MINERAL INVESTIGATIONS OF THE MISHEGUK MOUNTAIN AND HOWARD PASS QUADRANGLES, NATIONAL PETROLEUM RESERVE-ALASKA

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ABSTRACT

The 1977 U.S. Bureau of Mines mineral investigation program in the National Petroleum Reserve-Alaska (NPR-A) was designed to make a preliminary evaluation of known and reported mineral showings, follow up on the U.S. Geological Survey's 1977 regional geochemical results, and sample "color" anomalies - those due to oxidation of iron.

Eighteen separate areas were examined during the 1977 field season. Significant mineralization was found at only one site, the Drenchwater Creek area, where concentrations of base metal sulfides occur in and near outcrop. The zinc-lead-silver bearing zone has been traced along strike and is at least 6,500 feet long and may possibly extend more than 10,000 feet. Minor mineralization has been found at other sites. These include fluorite at Mount Bupto, chromite at Siniktanneyak Mountain, and barite nodules near Safari Creek.

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INTRODUCTION

Public Law 94-258 (94th Congress, H.R. 49, April 5, 1976), referred to as the Naval Petroleum Reserves Production Act of 1976, transferred the administration of the Naval Petroleum Reserve Number 4 (NPR-4) from the U.S. Navy to the Department of Interior on June 1, 1977. All lands within NPR-4 were redesignated as the National Petroleum Reserve-Alaska (NPR-A). Under Section 105 (c) of the Act, the Secretary of the Interior was mandated to determine and inventory all types of resources contained with those lands (in addition to oil and gas) and to determine best uses for the lands within the reserve. To effect this mandate, a task force was formed to include representation from Department of Interior agencies including the Bureau of Mines, Bureau of Outdoor Recreation, Bureau of Indian Affairs, Geological Survey, National Park Service, Fish and Wildlife Service and the Bureau of Land Management. The task force also has representation from the state of Alaska, the North Slope Borough, and the Arctic Slope Regional Corporation. The task force, assisted by the NPR-A Planning Team which consists of seven work groups, will compile recommendations for a land use plan. These seven work groups are to compile information on Native livelihood and dependence, recreation, scenery, wilderness, fish and wildlife populations and habitat, history and archaeology, geology and hydrology, public facilities and communities, and minerals.

In 1977 the Bureau of Mines and the Geological Survey formed a study team to investigate the mineralization and the geology related to this mineralization in the northern foothills area of the Brooks Range. Field work consisted of geological mapping, geochemical sampling, aerial reconnaissance, site specific investigations and sampling. This work was helicopter supported and based out of an established river bar airstrip near the confluence of the Driftwood and Utukok Rivers near the southwest corner of the NPR-A.

This report summarizes the results of the Bureau of Mines field work and presents analytical results on samples collected. Results of assays and other technical information derived from more detailed sampling of the Drenchwater Creek area base metal sulfide prospect will be made available in a separate Bureau of Mines open-file report. Results of the 1977 work performed by the Geological Survey may be obtained from that agency.

The areas investigated in the southern NPR-A occur within the areas covered by the Misheguk Mountain and Howard Pass National Topographic Map Series (NTMS) quadrangle map sheets (1:250,000). The land boundaries of the NPR-A and outlines of the two quadrangles are shown on Figure 1.

More detailed locations of the investigated areas are shown on figures accompanying the text. In the text they are located by section, township, and range. The Umiat baseline and meridian are used for all except the southeast Siniktanneyak Mountain location for which the Kateel River baseline and meridian pertains.

The areas investigated will be discussed in groups by quadrangle.

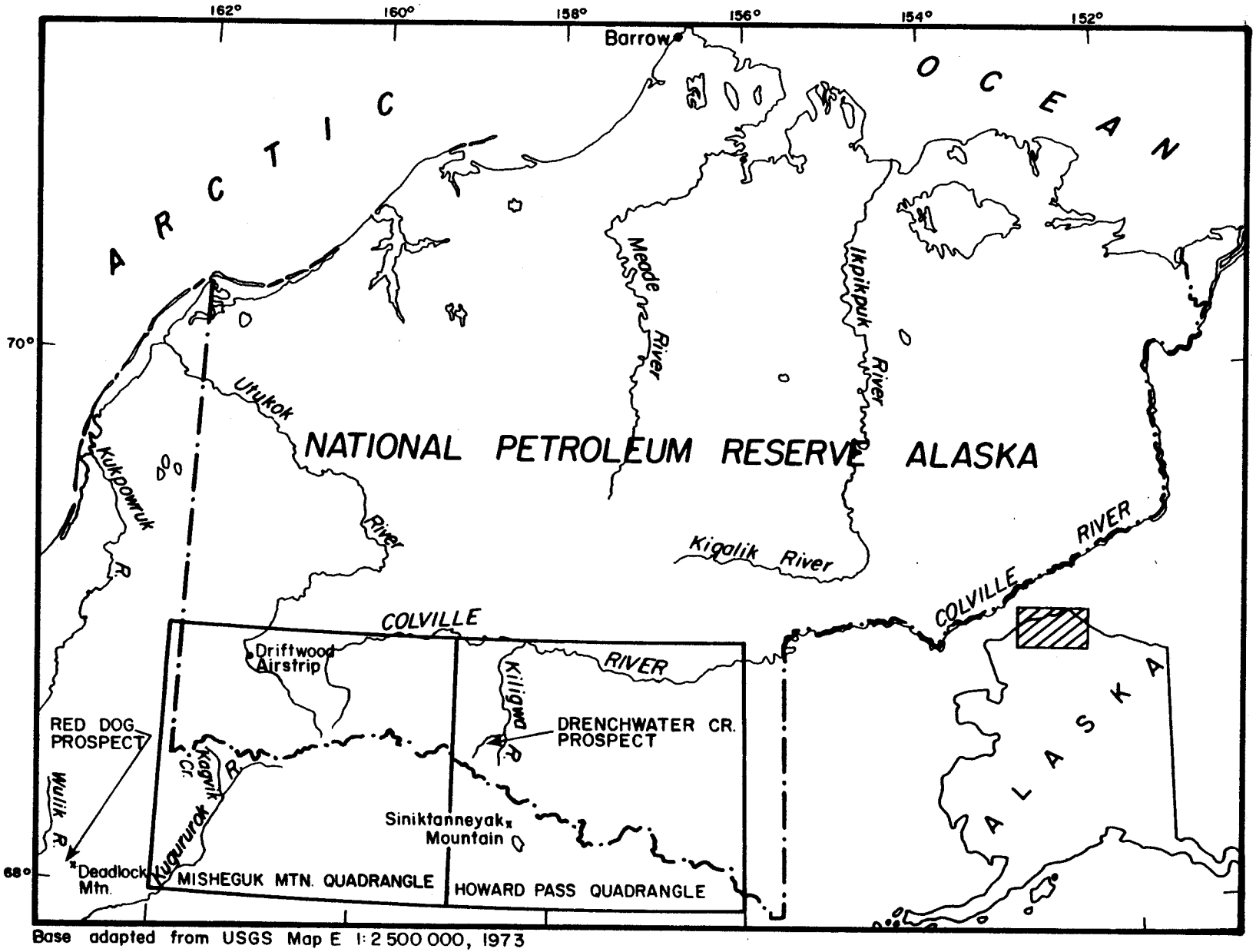

FIGURE 1.- Index map of Northern Alaska showing location of 1977 field studies related to the National Petroleum Reserve-Alaska

Analytical procedures on the samples include atomic absorption spectrophotometric work and optical emission spectrographic work. All analytical work was done by commercial laboratories in Anchorage, Alaska and Denver, Colorado using standard commercial sample preparation and analytical procedures.

MISHEGUK MOUNTAIN QUADRANGLE

The Misheguk Mountain quadrangle encompasses the area between latitudes 68° 00' N and 69° 00' N and longitudes 159° 00' W and 162° 00' W (fig. 2). Six widely separated areas of potential mineralization were investigated within this quadrangle. Significant mineralization was not found in the areas investigated but pyritiferous materials, cherts or tuffs, were identified at four sites. The geologic (stratigraphic and structural) settings of some of these areas may be similar to those at the two main known zinc and lead sulfide occurrences in the northern Brooks Range at and near the Red Dog prospect in the DeLong Mountains outside the NPR-A and at Drenchwater Creek in the NPR-A (see figure 1). Base metal sulfide occurrences or other economic mineral resource occurrences were not identified during the very brief time spent in this area. However, only a limited number of areas were field checked and further prospecting and follow-up on the regional geochemical data should be pursued.

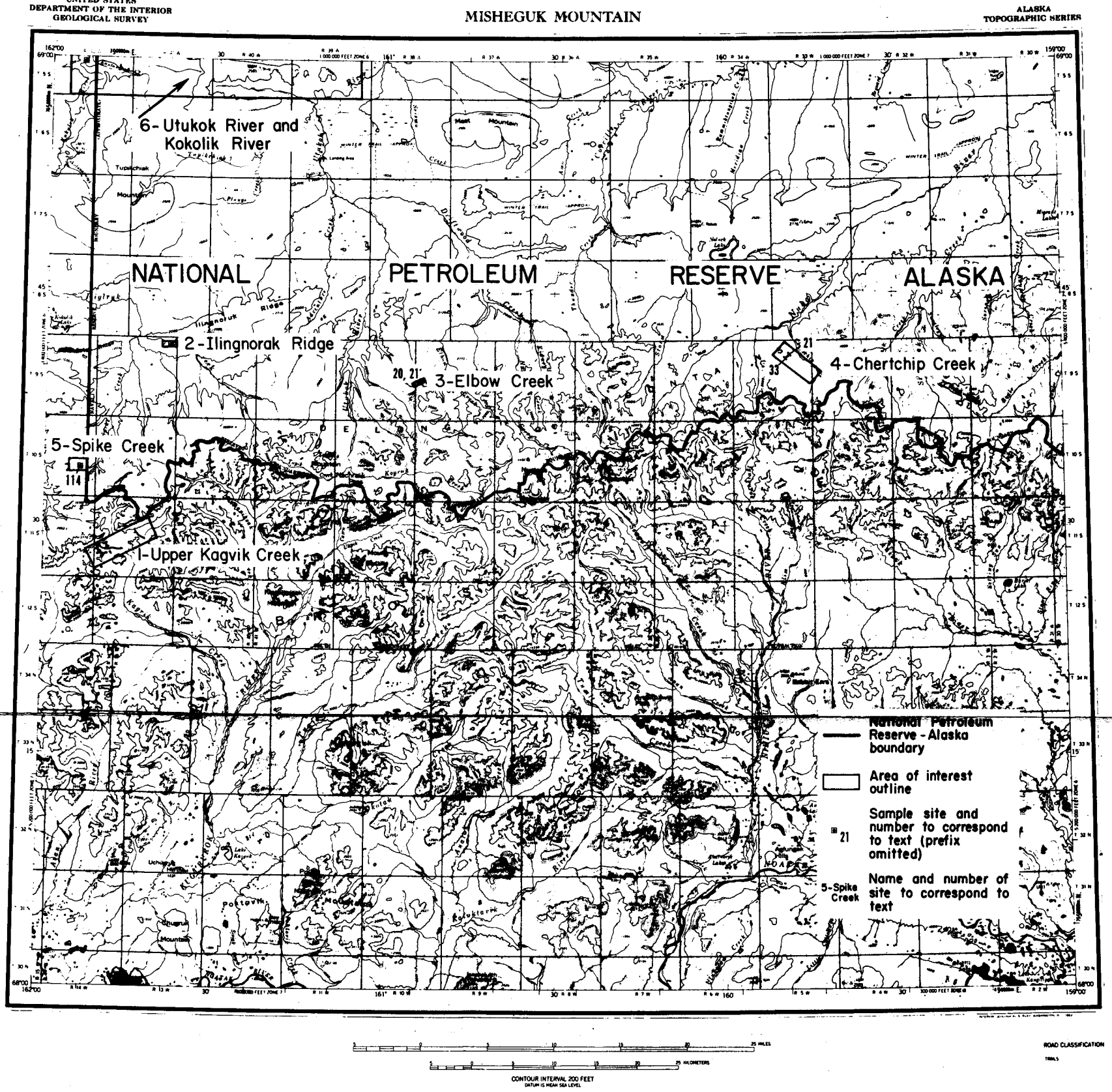

FIGURE 2.- Sites investigated by the Bureau of Mines in the Misheguk Mountain quadrangle, Alaska

1. Upper Kagvik Creek

The upper Kagvik Creek area lies in sections 15, 16, 17, 19, 20, 21, of T. 11 S., R. 42 W., outside and near the southwest corner of the NPR-A. This area was selected for initial detail sampling because the limonite color anomalies here occur in an apparently similar geologic setting to that at the Red Dog prospect located 39 miles to the southwest. The 1976 geochemical work by the Geological Survey indicated anomalous barium and minor, possibly anomalous, zinc in several samples from this area. The color anomalies are due to weathering and oxidation of pyritiferous cherts of Siksikpuk(?) Formation. The local geology appears to be complex, possibly repeating the formation by tight, overturned folding, but the strike extent of the units appears to be less complex.

Stream sediment samples were taken at closely spaced intervals in two south flowing creeks that cut across the strike of the rock units and bedrock samples were taken at two color anomalies to determine any possible sources of barium and base metals. The outcrops at the color anomalies were chip channel sampled with individual sample lengths not exceeding 100 feet.

Sample sites and sample numbers are shown in figures 3, 4, and 5 and analytical results are shown in tables 1 and 2.

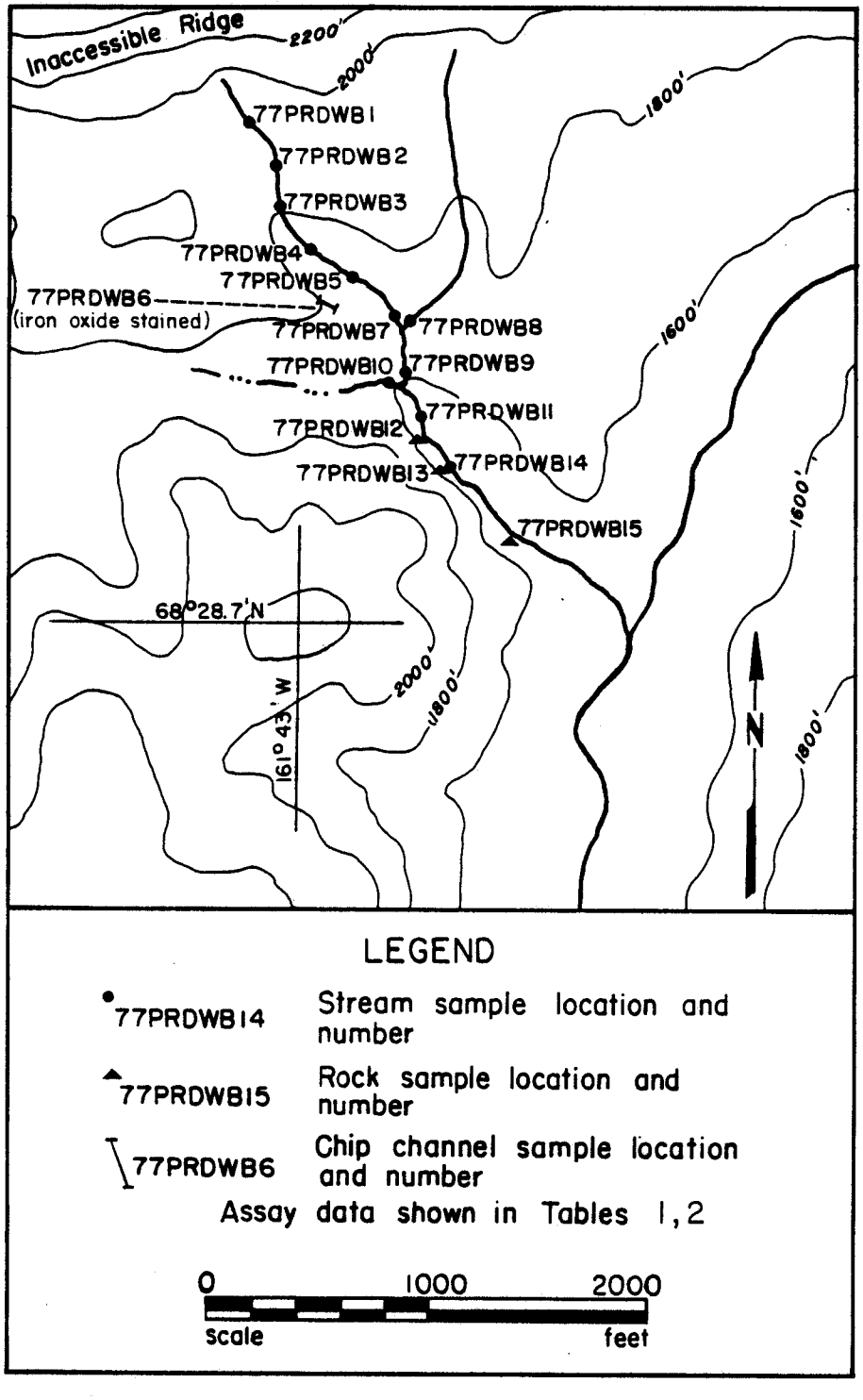

FIGURE 3.- Sketch map of stream silt and bedrock sample locations east of Kagvik Creek, Inaccessible Ridge area, Misheguk Mountain quadrangle, Alaska

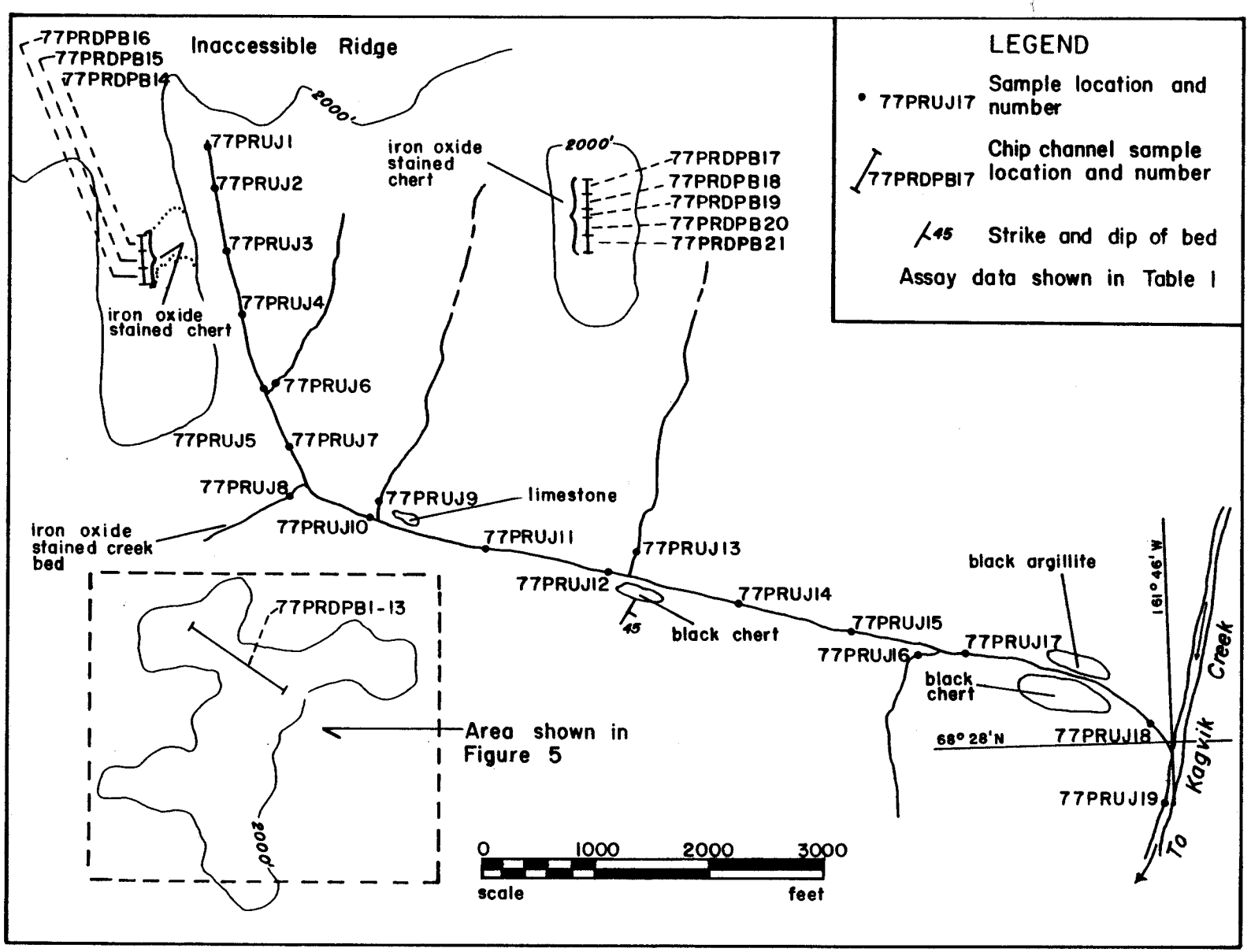

FIGURE 4.- Sketch map of stream silt and bedrock sample locations west of Kagvik Creek, Inaccessible Ridge area, Misheguk Mountain quadrangle, Alaska

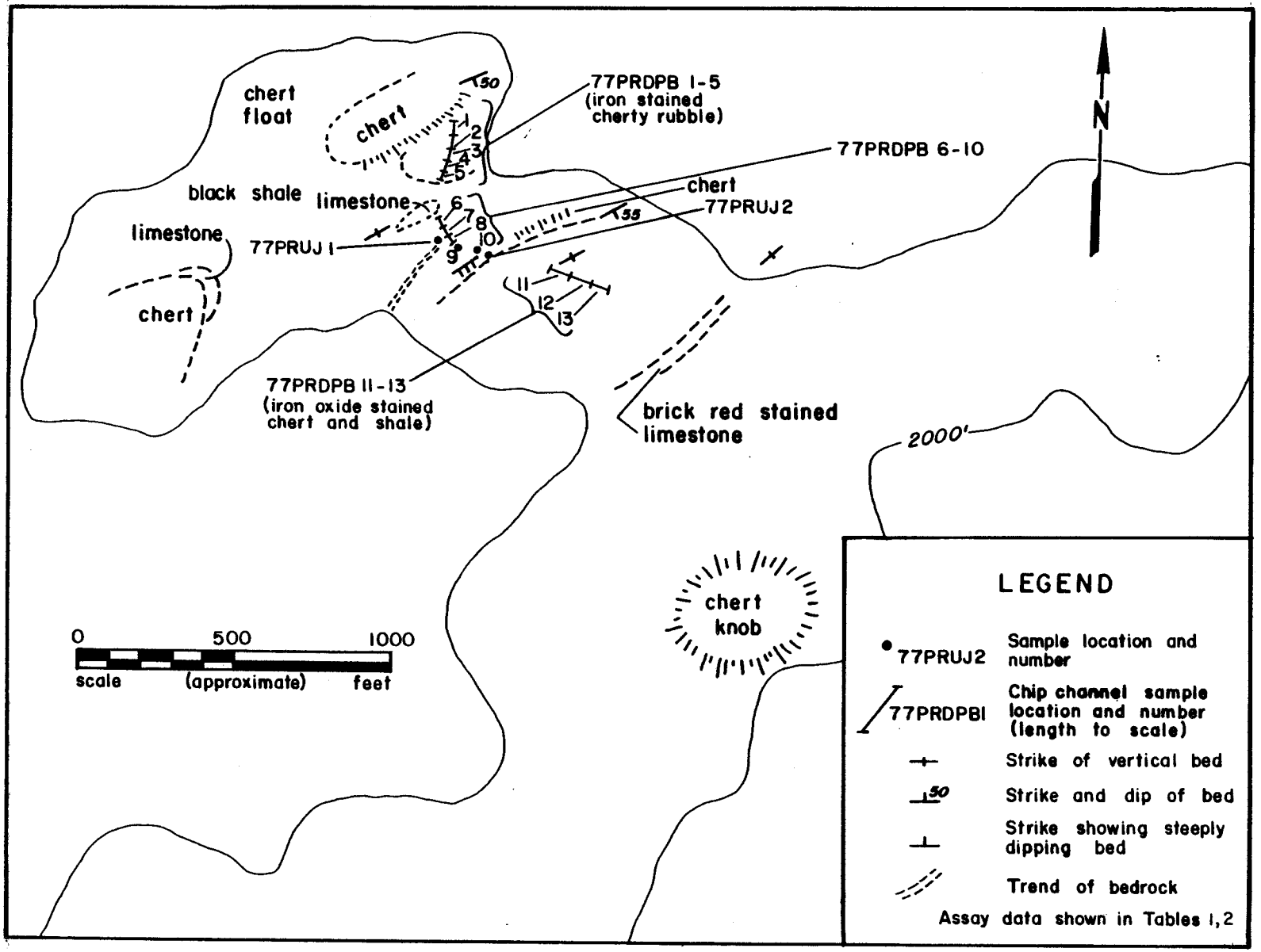

FIGURE 5.- Bedrock sample locations west of Kagvik Creek, Misheguk Mountain quadrangle, Alaska

TABLE 1. - Analytical results of Upper Kagvik Creek samples

Sample Number		Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDWB	1	80	45	175	Stream silt
	2	45	30	135	Stream silt
	3	35	35	140	Stream silt
	4	50	35	115	Stream silt
	5	55	35	120	Stream silt
	6	55	5	30	Chert
	7	70	35	145	Stream silt
	8	90	40	135	Stream silt
	9	75	35	140	Stream silt
	10	55	25	215	Stream silt
	11	80	35	185	Stream silt
	12	25	5	20	Brown chert
	13	70	35	170	Stream silt
	14	105	15	215	Black shale
	15	60	5	25	Pyritiferous chert
77 PRUJ	1	125	20	270	Stream silt
	2	130	20	310	Stream silt
	3	145	20	205	Stream silt
	4	140	20	160	Stream silt
	5	120	15	310	Stream silt
	6	150	20	255	Stream silt
	7	145	15	365	Stream silt

TABLE 1. - Analytical results of Upper Kagvik Creek samples, continued

Sample Number		Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ	8	90	25	165	Stream silt
	9	85	20	215	Stream silt
	10	130	20	470	Stream silt
	11	120	15	390	Stream silt
	12	105	15	370	Stream silt
	13	105	25	215	Stream silt
	14	105	15	340	Stream silt
	15	105	20	340	Stream silt
	16	50	25	155	Stream silt
	17	80	15	310	Stream silt
	18	80	15	280	Stream silt
	19	55	25	160	Stream silt
77 PRDPB	1	30	10	95	Light gray chert
	2	55	5	500	Light gray chert
	3	55	5	120	Gray siliceous mudstone
	4	45	5	90	Gray siliceous mudstone
	5	35	5	75	Gray chert
	6	15	10	40	Dark gray-black mudstone
	7	5	10	20	Black carbonaceous mudstone
	8	5	5	40	Black carbonaceous mudstone
	9	5	5	35	Black shale-mudstone
	10	35	5	105	Black shale-mudstone

TABLE 1. - Analytical results of Upper Kagvik Creek samples, continued

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDPB 11	25	5	20	Gray siliceous mudstone
12	55	5	30	Gray siliceous mudstone
13	45	5	80	Gray siliceous mudstone
14	60	5	40	Gray siliceous mudstone
15	50	5	65	Gray siliceous mudstone
16	70	5	70	Gray chert
17	45	5	80	Gray chert
18	55	5	55	Gray chert
19	65	5	35	Gray mudstone
20	65	5	50	Gray siliceous mudstone
21	45	5	100	Gray siliceous mudstone

TABLE 2. - Emission spectrographic results from Upper Kagvik Creek samples 1/

Elements	Sample Numbers 77PRDPB-1	77PRDPB-9	77PRDPB-13	77PRDPB-16	77PRDPB-21	77PRDWB-6	77PRDWB-12	77PRDWB-14	77PRDWB-15	77UJPR4-2
Fe	1%	1%	2%	1%	2%	1%	.7%	3%	1%	.2%
Ca	.05%	.7%	.02%	.02%	.02%	.15%	.02%	.07%	.03%	20%
Mg	.15%	.15%	.2%	.15%	.2%	.15%	.1%	.2%	.1%	1%
Ag	1	1	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
B	30	30	20	20	20	20	20	30	15	10
Ba	5,000	1,000	5,000	10,000	10,000	10,000	2,000	>10,000	10,000	500
Be	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Co	<5	<5	<5	<5	<5	<5	5	15	<5	<5
Cr	100	150	70	70	70	50	100	50	70	30
Cu	50	10	50	50	50	50	20	100	50	5
Ga	<10	<10	<10	<10	<10	<10	<10	10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
La	30	30	20	20	20	30	30	20	30	20
Mn	15	20	200	500	100	3,000	70	1,000	700	700
Mo	2	2	<2	<2	<2	2	2	<2	<2	<2
Nb	20	20	<20	<20	<20	<20	<20	<20	<20	<20
Ni	15	15	20	15	20	15	20	100	10	10
Pb	15	10	10	<10	<10	<10	<10	<10	<10	10
Sb	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sc	10	<10	10	10	10	15	10	20	15	<10
Sn	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sr	50	70	50	50	100	70	50	150	200	1,000
Ti	1,500	1,000	1,000	500	1,000	700	500	2,000	500	200
V	100	100	50	50	50	70	50	70	20	20
W	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Y	20	10	10	<10	10	20	10	20	<10	10
Zn	<200	<200	<200	<200	<200	<200	<200	200	<200	<200
Zr	50	50	50	30	50	50	50	70	50	20

1/ Values in ppm unless otherwise noted.

2. Ilingnorak Ridge

The area investigated on Ilingnorak Ridge is located in section 1, T. 9 S., R. 42 W.

Red and yellow stained zones on this ridge were noted while on helicopter trips to investigate other areas of mineralization. The mapped rock units in this area are Cretaceous sedimentaries, but a field check was made nevertheless. These color anomalies, which have very limited surface extent, are confined to a carbonate cemented greywacke to impure sandstone and they are due to hematite matrix cementing of sand grains. Samples were not taken.

3. Elbow Creek

The Elbow Creek area is located in sections 18 and 19, T. 9 S., R. 38 W.

After the sampling of the upper Kagvik Creek area, an effort was made to look to the northeast for strike extensions of pyritiferous cherts in the NPR-A. The helicopter reconnaissance from upper Kagvik Creek led to an area of similar color anomalies 25 miles to the northeast near the headwaters of Elbow Creek. Here, a dark gray, brown weathering chert, a pyritiferous chert, tuffs(?), and a thin, one to two foot thick zone of bedded pyritiferous tuff were located and sampled.

A list of samples, their base metal content, as well as a general sample description are given in tables 3 and 4.

TABLE 3 - Analytical results of Elbow Creek samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 20	5	<5	5	Chert
21	125	5	285	Gray siliceous banded mudstone (tuff?) with pyrite

TABLE 4. - Emission spectrographic results from an Elbow Creek sample 1/

Element	Sample Number 77PRUJ-21
Fe	3%
Ca	.07%
Mg	.5%
Ag	1
As	<500
B	20
Ba	10,000
Be	<2
Bi	<10
Cd	<50
Co	20
Cr	30
Cu	100
Ga	10
Ge	<20
La	20
Mn	500
Mo	2
Nb	20
Ni	50
Pb	10
Sb	<100
Sc	20
Sn	<10
Sr	150
Ti	3,000
V	100
W	<50
Y	15
Zn	200
Zr	70

1/ Values in ppm unless otherwise noted.

4. Chertchip Creek

The Chertchip Creek investigations were performed in sections 11 and 24, T. 9 S., R. 34 W.

A striking limonite color anomaly near the headwaters of Chertchip Creek is formed by weathering and oxidation of a pyritiferous gray chert. Field follow-up in this area was undertaken because of the similarity of this color anomaly to those near the Drenchwater Creek chert-related base metal sulfide occurrences located 27 miles to the east.

A field investigation was made of the light-gray pyritiferous chert but base metal sulfides were not found. During a helicopter reconnaissance, an area of outcropping black graphitic shales and mudstones was identified in a tributary to Chertchip Creek. Previous work at Drenchwater Creek showed anomalous base metal concentrations and a two-foot thick sphalerite bearing bed in shales underlying pyritiferous cherts. The black shales and siliceous mudstones near Chertchip Creek were chip channel sampled for geochemical analysis to determine if any anomalous base metal concentrations are present.

A list of samples, their base metal content, as well as a general rock description are given in table 5.

TABLE 5. - Analytical results of Chertchip Creek samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDWB 21	5	5	10	Black Shale
21-A	10	<5	20	Siliceous pyrite nodule in black shale
22	30	<5	15	Pyritiferous gray chert
23	45	5	20	Pyritiferous gray chert
24	10	<5	20	Gray siliceous argillite
25	5	<5	20	Black Shale
26	30	<5	50	Pyritiferous black siliceous mudstone
27	25	<5	75	Mudstone and black pyritiferous chert
28	50	5	95	Pyritiferous black chert and mudstone
29	10	5	15	Black Shale
30	5	<5	5	Black siliceous mudstone
31	15	<5	15	Black siliceous mudstone
32	15	<5	30	Iron stain zone; dolomite
33	25	15	265	Concretion; dolomite

5. Spike Creek

The area investigated at Spike Creek is located in section 23, T. 10 S., R. 43 W. It is about six miles north of the Upper Kagvik Creek sample sites.

The limonite color anomaly here results from the weathering and oxidation of pyritiferous cherts. The local stratigraphic section in the area appears to be similar to that at the Red Dog prospect, which is located about 41 miles to the southwest.

One sample of pyritiferous gray chert was taken for chemical analysis to determine its elemental content and for comparison with other red weathering pyritiferous cherts in this area. Results are given in table 6.

TABLE 6. - Emission spectrographic results of the Spike Creek sample 1/

Element	Sample Number 77PRUJ-114
Fe	1%
Ca	.1%
Mg	.2%
Ag	1
As	<500
B	20
Ba	2,000
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	10
Cu	15
Ga	<10
Ge	<20
La	20
Mn	50
Mo	=2
Nb	<20
Ni	10
Pb	10
Sb	<100
Sc	<10
Sn	<10
Sr	50
Ti	500
V	20
W	<50
Y	<10
Zn	<200
Zr	20

1/ Values in ppm unless otherwise noted.

6. Utukok River - Kokolik River

The areas overflown during the coal reconnaissance are located in T. 3, 4, 5 S., and R 39, 40, 41, 42 W.

Thin coal beds are reported in the upper reaches of the Utukok and Kokolik Rivers in U.S. Geological Survey Professional Paper 303-C (1) 3/. A brief helicopter reconnaissance of the upper Utukok and Kokolik Rivers was made to see if coal exposures could be readily identified and sampled. Coal beds were not noted from the air, and one field check was made. A dark gray shale rather than coal was found at this site.

3/ Underlined numbers in parenthesis refer to references listed in the back of this report.

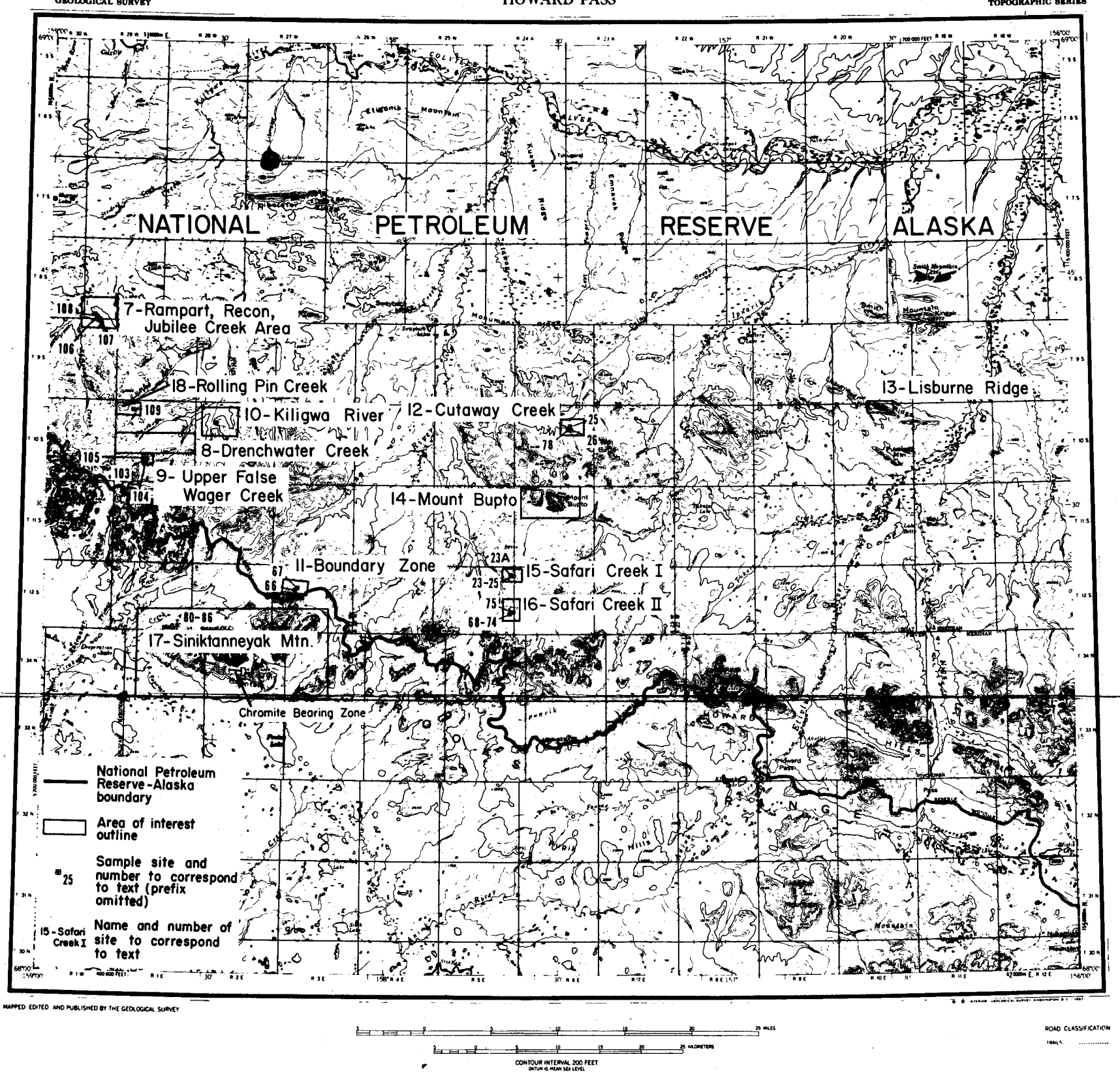

FIGURE 6.-| Sites investigated by the Bureau of Mines in the Howard Pass quadrangle, Alaska

7. Rampart, Recon and Jubilee Creeks

The Rampart, Recon, and Jubilee Creek area is located in section 31, T. 8 S., R. 29 W.

Limonite stained zones occur along much of the length of an unnamed creek located between Recon and Rampart Creeks; all three are tributary to Jubilee Creek from the east. This area is 10 miles north-northwest from the known sulfide mineralization at Drenchwater Creek where chert of similar aspect contains zinc and lead sulfide mineralization. Therefore, these color anomalies were sampled to determine their base metal content. Only pyrite was noted in the cherts. This chert unit is "tough" and resistant to weathering and erosion and, to a large extent, controls the stream channel location.

Two chip channel samples, representing part of the chert bed, were taken. These were located a short distance (200 to 400 feet) upstream from the area of the confluence of the unnamed creek and Jubilee Creek. A stream silt sample was taken to determine if any base metal values are entering the stream above the area of the chip channel sampling. The analytical results show no highly anomalous base metal content in this sample.

A list of all samples taken, their base metal content, as well as a general rock description are given in tables 7 and 8.

TABLE 7. - Analytical results of the Rampart, Recon, and Jubilee Creek samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 106-A	30	45	110	Black pyritiferous chert
106-B	30	5	35	Black pyritiferous chert
107	95	15	190	Stream silt
108	30	5	30	Black pyritiferous chert; stratigraphically above 106

TABLE 8. - Emission spectrographic results of Rampart, Recon, and Jubilee Creek samples 1/

Element	Sample Number 77PRUJ 106	77PRUJ 108
Fe	1%	1%
Ca	.05%	.03%
Mg	.1%	.1%
Ag	1	1
As	<500	<500
B	20	20
Ba	3,000	1,500
Be	<2	<2
Bi	<10	<10
Cd	<50	<50
Co	<5	<5
Cr	30	50
Cu	300	100
Ga	<10	<10
Ge	20	20
La	20	20
Mn	50	50
Mo	2	2
Nb	<20	<20
Ni	10	10
Pb	30	10
Sb	<100	<100
Sc	<10	<10
Sn	20	<10
Sr	<50	50
Ti	300	300
V	100	70
W	<50	<50
Y	<10	<10
Zn	<200	<200
Zr	20	20

1/ Values in ppm unless otherwise noted.

8. Drenchwater Creek

The Drenchwater Creek mineralized area lies principally in sections 15 and 16, T. 10 S., R. 29 W.

Interest in the Drenchwater Creek area resulted from verbal reports from the Geological Survey that anomalous base metal and barium values were obtained in samples collected in this area in 1975. The highest analytical values were barium rather than base metals, but one of the metal values was highly anomalous in lead (3,000 ppm) and warranted follow-up.

A revisit to this area by the Geological Survey in 1977 included limited prospecting which led to the discovery of a siliceous two foot bed(?) containing sphalerite in black shales which apparently underlie pyritiferous tuffs(?) and cherts.

With this information in hand, the Bureau of Mines decided to chip channel sample all "stratigraphic" units along Drenchwater Creek near the mineralized zone (see figures 9, 10, 11).

Later visits to the area were made to prospect and sample "felsites", volcanics, and a group of outlined but unmapped (unidentified?) units on several ridges immediately to the east of the Drenchwater Creek showings as shown on the 1966 geologic map of the NPR-A (5).

During the course of the 1977 Bureau of Mines investigations and sampling activity, the Geological Survey mapped the area in detail (1:20,000). On the basis of the results of the detailed geologic mapping, it was decided to prospect the eastward strike extensions of the black shale and pyritiferous chert units from Drenchwater Creek, including the mapped area.

A brown limonite stained creek bed was noted in a small northwest flowing tributary to Drenchwater Creek and it was followed to locate the source of the iron. Prospecting in this area revealed gossan and boxworks that represented leached base metal sulfides in what had been identified as a "pyritic" zone in mapping in the 1960's. Sphalerite, minor galena, lesser pyrite and traces of fluorite were found in place. This mineralization is present at the top(?) of the acid volcanic sequence and is spatially closely associated with the overlying(?) siliceous gray mudstone. Analytical results of these sulfides are presented in table 12.

This second zone of sulfide mineralization presented another stratigraphic horizon above the black shales for further prospecting and exploration. Subsequently, several zones of pyrite bearing float were found in a similar stratigraphic position while tracing this horizon to the east. Galena bearing boxworks were discovered and sampled approximately 4,000 feet to the east of the sulfide outcrop. At the water level of Drenchwater Creek, dark gray cherts that overlie the black shales and mudstones, and are found at the base of the volcanic section, contain pyrite, sphalerite and galena mineralization.

In summary the mineral bearing zone has been traced along strike and is at least 6,500 feet long and may possibly extend more than 10,000 feet. It contains at least three specific mineralized areas and three types of base metal sulfide mineral and rock associations. The stratigraphically lowest mineralized unit is a black shale in which a 2 foot sphalerite bed, or lens, containing 230,000 ppm (about 23%) zinc has been found. These black shales also contain geochemically anomalous lead. The second zone of mineralization containing "massive" sulfides appears to be at or near the top of a thin, south dipping acid volcanic tuff sequence, which is several hundred feet higher stratigraphically than the mineralized black shales. The highest grade assay of the massive sulfides shows the presence of 8.4% Pb and 31% Zn. The third zone is a dark gray chert bed at Drenchwater Creek which contains up to 5.1% Pb and 11.0% Zn. These mineralized cherts apparently overlie shales and underlie the felsic tuffs.

The distribution of volcanic units and the known related zones of mineralization are shown on figure 7. Other sketch geologic maps and sections of the Drenchwater Creek area are presented in figures 8, 9, 10, and 11.

A generalized stratigraphic section along Drenchwater Creek is described in table 9.

Analytical results of Drenchwater Creek area samples appear in tables 11, 12, and 13.

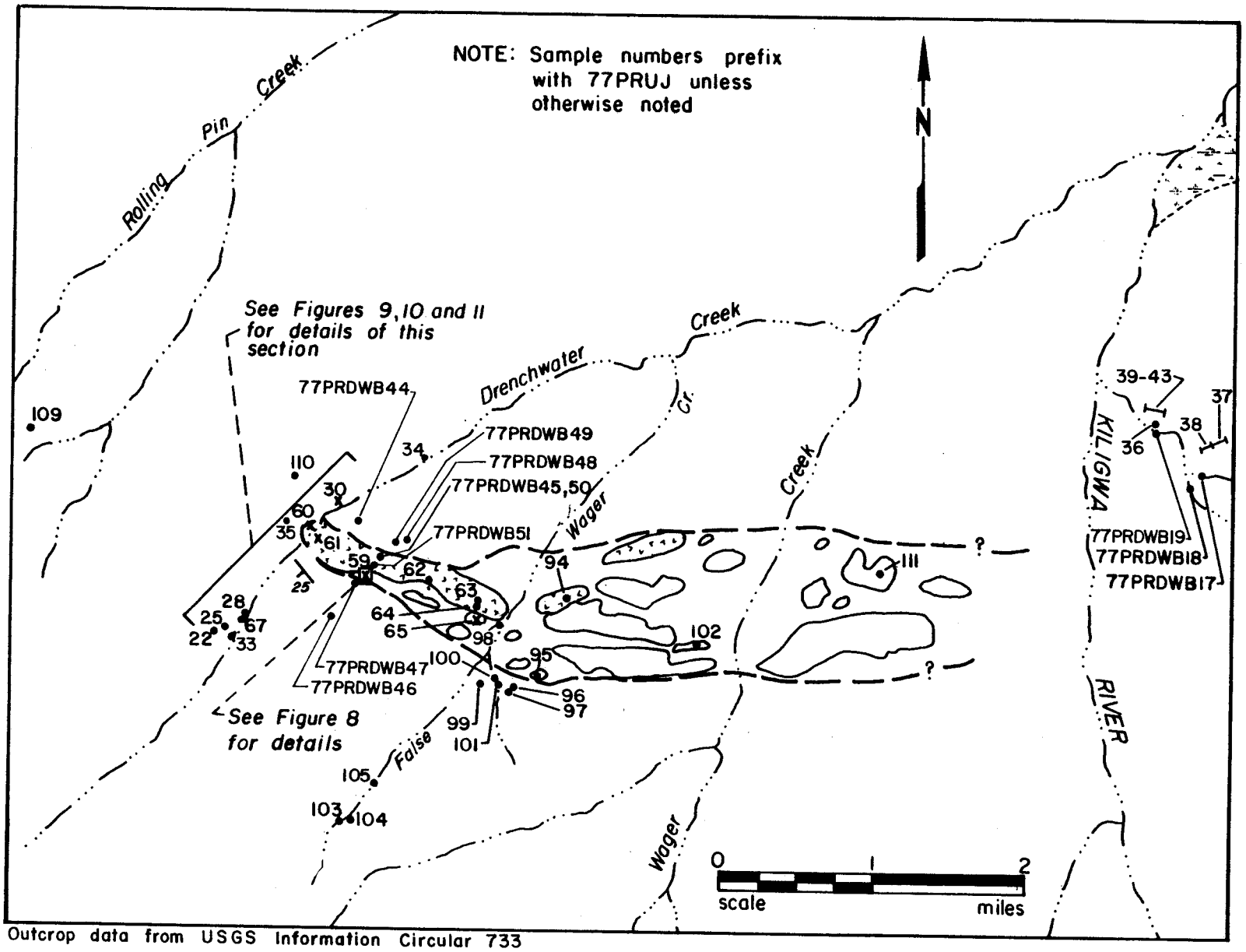

FIGURE 7.- Relation of mineralized zones to felsic rocks, and selected sample locations, Drenchwater Creek area, Howard Pass quadrangle, Alaska

LEGEND

• 77PRUJ21	Sample location and number	———	Outline of occurrences of volcanic rocks
77PRUJ30	Chip channel sample location and number		Felsites
x	Zones of known base metal sulfide occurrences		Unidentified rock type, possibly felsites
25	Strike and dip of bed		Marsh

Assay data shown in Tables 10,11

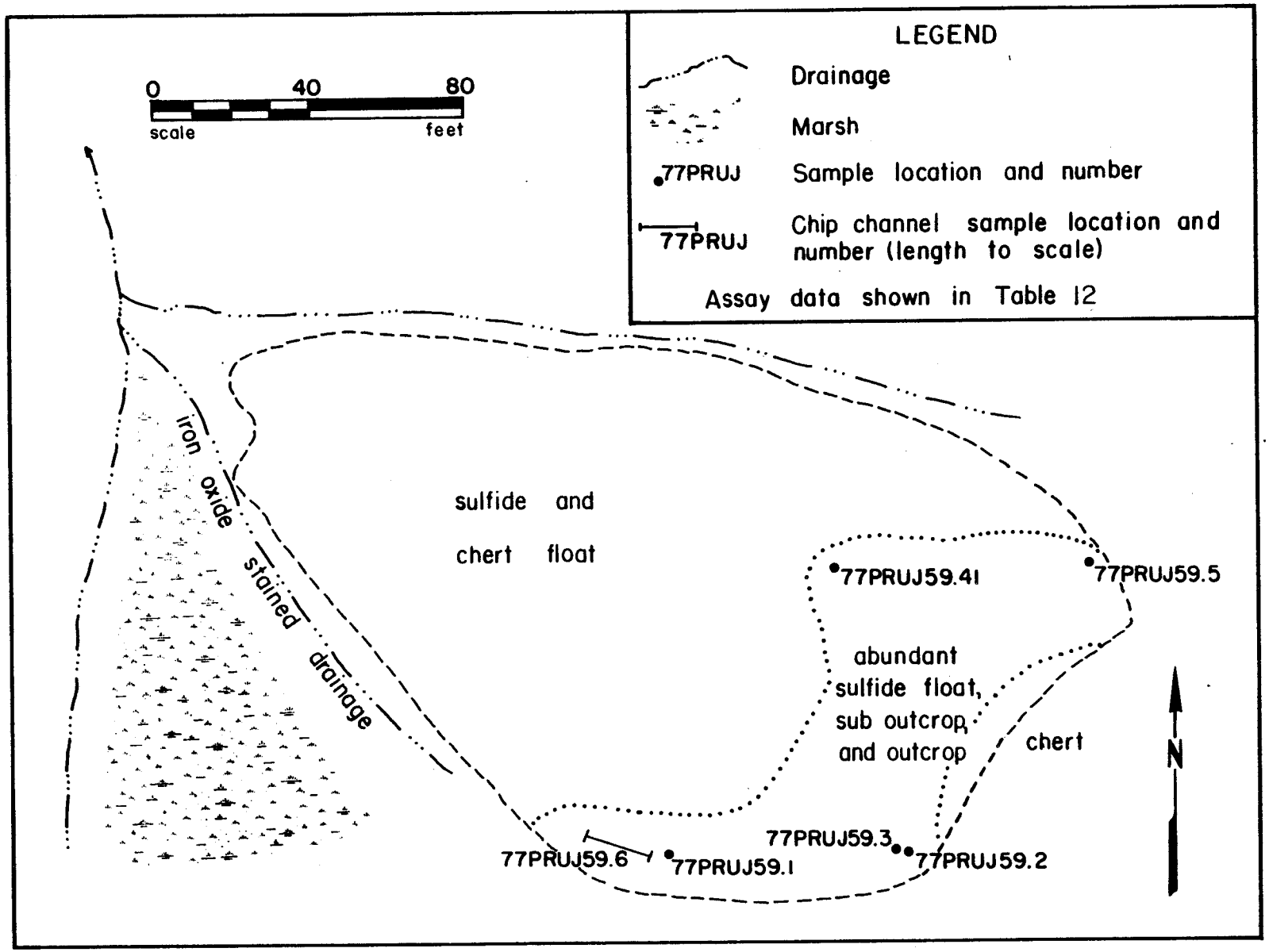

FIGURE 8.- Sample location map of massive sulfides, Drenchwater Creek, Howard Pass quadrangle, Alaska

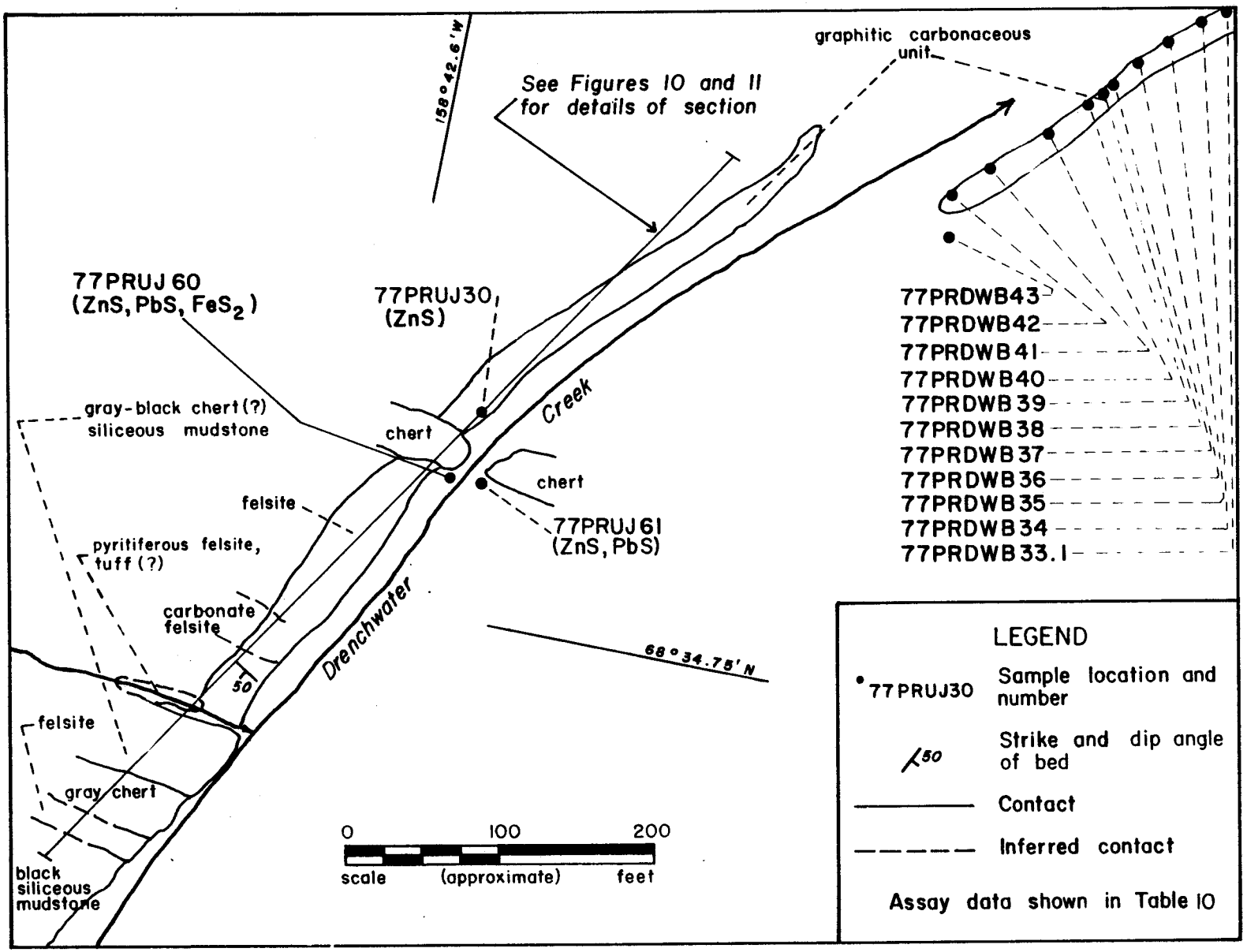

FIGURE 9.- Generalized geology, mineral occurrences and sample locations--Drenchwater Creek, Howard Pass quadrangle, Alaska

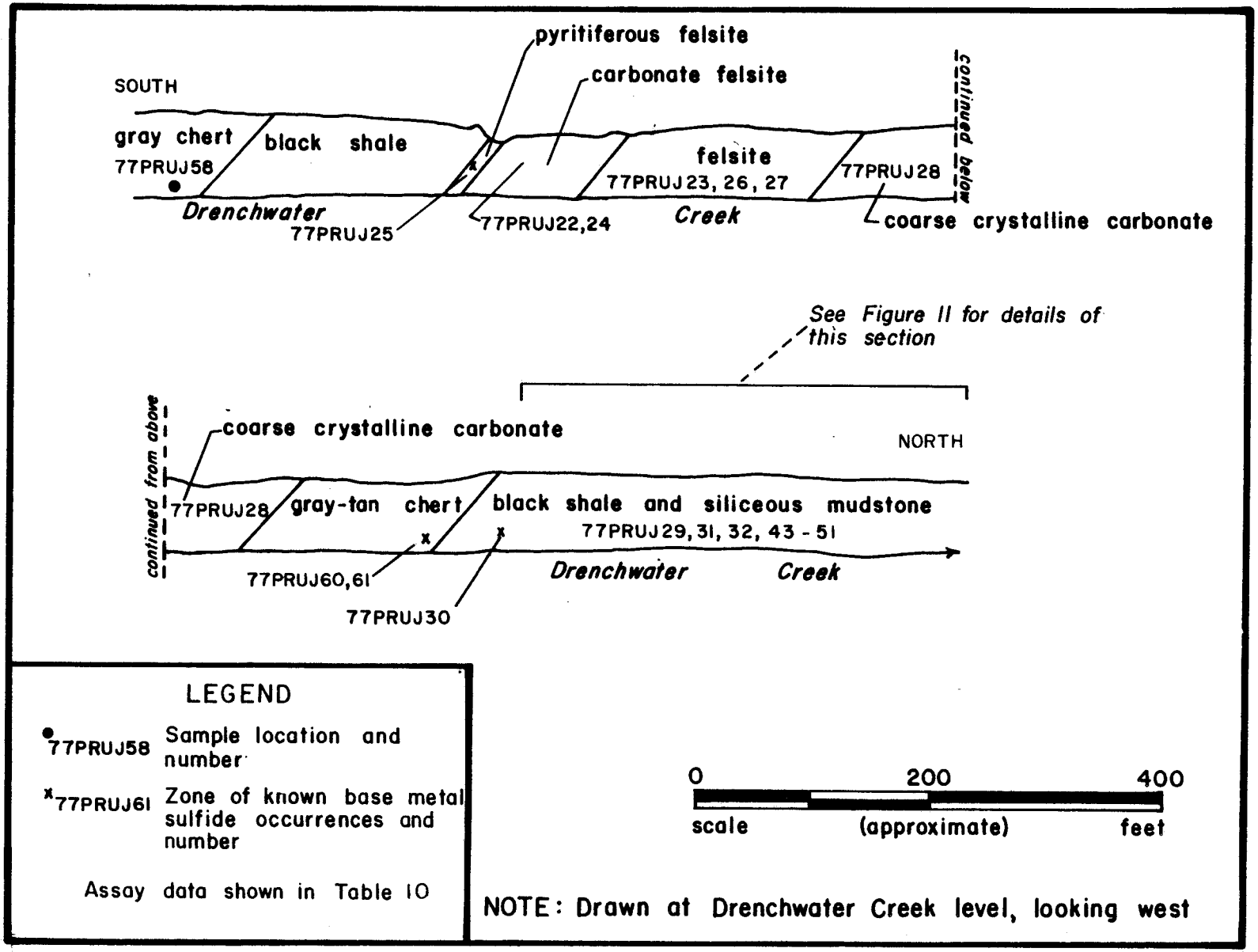

FIGURE 10.- Schematic geologic section and samples of rock units, Drenchwater Creek, Howard Pass quadrangle, Alaska

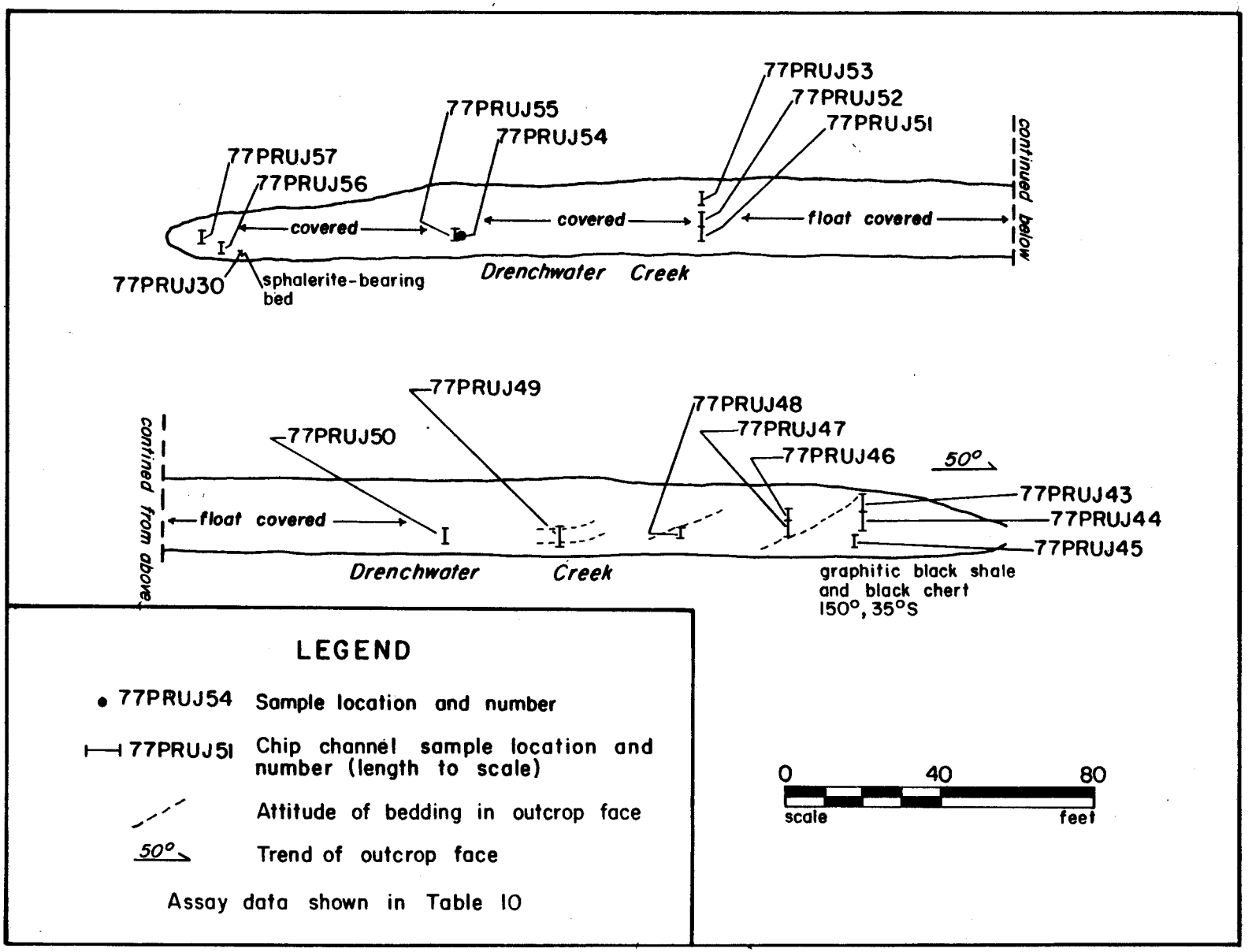

FIGURE 11.- Drenchwater Creek black shale outcrop

TABLE 9. - Generalized stratigraphic section at Drenchwater Creek Mineralized area

Rock Type	Sample Number
Dark gray, siliceous mudstone Felsite Gray chert Dark gray to black chert	77PRUJ 58
Felsite Unit	
Pyritiferous felsite	77PRUJ 25
Carbonate felsite tuff	77PRUJ 22, 24
Felsite	77PRUJ 23, 26, 27
Coarse crystalline limestone	77PRUJ 28
Tan weathering gray chert	77PRUJ 35
Pyrite with sphalerite, and galena	77PRUJ 60, 61
Graphitic/Carbonaceous Unit	
Graphitic mudstone and shale	77PRUJ 29-32 77PRUJ 43-57

TABLE 10. - Analytical results of Drenchwater Creek area samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 22	55	25	60	Pyritiferous gray carbonate tuff(?)
23	20	65	5	Rhyolite tuff
24	80	95	35	Gray brecciated carbonate
25a	70	100	5	Pyrite (30%) in tuff(?)
25b	30	150	20	Gray clastic volcanic with shards
26	5	155	5	Pyritiferous chert
28	5	20	75	Carbonate tuff
29	5	220	25	Gray siliceous mudstone
30	1,150	105	230,000	Sulfides in black siliceous mudstone
31	5	520	80	Gray graphitic shale-mudstone
32	5	150	25	Black carbonaceous mudstone
33	140	720	150	Stream silt
34	85	25	320	Pan concentrate; Pyritiferous black shale
35	5	125	5	Banded pyritiferous chert
36	105	5	75	Gray-black siliceous mudstone
37	100	5	45	Gray chert
38	65	5	45	Light gray mudstone
39	45	5	60	Gray-black pyritiferous chert

TABLE 10. - Analytical results of Drenchwater Creek area samples, continued

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 41	55	5	45	Dark gray-black chert
42	65	5	45	Gray chert
43	5	125	5	Carbonaceous mudstone-shale
44	5	50	5	Carbonaceous mudstone-shale
45	5	120	10	Carbonaceous mudstone-shale
46	5	125	5	Carbonaceous mudstone-shale
47	5	75	15	Siliceous carbonaceous mudstone-shale
48	5	110	30	Siliceous carbonaceous mudstone-shale
49	5	275	35	Carbonaceous mudstone-shale
50	5	960	40	Carbonaceous mudstone-shale
51	15	1,150	55	Gray siliceous mudstone
52	5	435	40	Gray siliceous mudstone
53	10	550	20	Black carbonaceous shale
54	5	340	60	Black siliceous mudstone
55	10	360	95	Black siliceous mudstone
56	10	195	50	Black siliceous mudstone
57	15	585	45	Black siliceous mudstone

TABLE 10. - Analytical results of Drenchwater Creek area samples, continued

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 60	65	1,500	47,000	Main sulfide zone
61	80	51,000	110,000	Sulfides in chert
62	5	70	250	Volcanic rock
63	5	60	80	Volcanic flow breccia(?)
65	45	1,500	4,100	Boxworks zone
94	5	55	10	Volcanic agglomerate with chert fragments
95	25	40	160	"Soil"
97	20	50	120	Volcanic rock
98	60	195	130	Stream silt
100	15	55	40	Pyritiferous volcanic
101	135	20	950	Stream silt
102	5	20	40	Pyritiferous volcanic grit with chert fragments
110	40	40	50	Limonite stained
111	30	65	90	Volcaniclastic rock
77 PRDWB 33.1	50	20	105	Black mudstone
34	25	10	625	Black shale
35	55	5	120	Black shale
36	5	35	75	Black mudstone
37	5	40	75	Black mudstone
38	55	50	715	Pyritiferous limestone concentrations in black shale
39	5	80	10	Black shale

TABLE 10. - Analytical results of Drenchwater Creek area samples, continued

Sample Numbers	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDWB 40	5	420	50	Black shale
41	5	5	5	Black siliceous mudstone
42	5	280	5	Fissile black shale
43	5	125	5	Fissile black shale
44	105	135	250	Stream silt
45	55	355	185	Stream silt
46	30	5	75	Stream silt
47	55	35	70	Stream silt
48	45	180	670	Stream silt
49	10	270	1,000	Stream silt
50	15	565	75	Stream silt
51	40	1,300	180	Stream silt

TABLE 11. - Emission spectrographic results from Drenchwater Creek area samples 1/

Element	Sample Numbers									
	77PRUJ-25	77PRUJ-29	77PRUJ-31	77PRUJ-35	77PRUJ-43	77PRUJ-49	77PRUJ-50	77PRUJ-51	77PRUJ-53	77PRUJ-55
Fe	5%	.5%	.3%	1%	.3%	.2%	.3%	.3%		
Ca	.1%	.02%	.5%	.02%	.02%	.03%	.02%	.05%		
Mg	.03%	.03%	.03%	.02%	.05%	.03%	.05%	.03%	.07%	.05%
Ag	<1	1.5	2	1	2	1	3	2	5	2
As	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
B	10	10	10	10	10	10	10	10	20	10
Ba	100	200	30	20	200	20	30	30	200	500
Be	2	2	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	10	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	50	<50	<50	<50	<50	<50	<50	<50	<50
Co	5	5	<5	<5	<5	<5	<5	<5	<5	<5
Cr	200	150	100	30	150	150	200	100	150	150
Cu	30	200	10	7	20	5	3	15	20	10
Ga	10	<10	<10	10	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	20	<20	<20	<20
La	100	20	20	100	50	20	30	30	50	20
Mn	150	10	<10	10	10	15	<10	<10	<10	<10
Mo	2	7	3	<2	10	2	2	2	10	2
Nb	50	<20	<20	70	<20	<20	<20	<20	<20	<20
Ni	20	15	20	<5	30	15	50	5	20	20
Pb	100	100	150	100	70	70	200	200	300	150
Sb	<100	<100	100	<100	<100	<100	<100	<100	<100	<100
Sc	20	10	<10	<10	<10	<10	<10	<10	<10	<10
Sn	10	10	<10	<10	<10	<10	<10	<10	<10	<10
Sr	50	50	<50	<50	<50	<50	<50	<50	<50	<50
Ti	3,000	300	200	300	500	100	300	150	500	200
V	200	50	100	20	150	70	100	50	100	100
W	50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Y	15	<10	<10	<10	<10	<10	<10	<10	<10	<10
Zn	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Zr	50	20	20	100	30	20	30	20	50	20

1/ Values in ppm unless otherwise noted.

TABLE 11. - Emission spectrographic results from Drenchwater Creek area samples 1/, continued

Element	Sample Numbers							
	77PRUJ-57	77PRUJ-61	77PRUJ-62	77PRUJ-63	77PRUJ-65	77PRUJ-96	77PRUJ-101	77PRUJ-102
Fe	.5%	1.5%	3%	.2%	2%	3%	2%	.7%
Ca	.02%	.02%	.2%	5%	.05%	1.5%	.15%	3%
Mg	.03%	.02%	.15%	.03%	.03%	1%	.2%	.03%
Ag	3	20	1	1	10	1	1	1
As	500	500	500	500	500	500	500	500
B	10	10	10	10	15	10	50	10
Ba	50	100	1,000	15	200	1,000	10,000	10
Be	2	2	2	2	2	2	2	2
Bi	10	10	10	10	10	10	10	10
Cd	50	200	50	50	50	50	50	50
Co	5	20	5	5	5	5	50	5
Cr	200	20	10	10	10	50	100	50
Cu	30	150	7	20	50	15	100	10
Ga	10	10	10	10	10	10	10	10
Ge	20	30	20	20	20	20	20	20
La	20	20	100	100	50	70	20	100
Mn	10	10	500	1,000	15	700	10,000	500
Mo	2	50	2	2	2	2	2	2
Nb	20	20	30	50	20	20	20	50
Ni	15	20	5	5	5	10	200	5
Pb	200	10,000	150	100	700	20	15	20
Sb	100	100	100	100	100	100	500	100
Sc	10	10	10	10	10	10	10	10
Sn	10	10	10	10	10	10	10	10
Sr	50	50	500	50	50	1,000	200	100
Ti	100	20	2,000	3,000	500	2,000	1,000	3,000
V	100	50	50	30	20	70	100	70
W	50	50	50	50	50	50	50	50
Y	10	10	20	20	10	10	15	20
Zn	200	10,000	200	200	1,500	200	700	200
Zr	20	20	70	100	50	50	50	70

1/ Values in ppm unless otherwise noted.

TABLE 12. - Chemical analyses of massive sulfides from Drenchwater Creek area

Sample Number	Elements Analyzed								
	Cu (%)	Pb (%)	Zn (%)	Fe (%)	Ba (%)	Au (ppm)	Ag (ppm)	As (ppm)	Mo (ppm)
Petroleum Reserve Drenchwater	0.021	8.4	31.0	-	-	-	-	180	22
77 PRUJ 59	0.016	5.9	14.0	2.4	0.02	0.02	160	-	-
59.1	0.018	1.7	18.0	2.2	0.01	0.02	70	-	-
59.2	0.004	4.1	15.0	1.6	0.14	0.02	200	-	-
59.3	0.002	2.1	7.1	0.8	0.23	0.02	42	-	-
59.4	0.002	0.58	21.0	1.7	0.15	0.02	24	-	-
59.5	0.004	1.4	21.0	2.5	0.07	0.02	100	-	-
59.6	0.018	5.2	26.0	3.3	0.04	0.02	190	-	-

- not determined

9. Upper False Wager Creek

The upper False Wager Creek (an unofficially named tributary of Drenchwater Creek) area is located in section 20, T. 10 S., R. 29 W.

Red and yellow iron oxide stained cherts in this area were reported by the Geological Survey to be similar in character and age to those associated with the base metal sulfide occurrence at Drenchwater Creek located one mile to the north. The hematite and jarosite staining is a surface phenomenon because the oxidized material does not extend more than 4-6 inches below the surface. Both light and dark gray pyritiferous chert were sampled. Outcrop was poor in that little rock was found in place, but it is thought to be sub-outcrop.

Stream sediment samples were taken upstream and downstream from the stained cherts to determine if any base metal zones are present upstream from this location. The samples contained no highly anomalous base metal values.

A list of samples, their base metal content, as well as a general sample description are given in tables 13 and 14. The location of the samples is shown on figure 7.

TABLE 13. - Analytical results of False Wager Creek samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 103	40	20	70	Iron stained shale
104	5	85	300	Gray siliceous pyritiferous mudstone
105	40	75	140	Stream silt, below above rock samples

TABLE 14. - Emission spectrographic results of False Wager Creek area sample 1/

Element	Sample Number 77 PRUJ 104
Fe	.7%
Ca	.02%
Mg	.03%
Ag	<1
As	500
B	15
Ba	300
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	10
Cu	20
Ga	<10
Ge	<20
La	50
Mn	15
Mo	<2
Nb	50
Ni	<5
Pb	70
Sb	<100
Sc	<10
Sn	<10
Sr	<50
Ti	500
V	20
W	<50
Y	<10
Zn	<200
Zr	50

1/ Values in ppm unless otherwise noted.

10. Kiligwa River

The Kiligwa River area is in section 8, T. 10 S., R. 28 W.

This area was investigated following the first visit to the original Drenchwater Creek sulfide showing. Hematite and jarosite (red and yellow) stained weathered pyritiferous cherts here appear to be similar to those found at Drenchwater Creek. Several rock chip channel and stream silt samples were taken. The results of these analyses are shown in tables 15 and 16. Sample locations are shown on figure 7.

TABLE 15. - Analytical results of Kiligwa River samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDWB 17	125	15	215	Stream silt
18	90	15	300	Stream silt
19	100	20	310	Stream silt
77 PRUJ 36	105	5	75	Gray-black siliceous mudstone
37	100	5	45	Gray chert
38	65	5	45	Light gray mudstone
39	45	5	60	Dark gray-black pyritiferous chert
40	55	5	40	Light gray chert; breccia in part
41	55	5	45	Dark gray-black chert
42	65	5	65	Gray chert

TABLE 16. - Emission spectrographic results of Kiligwa River samples 1/

Element	Sample Numbers	
	77PRUJ-36	77PRUJ-39
Fe	2%	3%
Ca	.05%	.1%
Mg	.2%	.15%
Ag	<1	<1
As	<500	<500
B	30	20
Ba	1,000	1,000
Be	<2	<2
Bi	<10	<10
Cd	<50	<50
Co	<5	5
Cr	50	150
Cu	100	70
Ga	<10	<10
Ge	<20	<20
La	30	20
Mn	100	1,000
Mo	<2	<2
Nb	20	<20
Ni	30	50
Pb	10	<10
Sb	<100	<100
Sc	15	10
Sn	<10	<10
Sr	50	50
Ti	1,000	500
V	70	30
W	<50	<50
Y	15	10
Zn	<200	<200
Zr	50	50

1/ Values in ppm unless otherwise noted.

11. Boundary Zone

The Boundary area is located in section 8, T. 12 S., R. 27 W.

The name for this area comes from its location north of the boundary line separating NPR-A from the adjacent land to the south which is referred to as (d)(2) lands in the Alaska Native Claims Settlement Act. The area of interest is north of Siniktanneyak Mountain.

Red weathering cherts and a red stained creek bed were reported by the Geological Survey to be present in this area. The pyritiferous cherts were identified as part of the Triassic Shublik Formation on the basis of fossil evidence. Two stream silts were taken to analyze for their base metal content. The stream bed contained cobbles of gabbros and peridotite(?), possibly derived from the Siniktanneyak Mountain pluton to the south.

A list of samples, their base metal content, as well as a general sample description are given in table 17.

TABLE 17. - Analytical results of Boundary Zone samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 66-R	5	40	20	Stream silt, brown stained creek
66-S	20	20	85	Stream silt
67	70	25	135	Stream silt; main stream

12. Cutaway Creek

The Cutaway Creek area is in sections 10 and 11, T. 10 S., R. 24 W.

The location of an iron oxide stained zone of possible interest for prospecting was reported by the Geological Survey. In this area rocks of the Siksikpuk Formation are reportedly thrust over and then eroded through in places to expose the underlying pyritiferous cherts of the Shublik Formation.

The cherts of the Shublik Formation were sampled. At the same time hydrocarbon bearing cherts were found below the pyritiferous cherts. These were sampled and analyzed.

A list of samples, their analytical results, as well as a general sample description are given in tables 18 and 19.

TABLE 18. - Analytical results of Cutaway Creek samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRDPB 25	55	10	105	Stream silt, red stained creek
77 PRUJ 78	30	5	115	Gray chert, Shublik Formation
77 PRDPB 26	Extractable organics .432g/100g Ash 90.7% Moisture .15% BTU <10 (no ignition) Sulfur .01%			

TABLE 19. - Emission spectrographic results of Cutaway Creek area sample 1/

Element	Sample Number 77PRUJ 78
Fe	.15%
Ca	.5%
Mg	.05%
Ag	1
As	<500
B	10
Ba	200
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	100
Cu	20
Ga	<10
Ge	<20
La	50
Mn	50
Mo	2
Nb	<20
Ni	70
Pb	10
Sb	<100
Sc	<10
Sn	<10
Sr	<50
Ti	100
V	50
W	<50
Y	15
Zn	200
Zr	20

1/ Values in ppm unless otherwise noted.

13. Lisburne Ridge

Phosphatic shale is reported to be present on Lisburne Ridge in Geological Survey Professional Paper 303-C (2). A brief visit was made to Lisburne Ridge (section 3, T. 10 S., R. 20 W.) but the phosphatic units were not relocated during the cursory examination of the area.

14. Mount Bupto

The Mount Bupto area is in section 4, T. 11 S., R. 24 W.

A "fist" size sample of fluorite was reported to have been found here in float by an oil company geologist (3). A brief effort was made to prospect for the source of this mineralization. Fluorite bearing float was found at the base of the north-south drainage which cuts Mount Bupto. Minor amounts of green and purple fluorite, associated with quartz and calcite, were found cementing fractured chert and limestone.

The prospecting commenced at the base of a talus slope and continued up slope, but not far laterally, to locate the source of the fluorite. An area of highly fractured rocks was found which may have been the source of the fluorite bearing rocks on the talus. Extensive zones of fluorite concentration in place were not found at this site.

One sample was taken to determine the fluorine content in a typical breccia with minor fluorite cement. The results are shown in table 20.

TABLE 20. - Analytical results of Mount Bupto sample

Sample Number	Elements Analyzed F (%)	Sample Description
77PRUJ 79	1.3	Fossiliferous Limestone, Fractured; Quartz Calcite, Fluorite in fracture fillings.

15. & 16. Safari Creek I and II

The two areas of interest along Safari Creek (an unofficially named tributary of the Kuna River) occur in section 1, T. 12 S., R. 25 W. and sections 24 and 25, T. 12 S., R. 25 W.

Two mineralized zones, one (in section 1) containing barite nodules weathering out of the Siksikpuk Formation and the other (in sections 24 and 25) containing dark red weathering rocks of the Kayak Formation, were recommended for prospecting by the Geological Survey. A helicopter reconnaissance of the Safari Creek area revealed extensive zones of red-weathering materials from the Kayak Formation.

In section 1, two areas containing "lag" deposits of barite are present. Several of the nodules were collected as specimens. The nodule bearing shale was sampled to determine its barium (barite?) content.

In section 24 and 25, red "nodules" weather out of enclosing soft black shale of the Kayak Formation near the headwaters of Safari Creek. Several were sampled and several stream silt samples were taken from drainages cutting the shales. The black shales of the Kayak Formation are overlain(?) by pyritiferous carbonates and cherts.

A list of samples, their base metal content, as well as a general sample description are given in tables 21, 22 and 23.

TABLE 21.- Analytical results of the Safari Creek I samples

Sample Number	Elements Analyzed Ba (%)	Elements Analyzed $BaSO_4$ (%)	Sample Description
77 PRDPB 23	46.	99.5	Barite nodules
23-A	39.	84.4	Barite nodules
24	0.035	-	Shale, hosting barite nodules

TABLE 22. - Analytical results of the Safari Creek II samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 68	5	5	45	Pyrite bands in stromatolite(?)
69	5	30	30	Pyritiferous chert
70	5	15	15	Carbonaceous black shales with pyrite
70.1	5	25	15	Pyrite layer in 77PRUJ70
71	10	45	30	Pyritiferous chert(?)
72	20	15	125	Pyritiferous chert(?)
73	25	25	160	Stream silt, below pyritiferous samples
74	45	20	155	Stream silt, main drainage
77 PRUJ 75.1	20	130	255	Red nodules
75.2	15	45	115	Red nodules
76	45	30	380	Stream silt from red nodule zone, side stream
77	40	25	225	Stream silt from red nodule zone, main stream

TABLE 23. - Emission spectrographic results of Safari Creek II area samples 1/

Element	Sample Numbers			
	77PRUJ 69	77PRUJ 70	77PRUJ 71	77PRUJ 72
Fe	.3%	1%	3%	2%
Ca	1%	.03%	20%	15%
Mg	.2%	.2%	2%	5%
Ag	<1	<1	<1	<1
As	<500	<500	<500	<500
B	<10	50	<10	<10
Ba	20	700	5	20
Be	<2	<2	<2	<2
Bi	<10	<10	<10	<10
Cd	<50	<50	<50	<50
Co	<5	<5	<5	<5
Cr	<10	200	10	10
Cu	5	10	10	30
Ga	<10	10	<10	<10
Ge	<20	<20	<20	<20
La	20	70	<20	<20
Mn	20	<10	500	700
Mo	<2	<2	<2	<2
Nb	<20	<20	<20	<20
Ni	<5	15	10	20
Pb	10	30	30	50
Sb	<100	<100	<100	<100
Sc	<10	20	<10	<10
Sn	<10	<10	<10	<10
Sr	<50	50	200	70
Ti	<20	2,000	20	50
V	<10	200	10	30
W	<50	<50	<50	<50
Y	<10	10	10	10
Zn	<200	<200	<200	<200
Zr	<20	50	<20	<20

1/ Values in ppm unless otherwise noted.

17. Siniktanneyak Mountain

The two Siniktanneyak Mountain areas investigated center near section 22, T. 34 N., R. 2 E. (Kateel River baseline and meridian) and section 25, T. 12 S., R. 29 W. (Umiat baseline and meridian).

At the first site the mafic-ultramafic pluton which underlies the Siniktanneyak Mountain area has been staked since at least 1973 and several brief exploration investigations have been made into the area in the past. The layered aspect of the gabbroic zone is readily observed. The main peridotite zone, present at the east-southeast part of the pluton contains widespread but minor amounts of chromite. The observed chromite occurs as minor disseminations and small segregated lenses with the largest observed chromite bearing lens being eight inches thick and 12 feet long. Only one brief traverse was made across this chromite bearing zone.

At the second site, near the northwest extremity of the known pluton, a N 60° W trending red weathering pyritiferous felsic phase of the pluton (or a rock unit adjoining the pluton) was sampled. The light colored pyritiferous zone has a general east-west trend as can be seen by the presence of bright red weathered zones to the east from the sampled area. The width of this "stained" zone on the surface is about 210 feet.

A list of samples, their analytical results, as well as general sample descriptions are given in tables 24 and 25.

TABLE 24. - Analytical results of Siniktanneyak Mountain samples

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
N. W. Pyritic Zone				
77 PRUJ 80	160	5	5	Felsite with pyrite
81	40	5	30	Felsite with pyrite
84	10	5	20	Felsite with pyrite
85	10	20	225	Felsite with pyrite
86	10	5	15	Felsite with pyrite

TABLE 24. - Analytical results of Siniktanneyak Mountain samples, continued

Sample Number	Elements Analyzed						Sample Description
	Cr (ppm)	Cu (%)	Mo (ppm)	Pb (%)	As (ppm)	Zn (%)	
"Sinik Mtn."	18,000	0.002	2	0.05	10	0.21	Random olivine peridotite sample, with approximately 3% chromite
77 PRUJ Cr	210,000						High grade 6 inch band of chromite

TABLE 25. - Emission spectrographic results of Siniktanneyak Mtn. samples 1/

Element	Sample Number										
	77PRUJ 80	77PRUJ 81	77PRUJ 84	77PRUJ 85	77PRUJ 86	77PRUJ 88	77PRUJ 89	77PRUJ 90	77PRUJ 91	77PRUJ 92	77PRUJ 93
Fe	10%	7%	5%	7%	1%	2%	3%	3%	3%	3%	3%
Ca	1.5%	3%	1.5%	5%	.1%	10%	15%	.05%	.02%	.03%	.1%
Mg	2%	2%	1%	1%	.2%	2%	3%	10%	10%	15%	10%
Ag	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
As	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
B	10	10	10	<10	<10	<10	<10	<10	<10	<10	<10
Ba	10	15	30	<5	<50	<5	<5	<5	<5	<5	<5
Be	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Bi	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cd	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Co	10	20	15	15	5	5	15	50	20	30	20
Cr	30	20	10	<10	<10	300	200	5,000	7,000	1,500	1,500
Cu	200	20	70	10	3	50	50	30	<2	5	<2
Ga	10	10	10	<10	10	<10	<10	<10	<10	<10	<10
Ge	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
La	<20	<20	<20	<20	20	<20	<20	<20	<20	<20	<20
Mn	<200	1,500	500	5,000	50	500	500	500	500	700	700
Mo	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Nb	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Ni	5	15	5	5	<5	70	50	1,500	1,500	1,000	300
Pb	20	<10	10	<10	30	<10	<10	<10	10	<10	<10
Sb	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Sc	30	30	20	30	<10	30	50	<10	<10	<10	<10
Sn	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sr	150	500	300	500	100	200	200	<50	<50	<50	<50
Ti	5,000	3,000	3,000	2,000	1,000	300	500	<20	<20	<20	<20
V	500	200	200	200	10	50	70	<10	10	<10	<10
W	<50	<50	<50	<50	<50	<50	<50	<50	100	<50	<50
Y	<10	10	20	10	<10	<10	<10	<10	<10	<10	<10
Zn	200	200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Zr	30	20	70	20	50	<20	<20	<20	<20	<20	<20

1/ Values in ppm unless otherwise noted.

18. Rolling Pin Creek

The Rolling Pin Creek area is located in section 5, T. 10 S., R. 29 W.

This limonite color anomaly is located two miles northwest of the main Drenchwater Creek mineralized zone. The anomaly results from the weathering and oxidation of a gray pyritiferous chert. These cherts were sampled and analyzed for their base metal content. Some pyrite was noted to be cementing breccia fragments. Lag deposits of small barite nodules in this area suggest this may be the Siksikpuk Formation.

Samples results are found in tables 26 and 27.

TABLE 26. - Analytical results of the Rolling Pin Creek sample

Sample Number	Elements Analyzed Cu (ppm)	Pb (ppm)	Zn (ppm)	Sample Description
77 PRUJ 109	50	5	25	Pyritiferous chert

TABLE 27.-Emission spectrographic results of Rolling Pin Creek area sample 1/

Element	77PRUJ 109
Fe	.7%
Ca	.02%
Mg	.1%
Ag	<1
As	<500
B	15
Ba	5,000
Be	<2
Bi	<10
Cd	<50
Co	<5
Cr	10
Cu	30
Ga	<10
Ge	<20
La	20
Mn	300
Mo	<2
Nb	<20
Ni	10
Pb	10
Sb	<100
Sc	<10
Sn	<10
Sr	100
Ti	500
V	20
W	<50
Y	<10
Zn	<200
Zr	30

1/ Values in ppm unless otherwise noted.

SUMMARY

A brief regional reconnaissance prospecting program was carried out in 18 widely separated areas in the NPR-A. Results are summarized in Table 28. At Drenchwater Creek, wide-spread base metal sulfide mineralization was found to be spatially closely related to felsic volcanic rocks. At least three types of metal sulfide and host rock associations are present. The strike length of the potentially mineralized zone may approach 10,000 feet based on results of previous regional geologic mapping.

Some areas such as Elbow Creek, Kiligwa River and Chertchip Creek appear to have geologic setting similar to those of the mineralization at Drenchwater Creek. Other areas such as Spike Creek and upper Kagvik Creek appear to have geologically similar setting to the Red Dog type base metal sulfide deposits located about 40 miles to the southwest. Minor mineralized zone such as fluorite at Mount Bupto, chromite at Siniktanneyak Mountain, and barite at a variety of locations require further work to define their nature and extent.

Neither the phosphatic shale at Lisburne Ridge nor the coal along the Utukok and Kokolik Rivers was located due to the time constraints of the 1977 program.

Numerous analytical results and samples collected from various sites will be useful in evaluating the regional geochemical data as well as in studying the geologic settings of the investigated areas. This work can then form part of the basis for future work in the NPR-A.

TABLE 28.- Summary data on the Bureau of Mines site investigations, National Petroleum Reserve - Alaska

Location/Site	Surface Materials	Analytical Results 1/ Zn	Pb	Ba	Ag	Cu	Cr
Misheguk Mountain Quadrangle							
1. Upper Kagvik Creek	Pyritiferous Cherts/ Black Shales	5-500	5-25	500-10,000	=1-1	5-500	NA 2/
2. Ilingnorak Ridge 3/	Iron Oxides in Greywackes						
3. Elbow Creek	Pyritiferous Cherts and Tuffs	50-285	5-5	10,000	1	5-125	NA
4. Chertchip Creek	Black Shales, Pyritiferous Chert	5-265	5-15	NA	NA	5-60	NA
5. Spike Creek	Pyritiferous Chert	200	10	2,000	1	15	NA
6. Utukok & Kokolik Rivers 3/	Coal Reported						
Howard Pass Quadrangle							
7. Rampart/Recon/Jubilee Creeks	Pyritiferous Cherts	30-190	5-45	NA	NA	30-95	NA
8. Drenchwater Creek	Volcanogenic Basemetal Sulfides	5-310,000	5-51,000	20-2,300	1-200	5-1,150	NA
9. Upper False Wager Creek	Pyritiferous Chert	70-300	20-85	NA	NA	5-40	NA
10. Kiligwa River	Pyritiferous Chert	40-310	5-20	1,000	1	40-310	NA
11. Boundary Area	Iron Oxides in Creek Bed	20-135	20-40	NA	NA	5-70	NA
12. Cutaway Creek	Pyritiferous Chert, Petroliferous Chert	105-115	5-10	NA	NA	30-50	NA
13. Lisburne Ridge 3/	Phosphatic Shale Reported, Not Found						
14. Mt. Bupto	Flourite			(1.3% Fluorine)			
15. Safari Creek I	Barite Nodules/Shales			0.035-46%			
16. Safari Creek II	Pyritiferous Carbonates/ Black Shales	15-380	5-130	350	NA	5-45	NA
17.a Siniktanneyak Mtn. NW	Felsites	5-225	5-20	NA	NA	10-160	NA
17.b Siniktanneyak Mtn SE	Mafics/ultramafics	2,100	NA	NA	NA	20	210,000
18. Rolling Pin Creek	Pyritiferous Chert	25	5	NA	NA	50	NA

1/ Range of values in parts per million unless otherwise indicated.
2/ NA indicates element was not analyzed for.
3/ No samples taken.

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