INVESTIGATION FOR PLATINUM-GROUP METALS IN THE EAGLE QUADRANGLE, EASTERN ALASKA, PART 1: FLUME CREEK AND AMERICAN CREEK AREAS.

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INTRODUCTION

The U.S. Bureau of Mines (USBM), Alaska Field Operations Center (AFOC) is currently investigating reported occurrences of platinum-group metals in Alaska. This is being done as part of the Bureau's effort to assure an adequate supply of materials for the nation's industrial needs.

Platinum and palladium were detected in ultramafic rocks collected in the Eagle Quadrangle in Eastern Alaska by the U.S. Geological Survey (USGS) (6)[2/]. The Bureau conducted site specific geological investigations and additional geochemical sampling in the region in order to further assess the potential for significant deposits of platinum-group metals.

Areas investigated by the Bureau include portions of the Flume Creek, American Creek, and Butte Creek drainages, the area indicated north of Joseph and a portion of the joseph Creek drainage and certain valleys along the Taylor Highway between Chicken and Eagle (fig. 1). This report presents the results of limited investigation in the Flume Creek and American Creek areas. This investigation was limited in terms of time spent and extent of sampling and should not be interpreted as a final statement regarding the mineral potential of the areas discussed.

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2/. Underlined numbers in parentheses refer to items in the list of references at the end of this report.

History and Previous Investigations

Detailed accounts of early surveying and geological expectations in the Eagle Quadrangle and surrounding areas are contained in a long series of USGS publications which are listed in chronological order in USGS Bulletins 872 (9, pp. 7-9) and 897 (10, pp. 135-136).

The Eagle mining district lies between the Circle district to the northwest and the Fortymile district to the south. These two neighboring districts were the sites of the oldest mining camps in interior Alaska with the discovery of placer gold in the Fortymile district in 1886 and in the Circle district in 1893 (10, p. 135). Since then, mining of placer gold has been a major form of subsistence in the three districts.

Published geologic maps of the area investigated include: Preliminary geologic map of the Eagle (D-1) quadrangle, east central Alaska (1); Preliminary geologic map of the Eagle D-2 and D-3 quadrangles, Alaska (2); and Geologic map of the Eagle quadrangle, Alaska (5).

Other reports pertinent to this investigation include: Report on the Flume Creek Lode-gold Prospect, Eagle quadrangle, by Saunders (7); A Geochemical Investigation along the Taylor Highway, east-central Alaska, by Saunders (8); Geochemical and Geological Reconnaissance in the Seventymile River Area, Alaska, by Clark and Foster (3); Basic Data on the Ultramafic Rocks of the Eagle quadrangle, east-central Alaska by Keith and Foster (6); and Ultramafic Rocks of the Eagle Quadrangle, east-central Alaska, by Foster and Keith (4).

Ownership

The area encompassing Flume Creek, American Creek and all lands between them is currently closed to mineral entry. These lands are variably administered by the National Park Service and Bureau of Land Management.

Portions of townships 2N, 26-31E (fig. 2) are within the Yukon-Charley Rivers National Preserve and are administered by the National Park Service. Portions of these same townships and townships 1N, 26-33E, 1S, 26-33E, and 2S, 26-33E were established for selection by regional and village corporations by Public Land Order 51-73, Bureau of land Management pending Interior conveyance or patenting.

PHYSIOGRAPHY

Flume Creek and the streams between it and American Creek drain northeasterly into the Seventymile River or Excelsior Creek, which occupy pronounced northwest trending linear depressions. American Creek and Excelsior Creek empty into the Yukon River at the community of Eagle (fig. 2). The Seventymile River drops about 1,000 ft from the mouth of Flume Creek to its own mouth near Calico Bluff on the Yukon River.

The northeast flowing tributaries of the Seventymile River and Excelsior Creek head in the rugged highlands to the south of the area investigated. These highlands are topped by prominent features including Arctic Dome, North Peak, Glacier Mountain and Mount Eldridge. Mount Eldridge is the tallest of these at 6,250 ft elevation. Maximum relief in the vicinity of Flume Creek is over 3,300 ft. The higher terrain is devoid of vegetation and frost-fractured rubble mantles the ridges.

The lower portion of the northeast draining streams are deeply incised into bedrock and are thickly vegetated by spruce forest, willow, and alder brush. Outcrops occur frequently along the incised portions of these streams. The low ridges between these portions of the streams are remarkably flat and are mostly covered by fractured rubble and thick sedge and grasses.

ACCESS

The region investigated is partially accessible via the Taylor Highway which connects Tetlin Junction to the south and on the Alaska Highway with Eagle on the Yukon River (fig. 1). This highway is a two-lane, gravel road and is maintained by the State of Alaska Department of Transportation between April 15 and October 15.

The Taylor Highway follows American Creek from the stream's headwaters all the way to Eagle where the highway ends. There are some primitive roads and bulldozer trails along the Taylor Highway which make some off-road sites accessible by tracked or four-wheel drive vehicles.

Airstrips are available at Eagle, Chicken and Alder Creek. Other areas, such as Flume Creek, are best reached by helicopters staged at either Eagle or at Circle to the northwest. There is a bulldozer trail from Eagle to Flume Creek which is currently used by placer miners for access to Barney Creek at the Seventymile River (fig. 2).

REGIONAL GEOLOGY

The region between Flume and American Creeks is largely underlain by metamorphic rocks ranging from Precambrian to Paleozoic in age and ranging from lower greenschist facies through amphibolite facies in grade. Protoliths of the metamorphic rocks include a wide range of sedimentary rocks and mafic volanic rocks (3, 5). Units mapped by Foster (5) generally strike parallel to the regional structural grain which is about N 55° W and parallel to the Tintina Trench which is a major fault zone. These units are frequently offset, left laterally, secondary, NE striking faults south of the Tintina Trench. The metamorphic rocks have been intruded by Cretaceous granitic rocks which underlay the highlands to the south of the study area (5).

The metamorphic rocks are cut and bounded by dikes and small lense shaped and masses of serpentinized ultramafic rocks which have been described by Foster and Keith (4). The ultramafic rocks are interpreted as late Paleozoic or early Mesozoic in age by Foster and Keith on the basis of deformation and distribution relative to other units for which better age control is available (4).

Foster and Keith (4) have suggested that the ultramafic rocks occurring near the Tintina Trench in the vicinity of the Seventymile River are part of a much larger feature which parallels the trench and extends southeastward into the Yukon Terriotry, Canada, and northwestward into the Charley River quadrangle, Alaska. This feature includes isolated ultramafic rocks, similar to those in the northeastern Eagle quadrangle and which all occur south of the Tintina Trench.

Younger rocks mapped in the region include Tertiary, non-marine sediments that have partially filled the Tintina Trench and other depressions. In addition to these are felsic diks and small hypabyssal intrusions which in some places cut the Tertiary sediments.

Work by the Bureau of Mines

Thirty-seven rock samples and one stream sediment sample were collected by the Bureau along the Taylor Highway near Eagle (fig. 2) and from the Flume Creek area (fig. 3) during May, 1981. Results of analyses for the elements Ag, As, Au, Co, Cr, Cu, Mo, Ni, Pb, Pd, Pt, Sn, W and Zn on select samples are presented in table 1. Three pan samples were collected from the upper Flume Creek drainage (fig. 3). Results of analyses for Au, Pd and Pt on these samples are presentd in table 2. Frozen stream beds prevented collection of panned concentrate samples from lower Flume Creek and other creeks traversed during the investigation.

No platinum or palladium were detected in any of the samples analyzed. Trace quantities of gold were detected in rock and pan samples from Flume Creek (tables 1 and 2). Analyses also indicate that very low concentrations of Au may exist in a narrow unit of mafic volcanic rocks that extend from west of Flume Creek near the Seventymile River to Alder creek farther to the east (table 1 and fig. 3).

The highest gold values detected were in samples of silica-carbonate altered rocks (table 1) from the Flume Creek prospect which was described by Saunders (7) and by Clark and Foster (3).

SUMMARY AND RECOMMENDATIONS

A brief investigation for platinum group metals was conducted in the north-central and north-eastern part of the Eagle quadrangle by the Bureau of Mines. Thirty-seven rock samples and three pan concentrate samples were analyzed for platinum, palladium and other select elements. Trace amounts of gold were detected but no platinum or palladium were detected.

The significance of earlier reported values (6) for platinum and palladium in serpentinized ultramafic rocks from the Flume Creek area remains unclear. Collection of pan concentrate samples from Flume Creek and adjacent drainages might yield more encouraging information regarding the potential for platinum metal resources in the area.

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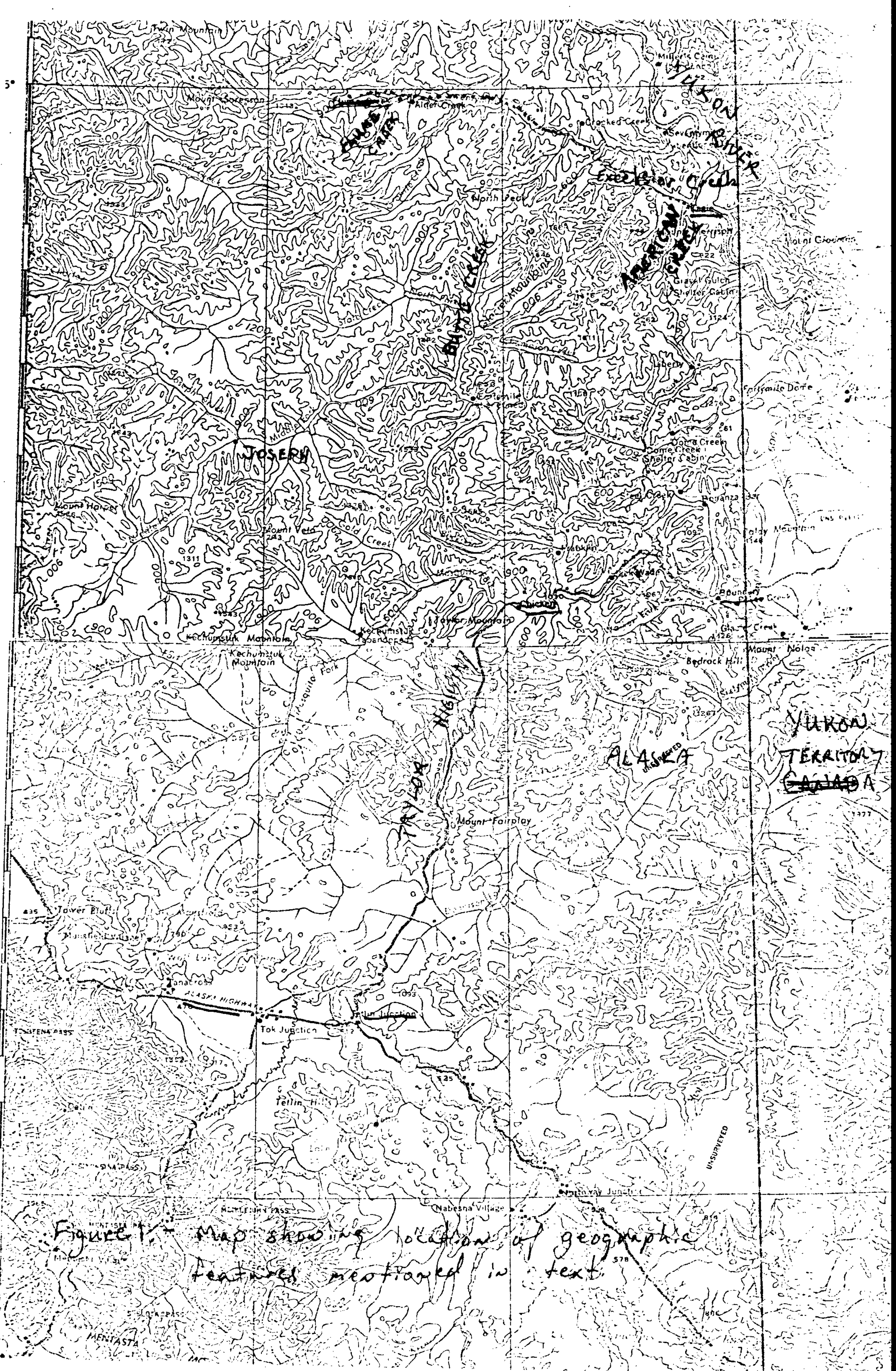

Figure 1. – Map showing location of geographic features mentioned in text.

TABLE 1. - Analyses and descriptions of rock and stream sediment samples from the northeastern Eagle Quadrangle, Alaska[1/]

Field no. EA-	Sample type	Ag	As	Au	Co	Cr	Cu	Mo	Ni	Pb	Pd	Pt	Sn	W	Zn	Description
18538	rock	0.6	--	<.0002	--	--	--	--	--	--	<0.001	<0.001	--	--	--	Serpentinized peridotite with abundant magnesite from the Boundary ultramafic body.
18540	rock	0.3	--	0.000*	--	--	--	--	--	--	<0.001	<0.001	--	--	--	Chip sample of massive, indurated serpentinite from the Columbia Creek ultramafic body.
18542	rock	0.7	--	0.000*	--	--	--	--	1450	--	<0.001	<0.001	--	--	--	Serpentinite float from road cut at head of east tributary of King Solomon Creek.
18543	rock	1.2	--	<.0002	--	--	200	--	27	--	<0.001	<0.001	--	--	--	Massive and foliated greenstone with disseminated pyrrhotite from roadcut near Discovery Fork.
18544	rock	0.7	--	<.0002	--	1485	--	--	1800	--	<0.001	<0.001	--	--	--	Serpentinized wehrlite from the American Creek ultramafic body.
18545	rock	1.7	--	0.000*	--	340	--	--	78	--	<0.001	<0.001	--	--	--	Foliated greenstone from outcrop near mouth of Discovery Fork.
18546	rock	0.7	--	0.000*	--	140	62	--	33	--	<0.001	<0.001	--	--	--	Foliated metagabbro cut by quartz and calcite veins near Discovery Fork.
18547	rock	0.3	--	0.000*	--	1405	17	--	1720	--	<0.001	<0.001	--	--	--	Serpentinized peridotite from American Creek ultramafic body.
18548	rock	0.2	--	0.000*	--	1315	9	--	1690	--	<0.001	<0.001	--	--	--	Do.
18550	rock	0.2	<10	0.000*	--	120	44	<2	36	23	<0.001	<0.001	--	--	83	Altered felsite dike in serpentinite at Flume Creek.
18552	rock	1.0	1720	0.001	54	1520	5	<2	970	14	<0.001	<0.001	--	--	31	Very fine-grained quartz and carbonate replacement in diorite from Flume Creek prospect

See footnotes at end of this table.

TABLE 1. - Analyses and descriptions of rock and stream sediment samples from the northeastern Eagle Quadrangle, Alaska

Field no. EA-	Sample type	Ag	As	Au	Co	Cr	Cu	Mo	Ni	Pb	Pd	Pt	Sn	W	Zn	Description
18554	rock	3.8	7600	0.057	29	15	54	<2	22	13	<0.001	<0.001	--	--	89	Arsenopyrite and pyrite in silica-carbonate rock from Flume Creek prospect.
18555	rock	1.0	6450	0.040	34	13	39	<2	14	15	<0.001	<0.001	--	--	100	Disseminated pyrite and arsenopyrite in fractured and strained K-feldspar and plagioclase rock with clay alteration and quartz-carbonate stockworks.
18557	rock	0.4	39	0.000*	35	115	48	<2	67	17	<0.001	<0.001	--	--	115	Aphanitic, mafic volcanic rock which transects serpentinite unit.
18558	rock	1.4	46	0.001	20	49	34	<2	33	15	<0.001	<0.001	--	--	74	Chip sample across 100 ft of mafic volcanic.
18559	rock	0.3	21	0.000*	36	12	83	<2	14	15	<0.001	<0.001	--	--	145	Disseminated pyrite in mafic volcanic.
18560	rock	1.3	23	0.000*	9	77	25	<2	49	13	<0.001	<0.001	--	--	66	Mafic volcanic with terminated quartz euledra in vugs.
18561	rock	2.5	36	0.000*	12	82	21	<2	54	15	<0.001	<0.001	--	--	67	Do.
18562	rock	0.7	32	0.000*	37	8	59	<2	15	19	<0.001	<0.001	--	--	120	Limonite in leached, red-stained volcanic unit between serpentinite and diorite near Bonanza Creek.
18563	rock	0.5	34	0.000*	36	12	64	<2	14	16	<0.001	<0.001	--	--	115	Rusty weathering, mafic volcanic west of Flume Creek.
18564	rock	0.5	39	<.0002	25	281	74	<2	51	10	<0.001	<0.001	--	--	48	Disseminated pyrhotite and quartz stockworks in aphanitic, mafic volcanic.
18565	rock	0.6	21	0.000*	37	92	67	<2	34	12	<0.001	<0.001	--	--	125	Do.
18566	rock	<0.1	<10	<0.0002	41	10	29	<2	16	16	<0.001	<0.001	--	--	120	Do.

See footnote at end of this table.

TABLE 1. - Analyses and descriptions of rock and stream sediment samples from the northeastern Eagle Quadrangle, Alaska

Field no. EA-	Sample type	Ag	As	Au	Co	Cr	Cu	Mo	Ni	Pb	Pd	Pt	Sn	W	Zn	Description
18567	rock	<0.1	19	0.001	22	64	19	<2	18	9	<0.001	<0.001	--	--	37	Serpentinite at head of Alder Creek.
18568	rock	0.4	--	0.000*	22	125	275	--	24	--	<0.001	<0.001	--	--	--	Retrograded garnet-sillimanite-amphilole schist included in serpentinite unit.
18569	rock	1.8	1300	0.040	12	6	9	<2	6	8	<0.001	<0.001	--	--	26	Iron-stained vein quartz in altered, silica-carbonate rock above adit at Flume Creek.
18570	rock	0.5	184	<.0002	2	--	7	<2	--	25	<0.001	<0.001	--	--	15	Bright orange-red stained chert from pinnacle above Flume Creek.
18571	rock	0.3	--	<.0002	--	785	13	--	1720	--	<0.001	<0.001	--	--	--	Serpentinized peridotite from roadcut in American Creek ultramafic body.
18573	rock	0.3	--	0.000*	--	240	--	--	1720	--	<0.001	<0.001	--	--	--	Do.
18600	rock	0.5	660	0.005	32	--	59	<2	--	13	<0.001	<0.001	--	--	63	Quartz vein at Flume Creek adit.
18913	sediment	--	--	--	12	--	23	<2	--	15	--	--	--	--	120	Stream sediment sample from upper Flume Creek.
18914	rock	--	--	<.0002	40	--	70	<2	--	16	<0.001	<0.001	--	--	64	Chip sample across 4 ft wide shear zone in metamorphosed clastic sedimentary rock.
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See footnote at end of this table.

TABLE 1. - Analyses and descriptions of rock and stream sediment samples from the northeastern Eagle Quadrangle, Alaska 1/

Field no. EA-	Sample type	Ag	As	Au	Co	Cr	Cu	Mo	Ni	Pb	Pd	Pt	Sn	W	Zn	Description
18921	rock	--	--	0.000*	33	--	49	--	31	--	<0.001	<0.001	--	--	--	Pyrrhotite and magnetite in greenstone.
18929	rock	--	--	0.000*	105	--	17	<2	2200	23	<0.001	<0.001	5	9	58	Abundant actinolite in altered, ultramafic dike.
18930	rock	--	--	0.001	--	--	--	--	--	--	<0.001	<0.001	--	--	--	Do.
18933	rock	--	--	<0.0002	35	--	47	<2	--	19	<0.001	<0.001	--	--	130	Random chips from a 2 ft thick, pyrite bearing lense in metamorphosed, clastic sedimentary rock.

1/. Atomic absorption analyses (ppm) of Ag, As, Co, Cr, Cu, Mo, Ni, Pb, Sn and Zn and colormetric analyses (ppm) of W by Technical Services Laboratories of Spokane, Washington. Gold, Pd and Pt analyses (oz/ton) by fire-assay inductively coupled plasma at U.S.B.M. Reno Research Center, Reno, Nevada.

Note: -- denotes not analyzed
* indicates result is near detection limit and must be interpreted accordingly.

TABLE 2. - Analyses of Pan Sample Concentrates from the Northeastern Eagle Quadrangle, Alaska[1/]

Sample No. EA-	Au	Pd	Pt	Location
18902	0.003	<0.002	<0.002	Upper Flume Creek
18908	0.010	<0.002	<0.002	Do.
18912	<0.0005	<0.003	<0.003	Do.
18915	0.007	<0.003	<0.003	Buck Creek

1/ Fire assay-inductively coupled plasma analyses by USBM Reno Research Center, Reno, Nevada. Results in oz/ton.