gulch has been mined from the confluence with Platinum Creek to 400-ft elevation.

Squirrel Creek has been mined upstream of the camp to 350-ft elevation.

Salmon River has been mined from Dowry Creek downstream to within 1 mi of its mouth. The bench on the east side of the river was mined by dragline from Medicine Creek to Dowry Creek. The dredge worked from between Boulder and Last Chance Creeks to within a mile of the ocean on both the bench and main creek.

GEOLOGIC SETTING: Mertie (63) described the PGM deposits at Goodnews Bay and the following discussion is taken predominantly from his report. Platinum Creek, with a length of 2 mi, has two tributaries from the north: Fox Gulch and Squirrel Creek. These streams had paystreaks which extended from their headwaters to their mouths; and Platinum Creek was mined from the mouth of Fox Gulch to its confluence with Salmon River. The paystreak on Platinum Creek included stream and bench placer deposits. At the mouth of Fox Gulch, the width of this paystreak was 200 ft, and at the confluence with Salmon River it had a width of at least 400 ft. The depth to bedrock, less the surficial cover of moss, increased from 12 ft at its confluence with Fox Gulch to 25 ft at its mouth. The total length of the paystreaks of Platinum Creek, Fox Gulch, and Squirrel Creek, was about 3.5 mi. PGM occurred in the lower few feet of the gravels, and on the surface of bedrock, and for a few feet within the cracks and crevices of fractured bedrock. These metals consist of fine grains, however, they are larger than those recovered from the paystreaks of Salmon River. Nuggets are uncommon, though more prevalent in Fox Gulch than elsewhere. The largest nugget recovered weighed 4 oz.

The PGM deposits in the valley of the Salmon River occur in two distinct paystreaks, one in the present valley floor and the other in what has been designated as the bench channel, along the eastern side of the valley.

The valley paystreak extends from claim 7 above Discovery claim, near the mouth of Boulder Creek, downstream to the lower end of claim 15 below Discovery, a distance of about 6 mi. This deposit ranges in width from 300 to 450 ft, except at the mouth of Platinum Creek, where it was as wide as 600 ft. The valley paystreak is covered by 30 to 80 ft of overburden. Gravels constitute a large percentage of the alluvium. The gravels range up to 2 ft in diameter, with no clay and are from 30 to 75 ft thick. Bedrock is unaltered by weathering and shows deep gutters with a depth as great as 20 ft. PGM occur mainly on bedrock, in the overlying 2 ft of gravels, and in the uppermost 2 ft of shattered bedrock. The sizes of the PGM grains, diminishing downstream, range from 0.2 in to less than 0.002 in diameter.

The paystreak terminates, or becomes noncommercial at the lower end of claim 15 below Discovery. On the east bank of the Salmon River, just above the mouth of Happy Creek, there is an ancient deposit of fairly well sorted outwash gravels of glacial origin. Four 75 to 110 ft holes, drilled on the south side of Salmon River below Happy Creek, contained no PGM or gold values (78).

The bench paystreak, as defined by drilling, extends from the Association claim east of claim 9 above Discovery downstream to within 0.75 mi from Chagvan Bay, a distance of about 10 mi. On the Olson bench claim, this deposit had a width of 600 ft, but at some sites farther upstream was as wide as 1,200 ft. At the northern limit of the bench paystreak, the depth to bedrock is 10 ft; east of the Discovery claim, the depth is 45 ft; at the lower end of the Olson bench claim the depth is 125 ft; and 0.87 mi from Chagvan Bay the depth is 200 ft. Bedrock on the bench is level.

The bench paystreak consists largely of clay from top to bottom, with an average content of about 20 pct gravel, which is irregulary distributed vertically. The gravels occur mainly as inlaid seams and lenses in the clay, though in places drilling has penetrated beds of gravel ranging in thickness from 25 to 70 ft. The paystreak is definitely of glacial origin. The bedrock, if nonsiliceous, is deeply weathered to as much as 5 ft. PGM occur mainly on the surface of the bedrock and in the overlying 10 ft of clay and gravel. The bench paystreak has been locally enriched in PGM at the sites of tributary gulches from the east that drained an older paystreak higher on the valley wall. The sites of these ancient gulches, do not correspond exactly with the position of the gulches shown on the topographic map. These high-level deposits have been prospected, but have been found to be narrow, intermittent, and too low grade to be mined at a profit.

Fifty holes were drilled on the east side of Red Mountain between Dowry and Last Chance Creeks in 1953 under a Defense Minerals Exploration Administration contract (57). Depths of the drill holes ranged from 5 to 51 ft. PGM values ranged from 0 to 0.0085 oz/yd^3. The highest values were found in drill holes along Boulder Creek. The average value of eight drill holes was 0.0024 oz/yd^3 PGM.

BUREAU INVESTIGATION: The Bureau sampled Platinum Creek, Fox Gulch, Squirrel Creek, and the tailings of the Salmon River in 1986.

Platinum Creek was sampled from 200 feet elevation, approximately 0.25 mi upstream of Fox Gulch to Dry Gulch. Six 0.1 yd^3 placer samples taken from five sample sites (209-213, fig. 6, appendix B) contained from trace to 0.0093 oz/yd^3 PGM. Of the PGM particles recovered, 3% were +30 mesh and 97% were -30 mesh in size. No PGM was reported by past investigators above the confluence with Fox Gulch; however, sample 213 (fig. 6, appendix B) taken 0.25 mi above the confluence contained 0.0028 oz/yd^3 PGM and 0.0006 oz/yd^3 Au. The tailings in Platinum creek were mapped and sampled. It was calculated that 50,000 yd^3 of overburden were stripped and 50,000 yd^3 of gravel were mined in Platinum Creek above the confluence with Squirrel Creek. Two samples of tailings (209-210, fig. 6, appendix B) contained 0.0012 and 0.0039 oz/yd^3 PGM. Microprobe analyses of the PGM grains in the samples contained from 0.8 to 1.6% Rh, 0.5 to 1/0% Ru, 45.6 to 77.8% Pt, 8.1 to 37.8% Ir, 3.2 to 13.4% Os, and 4.1 to 8.4% Fe (appendix C). The identified grains were iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with less iron-platinum alloy), osmiridium (with lesser iron-platinum alloy), hollingsworthite, prassoite, kashinite, sulrhodite, ehrlichmanite, iridosmine, osmium, iridarsenite, iridium, sperrylite, and tulameenite (appendix C). One fineness value for the recovered gold was 714 (table 3).

Four 0.1 yd^3 placer samples (214-217, fig. 6, appendix B) were taken from Fox Gulch. The samples contained from 0.0009 to 0.0378 oz/yd^3 PGM. The highest value was from the virgin ground at the head of the creek. A sample of tailings (214, fig. 6, appendix B) contained 0.0121 oz/yd^3 PGM. The sizes by volume of the PGM grains recovered were 1.25% +20 mesh, 6.5% -30/+30 mesh, 6.25% -30/+35 mesh, and 86% -35 mesh. It was calculated that approximately 160,000 yd^3 of material was moved. Microprobe analyses of the PGM grains contained from 1.3 to 1.9% Rh, 0.7 to 1.0% Ru, 37.7 to 48.6% Pt, 26.7 to 41.3% Ir, 9.8 to 13.4% Os, and 3.8 to 4.8% Fe (appendix C). The recovered grains consisted of iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, iridium with minor osmium, hollingsworthite, iridarsenite, irarsite, iridium, sperrylite, and platarsite (appendix C).

Three 0.1 yd^3 placer samples (206-208, fig. 6, appendix B) of tailings were taken from Squirrel Creek. The samples contained from 0.0006 to 0.0033 oz/yd^3 PGM. The sizes by volume of the PGM grains

were 5.4% +30 mesh, 2.7% -30/+35 mesh, and 91% -35 mesh. It was calculated that approximately 55,000 yd^3 of material was mined. The Goodnews Bay Mining Camp is on ground that has not been mined. Microprobe analyses of the PGM grains contained from 0.5 to 1.9% Rh, 0.3 to 0.9% Ru, 47 to 88.4% Pt, 0.7 to 37.4% Ir, 0.5 to 9.2% Os, and 4.1 to 9.0% Fe (appendix C). The recovered grains consisted of iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium with lesser iron-platinum alloy, and osmium.

Some of the dredge tailings along the Salmon River were sampled. Ten 0.1 yd^3 placer samples taken from nine sample sites (197-205, fig. 6, appendix B) contained from 0 to 0.0037 oz/yd^3 PGM. PGM grain sizes by volume were 6.9% +20 mesh, 12.3% -20/+30 mesh, 6.8% -30/+35 mesh, 11% -35/+45 mesh, 37% -45/+60 mesh, 26.0% +60 mesh (fig. 8). Microprobe analyses of the recovered PGM grains contained from 0.6 to 1.1% Rh, 0.4 to 0.7% Ru, 60.3 to 85.5% Pt, 3.8 to 25.6% Ir, 1.2 to 6.3% Os, and 5.9 to 8.9% Fe (appendix C). The recovered grains consisted of iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with minor osmium), sperrylite, and tetraferroplatinum (appendix C). A sample (196, fig. 6, appendix B) was taken from a weathered (saprolite) dunite which is exposed in a bench cut near Boulder Creek. The sample contained PGM, but it was later proven that the sample was contaminated by the PGM-bearing overlying gravels.

RESOURCE ESTIMATE:

Platinum Creek - Inferred: 50,000 yd^3 of tailings with 0.0026 oz/yd^3 PGM.

Fox Gulch - Measured (36): 20,000 yd^3 of virgin ground with 0.02 oz/yd^3
Inferred: 160,000 yd^3 of tailings with 0.012 oz/yd^3

Squirrel Creek - Measured (36): 37,000 yd^3 of virgin ground with 0.0135 oz/yd^3 PGM
Inferred: 50,000 yd^3 of tailings with 0.002 oz/yd^3 PGM.

Salmon River (33)-
Measured dredge reserve
Bench paystreak.....37,882,300 yd^3 with 0.0023 oz/yd^3 PGM
Indicated dredge reserve
Bench paystreak.....24,530,000 yd^3 with 0.0017 oz/yd^3 PGM
Measured dragline reserve...496,000 yd^3 with 0.0084 oz/yd^3 PGM
Indicated dragline reserve..500,000 yd^3 with 0.007 oz/yd^3 PGM

Bundzten (11) postulated that there were 62,900,000 yd^3 of material with 500,000 oz of PGM in the Salmon River.

The dredge mined approximately 40 million yd^3 of virgin ground, with an a recovery of between 0.002 and 0.026 oz/yd^3 PGM (figs. A-1 and 2). If the dredge were 60% efficient, as stated by Ron Dowers of Hanson Properties (28), then there should be 40 million yd^3 of tailings which range from 0.0013 to 0.017 oz/yd^3 PGM.

MINERAL DEVELOPMENT POTENTIAL: The Bureau investigation of the Salmon River property indicates that there is a high mineral development potential for a large mining operation in the Salmon River and small operations in the tributaries. The tailings of the Salmon River, however, need to be tested more thoroughly and a feasibility study should be conducted before any development could occur. The tailings are a good building material source for southwest Alaska.

RECOMMENDATIONS: Drilling or bulk sampling by trenching of the tailings in the Salmon River is recommended before mining is conducted. An efficient recovery system that is capable of recovering PGM from the clay-rich gravels is also needed.

REFERENCES: 1-2, 11-13, 16-20, 23, 26-31, 33-36, 38, 51, 55, 57, 61-64, 66, 69-70, 72, 75, 77-82, 91, 93-95, 97-98, 100-101, 106-108, 115.

FIGURE A-1. AMOUNT OF MATERIAL MINED

BY THE GOODNEWS BAY MINING CO.

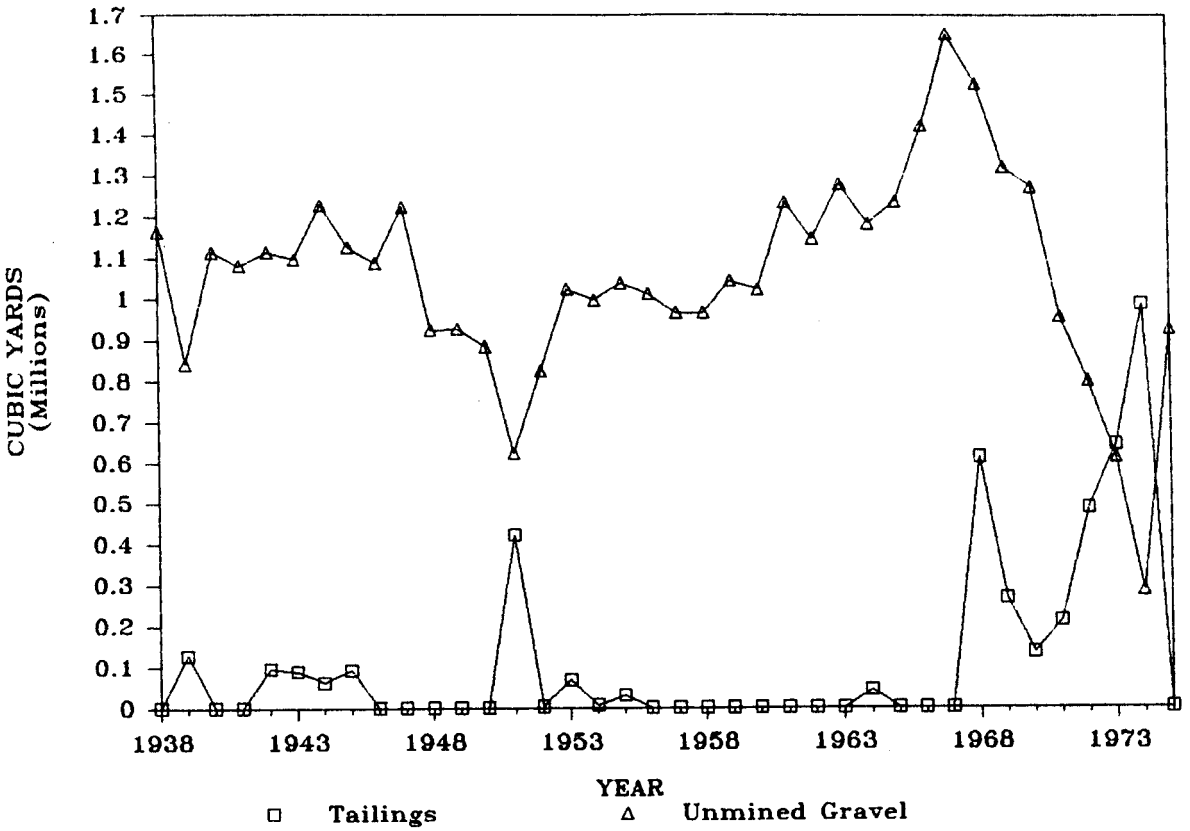
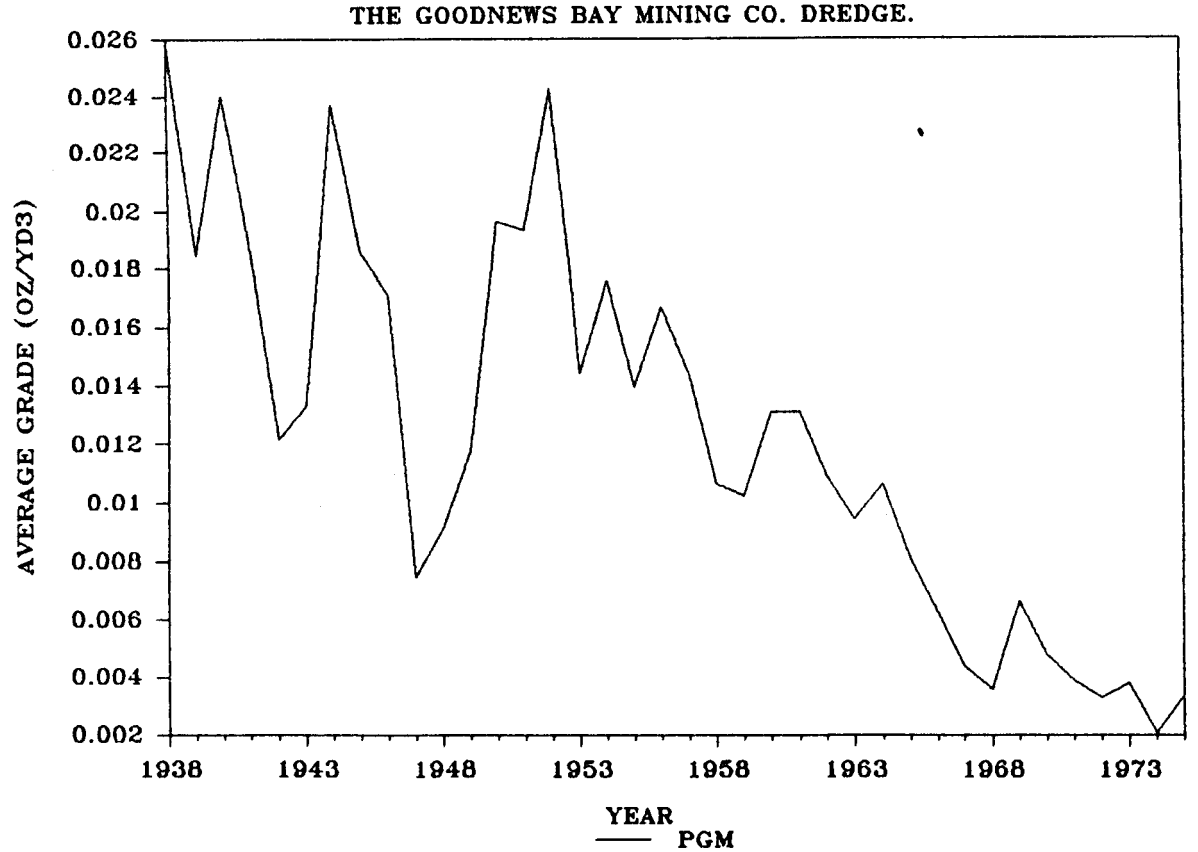


FIGURE A-2. AVERAGE RECOVERED GRADE BY

THE GOODNEWS BAY MINING CO. DREDGE.



NAME: Red Mountain (West Side)

Map Location No. 23
Kardex No. 11,17
Mineral Survey No. ____
MAS No. 2

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D-6.
Deposit Type: Placer.
Commodities: Pt, Fe.
SW 1/4 Sec 34 T14S R75W
Meridian: Seward.
Geographic: South of the town of Platinum.
Elevation: 600 ft.
Access: By road 3 mi south of Platinum.

HISTORY:
Production: Minor.

1930-34 - $10.00 per day of platinum was recovered from the Prospector's channel (105).
1936 - Considerable ground staked. Hand drill hole sunk to a depth of 30 ft on a group of 18 claims owned by Haraldson, Wicklund, Brevick, and Burness. 152 milligrams of platinum were recovered (79).
1937 - A power drill was purchased. 13 holes were drilled, with trace to a few milligrams recovered. The 1936 hole was redrilled with negative results (79).
1963 - Six pan concentrate samples taken from the west side of Red Mountain by Berryhill. A trace of gold and platinum were found in each sample (4).
1965 - A recovery plant was taken to a site on top of Red Mountain and small amounts of platinum were recovered from the residual material (63).
1969 - 62 claims staked.
1981 - Ulrich, S.D. (105) mapped and sampled the sediments on the west side of Red Mountain.

WORKINGS AND FACILITIES: Prospector's channel dug in the vicinity of Cabin Creek (local name for the creek).

GEOLOGIC SETTING: Red Mountain is composed of dunite. The west side of Red Mountain consists of colluvium from Red Mountain, glacial outwash and moraines, and alluvial fans. Fourteen holes drilled in 1936 and 1937 ranged from 30 to 110 ft deep, with bedrock reached in the 110 ft deep hole (78). Eighty-eight milligrams of PGM were found over 30-ft intercept in a 4-in drill hole in one sample (78). The other drill holes contained little or no PGM.

Ulrich (105) reported that the glacial bluff is composed of a broad range of grain sizes, the percentages of which vary considerably from location to location. Gravel comprises approximately 50% of the bluff material. The sediment is very poorly to extremely poorly sorted. In these deposits Pt values decrease steadily away from Red Mountain. Ulrich (105) found that the sample closest to Red Mountain contained 0.7 ppm Pt and the sample beyond Dead Walrus Creek ½a name assigned to a creek by Bond (6) and Ulrich (105)¾ contained no Pt. The Os, Ir, and Rh values were comparable to the Dead Walrus Creek samples.

A recessional moraine in the area is composed of 40% gravel, 55% sand, and 2.5% mud.

Ulrich (105) reported that the alluvial fans have a broad range of elemental values, however, they are generally characterized by higher Pt and Pd values than the glacial bluff samples, and greater Pd, Mg, and lesser Fe, Cr, As, Mn, and U values than the stream deposits.

Ulrich (105) found that Dead Walrus Creek had the highest Pt values of any creek sampled in 1981. This may be attributed to the fact that the creek drains a more Pt rich portion of Red Mountain or that an older stream channel may have been cut by the creek. The majority of PGM grains recovered in the creek are less than 120 mesh in size. The sediments in the creek are poorly to very poorly sorted and are composed of variable amounts of sand and gravel. A large percentage of the samples are composed of heavy and magnetic minerals. Ulrich (105) postulated that the PGM grains in Dead Walrus Creek were in the process of being washed into the ocean, with little deposition along the beach.

Ulrich (105) concluded from her study of the piedmont deposits that:

1. The abundance of Pt in the glacial bluff samples decreases away from Red Mountain due to mixing with Pt-deficient glacial sediments.

2. The glacial bluff and moraine samples are composed of sediment collected from a variety of source rock types; whereas the remainder of the piedmont samples are composed primarily of weathered Red Mountain ultramafic material.

3. The moraine is compositionally and texturally intermediate to the glacial bluff and stream deposits. This is the result of cursory sorting by meltwater streams.

BUREAU INVESTIGATION: The Bureau took six pan concentrate samples from the west side of Red Mountain in 1963 (4). Only trace amounts of gold and platinum were found.

Six 0.1 yd^3 placer samples were taken from five sample sites (178, 180-183, fig. 6, appendix B), taken from the bluffs in 1986 by the Bureau, contained from 0 to 0.0005 oz/yd^3 PGM and 0 to 0.0004 oz/yd^3 Au. The recovered PGM grains were -60 mesh in size. The recovered Au grain mesh sizes were 5.5% +30, 61.5% -30/+35, and 33% -60. Microprobe analyses of grains from sample site 178 contained 1.4 to 1.6 % Rh, 0.9 to 1.0% Ru, 35.5 to 49.4% Pt, 33.7 to 44.7% Ir, 7.1 to 11.2% Os, and 4.0 to 4.6% Fe (appendix C). Iron-platinum alloy with 8 to 30% platinum and osmiridium (iridium with minor osmium) were identified in the sample.

RESOURCE ESTIMATE: A resource estimate can not be made because no economic quantities of placer minerals were found in the bluffs.

MINERAL DEVELOPMENT POTENTIAL: Sampling of the bluffs by drilling in 1936-37, Ulrich, and the Bureau indicates that this propoerty has a low mineral development potential.

RECOMMENDATIONS: None.

REFERENCES: 1, 4, 16-20, 23, 31, 62-63, 78-79, 100-101, 105, 108.

NAME: Platinum-Salmon River Beach

Map Location No. 24
Kardex No.
Mineral Survey No.
MAS No. 1

LOCATION:

Deposit Type: Placer.
Commodities: PGM, Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Goodnews Bay A-8 & Hagemeister Is. D6. T14 & 15S R75W Meridian: Seward.
Geographic: Beach from the town of Platinum to the Salmon River.
Elevation: Sea level.
Access: Overland access along the beach from Platinum.

HISTORY:

Production: None.

1963 - U.S. Bureau of Mines drilled and sampled the beaches (4).
1981 - Bond, S.C. and Ulrich, S.D. sampled the beach for the Univ. of Texas (6, 105).
1985 - U.S. Bureau of Mines redrilled and bulk sampled some of the beach (3).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: The beach is from 10 to 100 ft wide. It is bordered on its east side by low to high (10- to 50-ft) bluffs of glaciofluvial and glacial outwash material. This material is also the bedrock on which the beach sands rest. Beach material north of Red Mountain ranges from 1 in thick near the bluffs to an unknown depth (probably less than 20 ft) at the surf line. Black sands (up to 3 in thick) are concentrated along the interface between the beach sands and the bedrock. Black sands are also found intercalated with the beach sands as the sands thicken away from the bluffs.

The mid-wash zone sediments are classified as sandy gravel and contain approximately equal amounts of sand and gravel (105). These sediments are the most poorly sorted of the beach sediments. Approximately 75% of the minerals are light. No PGM is being concentrated in this zone (105).

The upper-swash zone is located at or just behind the beach crest. This zone is characterized by the largest mean grain size of the beach sediments, and by moderate sorting of the grain sizes (105). This zone contains over 90% gravel, and less than 10% sand. Approximately 80% of the minerals are light in the upper grain sizes, but in the lower grain sizes the ratio of light to heavy minerals is 1:1 (105). No PGM was detected by Ulrich (105) from this zone. No PGM would be predicted from this zone because it gets eroded and deposited twice per day.

The near back-beach or the seaward portion of the backbeach is rich in PGM. The area has the smallest mean grain-size of any beach sample and is poorly sorted. Grains are concentrated in the 45 to 100 mesh

size fractions (105). Magnetite and chromite grains are from 45 to 80 mesh in size (105). PGM is being concentrated by daily tidal spillover events that take place beyond the high-tide line.

The far back-beach sediments contain over 90% sand, less than 10% gravel, and almost no mud. These sediments are poorly sorted and have variable grain-size distributions. The most abundant size range is between 10 and 35 mesh (105). The Pt content ranged from 0.01 to 0.07 ppm (105). Ulrich (105) concluded that this is an excellent target for further Pt exploration. Large concentrations would not form in this region, because the beach is rapidly eroding (approximately 7 in/year). At least 690 yd^3/year of bluff detritus is contributed to the beach system over a 1 mi length of beach north of Red Mountain (105).

Washover fan deposits are highly variable in their grain-size content because each layer within the deposit represents a separate pulse of a storm event. The deposits are composed of rhythmically-alternating, low-angle, landward-dipping, coarse, fine, and rare heavy mineral layers (105). Ulrich (105) found during her sampling that the Pt content ranged from 0.01 to 10 ppm.

BUREAU INVESTIGATION: The Bureau sampled the beaches in 1963, 1985, and 1986. A 3-in diameter auger was used in 1963 and 1985, which accounted for low sample volumes. Results from the drilling of the beach north of Red Mountain in 1985 indicated that the beaches contained from 0.0009 to 0.0352 oz/yd^3 PGM (3). Berryhill (4) recovered minor Cr and less than 39 lb/yd^3 Fe.

In 1986, the Bureau sampled the beaches between Platinum and Chagvan Bay. Sampling was conducted on 1 mi, 0.5 mi, and 0.25 mi intervals, with time restrictions being the dominant factor limiting the sampling density. Sixty-one samples of the beach between Platinum and the Chagvan Bay were taken from twenty-eight sample sites (176-183, 219-238, figs. 4 and 6, appendix B). The samples contained from 0 to 0.1029 oz/yd^3 Au and 0 to 0.26 oz/yd^3 PGM. The highest concentrations of PGM and gold were found in the Flat Cape area, with the lowest concentrations being north of Red Mountain and south of the Salmon River. The grain size distribution for gold was 1% +20 mesh, 4.5% -20/+30 mesh, 11% -30/+35 mesh, 26.5% -35/+45 mesh, 20% -45/+60 mesh, and 37% -60 mesh (fig. 11). The grain size distribution for PGM was 0.3% +20 mesh, 2.6% -20/+30 mesh, 6.7% -30/+35 mesh, 10.6% -35/+45 mesh, 4% -45/+60 mesh, and 75.8% -60 mesh (fig. 12). Microprobe analyses of the PGM grains found that they contained from 0.5 to 4.5% Rh, 0.2 to 1.0% Ru, 32 to 89.1% Pt, 1.6 to 47.8% Ir, 0.8 to 15.9% Os, and 3.2 to 8.9% Fe (appendix C). The grains were iron-platinum alloy with 8 to 30% iron, iron-platinum alloy with minor osmiridium inclusions, osmiridium (iridium with minor osmium), iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, osmiridium with lesser iron-platinum alloy, rhodium, hollingsworthite, iridosmine, osmium, iridarsenite, irarsite, iridium, sperrylite, platarsite, tulameenite, and tetraferroplatinum (appendix C). Fineness values for the gold grains ranged from 548 to 863 (table 3).

Sixteen placer samples (178, 180, 181-183, 220, 222-231, fig. 6, appendix B) of the glacial material that comprises the bluffs along the beach were taken. Sampling consisted of cutting a channel from the top of the bluffs to sea level. The samples contained from 0 to 0.0005 oz/yd^3 Au and from 0 to 0.0013 oz/yd^3 PGM. The best samples were found in the Flat Cape area. The grain size distribution for gold was 1.3% +30 mesh, 19.3% -30/+35 mesh, 8.4% -35/+45 mesh, 38.5% -45/+60 mesh, and 32.5% -60 mesh (fig. 11). The grain size distributions for PGM were 0.7% +30 mesh, 8% -30/+35 mesh, 1.5% -35/+45 mesh, 13% -45/+60 mesh, and 68.8% -60 mesh (fig. 12). Microprobe analyses of the PGM grains found 0.7 to 1.7% Rh, 0.4 to 1.0% Ru, 7.2 to 86.2% Pt, 3 to 69.4% Ir, 0.6 to 20.2% Os, and 0.3 to 8.2% Fe (appendix C). Ferroan platinum with 8 to 30% iron, ferroan platinum with minor osmiridium inclusions, osmiridium (iridium with minor osmium), ferroan platinum with oriented inclusions of Ru and Ir arsenides, and hollingsworthite were found (appendix C). Fineness values for the gold grains ranged from 688 to 900 (table 3).

RESOURCE ESTIMATE: The mean area method was used to calculate the resources using the limits of the area sampled. The beach was subdivided into the area north of Red Mountain and the area between Red Mountain and the Salmon River.

Area north of Red Mountain:	Inferred:	27,000 yd^3 averaging 0.0001 oz/yd^3 Au, and 0.0008 oz/yd^3 PGM
Area south of Red Mountain:	Inferred:	39,000 yd^3 averaging 0.0033 oz/yd^3 Au, and 0.0073 oz/yd^3 PGM

MINERAL DEVELOPMENT POTENTIAL: The beach south of Red Mountain has a high mineral development potential because there are some areas of the beach (e.g. Flat Cape) that contain high values of PGM and Au.

RECOMMENDATIONS: The Bureau sampling indicated that PGM and gold values on the beach are highly variable. There is a strong correlation between the amount of PGM on the beach and the presence of PGM and gold in the bluffs. The highest values are found at the base of the bluffs, with values decreasing with the distance from the bluffs. Although, there are economic values of PGM and gold in the beach sands, the reserves are too low to support a large placer operation.

REFERENCES: 1, 3-4, 6, 16-21, 23, 31, 40, 61-63, 105, 108, 116.

NAME: Red Mountain

Map Location No. 25
Kardex No. 5, 13, 15
Mineral Survey No.
MAS No. 7

LOCATION:
Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. Sec 26 T14S R75W Meridian: Seward.
Geographic: An 1887 ft mountain located 4 mi south of Platinum.
Elevation: 1880 ft.
Access: Road to the base of the mountain.

Deposit Type: Lode.
Commodities: PGM, Au, Cr.

HISTORY:

Production: None reported.

1935 - Platinum was identified in basic dike rock from Squirrel Creek by Paul Hopkins of the USGS (93).
1960 - 148 lode claims staked.
1965 - Residual soils sluiced by the Goodnews Bay Mining Co. near the head of Squirrel Creek. Minor PGM and gold were noted (62).
1981 - Ulrich, S.D. studied the ultramafic pluton (105).
1982 - 1984 - Southworth and Foley mapped and sampled the ultramafic pluton (100-101).

WORKINGS AND FACILITIES: Some pits.

GEOLOGIC SETTING: Red Mountain is located on the Bering Sea, approximately 4 mi south of Platinum. Red Mountains is a Jurassic age ultramafic intrusive body. Southworth and Foley (100-101) have determined that the intrusive is an Alaskan-type concentrically zoned ultramafic body. The body consists of the following rocks: dunite, wehrlite, magnetite clinopyroxenite, hornblende clinopyroxenite, and hornblendite. Much of the dunite has been altered to serpentinite.

Workers have found higher platinum and palladium values associated with high chromite and magnetite concentrations in the intrusive. However, no workable concentrations of either metal have been found in the dunite of the Red Mountain ridge. Mertie (63) suggests that PGM may be found as residual concentrations along the ridge. He also thought that small concentrations of PGM-bearing dunites may be found in the mass (63). All the headwater tributaries of the Salmon River flowing eastward from this ridge have fluvial deposits that are PGM-bearing.

Ulrich (105) examined the body and concluded that:

1. Olivine is the only primary silicate in the dunite and formed as a result of magmatic cumulus processes.

2. Serpentine is present in all samples but ranges in abundance from 30 to 90%. Serpentinization may have occurred during late-stage hydrothermal reactions or as an unloading process. Semi-quantitative analyses show surprisingly high values of Cr, Fe, Ni. All three are probably present as discrete magnetite, chromite, and Ni-bearing phases.

3. Chromite is typically euhedral and ranges in size from 0.1 to 0.8 mm. Although the majority of chromite crystals are unaltered, a few are surrounded and/or have fractures lined with secondary magnetite. This secondary magnetite most likely formed duirng serpentinization reactions. The chromite is compositionally similar to that in other concentric-type ultramafic bodies.

4. Chromium-aluminum magnetite crystals are approximately the same size as the chromite crystals, however most of the magnetite grains are partly dissolved and irregular in shape. As with chromite, this dissolution appears to have occurred during serpentinization.

5. Cooperite, $(Pt_{.80}Fe_{.20})S_{.82}$, and smaller grains of a Pt-Fe alloy, (Pt_2Fe), were identified in the olivine. The cooperite is partly mantled by the Pt-Fe alloy. The alloy is similar in composition to the platinum in the beach placer.

BUREAU INVESTIGATION: The Bureau worked on Red Moutain from 1982 to 1984. The results of the work are published in Bureau OFR 51-86 and a University of Alaska Master's thesis (100-101). Minor platinum and palladium values were found, but no lode sources were identified. The headwaters of Fox and Squirrel Creeks were identified as having the greatest possible PGM accumulations.

The Bureau took 3 samples of weathered dunite from the Red Mountain ridge in 1986. The samples (184-185, 218, fig. 6, appendix B) were 0.1 yd^3 in size and were processed through a hydraulic concentrator. The samples contained from trace to 0.0011 oz/yd^3 PGM and trace to 0.0002 oz/yd^3 Au. The highest value occurred in sample 218 and was from the headwaters of Fox Gulch. The PGM grain sizes by volume were 1.7% +35 mesh, 3.5% -35/+45 mesh, 15.5% -45/+60 mesh, and 79.3% -60 mesh. The grain sizes by volume for the recovered gold were 5.9% +30 mesh, 5.9% -30/+35 mesh, 11.7% -35/+45 mesh, 53% -45/+60 mesh, and 23.5% -60 mesh.

RESOURCE ESTIMATE: Data and the sample values were insufficient to calculate a resource.

MINERAL DEVELOPMENT POTENTIAL: PGM and gold were found in weathered dunite on top of Red Mountain. The sampling proved that the mountain is a source of the PGM and some gold; however, as a lode deposit, all of the present available data indicates that the property has a low mineral development potential.

RECOMMENDATIONS: Detailed sampling with at depth with using a drill is needed.

REFERENCES: 1, 5, 11, 15, 16, 18-20, 22, 24-25, 31, 34, 37, 40, 48, 61-64, 66-67, 93, 100-101, 105, 108, 114-115.

NAME: Susie Mountain

Map Location No. 26
Kardex No.
Mineral Survey No.
MAS No.

LOCATION: Deposit Type: Lode.
Mining District: Goodnews Bay. Commodities: Cu.
Recording District: Bethel.
Quadrangle:Hagemeister Is. D5. Sec 16 T14S R75W Meridian: Seward.
Geographic: Headwaters of Susie Creek on Susie Mountain, approximately 10 mi southeast of Platinum.
Elevation: 1000 ft.
Access: By road from Platinum, then by foot up the mountain.

HISTORY: Production: None.

1972 - Allen L. Clark reported a copper occurrence (16).

WORKINGS AND FACILITIES: None noted.

GEOLOGIC SETTING: Jurassic age ultramafic rocks consisting of a dunite-werhlite core rimmed by clinopyroxenite are located on the northwest side of Susie Mountain. The rocks are in contact with Mesozoic and Paleozoic age sedimentary and volcanic rocks. The ultramafic rocks may be the eastern extension of the Red Mountain ultramafic complex.

BUREAU INVESTIGATION: Southworth and Foley (100-101) looked at the geology of Susie Mountain in 1982-84 and found chalcopyrite present in the magnetite clinopyroxites and hornblende clinopyroxenites. However, chalcopyrite usually comprises less than 1% of the rock.

RESOURCE ESTIMATE: No resource could be calculated because of insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The occurrence has a low mineral development potential because there are low concentrations of copper minerals present.

RECOMMENDATIONS: None.

REFERENCES: 16, 18, 100-101.

NAME: Unnamed Occurrence

Map Location No. 27
Kardex No.
Mineral Survey No.
MAS No. 10

LOCATION:

Deposit Type: Lode.
Mining District: Goodnews Bay. Commodities: Au.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D5.NE 1/4 Sec 9 T15S R73W Meridian:Seward
Geographic: At the head of a tributary of the Unaluk River.
Elevation: 1000 ft.
Access: By helicopter or from Chagvan Bay up the Kinegnak River by boat, then overland by foot.

HISTORY:

Production: None.

1972 - Allen L. Clark (USGS) reported lode gold at this locality (18).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: Medium to coarse grained, locally pegmatitic, gabbroic intrusive rocks consisting of hornblende, clinopyroxene, and calcic plagioclase. The intrusive locally contains olivine and commonly shows compositional layering. It ranges from 159.3 to 186.9 my (55). The gabbro is in contact with a Permian limestone and undifferentiated Mesozoic and Paleozoic volcanic and sedimentary rocks.

BUREAU INVESTIGATION: The Bureau mapped and sampled the area in 1986. Eleven samples (162-166, fig. 4, appendix B) were taken. A pan concentrate sample (166, fig. 4, appendix B) taken from a saddle on the mountain contained 240 ppb Au and 125 ppb Pt. A sample of chert (165, fig. 4, appendix B) from the contact of the gabbro and chert contained 70 ppb gold.. Three small flakes of gold were recovered in a 0.1 yd^3 placer sample (160, fig. 4, appendix B) from a south flowing creek.

RESOURCE ESTIMATE: A resource could not be calculated because of insufficient data.

MINERAL DEVELOPMENT POTENTIAL: The occurrence has a low mineral development potential.

RECOMMENDATIONS: None.

REFERENCES: 16, 18, 55, 108.

NAME: Chagvan Bay

Map Location No. 28
Kardex No.
Mineral Survey No.
MAS No. 5

LOCATION:

Deposit Type: Lode.
Commodities: Cr, PGM, Au.

Mining District: Goodnews Bay.
Recording District: Bethel.
Quadrangle: Hagemeister Is. D6. Sec 34 T15S R75W Meridian: Seward.
Geographic: Shallow bay of Kuskokwim Bay, located between the mouth of the Salmon River and Chagvan Mountain.
Elevation: Sea level.
Access: By road from Platinum to the Salmon River, then along the beach.

HISTORY:

Production: None.

1963 - U.S. Bureau of Mines drilled 5 auger holes along the beach (4).

WORKINGS AND FACILITIES: None.

GEOLOGIC SETTING: Glacial outwash, which is exposed as low lying hills and plains are present along Kuskokwim Bay. Beach accumulations include sand dunes and beach sands. The Goodnews Bay Mining Co. drilled buried bench gravels that trend into Chagvan Bay from the Salmon River. The gravels extend to 250 ft below sea level (62).

BUREAU INVESTIGATION: In 1963, Berryhill (4) took pan concentrates from 5 auger holes. Chromite and magnetite were the major (greater than 10%) constituents. Traces of gold and platinum were also found. Iron concentrations, calculated for material in place, were less than 31 lb/yd^3 (4). Reconnaissance pan samples were taken in the area in 1985. PGM and gold were noted in the pans.

The Bureau sampled the Kuskokwim Bay side of Chagvan Bay in 1986. At the north end of Chagvan Bay there are bluffs composed of glacial till and the beach deposits are from 1 to 1.5 ft thick at the base of the bluffs. The beach sands become thicker (greater than 4.5 ft) to the south. Four 0.1 yd^3 placer samples (235-238, fig. 4, appendix B) taken contained from 0 to 0.0010 oz/yd^3 Au and 0 to 0.0006 oz/yd^3 PGM. Sizes by volume of the PGM grains were 7.3% +60 mesh and 82.7% -60 mesh. Sizes by volume of the gold were 3.7% +30 mesh, 10% -30/+35 mesh, 34.5% -35/+45 mesh, and 51.8% -45/+60 mesh. Microprobe analyses of the recovered PGM grains in sample 235 contained 0.9% Rh, 0.4% Ru, 67.8% Pt, 17.2% Ir, 3.6% Os, and 5.8% Fe (appendix C). The identifed grains were iron-platinum alloy, with 8 to 30% iron, iron-platinum alloy, with minor osmiridium inclusions, osmiridium (iridium with minor osmium), osmiridium, with lesser ferroan platinum, iron-platinum alloy with oriented inclusions of Ru-Ir arsenides, hollingsworthite, osmium, iridarsenite, irarsite, and sperrylite (appendix C). A gold fineness for sample 235 was 856 (table 3).

RESOURCE ESTIMATE: No resource could be calculated because no economic quantities of placer minerals were found and the available data is insufficient.

MINERAL DEVELOPMENT POTENTIAL: Chagvan Bay has an unknown mineral development potential; however, the sampling by the Bureau indicates that there are low surficial accumulations of PGM and gold.

RECOMMENDATIONS: Drill hole sampling is necessary to properly evaluate the bay.

REFERENCES: 4, 16, 18-20, 23, 31, 62, 68, 108.

NAME: Security Cove

Map Location No. 29
Kardex No.
Mineral Survey No.
MAS No. 11

LOCATION:
Deposit Type: Placer.
Mining District: Goodnews Bay. Commodities: Au.
Recording District: Bethel.
Quadrangle: Hagemeister Is. C6.NE 1/4 Sec 2 T18S R77W
Meridian: Seward.
Geographic: Main tributary to Security Cove on the southwest side.
Elevation: Sea level to 45 ft.
Access: Boat.

HISTORY:
Production: None reported.
1937 - Gold reported in the bed of a small creek (78).

WORKINGS AND FACILITIES: Minor pits.

GEOLOGIC SETTING: The small creek flows across extensive gravel deposits between the Gap and Jagged Mountains. The gravel overlies Paleozoic age schistose calcareous siltstones, limestones, and tuffaceous rocks.

BUREAU INVESTIGATION: The Bureau sampled the creeks and the beach at Security Cove in 1986. Four 0.1 yd^3 stream placer samples (249, 251-252, 254, fig. 4, appendix B) contained from trace to 0.0033 oz/yd^3 Au. The gold particles were rough, nuggety, and iron-stained. Gold particle grain sizes by volume were 33.4% +20 mesh, 20% -20/+30 mesh, 20% -30/+35 mesh, and 26.6% -35/+60 mesh. Fineness for two samples (249-250) were 781 and 834 (table 3). Three PGM grains were found in sample 249. Microprobe analyses of the PGM grains found that they contain 0.5% Rh, 0.2% Ru, 84% Pt, 3.2% Ir, 1.4% Os, and 7.7% Fe (appendix C). The grains were iron-platinum alloy with 8 to 30% Fe, iron-platinum alloy with minor osmiridium inclusions, and osmiridium (iridium with minor osmium) (appendix C). Three 0.1 yd^3 beach samples (246-247, 249, fig. 4, appendix B) were taken along Security Cove. Trace amounts of gold (less than 4 flakes per 0.1 yd^3 sample) were recovered.

The bluffs on the west side of the cove were sampled (250, 253, fig. 4, appendix B). The rocks are sheared metavolcanics and argillaceous sediments. The shear zones strike from N45° to 55°E and dip 60° to 75°NW, are from 4 to 15 ft wide, and contain abundant pyrite in pods, stringers, and disseminations. Sample 253 contained 0.34% Pb (appendix B).

RESOURCE ESTIMATE: A resource could not be calculated because of insufficient data.

MINERAL DEVELOPMENT POTENTIAL: Samples taken from onshore indicate that there is a moderate placer mineral development potential.

RECOMMENDATIONS: Drilling and/or trenching is needed.

REFERENCES: 16, 18, 78, 108.

APPENDIX B.--SAMPLE RESULTS OF THE GOODNEWS BAY MINING DISTRICT.

Explanation

Map No/Sample No/Yr : Refers to map and field sample numbers and the year sample was taken. Sample locations are shown on figures 4, 5, and 6.

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

Argillite	
Breccia	
Chert	
Fel Plut	- Felsic plutonic rock
Fel Volc	- Felsic volcanic rock
Gneiss	
Hornfels	
Limestone	
Limonite	
Maf Plut	- Mafic plutonic rock
Maf Volc	- Mafic volcanic rock
Peg	- Pegmatite
Placer	- Concentrates from 0.1 yd^3 of material
Qtz	- Quartz
Quartzite	
Sandstone	
Schist	
Shale	
Siltstone	
Slate	
Soil	- Soil sample
Str Sed	- Stream sediment sample
Till	- Glacial till material
Ultramaf	- Ultramafic plutonic rock
Volc	- Volcanic rock

Rock Type : Refers to rock types in the area of sampling as shown on the 1:250,000 scale geologic map (55). The rock types are:

Fel Int	- Felsic intrusive rocks
Fel Volc	- Felsic volcanic rocks
Maf Int	- Mafic intrusive rocks
Maf Volc	- Mafic volcanic rocks
Meta	- Metamorphic rocks
Qac	- Alluvium and colluvium
Qal	- Alluvium
Qg	- Glacial deposits
Qm	- Marine, beach unconsolidated deposits
Sed	- Sedimentary rocks

Tailings - Tailings from mined material
Umaf Int - Ultramafic intrusive rocks
Volc - Volcanic rocks

Rock Age : Refers to the geologic age of the underlying rock groups as shown on the 1:250,000 scale geologic maps (55). The rock ages are:

Quaternary
TK - Tertiary-Cretaceous
Cretaceous
KJ - Cretaceous-Jurassic
Jurassic
Permian
MzPz - Mesozoic-Paleozoic
DO - Devonian-Ordovician
Paleozoic

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

Sec/T/R/Mer : Refers to section, township, range, and meridian in which the samples were taken.

Location/Property : Refers to the geographic location of the sampling site and/or the name of the mine, prospect, or occurrence.

KX/MAS : Refers to the Kardex (1), and Minerals Availability System (108) number for the mine, prospect, or occurrence.

Project : Refers to the mining district where the sample was taken.

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

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

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

Pan - A sample taken from surficial material, which is concentrated using a 16 in diameter pan.

Placer - A 0.1 yd^3 sample taken from surficial material which is concentrated in a sluicebox or pan.

Sediment- Material taken from the bottom of an active stream bed.

Soil - Sample taken from the C-soil horizon.

Specimen- Representative sample, not taken for chemical analysis.

ICP : Refers to induced coupled plasma technique analysis. Given in ppm unless noted otherwise.

AA/Wet : Refers to quantitative atomic absorption spectrophotometric analysis. Given in ppb.

Assay : Refers to fire assaying technique analysis. Given in troy ounces per short ton.

Oz/yd^3 : Refers to amount of gold and/or PGM recovered from a placer sample by sluicing or panning.

G : Refers to analyses greater than the detection limits.

Upper detection limits for ICP and AA/Wet analyses are:

Chromium - 10,000 ppm
Gold - 10,000 ppb
Platinum - 10,000 ppb

L : Refers to analyses less than the detection limits.

Detection limits for ICP and AA/Wet analyses are shown in the following table (values are in ppm unless otherwise indicated):

Element	ICP	AA/Wet
Aluminum	0.01%	
Antimony	10	
Arsenic	10	
Barium	1	
Beryllium	0.5	
Bismuth	2	
Cadmium	0.5	
Calcium	0.01%	
Chromium	1	
Cobalt	1	
Copper	1	
Gallium	10	
Gold		5
Iron	0.01%	
Lanthanum	10	
Lead	2	
Manganese	1	
Magnesium	0.01%	
Molybdenum	1	
Nickel	1	
Palladium		20
Phosphorus	10	
Platinum		50
Potassium	0.01%	
Silver	0.2	
Sodium	0.01%	
Strontium	1	
Thallium	10	
Tin	2	
Titanium	0.01%	
Tungsten	10	
Uranium	10	
Vanadium	1	
Zinc	1	

NOTE : For placer and pan type samples: ICP, AA/Wet, and/or Assay analyses were conducted on material weighing between 0.06 and 10 pounds, which had been concentrated from sluicing or panning between 20 and 300 pounds of unconsolidated material (approximate weights of 1 pan and 0.1 yd^3, respectively).

If results are listed under the Oz/yd^3 column for a given sample: ICP and AA/Wet analyses were conducted on concentrates from which the visible gold and PGM were previously separated. The results under the Oz/yd^3 column refer to the weight of the physically separated gold and PGM recalculated into an oz/yd^3 measure.

If there are only results under the ICP and Assay columns, then analyses were conducted on concentrates from which no gold was previously separated. The assayed samples had been previously concentrated by a factor of 150 to 200 times.

Oz/yd^3 values can be calculated for the concentrates taken from a 0.1 yd^3 placer sample using the following equation:

(0.000011)(weight of concentrate in grams)(troy oz/st precious metal value from analysis) = Oz/yd^3.

Pound/yd^3 values can be calculated for the concentrates taken from a 0.1 yd^3 placer sample using the following equation:

(0.022)(weight of concentrate in grams)(% concentration from analysis) = Pound/yd^3.

The weight of the placer concentrates are listed below:

Map no.	Sample no.	Concentrate weight (grams)
1	6530	81
2	6503	47
3	6504	104
4	6531	76
6	6535	41
7	6505	47
8	6520	32
10	6506	79
11	6507	70
12	6508	132
13	6509	85
14	6522	30
15	6521	51
16	6527	170
17	6510	99
18	6526	180
19	6536	63
20	6528	119
21	6529	213
22	6551	13
26	6513	40
27	6514	84
29	6553	208
30	6554	54
32	6516	105
33	6515	84
34	6517	117
35	6555	72
36	6518	89
37	6525	22
38	6524	155
39	6523	94
40	6511	117
41	6656	42
44	6639	52
45	6637	40
46	6638	80
47	6693	33
48	6694	54
49	6695	60
50	6715	63
51	6716	80
52	6717	52
53	6718	16
54	6696	57
55	6697	77
56	6719	82
57	6720	50
59	6722	52
60	6723	53

Map no.	Sample no.	Concentrate weight (grams)
61	6736	119
62	6735	86
63	6734	68
64	6733	72
65	6732	82
66	6731	90
67	6725	100
68	6724	28
69	6831	281
70	6830	251
71	6757	39
72	6829	251
73	6783	106
74	6782	184
75	6714	140
76	6756	28
77	6755	45
78	6713	48
81	6753	35
83	6752	43
84	6751	16
98	6605	57
99	6537	121
106	6557	135
115	6541	108
116	6538	94
117	6539	80
118	6665	57
121	6664	28
122	6663	28
123	6558	80
124	6559	232
125	6540	74
126	6818	120
127	6817	69
128	6816	135
129	6815	99
130	6814	317
131	6813	228
132	6812	242
133	6810	93
134	6811	200
135	6544	65
138	6560	157
142	6561	115
143	6543	79
145	6542	49
146	6519	83
147	6556	209
148	6563	138
149	6545	80
150	6564	26
151	6546	71

Map no.	Sample no.	Concentrate weight (grams)
152	6566	146
153	6547	88
159	6567	31
160	6550	99
161	6580	125
162	6645	190
167	6568	46
168	6549	83
169	6548	83
170	6562	254
171	6674	40
172	6569	57
175	6789	216
176	6653	263
177	6652	816
178	6584	205
178	6585	205
178	6582	151
178	6581	87
178	6583	151
179	6589	234
179	6588	3070
179	6587	642
179	6586	379
180	6622	1670
180	6623	535
180	6590	345
180	6624	450
180	6621	103
181	6625	267
181	6626	430
181	6627	252
181	6628	386
182	6641	575
182	6629	277
182	6642	523
182	6640	237
182	6630	333
183	6634	451
183	6636	158
183	6633	92
183	6635	451
184	6827	207
185	6828	197
186	6785	133
187	6786	189
187	6502	93
188	6501	167
189	6787	178
190	6739	121
191	6738	139
193	6788	153
194	6760	81

Map no.	Sample no.	Concentrate weight (grams)
195	6761	205
196	6570	58
197	6748	39
198	6749	28
199	6791	76
200	6781	100
201	6779	89
201	6778	132
202	6780	251
203	6792	126
204	6793	118
205	6750	48
206	6597	141
207	6598	116
208	6599	120
209	6579	93
210	6578	138
211	6577	157
212	6576	65
213	6575	175
213	6784	74
214	6574	306
215	6573	122
216	6572	146
217	6571	387
218	6826	84
219	6698	296
219	6700	391
219	6699	274
220	6730	192
220	6727	563
220	6726	455
220	6728	420
221	6729	374
221	6742	423
221	6741	409
222	6737	56
223	6744	276
223	6745	522
223	6743	74
224	6747	113
224	6746	476
224	6762	551
225	6799	112
225	6809	299
225	6800	130
226	6763	150
226	6765	258
226	6764	251
227	6797	89
227	6798	149
227	6801	354
228	6768	146

Map no.	Sample no.	Concentrate weight (grams)
228	6766	83
228	6767	389
229	6796	122
229	6795	122
229	6794	171
230	6708	580
230	6770	174
230	6769	136
230	6707	382
231	6710	257
231	6709	170
231	6711	166
232	6771	294
232	6759	455
232	6758	253
233	6773	64
233	6774	475
233	6772	563
234	6776	307
234	6775	217
234	6777	336
235	6836	600
236	6837	293
237	6838	173
238	6839	81
244	6808	70
245	6807	87
246	6806	111
247	6805	87
249	6804	78
249	6803	82
250	6670	50
252	6671	36
254	6596	59

Map No/Sample No/Yr	1/6530/86	2/6503/86	3/6504/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/C-4	Goodnews Bay/C-4	Goodnews Bay/C-4
Sec/T/R/Mer	3/7S/66W/Sew	11/7S/66W/Sew	23/7S/66W/Sew
Location/Property	Igmiumanik Cr. Trib.	Igmiumanik Cr. Trib.	Igmiumanik Cr. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.38%	7.35%	6.25%
Antimony	L	L	L
Arsenic	30	10	20
Barium	615	715	530
Beryllium	L	L	L
Bismuth	5	L	L
Cadmium	L	L	L
Calcium	2.22%	2.21%	2.02%
Chromium	1320	865	370
Cobalt	21	13	17
Copper	47	44	43
Gallium	10	10	10
Gold	L	35	20
Iron	8.73%	7.94%	13.9%
Lanthanum	20	20	20
Lead	8	12	6
Manganese	2070	1490	2370
Magnesium	3.17%	1.62%	1.85%
Molybdenum	1	L	1
Nickel	67	36	29
Palladium	L	L	L
Phosphorus	780	745	985
Platinum	L	350	L
Potassium	1.81%	2.09%	1.56%
Silver	L	L	L
Sodium	1.81%	2.06%	1.74%
Strontium	166	240	180
Thallium	L	L	L
Tin	1	1	1
Titanium	1.05%	1.06%	1.89%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	174	169	280
Zinc	161	122	225

Map No/Sample No/Yr	4/6531/86	5/6532/86	5/6533/86
Material Type	Placer	Shale	Limestone
Rock Type	Qg	Sed	Sed
Rock Age	Quaternary	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Goodnews Bay/C-4	Goodnews Bay/C-4	Goodnews Bay/C-4
Sec/T/R/Mer	18/7S/65W/Sew	20/7S/65W/Sew	20/7S/65W/Sew
Location/Property	Igmiumanik Cr. Trib.	Igmiumanik Cr. Trib.	Igmiumanik Cr. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Chip	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.04%	5.54%	2.65%
Antimony	L	L	L
Arsenic	30	40	40
Barium	620	955	290
Beryllium	L	L	1.0
Bismuth	L	L	3
Cadmium	L	L	1.0
Calcium	2.66%	1.96%	26.2%
Chromium	675	120	30
Cobalt	19	L	12
Copper	48	73	35
Gallium	10	20	70
Gold	445	L	L
Iron	7.8%	10.6%	2.76%
Lanthanum	20	50	L
Lead	12	18	14
Manganese	1520	295	G
Magnesium	2.74%	0.65%	0.47%
Molybdenum	1	8	2
Nickel	60	13	28
Palladium	L	L	L
Phosphorus	785	8860	G
Platinum	L	L	L
Potassium	1.84%	1.65%	0.27%
Silver	L	1.2	0.6
Sodium	2.16%	1.42%	1.37%
Strontium	240	305	330
Thallium	L	L	L
Tin	1	1	1
Titanium	0.92%	0.34%	0.16%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	189	390	57
Zinc	150	95	120

Map No/Sample No/Yr	5/6534/86	6/6535/86	7/6505/86
Material Type	Fel Plut	Placer	Placer
Rock Type	Fel Int	Qg	Qg
Rock Age	Cretaceous	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/C-4	Goodnews Bay/C-4	Goodnews Bay/C-5
Sec/T/R/Mer	20/7S/65W/Sew	35/7S/66W/Sew	34/7S/67W/Sew
Location/Property	Igmiumanik Cr. Trib.	Igmiumanik Cr. Trib.	Awayak Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	10.3%	6.37%	7.11%
Antimony	L	L	L
Arsenic	10	10	20
Barium	1530	815	650
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	2.5	L	L
Calcium	1.93%	1.4%	1.68%
Chromium	32	355	240
Cobalt	9	18	12
Copper	39	55	51
Gallium	30	10	10
Gold	L	100	L
Iron	8.06%	6.16%	7.6%
Lanthanum	70	10	20
Lead	12	10	10
Manganese	690	2070	1320
Magnesium	1.68%	1.96%	1.59%
Molybdenum	13	2	L
Nickel	29	57	32
Palladium	L	L	L
Phosphorus	4910	525	875
Platinum	L	L	100
Potassium	2.57%	1.73%	1.63%
Silver	0.4	L	L
Sodium	2.47%	1.52%	1.87%
Strontium	325	125	196
Thallium	20	L	L
Tin	1	1	1
Titanium	1.06%	0.54%	0.85%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	121	134	164
Zinc	275	165	132

Map No/Sample No/Yr	8/6520/86	9/6594/86	9/6614/86
Material Type	Placer	Chert	Argillite
Rock Type	Qg	Sed	Sed
Rock Age	Quaternary	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Goodnews Bay/C-5	Goodnews Bay/C-5	Goodnews Bay/C-5
Sec/T/R/Mer	29/7S/67W/Sew	29/7S/67W/Sew	29/7S/67W/Sew
Location/Property	Nimgun Cr. Trib.		
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	5.24%	3.11%	4.91%
Antimony	L	L	L
Arsenic	20	L	40
Barium	5980	935	415
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	0.80%	0.08%	0.40%
Chromium	140	145	90
Cobalt	14	3	9
Copper	48	58	69
Gallium	10	L	L
Gold	5	L	L
Iron	10.6%	1.75%	3.61%
Lanthanum	10	L	10
Lead	10	6	6
Manganese	1210	230	525
Magnesium	1.35%	0.59%	0.66%
Molybdenum	L	L	7
Nickel	37	24	23
Palladium	L	L	L
Phosphorus	535	145	565
Platinum	L	L	L
Potassium	1.31%	0.77%	0.66%
Silver	L	0.2	0.6
Sodium	1.05%	0.34%	2.17%
Strontium	129	37	141
Thallium	L	L	L
Tin	1	1	1
Titanium	1.01%	0.13%	0.26%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	195	55	132
Zinc	153	29	65

Map No/Sample No/Yr	10/6506/86	11/6507/86	12/6508/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/C-5	Goodnews Bay/C-5	Goodnews Bay/C-6
Sec/T/R/Mer	11/7S/67W/Sew	9/7S/68W/Sew	11/7S/69W/Sew
Location/Property	Awayak Cr.	Nimgun Cr.	Nimgun Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.05%	6.42%	6.76%
Antimony	L	L	L
Arsenic	20	20	30
Barium	875	675	760
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.35%	2.6%	2.68%
Chromium	125	285	480
Cobalt	12	19	20
Copper	48	54	59
Gallium	10	10	10
Gold	L	L	L
Iron	5.39%	12.4%	12.3%
Lanthanum	20	20	20
Lead	12	12	16
Manganese	1090	2350	2170
Magnesium	1.48%	2.2%	2.22%
Molybdenum	1	L	4
Nickel	30	46	62
Palladium	L	L	L
Phosphorus	560	1650	995
Platinum	L	L	L
Potassium	1.76%	1.37%	1.47%
Silver	L	L	L
Sodium	1.74%	1.66%	1.74%
Strontium	190	198	194
Thallium	L	L	L
Tin	1	1	1
Titanium	0.51%	1.29%	1.09%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	118	250	255
Zinc	107	174	148

Map No/Sample No/Yr	13/6509/86	14/6522/86	15/6521/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/C-6	Goodnews Bay/C-6	Goodnews Bay/C-5
Sec/T/R/Mer	35/7S/69W/Sew	3/8S/69W/Sew	2/8S/68W/Sew
Location/Property	Nimgun Cr. Trib.		Nimgun Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.55%	5.26%	6.59%
Antimony	L	L	L
Arsenic	20	20	20
Barium	485	615	855
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.56%	2.58%	2.13%
Chromium	150	1050	165
Cobalt	14	18	13
Copper	49	38	46
Gallium	10	10	10
Gold	L	175	L
Iron	8.14%	14%	6.83%
Lanthanum	10	20	20
Lead	10	10	12
Manganese	1920	2300	1470
Magnesium	1.78%	2.5%	1.72%
Molybdenum	L	L	L
Nickel	33	41	34
Palladium	L	L	L
Phosphorus	965	965	805
Platinum	L	L	L
Potassium	1.58%	1.07%	1.45%
Silver	L	L	L
Sodium	2.23%	1.39%	1.77%
Strontium	230	154	205
Thallium	L	L	L
Tin	T	T	T
Titanium	1.05%	1.91%	0.91%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	174	295	163
Zinc	136	215	114

Map No/Sample No/Yr	16/6527/86	17/6510/86	18/6526/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-6	Goodnews Bay/B-5
Sec/T/R/Mer	24/8S/68W/Sew	21/8S/69W/Sew	33/8S/68W/Sew
Location/Property	Nimgun Cr.	Canyon Cr. Trib.	Goodnews R. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.16%	7.52%	6.62%
Antimony	L	L	L
Arsenic	20	30	30
Barium	930	680	1000
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.93%	2.3%	1.56%
Chromium	125	170	140
Cobalt	13	15	15
Copper	53	54	56
Gallium	10	10	10
Gold	L	L	L
Iron	6.71%	7.71%	7.04%
Lanthanum	10	20	20
Lead	8	8	10
Manganese	1380	1960	1560
Magnesium	1.75%	1.69%	1.67%
Molybdenum	L	L	L
Nickel	36	42	39
Palladium	L	L	L
Phosphorus	935	915	850
Platinum	L	L	L
Potassium	1.74%	1.68%	1.76%
Silver	L	L	0.4
Sodium	2.13%	1.96%	1.69%
Strontium	220	215	173
Thallium	L	L	L
Tin	1	1	1
Titanium	0.77%	0.77%	0.75%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	161	185	162
Zinc	119	130	128

Map No/Sample No/Yr	19/6536/86	20/6528/86	21/6529/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	24/8S/67W/Sew	25/8S/67W/Sew	13/9S/68W/Sew
Location/Property	Goodnews Lake Trib.	Goodnews R. Trib.	Goodnews R. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	8.59%	7.91%	7.64%
Antimony	L	L	L
Arsenic	L	20	20
Barium	695	655	575
Beryllium	L	L	L
Bismuth	3	L	L
Cadmium	L	L	L
Calcium	2.08%	2.06%	1.82%
Chromium	200	88	130
Cobalt	18	14	16
Copper	68	54	58
Gallium	10	10	10
Gold	L	L	L
Iron	8.11%	5.48%	7.54%
Lanthanum	20	20	20
Lead	8	8	10
Manganese	2150	1390	2130
Magnesium	2.13%	1.56%	1.84%
Molybdenum	3	L	L
Nickel	40	28	38
Palladium	L	L	L
Phosphorus	900	840	935
Platinum	L	L	L
Potassium	2.20%	2.21%	1.94%
Silver	L	L	L
Sodium	2.28%	2.57%	2.18%
Strontium	260	255	215
Thallium	L	L	L
Tin	T	T	T
Titanium	0.91%	0.59%	0.80%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	179	127	166
Zinc	153	91	145

Map No/Sample No/Yr	22/6551/86	22/6552/86	23/6591/86
Material Type	Placer	Str. Sed.	Volc.
Rock Type	Qg	Maf Volc.	Maf Volc.
Rock Age	Quaternary	KJ	KJ
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	31/9S/67W/Sew	31/9S/67W/Sew	1/10S/68W/Sew
Location/Property	Goodnews R. Trib.	Goodnews R.	
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Sediment	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.98%	8.07%	6.96%
Antimony	L	L	L
Arsenic	40	20	10
Barium	790	860	1080
Beryllium	L	L	L
Bismuth	2	L	L
Cadmium	L	1.5	L
Calcium	0.54%	0.53%	1.12%
Chromium	200	45	64
Cobalt	37	43	7
Copper	83	102	42
Gallium	L	10	10
Gold	5	5	L
Iron	8.42%	7.85%	3.20%
Lanthanum	10	10	20
Lead	14	18	8
Manganese	3550	4000	665
Magnesium	0.93%	0.68%	0.79%
Molybdenum	2	3	3
Nickel	73	76	4
Palladium	L	L	L
Phosphorus	770	1110	465
Platinum	L	L	L
Potassium	1.80%	2.01%	2.59%
Silver	0.4	0.4	0.2
Sodium	1.24%	1.21%	3.61%
Strontium	171	225	170
Thallium	L	L	L
Tin	NA	1	1
Titanium	0.56%	0.52%	0.30%
Tungsten	L	L	11
Uranium	L	L	L
Vanadium	145	140	61
Zinc	220	245	46

Map No/Sample No/Yr	24/6613/86	25/6657/86	25/6658/86
Material Type	Volc.	Str. Sed.	Str. Sed.
Rock Type	Maf. Volc.	Maf Volc.	Maf Volc.
Rock Age	KJ	KJ	KJ
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	1/10S/68W/Sew	6/10S/67W/Sew	6/10S/67W/Sew
Location/Property			
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Sediment	Sediment

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.76%	7.4%	NA
Antimony	L	L	L
Arsenic	10	20	40
Barium	1100	620	1030
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	3.5
Calcium	1.06%	0.77%	0.58%
Chromium	78	48	47
Cobalt	8	24	61
Copper	42	75	150
Gallium	10	L	L
Gold	5	L	L
Iron	3.13%	5.61%	7.97
Lanthanum	10	10	20
Lead	12	16	18
Manganese	740	3260	7600
Magnesium	0.79%	0.63%	0.79%
Molybdenum	3	5	4
Nickel	6	41	105
Palladium	L	L	L
Phosphorus	505	1520	945
Platinum	L	L	L
Potassium	2.35%	1.51%	2.14%
Silver	0.4	0.2	0.2
Sodium	3.20%	1.25%	1.54%
Strontium	187	210	300
Thallium	L	L	1
Tin	4	NA	NA
Titanium	0.30%	0.47%	0.64%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	59	132	147
Zinc	44	205	285

Map No/Sample No/Yr	26/6513/86	27/6514/86	28/6592/86
Material Type	Placer	Placer	Sandstone
Rock Type	Qg	Qg	Sed
Rock Age	Quaternary	Quaternary	KJ
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	14/10S/67W/Sew	17/10S/67W/Sew	10/10S/68W/Sew
Location/Property	Kukatklik R.	Kukaktlik R. Trib.	
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.94%	7.84%	7.67%
Antimony	L	L	L
Arsenic	20	30	10
Barium	405	615	585
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.7%	1.93%	2.58%
Chromium	185	150	75
Cobalt	13	15	12
Copper	35	52	51
Gallium	10	L	10
Gold	L	L	L
Iron	8.83%	9.31%	4.14%
Lanthanum	10	10	10
Lead	8	10	6
Manganese	2230	1950	685
Magnesium	2.4%	2.01%	1.59%
Molybdenum	L	2	1
Nickel	31	32	20
Palladium	L	L	L
Phosphorus	1210	895	660
Platinum	L	L	L
Potassium	1.57%	1.92%	1.96%
Silver	L	L	0.2
Sodium	2.02%	1.88%	3.07%
Strontium	240	230	365
Thallium	L	L	L
Tin	1	1	1
Titanium	1.43%	0.99%	0.43%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	193	196	103
Zinc	137	160	58

Map No/Sample No/Yr	29/6553/86	30/6554/86	31/6593/86
Material Type	Placer	Placer	Sandstone
Rock Type	Volc/Sed	Qg	Sed
Rock Age	KJ	Quaternary	KJ
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	3/10S/68W/Sew	33/9S/68W/Sew	10/10S/68W/Sew
Location/Property	Goodnews R.	Goodnews R.	
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.13%	6.14%	7.36%
Antimony	L	L	L
Arsenic	10	L	10
Barium	580	625	135
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.54%	2.77%	5.81%
Chromium	90	245	75
Cobalt	11	19	9
Copper	38	70	34
Gallium	10	10	20
Gold	L	L	L
Iron	6.29%	13.9%	3.98%
Lanthanum	10	20	L
Lead	12	6	6
Manganese	1360	1840	655
Magnesium	1.46%	2.21%	1.16%
Molybdenum	L	L	L
Nickel	21	38	11
Palladium	L	L	L
Phosphorus	720	885	420
Platinum	L	L	L
Potassium	1.81%	1.43%	0.60%
Silver	0.4	L	0.2
Sodium	2.25%	1.56%	1.82%
Strontium	225	149	147
Thallium	L	L	L
Tin	1	1	1
Titanium	0.76%	1.52%	0.47%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	142	315	97
Zinc	114	158	58

Map No/Sample No/Yr	32/6516/86	33/6515/86	34/6517/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Volc/Sed
Rock Age	Quaternary	Quaternary	KJ
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-5
Sec/T/R/Mer	22/10S/68W/Sew	26/10S/68W/Sew	33/10S/68W/Sew
Location/Property	Kukaktlik R. Trib.	Kukaktlik R. Trib.	Kukaktlik R. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.65%	6.96%	6.82
Antimony	L	L	L
Arsenic	30	20	30
Barium	940	645	490
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.35%	1.45%	2.54%
Chromium	96	84	350
Cobalt	14	12	20
Copper	47	46	54
Gallium	10	L	10
Gold	L	L	15
Iron	8.19%	6.14%	13.4%
Lanthanum	10	10	20
Lead	12	10	8
Manganese	1960	1530	3760
Magnesium	1.21%	1.39%	2.38%
Molybdenum	3	L	2
Nickel	28	28	42
Palladium	L	L	L
Phosphorus	940	580	1020
Platinum	L	L	L
Potassium	1.49%	1.64%	1.52%
Silver	L	L	L
Sodium	1.55%	1.78%	1.54%
Strontium	196	198	185
Thallium	L	L	L
Tin	I	I	I
Titanium	0.82%	0.67%	1.36%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	176	131	280
Zinc	140	110	195

Map No/Sample No/Yr	35/6555/86	36/6518/86	37/6525/86
Material Type	Placer	Placer	Placer
Rock Type	Volc/Sed	Qg	Qg
Rock Age	KJ	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-6
Sec/T/R/Mer	31/10S/68W/Sew	23/10S/69W/Sew	10/9S/69W/Sew
Location/Property	Kukaktlik R. Trib.	Goodnews-Kukaktlik R.	Goodnews R. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.10%	7.60%	6.56%
Antimony	L	L	L
Arsenic	10	20	30
Barium	550	560	850
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.79%	2.04%	2.15%
Chromium	250	96	330
Cobalt	19	14	17
Copper	58	53	55
Gallium	10	10	10
Gold	L	400	L
Iron	9.40%	6.44%	10.5%
Lanthanum	10	20	20
Lead	8	10	12
Manganese	3590	1590	2320
Magnesium	2.03%	1.57%	2.41%
Molybdenum	1	1	L
Nickel	46	33	43
Palladium	L	L	L
Phosphorus	1040	995	915
Platinum	L	L	L
Potassium	1.83%	1.72%	1.62%
Silver	0.4	L	L
Sodium	1.77%	2.10%	1.67%
Strontium	172	225	170
Thallium	L	L	L
Tin	1	1	1
Titanium	1.03%	0.70%	1.37%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	198	153	220
Zinc	191	105	195

Map No/Sample No/Yr	38/6524/86	39/6523/86	40/6511/86
Material Type	Placer	Placer	Placer
Rock Type	Volc/Sed	Qg	Sed
Rock Age	MzPz	Quaternary	Permian
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	18/9S/69W/Sew	24/9S/70W/Sew	11/9S/70W/Sew
Location/Property	Canyon Cr. Trib.	Canyon Cr. Trib.	Canyon Cr. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.84%	5.71%	7.39%
Antimony	L	L	L
Arsenic	30	20	20
Barium	785	480	760
Beryllium	L	L	L
Bismuth	L	3	L
Cadmium	L	L	L
Calcium	2.08%	2.85%	2.87%
Chromium	195	3180	150
Cobalt	14	24	15
Copper	62	47	49
Gallium	10	10	10
Gold	L	L	L
Iron	7.15%	11.7%	6.85%
Lanthanum	20	10	10
Lead	8	8	8
Manganese	1620	2430	1400
Magnesium	1.98%	2.4%	1.78%
Molybdenum	L	L	2
Nickel	41	86	39
Palladium	L	L	L
Phosphorus	825	865	830
Platinum	L	L	L
Potassium	1.58%	1.07%	1.52%
Silver	L	L	L
Sodium	1.98%	1.60%	2.07%
Strontium	195	198	255
Thallium	L	L	L
Tin	1	1	1
Titanium	0.84%	1.53%	0.78%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	173	275	170
Zinc	153	167	109

Map No/Sample No/Yr	40/6512/86	41/6612/86	41/6656/86
Material Type	Placer	Maf Volc.	Placer
Rock Type	Sed	Maf Volc.	Sed
Rock Age	Permian	MzPz	Permian
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	11/9S/70W/Seew	7/9S/70W/Sew	7/9S/70W/Sew
Location/Property		Bear Cr.	Bear Cr.
KX/MAS		3/9	3/9
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	4 pans	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.42%	8.27%	5.94%
Antimony	L	L	L
Arsenic	20	170	10
Barium	525	140	600
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	14
Calcium	4.56%	9.31%	2.54%
Chromium	220	66	1100
Cobalt	16	30	20
Copper	49	83	66
Gallium	10	30	10
Gold	L	45	G 0.624
Iron	5.94%	6.42%	8.42%
Lanthanum	L	L	10
Lead	8	6	6
Manganese	1230	1260	1940
Magnesium	1.68%	3.11%	2.06%
Molybdenum	L	L	L
Nickel	78	17	57
Palladium	L	20	40
Phosphorus	710	520	730
Platinum	L	L	6200
Potassium	1.47%	0.55%	1.28%
Silver	L	0.4	0.6
Sodium	1.64%	0.79%	1.66%
Strontium	225	305	215
Thallium	L	L	L
Tin	T	T	NA
Titanium	0.50%	0.39%	0.79%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	137	220	260
Zinc	97	96	139

Map No/Sample No/Yr	42/6660/86	43/6659/86	44/6600/86
Material Type	Str. Sed.	Chert	Fel Plut
Rock Type	Sed	Sed	Fel Int
Rock Age	MzPz	MzPz	TK
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-5
Sec/T/R/Mer	12/9S/71W/Sew	12/9S/71W/Sew	18/9S/70W/Sew
Location/Property	JFM and Associates	JFM and Associates	Bear Cr.
KX/MAS	37/9001	37/9001	3/9
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Stream Sediment	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	5.81%	3.95%	8.86%
Antimony	L	10	L
Arsenic	50	10	180
Barium	410	5210	2040
Beryllium	L	L	0.5
Bismuth	L	L	10
Cadmium	L	L	L
Calcium	2.08%	1.37%	2.42%
Chromium	115	125	57
Cobalt	14	24	5
Copper	68	91	49
Gallium	L	L	L
Gold	L	L	725
Iron	3.49%	4.92%	3.17%
Lanthanum	10	10	10
Lead	12	24	6
Manganese	1020	9520	175
Magnesium	1.80%	1.19%	0.72%
Molybdenum	2	1	1
Nickel	57	69	4
Palladium	L	L	L
Phosphorus	1600	430	1070
Platinum	L	L	L
Potassium	0.74%	0.56%	2.36%
Silver	0.2	0.2	0.4
Sodium	1.47%	0.82%	2.39%
Strontium	171	182	685
Thallium	L	L	L
Tin	NA	NA	1
Titanium	0.41%	0.22%	0.30%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	88	72	53
Zinc	69	96	15

Map No/Sample No/Yr	44/6611/86	44/6639/86	45/6637/86
Material Type	Sandstone	Placer	Placer
Rock Type	Sed	Volc/Sed	Volc/Sed
Rock Age	MzPz	MzPz	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	18/9S/70W/Sew	18/9S/70W/Sew	13/9S/71W/Sew
Location/Property	Bear Cr.	Bear Cr.	Danielson Cr.
KX/MAS	3/9	3/9	3/9
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.71%	7.05%	6.63%
Antimony	L	L	L
Arsenic	20	20	50
Barium	510	530	685
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	2	2
Calcium	0.61%	3.18%	3.08%
Chromium	71	465	1150
Cobalt	24	17	24
Copper	70	67	102
Gallium	L	L	L
Gold	10	110	G
Iron	4.65%	10.2%	12.3%
Lanthanum	L	10	10
Lead	6	4	4
Manganese	3910	2190	3130
Magnesium	1.28%	2.54%	2.91%
Molybdenum	L	L	L
Nickel	35	52	49
Palladium	L	L	325
Phosphorus	425	740	780
Platinum	L	300	G
Potassium	2.53%	1.43%	1.36%
Silver	0.2	0.4	0.4
Sodium	2.17%	1.88%	1.56%
Strontium	190	255	210
Thallium	L	L	L
Tin	T	T	T
Titanium	0.45%	1.01%	0.99%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	120	250	355
Zinc	58	151	159

Map No/Sample No/Yr	46/6638/86	47/6693/86	48/6694/86
Material Type	Placer	Placer	Placer
Rock Type	Sed	Volc/SEd	Sed
Rock Age	MzPz	MzPz	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	18/9S/70W/Sew	20/9S/70W/Sew	20/9S/70W/Sew
Location/Property	Bear Cr.	Fox Cr.	Fox Cr.
KX/MAS	3/9	19/7	19/7
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	5.44%	5.39%	4.83%
Antimony	L	L	10
Arsenic	20	10	30
Barium	425	695	930
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	1.5	13	13
Calcium	3.21%	1.43%	1.55%
Chromium	2800	1220	1100
Cobalt	22	24	27
Copper	58	69	77
Gallium	L	L	10
Gold	220	60	10
Iron	11.6%	14.1%	16.6%
Lanthanum	10	10	20
Lead	2	6	8
Manganese	3030	3470	7720
Magnesium	2.72%	2.14%	2.01%
Molybdenum	L	1	6
Nickel	57	47	53
Palladium	25	L	L
Phosphorus	700	885	1170
Platinum	6500	L	L
Potassium	1.01%	1.09%	0.94%
Silver	0.2	0.2	0.2
Sodium	1.26%	1.05%	0.97%
Strontium	170	131	140
Thallium	L	L	L
Tin	1	NA	NA
Titanium	1.25%	1.96%	1.62%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	330	410	440
Zinc	181	290	285

Map No/Sample No/Yr	49/6695/86	50/6715/86	51/6716/86
Material Type	Placer	Placer	Placer
Rock Type	Volc/Sed	Qg	Qg
Rock Age	MzPz	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	29/9S/70W/Sew	23/9S/71W/Sew	36/9S/71W/Sew
Location/Property	Fox Cr.	Slate Cr.	Slate Cr.
KX/MAS	19/7	8, 10/4	8, 10/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	4.42%	3.45%	2.71%
Antimony	L	L	L
Arsenic	10	20	10
Barium	510	250	210
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	12	L	L
Calcium	3.55%	5.57%	4.26%
Chromium	925	1020	1260
Cobalt	26	38	36
Copper	51	55	50
Gallium	20	L	L
Gold	420	760 0.0001	2200 0.0008
Iron	15.3%	20.3%	24.3%
Lanthanum	20	10	10
Lead	2	L	L
Manganese	4050	3220	3620
Magnesium	3.01%	5.36%	4.25%
Molybdenum	2	L	L
Nickel	42	72	68
Palladium	L	L	L
Phosphorus	955	835	830
Platinum	L	L	L
Potassium	0.77%	0.26%	0.18%
Silver	0.6	L	3.8
Sodium	1.06%	0.63%	0.47%
Strontium	180	159	110
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	2.13%	3.24%	4.31%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	740	1110	1410
Zinc	187	225	265

Map No/Sample No/Yr	52/6717/86	53/6718/86	54/6696/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Sed
Rock Age	Quaternary	Quaternary	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-7	Goodnews Bay/B-6
Sec/T/R/Mer	25/9S/71W/Sew	36/9S/71W/Sew	31/9S/70W/Sew
Location/Property	Slate Cr.	Caribou Cr.	Fox Cr.
KX/MAS	8, 10/4	8, 10/4	19/7
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	5.10%			3.28%			4.13%		
Antimony	L			L			L		
Arsenic	20			L			40		
Barium	495			410			1620		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	5.90%			3.77%			2.91%		
Chromium	805			1670			1120		
Cobalt	34			31			29		
Copper	54			54			76		
Gallium	L			L			L		
Gold	1760	L		15800	0.0015		L	0.0003	
Iron	15.7%			25.6%			26.5%		
Lanthanum	10			20			20		
Lead	L			L			5		
Manganese	2960			6020			9210		
Magnesium	5.16%			3.38%			2.99%		
Molybdenum	L			L			8		
Nickel	67			59			60		
Palladium	L			L			L		
Phosphorus	880			885			1040		
Platinum	L			L			L		
Potassium	0.44%			0.22%			0.72%		
Silver	L			4.6			1.5		
Sodium	1.03%			0.46%			1.02%		
Strontium	255			108			160		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	2.69%			4.26%			3.61%		
Tungsten	L			85			L		
Uranium	L			L			2		
Vanadium	760			1290			935		
Zinc	205			250			310		

Map No/Sample No/Yr	55/6697/86	56/6719/86	57/6720/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-7	Goodnews Bay/B-6
Sec/T/R/Mer	36/9S/71W/Sew	1/10S/71W/Sew	2/10S/71W/Sew
Location/Property	Fox Cr.	Slate Cr.	Slate Cr.
KX/MAS	19/7	8, 10/4	8, 10/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	5.39%			3.47%			2.59%		
Antimony	L			L			L		
Arsenic	20			L			L		
Barium	3010			615			265		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	3.49%			4.38%			3.84%		
Chromium	550			1120			1210		
Cobalt	26			35			32		
Copper	70			57			50		
Gallium	10			L			L		
Gold	L	L		350	0.0009		19400	0.0014	
Iron	13.5%			23.7%			26.7%		
Lanthanum	10			10			10		
Lead	5			L			L		
Manganese	3510			4210			4560		
Magnesium	3.25%			4.27%			3.64%		
Molybdenum	6			L			L		
Nickel	56			65			61		
Palladium	L			L			L		
Phosphorus	835			805			690		
Platinum	L			L			L		
Potassium	1.05%			0.28%			0.18%		
Silver	1.5			L			0.4		
Sodium	1.43%			0.55%			0.40%		
Strontium	225			130			83		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.75%			4.00%			4.98%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	470			1270			1500		
Zinc	200			250			285		

Map No/Sample No/Yr	58/6721/86	59/6722/86	60/6723/86
Material Type	Sandstone	Placer	Placer
Rock Type	Sed	Qg	Qg
Rock Age	MzPz	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	10/10S/71W/Sew	10/10S/71W/Sew	10/10S/71W/Sew
Location/Property	Slate Cr.	Slate Cr.	Olympic Cr.
KX/MAS	8, 10/4	8, 10/4	18/5
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP	AA/Wet Assay	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3
Aluminum	9.39%		3.87%		5.18%	
Antimony	L		L		L	
Arsenic	L		10		20	
Barium	2460		870		675	
Beryllium	L		L		L	
Bismuth	L		L		L	
Cadmium	L		L		L	
Calcium	0.49%		5.14%		6.26%	
Chromium	26		700		675	
Cobalt	6		33		26	
Copper	26		50		49	
Gallium	L		L		10	
Gold		L		8500 L	10000	0.0004
Iron	6.33%		16.5%		15.1%	
Lanthanum	L		10		10	
Lead	2		12		L	
Manganese	350		3810		2750	
Magnesium	1.53%		5.07%		3.58%	
Molybdenum	4		L		L	
Nickel	15		50		48	
Palladium		L	L		L	
Phosphorus	1330		835		975	
Platinum		L	L		L	
Potassium	1.85%		0.28%		0.46%	
Silver	0.2		0.8		1.4	
Sodium	3.37%		0.70%		0.89%	
Strontium	360		141		205	
Thallium	L		L		L	
Tin	NA		NA		NA	
Titanium	0.35%		3.22%		2.49%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	175		750		765	
Zinc	67		215		200	

Map No/Sample No/Yr	61/6736/86	62/6735/86	63/6734/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	3/10S/71W/Sew	3/10S/71W/Sew	3/10S/71W/Sew
Location/Property	Olympic Cr.	Olympic Cr.	Olympic Cr.
KX/MAS	18/5	18/5	18/5
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/ys^3	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	5.29%	5.84%	4.78%
Antimony	L	L	L
Arsenic	10	20	10
Barium	740	560	380
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	3.5	L
Calcium	7.84%	4.36%	6.47%
Chromium	625	305	685
Cobalt	26	18	26
Copper	47	53	52
Gallium	10	20	20
Gold	400 0.0041	5300	8400 0.0006
Iron	13.1%	7.44%	17.1%
Lanthanum	10	10	10
Lead	L	1	L
Manganese	2540	1420	2920
Magnesium	4.28%	2.71%	3.96%
Molybdenum	L	L	L
Nickel	52	32	52
Palladium	L	L	L
Phosphorus	700	820	720
Platinum	600	L	L
Potassium	0.50%	1.01%	0.49%
Silver	L	0.2	L
Sodium	0.94%	1.82%	0.84%
Strontium	192	300	179
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	2.2%	0.99%	2.98%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	665	350	940
Zinc	190	109	235

Map No/Sample No/Yr	64/6733/86	65/6732/86	66/6731/86
Material Type	Placer	Placer	Placer
Rock Type	Qal	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	3/10S/71W/Sew	34/9S/71W/Sew	27/9S/71W/Sew
Location/Property	Olympic Cr. Trib.	Olympic Cr.	Olympic Cr.
KX/MAS	18/5	18/5	18/5
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3	ICP AA/Wet Assay
Aluminum	5.90%	5.07%	5.69%
Antimony	10	L	L
Arsenic	10	20	60
Barium	900	350	475
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	3.5	L	7
Calcium	3.36%	8.00%	11.70%
Chromium	290	640	415
Cobalt	22	25	17
Copper	68	50	47
Gallium	10	20	20
Gold	980	5300 0.0045	7800
Iron	8.33%	14.5%	9.74%
Lanthanum	10	10	L
Lead	6	L	4
Manganese	2570	2610	1750
Magnesium	2.86%	3.92%	3.23%
Molybdenum	1	L	L
Nickel	47	46	32
Palladium	L	L	L
Phosphorus	835	675	860
Platinum	L	L	L
Potassium	1.35%	0.50%	0.83%
Silver	0.2	2.8	1.8
Sodium	1.46%	0.75%	1.18%
Strontium	280	170	305
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.90%	2.48%	0.94%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	295	735	405
Zinc	188	210	158

Map No/Sample No/Yr	67/6725/86	68/6724/86	69/6831/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qal	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	15/10S/71W/Sew	9/10S/71W/Sew	9/10S/71W/Sew
Location/Property	Slate Cr.	Cascade Cr.	Wattamuse Cr.
KX/MAS	8/ 10/4	17, 26/6	1, 2, 4-7, 9, 31/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay	ICP	AA/Wet	Oz/yd^3
Aluminum	3.75%			7.41%			1.92%		
Antimony	L			L			L		
Arsenic	10			40			20		
Barium	445			1110			385		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			4.5			L		
Calcium	4.08%			4.05%			2.31%		
Chromium	970			310			715		
Cobalt	31			16			33		
Copper	52			69			69		
Gallium	L			10			L		
Gold	1760	0.0005		3000			G	0.7583	
Iron	23.1%			7.72%			36.3%		
Lanthanum	10			10			10		
Lead	6			6			5		
Manganese	3780			1990			5360		
Magnesium	3.45%			2.07%			1.54%		
Molybdenum	L			3			12		
Nickel	57			31			28		
Palladium	L			L			L		
Phosphorus	730			960			905		
Platinum	L			L			L		
Potassium	0.34%			1.80%			0.55%		
Silver	0.4			0.8			5.0		
Sodium	0.60%			1.63%			0.55%		
Strontium	130			270			121		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	4.27%			1.13%			9.44%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1290			275			2050		
Zinc	260			131			310		

Map No/Sample No/Yr	70/6830/86	71/6757/86	72/6829/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-6	Goodnews Bay/B-6	Goodnews Bay/B-6
Sec/T/R/Mer	9/10S/71W/Sew	4/10S/71W/Sew	9/10S/71W/Sew
Location/Property	Wattamuse Cr.	Cascade Cr.	Wattamuse Cr.
KX/MAS	1, 2, 4-7, 9, 31/3	17, 26/6	1, 2, 4-7, 9, 31/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd$_3$
Aluminum	1.55%			8.84%			1.76%		
Antimony	L			L			L		
Arsenic	10			40			L		
Barium	290			1030			675		
Beryllium	L			L			L		
Bismuth	L			13			L		
Cadmium	L			5			L		
Calcium	2.19%			4.37%			2.06%		
Chromium	815			505			1150		
Cobalt	19			19			23		
Copper	70			55			66		
Gallium	L			10			L		
Gold	5000	0.6615		1830	0.0017		1070	0.0108	
Iron	39.6%			6.43%			40.5%		
Lanthanum	10			10			10		
Lead	5			10			5		
Manganese	5920			1810			5490		
Magnesium	1.61%			2.61%			1.47%		
Molybdenum	14			L			10		
Nickel	31			48			35		
Palladium	L			L			L		
Phosphorus	865			645			735		
Platinum	L			L			L		
Potassium	0.43%			1.28%			0.47%		
Silver	1.5			L			2.5		
Sodium	0.43%			1.90%			0.52%		
Strontium	81			325			116		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	11.2%			1.57%			5.98%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	2510			248			1960		
Zinc	355			138			335		

Map No/Sample No/Yr	73/6783/86	74/6782/86	75/6714/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	4/10S/71W/Sew	5/10S/71W/Sew	5/10S/71W/Sew
Location/Property	Wattamuse Cr.	Wattamuse Cr.	Wattamuse Cr.
KX/MAS	1, 2, 4-7, 9, 31/3	1, 2, 4-7, 9, 31/3	1, 2, 4-7, 9, 31/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.38%			1.54%			2.63%		
Antimony	L			L			L		
Arsenic	10			L			30		
Barium	495			360			365		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	2.38%			2.20%			2.11%		
Chromium	705			1030			600		
Cobalt	20			15			20		
Copper	62			71			57		
Gallium	L			L			10		
Gold		G	0.0053		G	0.0083		G	0.0087
Iron	33.1%			39.6%			30.4%		
Lanthanum	20			20			20		
Lead	5			5			L		
Manganese	4820			5760			3696		
Magnesium	1.53%			1.31%			1.26%		
Molybdenum	9			14			9		
Nickel	29			30			23		
Palladium		L			L			L	
Phosphorus	635			1460			1460		
Platinum		L			L			L	
Potassium	0.57%			0.03%			0.35%		
Silver	2.5			3.5			1.4		
Sodium	0.66%			0.06%			0.47%		
Strontium	157			12			140		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	4.89%			10.9%			6.04%		
Tungsten	L			30			L		
Uranium	L			L			L		
Vanadium	1420			2440			1850		
Zinc	290			290			260		

Map No/Sample No/Yr	76/6756/86	77/6755/86	78/6713/86
Material Type	Placer	Placer	Placer
Rock Type	Volc/Sed	Volc/Sed	Volc/Sed
Rock Age	MzPz	MzPz	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	4/10S/71W/Sew	33/9S/71W/Sew	31/9S/71W/Sew
Location/Property	Cascade Cr.	Cascade Cr.	Wattamuse Cr.
KX/MAS	17, 26/6	17, 26/6	1, 2, 4-7, 9, 31/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	6.48%	5.50%	6.44%
Antimony	L	L	L
Arsenic	90	60	380
Barium	550	320	525
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	1.5	L
Calcium	5.14%	6.05%	8.35%
Chromium	290	290	390
Cobalt	18	26	15
Copper	52	50	59
Gallium	L	L	10
Gold	6200	3700	G 0.0013
Iron	9.30%	12.80%	13.4%
Lanthanum	10	10	L
Lead	L	L	L
Manganese	2000	2900	3100
Magnesium	2.51%	2.90%	2.40%
Molybdenum	L	L	L
Nickel	37	33	36
Palladium	L	L	L
Phosphorus	790	880	975
Platinum	L	L	L
Potassium	0.88%	0.52%	0.64%
Silver	L	L	L
Sodium	1.45%	1.13%	0.84%
Strontium	320	260	200
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.40%	2.34%	3.91%
Tungsten	L	L	55
Uranium	L	L	L
Vanadium	350	510	555
Zinc	159	230	210

Map No/Sample No/Yr	79/6712/86	80/6706/86	81/6753/86
Material Type	Fel Plut	Maf Plut	Placer
Rock Type	Fel Int	Maf Int	Volc/Sed
Rock Age	TK	TK	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	31/9S/71W/Sew	32/9S/71W/Sew	32/9S/71W/Sew
Location/Property	Wattamuse Cr.	Wattamuse Cr.	Cascade Cr.
KX/MAS	1, 2, 4-7, 9, 31/3	1, 2, 4-7, 9, 31/3	17, 26/6
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	15.10%	6.55%	5.03%
Antimony	L	L	L
Arsenic	140	L	100
Barium	1260	85	345
Beryllium	2	L	L
Bismuth	L	L	L
Cadmium	1	5	L
Calcium	6.32%	6.11%	4.25%
Chromium	100	91	375
Cobalt	10	33	38
Copper	230	73	59
Gallium	10	10	10
Gold	55	L	G 0.766
Iron	3.95%	8.36%	13.50%
Lanthanum	10	10	10
Lead	8	2	L
Manganese	445	1440	2190
Magnesium	0.85%	3.59%	2.63%
Molybdenum	4	L	2
Nickel	5	29	45
Palladium	L	L	L
Phosphorus	1810	865	500
Platinum	L	L	L
Potassium	2.55%	0.34%	0.43%
Silver	L	0.2	2.4
Sodium	2.79%	2.91%	1.04%
Strontium	1270	290	220
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.48%	1.92%	2.11%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	75	335	935
Zinc	30	63	220

Map No/Sample No/Yr	82/6754/86	83/6752/86	84/6751/86
Material Type	Maf Plut	Placer	Placer
Rock Type	Maf Int	Volc/Sed	Volc/Sed
Rock Age	TK	MzPz	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	29/9S/71W/Sew	29/9S/71W/Sew	30/9S/71W/Sew
Location/Property	Cascade Cr.	Cascade Cr.	Cascade Cr.
KX/MAS	17, 26/6	17, 26/6	17, 26/6
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP	AA/Wet Assay	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3
Aluminum	8.53%		8.37%		9.10%	
Antimony	L		L		L	
Arsenic	10		40		20	
Barium	300		385		245	
Beryllium	L		L		L	
Bismuth	L		14		12	
Cadmium	L		3		3	
Calcium	5.54%		6.57%		7.48%	
Chromium	135		980		1790	
Cobalt	35		51		45	
Copper	210		93		86	
Gallium	10		10		10	
Gold	L		14200	0.0005	3300	0.0009
Iron	6.88%		19.4%		12.6%	
Lanthanum	10		10		L	
Lead	L		L		L	
Manganese	1520		2910		2250	
Magnesium	3.35%		3.46%		3.23%	
Molybdenum	L		4		L	
Nickel	58		77		75	
Palladium	L		L		L	
Phosphorus	770		450		360	
Platinum	L		L		1300	
Potassium	0.60%		0.59%		0.49%	
Silver	L		L		1.0	
Sodium	2.49%		1.31%		1.23%	
Strontium	485		300		350	
Thallium	L		L		L	
Tin	NA		NA		NA	
Titanium	0.92%		3.87%		2.48%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	225		1420		515	
Zinc	58		320		200	

Map No/Sample No/Yr	85/6669/86	85/6704/86	85/6705/86
Material Type	Soil	Maf Plut	Siltstone
Rock Type	Maf Int	Maf Int	Sed
Rock Age	TK	TK	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	31/9S/71W/Sew	31/9S/71W/Sew	31/9S/71W/Sew
Location/Property	Wattamuse Cr.	Wattamuse Cr.	Wattamuse Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Soil	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	11.4%	5.84%	5.82%
Antimony	L	L	L
Arsenic	200	10	10
Barium	320	200	3070
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	3	6	L
Calcium	0.67%	5.46%	0.62%
Chromium	162	38	130
Cobalt	49	31	14
Copper	250	129	22
Gallium	10	20	10
Gold	20	L	L
Iron	7.74%	10.70%	4.12%
Lanthanum	10	10	10
Lead	14	2	4
Manganese	1240	1680	1170
Magnesium	0.59%	2.49%	1.46%
Molybdenum	1	L	2
Nickel	102	9	30
Palladium	L	L	10
Phosphorus	805	810	185
Platinum	L	L	L
Potassium	0.43%	0.42%	0.70%
Silver	0.2	0.2	0.2
Sodium	0.76%	2.94%	3.46%
Strontium	104	180	157
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.94%	1.91%	0.37%
Tungsten	30	L	L
Uranium	L	L	L
Vanadium	285	380	137
Zinc	110	106	23

Map No/Sample No/Yr	86/6668/86	87/6667/86	88/6702/86
Material Type	Volc	Soil	Hornfels
Rock Type	Volc	Meta	Meta
Rock Age	MzPz	TK	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	36/9S/72W/Sew	36/9S/72W/Sew	36/9S/72W/Sew
Location/Property	Wattamuse Cr.	Wattamuse Cr.	Wattamuse Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Soil	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	8.26%	9.47%	6.44%
Antimony	L	70	L
Arsenic	L	5050	L
Barium	2140	300	320
Beryllium	L	L	L
Bismuth	L	65	L
Cadmium	L	15	3
Calcium	5.82%	1.04%	8.24%
Chromium	175	48	240
Cobalt	19	93	30
Copper	61	550	177
Gallium	10	L	L
Gold	L	6550	L
Iron	5.55%	8.91%	7.15%
Lanthanum	20	L	L
Lead	40	784	2
Manganese	945	2430	2030
Magnesium	3.05%	0.80%	4.36%
Molybdenum	1	2	L
Nickel	28	66	50
Palladium	L	10	10
Phosphorus	1440	350	520
Platinum	L	L	L
Potassium	2.92%	2.02%	0.47%
Silver	0.2	15.4	0.2
Sodium	2.69%	1.18%	2.32%
Strontium	640	147	255
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.56%	0.66%	1.01%
Tungsten	L	30	L
Uranium	L	L	L
Vanadium	154	225	265
Zinc	97	860	99

Map No/Sample No/Yr	88/6703/86	89/6701/86	90/6666/86
Material Type	Fel Volc	Fel Plut	Maf Plut
Rock Type	Fel Volc	Fel Int	Maf Int
Rock Age	MzPz	TK	TK
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	36/9S/72W/Sew	36/9S/72W/Sew	36/9S/72W/Sew
Location/Property	Wattamuse Cr.	Wattamuse Cr.	Wattamuse Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	5.47%	7.04%	10.2%
Antimony	L	L	L
Arsenic	10	L	L
Barium	130	1740	1950
Beryllium	L	L	0.5
Bismuth	L	L	L
Cadmium	6	L	L
Calcium	6.39%	4.75%	5.98%
Chromium	41	140	82
Cobalt	32	9	12
Copper	270	47	39
Gallium	L	L	10
Gold	5	L	L
Iron	10.50%	3.93%	4.42%
Lanthanum	10	10	20
Lead	8	14	22
Manganese	2240	715	710
Magnesium	2.87%	2.16%	1.43%
Molybdenum	L	2	L
Nickel	18	11	8
Palladium	L	L	L
Phosphorus	665	880	1560
Platinum	L	L	L
Potassium	0.42%	2.21%	2.92%
Silver	0.2	0.2	0.2
Sodium	2.34%	2.40%	2.94%
Strontium	141	535	815
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.95%	0.43%	0.53%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	555	113	118
Zinc	124	59	64

Map No/Sample No/Yr	91/6595/86	92/6603/86	93/6604/86
Material Type	Qtz	Str. Sed.	Fel Plut
Rock Type	Fel Int	Fel Int	Fel Int
Rock Age	TK	TK	TK
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	1/10S/72W/Sew	1/10S/72W/Sew	1/10S/72W/Sew
Location/Property	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Sediment	Specimen

Element	ICP	AA/Wet	Assay	ICP	AA/Wet	Assay	ICP	AA/Wet	Assay
Aluminum	0.18%			6.26%					
Antimony	40			10					
Arsenic	2850			2330					
Barium	30			660					
Beryllium	L			L					
Bismuth	400			L					
Cadmium	L			1					
Calcium	0.04%			4.12%					
Chromium	155			125					
Cobalt	1			15					
Copper	4			61					
Gallium	L			10					
Gold		G	2.18		1300				
Iron	0.55%			6.36%					
Lanthanum	L			30					
Lead	22			10					
Manganese	45			1020					
Magnesium	0.02%			2.20%					
Molybdenum	L			L					
Nickel	5			14					
Palladium		L			L				
Phosphorus	15			4100					
Platinum		L			L				
Potassium	0.02%			1.11%					
Silver	6.6			0.2					
Sodium	0.01%			1.79%					
Strontium	4			370					
Thallium	L			L					
Tin	2			1					
Titanium	0.01%			0.86%					
Tungsten	184			L					
Uranium	L			L					
Vanadium	3			220					
Zinc	L			79					

Map No/Sample No/Yr	94/6832/86	95/6602/86	96/6833/86
Material Type	Fel Plut	Qtz	Fel Plut
Rock Type	Fel Int	Fel Int	Fel Int
Rock Age	TK	TK	TK
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-7	Goodnews Bay/B-5
Sec/T/R/Mer	1/10S/72W/Sew	1/10S/72W/Sew	1/10S/72W/Sew
Location/Property	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	11.60%	0.68%	7.02%
Antimony	L	190	10
Arsenic	L	1000	170
Barium	540	210	30
Beryllium	L	L	2
Bismuth	L	2	L
Cadmium	L	L	0.5
Calcium	8.84%	0.04%	23.00%
Chromium	130	185	195
Cobalt	41	L	10
Copper	890	5	108
Gallium	40	L	70
Gold	25	1250	85
Iron	5.52%	0.45%	2.85%
Lanthanum	L	L	L
Lead	L	2	24
Manganese	740	39	395
Magnesium	2.58%	0.02%	2.61%
Molybdenum	L	L	L
Nickel	35	6	17
Palladium	L	10	L
Phosphorus	2660	30	215
Platinum	L	L	L
Potassium	0.50%	0.06%	0.04%
Silver	0.6	0.6	1.0
Sodium	1.93%	0.03%	0.31%
Strontium	1160	13	445
Thallium	L	L	L
Tin	NA	1	NA
Titanium	0.21%	0.01%	0.27%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	97	5	44
Zinc	45	3	64

Map No/Sample No/Yr	96/6834/86	96/6835/86	97/6601/86
Material Type	Qtz	Maf Plut	Hornfels
Rock Type	Fel Int	Maf Int	Meta
Rock Age	TK	TK	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-5	Goodnews Bay/B-5	Goodnews Bay/B-7
Sec/T/R/Mer	1/10S/72W/Sew	1/10S/72W/Sew	2/10S/72W/Sew
Location/Property	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.	Wattamuse-Granite Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Specimen

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	0.44%	4.04%	
Antimony	30	L	
Arsenic	G	1300	
Barium	85	370	
Beryllium	L	L	
Bismuth	41	30	
Cadmium	L	L	
Calcium	0.58%	8.46%	
Chromium	460	225	
Cobalt	3	9	
Copper	31	1870	
Gallium	L	10	
Gold	5300	3300	
Iron	3.16%	6.86%	
Lanthanum	L	10	
Lead	26	L	
Manganese	50	1270	
Magnesium	0.09%	2.39%	
Molybdenum	L	8	
Nickel	6	20	
Palladium	L	L	
Phosphorus	95	2160	
Platinum	L	L	
Potassium	L	0.93%	
Silver	2.2	17.4	
Sodium	0.02%	0.34%	
Strontium	27	220	
Thallium	L	L	
Tin	NA	NA	
Titanium	0.01%	0.16%	
Tungsten	L	L	
Uranium	L	L	
Vanadium	5	195	
Zinc	6	109	

Map No/Sample No/Yr	98/6605/86	99/6537/86	100/6691/86
Material Type	Placer	Placer	Argillite
Rock Type	Qg	Qg	Sed
Rock Age	Quaternary	Quaternary	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	12/10S/72W/Sew	7/10S/71W/Sew	13/10S/72W/Sew
Location/Property	Granite Cr. Trib.	Granite Cr.	Sugtutlig Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	1 pan	Placer	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.91%	3.76%	6.59%
Antimony	L	L	L
Arsenic	140	10	L
Barium	1280	540	530
Beryllium	1	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	3.69%	2.54%	3.43%
Chromium	175	365	165
Cobalt	8	93	10
Copper	35	33	465
Gallium	L	10	10
Gold	20	85	75
Iron	5.64%	30.9%	4.46%
Lanthanum	30	20	10
Lead	14	4	26
Manganese	1080	4640	585
Magnesium	1.75%	2.00%	2.15%
Molybdenum	3	5	3
Nickel	10	16	28
Palladium	L	L	L
Phosphorus	1060	880	690
Platinum	L	L	L
Potassium	2.74%	0.95%	1.35%
Silver	0.2	L	1.4
Sodium	2.24%	1.06%	3.01%
Strontium	465	181	455
Thallium	L	10	L
Tin	1	1	
Titanium	0.79%	9.17%	0.41%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	130	1390	134
Zinc	68	185	565

Map No/Sample No/Yr	101/6692/86	102/6679/86	103/6686/86
Material Type	Argillite	Qtz	Schist
Rock Type	Sed	Maf Int	Maf Int
Rock Age	MzPz	Jurassic	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	3/10S/72W/Sew	34/9S/72W/Sew	34/9S/72W/Sew
Location/Property	Velvet Cr.	Velvet Cr.	Velvet Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	4.31%	0.53%	8.09%
Antimony	L	L	L
Arsenic	10	L	L
Barium	2250	10	30
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	0.39%	0.40%	7.10%
Chromium	115	385	100
Cobalt	16	23	35
Copper	105	335	910
Gallium	10	L	L
Gold	L	10	25
Iron	3.42%	1.16%	6.36
Lanthanum	10	L	L
Lead	210	10	2
Manganese	1200	85	1030
Magnesium	1.11%	0.40%	3.27%
Molybdenum	5	L	2
Nickel	30	11	25
Palladium	L	L	L
Phosphorus	335	145	460
Platinum	L	L	L
Potassium	1.89%	L	0.25%
Silver	0.2	2.8	0.2
Sodium	1.00%	0.05%	3.15%
Strontium	124	14	260
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.27%	0.10%	0.28%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	140	15	250
Zinc	110	5	28

Map No/Sample No/Yr	103/6687/86	104/6680/86	105/6688/86
Material Type	Schist	Schist	Schist
Rock Type	Maf Int	Maf Int	Maf Int
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	34/9S/72W/Sew	34/9S/72W/Sew	34/9S/72W/Sew
Location/Property	Velvet Cr.	Velvet Cr.	Velvet Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.57%	8.84%	7.84%
Antimony	L	L	L
Arsenic	L	L	L
Barium	80	20	32
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	6.67%	12.30%	5.92%
Chromium	80	140	130
Cobalt	32	63	22
Copper	195	2230	72
Gallium	10	10	L
Gold	L	130	5
Iron	7.68%	8.00%	6.88%
Lanthanum	L	L	L
Lead	2	2	4
Manganese	960	770	1410
Magnesium	2.93%	0.90%	3.95%
Molybdenum	1	6	L
Nickel	14	26	28
Palladium	L	L	L
Phosphorus	575	730	505
Platinum	L	L	L
Potassium	0.49%	0.09%	0.26%
Silver	0.2	0.6	0.2
Sodium	2.68%	0.47%	3.62%
Strontium	210	735	245
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.35%	0.29%	0.21%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	305	215	220
Zinc	37	11	84

Map No/Sample No/Yr	105/6689/86	105/6690/86	106/6557/86
Material Type	Schist	Schist	Placer
Rock Type	Maf Int	Maf Int	Qg
Rock Age	Jurassic	Jurassic	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	34/9S/72W/Sew	34/9S/72W/Sew	9/10S/72W/Sew
Location/Property	Velvet Cr.	Velvet Cr.	Velvet Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	9.47%	6.58%	4.78%
Antimony	L	L	L
Arsenic	L	L	10
Barium	20	35	520
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	13.10%	7.48%	4.64%
Chromium	170	57	1520
Cobalt	22	26	35
Copper	280	49	35
Gallium	10	10	10
Gold	15	L	50
Iron	6.88%	7.73%	18.6%
Lanthanum	L	L	10
Lead	14	26	L
Manganese	810	890	2310
Magnesium	0.93%	3.14%	3.15%
Molybdenum	L	1	L
Nickel	12	8	65
Palladium	L	L	L
Phosphorus	885	270	770
Platinum	L	L	L
Potassium	0.08%	0.37%	0.50%
Silver	0.2	0.2	L
Sodium	0.56%	1.86%	0.98%
Strontium	923	230	205
Thallium	L	L	L
Tin	NA	NA	1
Titanium	0.43%	0.34%	4.13%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	210	400	905
Zinc	6	40	150

Map No/Sample No/Yr	107/6678/86	108/6685/86	109/6684/86
Material Type	Maf Plut	Maf Plut	Maf Plut
Rock Type	Maf Int	Maf Int	Maf Int
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	33/9S/72W/Sew	32/9S/72W/Sew	32/9S/72W/Sew
Location/Property	Tatlignagpeke Mountain	Tatlignagpeke Mountain	Tatlignagpeke Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	8.90%	10.30%	10.80%
Antimony	L	L	L
Arsenic	L	L	L
Barium	50	115	40
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	1	L	L
Calcium	9.95%	9.30%	11.40%
Chromium	59	99	71
Cobalt	39	30	41
Copper	171	187	485
Gallium	10	10	30
Gold	L	L	L
Iron	10.30%	7.48%	8.06%
Lanthanum		L	L
Lead	2	2	2
Manganese	815	1470	860
Magnesium	4.34%	3.96%	4.12%
Molybdenum	L	L	L
Nickel	28	21	39
Palladium	L	L	20
Phosphorus	L	805	L
Platinum	L	L	L
Potassium	0.20%	0.60%	0.09%
Silver	0.2	0.2	0.2
Sodium	1.12%	2.61%	1.32%
Strontium	335	545	535
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.66%	0.60%	0.53%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	510	325	495
Zinc	60	90	53

Map No/Sample No/Yr	110/6677/86	111/6683/86	112/6676/86
Material Type	Ultramaf	Maf Plut	Gneiss
Rock Type	Umaf Int	Maf Int	Meta
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	32/9S/72W/Sew	30/9S/72W/Sew	30/9S/72W/Sew
Location/Property	Tatlignagpeke Mountain	Tatlignagpeke Mountain	Tatlignagpeke Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	0.35%	8.53%	10.00%
Antimony	20	L	L
Arsenic	L	L	L
Barium	20	81	60
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	0.17%	11.00%	1.02%
Chromium	310	57	180
Cobalt	122	35	2
Copper	26	245	17
Gallium	L	30	L
Gold	L	L	L
Iron	10.70%	9.36%	3.37%
Lanthanum	L	L	L
Lead	2	4	6
Manganese	1100	1360	300
Magnesium	17.80%	4.39%	0.80%
Molybdenum	L	L	2
Nickel	555	32	5
Palladium	10	L	L
Phosphorus	68	L	135
Platinum	L	L	L
Potassium	0.01%	0.17%	0.11%
Silver	0.2	0.2	0.2
Sodium	0.09%	1.35%	3.83%
Strontium	9	530	116
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.02%	0.80%	0.30%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	16	410	43
Zinc	78	94	6

Map No/Sample No/Yr	112/6682/86	113/6655/86	114/6654/86
Material Type	Maf Plut	Maf Plut	Maf Plut
Rock Type	Maf Int	Maf Int	Maf Int
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	30/9S/72W/Sew	30/9S/72W/Sew	30/9S/72W/Sew
Location/Property	Tatlignagpeke Mountain	Tatlignagpeke Mountain	Tatlignagpeke Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	10.80%	9.08%	7.35%
Antimony	L	L	L
Arsenic	L	L	L
Barium	195	70	35
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	1	L	L
Calcium	10.00%	10.10%	8.70%
Chromium	98	180	215
Cobalt	31	40	48
Copper	235	54	52
Gallium	20	30	20
Gold	L	L	L
Iron	7.82%	6.57%	7.36%
Lanthanum	L	L	L
Lead	102	6	20
Manganese	1300	1090	1260
Magnesium	4.11%	6.15%	7.31%
Molybdenum	L	L	L
Nickel	25	54	66
Palladium	L	L	20
Phosphorus	1260	L	L
Platinum	L	L	L
Potassium	0.72%	0.20%	0.12%
Silver	0.2	0.2	0.2
Sodium	2.37%	1.27%	0.97%
Strontium	525	380	290
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.64%	0.21%	0.20%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	280	172	157
Zinc	70	68	52

Map No/Sample No/Yr	114/6675/86	115/6541/86	116/6538/86
Material Type	Maf Plut	Placer	Placer
Rock Type	Maf Int	Volc/Sed	Qg
Rock Age	Jurassic	MzPz	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	30/9S/72W/Sew	12/10S/73W/Sew	1/10S/73W/Sew
Location/Property	Tatlignagpeke Mountain	Barnum Cr.	Barnum Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	9.25%	5.37%	5.99%
Antimony	L	L	L
Arsenic	L	L	L
Barium	115	230	305
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	9.79%	5.45%	6.58%
Chromium	79	2390	3750
Cobalt	33	31	47
Copper	90	38	52
Gallium	10	10	10
Gold	L	5600	5
Iron	8.00%	15.9%	23.4%
Lanthanum	L	10	10
Lead	2	L	L
Manganese	1160	2370	2620
Magnesium	4.30%	2.92%	3.75%
Molybdenum	L	L	L
Nickel	29	68	100
Palladium	L	L	L
Phosphorus	400	445	475
Platinum	L	L	L
Potassium	0.71%	0.48%	0.41%
Silver	0.2	L	L
Sodium	1.68%	1.10%	1.10%
Strontium	530	265	305
Thallium	L	L	L
Tin	NA	1	1
Titanium	0.54%	3.93%	4.58%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	315	740	1200
Zinc	63	121	159

Map No/Sample No/Yr	117/6539/86	118/6665/86	119/6661/86
Material Type	Placer	Placer	Chert
Rock Type	Qg	Qg	Sed
Rock Age	Quaternary	Quaternary	MzPz
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	34/9S/73W/Sew	23/9S/73W/Sew	14/9S/73W/Sew
Location/Property	Barnum Cr. Trib.	Barnum Cr. Trib.	Nagotligageivik Mtn.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay
Aluminum	4.36%			3.14%			7.70%		
Antimony	L			L			L		
Arsenic	10			30			L		
Barium	395			140			1590		
Beryllium	L			L			1		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	4.82%			4.28%			4.79%		
Chromium	2740			6060			49		
Cobalt	30			44			9		
Copper	57			58			53		
Gallium	L			L			20		
Gold		415	0.0004		50	0.0010		L	
Iron	14.9%			30.5%			3.43%		
Lanthanum	10			10			L		
Lead	L			5			14		
Manganese	3410			4800			2040		
Magnesium	2.63%			2.14%			0.88%		
Molybdenum	L			4			1		
Nickel	87			115			11		
Palladium		L			L			L	
Phosphorus	375			350			860		
Platinum		L			L			L	
Potassium	0.69%			0.28%			2.37%		
Silver	1.5			1.5			0.2		
Sodium	1.36%			0.55%			2.05%		
Strontium	290			210			265		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	5.35%			6.14%			0.37%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	810			1470			66		
Zinc	170			235			66		

Map No/Sample No/Yr	120/6662/86	121/6664/86	122/6663/86
Material Type	Qtz	Placer	Placer
Rock Type	Sed	Qg	Qg
Rock Age	MzPz	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-7
Sec/T/R/Mer	15/9S/73W/Sew	22/9S/73W/Sew	27/9S/73W/Sew
Location/Property	Barnum Cr.	Barnum Cr. Trib.	Barnum Cr. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	4.93%	3.48%	2.26%
Antimony	L	L	L
Arsenic	L	30	20
Barium	2380	230	120
Beryllium	0.5	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.56%	4.02%	1.43%
Chromium	155	6220	G
Cobalt	6	38	175
Copper	18	60	53
Gallium	10	10	L
Gold	L	1940 0.0002	560 0.0002
Iron	1.81%	28.5%	34.7%
Lanthanum	10	10	L
Lead	12	5	350
Manganese	1550	4310	2430
Magnesium	0.53%	2.13%	3.43%
Molybdenum	L	4	5
Nickel	8	107	460
Palladium	L	L	15
Phosphorus	210	340	135
Platinum	L	L	3500
Potassium	2.21%	0.35%	0.10%
Silver	0.2	1.5	1.0
Sodium	0.98%	0.61%	0.22%
Strontium	305	210	61
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.16%	5.68%	1.5%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	25	1270	1190
Zinc	33	225	615

Map No/Sample No/Yr	123/6558/86	124/6559/86	125/6540/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Sed
Rock Age	Quaternary	Quaternary	Permian
Quad 4 mile/1 mile	Goodnews Bay/B-7	Goodnews Bay/B-7	Goodnews Bay/B-8
Sec/T/R/Mer	33/9S/73W/Sew	21/10S/73W/Sew	16/10S/74W/Sew
Location/Property	Barnum Cr. Trib.	Camp Cr.	Cot Mountain Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay	ICP	AA/Wet	Assay
Aluminum	6.28%			6.97%			6.11%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	385			1220			1100		
Beryllium	L			L			L		
Bismuth	L			L			3		
Cadmium	L			L			L		
Calcium	4.33%			0.53%			1.07%		
Chromium	1930			95			165		
Cobalt	24			10			10		
Copper	50			50			26		
Gallium	L			L			L		
Gold	50	0.0002		L			50		
Iron	13.1%			4.65%			6.36%		
Lanthanum	10			20			10		
Lead	L			10			6		
Manganese	3240			1150			1670		
Magnesium	2.19%			1.36%			1.7%		
Molybdenum	L			2			2		
Nickel	64			28			21		
Palladium	L			L			L		
Phosphorus	295			470			620		
Platinum	L			L			L		
Potassium	0.64%			2.58%			1.90%		
Silver	1.5			L			L		
Sodium	1.03%			1.34%			1.71%		
Strontium	260			107			118		
Thallium	L			L			L		
Tin	NA			1			1		
Titanium	4.66%			0.46%			1.00%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	685			99			129		
Zinc	151			93			102		

Map No/Sample No/Yr	T26/6818/86	T27/6817/86	T28/6816/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Kuskokwim Bay/A-1, B-1	Kuskokwim Bay/A-1, B-1	Kuskokwim Bay/A-1, B-1
Sec/T/R/Mer	11/11S/75W/Sew	23/11S/75W/Sew	25/11S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	5.14%	4.98%	4.45%
Antimony	L	L	L
Arsenic	10	20	20
Barium	460	500	440
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	3.73%	3.39%	3.77%
Chromium	3020	2880	5740
Cobalt	26	25	37
Copper	42	52	47
Gallium	L	L	10
Gold	150 L	70 L	L 0.0003
Iron	11.4%	11.2%	14.3%
Lanthanum	10	20	20
Lead	10	15	10
Manganese	1670	1980	2290
Magnesium	2.17%	2.24%	2.76%
Molybdenum	3	3	5
Nickel	78	75	114
Palladium	L	L	L
Phosphorus	645	605	590
Platinum	L L	L	L L
Potassium	0.85%	0.86%	0.69%
Silver	1.0	L	1.5
Sodium	1.69%	1.69%	1.39%
Strontium	270	260	250
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.42%	1.88%	2.20%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	365	360	465
Zinc	149	150	175

Map No/Sample No/Yr	129/6815/86	130/6814/86	131/6813/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-8	Goodnews Bay/A-8
Sec/T/R/Mer	7/12S/75W/Sew	17/12S/75W/Sew	28/12S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3
Aluminum	5.05%		2.83%		3.21%	
Antimony	L		L		L	
Arsenic	10		20		20	
Barium	495		365		270	
Beryllium	L		L		L	
Bismuth	L		L		L	
Cadmium	L		L		L	
Calcium	3.26%		2.58%		2.38%	
Chromium	2470		G		G	
Cobalt	26		80		115	
Copper	41		50		56	
Gallium	10		L		L	
Gold	30	L	L	0.0003	L	0.0001
Iron	8.97		23.7%		28.7%	
Lanthanum	20		10		10	
Lead	10		5		5	
Manganese	1490		2230		2280	
Magnesium	2.29%		3.14%		3.14%	
Molybdenum	L		L		4	
Nickel	79		225		305	
Palladium	L		L		L	
Phosphorus	565		325		375	
Platinum	L	L	L	0.0001	500	L
Potassium	0.86%		0.34%		0.35%	
Silver	1.0		1.0		1.0	
Sodium	1.74%		0.76%		0.78%	
Strontium	260		163		158	
Thallium	L		L		L	
Tin	NA		NA		NA	
Titanium	1.28%		2.25%		1.73%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	290		805		960	
Zinc	120		320		460	

Map No/Sample No/Yr	T32/6812/86	T33/6810/86	T34/6811/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-8	Goodnews Bay/A-8
Sec/T/R/Mer	2/13S/76W/Sew	7/13S/75W/Sew	20/12S/74W/Sew
Location/Property	Beach	North Spit Beach	Goodnews Bay Beach
KX/MAS			33/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.42%			5.49%			6.32%		
Antimony	L			L			L		
Arsenic	20			20			10		
Barium	170			505			550		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.72%			3.81%			2.77%		
Chromium	G			1660			330		
Cobalt	118			25			16		
Copper	50			56			56		
Gallium	L			10			10		
Gold	L	0.0004		1490	0.0002		20		L
Iron	32.6%			8.85%			5.48%		
Lanthanum	10			20			10		
Lead	5			75			10		
Manganese	2070			1510			1150		
Magnesium	2.37%			2.43%			1.61%		
Molybdenum	L			L			L		
Nickel	295			72			35		
Palladium	L			20			40		
Phosphorus	205			735			595		
Platinum	L	0.0002		6300	0.0005		2500		L
Potassium	0.24%			0.94%			1.24%		
Silver	1.0			1.0			1.0		
Sodium	0.48%			1.90%			2.2%		
Strontium	107			290			260		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.68%			1.17%			0.66%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1170			265			171		
Zinc	450			147			104		

Map No/Sample No/Yr	T35/6544/86	T36/6650/86	T37/6651/86
Material Type	Placer	Quartzite	Limestone
Rock Type	Volc/Sed	Sed	Sed
Rock Age	MzPz	DO	DO
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-8	Goodnews Bay/A-8
Sec/T/R/Mer	2/12S/74W/Sew	27/11S/74W/Sew	22/11S/74W/Sew
Location/Property	Sphinx Cr. Trib.	Carter Cr.	Carter Cr.
KX/MAS		9/	9/
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.65%	0.16%	0.10%
Antimony	L	L	10
Arsenic	L	L	30
Barium	345	30	10
Beryllium	L	L	1
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.35%	0.50%	G
Chromium	82	370	14
Cobalt	16	2	L
Copper	57	9	15
Gallium	10	L	90
Gold	L	L	L
Iron	10.90%	8.85%	0.10%
Lanthanum	10	L	L
Lead	6	184	44
Manganese	3240	200	42
Magnesium	2.22%	0.93%	0.15%
Molybdenum	L	2	2
Nickel	25	15	1
Palladium	L	L	L
Phosphorus	890	415	60
Platinum	L	L	L
Potassium	1.67%	L	0.04%
Silver	L	0.2	0.2
Sodium	2.41%	L	L
Strontium	245	11	235
Thallium	L	L	L
Tin	1	NA	NA
Titanium	1.45%	60	30
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	250	9	3
Zinc	179	14	10

Map No/Sample No/Yr	T38/6560/86	T39/6649/86	T40/6648/86
Material Type	Placer	Limestone	Quartzite
Rock Type	Qg	Sed	Sed
Rock Age	Quaternary	DO	DO
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-8	Goodnews Bay/A-8
Sec/T/R/Mer	10/11S/74W/Sew	26/11S/74W/Sew	26/11S/74W/Sew
Location/Property	Indian R. Trib.	Limestone Ridge	Limestone Ridge
KX/MAS		9/	9/
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.06%	0.12%	0.75%
Antimony	L	10	L
Arsenic	L	20	L
Barium	765	L	75
Beryllium	L	1	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.37%	G	0.04%
Chromium	76	14	335
Cobalt	10	L	3
Copper	41	15	5
Gallium	L	80	L
Gold	L	L	L
Iron	5.26%	0.12%	1.69%
Lanthanum	10	L	L
Lead	8	10	10
Manganese	1070	33	48
Magnesium	1.33%	0.12%	0.19%
Molybdenum	2	L	L
Nickel	22	2	14
Palladium	L	L	L
Phosphorus	535	80	20
Platinum	L	L	L
Potassium	2.08%	0.05%	0.07%
Silver	0.6	0.2	0.2
Sodium	2.17%	0.02%	0.01%
Strontium	147	186	8
Thallium	L	L	L
Tin	1		
Titanium	0.51%	40	0.07%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	115	3	6
Zinc	100	7	8

Map No/Sample No/Yr	T41/6647/86	T42/6561/86	T43/6543/86
Material Type	Limonite	Placer	Placer
Rock Type	Sed	Qg	Qg
Rock Age	DO	Quaternary	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-8	Goodnews Bay/A-8
Sec/T/R/Mer	26/11S/74W/Sew	36/11S/74W/Sew	31/11S/73W.Sew
Location/Property	Limestone Ridge	Sphinx Cr.	Poker Cr.
KX/MAS	9/		
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	1.17%	6.49%	5.01%
Antimony	30	L	L
Arsenic	200	L	10
Barium	105	310	415
Beryllium	8	L	L
Bismuth	L	L	L
Cadmium	4	L	L
Calcium	0.10%	4.25%	4.14%
Chromium	57	265	785
Cobalt	89	20	30
Copper	22	30	77
Gallium	100	L	L
Gold	L	4500	6100 0.0004
Iron	59.3%	9.13%	15.3%
Lanthanum	L	10	10
Lead	2	8	L
Manganese	860	2050	3240
Magnesium	0.52%	2.59%	3.50%
Molybdenum	L	L	L
Nickel	68	30	64
Palladium	L	L	L
Phosphorus	115	555	580
Platinum	L	L	L
Potassium	0.12%	1.05%	1.07%
Silver	0.2	L	1.5
Sodium	0.03%	1.99%	1.75%
Strontium	14	235	260
Thallium	20	L	L
Tin	NA	T	NA
Titanium	0.04%	2.64%	3.65%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	L	285	760
Zinc	475	90	205

Map No/Sample No/Yr	T44/6646/86	T45/6542/86	T46/6519/86
Material Type	Siltstone	Placer	Placer
Rock Type	Sed	Qg	Qal
Rock Age	DO	Quaternary	KJ
Quad 4 mile/1 mile	Goodnews Bay/A-8	Goodnews Bay/A-7	Goodnews Bay/A-6
Sec/T/R/Mer	24/11S/74W/Sew	5/11S/73W/Sew	17/11S/69W/SEw
Location/Property	Limestone Ridge	Indian River	Goodnews R. Trib.
KX/MAS	9/		
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	3.22%	5.84%	7.36%
Antimony	L	L	L
Arsenic	10	10	20
Barium	225	455	360
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	0.05%	3.01%	2.23%
Chromium	180	400	100
Cobalt	3	28	12
Copper	13	44	42
Gallium	L	10	10
Gold	L	30	L
Iron	5.62%	15.1%	8.18%
Lanthanum	L	10	10
Lead	14	6	8
Manganese	37	2140	1940
Magnesium	0.48%	2.61%	1.64%
Molybdenum	L	L	L
Nickel	6	36	21
Palladium	L	L	L
Phosphorus	25	525	870
Platinum	L	L	L
Potassium	0.29%	1.28%	1.34%
Silver	0.4	L	L
Sodium	0.36%	1.69%	1.98%
Strontium	19	146	220
Thallium	L	L	L
Tin	T	T	T
Titanium	0.14%	2.86%	1.05%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	8	585	182
Zinc	13	149	138

Map No/Sample No/Yr	147/6556/86	148/6563/86	149/6545/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Volc/Sed	Qg
Rock Age	Quaternary	KJ	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/A-6	Goodnews Bay/A-6	Goodnews Bay/A-6
Sec/T/R/Mer	5/12S/69W/Sew	17/12S/69W/Sew	18/12S/69W/Sew
Location/Property	Goodnews R. Trib.	Goodnews R. Trib.	Goodnews R.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Assay	ICP	AA/Wet Assay
Aluminum	7.87%		7.04%		7.12%	
Antimony	L		L		L	
Arsenic	L		10		10	
Barium	1130		540		265	
Beryllium	L		L		L	
Bismuth	L		L		L	
Cadmium	L		2		2	
Calcium	2.25%		3.12%		3.57%	
Chromium	195		230		235	
Cobalt	16		21		17	
Copper	66		83		54	
Gallium	L		10		10	
Gold	L		L		L	
Iron	8.37%		8.84%		9.51%	
Lanthanum	10		10		10	
Lead	6		2		2	
Manganese	2000		1590		2200	
Magnesium	2.04%		3.33%		2.33%	
Molybdenum	L		L		L	
Nickel	31		60		39	
Palladium	L		L		L	
Phosphorus	1140		850		790	
Platinum	L		L		L	
Potassium	1.52%		1.38%		1.23%	
Silver	L		0.2		0.2	
Sodium	2.18%		1.87%		2.15%	
Strontium	260		170		250	
Thallium	L		L		L	
Tin	I		I		I	
Titanium	0.96%		1.26%		1.29%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	197		215		215	
Zinc	134		136		138	

Map No/Sample No/Yr	T50/6564/86	T50/6565/86	T51/6546/86
Material Type	Placer	Siltstone	Placer
Rock Type	Sed	Sed	Qg
Rock Age	KJ	KJ	Quaternary
Quad 4 mile/1 mile	Goodnews Bay/A-6	Goodnews Bay/A-6	Goodnews Bay/A-6
Sec/T/R/Mer	27/12S/71W/Sew	27/12S/71W/Sew	35/12S/71W/Sew
Location/Property	Tivyagak Cr. Trib.	Tivyagak Cr. Trib.	Tivyagak Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.50%	3.06%	8.15%
Antimony	L	L	L
Arsenic	10	10	10
Barium	245	145	215
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	1.5	L	2
Calcium	5.71%	0.62%	5.78%
Chromium	590	81	530
Cobalt	15	4	18
Copper	127	13	56
Gallium	20	L	10
Gold	360	L	1100
Iron	9.20%	3.44%	9.36%
Lanthanum	10	10	10
Lead	2	12	2
Manganese	1520	2350	1360
Magnesium	2.66%	0.54%	2.53%
Molybdenum	L	L	L
Nickel	33	27	35
Palladium	L	L	L
Phosphorus	795	195	640
Platinum	L	L	L
Potassium	1.17%	0.38%	1.25%
Silver	0.2	0.2	0.2
Sodium	1.88%	0.93%	1.88%
Strontium	580	132	575
Thallium	L	L	L
Tin	T	T	T
Titanium	1.04%	0.18%	0.92%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	265	34	250
Zinc	114	42	104

Map No/Sample No/Yr	152/6566/86	153/6547/86	154/6615/86
Material Type	Placer	Placer	Maf Volc
Rock Type	Volc/Sed	Maf Volc	Maf Volc
Rock Age	MzPz	MzPz	MzPz
Quad 4 mile/1 mile	Goodnews Bay/A-7	Goodnews Bay/A-7	Hagemeister Island/D-4
Sec/T/R/Mer	7/13S/72W/Sew	23/13S/73W/Sew	8/14S/72W/Sew
Location/Property	Goodnews R. Trib.	Puyulik Cr.	
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.51%	7.43%	7.73%
Antimony	L	L	L
Arsenic	10	L	20
Barium	215	145	215
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	2	4.5	3
Calcium	5.09%	6.10%	7.99%
Chromium	290	430	66
Cobalt	19	15	35
Copper	66	49	76
Gallium	20	20	L
Gold	L	L	L
Iron	11.40%	14.40%	7.26%
Lanthanum	L	L	10
Lead	2	2	2
Manganese	1690	1240	1110
Magnesium	2.89%	2.20%	3.94%
Molybdenum	L	L	L
Nickel	53	55	42
Palladium	L	L	L
Phosphorus	470	270	405
Platinum	L	L	L
Potassium	1.23%	0.94%	0.55%
Silver	0.2	0.2	0.2
Sodium	2.03%	1.66%	1.84%
Strontium	375	465	375
Thallium	L	L	L
Tin	I	I	NA
Titanium	0.85%	0.69%	1.0%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	295	355	415
Zinc	109	82	81

Map No/Sample No/Yr	155/6617/86	156/6616/86	157/6619/86
Material Type	Maf Plut	Maf Volc	Maf Plut
Rock Type	Maf Int	Maf Volc	Maf Int
Rock Age	Jurassic	MzPz	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	18/14S/72W/Sew	18/14S/72W/Sew	30/14S/72W/Sew
Location/Property			
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Chip	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.49%	7.84%	4.23%
Antimony	L	L	L
Arsenic	L	10	L
Barium	635	1080	40
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	4	2.5	2
Calcium	5.96%	7.10%	4.60%
Chromium	50	155	670
Cobalt	29	27	77
Copper	58	72	91
Gallium	10	L	L
Gold	L	L	L
Iron	8.39%	6.26%	8.20%
Lanthanum	10	10	10
Lead	2	2	2
Manganese	1520	1110	1110
Magnesium	2.78%	3.72%	13.7%
Molybdenum	L	L	L
Nickel	16	41	870
Palladium	L	L	L
Phosphorus	855	640	540
Platinum	L	L	L
Potassium	1.20%	0.59%	0.08%
Silver	0.2	0.2	0.2
Sodium	2.42%	2.05%	0.62%
Strontium	330	420	124
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.40%	1.04%	0.86%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	400	250	132
Zinc	75	112	93

Map No/Sample No/Yr	158/6618/86	159/6567/86	160/6550/86
Material Type	Maf Volc	Placer	Placer
Rock Type	Maf Volc	Qg	Qg
Rock Age	MzPz	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	30/14S/72W/Sew	31/14S/72W/Sew	11/15S/73W/Sew
Location/Property		Unaluk R. Trib.	Unaluk R. Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.76%	5.87%	6.67%
Antimony	L	L	L
Arsenic	L	10	10
Barium	70	210	455
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	3	3	4
Calcium	6.81%	5.35%	4.90%
Chromium	155	1330	1100
Cobalt	30	22	24
Copper	140	74	44
Gallium	10	20	20
Gold	L	1100	3300
Iron	7.51%	11.80%	12.90%
Lanthanum	L	10	10
Lead	2	2	2
Manganese	1040	1730	2140
Magnesium	3.69%	3.34%	2.22%
Molybdenum	L	L	L
Nickel	68	79	63
Palladium	L	L	L
Phosphorus	1100	605	555
Platinum	L	L	L
Potassium	0.80%	0.74%	0.87%
Silver	0.2	0.2	0.2
Sodium	1.93%	1.48%	1.93%
Strontium	265	300	310
Thallium	L	L	L
Tin	NA	1	1
Titanium	1.68%	2.31%	1.53%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	265	390	480
Zinc	105	130	115

Map No/Sample No/Yr	T61/6580/86	T62/6645/86	T63/6819/86
Material Type	Placer	Slate	Hornfels
Rock Type	Qal	Sed	Meta
Rock Age	Quaternary	MzPz	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	13/15S/74W/Sew	4/15S/73W/Sew	4/15S/73W/Sew
Location/Property	Kinegnak R.	Unaluk R.	Unaluk R.
KX/MAS		/10	/10
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	5.34%	7.05%	7.07%
Antimony	L	L	L
Arsenic	L	50	10
Barium	120	1.38%	545
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	4	L	L
Calcium	8.20%	2.46%	4.79%
Chromium	805	70	79
Cobalt	31	13	27
Copper	33	36	100
Gallium	10	L	20
Gold	L	L	L
Iron	13.10%	5.00%	6.41%
Lanthanum	L	10	10
Lead	2	2	L
Manganese	1690	295	1110
Magnesium	3.75%	1.30%	2.78%
Molybdenum	L	3	L
Nickel	72	18	31
Palladium	10	L	L
Phosphorus	385	1060	685
Platinum	L	L	L
Potassium	0.49%	0.17%	1.00%
Silver	0.2	0.4	L
Sodium	1.25%	4.23%	2.52%
Strontium	475	260	215
Thallium	L	L	L
Tin	1	2	NA
Titanium	1.6%	0.88%	0.87%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	575	140	250
Zinc	85	16	76

Map No/Sample No/Yr	163/6820/86	164/6821/86	165/6643/86
Material Type	Siltstone	Maf Plut	Chert
Rock Type	Sed	Maf Int	Sed
Rock Age	MzPz	Jurassic	MzPz
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	4/15S/73W/Sew	4/15S/73W/Sew	9/15S/73W/Sew
Location/Property	Unaluk R.	Unaluk R.	Unaluk R.
KX/MAS	/10	/10	/10
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.09%	8.07%	2.73%
Antimony	L	L	L
Arsenic	20	10	20
Barium	485	205	240
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.46%	6.32%	1.42%
Chromium	57	65	315
Cobalt	16	31	9
Copper	29	78	530
Gallium	10	20	10
Gold	L	L	70
Iron	7.64%	6.84%	2.12%
Lanthanum	20	10	20
Lead	4	L	4
Manganese	1770	1190	275
Magnesium	2.41%	2.82%	1.39%
Molybdenum	L	1	L
Nickel	22	28	28
Palladium	L	L	L
Phosphorus	900	830	130
Platinum	L	L	L
Potassium	0.62%	1.00%	0.02%
Silver	0.4	L	1.0
Sodium	2.40%	2.34%	0.30%
Strontium	56	415	63
Thallium	L	L	L
Tin	NA	NA	1
Titanium	0.84%	1.02%	0.19%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	160	280	37
Zinc	74	74	19

Map No/Sample No/Yr	T65/6644/86	T66/6822/86	T66/6823/86
Material Type	Maf Plut	Maf Plut	Maf Plut
Rock Type	Maf Int	Maf Int	Maf Int
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	9/15S/73W/Sew	3/15S/73W/Sew	3/15S/73W/Sew
Location/Property	Unaluk R.	Unaluk R.	Unaluk R.
KX/MAS	/10	/10	/10
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	1 Pan	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	8.60%	6.67%	7.49%
Antimony	L	L	L
Arsenic	10	30	20
Barium	470	810	275
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	9.28%	1.66%	6.92%
Chromium	120	135	140
Cobalt	32	25	29
Copper	128	101	103
Gallium	20	L	20
Gold	L	240	L
Iron	5.68%	8.92%	6.38%
Lanthanum	L	20	L
Lead	4	6	L
Manganese	2370	3000	1200
Magnesium	4.32%	0.86%	3.35%
Molybdenum	L	17	L
Nickel	96	23	47
Palladium	10	L	L
Phosphorus	425	935	610
Platinum	L	125	L
Potassium	0.03%	0.50%	0.51%
Silver	0.4	L	0.4
Sodium	2.04%	1.21%	2.19%
Strontium	75	129	315
Thallium	L	L	L
Tin	1	NA	NA
Titanium	0.40%	0.96%	0.86%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	134	230	255
Zinc	115	56	72

Map No/Sample No/Yr	166/6824/86	166/6825/86	167/6568/86
Material Type	Maf Plut	Breccia	Placer
Rock Type	Maf Int	Maf Int	Qg
Rock Age	Jurassic	Jurassic	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	3/15S/73W/Sew	3/15S/73W/Sew	33/14S/73W/Sew
Location/Property	Unaluk R.	Unaluk R.	Kinegnak Cr. Trib.
KX/MAS	/10	/10	
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.30%	5.64%	6.03%
Antimony	L	L	L
Arsenic	10	10	10
Barium	600	95	365
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	4
Calcium	7.06%	7.39%	6.25%
Chromium	135	205	2780
Cobalt	29	10	21
Copper	101	40	66
Gallium	20	30	10
Gold	L	L	L
Iron	6.15%	2.28%	11.70%
Lanthanum	L	L	10
Lead	L	L	4
Manganese	1100	560	2070
Magnesium	3.30%	0.91%	3.06%
Molybdenum	L	L	L
Nickel	48	10	85
Palladium	L	L	L
Phosphorus	565	120	620
Platinum	L	L	L
Potassium	0.64%	0.02%	0.71%
Silver	L	L	0.2
Sodium	1.95%	0.12%	1.56%
Strontium	295	32	375
Thallium	L	L	L
Tin	NA	NA	T
Titanium	0.83%	0.10%	2.01%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	255	77	375
Zinc	67	17	98

Map No/Sample No/Yr	168/6549/86	169/6548/86	170/6562/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-5	Goodnews Bay/A-7
Sec/T/R/Mer	20/14S/73W/Sew	6/14S/73W/Sew	23/13S/74W/Sew
Location/Property	Kinegnak R.	Wind Cr. Trib.	Ukfigag Cr.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.17%	8.18%	5.99%
Antimony	L	L	L
Arsenic	10	10	L
Barium	155	215	180
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	2.5	1.5	L
Calcium	7.95%	6.43%	6.31%
Chromium	1120	215	200
Cobalt	17	14	40
Copper	37	42	67
Gallium	10	10	10
Gold	L	L	L
Iron	8.46%	7.04%	19.8%
Lanthanum	L	10	10
Lead	2	2	2
Manganese	1610	1170	1560
Magnesium	3.59%	2.51%	3.37%
Molybdenum	L	L	L
Nickel	72	27	58
Palladium	L	L	NA
Phosphorus	555	570	585
Platinum	L	L	L
Potassium	0.80%	1.28%	0.66%
Silver	0.2	0.2	L
Sodium	1.81%	2.10%	1.32%
Strontium	545	605	665
Thallium	L	L	L
Tin	1	1	1
Titanium	1.20%	0.69%	1.42%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	260	210	905
Zinc	86	74	85

Map No/Sample No/Yr	171/6674/86	172/6569/86	173/6620/86
Material Type	Placer	Placer	Ultramaf
Rock Type	Qg	Qg	Umaf Int
Rock Age	Quaternary	Quaternary	Jurassic
Quad 4 mile/1 mile	Goodnews Bay/A-7	Hagemeister Island/D-5	Hagemeister Island/D-5
Sec/T/R/Mer	34/13S/74W/Sew	22/14S/74W/Sew	16/14S/74W/Sew
Location/Property	Smalls R.	Fog Cr.	
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	7.38%	3.06%	0.38%
Antimony	L	L	20
Arsenic	10	L	L
Barium	255	62	15
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	7	10	L
Calcium	6.72%	3.05%	0.22%
Chromium	485	7670	940
Cobalt	23	86	113
Copper	70	46	12
Gallium	20	20	L
Gold	100	30	L
Iron	10.4%	21.30%	8.35%
Lanthanum	10	L	L
Lead	2	2	2
Manganese	1920	1740	1330
Magnesium	2.87%	5.49%	20.00%
Molybdenum	1	L	L
Nickel	32	260	685
Palladium	L	45	L
Phosphorus	740	260	55
Platinum	L	250	L
Potassium	0.95%	0.17%	0.02%
Silver	0.2	0.2	0.2
Sodium	1.97%	0.46%	0.05%
Strontium	710	140	7
Thallium	L	L	L
Tin	NA	1	NA
Titanium	1.19%	1.66%	0.04%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	385	1310	17
Zinc	131	250	63

Map No/Sample No/Yr	T74/6681/86	T75/6789/86	T76/6653/86
Material Type	Ultramaf	Placer	Placer
Rock Type	Umaf Int	Qg	Qm
Rock Age	Jurassic	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-5	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	17/14S/74W/Sew	12/14S/75W/Sew	4/14S/75W/Sew
Location/Property	Susie Mountain	McCann Cr.	Beach
KX/MAS		9/9	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Placer	Placer

Element	ICP	AA/Wet Assay	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3
Aluminum	1.18%		2.49%		4.11%	
Antimony	10		L		L	
Arsenic	L		L		20	
Barium	20		75		585	
Beryllium	L		L		L	
Bismuth	L		35		L	
Cadmium	1		L		L	
Calcium	6.95%		1.61%		2.73%	
Chromium	1690		G		G	
Cobalt	95		187		55	
Copper	40		41		69	
Gallium	L		L		L	
Gold	L		L	0.0008	920	0.0001
Iron	7.96%		25.7%		26.8%	
Lanthanum	L		L		10	
Lead	6		5		5	
Manganese	1350		2090		3680	
Magnesium	15.90%		5.51%		3.11%	
Molybdenum	L		5		7	
Nickel	385		445		166	
Palladium	L		L		L	
Phosphorus	95		40		420	
Platinum	L		4500	0.0018	150	0.0002
Potassium	0.04%		0.12%		0.08%	
Silver	0.2		2.0		1.5	
Sodium	0.18%		0.23%		0.93%	
Strontium	52		59		175	
Thallium	L		L		L	
Tin	NA		NA		NA	
Titanium	0.16%		0.89%		4.79%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	82		635		1250	
Zinc	74		625		360	

Map No/Sample No/Yr	177/6652/86	178/6581/86	178/6582/86
Material Type	Placer	Till	Till
Rock Type	Qm	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	9/14S/75W/Sew	9/14S/75W/Sew	9/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	11, 17, 32/1, 2	11, 17, 32/1, 2
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	1.43%			6.17%			7.55%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	105			280			360		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	0.93%			3.13%			3.58%		
Chromium	G			6140			1800		
Cobalt	145			33			24		
Copper	65			46			52		
Gallium	L			L			L		
Gold	1120	0.0011		7800	0.0004		L		tr
Iron	38%			8.05%			6.82%		
Lanthanum	L			10			10		
Lead	5			L			L		
Manganese	2120			1070			1120		
Magnesium	2.25%			1.87%			1.93%		
Molybdenum	3			L			L		
Nickel	375			85			57		
Palladium	10			330			L		
Phosphorus	115			350			425		
Platinum	1850	0.0038		G	0.0005		2500		0.0003
Potassium	0.07%			0.65%			0.92%		
Silver	1.0			1.0			1.0		
Sodium	0.13%			1.47%			1.90%		
Strontium	42			260			315		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.55%			0.83%			0.83%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1480			280			250		
Zinc	515			133			106		

Map No/Sample No/Yr	T78/6583/86	T78/6584/86	T78/6585/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	9/14S/75W/Sew	9/14S/75W/Sew	9/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.08%			3.67%			3.89%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	150			230			235		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.48%			2.80%			2.57%		
Chromium	G			G			G		
Cobalt	84			68			70		
Copper	30			29			31		
Gallium	L			L			L		
Gold	L		tr	1000		tr	700		tr
Iron	17.60%			11.70%			12.8%		
Lanthanum	L			L			L		
Lead	L			L			L		
Manganese	1240			1190			1160		
Magnesium	2.56%			4.76%			3.54%		
Molybdenum	L			L			L		
Nickel	225			225			200		
Palladium	L			L			L		
Phosphorus	115			195			195		
Platinum	L			200		tr	400		tr
Potassium	0.12%			0.30%			0.34%		
Silver	1.0			1.5			2.0		
Sodium	0.26%			0.79%			0.82%		
Strontium	71			155			145		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.89%			0.75%			0.75%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	560			365			415		
Zinc	275			205			225		

Map No/Sample No/Yr	179/6586/86	179/6587/86	179/6588/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/14S/75W/Sew	16/14S/75W/Sew	16/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.04%			1.71%			2.23%		
Antimony	L			L			L		
Arsenic	10			L			10		
Barium	70			120			140		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	0.88%			0.82%			0.94%		
Chromium	G			G			G		
Cobalt	118			103			123		
Copper	29			31			32		
Gallium	L			L			L		
Gold	1250	0.0012		500	0.0002		L	0.0002	
Iron	20.9%			21.6%			23.5%		
Lanthanum	L			L			L		
Lead	L			L			L		
Manganese	1460			1270			1530		
Magnesium	1.94%			1.68%			2.05%		
Molybdenum	L			L			L		
Nickel	285			245			300		
Palladium	40			40			L		
Phosphorus	40			75			75		
Platinum	G	0.0058		4700	0.0005		2900	0.0014	
Potassium	0.09%			0.08%			0.09%		
Silver	1.0			L			1.0		
Sodium	0.14%			0.12%			0.16%		
Strontium	43			39			45		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.85%			0.83%			0.89%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	655			730			730		
Zinc	410			340			430		

Map No/Sample No/Yr	179/6589/86	180/6590/86	180/6621/86
Material Type	Placer	Till	Placer
Rock Type	Qm	Qg	Qm - Tailings
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/14S/75W/Sew	16/14S/75W/Sew	16/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	11, 17, 32/1, 2	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Pan

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay
Aluminum	2.94%			2.98%			2.61%		
Antimony	L			L			L		
Arsenic	L			10			20		
Barium	165			100			60		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.44%			2.18%			1.86%		
Chromium	G			G			G		
Cobalt	137			85			105		
Copper	39			27			26		
Gallium	L			L			L		
Gold	1200	0.0001		40	tr		50		
Iron	25.7%			9.52%			11.2%		
Lanthanum	L			L			L		
Lead	L			L			L		
Manganese	1830			1060			1190		
Magnesium	3.16%			3.88%			3.74%		
Molybdenum	L			L			L		
Nickel	353			225			255		
Palladium	20			L			L		
Phosphorus	85			135			110		
Platinum	5500	0.0013		800	tr		200		
Potassium	0.11%			0.15%			0.10%		
Silver	1.5%			1.0			1.0		
Sodium	0.22%			0.44%			0.27%		
Strontium	65			105			78		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.07%			0.53%			0.57%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	800			245			270		
Zinc	480			310			395		

Map No/Sample No/Yr	T80/6622/86	T80/6623/86	T80/6624/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/14S/75W/Sew	16/14S/75W/Sew	16/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.58%			2.80%			2.42%		
Antimony	L			L			L		
Arsenic	10			10			20		
Barium	150			185			205		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.37%			1.71%			1.80%		
Chromium	G			G			G		
Cobalt	108			88			155		
Copper	31			35			49		
Gallium	L			L			L		
Gold	115	0.0008		L	0.0003		L		L
Iron	20.7%			17.9%			30.8%		
Lanthanum	L			L			L		
Lead	L			L			5		
Manganese	1400			1280			2230		
Magnesium	2.45%			3.14%			4.1%		
Molybdenum	L			L			3		
Nickel	270			240			430		
Palladium	40			L			25		
Phosphorus	120			170			175		
Platinum	G	0.0073		1500	0.0016		4250	0.0010	
Potassium	0.15%			0.17%			0.19%		
Silver	L			L			1.5		
Sodium	0.31%			0.44%			0.43%		
Strontium	73			94			96		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.84%			0.86%			1.25%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	675			620			940		
Zinc	355			275			550		

Map No/Sample No/Yr	T81/6625/86	T81/6626/86	T81/6627/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/14S/75W/Sew	16/14S/75W/Sew	16/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	11, 17, 32/1, 2	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	1.84%			2.03%			2.76%		
Antimony	L			L			L		
Arsenic	L			20			30		
Barium	75			125			140		
Beryllium	L			L			L		
Bismuth	20			10			L		
Cadmium	L			L			L		
Calcium	1.84%			1.39%			1.56%		
Chromium	G			G			G		
Cobalt	155			160			190		
Copper	38			42			46		
Gallium	L			L			L		
Gold	L		L	L		L	L		L
Iron	20.2%			28.5%			35.6%		
Lanthanum	L			L			L		
Lead	5			5			5		
Manganese	1860			2100			2480		
Magnesium	10.3%			4.6%			4.39%		
Molybdenum	5			3			4		
Nickel	585			465			520		
Palladium	10			L			L		
Phosphorus	170			95			260		
Platinum	1400		L	800		0.0030	750		L
Potassium	0.10%			0.12%			0.15%		
Silver	1.5			13			1.0		
Sodium	0.28%			0.29%			0.35%		
Strontium	66			67			78		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.78%			0.94%			1.2%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	455			835			1000		
Zinc	490			565			675		

Map No/Sample No/Yr	181/6628/86	182/6629/86	182/6630/86
Material Type	Placer	Till	Placer
Rock Type	Qm	Qg	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/14S/75W/Sew	21/14S/75W/Sew	21/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	11, 17, 32/1, 2	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.39%			2.69%			2.81%		
Antimony	L			10			L		
Arsenic	30			L			20		
Barium	135			115			140		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.50%			3.53%			3.06%		
Chromium	G			G			G		
Cobalt	175			122			155		
Copper	46			40			50		
Gallium	L			L			L		
Gold	L	0.0007		L			L		L
Iron	33.6%			20.1%			31%		
Lanthanum	L			10			L		
Lead	5			5			5		
Manganese	2350			1640			2220		
Magnesium	3.66%			13.00%			5.66%		
Molybdenum	4			4			L		
Nickel	470			600			455		
Palladium	L			L			25		
Phosphorus	115			230			200		
Platinum	200	0.0003		300		L	1050	0.0003	
Potassium	0.14%			0.22%			0.17%		
Silver	1.5			1.0			1.5		
Sodium	0.32%			0.64%			0.45%		
Strontium	71			143			127		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.21%			0.80%			1.21%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1010			520			935		
Zinc	635			310			550		

Map No/Sample No/Yr	182/6640/86	182/6641/86	182/6642/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	21/14S/75W/Sew	21/14S/75W/Sew	21/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	11, 17, 32/1, 2	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.03%			1.72%			1.26%		
Antimony	10			L			L		
Arsenic	L			20			20		
Barium	85			120			100		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	3.24%			1.98%			1.64%		
Chromium	G			G			G		
Cobalt	112			120			103		
Copper	38			40			34		
Gallium	L			L			L		
Gold	L		L	L		L	L		0.0001
Iron	17.7%			25.6%			24.5%		
Lanthanum	L			L			L		
Lead	5			5			5		
Manganese	1500			1800			1590		
Magnesium	13.5%			3.95%			3.42%		
Molybdenum	3			L			L		
Nickel	585			350			295		
Palladium	15			15			L		
Phosphorus	165			135			145		
Platinum	1500		0.0002	3200		0.0001	3250		0.0034
Potassium	0.15%			0.12%			0.10%		
Silver	1.0			1.5			1.0		
Sodium	0.46%			0.29%			0.24%		
Strontium	112			85			68		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.86%			1.04%			1.06%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	535			835			870		
Zinc	255			425			335		

Map No/Sample No/Yr	T83/6633/86	T83/6634/86	T83/6635/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	21/14S/75W/Sew	21/14S/75W/Sew	21/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	11, 17, 32/1, 2	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	4.46%			2.12%			2.02%		
Antimony	L			L			L		
Arsenic	20			20			30		
Barium	255			100			110		
Beryllium	L			L			L		
Bismuth	5			L			L		
Cadmium	L			L			L		
Calcium	4.38%			2.01%			1.43%		
Chromium	G			G			G		
Cobalt	125			160			171		
Copper	59			46			49		
Gallium	L			L			L		
Gold	L		L	L		0.0007	L		L
Iron	23.3%			31.8%			35.6%		
Lanthanum	10			L			L		
Lead	5			5			5		
Manganese	2070			2200			2400		
Magnesium	7.02%			5.45%			4.55%		
Molybdenum	4			4			4		
Nickel	385			475			495		
Palladium	L			L			25		
Phosphorus	355			105			150		
Platinum	250			1650		0.0048	5000		0.0005
Potassium	0.52%			0.11%			0.10%		
Silver	1.5			1.0			1.5		
Sodium	1.25%			0.26%			0.22%		
Strontium	245			79			62		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.12%			1.23%			1.33%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	675			1020			1050		
Zinc	420			545			610		

Map No/Sample No/Yr	T83/6636/86	T84/6827/86	T85/6828/86
Material Type	Placer	Ultramaf	Ultramaf
Rock Type	Qm	Umaf Int	Umaf Int
Rock Age	Quaternary	Jurassic	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	21/14S/75W/Sew	23/14S/75W/Sew	14/14S/75W/Sew
Location/Property	Beach	Red Mountain	Red Mountain
KX/MAS	32/1	5, 13, 15/7	5, 13, 15/7
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.25%			3.56%			1.16%		
Antimony	L			L			10		
Arsenic	30			20			L		
Barium	135			175			45		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.96%			6.25%			1.06%		
Chromium	G			3550			G		
Cobalt	155			72			164		
Copper	57			42			40		
Gallium	L			10			L		
Gold	L		L	L		0.0001	750		L
Iron	34.1%			20.9%			19.5%		
Lanthanum	10			10			L		
Lead	5			5			5		
Manganese	2350			1410			1750		
Magnesium	5.12%			8.24%			15.9%		
Molybdenum	3			L			3		
Nickel	460			250			710		
Palladium	L			L			L		
Phosphorus	200			85			75		
Platinum	1300		0.0101	L		L	3600		0.0001
Potassium	0.12%			0.39%			0.04%		
Silver	1.0			L			1.5		
Sodium	0.30%			1.00%			0.10%		
Strontium	88			255			23		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.44%			1.22%			0.48%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1110			920			340		
Zinc	550			149			420		

Map No/Sample No/Yr	T86/6785/86	T87/6502/86	T87/6786/86
Material Type	Placer	Placer	Placer
Rock Type	Qac	Meta	Umaf Int
Rock Age	Quaternary	MzPz	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	14/14S/75W/Sew	14/14S/75W/Sew	14/14S/75W/Sew
Location/Property	Clara Cr.	Clara Cr.	Clara Cr.
KX/MAS	1, 3, 6-7, 10/3	1, 3, 6-7, 10/3	1, 3, 6-7, 10/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Assay	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	1.98%			3.02%			2.35%		
Antimony	10			10			L		
Arsenic	L			L			L		
Barium	10			165			65		
Beryllium	L			L			L		
Bismuth	L			L			15		
Cadmium	L			L			L		
Calcium	1.81%			2.61%			1.84%		
Chromium	G			G			G		
Cobalt	93			113			149		
Copper	48			58			55		
Gallium	L			L			L		
Gold	L			3230			30		L
Iron	14.20%			13.3%			22.5%		
Lanthanum	L			L			L		
Lead	L			L			5		
Manganese	1300			2070			1900		
Magnesium	8.91%			10.10%			10.2%		
Molybdenum	L			L			4		
Nickel	385			385			505		
Palladium	70			L			L		
Phosphorus	80			210					
Platinum	8000			700		0.0087	95	6400	0.0339
Potassium	0.06%			0.41%			0.12%		
Silver	L			L			1.5		
Sodium	0.27%			1.22%			0.42%		
Strontium	117			157			122		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.47%			0.69%			0.76%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	505			375			580		
Zinc	194			295			465		

Map No/Sample No/Yr	188/6501/86	189/6787/86	190/6739/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Umaf Int
Rock Age	Quaternary	Quaternary	Jurassicry
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	14/14S/75W/Sew	13/14S/75W/Sew	24/14S/75W/Sew
Location/Property	Clara Cr.	Clara Cr.	Dowry Cr.
KX/MAS	1, 3, 6-7, 10/3	1, 3, 6-7, 10/3	16/
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	1.81%	2.29%	2.44%
Antimony	L	L	L
Arsenic	10	L	L
Barium	35	60	45
Beryllium	L	L	L
Bismuth	28	L	22
Cadmium	L	L	L
Calcium	0.82%	2.53%	0.85%
Chromium	G	G	G
Cobalt	113	150	174
Copper	18	65	36
Gallium	L	L	L
Gold	10	G	L L
Iron	17.9%	34.6%	13.6%
Lanthanum	L	L	L
Lead	L	40	L
Manganese	1340	2120	2240
Magnesium	5.93%	4.63%	11.00%
Molybdenum	L	L	L
Nickel	375	390	620
Palladium	20	G	165
Phosphorus	L	80	50
Platinum	2600	G	G 0.0035
Potassium	0.07%	0.13%	0.06%
Silver	L	1.5	0.4
Sodium	0.12%	0.26%	0.05%
Strontium	35	86	24
Thallium	L	L	L
Tin	T	NA	NA
Titanium	0.63%	1.68%	0.91%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	440	1340	750
Zinc	325	465	510

Map No/Sample No/Yr	T91/6738/86	T92/6740/86	T93/6788/86
Material Type	Placer	Peg	Placer
Rock Type	Umaf Int	Umaf Int	Qg
Rock Age	Jurassic	Jurassic	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	24/14S/75W/Sew	24/14S/75W/Sew	24/14S/75W/Sew
Location/Property	Dowry Cr.	Dowry Cr.	Clara Cr.
KX/MAS	T6/	T6/	1, 3, 6-7, 10/3
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Grab	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	2.29%	17.40	2.31%
Antimony	10	L	L
Arsenic	L	L	10
Barium	50	960	40
Beryllium	L	2.5	L
Bismuth	9	L	L
Cadmium	L	1	L
Calcium	1.00%	7.87%	2.13%
Chromium	G	44	G
Cobalt	161	8	94
Copper	34	33	33
Gallium	L	40	L
Gold	L 0.0006	L	L
Iron	22.7%	1.23%	21.00%
Lanthanum	L	L	L
Lead	L	4	L
Manganese	2090	420	1710
Magnesium	12.9%	1.22%	4.55%
Molybdenum	L	2	L
Nickel	640	29	285
Palladium	130	L	130
Phosphorus	55	1190	125
Platinum	G 0.0215	L	2150
Potassium	0.07%	3.47%	0.09%
Silver	L	L	L
Sodium	0.08%	3.59%	0.30%
Strontium	32	5510	120
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.93%	0.14%	1.05%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	760	23	1070
Zinc	445	24	215

Map No/Sample No/Yr	T94/6760/86	T95/6761/86	T96/6570/86
Material Type	Placer	Placer	Ultramaf
Rock Type	Qg - Tailings	Qg - Tailings	Umaf Int
Rock Age	Quaternary	Quaternary	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	24/14S/75W/Sew	24/14S/75W/Sew	24/14S/75W/Sew
Location/Property	Dowry Cr.	Dowry Cr.	Salmon R.
KX/MAS	16/	16/	1-4,7-8,14,16,18-19/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	1 Pan

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay
Aluminum	2.18%			2.04%			2.17%		
Antimony	L			L			L		
Arsenic	L			L			10		
Barium	55			85			24		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.24%			1.74%			15.00%		
Chromium	G			G			865		
Cobalt	200			155			35		
Copper	45			55			28		
Gallium	L			L			L		
Gold	70		L	80		0.0002	L		
Iron	30.2%			35.6%			5.61%		
Lanthanum	L			L			L		
Lead	5			5			L		
Manganese	2610			2410			900		
Magnesium	10.3%			7.15%			8.07%		
Molybdenum	3			L			L		
Nickel	650			490			93		
Palladium	160			L			200		
Phosphorus	30			95			70		
Platinum	G		0.0015	3500		0.0007	G		
Potassium	0.06%			0.10%			0.04%		
Silver	1.0			1.0			L		
Sodium	0.11%			0.20%			0.17%		
Strontium	42			60			60		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.96%			1.59%			0.39%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	870			1390			210		
Zinc	640			490			42		

Map No/Sample No/Yr	T97/6748/86	T98/6749/86	T99/6791/86
Material Type	Placer	Placer	Placer
Rock Type	Qg - Tailings	Qg - Tailings	Qg - Tailings
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	25/14S/75W/Sew	25/14S/75W/Sew	36/14S/75W/Sew
Location/Property	Salmon R.	Salmon R.	Salmon R.
KX/MAS	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Assay	ICP	AA/Wet	Assay	ICP	AA/Wet	Oz/yd^3
Aluminum	3.27%			3.92%			4.44%		
Antimony	L			L			L		
Arsenic	10			20			L		
Barium	85			105			115		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	6.44%			7.15%			7.16%		
Chromium	5250			1850			4390		
Cobalt	66			52			80		
Copper	34			59			54		
Gallium	L			L			L		
Gold		4900			5100			280	
Iron	11.60%			15.30%			24.6%		
Lanthanum	L			10			10		
Lead	L			L			5		
Manganese	1410			1360			1630		
Magnesium	8.87%			4.80%			3.47%		
Molybdenum	L			L			L		
Nickel	270			127			161		
Palladium		5			L			L	
Phosphorus	210			395			275		
Platinum		1625			775			3900	0.0012
Potassium	0.18%			0.26%			0.28%		
Silver	L			L			1.5		
Sodium	0.72%			0.82%			0.91%		
Strontium	250			270			215		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.67%			0.78%			1.46%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	410			680			1030		
Zinc	112			80			168		

Map No/Sample No/Yr	200/6781/86	201/6778/86	201/6779/86
Material Type	Placer	Placer	Placer
Rock Type	Qg - Tailings	Qg - Tailings	Qg - Tailings
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	36/14S/75W/Sew	36/14S/75W/Sew	36/14S/75W/Sew
Location/Property	Salmon R.	Salmon R.	Salmon R.
KX/MAS	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	3.17%	2.04%	4.84%
Antimony	L	L	L
Arsenic	L	70	L
Barium	95	60	115
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	7.86%	3.97%	6.92%
Chromium	6160	G	6250
Cobalt	87	115	73
Copper	54	57	59
Gallium	L	30	L
Gold	160	L	L L
Iron	27%	40.1%	25.1%
Lanthanum	L	L	10
Lead	10	10	10
Manganese	1810	1950	1700
Magnesium	4.75%	2.73%	2.79%
Molybdenum	L	L	L
Nickel	188	255	156
Palladium	L	L	L
Phosphorus	140	115	200
Platinum	L 0.0015	L	200 L
Potassium	0.26%	0.13%	0.50%
Silver	1.0	1.5	1.0
Sodium	0.62%	0.26%	0.75%
Strontium	205	143	385
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.42%	1.95%	1.44%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	1130	1670	980
Zinc	205	310	168

Map No/Sample No/Yr	202/6780/86	203/6792/86	204/6793/86
Material Type	Placer	Placer	Siltstone
Rock Type	Qg - Tailings	Qg - Tailings	Sed
Rock Age	Quaternary	Quaternary	MzPz
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	36/14S/75W/Sew	36/14S/75W/Sew	36/14S/75W/Sew
Location/Property	Salmon R.	Salmon R.	Salmon R.
KX/MAS	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4	1-4,7-8,14,16,18-19/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.01%			3.34%			2.41%		
Antimony	L			L			L		
Arsenic	130			L			80		
Barium	70			140			140		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.54%			3.50%			1.69%		
Chromium	G			G			G		
Cobalt	159			129			177		
Copper	60			71			78		
Gallium	40			L			20		
Gold		L			L	L		L	
Iron	47.4%			34.7%			48.9%		
Lanthanum	L			L			L		
Lead	5			5			5		
Manganese	2520			2440			3200		
Magnesium	1.92%			3.23%			2.11%		
Molybdenum	L			3			L		
Nickel	365			315			390		
Palladium		L			L			L	
Phosphorus	75			110			70		
Platinum		800	0.0024		2500	0.0013		5400	0.0036
Potassium	0.10%			0.28%			0.17%		
Silver	1.0			2.5			2.0		
Sodium	0.13%			0.52%			0.18%		
Strontium	95			200			98		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	2.13%			1.68%			2.27%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1920			1330			1960		
Zinc	430			345			495		

Map No/Sample No/Yr	205/6750/86	206/6597/86	207/6598/86
Material Type	Placer	Placer	Placer
Rock Type	Qg - Tailings	Qac - Tailings	Qac - Tailings
Rock Age	Quaternary	MzPz	MzPz
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	36/14S/75W/Sew	26/14S/75W/Sew	26/14S/75W/Sew
Location/Property	Salmon R.	Squirrel Cr.	Squirrel Cr.
KX/MAS	1-4,7-8,14,16,18-19/4	2f/4	2f/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	3.41%			1.71%			2.00%		
Antimony	L			10			10		
Arsenic	L			L			L		
Barium	93			35			43		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	3.62%			2.70%			4.39%		
Chromium	G			G			G		
Cobalt	126			102			102		
Copper	63			20			21		
Gallium	10			L			L		
Gold	L			175			10		
Iron	40.3%			10.6%			10.5%		
Lanthanum	10			L			L		
Lead	L			L			L		
Manganese	2220			1220			1290		
Magnesium	3.53%			9.81%			10.6%		
Molybdenum	L			L			L		
Nickel	290			390			375		
Palladium	15			L			L		
Phosphorus	110			85			110		
Platinum	2050	0.0037		300	0.0021		1000	0.0006	
Potassium	0.16%			0.06%			0.07%		
Silver	L			L			1		
Sodium	0.26%			0.13%			0.18%		
Strontium	141			56			77		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	2.2%			0.37%			0.38%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1860			250			240		
Zinc	320			280			280		

Map No/Sample No/Yr	208/6599/86	209/6579/86	210/6578/86
Material Type	Placer	Placer	Placer
Rock Type	Qac - Tailings	Qg - Tailings	Qg - Tailings
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	26/14S/75W/Sew	35/14S/75W/Sew	35/14S/75W/Sew
Location/Property	Squirrel Cr.	Platinum Cr.	Platinum Cr.
KX/MAS	2f/4	2d/4	2d/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.01%			2.50%			1.84%		
Antimony	10			L			L		
Arsenic	L			L			L		
Barium	35			55			39		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	0.79%			2.82%			1.97%		
Chromium	G			G			G		
Cobalt	145			108			115		
Copper	24			36			35		
Gallium	L			L			L		
Gold	L			140			L		
Iron	15.5%			20%			20.5%		
Lanthanum	L			L			L		
Lead	L			L			L		
Manganese	1630			1280			1330		
Magnesium	12.6%			5.4%			4.85%		
Molybdenum	L			L			L		
Nickel	575			315			330		
Palladium	L			20			80		
Phosphorus	45			45			45		
Platinum	3000	0.0033		3700	0.0012		8800	0.0039	
Potassium	0.05%			0.08%			0.06%		
Silver	1.5			L			L		
Sodium	0.06%			0.19%			0.08%		
Strontium	26			83			44		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.39%			0.75%			0.75%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	330			605			630		
Zinc	380			290			330		

Map No/Sample No/Yr	211/6577/86	212/6576/86	213/6575/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qg	Volc/SEd
Rock Age	Quaternary	Quaternary	MzPz
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	35/14S/75W/Sew	35/14S/75W/Sew	34/14S/75W/Sew
Location/Property	Platinum Cr.	Platinum Cr.	Platinum Cr.
KX/MAS	2d/4	2d/4	2d/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.25%			4.27%			3.37%		
Antimony	L			L			L		
Arsenic	L			10			10		
Barium	45			70			65		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	2.10%			3.82%			5.05%		
Chromium	G			G			G		
Cobalt	119			128			92		
Copper	35			41			33		
Gallium	L			L			L		
Gold	L			60			6700		0.0006
Iron	20.4%			21.5%			15.5%		
Lanthanum	L			L			L		
Lead	L			L			L		
Manganese	1450			1740			1360		
Magnesium	5.90%			4.51%			4.40%		
Molybdenum	L			L			L		
Nickel	365			330			230		
Palladium	170			50			420		
Phosphorus	85			90			115		
Platinum	G		0.0093	G		0.0046	G		0.0028
Potassium	0.07%			0.18%			0.16%		
Silver	L			L			L		
Sodium	0.11%			0.41%			0.36%		
Strontium	62			176			154		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.78%			0.98%			0.68%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	625			615			430		
Zinc	345			460			300		

Map No/Sample No/Yr	213/6784/86	214/6574/86	215/6573/86
Material Type	Placer	Placer	Placer
Rock Type	Volc/Sed	Qg - Tailings	Volc/Sed
Rock Age	MzPz	Quaternary	MzPz
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	34/14S/75W/Sew	35/14S/75W/Sew	34/14S/75W/Sew
Location/Property	Platinum Cr.	Fox Gulch	Fox Gulch
KX/MAS	2d/4	2c/4	2c/4
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet Assay	ICP	AA/Wet Oz/yd^3	ICP	AA/Wet Oz/yd^3
Aluminum	4.72%		1.82%		2.14%	
Antimony	L		L		L	
Arsenic	20		L		L	
Barium	55		35		37	
Beryllium	L		L		L	
Bismuth	L		L		L	
Cadmium	L		L		L	
Calcium	6.20%		5.00%		0.77%	
Chromium	G		G		G	
Cobalt	52		75		142	
Copper	40		38		30	
Gallium	L		L		L	
Gold	L		L		L	
Iron	12.90%		9.65%		19.4%	
Lanthanum	L		L		L	
Lead	L		L		L	
Manganese	1200		1030		1660	
Magnesium	3.69%		9.50%		7.46%	
Molybdenum	L		L		L	
Nickel	146		320		490	
Palladium	20		L		L	
Phosphorus	280		95		90	
Platinum	2885		8500	0.0121	4000	0.0009
Potassium	0.31%		0.06%		0.06%	
Silver	L		L		L	
Sodium	0.85%		0.14%		0.05%	
Strontium	330		88		32	
Thallium	L		L		L	
Tin	NA		NA		NA	
Titanium	0.66%		0.41%		0.57%	
Tungsten	L		L		L	
Uranium	L		L		L	
Vanadium	365		285		485	
Zinc	187		149		445	

Map No/Sample No/Yr	216/6572/86	217/6571/86	218/6826/86
Material Type	Placer	Placer	Ultramaf
Rock Type	Umaf Int	Umaf Int	Umaf Int
Rock Age	Jurassic	Jurassic	Jurassic
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	34/14S/75W/Sew	34/14S/75W/Sew	27/14S/75W/Sew
Location/Property	Fox Gulch	Fox Gulch	Red Mountain
KX/MAS	2c/4	2c/4	5, 13, 15/7
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	1.78%	1.64%	2.8%
Antimony	10	10	L
Arsenic	L	L	L
Barium	50	40	120
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	1.29%	1.09%	2.52%
Chromium	G	G	G
Cobalt	103	96	140
Copper	30	25	71
Gallium	L	L	L
Gold	L	5	L 0.0002
Iron	16.4%	14.10%	20%
Lanthanum	L	L	L
Lead	L	L	15
Manganese	1330	1210	2430
Magnesium	9.31%	8.39%	9.54%
Molybdenum	L	L	5
Nickel	440	405	625
Palladium	50	L	L
Phosphorus	195	135	235
Platinum	G 0.0078	500 0.0378	1200 0.0011
Potassium	0.07%	0.06%	0.14%
Silver	L	L	1.0
Sodium	0.13%	1.00%	0.37%
Strontium	65	51	423
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.63%	0.54%	0.62%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	455	375	310
Zinc	260	240	630

Map No/Sample No/Yr	219/6698/86	219/6699/86	219/6700/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	33/14S/75W/Sew	33/14S/75W/Sew	33/14S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.41%			2.14%			2.14%		
Antimony	L			L			L		
Arsenic	20			20			20		
Barium	265			125			170		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	2.54%			2.11%			1.79%		
Chromium	G			G			G		
Cobalt	115			125			120		
Copper	43			43			42		
Gallium	L			L			L		
Gold	L		L	L		L	L		0.0002
Iron	29.5%			30.8%			32.8%		
Lanthanum	L			L			L		
Lead	5			5			5		
Manganese	1990			2040			2030		
Magnesium	2.44%			2.39%			1.86%		
Molybdenum	4			3			L		
Nickel	270			305			280		
Palladium	L			L			L		
Phosphorus	185			165			195		
Platinum	1400		0.0001	700		L	150		L
Potassium	0.24%			0.17%			0.21%		
Silver	1.0			1.5			1.0		
Sodium	0.55%			0.41%			0.48%		
Strontium	129			99			102		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.51%			1.46%			1.51%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1100			1100			1250		
Zinc	390			450			415		

Map No/Sample No/Yr	220/6726/86	220/6727/86	220/6728/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	4/15S/75W/Sew	4/15S/75W/Sew	4/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	2.92%	1.97%	2.94%
Antimony	L	L	L
Arsenic	10	10	10
Barium	140	155	170
Beryllium	L	L	L
Bismuth	L	L	40
Cadmium	L	L	L
Calcium	1.79%	1.30%	1.35%
Chromium	G	G	G
Cobalt	122	120	142
Copper	33	23	35
Gallium	L	10	10
Gold	L 0.0003	2900 0.0065	5300 0.0008
Iron	26.1%	26.8%	30.6%
Lanthanum	L	L	L
Lead	L	L	L
Manganese	1770	1870	2110
Magnesium	2.32%	2.20%	2.29%
Molybdenum	L	L	15
Nickel	290	290	350
Palladium	L	35	L
Phosphorus	90	135	185
Platinum	L 0.0004	3300 0.0025	1125 0.0003
Potassium	1.00%	0.07%	0.10%
Silver	L	0.4	L
Sodium	0.23%	0.15%	0.17%
Strontium	85	57	70
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.14%	0.77%	1.31%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	930	945	1030
Zinc	425	430	500

Map No/Sample No/Yr	220/6730/86	221/6729/86	221/6741/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	4/15S/75W/Sew	4/15S/75W/Sew	4/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	3.46%			2.91%			2.12%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	125			280			245		
Beryllium	L			L			L		
Bismuth	9			L			9		
Cadmium	L			L			L		
Calcium	2.16%			1.43%			0.69%		
Chromium	G			G			G		
Cobalt	105			137			158		
Copper	34			34			40		
Gallium	10			10			10		
Gold	L		L	L		0.0013	2500		0.0044
Iron	22.5%			28.7%			34.4%		
Lanthanum	10			L			L		
Lead	L			L			L		
Manganese	1850			1970			2140		
Magnesium	2.25%			2.38%			1.63%		
Molybdenum	L			L			L		
Nickel	240			335			370		
Palladium	L			L			70		
Phosphorus	185			50			L		
Platinum	200			900		0.0023	G		0.0062
Potassium	0.17%			0.09%			0.08%		
Silver	L			0.4			L		
Sodium	0.41%			0.17%			0.08%		
Strontium	122			75			30		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.27%			1.24%			1.44%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	740			975			1280		
Zinc	400			475			545		

Map No/Sample No/Yr	221/6742/86	222/6737/86	223/6743/86
Material Type	Placer	Till	Till
Rock Type	Qm	Qg	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	4/15S/75W/Sew	9/15S/75W/Sew	9/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.36%			6.53%			7.12%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	305			385			545		
Beryllium	L			L			L		
Bismuth	L			7			L		
Cadmium	L			L			3		
Calcium	1.74%			4.38%			4.41%		
Chromium	G			9610			4550		
Cobalt	120			56			39		
Copper	36			56			56		
Gallium	10			10			10		
Gold		430	0.0072		L	L		L	L
Iron	24.7%			13.1%			8.81%		
Lanthanum	10			10			10		
Lead	L			L			L		
Manganese	1840			1620			1350		
Magnesium	2.23%			3.56%			3.13%		
Molybdenum	L			L			L		
Nickel	270			151			115		
Palladium		175			L			L	
Phosphorus	75			460			475		
Platinum		G	0.0102		L			L	
Potassium	0.12%			0.81%			0.96%		
Silver	L			L			L		
Sodium	0.23%			1.54%			1.83%		
Strontium	74			285			320		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.31%			1.29%			0.99%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	935			530			345		
Zinc	400			192			145		

Map No/Sample No/Yr	223/6744/86	223/6745/86	224/6746/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	9/15S/75W/Sew	9/15S/75W/Sew	9/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	3.24%			2.78%			2.71%		
Antimony	L			L			L		
Arsenic	10			10			10		
Barium	380			425			180		
Beryllium	L			L			L		
Bismuth	10			110			L		
Cadmium	L			L			L		
Calcium	2.08%			1.71%			1.51%		
Chromium	G			G			G		
Cobalt	148			151			164		
Copper	44			44			46		
Gallium	10			10			10		
Gold		14100	0.0013		1070	0.0012		70	0.0392
Iron	31.8%			32.9%			37.7%		
Lanthanum	10			L			L		
Lead	L			L			L		
Manganese	2290			2250			2380		
Magnesium	3.13%			2.56%			2.42%		
Molybdenum	L			39			L		
Nickel	355			365			395		
Palladium		105			45			55	
Phosphorus	100			320			65		
Platinum		G	0.0019		5525	0.0021		7250	0.0717
Potassium	0.17%			0.14%			0.11%		
Silver	L			L			L		
Sodium	0.29%			0.20%			0.15%		
Strontium	99			79			62		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.66%			1.62%			1.68%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1220			1250			1440		
Zinc	500			505			545		

Map No/Sample No/Yr	224/6747/86	224/6762/86	225/6799/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	9/15S/75W/Sew	9/15S/75W/Sew	16/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	7.33%			2.31%			3.17%		
Antimony	L			L			L		
Arsenic	10			L			L		
Barium	400			210			230		
Beryllium	L			L			L		
Bismuth	16			9			L		
Cadmium	L			L			L		
Calcium	5.02%			1.16%			2.68%		
Chromium	G			G			G		
Cobalt	58			155			144		
Copper	58			40			53		
Gallium	10			10			L		
Gold	L	L		1700	0.0044		G	0.0443	
Iron	12.6%			36.00%			31.8%		
Lanthanum	10			L			L		
Lead	L			L			5		
Manganese	1660			2290			2240		
Magnesium	4.76%			2.08%			3.37%		
Molybdenum	L			L			4		
Nickel	180			375			355		
Palladium	L			60			200		
Phosphorus	500			45			170		
Platinum	700	L		G	0.0095		G	0.1378	
Potassium	0.93%			0.09%			0.29%		
Silver	L			L			2.5		
Sodium	1.83%			0.12%			0.66%		
Strontium	345			50			143		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.29%			1.66%			1.44%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	485			1410			1100		
Zinc	196			525			515		

Map No/Sample No/Yr	225/6800/86	225/6809/86	226/6763/86
Material Type	Till	Placer	Till
Rock Type	Qg	Qm	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/15S/75W/Sew	16/15S/75W/Sew	16/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	5.58%			1.80%			6.45%		
Antimony	L			L			L		
Arsenic	10			30			10		
Barium	495			185			535		
Beryllium	L			L			L		
Bismuth	L			L			16		
Cadmium	L			L			L		
Calcium	4.63%			1.47%			4.94%		
Chromium	3950			G			G		
Cobalt	37			155			70		
Copper	51			48			52		
Gallium	L			L			10		
Gold	80	0.0005		5500	0.0088		20	0.0004	
Iron	10.1%			38.6%			14.2%		
Lanthanum	10			L			10		
Lead	5			5			6		
Manganese	1350			2250			1570		
Magnesium	2.96%			2.22%			4.18%		
Molybdenum	3			L			L		
Nickel	109			375			196		
Palladium	L			30			L		
Phosphorus	790			45			345		
Platinum	300	0.0013		8700	0.0157		1800	0.0004	
Potassium	0.88%			0.12%			0.67%		
Silver	2.0			1.5			L		
Sodium	1.85%			0.21%			1.42%		
Strontium	320			65			330		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.79%			1.57%			1.26%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	280			1380			560		
Zinc	130			545			210		

Map No/Sample No/Yr	226/6764/86	226/6765/86	227/6797/86
Material Type	Placer	Placer	Till
Rock Type	Qm	Qm	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	16/15S/75W/Sew	16/15S/75W/Sew	15/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	3.85%			3.29%			5.69%		
Antimony	L			L			L		
Arsenic	10			L			10		
Barium	165			115			410		
Beryllium	L			L			L		
Bismuth	22			10			L		
Cadmium	L			L			L		
Calcium	2.90%			0.99%			4.31%		
Chromium	G			G			9040		
Cobalt	142			210			55		
Copper	43			48			64		
Gallium	10			L			L		
Gold	L	0.0011		6000	0.0007		L		
Iron	28.1%			45.6%			11.4%		
Lanthanum	L			L			10		
Lead	L			L			5		
Manganese	2080			2830			1250		
Magnesium	3.32%			2.29%			2.78%		
Molybdenum	L			L			L		
Nickel	335			500			142		
Palladium	20			L			L		
Phosphorus	125			L			555		
Platinum	4925	0.0044		3800	0.0014		400		L
Potassium	0.21%			0.11%			0.87%		
Silver	L			L			2.0		
Sodium	0.44%			0.13%			1.82%		
Strontium	128			44			320		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.42%			1.80%			0.86%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1100			1750			340		
Zinc	465			675			200		

Map No/Sample No/Yr	227/6798/86	227/6801/86	228/6766/86
Material Type	Placer	Placer	Till
Rock Type	Qm	Qm	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	15/15S/75W/Sew	15/15S/75W/Sew	15/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.39%			1.57%			5.05%		
Antimony	L			L			L		
Arsenic	L			20			10		
Barium	95			125			295		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	0.63%			1.09%			5.82%		
Chromium	G			G			G		
Cobalt	235			148			61		
Copper	53			45			48		
Gallium	L			L			L		
Gold	G	0.1029		50	0.0003		L		L
Iron	48.4%			37%			13.8%		
Lanthanum	L			L			10		
Lead	5			5			5		
Manganese	2750			2140			1480		
Magnesium	2.29%			1.86%			3.86%		
Molybdenum	3			L			L		
Nickel	540			360			165		
Palladium	110			20			L		
Phosphorus	L			30			360		
Platinum	G	0.2605		1200	0.0008		L		L
Potassium	0.10%			0.10%			0.65%		
Silver	2.0			1.5			1.5		
Sodium	0.15%			0.16%			1.47%		
Strontium	32			45			350		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.59%			1.57%			1.08%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1720			1330			440		
Zinc	745			515			235		

Map No/Sample No/Yr	228/6767/86	228/6768/86	229/6794/86
Material Type	Placer	Placer	Till
Rock Type	Qm	Qm	Qg
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	15/15S/75W/Sew	15/15S/75W/Sew	15/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3	ICP AA/Wet Oz/yd^3
Aluminum	1.80%	1.77%	5.71%
Antimony	L	L	L
Arsenic	L	L	10
Barium	145	110	475
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.77%	0.84%	4.48%
Chromium	G	G	5960
Cobalt	114	190	54
Copper	46	50	59
Gallium	L	L	L
Gold	L 0.0002	L 0.0007	320 L
Iron	31.6%	44.7%	13%
Lanthanum	L	L	10
Lead	5	5	5
Manganese	2130	2550	1550
Magnesium	3.32%	1.96%	4.25%
Molybdenum	L	L	3
Nickel	285	450	170
Palladium	L	30	L
Phosphorus	100	25	610
Platinum	1400 0.0008	2300 0.0015	300 L
Potassium	0.14%	0.10%	0.88%
Silver	1.5	1.0	2.0
Sodium	0.32%	0.14%	1.91%
Strontium	105	36	320
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.57%	1.65%	0.96%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	1090	1580	375
Zinc	360	620	163

Map No/Sample No/Yr	229/6795/86	229/6796/86	230/6707/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	15/15S/75W/Sew	15/15S/75W/Sew	22/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.77%			3.13%			1.77%		
Antimony	L			L			L		
Arsenic	L			L			20		
Barium	170			165			80		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	2.98%			1.77%			1.2%		
Chromium	G			G			G		
Cobalt	142			200			175		
Copper	53			53			50		
Gallium	L			L			L		
Gold	L	0.0002		300	0.0004		L	0.0006	
Iron	33.3%			41.3%			42.4%		
Lanthanum	10			L			L		
Lead	5			L			5		
Manganese	2380			2650			2570		
Magnesium	4.01%			2.92%			2.01%		
Molybdenum	3			4			L		
Nickel	365			470			410		
Palladium	L			L			30		
Phosphorus	150			105			80		
Platinum	3600	0.0002		3000	0.0016		4600	0.0006	
Potassium	0.22%			0.23%			0.09%		
Silver	2.0			1.5			1.5		
Sodium	0.45%			0.47%			0.15%		
Strontium	131			95			47		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.63%			1.6%			1.72%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1170			1460			1590		
Zinc	510			660			580		

Map No/Sample No/Yr	230/6708/86	230/6769/86	230/6770/86
Material Type	Placer	Till	Placer
Rock Type	Qm	Qg	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	22/15S/75W/Sew	22/15S/75W/Sew	22/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	2.57%			3.05%			1.98%		
Antimony	L			L			L		
Arsenic	L			L			L		
Barium	60			90			65		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	15.5			L			L		
Calcium	0.67%			4.89%			0.64%		
Chromium	G			G			G		
Cobalt	143			115			215		
Copper	28			44			51		
Gallium	L			L			L		
Gold	L	0.0003		L	0.0001		L	0.0014	
Iron	40.2%			20%			46.2%		
Lanthanum	L			L			L		
Lead	L			5			5		
Manganese	2130			1960			2630		
Magnesium	1.67%			4.15%			1.93%		
Molybdenum	L			3			3		
Nickel	330			270			495		
Palladium	45			50			L		
Phosphorus	70			135			L		
Platinum	7500	0.0005		L	0.0002		2400	0.0041	
Potassium	0.17%			0.20%			0.08%		
Silver	L			1.0			1.0		
Sodium	0.18%			0.52%			0.08%		
Strontium	34			190			23		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.38%			1.21%			1.63%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1330			635			1690		
Zinc	460			435			680		

Map No/Sample No/Yr	231/6709/86	231/6710/86	231/6711/86
Material Type	Till	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	22/15S/75W/Sew	22/15S/75W/Sew	22/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS	32/1	32/1	32/1
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	5.61%			3.49%			4.36%		
Antimony	L			L			L		
Arsenic	10			L			10		
Barium	140			110			165		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	9.06%			2.03%			3.71%		
Chromium	7470			G			G		
Cobalt	32			123			84		
Copper	35			31			33		
Gallium	L			L			L		
Gold	L	0.0002		2300	L		860	L	
Iron	5.96%			34.50%			22.00%		
Lanthanum	L			L			10		
Lead	L			L			L		
Manganese	1160			1900			1660		
Magnesium	4.31%			2.32%			3.09%		
Molybdenum	L			L			L		
Nickel	77			285			215		
Palladium	L			L			L		
Phosphorus	320			125			320		
Platinum	800	0.0001		500	L		1100	0.0001	
Potassium	0.80%			0.30%			0.47%		
Silver	L			L			L		
Sodium	1.52%			0.51%			0.92%		
Strontium	410			106			178		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	0.59%			1.14%			1.02%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	230			1000			670		
Zinc	92			395			275		

Map No/Sample No/Yr	232/6758/86	232/6759/86	232/6771/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	27/15S/75W/Sew	27/15S/75W/Sew	27/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	3.45%			2.88%			1.80%		
Antimony	L			L			L		
Arsenic	10			10			L		
Barium	100			75			100		
Beryllium	L			L			L		
Bismuth	25			23			L		
Cadmium	L			L			L		
Calcium	1.75%			1.32%			0.95%		
Chromium	G			G			G		
Cobalt	171			165			164		
Copper	42			40			46		
Gallium	10			10			L		
Gold	L		L	L		L	L		0.0001
Iron	34.2%			33.3%			38.7%		
Lanthanum	L			L			L		
Lead	L			L			5		
Manganese	2460			2500			2390		
Magnesium	2.4%			2.18%			1.77%		
Molybdenum	L			L			L		
Nickel	395			390			395		
Palladium	L			L			L		
Phosphorus	65			60			55		
Platinum	2400		L	L			1400		0.0001
Potassium	0.14%			0.10%			0.11%		
Silver	L			L			1.5		
Sodium	0.25%			0.11%			0.16%		
Strontium	75			53			45		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.66%			1.75%			1.67%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1300			1270			1420		
Zinc	575			585			575		

Map No/Sample No/Yr	233/6772/86	233/6773/86	233/6774/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	27/15S/75W/Sew	27/15S/75W/Sew	27/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3
Aluminum	1.72%			3.55%			2.38%		
Antimony	L			L			L		
Arsenic	L			L			L		
Barium	85			170			155		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	1.50%			3.62%			2.61%		
Chromium	G			G			G		
Cobalt	139			145			105		
Copper	43			46			40		
Gallium	L			L			L		
Gold	L		L	50		L	L		L
Iron	33.5%			28.3%			25.7%		
Lanthanum	L			10			L		
Lead	5			5			5		
Manganese	2220			2420			1810		
Magnesium	1.97%			3.78%			2.43%		
Molybdenum	L			3			L		
Nickel	340			360			250		
Palladium	L			L			L		
Phosphorus	85			200			160		
Platinum	L		L	L		L	L		L
Potassium	0.11%			0.29%			0.23%		
Silver	1.5			1.5			1.5		
Sodium	0.19%			0.67%			0.52%		
Strontium	60			174			134		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.64%			1.55%			1.44%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1230			940			950		
Zinc	500			530			350		

Map No/Sample No/Yr	234/6775/86	234/6776/86	234/6777/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	34/15S/75W/Sew	34/15S/75W/Sew	34/15S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay
Aluminum	2.23%			2.10%			1.60%		
Antimony	L			L			L		
Arsenic	L			L			L		
Barium	100			85			85		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	2.04%			2.05%			1.42%		
Chromium	G			G			G		
Cobalt	140			140			130		
Copper	45			44			42		
Gallium	L			L			L		
Gold	3300	0.0001		L	0.0001		L		
Iron	32.3%			32.2%			30.4%		
Lanthanum	L			L			L		
Lead	5			10			5		
Manganese	2250			2210			2130		
Magnesium	2.14%			2.23%			1.94%		
Molybdenum	5			4			L		
Nickel	325			335			305		
Palladium	L			L			L		
Phosphorus	125			90			95		
Platinum	600	0.0001		L	0.0001		L		
Potassium	0.16%			0.13%			0.10%		
Silver	1.0			1.0			1.0		
Sodium	0.36%			0.29%			0.18%		
Strontium	98			94			61		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.60%			1.42%			1.61%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1120			1050			1050		
Zinc	510			515			465		

Map No/Sample No/Yr	235/6836/86	236/6837/86	237/6838/86
Material Type	Placer	Placer	Placer
Rock Type	Qm	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/D-6	Hagemeister Island/D-6
Sec/T/R/Mer	2/16S/75W/Sew	11/16S/75W/Sew	7/16S/75W/Sew
Location/Property	Beach	Beach	Beach
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Oz/yd^3	ICP	AA/Wet	Assay
Aluminum	1.64%			2.83%			3.26%		
Antimony	L			L			L		
Arsenic	20			20			20		
Barium	75			155			184		
Beryllium	L			L			L		
Bismuth	L			L			L		
Cadmium	L			L			L		
Calcium	0.88%			2.02%			2.85%		
Chromium	G			G			G		
Cobalt	154			139			107		
Copper	45			48			49		
Gallium	L			L			10		
Gold	130	0.0010		20	0.0005		L		
Iron	37.1%			34.2%			28.1%		
Lanthanum	L			L			10		
Lead	5			5			5		
Manganese	2180			2280			2560		
Magnesium	1.51%			2.10%			2.62%		
Molybdenum	L			L			3		
Nickel	350			320			255		
Palladium	L			L			L		
Phosphorus	70			160			305		
Platinum	L	0.0006		L	0.0001		L		
Potassium	0.09%			0.24%			0.35%		
Silver	2.0			2.0			2.5		
Sodium	0.15%			0.56%			0.74%		
Strontium	46			124			163		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	1.63%			1.71%			2.19%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	1370			1260			970		
Zinc	560			530			455		

Map No/Sample No/Yr	238/6839/86	239/6609/86	240/6608/86
Material Type	Placer	Str. Sed.	Str. Sed.
Rock Type	Qm	Umaf Int	Umaf Int
Rock Age	Quaternary	Paleozoic	Paleozoic
Quad 4 mile/1 mile	Hagemeister Island/D-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	22/16S/75W/Sew	2/17S/76W/Sew	2/17S/76W/Sew
Location/Property	Beach	Chagvan Mountain	Chagvan Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Sediment	Sediment

Element	ICP AA/Wet Oz/yd^3	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	4.27%	7.73%	7.62%
Antimony	L	L	L
Arsenic	20	L	10
Barium	290	420	380
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	4.29%	1.94%	2.64%
Chromium	7330	46	175
Cobalt	46	7	16
Copper	41	34	50
Gallium	10	L	L
Gold	330 L	L	L
Iron	16.3%	4.62%	4.48%
Lanthanum	20	10	10
Lead	10	12	10
Manganese	1910	740	880
Magnesium	2.52%	0.88%	1.92%
Molybdenum	3	1	2
Nickel	122	14	71
Palladium	L	L	L
Phosphorus	440	1300	1140
Platinum	L	L	L
Potassium	0.56%	1.21%	1.00%
Silver	2.0	0.4	0.2
Sodium	1.29%	2.14%	2.19%
Strontium	270	200	188
Thallium	L	L	L
Tin	NA	1	1
Titanium	1.83%	0.61%	0.57%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	510	94	104
Zinc	195	59	65

Map No/Sample No/Yr	241/6632/26	242/6607/86	242/6631/86
Material Type	Qtz	Ultramaf	Ultramaf
Rock Type	Umaf Int	Umaf Int	Umaf Int
Rock Age	Paleozoic	Paleozoic	Paleozoic
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	10/17S/76W/Sew	15/17S/76W/Sew	10/17S/76W/Sew
Location/Property	Chagvan Mountain	Chagvan Mountain	Chagvan Mountain
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Grab

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	4.43%	4.15%	4.39%
Antimony	L	10	10
Arsenic	10	30	L
Barium	14300	65	55
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	2.51%	2.45%	2.34%
Chromium	125	965	975
Cobalt	22	80	77
Copper	140	91	67
Gallium	L	L	L
Gold	L	50	L
Iron	2.98%	7.73%	7.15%
Lanthanum	L	L	L
Lead	2	8	2
Manganese	3580	985	980
Magnesium	0.73%	15%	14.5%
Molybdenum	L	L	L
Nickel	61	865	800
Palladium	L	L	L
Phosphorus	9510	L	L
Platinum	L	L	L
Potassium	0.06%	0.3%	0.02%
Silver	0.4	0.2	0.6
Sodium	2.54%	0.23%	0.31%
Strontium	425	16	125
Thallium	L	L	L
Tin	1	7	1
Titanium	0.29%	0.04%	0.05%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	176	21	25
Zinc	32	61	58

Map No/Sample No/Yr	243/6606/86	243/6610/86	244/6808/86
Material Type	Maf Plut	Maf Plut	Placer
Rock Type	Umaf Int	Umaf Int	Qg
Rock Age	Paleozoic	Paleozoic	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	16/17S/76W/Sew	16/17S/76W/Sew	27/17S/76W/Sew
Location/Property	Chagvan Mountain	Chagvan Mountain	Security Cove Trib.
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Specimen	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum		8.16%	8.39%
Antimony		L	L
Arsenic		20	10
Barium		45	105
Beryllium		L	L
Bismuth		L	L
Cadmium		1	0.5
Calcium		6.72%	7.63%
Chromium		170	2040
Cobalt		25	18
Copper		54	34
Gallium		10	10
Gold		35	20
Iron		6.17%	4.65%
Lanthanum		10	L
Lead		2	L
Manganese		1020	1110
Magnesium		4.23%	2.42%
Molybdenum		1	L
Nickel		92	75
Palladium		L	L
Phosphorus		1340	285
Platinum		L	L
Potassium		0.09%	0.25%
Silver		0.2	L
Sodium		2.71%	1.71%
Strontium		182	360
Thallium		L	L
Tin		2	NA
Titanium		1.01%	0.77%
Tungsten		L	L
Uranium		L	L
Vanadium		140	155
Zinc		59	81

Map No/Sample No/Yr	245/6807/86	246/6806/86	247/6805/86
Material Type	Placer	Placer	Placer
Rock Type	Qg	Qm	Qm
Rock Age	Quaternary	Quaternary	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	33/17S/76W/Sew	31/17S/76W/Sew	1/18S/77W/Sew
Location/Property	Security Cove Trib.	Security Cove	Security Cove
KX/MAS			
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Assay
Aluminum	6.87%	6.40%	6.85%
Antimony	L	L	L
Arsenic	10	10	20
Barium	190	200	195
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	L
Calcium	6.06%	4.58%	5.01%
Chromium	8290	5660	4560
Cobalt	35	22	35
Copper	76	33	76
Gallium	10	L	10
Gold	40	L	G 0.756
Iron	6.79%	5.27%	6.85%
Lanthanum	L	L	10
Lead	L	L	L
Manganese	1680	1630	1130
Magnesium	2.45%	2.08%	1.94%
Molybdenum	L	L	1
Nickel	119	90	104
Palladium	L	L	L
Phosphorus	230	310	275
Platinum	L	L	L
Potassium	0.45%	0.38%	0.49%
Silver	L	0.4	0.8
Sodium	1.42%	1.46%	1.62%
Strontium	275	240	315
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.86%	1.19%	0.94%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	210	177	205
Zinc	183	169	133

Map No/Sample No/Yr	248/6790/86	248/6802/86	249/6803/86
Material Type	Qtz	Argillite	Placer
Rock Type	Sed	Sed	Qg
Rock Age	Paleozoic	Paleozoic	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	12/18S/77W/Sew	12/18S/77W/Sew	1/18S/77W/Sew
Location/Property	Security Cove	Security Cove	Security Cove Trib.
KX/MAS			/11
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Grab	Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	6.67%	10.40%	7.27%
Antimony	L	L	L
Arsenic	10	30	10
Barium	135	295	160
Beryllium	L	L	L
Bismuth	L	L	L
Cadmium	L	L	2.5
Calcium	1.97%	1.61%	7.18%
Chromium	295	175	1680
Cobalt	14	17	24
Copper	49	103	40
Gallium	10	10	10
Gold	L	L	10 0.0033
Iron	2.40%	6.39%	6.74%
Lanthanum	L	10	L
Lead	L	L	10
Manganese	335	650	1680
Magnesium	1.91%	2.13%	3.21%
Molybdenum	1	L	L
Nickel	113	73	122
Palladium	L	L	L
Phosphorus	490	925	240
Platinum	L	L	1300 L
Potassium	0.59%	0.83%	0.39%
Silver	L	L	1.0
Sodium	2.08%	1.59%	1.79%
Strontium	73	154	320
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	0.20%	0.76%	2.51%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	57	205	260
Zinc	33	108	215

Map No/Sample No/Yr	249/6804/86	250/6670/86	251/6673/86
Material Type	Placer	Placer	Fel Volc
Rock Type	Qm	Qg	Fel Volc
Rock Age	Quaternary	Quaternary	Paleozoic
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	1/18S/77W/Sew	2/18S/77W/Sew	2/18S/77W/Sew
Location/Property	Security Cove	Security Cove	Security Cove Trib.
KX/MAS		/11	
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Placer	Grab

Element	ICP	AA/Wet	Assay	ICP	AA/Wet	Assay	ICP	AA/Wet	Oz/yd^3
Aluminum	6.28%			6.67%			4.34%		
Antimony	L			L			L		
Arsenic	20			10			30		
Barium	90			135			295		
Beryllium	L			L			L		
Bismuth	L			20			L		
Cadmium	L			L			L		
Calcium	5.54%			6.43%			2.25%		
Chromium	G			G			155		
Cobalt	82			68			106		
Copper	126			56			55		
Gallium	L			L			10		
Gold		90			3600	0.0011		L	
Iron	12.70%			14%			17.20%		
Lanthanum	L			L			L		
Lead	L			5			80		
Manganese	2080			3050			118		
Magnesium	1.90%			3.12%			0.23%		
Molybdenum	L			4			L		
Nickel	169			245			105		
Palladium		L			L			L	
Phosphorus	390			180			505		
Platinum		L			L			L	
Potassium	0.23%			0.27%			0.63%		
Silver	L			3.0			0.6		
Sodium	1.02%			1.32%			0.75%		
Strontium	330			285			73		
Thallium	L			L			L		
Tin	NA			NA			NA		
Titanium	2.01%			3.37%			0.20%		
Tungsten	L			L			L		
Uranium	L			L			L		
Vanadium	450			485			74		
Zinc	360			530			9		

Map No/Sample No/Yr	252/6671/86	253/6672/86	254/6596/86
Material Type	Placer	Fel Volc	Placer
Rock Type	Fel Volc	Fel Volc	Qg
Rock Age	Paleozoic	Paleozoic	Quaternary
Quad 4 mile/1 mile	Hagemeister Island/C-6	Hagemeister Island/C-6	Hagemeister Island/C-6
Sec/T/R/Mer	35/17S/77W/Sew	35/17S/77W/Sew	2/18S/77W/Sew
Location/Property	Security Cove Trib.	Security Cove	Security Cove Trib.
KX/MAS			/11
District	Goodnews Bay	Goodnews Bay	Goodnews Bay
Sample Type	Placer	Select Grab	Placer

Element	ICP AA/Wet Assay	ICP AA/Wet Assay	ICP AA/Wet Oz/yd^3
Aluminum	8.27%	7.94%	8.67%
Antimony	L	L	L
Arsenic	L	L	10
Barium	565	60	200
Beryllium	L	L	L
Bismuth	L	3	L
Cadmium	2	0.5	L
Calcium	4%	3.12%	6.68%
Chromium	830	135	5490
Cobalt	10	4	25
Copper	33	25	34
Gallium	10	L	L
Gold	1910	L	105 tr
Iron	5.13%	1.94%	4.88%
Lanthanum	10	L	L
Lead	8	3460	L
Manganese	850	165	1320
Magnesium	1.48%	0.21%	3.31%
Molybdenum	2	1	L
Nickel	29	4	121
Palladium	L	L	L
Phosphorus	640	235	210
Platinum	L	L	L
Potassium	1.35%	0.16%	0.33%
Silver	0.2	0.4	1.0
Sodium	2.16%	3.69%	1.56%
Strontium	410	305	240
Thallium	L	L	L
Tin	NA	NA	NA
Titanium	1.27%	0.18%	1.66%
Tungsten	L	L	L
Uranium	L	L	L
Vanadium	170	63	200
Zinc	93	14	172

APPENDIX C. - Scanning Electron Microprobe analyses of PGM grains.

EXPLANATION

Chemex Labs, Ltd. was contracted to provide Scanning Electron Mircroprobe (SEM) analyses of the recovered platinum grains. Chemex contracted with Bart Cannon of Cannon Microprobe of Seattle, Washington, to perform the work. The following explanation and tables are from the report done by Cannon Microprobe.

METHOD OF ANALYSIS

The contents of each sample vial were placed on the bottoms of individual mold cavities and set in casting resin.

The hardened castings were ground and polished on diamond laps to expose the grains from the plastic and to expose the interior of the grains.

The mineral grains in each sample were analyzed, one by one in an ARL EMX-SM electron microprobe using wavelength dispersive x-ray spectrometers.

Raw counts were obtained from three simultaneously read detector scalers, each set to a different key x-ray emission line. Grains were periodically numbered for later reference by thermally engraving the epoxy mounting medium near the grain with an electron beam.

Analysis sets used were: Pt M beta, Ir L alpha 1 (3), Os M alpha
Pd L gamma 1, Rh L beta 1, Ru L alpha 1
As L alpha 1, Sb L alpha, Bi M alpha
Cu L alpha 1, Fe K alpha, Au M beta

Probe standards used were pure metals, synthetic palladium arsenide, and synthetic isoferroplatinum.

Palladium, gold, bismuth, mercury, and antimony were found in significant amounts in only a few samples and thus count rates were not always collected.

The number of analyses indicated for each grain is in most cases a minimum number. Before conducting an analysis the grain was traversed beneath the electron beam to determine its homogeneousness. Grains such as the "Fe Platinum with minor osmiridium inclusions" were analyzed in the beam "sweep" mode to produce an average analysis.

Analyses were assumed to represent the whole grain, including that removed by grinding and that portion below the polished surface.

Grains were "weighted" by dividing them into three size fractions: small, medium, and large. Small grains were awarded a multiplier of 1; medium grains a multiplier of 2; and large a multiplier of 4. The average analysis of the total sample was derived from the averaged grain analyses.

Probe Operating Conditions

Accelerating Voltage = 20 kv
Beam Current = .1 ua
Spot Size = 1 - 2 micron

SUMMARY OF RESULTS

This study has shown that the fundamental mineralogy of each sample is simple and very consistent. Variation in platinum group metal concentrations of the different samples is a product of relative abundance of three major grain types.

Iron-platinum alloy, osmiridium, and iron-platinum alloy with osmiridium inclusions. Over a dozen other species of uncommon to extremely rare PGE-bearing minerals are also present.

Platinum

At least 90% of the platinum in the samples occurs as iron-platinum alloy, which contain from 7 to 28 wt% iron and from 70 to 91 wt% platinum. Only trace amounts of other PGE occur as dissolved constituents within the iron-platinum alloy itself.

The related, but structurally distinct phases; isoferroplatinum and tetraferroplatinum also occur, but in minor amounts. The mineral platiniridum, reported by some other investigators to be common in the district was found in only one grain in this study. The platinum arsenide sperrylite is relatively common as small grains and coatings, but could contribute less than 1% to the total platinum content. Several grains of the platinum sulpharsenide, platarsite were encountered.

At least half of the iron-platinum alloy grains contain very small widely scattered, to coarse thickly clustered inclusions of osmiridium. The osmiridium is commonly concentrated toward the center of the ferroan platinum grains.

The osmiridium grains themselves contain less than 3.5% total Pt, Ru, Rh, and Pd.

Iridium

More than 90% of the iridium in these samples is contained in the mineral osmiridium, which itself contains about 76% Iridium by weight.

Other minerals containing essential iridium, ranked according to abundance, include; iridarsenite, irarsite, iridosmine, iridium, and xingzhongite.

Perhaps 30% of the osmiridium grains occur as fully enclosed inclusions within the iron-platinum alloy. This association suggests a gradual phase equilibration of an original Pt/Ir alloy. Optically

homogenous iron-platinum alloy grains (grains containing no visible osmiridium) do not show high dissolved iridium and therefore it can be assumed that not all platinum grains were originally rich in iridium.

Osmium

About 80% of the total osmium occurs in the form of the mineral osmiridium which contains approximately 21% osmium.

10% of the osmium occurs as crystals of native osmium included in iron-platinum alloy grains. The native osmium contains about 12% dissolved iridium.

The remainder of the osmium occurs in the form of the rare accessory mineral ehrlichmanite and iridosmine.

Rhodium

Rhodium is only a minor constituent of the concentrates. It occurs most importantly as a dissolved constituent of osmiridium. Its concentration within the osmiridium is uniformly about 1.2 wt% throughout all of the samples.

The presence of other rare accessory rhodium minerals rarely contributes more than a few tenths of a per cent to total rhodium. Sample 181 which consists of a single grain of iron-platinum alloy with abundant inclusions of hollingsworthite (rhodium arsenide) displays a high rhodium value that is probably not meaningful due to small sample size.

Minerals containing essential rhodium, ranked in order of abundance, include: hollingsworthite, prassoite, ruthenarsenite, xingzhongite, and rhodium (?). A rhodium iridium iron alloy also occurs, and may be a new mineral.

Ruthenium

Ruthenium is a trace to minor component of the samples. It occurs in a dissolved state in the osmiridium. Concentrations range from 0.4 wt% to 1.1 wt% and average about 0.7 wt%.

Other reports indicate that the mineral laurite (ruthenium sulphide) is relatively common in the district. This study only located a single grain. Laurite occurs as tiny black octahedrons resembling magnetite or chromite. Perhaps they are thought to be a gangue mineral and hand removed from the samples prior to shipment to this lab.

One grain of ruthenarsenite was found.

Palladium

Palladium occurred in trace amounts only, generally in concentrations of 0.25% or less. No discrete palladium minerals were found.

This metal was not reported upon in the tabulation.

Chromite, Magnetite

Platinum group metals commonly encrust grains of chromite and magnetite, but no examples of these gangue minerals enclosing tiny PGM were noted.

Separation

High purity PGE separates will be impossible to produce due to the pervasive phase intergrowths.

Rhodium, iridium, and osmium sulphides and arsenides are very soft and commonly encrust the harder PGM minerals. Easy comminution will result in the loss of these very minerals during processing.

Analytical and Sampling Errors

Microprobe surface area scans were employed only occasionally. Therefore, in most cases a bulk analysis has been inferred from a series of point anlaysis.

The simple mineralogy of the samples makes this a valid method. The major source of error, however, lies in the crude estimation of the sizes of the individual grains, and the fact that not all of the platinum grains were exposed for analysis. Also some grains which were assigned small (multiplier one) grain status may at depth in the casting have actually been large grains.

Interpretating the Compositional Analysis Data Table

Key figures to note are in the "A", "B", and "C" columns. When correlating the weight per cent analyses with the total weight of the original sample, the PGM purity of that original sample must be considered. Using a ratio C/A will not directly produce the percentage PGM present since the PGM are generally 2 or 3 times larger than the gangue mineral grains. This disparity is reduced, however, since the PGM are usually at least 2.5 times heavier than the gangue minerals.

Analyses based upon the examination of less than 5 grains are of minimal value for larger generalizations.

The number of grains analyzed (column C) is usually greater than actually indicated.

Since some grains contain separately analyzed inclusions the figures in the three lettered columns may not always balance.

Interpreting the Mineralogical Analysis Data Table

This table is provided only as a general guide since grain size and total areal coverage is not included. Since inclusions are included in the grain count the grain numbers in this column may not balanace with the data in the compositional table.

Column D is under represented since this distinction was not commented on very often during analysis.

Further Work

The analytical procedure used in this study has established the basic mineralogical nature of the concentrates, and suggests the PGE compositional trends of each sample.

The limited sample size of many of the concentrates results in data of limited statistical value.

Future analysis should be conducted as bulk, whole sample assays. Fusion of the sample followed by microprobe analysis should provide a better quantitative analysis and a faster turnaround time.

A - Total Grains in sample
B - Platinoid Grains analyzed
C - Total Platinoid Grains

Map No.	Sample No.	A	B	C	%Rh	%Ru	%Pt	%Ir	%Os	%Fe	Total
0133....	6810.....	1	1	1	0.7	0.4	88.0	2.1	0.9	7.1	99.2
0175....	6789.....	10	6	8	2.1	0.8	81.4	1.9	0.9	8.1	95.2
0199....	6791.....	8	8	7	0.8	0.3	84.5	1.8	0.6	8.3	96.3
0176....	6653.....	7	3	4	1.1	0.5	57.6	26.8	6.3	5.7	98.0
0177....	6652.....	62	25	37	0.9	0.5	73.3	14.4	2.6	7.2	98.9
0178....	6581.....	3	2	2	1.6	1.0	49.4	33.7	7.1	4.6	97.4
0178....	6582.....	19	3	6	1.4	0.9	35.5	44.7	11.2	4.0	97.7
0179....	6586.....	11	8	9	0.5	0.2	89.1	2.2	0.8	6.8	99.1
0179....	6587.....	8	2	3	1.2	0.5	46.3	34.5	11.0	4.6	98.6
0179....	6588.....	6	5	5	1.4	0.8	67.2	17.3	4.1	5.6	96.4
0179....	6589.....	1	2	1	1.4	0.8	11.7	65.0	15.6	3.2	97.7
0180....	6622.....	61	32	49	1.6	0.5	72.9	14.0	2.9	5.6	97.5
0180....	6623.....	9	6	7	1.5	0.9	54.0	30.0	7.8	3.2	97.4
0180....	6624.....	34	16	27	1.1	0.8	75.9	12.2	3.3	6.3	99.6
0181....	6626.....	1	2	1	4.5	0.5	82.2	1.6	2.4	6.8	98.0
0182....	6640.....	1	1	1	0.5	0.4	81.5	5.5	2.4	8.9	99.2
0182....	6641.....	2	2	2	1.2	0.8	48.3	14.8	15.9	3.8	84.8
0182....	6642.....	23	21	22	0.9	0.6	71.0	9.6	6.0	7.8	95.9
0183....	6634.....	69	10	12	0.8	0.4	66.1	18.8	5.4	4.5	96.0
0183....	6635.....	10	9	10	0.8	0.5	67.3	17.2	5.2	4.3	95.3
0183....	6636.....	21	18	21	2.7	0.5	63.2	20.4	5.8	4.8	97.4
0187....	6502.....	26	16	20	1.6	0.5	83.0	3.8	1.0	8.1	97.8
0190....	6739.....	17	8	12	0.8	0.4	78.3	8.6	1.2	7.1	96.4
0191....	6738.....	213	77	195	1.4	0.6	80.2	7.2	2.9	7.5	99.4
0194....	6760.....	14	6	9	1.5	0.9	63.4	18.0	6.8	6.6	97.2
0195....	6761.....	21	14	17	0.9	0.5	70.4	11.4	6.0	6.2	95.4
0202....	6780.....	2	2	2	0.6	0.4	83.5	4.4	1.7	7.6	98.6
0203....	6792.....	16	12	13	1.1	0.7	60.3	25.6	6.3	5.9	99.9
0205....	6750.....	2	2	2	1.1	0.6	85.5	3.8	1.2	8.9	98.5
0206....	6597.....	15	12	12	1.9	0.9	47.0	37.4	9.2	4.1	99.5
0207....	6598.....	1	1	1	0.5	0.3	88.4	0.7	0.5	9.0	99.4
0208....	6599.....	20	13	20	0.9	0.5	75.2	13.3	2.5	6.2	97.2
0209....	6579.....	2	5	2	0.8	0.5	77.8	8.1	3.2	8.4	98.8
0210....	6578.....	33	13	28	1.1	0.6	63.2	22.4	6.5	5.6	99.4
0211....	6577.....	190	27	131	1.6	1.0	45.6	37.8	8.7	4.1	98.8
0212....	6576.....	25	19	22	0.9	0.6	63.4	19.6	8.2	5.8	98.5
0213....	6575.....	43	22	37	1.3	0.8	48.6	26.7	13.4	4.4	95.2
0214....	6574.....	53	34	50	1.4	0.7	42.1	37.7	9.8	4.8	96.1
0215....	6573.....	1	1	1	0.7	0.4	87.2	2.8	0.9	7.4	99.4
0216....	6572.....	44	28	44	1.3	0.8	45.2	37.5	9.9	4.0	98.7
0217....	6571.....	177	45	136	1.9	1.0	37.7	41.3	11.3	3.8	97.0
0219....	6698.....	2	2	2	0.3	0.1	87.2	1.2	0.4	8.5	97.7
0219....	6699.....	2	2	2	1.5	0.6	47.0	36.2	9.2	4.8	98.3
0219....	6700.....	10	4	5	2.1	0.4	85.1	2.6	1.6	7.0	98.8
0220....	6726.....	6	4	4	0.6	0.3	84.2	1.7	1.8	8.1	96.7
0220....	6727.....	25	10	16	0.8	0.5	75.3	11.3	3.2	7.1	98.2

Map No.	Sample No.	A	B	C	%Rh	%Ru	%Pt	%Ir	%Os	%Fe	Total
0221....	6729.....	26	13	19	1.2	0.7	72.2	13.9	3.9	6.8	98.7
0221....	6741.....	72	25	56	1.8	0.6	58.2	24.2	6.9	5.4	96.1
0221....	6742.....	155	36	111	1.1	0.6	68.3	18.3	5.2	4.8	98.3
0223....	6744.....	23	13	17	1.6	1.0	54.8	26.0	9.1	4.4	96.9
0223....	6745.....	10	5	7	1.2	0.8	68.7	17.8	4.1	5.8	98.4
0224....	6746.....	+500	96	+420	1.0	0.6	71.0	12.2	4.7	7.2	96.7
0224....	6762.....	139	41	102	1.6	0.7	57.9	24.8	7.1	5.6	97.7
0225....	6799.....	510	91	450	0.8	0.5	74.8	11.9	3.5	6.1	97.6
0225....	6800.....	59	22	42	0.7	0.4	81.5	5.8	1.8	8.2	98.4
0226....	6763.....	22	3	12	1.1	0.7	59.2	27.3	6.5	4.8	99.6
0226....	6764.....	151	66	123	1.4	0.8	65.6	19.0	5.1	4.5	96.4
0226....	6765.....	32	10	25	1.1	0.6	67.9	16.8	3.7	5.5	95.6
0227....	6798.....	102	65	89	0.8	0.5	77.8	7.6	2.9	8.1	97.7
0228....	6766.....	1	1	1	1.7	0.9	7.2	69.4	20.2	0.3	99.7
0229....	6796.....	47	28	36	0.7	0.4	73.2	12.5	4.9	7.1	98.8
0230....	6707.....	1	1	1	0.7	0.4	81.3	5.0	2.4	7.5	97.3
0230....	6708.....	59	14	32	0.8	0.5	77.8	6.5	3.9	6.4	95.9
0231....	6709.....	2	1	1	0.9	0.5	86.2	3.0	0.6	6.8	98.0
0231....	6710.....	8	4	5	1.4	0.9	36.7	35.8	8.9	3.9	87.6
0231....	6711.....	1	1	1	0.5	0.3	87.9	1.2	0.7	9.3	99.9
0232....	6758.....	2	2	2	1.1	0.7	79.3	6.9	1.7	8.9	98.2
0232....	6771.....	4	2	2	0.7	0.4	84.0	3.2	1.4	6.8	96.5
0234....	6776.....	6	3	4	1.1	0.6	32.0	47.8	12.2	4.2	97.9
0235....	6836.....	83	36	72	0.9	0.4	67.8	17.2	3.6	5.8	95.7
0236....	6837.....	4	2	1	1.8	0.3	87.9	0.9	0.4	7.0	98.3
0249....	6803.....	6	2	3	0.5	0.2	84.0	3.2	1.4	7.7	97.1

A = Iron-Platinum alloy (Platinum with 8 to 30% Iron)
B = Iron-Platinum alloy (with minor Osmiridium inclusions)
C = Osmiridium (Iridium with minor Osmium)
D = Osmiridium (with lesser Platinum)
E = Iron-Platinum alloy (with oriented inclusions of Ru, Ir Arsenides)
F = Rhodium
G = Hollingsworthite (Rhodium Arsenide)
H = Prassoite (Rhodium Sulphide)
  = Kashinite (Iridium, Rhodium Sulphide)
  = Sulrhodite (Rhodium Sulphide)
I = Ehrlichmanite (Osmium Sulphide)
J = Iridosmine (Iridium bearing Osmium)
K = Osmium
L = Xingzhongite (Lead, Copper, Iridium, Rhodium Sulpharsenide)
M = Iridarsenite (Iridium Arsenide)
N = Irarsite (Iridium Sulpharsenide)
O = Iridium
P = Sperrylite (Platinum Arsenide)
Q = Platarsite (Platinum Sulpharsenide)
R = Tulameenite (Platinum Copper Iron)
S = Tetraferroplatinum (Platinum Iron)
T = Laurite (Ruthenium Sulphide)
U = Ruthenarsenite (Ruthenium Rhodium Arsenide)

Map No.	Sample No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
0133...	6810.....	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0175...	6789.....	4	-	-	-	1	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-
0176...	6653.....	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0177...	6652.....	14	7	3	-	-	-	1	-	1	-	1	-	1	-	-	2	-	1	-	-	-
0178...	6581.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0178...	6582.....	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0179...	6586.....	7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
0179...	6587.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0179...	6588.....	2	1	2	1	1	-	1	-	-	-	-	-	1	1	-	-	-	-	-	-	-
0179...	6589.....	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0180...	6622.....	11	17	7	-	-	-	1	-	-	1	1	-	-	-	-	-	-	1	-	-	-
0180...	6623.....	2	3	3	-	1	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-
0180...	6624.....	5	7	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0181...	6626.....	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0182...	6640.....	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0182...	6641.....	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
0182...	6642.....	5	11	2	-	-	-	2	-	-	-	1	-	-	1	-	-	-	-	-	-	-
0183...	6634.....	3	7	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
0183...	6635.....	1	7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
0183...	6636.....	6	6	4	1	1	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-
0187...	6502.....	11	5	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
0190...	6739.....	2	7	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	--
0191...	6738.....	51	21	5	-	-	-	-	-	-	-	2	1	2	2	-	4	-	3	-	-	-
0194...	6760.....	1	4	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
0195...	6761.....	3	8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0199...	6791.....	5	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
0202...	6780.....	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0203...	6792.....	2	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
0205...	6750.....	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Map No.	Sample No.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
0206...	6597.....	2	5	10	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
0207...	6598.....	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0208...	6599.....	2	8	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0209...	6579.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0210...	6578.....	4	5	5	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
0211...	6577.....	4	10	13	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
0212...	6576.....	4	9	5	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-
0213...	6575.....	6	7	9	-	-	-	-	-	-	2	-	-	2	-	-	2	-	-	-	-	-
0214...	6574.....	4	11	17	-	-	-	1	-	-	-	-	-	-	2	-	-	1	-	-	-	-
0215...	6573.....	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0216...	6572.....	4	7	16	-	-	-	1	-	-	-	-	-	-	4	-	2	-	-	-	-	-
0217...	6571.....	4	7	33	-	-	-	3	-	-	-	-	-	3	4	1	2	-	-	-	-	-
0219...	6698.....	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0219...	6699.....	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0219...	6700.....	3	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0220...	6726.....	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0220...	6727.....	6	2	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
0221...	6729.....	7	4	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
0221...	6741.....	7	5	7	-	2	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-	-
0221...	6742.....	4	20	6	-	-	-	2	-	-	-	-	-	-	1	2	-	3	2	-	-	-
0223...	6744.....	3	2	4	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
0223...	6745.....	-	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0224...	6746.....	24	51	17	4	-	6	2	-	-	-	-	-	-	-	5	3	2	-	-	-	1
0224...	6762.....	18	9	11	-	2	-	1	-	-	-	1	-	1	-	-	2	-	-	-	-	-
0225...	6799.....	61	30	9	-	5	-	6	-	-	-	20	-	-	-	-	-	-	-	-	-	-
0225...	6800.....	16	8	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0225...	6809.....	7	5	4	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
0226...	6763.....	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0226...	6764.....	32	17	11	-	-	-	-	1	-	-	7	-	-	1	1	-	2	-	-	-	-
0226...	6765.....	5	2	3	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
0227...	6798.....	31	77	7	-	-	-	2	-	-	-	14	-	-	-	-	4	-	-	3	-	-
0228...	6776.....	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0229...	6796.....	17	8	4	-	-	1	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-
0230...	6707.....	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0230...	6708.....	6	8	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
0231...	6709.....	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0231...	6710.....	1	-	2	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
0231...	6711.....	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0232...	6758.....	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0232...	6771.....	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0234...	6776.....	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0235...	6836.....	22	30	17	2	2	-	7	-	-	-	2	-	1	3	-	2	-	-	-	-	-
0236...	6837.....	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0249...	6803.....	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-