MINERAL DATA APPRAISAL OF THE PROPOSED NOATAK NATIONAL ECOLOGICAL PRESERVE ALASKA: A PRELIMINARY COMMENT

By: Staff, Alaska Field Operations Center, Juneau, Alaska

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UNITED STATES DEPARTMENT OF THE INTERIOR

Cecil D. Andrus, Secretary

BUREAU OF MINES

FOREWORD

This is one of a series of summary reports that present the findings of reconnaissance-type mineral assessments of certain lands in Alaska. It is important to remember that Alaska has not been seriously prospected for minerals other than gold--except in a few relatively limited areas. These summary reports include data developed by both contract and Bureau studies; frequently a combination of both. As digests of more detailed reports that are still in preparation, these summaries omit the detailed findings that will be presented in the main reports, but the basic data and conclusions remain the same.

Assessing an area for its potential for buried mineral deposits is by far the most difficult of all natural resource assessments. This becomes more apparent when considering that no two deposits even of the same genesis and host rock conditions are identical. Moreover, judgments prior to drilling, the ultimate test, frequently vary among evaluators and continue to change as more detailed studies add to the understanding.

Included in these reports are estimates of the relative favorability for discovering metallic and related nonmetallic mineral deposits similar to those mined elsewhere. Favorability is estimated by evaluation of visible outcrops, and analyses of sampling data, including mineralogic characteristics and associated elements, in combination with an evaluation of the processes that have formed the rocks in which they occur. Essentially, it is a comparison of a related series of prospects and the environment in which they occur with the mineral deposits and environments in well-known mining districts. Recognition of a characteristic environment allows not only the delineation of a trend but also a rough estimate of the favorability of conditions in the trend for the formation of minable concentrations of mineral materials. This is a technique long used in the mineral industry to select areas for mineral exploration. Qualifying a trend or area as "highly favorable" for the discovery of mineral deposits indicates that the combination of outcrop samples, mineralogic data and geologic conditions that have been observed essentially duplicate the conditions in a recognized mining district elsewhere.

TABLE OF CONTENTS

ILLUSTRATIONS

MINERAL DATA APPRAISAL OF THE PROPOSED NOATAK NATIONAL ECOLOGICAL PRESERVE, ALASKA A PRELIMINARY COMMENT

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ABSTRACT

The Bureau of Mines in 1975 started to assess the availability of locatable and leasable minerals in 19.2 million acres of the Western Brooks Range. This report is on the Noatak National Ecological Preserve. This is in the same region as the Noatak National Arctic Range, a 7.59 million acre tract outlined on the Bureau of Land Management map of Alaska dated 1974, that was used during this study. H.R. 39 and recent Administration proposals reduce the area by about 20 percent. Detailed maps of the new boundaries were not available when this report was compiled.

At least six environments are favorable for mineral exploration:

(1) Lower Paleozoic carbonate and clastic rocks - These rocks, present in the west central part of the study region, contain copper-zinc deposits similar to the Bornite (Ruby Creek) deposit and deposits of fluorite, lead, zinc, and barite.

(2) Mafic and ultramafic intrusive rocks - Large bodies of these rocks identified in the western and northwestern part of the study region are reported to contain chromite and sulfide mineralization. Copper, nickel, cobalt and platinum group metals are found within similar rock types worldwide and could be present here.

(3) Placer gold and tin - Placer gold has been mined in the southern part of the region in the Klery and Timber Creek areas as well as on many lesser drainages. Gold is reported to be present in the bars of the Noatak River and some tributaries. Placer tin has been identified in the Eli River near the western end of the study region.

(4) Basic volcanic rocks - These rocks occur in the western and northern parts of the study region spatially related to the ultramafic rocks. Copper occurs in similar rocks west of the study area in the Kivalina Valley. Chromium and copper, on the south side of the study region, may have been derived from these rocks. These rocks have not been investigated in the study region.

(5) Granitic rocks - In the southeastern part of the study region tin, tungsten, lead, zinc, copper, fluorite and a minor amount of uranium have been identified associated with the Kaluich granite body, one in a series of east-west trending, mineralized granitic intrusives in the Brooks Range.

(6) Upper Paleozoic and younger carbonate and clastic rocks - Lenses of solid sulfide deposits and disseminated high to medium grade deposits of lead, zinc, silver, and barite occur at the western edge of the study region and extend westward into the Wulik Valley. A trend of similar rock types extends across the western and northern sections of the study region into NPRA where similar deposits occur at Drenchwater Creek, 120 miles to the east.

INTRODUCTION

The Bureau of Mines in 1975 started to assess the availability of locatable and leasable minerals on 19.2 million acres in the western

Brooks Range. This study concerns the proposed Noatak National Ecological Preserve. The Bureau of Land Management map of Alaska, dated 1974 shows the Noatak National Arctic Range, as a 7.59 million acre tract in the Western Brooks Range (see Figures 1 and 2). This is the study region covered in this report. The Noatak National Ecological Preserve as shown on Administration proposals and in H.R. 39 is about 20 percent smaller but detailed maps of the new boundaries were not available when this report was compiled. The purpose of the investigation was to provide specific mineral information requested by Congressional committees and the Joint Federal-State Land Use Planning Commission for Alaska. The study was funded by a special Congressional appropriation.

A three-phase program was undertaken to (1) compile a list of known mineral occurrences and prospects within and adjacent to withdrawn lands; (2) sample, map and evaluate as many of the better prospects as possible with funds and time available; and (3) identify areas, on the basis of these findings, that are the most favorable for future mineral exploration.

Phases 1-3 of the program were contracted to WGM, Inc., a firm with minerals exploration and evaluation experience in this area. The Bureau of Mines undertook to search for and compile additional data on mineralized areas that might not be available to the contractors.

EXPLORATION HISTORY IN NORTHWESTERN ALASKA

To place the quantity and quality of minerals data available in the study region in perspective it should be recognized that prior to the 1950's exploration in Alaska was largely limited to individual prospectors and small groups interested principally in placer and lode gold

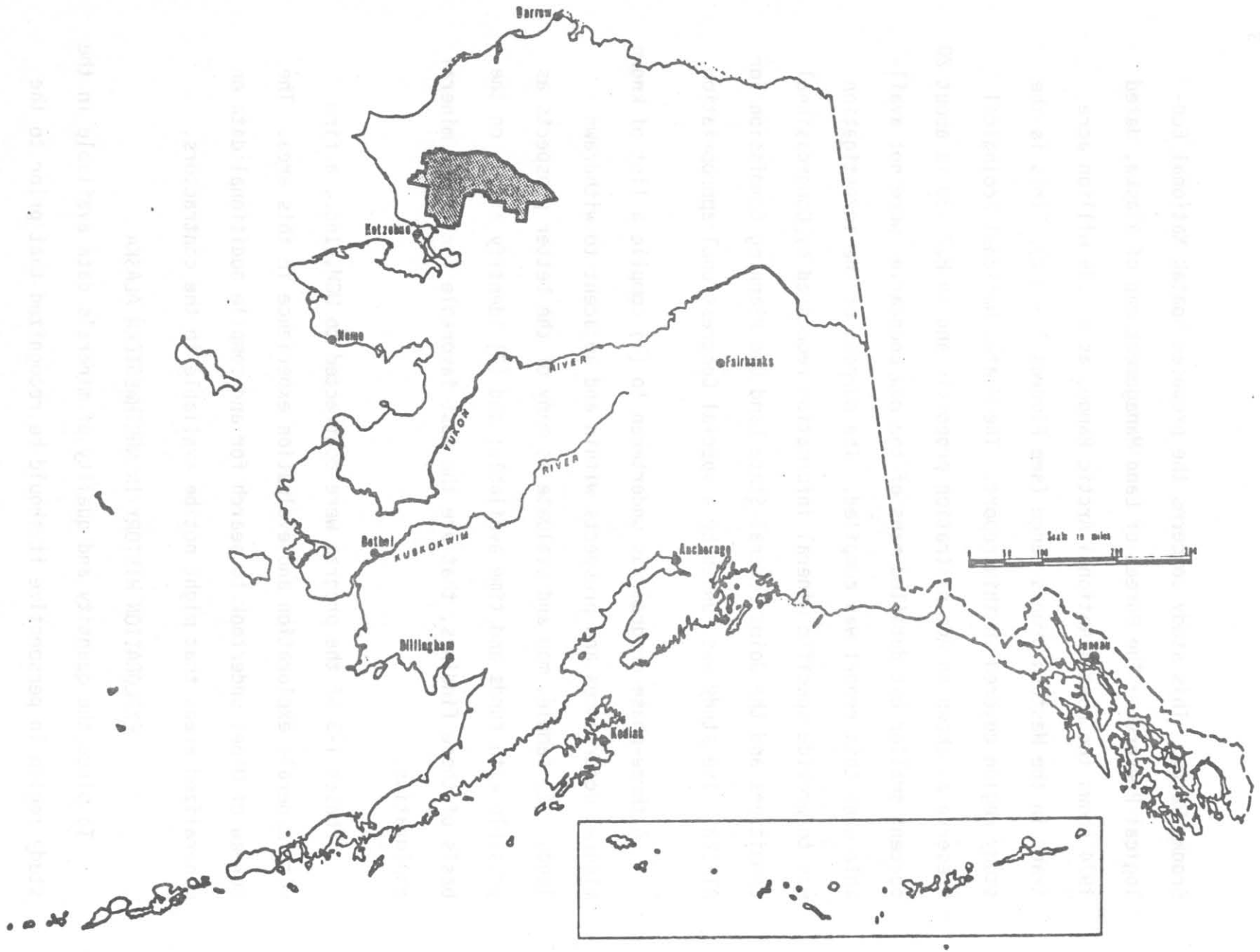

Figure 1 - Index Map of Proposed Noatak National Arctic Range

deposits. Since the 1950's exploration has been oriented towards finding base metal and other commodities. In the Brooks Range, this was carried out on a regional basis by only two groups, a major mining company in the early 1960's and an exploration syndicate in 1969. Since 1971 no systematic regional minerals exploration has been undertaken in the withdrawn lands.

In addition to the exploration work conducted by private industry, state and federal government agencies have been active intermittently, on a relatively limited basis. The work by the federal groups has been primarily mapping regional geology and is not specifically minerals discovery oriented. The state projects have focused more directly on areas of known mineralization and their possible extensions.

ROCK TYPE AREAS AND ASSOCIATED MINERALIZATION

The regional rock structure of the Brooks Range is only superficially known (4). 2/ Mapping on a quadrangle basis at a scale of four miles to the inch was initiated only recently (8). Therefore, the rock type relationships relevant to mineral resources within the withdrawn areas are not well known.

In spite of the lack of detailed knowledge concerning area rock structures, some very general relationships between rock types and commodities can be discerned. The major rock units and trends persist regionally across the western Brooks Range. By plotting mineralized areas and zones of trace element anomalies on maps illustrating rock structure, generalized associations of mineralization in certain rock units become apparent. These rock type areas, known mineral localities

2/ Underlined numbers in parenthese refer to references listed at the end of this report.

and trace element anomalies are shown on figure 3. Figure 4 shows mineral localities in the study area in relation to geographic features. Other details on the prospects and mineral occurrences, such as common name, location and minerals present are appended to this report.

Six rock type areas are recognized as warranting further investigation. These include: (1) Lower Paleozoic carbonate and clastic rocks, (2) mafic and ultramafic rocks, (3) placer gold and tin, (4) basic volcanics, (5) granitic intrusives, and (6) Upper Paleozoic and younger carbonate and clastic rocks. The relationships between rock type areas and mineral occurrences are shown on figure 3.

(1) Paleozoic Carbonate and Clastic Rocks - These rocks extend along the south flank of the Brooks Range and are present in the western part of the study region. Fifty to one hundred million tons (or more) of 1 percent copper are inferred to occur in these rocks in the Bornite (Ruby Creek) area (No. 196) outside the study area (10). The belt of carbonate rocks hosting these deposits apparently trends into the study region. Similar, perhaps equivalent rocks of similar age are exposed in the area of the Omar River, figure 3. The lack of rock structure mapping in this area makes it impossible to trace and correlate these units conclusively. Within the study region, copper or other mineralization in these rock types is known to be present at the Agashashok River headwaters (No. 15, 16), the Kavachurak-Ningyoyak Creek (No. 47, 50), and the Omar River area (No.'s 21, 22) (2).

In the Omar River area, visible surface mineralization was investigated in the mid-1960's at two prospects, the Omar (No. 21) and

the Frost (No. 22) (2). At the Omar prospect several mineralized fracture groups zones, up to 100 feet wide, contain material that assays up to 15.39 percent copper. The mineralized fracture zones are present in an area that measures 3,500 feet in width and extends at least 9,000 feet in length. Other mineralized samples taken along the 9,000 foot length of the fracture zones range in value from 0.1 percent to 2 percent copper (2).

The Frost prospect (No. 22), which lies about 6 miles east of the Omar prospect, has potential for barite and zinc. Minor amounts of lead, copper and fluorite may also be present (2). There are two apparently unrelated types of mineralization present. Barite is present as discontinous pods or lenses along an outcrop length of about 5,000 feet. Zinc and copper sulfide mineralization is associated with quartz-calcite-barite veins, or lenses, that pinch and swell along strike. A representative sample from one of these "veins" assayed 13.2 percent zinc, 0.49 percent copper, and 20.7 percent barite.

(2) Mafic and Ultramafic Intrusive Rocks - These rocks are present in a trend along the western and northern parts of the study region. The Avan River (No. 10), Misheguk Mountain (No. 12), Asik Mountain (No. 7), and Siniktanneyak Mountain (No. 30) areas are in part underlain by chromite bearing ultramafic rocks (2, 4). Placer deposits in the Avan River contain minor platinum. Additional platinum may be present in the surrounding rocks. Sulfide mineralization has been recognized in the Avan River mafic rocks (7). None of these intrusives are known to have been evaluated for concentrations of chromium, platinum, nickel, cobalt, and copper despite the fact these types of mineralization are known to occur world-wide with these types of rocks.

(3) Placer Gold and Tin - The gold placer deposits in the western Brooks Range at Klery Creek (No. 23), Timber Creek (No. 24), and other drainages in the area have been mined intermittently from the turn of the century to the present time (9). Only the stream placer gravels have been mined; the bench gravels remain untested. The source rocks of this gold have not been identified.

Placer tin has been identified in the Eli River (No. 9) at the western edge of the withdrawn lands (1). The source of this tin is not known, nor has any systematic attempt been made to evaluate the tin content in the Eli River placers.

(4) Basic Volcanics - These rocks are related to the mafic and ultramafic intrusives and are principally present in the western and northern parts of the study region. The Maiyumerak Mountains appear to be underlain by an assemblage of predominantly volcanic rocks. Streams draining this area are known to contain anomalous amounts of chromium and copper (No. 6) (2). Copper mineralization has been identified at the Kivalina River in reportedly similar rocks located to the west of the withdrawn lands. There has been no systematic effort to evaluate the mineral potential of this assemblage or similar assemblages in the withdrawal area.

(5) Granitic Intrusive Rocks - Mineralized granitic rocks are present in an east-west trend in the study region and to the east of the study region on the adjacent lands. Sampling such rocks in the study area near Kaluich Creek (No. 44) resulted in the identification of

mineralized zones containing tin, tungsten, lead, zinc, copper, molybdenum, fluorine and silver (2). There has been no systematic evaluation of this prospect nor of the mineral potential of the granitic intrusive rocks of the study area.

(6) Upper Paleozoic and Younger Carbonate and Clastic Rocks - Rocks of Mississippian to Triassic age are known to contain an unclaimed zone of lead, zinc, silver, and barite mineralization on lands west of the Kelly River (No.'s 1-5) (2, 12). This mineralization has been noted in private reports since at least 1965. The area was sampled in 1968 by the Geological Survey and the presence of anomalous concentrations of various elements was made public in 1970 (12). Bureau of Mines site specific work in 1975 revealed the presence of a 1/4 square mile zone of outcropping solid sulfide deposits and disseminated, high to medium grade deposits of lead-zinc sulfides and barite (2). This locality is now commonly referred to as the "Red Dog" prospect (No. 1).

Since 1975, industry's exploration to the west of the Red Dog site has revealed other zones of similar high grade mineralization on lands open for mineral entry (3). The general trend of rocks hosting this mineralization can be followed east to the high grade zinc, lead, and silver mineralization in the Drenchwater Creek area (No. 103) (11). This site is in the National Petroleum Reserve-Alaska, which lies about 120 miles northeast of Red Dog. In 1977, regional trace element surveys identified anomalous base metal concentrations in samples collected between the Red Dog and Drenchwater Creek prospects. This suggests that this mineralized trend crosses the western and northern parts of the study area.

ZONES HAVING ROCK STRUCTURES FAVORABLE FOR DISCOVERY OF ADDITIONAL MINERAL DEPOSITS

An evaluation of the available information, the distribution of areas of known mineralization and trace element anomalies can be used to indicate the zones that may have potential for the discovery of additional mineralization. The trends or inferred zones favorable for mineral discovery are within the previously defined rock type areas. The areas favorable for the discovery of metallic and related mineral deposits are shown on figure 5. The identified trends are necessarily based on the scanty data and may not reflect other mineralized zones that remain to be identified within the study region.

ON-GOING STUDIES

Regional as well as site-specific studies will be necessary if a reliable minerals evaluation of this area is to be made. Sufficient data are available to select some areas for additional study, although large areas still lack the most preliminary types of studies. The Bureau of Mines is proposing to undertake limited studies in the eastern half of the study area during 1978. In areas favorable for mineralization and in areas where trace element anomalies are indicated, these investigations will include the location and sampling of bedrock.

CONCLUSIONS

Only the most preliminary type of modern exploration has been conducted in the study area, and this covers a very limited portion of the area. However, at least 13 specific commodities are known to be present. These include barium, chromium, copper, fluorite, gold, lead, molybdenum, platinum, silver, tin, tungsten, uranium, and zinc.

Systematic regional rock structure mapping as well as trace elements and geophysical surveys are lacking. Studies, ranging from the most basic type of examination, to follow-up trace element studies and detailed site-specific investigations are needed to make a technically sound mineral resource assessment. No such surveys have been made in the study area.

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APPENDIX*

MINERAL OCCURRENCES AND TRACE ELEMENT ANOMALIES IN NORTHWESTERN ALASKA**

**Indicates localities in the proposed Noatak National Arctic Range

* DATA TAKEN FROM:

Grybeck, Donald, 1977, Maps showing known Mineral Deposits of the Brooks Range, Alaska: USGS Open File Report 77-166C.

Grybeck, Donald, 1977, Maps showing Geochemical Anomalies in the Brooks Range, Alaska: USGS Open File Report 77-166D.

Bureau of Mines Unpublished Data; and Private Reports

Map #	Name	Location	Notes
1**	Red Dog	T 31N R 18W	Zinc, lead, silver, barite; solid sulfide and disseminated deposits; 1/4 square mile
2-5	Color Anomalies	T 31N R 19W	Geologic setting similar to Red Dog, high grade zinc, lead at one site drilled in 1977
6**	Maiyumerak Mtns.	Tps 27, 28N R 15, 16W	Volcanic, ultramafic, mafic complex reported copper mineralization, anomalous chrome geochemistry
7**	Sour's Chrome	T 24N R 17W	Mafic/ultramafic rocks identified bands of chromite bearing rocks
8**	Eli River Tin		Placer tin confirmed in 1940's
9**	Lean Creek		Lode and placer gold reported in literature
10**	Avan	T 31, 32, 33, 34N R 13, 14, 15W	Mafic, ultramafic rocks, chromite identified platinum found in placer
11**	Kugururok	T 30N R 14W	High grade boulder of chromite found in river gravels
12**	Misheguk Mountain	T 33N R 10,11W	Ultramafic pluton, reported copper, asbestos, chromite mineralization
13**	Amaktukvik Pass	T 33N R 7W	One claim staked; commodity unknown
14**	Loesche	T 24N R 14W	Copper in carbonates, possibly similar to Bornite
15**	Agashashok River	T 26N R 12W	Copper, 18 claims
16**	Agashashok River	T 26N R 12W	Copper with vein quartz to 1% Cu
17**	Agashashok River	T 26N R 12W	Iron oxide stained zone, no mineralization noted in place

Map #	Name	Location	Notes
18**	Agashashok River	T 26N R 12W	Iron oxide zone, no mineralization noted in place
19**	Agashashok River Zinc	T 25N R 14W	100'+ thick section of zinc bearing pyritiferous schists
20**	Nakolikurok Creek	T 26N R 8W	Copper in quartz vein in greenstone sill
21**	Omar	T 24N R 10W	High grade copper sulfides in large fracture zones in carbonate rocks
22**	Frost	T 24N R 9W	Lenses of barite mineralization with zinc, lead, copper, and fluorite; discontinuous for 5000 feet
23**	Klery Creek	T 19-24N R 7-9W	Old placer gold district, gold still pannable in areas of previous placering
24**	Timber Creek	T 24, 25N R 7-9W	Old placer district
25**	Chevron	T 29N R 5W	Copper in quartz vein system, grades 0.02 oz. Au, 2.08% Cu over 4.3 feet or 0.5% over 10 feet
26	Hub	T 27N R 4W	Copper bearing quartz-calcite vein
27	Temby	T 25N R 4W	Copper bearing quartz vein. 1.5% Cu reported
28	Tundra	T 25N R 4, 5W	Reported claims nature of mineralization not known
29	Salmon River	T 26, 27, 28N R 5W	Placer gold
30	Salmon River	T 26N R 5W	Copper bearing quartz veins
31	Copper Creek (Cu)	T 27N R 5W	Copper bearing quartz veins
32	Copper Creek (Pb-Zn)	T 27N R 4, 5W	Lead, zinc in quartz veins
33	Lena Creek	T 29N R 8W (?)	Barite reported in stream float, source unknown

Map #	Name	Location	Notes
34	Tutuksuk River	T 23N R 4W	Lead reported in slate
35	Kallarichuk River	T 20, 21N R 5, 6W (?)	Reported placer gold
36**	Eskimo Venture	T 34, 35N R 1, 2, 3E	Chromite in ultramafic rocks
37**	Kingsavik Mtns.	T 32N R 5, 6W	Reported gold
38	Malfiatti	T 25N R 1W	Reported copper mineralization in limestone-schists (?)
39**	Atongarak Creek	T 29, 30N R 6, 7E	Placer gold reported
40	Hunt River	T 20N R 1W	One placer claim on Kobuk River
41**	Aniuk River	T 31N R 7E	Reported placer gold
42**	Aniuk River	T 31N R 7, 8E	Reported oil shale
43	Redstone River	Vague location	Reported placer gold
44**	Kaluich	T 25N R 6E	Lead, zinc, copper in and near contact, also fluorite and minor uranium with granitic intrusive. Tin, tungsten, and silver also reported.
45**	Otter Bar	T 29N R 9E	Copper in sedimentary rocks
46	Imelyak River	T 25N R 8E	Reported gold mineralization and claims
47**	Kav	T 28N R 9E	Copper, silver, antimony mineralization in quartz-calcite filled veinlets
48**	Tunukuchiak Creek	T 27, 28N R 10E	Reported placer gold similar to Midas Creek
49**	Douglas Creek	T 29, 30N R 10, 11E	Geology similar to Midas Creek

Map #	Name	Location	Notes
50**	Ningyoyak Creek	T 29N R 11E	Copper mineralization in quartz calcite vein
51**	Midas Creek	T 28, 29N R 12E	Placer gold deposit
52	Shishakshinovik Pass	T 23, 24N R 11, 12E	Lead, zinc, silver, molybdenum, beryllium, tin, uranium in contact zone and float rock
53	Gull Pass	T 25N R 18E	0.32 oz. gold reported
54	Kutarlak Creek	T 23, 24N R 12, 13E	Geochemically anomalous zone reported, mineralization not located
55	Nigikpalvgururvrak	T 27N R 13E	Active placer gold mine
56	Igning River	T 24, 25, 26N R 13W	Geochemically anomalous zones for zinc and copper
57	Ladanan Creek	T 26N R 20E	Copper reported
58	Iyahuna Creek	T 24,25N R 15, 16E	Reported geochemically anomalous zone for lead and zinc
59	Angunelechak Pass	T 26N R 16E	Reported silver mineralization, also geochemically anomalous lead and zinc
60	Killik River	T 29N R 17E	Reported copper and antimony
61	Twelvemile Creek	T 25, 26N R 17E	Geochemically anomalous zone for lead and zinc
62	Tupik Creek	T 24, 25N R 17E	Granite contact zone geochemically anomalous for lead, zinc, copper, silver
63	Angiak Pass	T 24N R 17E	Granite, granite contact zone, geochemically anomalous in lead and copper
64	Glacier Creek	T 24N R 17, 18E	Granite, granite contact zone geochemically anomalous in lead, zinc, copper, and silver

Map #	Name	Location	Notes
65	Mount Papiok	T 25N R 17E	Geochemically highly anomalous for lead, zinc, and silver
66	Lucky Six Creek	T 25, 26N R 17, 18E	Quartz veins containing copper, antimony, gold; placer gold
67	Walker Lake West	T 20N R 20E	Schist belt rocks containing anomalous copper and 0.1 oz. gold
68	Walker Lake West	T 20N R 20E	Schist belt rocks high in geochemical lead values
69	Walker Lake East	T 21N R 21E	Schist belt rocks with geochemically high zinc values
70	Arrigetch Peaks	T 23, 24N R 21, 22E	Tactite zone to 450 feet long containing anomalous copper, zinc, and tungsten
71	Helpmejack Creek	T 19N R 24E (?)	Placer gold reported
72	Malamute	T 19N R 25E (?)	Placer gold reported
73	Alatna South	T 20N R 25E (?)	Placer gold reported
74	Quartz Hill		Placer gold, copper
75	Igikpak	T 23N R 17E	Reported placer gold in small drainages
76	Walker Lake South	T 20N R 21E	Placer gold on lake shore reported
77	Pingaluk River	T 24, 27N R 23, 24E	Placer gold along 8 mile length of river reported
78	Alatna North	T 24, 25N R 20, 22E	Placer gold along 10 mile drainage
79	Lake Selby	T 17N R 14E	Copper bearing quartz vein in conglomerate
80	Angeta	T 17N R 15E	Gold

Map #	Name	Location	Notes
81	Sheep Creek	T 32N R 20W	Fault controlled copper mineralization in carbonates
82	Tobin	T 33N R 18W	Pyritiferous phyllite float with reported high zinc geochemical
83	Kinnorutin	T 36N R 13W	Volcanics with reported high geochemical values
84	St. Patricks Creek	T 35N R 13W	High copper in volcanics
85	Rabbit Creek	T 26N R 21W	Zinc, lead, silver reported
86	Nauyoaruk	T 22N R 19, 20W	Placer gold, tin claims
87	Shiliak Creek	T 21N R 14, 15W	Cupriferous pyritiferous schists
88	Mt. Kaksurok	T 21N R 21W	Ultramafics with chromite and nickel geochemistry
89	Redstone Pluton	T 24N R 8E	Iron and lead in granite contact zone
90	Ambler River	T 25N R 9, 10E	Copper mineral locality
91	Ambler River	T 25N R 10E	Copper mineral locality
92	Igning River	T 24, 25N R 13, 14E	Magnetite occurrence
93	East Oyukak Mtn.	T 25N R 16E	Copper mineralization and anomaly
94	East Oyukak Mtn.	T 25N R 16E	Iron in granite contact zone
95	Portage Creek	T 26N R 16E	Copper, silver mineralization
96	Reed River	T 22N R 17E	Pyrite in skarn zone
97	South Mt. Chitiok	T 23N R 15E	Chalcocite reported

Map #	Name	Location	Notes
98	Pass Hematite	T 23N R 16E	Hematite in granite contact zone
99	Divide Copper	T 25N R 18E	Copper iron mineralization
100	Awlinyak Creek	T 23, 24N R 20E	Lead copper occurrence
101**	Kugururok	T 33, 34N R 12, 13W	Black Siltstone, Shublik (?) Fm, 5% P_2O_5
102		T 8S R 8W	Black Siltstone, strat. position unknown 0.2% P_2O_5
103	Drenchwater Creek	T 9S R 29W	Black to gray siltstone. Lisburne Group, 5% P_2O_5; .001% eU
104	Kiligwa River	T 10S R 28W	Shale, possibly Alapah Limestone of Lisburne Group, 5% P_2O_5; to 0.002% eU
105	Mount Bupto	T 11S R 24W	Phosphatic calcareous mudstone, probably Alapah Limestone of Lisburne Group, 13.7% P_2O_5; .004% U
106		T 10S R 21W	Shale. 5% P_2O_5; .001% U
107		T 9, 10S R 20, 21W	Phosphate rock, 8 foot zone, 24.8% P_2O_5, 0.17% V_2O_5, .008% U
108		T 10S R 21W	Black limestone, 5% P_2O_5; 0.001% eU
109		T 34N R 9E	Limestone to calcareous silty shale, 5% P_2O_5; .001% eU
110	Nigu River	T 11S R 19W	Calcareous mudstone, 5±% P_2O_5%; .004% eU
111	Oolamnagavik River	T 10S R 12W	Black siltstone, 1.4% P_2O_5; .005% eU
112	Killik River	T 12S R 10W	Phosphatic limestone, 0.4% P_2O_5; 0.004% eU
113	Kiruktagiak	T 12S R 10W	Phosphatic limestone, 0.4% P_2O_5; 0.004% eU

Map #	Name	Location	Notes
114		T 12S R 3W	Oolitic phosphate rock, 25.6% P_2O_5; 0.02% V_2O_5; 0.009% eU
115	Tiglukpuk Creek	T 13S R 1E	Phosphatic zone, 36 foot thick zone averages 8% P_2O_5. Small samples contain to 30% P_2O_5
116		T 13S R 1E	Black shaly limestone, 5% P_2O_5; 0.008% eU
117		T 13S R 2E	Phosphate rock, 27.9% P_2O_5; 0.020% eU
118		T 13S R 2E	Phosphate rock, 15±% P_2O_5; 0.009% eU
119		T 13S R 3E	Phosphate rock, 21.4% P_2O_5; 0.014% eU
120		T 12S R 5E	Dark limestone, 5% P_2O_5; 0.001% eU
121		T 33N R 24W	Copper sulfides and malachite in Devonian slate and phyllite
122	Hunt Fork	T 35N R 22W	Lead bearing quartz veins in Devonian slate and phyllite
123	John River		Antimony lode. Chalcopyrite and bornite reported in river gravels, source not known
124		T 27N R 24W	Copper and zinc, possibly stratiform deposits. Geology and geochemistry apparently similar to Arctic schist belt deposits
125		T 27N R 24W	Copper and zinc, possibly stratiform deposits similar to Arctic schist belt deposits
126		T 27N R 23W	Copper and zinc, possibly stratiform deposits similar to Arctic schist belt deposits
127	Ann Claims	T 30N R 24W	Zinc and lead mineralization in carbonate rocks

Map #	Name	Location	Notes
128		T 30N R 23W	Zinc and lead mineralization in carbonate rocks
129		T 30N R 23W	Zinc and lead mineralization in carbonate rocks
130		T 31N R 21W	Copper sulfides in Skajit Limestone
131		T 31N R 20W	Copper sulfides at fault contact between Devonian limestone and phyllite and siltstone
132		T 32N R 19(29)W	Copper and lead sulfides along thrust fault
133		T 31N R 19W	Copper sulfides in Skajit Limestone
134		T 31N R 19W	Copper sulfides in Devonian phyllite and siltstone
135		T 31N R 18W	Copper sulfides in quartz vein
136		T 31N R 18W	Copper and lead mineralization in quartz stockworks
137		T 31N R 18W	Copper sulfides in vein quartz, at at least 3 locations
138		T 31N R 18W	Copper and lead mineralization in vein quartz
139	Spring Creek/ Lake Creek	T 31N R 18W	Placer gold, previous production
140	Matthews Dome	T 31N R 18W	Copper sulfides in calc-schist and vein quartz
141	Bird Creek	T 30N R 17W	Placer gold, previous production
142	Jay/Rye/Lucky Creek	T 30N R 17W	Placer gold, previous production
143	Kay Creek	T 30N R 16W	Placer gold, previous production
144	Bourbon Creek	T 28N R 16W	Placer gold, previous production

Map #	Name	Location	Notes
145		T 29N R 17W	Lode claims, commodity unknown
146	Galena Creek	T 29N R 17W	Lead sulfide (galena) found in creek, reported lode mineralization in area
147	Michigan Creek	T 28,29N R 17W	Argentiferous galena in quartz vein in sedimentary rocks
148	Allen River	T 30N R 20W	Copper sulfides in Devonian black phyllites and slates
149	Crevice Creek	T 20N R 19, 20N	Lead and copper sulfides in Skajit Limestone
150		T 29N R 21W	Lead, zinc, copper and iron sulfides; stratiform in interbedded schist, quartzite and limestone
151		T 31N R 15W	Lead sulfide bearing quartz vein in Devonian slate, phyllite and siltstone
152	Vermont Dome	T 31N R 12W	Copper sulfides and vein quartz with minor copper and zinc in Devonian phyllite and siltstone
153	Vermont Creek/ Hammond Ridge/ Swift Gulch	T 31N R 12W	Placer gold, previous production
154	Nolan Creek etc.	T 31N R 12W	Placer gold, Nolan River and tributaries, previous production
155	Ferguson, etc.	T 30, 31N R 12W	Numerous antimony, gold quartz veins; previous production
156	Union Gulch	T 30N R 11W	Placer gold, previous production
157	Mascot Creek	T 31N R 13W	Placer gold, previous production

Map #	Name	Location	Notes
158	Cow Creek	T 30N R 12W	Copper sulfides in quartz vein in Devonian schists and marble
159	Emma Dome	T 29N R 13W	Gold and silver in quartz vein
160	Emma Creek	T 29N R 12W	Placer gold, previous production
161	Slate Creek	T 28N R 13W	Placer gold, previous production
162	Myrtle Creek	T 28N R 11W	Placer gold, previous production
163	Slate Creek	T 28N R 11W	Placer gold, previous production
164		T 28N R 10W	Copper sulfides in Devonian (?) micaceous greywacke
165	Howard Creek	T 30N R 11W	Lead and copper sulfides in masses of iron sulfides in Devonian chloritic schists
166	Gold Creek/ Magnet Creek	T 31N R 10W	Placer gold, previous production
167		T 32N R 11W	Copper sulfides in Upper Devonian siltstone and grit unit
168	Big Jim Creek	T 35N R 11W	Lead and copper sulfides in Upper Devonian phyllite
169		T 36N R 10W	Copper sulfides in Skajit Formation
170	Snowden Creek	T 34N R 10W	Copper sulfides in vein quartz float near contact of Devonian limestone and greenstone
171		T 35N R 8,9W	Claim staked, commodity unknown
172		T 33N R 9W	Claims staked, commodity unknown

Map #	Name	Location	Notes
173	Matthews River	T 33N R 9W	Auriferous copper, lead, zinc sulfides in quartz veins in Devonian (?) greenstone and greenschists
174	Jade Mountains	T 21N R 3E	Copper and lead bearing vein in limestone
175	Jade Mountains (?)	T 21N R 4E	Jade and asbestos in ultramafic body
176	Jade Mountains	T 21N R 5E	Nickel, asbestos, jade with ultramafic body
177	Smucker	T 22N R 8E	Argentiferous zinc, copper sulfide mineralization; reportedly similar to Arctic Camp
178	Horse Creek	T 22N R 10E	Argentiferous zinc, copper deposits; reportedly similar to Arctic Camp
179	Sunshine Creek	T 21N R 10E	Argentiferous zinc, copper deposits; reportedly similar to Arctic Camp
180	Dead Creek	T 21N R 11E	Argentiferous zinc, copper deposits; reportedly similar to Arctic Camp
181	Diane Creek	T 20N R 12E	Copper and zinc sulfide mineralization in calcareous schist and skarn
182	Que Creek	T 20N R 12E	Copper mineralization in muscovite quartz schist over large areas
183		T 21N R 13E	Lead and zinc sulfide in highly mineralized carbonate unit
184	Sharp Creek	T 21N R 14E	Copper sulfide mineralization in chlorite-muscovite-quartz schist
185	Jerry Creek	T 20N R 13E	Zinc and copper sulfide mineralization along some trend as Arctic Camp deposit

Map #	Name	Location	Notes
186		T 20N R 14E	Mineralized rock containing geochemically anomalous gold, silver, copper, lead, zinc
187		T 20N R 14E	Copper in chlorite-quartz schist
188		T 20N R 16E	Copper in chlorite-quartz schist
189		T 19N R 16E	Claims staked, commodity unknown
190		T 20N R 17E	Auriferous rock samples
191		T 20N R 17E	Auriferous rock samples
192		T 20N R 18E	Auriferous rock samples
193	Picnic Creek	T 29N R 17,18E	Zinc, copper mineralization, some drilling
194	Riley Creek	T 19N R 9,10E	Claims staked, commodity unknown
195	Asbestos Mountain	T 19N R 9E	Asbestos and jade in ultramafic rocks
196	Bornite	T 19N R 9E	Copper, zinc, uranium in carbonate rocks
197	Partner Hill	T 18N R 8E	Copper mineralization in carbonates
198	Cosmos Creek	T 19N R 8E	Asbestos, jade in ultramafic terrane
199	Aurora Mountain	T 19,20N R 8E	Copper in carbonate rocks
200	Bismark Mountain	T 19N R 7E	Asbestos in ultramafic rocks
201	Shungnak River	T 19N R 7E	Placer gold; jade and asbestos in ultramafic rocks
202		T 21N R 1E	Coal
203		T 20N R 6W	Coal

Map #	Name	Location	Notes
204		T 21N R 9E	Coal
205	Shovel Creek	T 11N R 5E	Placer gold, previous production
206	Hawk River	T 10N R 6E	Copper, lead, and silver veins in volcanic rocks
207		T 7,8N R 9,10W	Uranium with acid intrusives
208		T 8,9N R 9,10W	Uranium, disseminated and in veins, in acid intrusive rock
209		T 8,9N R 9,10W	Uranium, disseminated and in veins, in acid intrusive rock
210		T 9N R 9W	Fluorite, cementing brecciated intrusive rock
211		T 8,9N R 9,10W	Uranium, disseminated and in veins, in acid intrusive rock
212		T 7,8N R 9,10W	Uranium claims
213		T 7,8N R 9,10W	Uranium, disseminated and in veins, in acid intrusive rock
214		T 8,9N R 8W	Uranium claims
215		T 8,9N R 9,10W	Uranium, in veins and disseminated, in acid intrusive rock
216	Hunt Creek	T 9N R 5W	Lead and zinc, in veins, in intrusive rock
217	Cosmos Creek	T 18N R 8E	Jade placers, previous production
218	Wesley Creek	T 18N R 8E	Lead in carbonate rocks; asbestos and jade in mafic/ultramafic rocks

Map #	Name	Location	Notes
219	Dahl Creek	T 18N R 9E	Placer gold, previous production. Jade in float. Asbestos
220	California Creek	T 18N R 10E	Placer gold, previous production
221	Arctic Camp	T 21N R 11W	Drilled deposits of zinc, copper, lead, silver, and gold mineralization; 35 million tons, 4% copper
222	Nantuk Mountain	T 24N R 26E	Reported zinc-silver mineralized float