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

by Mark P. Meyer
Alaska Field Operations Center, Anchorage, Alaska

** Open file 9-85

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	feet
in	inch(es)
mi	mile(s)
oz	ounce(s)
pct	percent
ppm	parts per million
lbs	pound(s)

MINERAL INVESTIGATION OF THE IDITAROD-GEORGE PLANNING BLOCK,

CENTRAL KUSKOKWIM RIVER AREA, ALASKA

By Mark P. Meyer1/

ABSTRACT

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

In addition to data in the literature, stream sediment and rock samples were taken to identify the presence of minerals and elements and to delineate the mineralized areas. Fourteen areas contain anomalous concentrations of several elements; twelve areas contain anomalous concentrations of one element; two contain coal; two have potential for oil and gas; and one is geothermally active. All stream valleys contain sand and gravel. Metals of possible economic interest found in the 1983 samples include antimony, chromium, cobalt, copper, gold, lead, manganese, mercury, molybdenum, nickel, tin, titanium, and tungsten. Placer deposits contain gold, mercury, and tungsten. Deposit grades and reserves were not estimated.

INTRODUCTION

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

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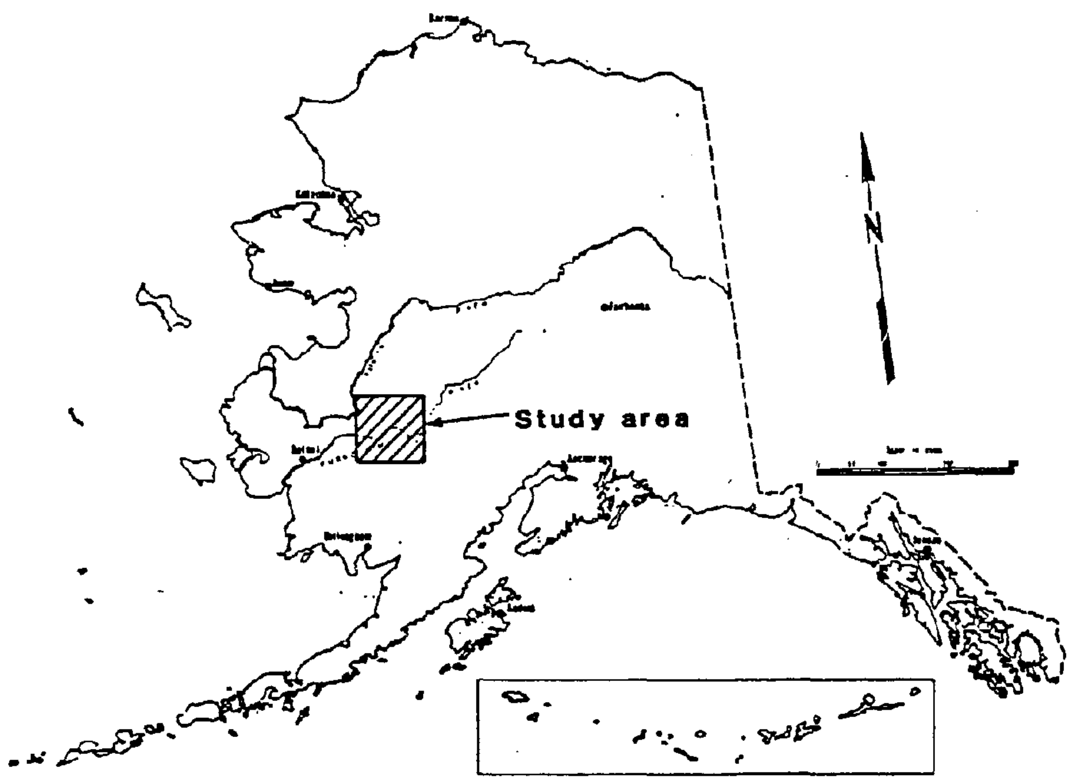

FIGURE 1. Location of the Iditarod-George study area, Alaska

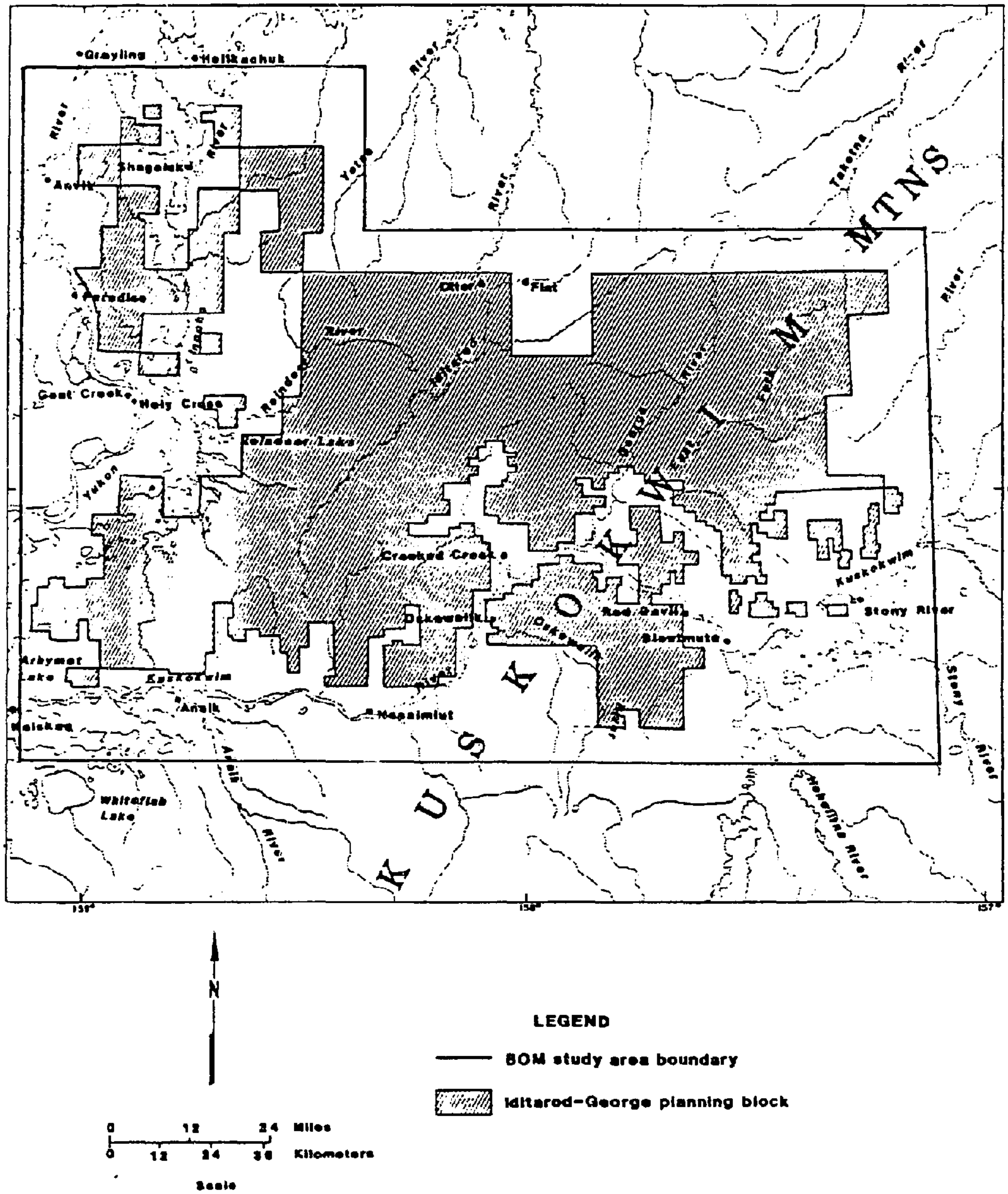

FIGURE 2. - Location of the Iditarod-George Planning Block, Alaska

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

LAND STATUS AND STUDY AREA

The Iditarod-George Planning Block consists of BLM-administered public lands surrounded by other federal, state, and private lands. Some private lands occur within the planning block. The planning block totals approximately 3.5 million acres and extends from Black Mountain on the east to the Yukon River on the west; and from approximately 7-mi south of Napaimiut to a point approximately 25-mi north of the town of Flat (fig. 2). Included in the study area are the Aniak and Iditarod Mining Districts (fig. 3). The planning block is made up of a large central block with an irregular outline and numerous small, widely-scattered, isolated areas. The study area is made up of a larger rectangular area which encompassed all of the planning block (fig. 2). These areas may verify mineralized geologic trends that may extend into the planning block.

PHYSIOGRAPHY AND ACCESS

The study area is in the Kuskokwim Mountains Physiographic Province (1)2/, and is characterized by rolling hills and isolated peaks. The Kuskokwim Mountains are eroded by streams and rivers, including the gorge of the Kuskokwim River and the broad open valleys of the Iditarod and George Rivers. The higher elevations were glaciated during the last glacial advance. Elevations range from 50-ft above sea level along the Kuskokwim and Yukon Rivers to over 3,750-ft. To the west, the rolling hills grade into the broad flood plain of the Yukon River.

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

Access to the area is by aircraft from Aniak, Bethel, and McGrath, or by riverboat along the Kuskokwim or Yukon Rivers. Most settlements and mining camps in or near the area have landing fields suitable for light fixed-wing aircraft. Two 5000-ft-long airstrips, one at Flat and the other at Red Devil, have the capacity to handle Hercules-type aircraft. The Kuskokwim River is navigable by tugboat and barge up to McGrath.

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

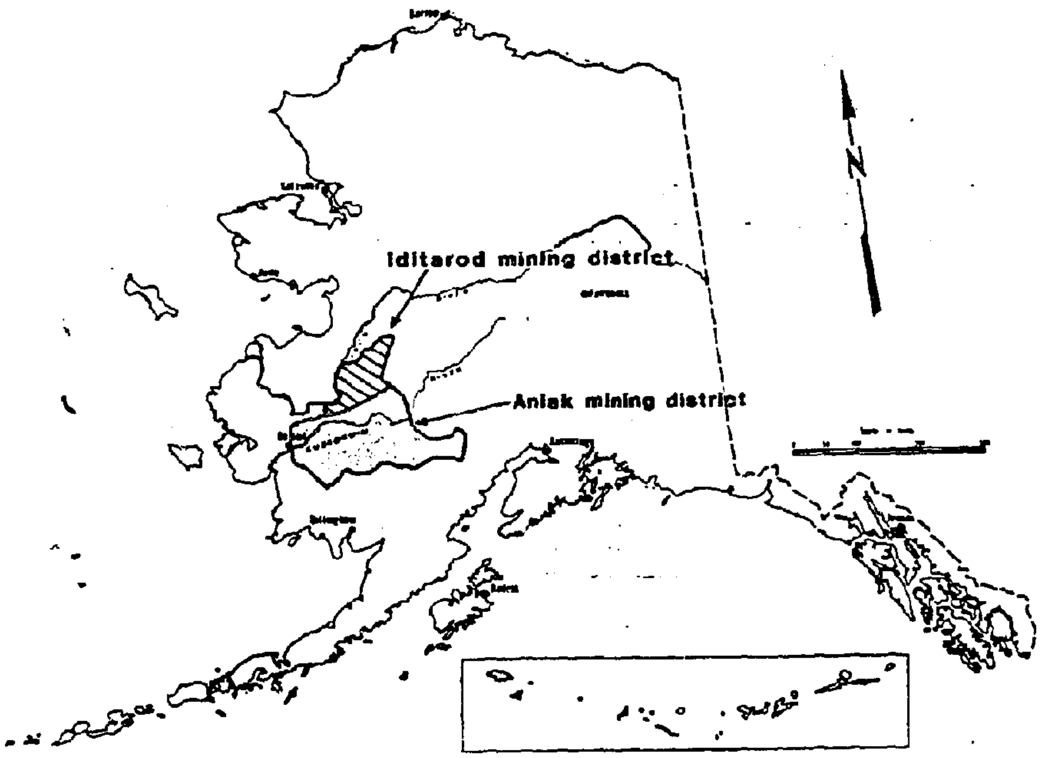

FIGURE 3. - Mining districts of the Iditarod-George study area, Alaska

ACKNOWLEDGMENTS

Helen Hankins, Geologist, Division of Minerals - BLM, Anchorage District Office, participated in setting up and planning the project. The BLM provided logistical support for the field phase.

PREVIOUS INVESTIGATIONS

Systematic geologic studies in the Iditarod-George Planning Block area started in 1898 by the U. S. Geological Survey (USGS) (3). Since that time the USGS, Alaska Territorial Department of Mines (TDM), and Bureau personnel have studied the regional geology as well as the mercury and gold placer occurrences. Most of the recent studies took place during the 1950's and 1960's. The regional geologic interpretation of Cady and others (fig. 4), is used in this report (2). Since the 1960's, little has been published on the general geology. The State of Alaska, Division of Geological and Geophysical Surveys (DGGS) has been working in the area just to the northeast of the study area.

Prior to 1898, little was known about the geology of the Kuskokwim River area. During 1898, the USGS made a regional geologic reconnaissance study along the Kuskokwim River (3). In 1914, the USGS studied the geology of the area, including a detailed investigation of the Alice and Bessie Mine (4-5). During the summer of 1915, the USGS investigated mineral localities including placer gold deposits on Donlin, Crooked, and New York Creeks, the Kolmakof mercury deposit, and copper lode deposits in the Russian Mountains (5-6). During 1922 and 1924, the TDM investigated the placer operations of the area (7-8). In 1926, the TDM reported on mining activity and coal occurrences near Flat (9). From 1937 to 1940, the TDM reported on the mercury mines near Sleetmute (10-13). In 1942, the TDM reported on strategic mineral occurrences (14). From 1942 to 1946, the Bureau trenched and sampled mercury deposits (15). During 1950, the TDM reported on the placer operations near Flat (16). In 1955, the USGS published a detailed description of the geology and the mineral resources (2). From 1955 through 1956, the Bureau made a reconnaissance of the Flat district as part of it's investigation of mercury and other strategic mineral resources. In 1956, the results of this study led to a program of trenching, sampling, and mapping of deposits of mercury, gold, and other strategic minerals including antimony, chromium, molybdenum, nickel, platinum, tin, and tungsten (17). During 1957 and 1958, the USGS mapped the Red Devil Mine (18). From 1956 to 1963, the TDM reported on the mercury deposits (19-24). In 1962, the Bureau wrote a detailed report on mercury occurrences in Alaska which included history, geology, mineralization, mining methods, and maps of the mercury deposits (25). The Bureau completed a reconnaissance sampling program to find methods for delineating and evaluating lode-gold deposits known to be the sources of placer gold deposits in the Iditarod Mining District (26). In 1969, the Bureau compiled a list of active placer mines in Alaska, including those in the study area, that were in operation during the 1975 mining season (27).

Results of private mineral investigations conducted in the area were not reviewed for this summary.

MINING HISTORY

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

In 1838, the Russian explorers reported the occurrence of mercury at Kolmakof. Mercury was noted at the Kolmakof occurrence in a regional geologic reconnaissance in 1898 (3). The first mercury deposit, the Alice and Bessie Mine (fig. 5), was staked in 1906 by E. W. Parks (21).

Since 1906, mercury lodes were staked and mined intermittently in times when mercury prices were high. From 1909 to 1971, production totaled 36,728 flasks of mercury mainly from the Red Devil, DeCourcy Mountain, Alice and Bessie, Barometer, Willis and Fuller, and Kolmakof Mines (table 1). The Red Devil Mine, staked in 1933 by Hans Halverson (28), was the largest U.S. producer of mercury during 1957 with a recovery of over 5,000 flasks of mercury (18). Between 1952 and 1958 Defense Minerals Exploration Administration (DMEA) loans to the Red Devil and DeCourcy Mountain Mines were used to explore for ore bodies (29). By 1964, ore reserves at the Red Devil Mine were exhausted and renewed exploration, funded by a loan from the Office of Mineral Exploration (OME), failed to disclose further minable ore in the existing deposits. Between 1964 and 1971, only minor amounts of mercury were produced mainly from Red Devil and no mercury production has been reported since 1971 because mercury prices have been too low to generate economic mineral development.

Fine-grained placer gold was discovered in the gravels along the Innoko River in 1906. The first major placer gold discovery was on Otter Creek in 1908 (30). In the spring of 1909 the Iditarod-Flat gold rush brought more than 2,000 people with equipment (31). Most of the placer operations were worked by hand until 1912 when the first bucket-line dredge was installed on Flat Creek (32). One of the most productive years for mining on Flat Creek was 1912, when more than 130,000 oz of gold were recovered. Reported total gold production from the Iditarod Mining District from 1910 to 1966, was 1,329,404 oz (table 1) which represented more than 6 pct of Alaska's placer gold production (26). From 1942 to 1946, most gold mining operations were closed by War Production Board Order L-208. From 1968 on, a small dredge and three mechanized operations using portable washing plants have been active near Flat. Production for the last few years can only be estimated since gold production figures have been listed by regions and districts instead of by individual mine or streams.

Currently placer gold is mined in the vicinity of Happy Creek, Otter Creek, Black Creek, Prince Creek, Snow Gulch, Julian Creek, Spruce Creek, Murray Gulch, and New York Creek. The operations use large mechanized equipment (bulldozers, loaders, backhoes, and draglines) to feed sluice boxes and processing plants. Several operations near Flat use hydraulic methods to strip permanently frozen overburden which overlies the pay gravels.

Individual mines, prospects, and occurrences are detailed in appendix B.

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

Mine	Years reported	Gold troy ounces1/	Silver troy ounces	Lead lbs	Zinc lbs	Mercury flasks
LODE MINES						
Golden Horn (9)2/	1925-1937	2,706	2,620	9,336	653	NAp
Red Devil (28)	1933-1971	NAp	NAp	NAp	NAp	35,000
Barometer (29)	1921-1943	NAp	NAp	NAp	NAp	16
Willis and Fuller (32)	1914-1918	NAp	NAp	NAp	NAp	2
Alice and Bessie (33)	1906-1961	NAp	NAp	NAp	NAp	174.2
DeCourcy Mountain (55)	1921-1965	NAp	NAp	NAp	NAp	1,534
Kolmakof (62)	1909-1910	NAp	NAp	NAp	NAp	2
Total		2,706	2,620	9,336	653	36,728.2
PLACER MINES						
Otter Creek (4)	1910-1969	296,557	31,418			
Malamute Pup (6)	up to 1952	1,907	241			
Granite Creek (7)	up to 1956	4,004	614			
Flat Creek (8)	1915-1966	255,086	NA			
Willow Creek (10)	1910-1934	Not reported	NA			
Happy Creek (11)	1926-1966	106,486	1,735			
Chicken Creek (13)	up to 1956	12,755	2,024			
Slate Creek (14)	1915-1940	Not reported	NA			
Prince Creek (15)	1929-1956	Not reported	NA			
Julian Creek (19)	1910-1982	Not reported	NA			
Quartz Gulch (44)	1910-1914	1,761	NA			
Donlin Creek (46)	up to 1955	$125,000.00	119			
Ruby Gulch (47)	1911	145.14	NA			
Snow Gulch (52)	1910-1912	237.06	NA			
Murray Gulch (60)	up to 1955	$ 2,000.00	NA			
Total		678,938.20 plus$127,000.00	36,151			

Total reported production of placer gold from the Iditarod Mining District up through 1969 (26).......1,329,404 oz

NA - Not available
NAp - Not applicable
1/Unless noted in dollar value. Dollar value given when gold price fluctuated over the time period reported
2/Numbers in parentheses refer to map numbers on figure 5 and in appendix B.

CLAIM AND MINERAL DISTRIBUTION

Placer (primarily gold) and lode (primarily mercury) claims exist in the area (fig. 5, table 2). Several large areas and some individual drainages have been staked as placer claims. The largest block of placer claims is in the George River (16-21)3/ and East George River (22-23) areas. Other large claim blocks are near Flat (4, 8), Discovery (6-7), and Willow Creek (10-11, 13, 15). Long segments of the Oskawalik River (43) and Crooked Creek (51) [including Queen Gulch (48), Snow Gulch (52), Quartz Gulch (44), and Lewis Gulch (50)], both tributaries of the Kuskokwim River, and some segments of shorter creeks [such as Fuller (35), Eightmile (37), California (38), and Central (42)] located between Red Devil and Crooked Creek, have been staked for placer mineral rights. Small creeks with placer claims include New York Creek-Murray Gulch (60), an unnamed tributary near Napaimiut (61), Return Creek (54) (near DeCourcy Mountain), Little Creek (56), an unnamed creek near Saddle Mountain (57), a short segment of an unnamed tributary (58) to Kolmakof River where the tributary drains the west flank of the Horn Mountains, and the lower portion of the Stony River (24).

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

Other lode mineral occurrences include: copper-lead-zinc (65), gold-silver (64), and gemstone (63) at Russian Mountains; antimony (67) and molybdenum (66) at Molybdenum Mountain; and three lode gold occurrences, two near Flat (5, 9) and one on Chicken Mountain (12). Scheelite occurs at the Golden Horn Mine (9) near Flat. Antimony (49) and lode gold (45) showings are present near the headwaters of Crooked Creek. The antimony occurrence is in the headwaters of Queen Gulch, a tributary of Crooked Creek; and the lode gold occurrence is on the south side of the drainage to Dome Creek. Coal crops out at a site about 2.2-mi north of Flat (3) and along the Innoko River (1) about 11-mi north of Shageluk. One previous productive sand and gravel pit (2) is near Iditarod.

PRESENT INVESTIGATION

The Bureau compiled and evaluated data on the mineralization of the Iditarod-George Planning Block from June 1 to September 1, 1983. A literature review formed the basis of the mineral evaluation. A field review of the area and cursory sampling were also undertaken.

The literature search reviewed USGS publications and maps, published and unpublished Bureau reports, State of Alaska "MinFile" (Kardex) micro-

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

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

Location no.	Name	Commodity
1.	Innoko River Occur.	Coal
2.	Old Town Occur.	Sand and Gravel
3.	Unnamed Prospect	Coal
4.	Otter Ck. Mine - Placer	Au, Ag, Hg, Sb, Pb, Sn, W, Cr, Zr
5.	Malamute Gulch Prospect	Au, Hg, Sn, W, Cr, Rare Earths (RE)
6.	Malamute Pup Mine - Placer	Au, Ag, Hg, Sn, W, Cr, U, RE
7.	Granite Ck. Mine - Placer	Au, Ag, Cr
8.	Flat Ck. Mine - Placer	Au, Ag, Hg, Sb, W
9.	Golden Horn Mine	Au, Ag, Hg, Zn, W, Pb, Sb
10.	Willow Ck. Mine - Placer	Au
11.	Happy Ck. Mine - Placer	Au, Ag, Hg, Sb, Sn, W, Cr, U
12.	Chicken Ck. Dome Occur.	Au, Ag, Hg, Zn, Cr, W, Sb, Co, RE
13.	Chicken Ck. Mine - Placer	Au, Ag, Hg, Sb, W, Cr, Co, Zn, RE
14.	Slate Ck. Mine - Placer	Au, Ag, Hg, W
15.	Prince Ck. Mine - Placer	Au, Ag, Hg
16.	Michigan Ck. Occur. - Placer	Au
17.	Big Three Mining Occur. - Placer	Au
18.	Spruce Ck. Prospect - Placer	Au
19.	Julian Ck. Mine - Placer	Au, Hg, Sn, U, RE, Ce
20.	George River Prospect - Placer	Au
21.	Granite-Willow Ck. Occur. - Placer	Au
22.	Moose Ck. Occur. - Placer	Au
23.	Glenn Bass Occur. - Placer	Au
24.	Stony River Occur. - Placer	Au, Ag
25.	Mellick's Occur.	Hg
26.	Landru Occur.	Hg
27.	McCally Ck. Prospect	Hg, Sb
28.	Red Devil Mine	Hg, Sb
29.	Barometer Mine	Hg, Sb
30.	No. 1 Discovery Claim Occur.	Unknown (Hg?)
31.	Two Genevieves Occur.	Hg
32.	Willis and Fuller Mine	Hg
33.	Alice and Bessie Mine	Hg
34.	Fairview Prospect	Hg, Sb
35.	Fuller Ck. Prospect - Placer	Au, Ag
36.	Cinnabar Chief Prospect	Hg
37.	Eightmile Ck. Prospect - Placer	Au, Ag
38.	California Ck. Prospect - Placer	Au, Ag
39.	Harvison Prospect	Hg
40.	R & H Mining Occur.	Hg (?)
41.	Egnaty Ck. Prospect	Hg
42.	Central Ck. Prospect - Placer	Au, Ag
43.	Oskawalik River Prospect - Placer	Au, Ag
44.	Quartz Gulch Mine - Placer	Au
45.	Quartz Prospect	Au, Ag
46.	Donlin Ck. Mine - Placer	Au, Ag, Hg, Sb, Sn, W
47.	Ruby Gulch Mine - Placer	Au
48.	Queen Gulch Prospect - Placer	Au

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

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

fiche files, TDM published and unpublished reports, DGGS reports, BLM mining claim records and plans of operations, BLM-Minerals Management Service (MMS) oil and gas and coal location maps, U.S. Energy Research and Development Administration's National Uranium Resource Evaluation (NURE) reports and maps, published articles from journals and magazines on mining.

The reconnaissance level field investigation was conducted from July 5 to 15, 1983 to gain familiarity with the geologic setting and mineral occurrences of the Iditarod-George Planning Block. Uniform sample coverage of the entire study area was planned, but this was constrained by time and budget. During this time period, 172 stream sediment samples and 3 rock "grab" samples were collected. The sample distribution is shown on figure 6 and the samples are described in appendix A. The samples were analyzed for 31 elements (antimony, arsenic, barium, beryllium, bismuth, boron, calcium, chromium, cobalt, copper, gallium, germanium, gold, iron, lanthanum, lead, manganese, magnesium, mercury, molybdenum, niobium, nickel, scandium, silver, strontium, tin, titanium, tungsten, vanadium, yttrium, zinc, and zirconium) using semiquantitative emission spectrographic techniques by Skyline Labs., Inc., Wheat Ridge, CO. Elements of economic and historic interest in the area (antimony, copper, gold, lead, tungsten, and zinc) were determined by atomic absorption spectrophotometric techniques. Mercury was analyzed by a mercury vapor detection instrument by Rainbow Resource Labs., Inc., Anchorage, AK. Analytical results are listed in appendix A.

The mean value and standard deviation of each element were determined. For this report, anomalous element values are defined as those greater than the mean plus 2 standard deviations. The values were rounded to reflect the proper significant figures for each analysis. Table 3 lists the elements, mean values, and one standard deviation of the 1983 samples. This information was used to delineate the mineralized areas shown on figure 7.

REGIONAL GEOLOGY

The geology and geologic setting of the central Kuskokwim region, Alaska, is described in USGS Prof. Paper 268 (2). That report is the primary source available on the regional geology. It was used to obtain the information presented in this report. More recent interpretations stressing the tectonostratigraphic concept on the geologic setting may exist.

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

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

Element	Mean (ppm)	Standard deviation (ppm)
EMISSION SPECTROGRAPHIC ANALYSIS		
Barium	700	500
Boron	100	700
Chromium	100	70
Cobalt	1.5	1.5
Copper	10	7
Gallium	10	10
Lanthanum	20	20
Lead	5	5
Manganese	500	300
Molybdenum	1	0.5
Nickel	20	15
Scandium	3	5
Strontium	30	100
Titanium	3000	1500
Vanadium	100	30
Yttrium	7	10
Zirconium	150	100
ATOMIC ABSORPTION (GEOCHEM) ANALYSIS		
Antimony	2	2
Copper	23	11
Lead	17	5
Tungsten	2	2
Zinc	67	16
VAPOR DETECTION		
Mercury	0.35	0.40

LITHOLOGY

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

The following description of the major rock units is from USGS Prof. Paper 268 (2). Their age relations are shown in table 4. The abbreviations of the rock types shown in the headings represent the map symbols used in figure 4.

Kuskokwim Group (Kk/Kkh)

The Kuskokwim Group, consisting of interbedded graywacke and shale, is the principal rock unit of the Kuskokwim Mountains. It is Early Cretaceous in age and terminates upward at a disconformity with the overlying Iditarod Basalt. The rocks are exposed in the bluffs and cut-banks along the Kuskokwim River.

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

Iditarod Basalt (Ki)

The Iditarod Basalt is comprised chiefly of massive basalt flows underlain by a comparatively thin but widely distributed basal zone of sedimentary breccia that lies disconformably on the uppermost strata of the Kuskokwim Group in the northwest portion of the study area. It is of Late Cretaceous age; deposited in the time interval between the deposition of the Early cretaceous strata of the Kuskokwim Group and strong folding of the earliest Tertiary. It is estimated to be between 2,000- and 3,000-ft-thick.

Albite rhyolite (Tr)

Albite rhyolite occurs as sheets, sills, and dikes and is early Tertiary in age. It intrudes folded bedded rocks whose uppermost beds are of Late Cretaceous age.

TABLE 4. - Lithology of the Iditarod-George study area (2)

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

Albite rhyolite is of limited extent and has been mapped at Barometer Mountain, along Fuller Creek, Snow Gulch, the junction of Michigan Creek and the George River, Moose Creek, and the Oskawalik River.

Basalt dikes and sills (Tba)

Biotite basalt sills and dikes, commonly less than 5-ft-thick, are exposed in mines, stream bluffs, and cut-banks. The intrusive relations of the basalt suggest that it was emplaced in the earliest Tertiary time. Hydrothermally altered basaltic rocks weather to a yellow-brown and form the "yellow rock" of the mercury prospectors. Basalt dikes and sills are the principle host-rock for mercury mineralization, such as at the DeCourcy Mountain, the Red Devil, the Alice and Bessie, and the Willis and Fuller Mines.

Quartz diabase (Tqd)

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

Quartz monzonite (Tqm)

The quartz monzonite stocks and stocks of related composition form the largest intrusive bodies in the area. They intruded sedimentary rocks after folding took place in the early Tertiary. Hornfels is associated with the quartz monzonite stocks. Quartz monzonite crops out in the Horn Mountains, Russian Mountains, and at Molybdenum Mountain.

Getmuna Rhyolite Group (Tgl/Tgt)

The Getmuna Rhyolite Group rocks are probably extrusive phases of the albite rhyolite sheets, sills, and dikes. It formed near the close of the Tertiary period in which the Kuskokwim Group, Iditarod Basalt, and older rocks were folded. The group extends beneath the Holokuk Basalt exposed nearby and occupies the area along Getmuna Creek north of the Horn Mountains. The Getmuna Rhyolite Group is at least 500-ft and possibly 1,500-ft-thick, with allowance for repetition by warping or possible faulting.

Holokuk Basalt (Th)

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

Gravel deposits (Qc)

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

Glacial deposits (Qg)

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

Flood-plain deposits (Qal)

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

MINERAL RESOURCES

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

The mineralized areas in figure 7 were delineated by using data on the reported mineral occurrences and known deposits, historic data, and the geochemical values presented in this study.

LOCATABLE MINERALS RESOURCES

Locatable minerals are divided into lode deposits and placer deposits which are described separately in this report.

Lode Deposits

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

Mercury-Antimony

Mercury was historically the chief lode mineral product of the study area. The total reported production was 36,728 flasks (table 1). The mercury deposits, which reportedly diminish in size with depth, are located on, or a little beneath the rolling surface terrain characteristic of the region but have not been found in areas of more sharply dissected topography.

The mercury mineral cinnabar is commonly associated with the antimony mineral stibnite. The mineralization occurs most frequently in the fault zones and joints in and near the borders of silica-carbonate-rich sedimentary rock which was formed by the hydrothermal alteration of biotite basalt sills and dikes during the late Mesozoic through the early Cenozoic. Graphite, and the arsenic mineral realgar, are freqently associated with the mercury in several of the deposits.

The greatest concentration of mercury deposits occurs in a northwestern trend from Barometer Mountain towards DeCourcy Mountain. Most deposits have been located in the vicinity of Barometer Mountain. The principal mines along this trend are the Red Devil (28), the Decourcy Mountain (55), the Alice and Bessie (33), the Barometer (29), the Willis & Fuller (32), and the Kolmakof (62). Other mercury prospects and occurrences along this trend include Mellicks (25), Landru (26), McCallay Creek (27), No. 1 Discovery (30), Two Genevieves (31), Fairview (34), Cinnabar Chief (36), Harrison (39), R & H Mining (40), Egnathy Creek (41), and Rhyolite (53).

The listed deposits occur along a southeast-northwest trend, but other similar fault zones and joints in silica-carbonate altered sedimentary rock may also host mercury-antimony deposits. Exploration is warranted in the vicinity of Crooked Creek, the head of Fuller Creek, and the junction of Michigan Creek and the George River.

Gold-Silver

Gold-silver mineralization occurs in both quartz veins and thin sedimentary breccia zones at or near the contact of early Cenozoic quartz-monzonite intrusives and basaltic dikes in late Mesozoic graywacke, sandstone and shale. Minerals and elements associated with the gold-silver-bearing quartz veins include cinnabar, antimony, tin, tungsten [scheelite at the Golden Horn Mine (9)], chromium, lead, zinc, and uranium. Gold ores are genetically related to albite rhyolite intrusions of the early Cenozoic.

Gold-silver lode deposits occur on Chicken Mountain, at Snow Gulch, and in the Russian Mountains. The Golden Horn Mine (9) was the principal gold-silver mine and produced 2,706 oz gold, 2,620 oz silver, 9,336 lbs lead, and 653 lbs zinc. Smaller prospects and occurrences include Malamute Gulch (5), Chicken Creek Dome (12), Quartz (45), and Mission (64). Production records from these have not been located.

Areas with quartz-monzonite intrusives are favorable for gold-silver mineralization. Exploration for these types of deposits is warranted throughout the entire study area where these rocks crop out especially near Chicken Mountain, Horn Mountains, Russian Mountains, along Crooked Creek, along the Oskawalik River, and the northeastern portion of the study area (fig. 7).

Antimony

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

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

Molybdenum

Molybdenum, in the form of the mineral molybdenite, occurs in quartz veins associated with an early Cenozoic granitic pluton that intrudes late Mesozoic graywacke and shale at the Brink (66) occurrence, on Molybdenum Mountain. Powellite (a molybdenum oxidation product) had been reported (34). Production records from the occurrence have not been located.

Environments favorable for molybdenum mineralization exist in the vicinity of granitic intrusive rocks like those that occur in the Horn Mountains, Russian Mountains, Molybdenum Mountain, Swinging Dome, Chicken Mountain, and Granite Mountain (fig. 7).

Copper-Lead-Zinc

Copper-lead-zinc sulfide minerals occur in early Cenozoic quartz veins and breccia zones within a fissure zone which cuts a quartz monzonite-granitic stock that has intruded late Mesozoic graywacke and shale. Elements associated with the copper-lead-zinc mineralization include gold, silver, tin, and nickel. One copper-lead-zinc prospect, Cobalt Creek (65), occurs in the Russian Mountains. Production from the prospect was not reported. However, samples taken in 1954 assayed up to 11.0 pct copper, <0.25 oz gold/ton, trace silver, and 1.22 to 1.4 pct tin (35).

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

Gemstone

A semiprecious silicate gemstone deposit (2), the Ptarmigan occurrence (63), is located in the Russian Mountains. There is no record of production from the prospect.

Placer Deposits

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

Gold

Placer gold occurs in stream gravels, bench gravels, and buried gravels, mainly in drainages containing both quartz monzonite intrusions and sheets and dikes of silicified and sericitized albite rhyolite in contact with the adjacent graywacke and shale. Heavy minerals and elements associated with the placer gold deposits include silver, antimony, tungsten, tin, cinnabar, pyrite, zircon, lead, chromium, cobalt, nickel, and uranium. The paystreaks are largely concentrated on bedrock. Smaller concentrations occur on false bedrock commonly a hardpan of interlayered clayey silt beneath the deposits of existing streams and above buried gravel. The most productive placers occur in areas of rolling topography where gentle stream gradients have prevented dispersion of gold downstream as in the central and northeastern portion of the study area. Placer gold was deposited along stream channels in the early Cenozoic by weathering and erosion of the bedrock and was either covered by late Cenozoic sediments or uplifted and redissected forming bench deposits during the late Cenozoic to Recent times.

Production from the placer gold deposits up through 1969 was at least 1,329,404 oz gold and 36,151 oz silver (table 1)(26). The principal placer gold mines are at Otter Creek (4), Malamute Pup (6), Granite Creek (7), Flat Creek (8), Happy Creek (11), Chicken Creek (13), Quartz Gulch (44), Donlin Creek (46), Ruby Creek (47), Snow Gulch (52), and New York Creek-Murray Gulch (60). Placer prospects and occurrences are at Willow Creek (10), Slate Creek (14), Prince Creek (15), Michigan Creek (16), Big Three Mining Co. (17), Spruce Creek (18), Julian Creek (19), George River (20), Granite-Willow Creek (21), Moose Creek (22), Glenn Bass (23), Stony River (24), Fuller Creek (36), Eightmile Creek (37), California Creek (38), Central Creek (42), Oskawalik River (43), Queen Gulch (48), Lewis Gulch (50), Crooked Creek (51), Little Creek (56), James Walker (57), Frank Lee (59), and Fishwheel 1-8 (61).

Other placer gold deposits may exist in drainages containing quartz monzonite intrusives, particularly in the central and northeastern portions of the study area (fig. 7).

Mercury

Mercury, in the form of the mineral cinnabar, is commonly found associated with the gold placer deposits of the region. One mercury placer occurrence, Return Creek (54), is located on DeCourcy Mountain. No production has been reported from this placer prospect.

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

Tungsten

One tungsten (scheelite) placer occurrence, in the Horn Mountains (58), has been reported (2). Production from this placer deposit is not known. Scheelite also occurs as an accessory mineral at the Golden Horn Mine (9) and along Otter-Black Creek (4).

Areas favorable for placer tungsten mineralization exist along the Horn Mountains, Russian Mountains, and at Chicken Mountain (fig. 7).

LEASABLE MINERAL RESOURCES

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

Coal Deposits

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

Coal has been used locally in the past and this local use will continue into the future.

Oil and Gas

The Holitna and Bethel sedimentary basins (36), geologically favorable for oil and gas accumulations, occur within the study area (fig. 7). The Holitna Basin is in the southeast part of the study area along the Kuskokwim and Stony Rivers. The Bethel Basin is in the southwest part of the study area on the Kuskokwim River delta. The DGGS conducted seismic surveys in the Holitna Basin for oil and gas structures in 1983.

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

Geothermal Energy

A geothermally active area has been reported along the north bank of Otter Creek at a site approximately 1-mi north of Discovery (37) (fig. 7).

Geothermal activity is also reported along Otter Creek (37) and conceivably exists in other areas. More field work is needed if other geothermally active areas are to be identified.

SALABLE MINERAL RESOURCES

A salable mineral resource identified in the study area includes sand and gravel deposits that occur in stream and river valleys throughout the area. They were deposited both by fluvial and glacial action. One sand and gravel pit, the Old Town (2), is located near the town of Iditarod (fig. 5). The sand and gravel was used locally but production figures are not available. Sand and gravel from along the Kuskokwim River has been used in the city of Bethel. Sand and gravel deposits adequate for local use requirements exist along all streams and rivers.

MINERALIZED AREAS

Based upon available historical data and the 1983 sampling, fourteen multi-element and twelve single element mineralized areas have been identified (fig. 7). In addition two areas may contain oil and gas, two may contain coal, and one area of minor geothermal activity. Stream and river valleys contain sand and gravel deposits.

MULTI-ELEMENT MINERALIZED AREAS

There are eight large and six small multi-element mineralized areas (fig. 7,table 5) discussed in this report.

The largest multi-element mineralized area occurs in the upper George River basin - Granite Mountain area. This area includes Julian, Michigan, Beaver, Eldorado, Willow-Granite Creeks, and the Big and Little Waldren Forks of the Takotna River. This area extends northeast-southwest for about 40-mi and is nearly 30-mi-wide. It is primarily an area of placer gold within which are smaller areas containing other elements which include antimony, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, tin, titanium, and zinc.

The second largest mineralized area extends from Sleetmute to DeCourcy Mountain. The area includes Barometer Mountain, Eightmile, Fuller, Willis, Downey, California, Central, Crooked, and Donlin Creeks, the George River, Juninggulra Mountain, and DeCourcy Mountain. This area extends northwest-southeast for about 60-mi and is nearly 16-mi-wide in the area of Crooked Creek. It is primarily a zone of mercury deposits within which smaller areas contain other elements which include antimony, chromium, cobalt, copper, gold, lead, manganese, molybdenum, nickel, tin, and titanium.

The third largest mineralized area is in the vicinity of the Horn Mountains to Oguohaydok Ridge. The area includes Sue and Getmuna Creeks, and Whitewing Valley. The area extends north-south for about 20-mi and is about 14-mi-wide. The primary element is titanium with areas containing cobalt, lead, manganese, nickel, and tungsten.

A mineralized area has been identified in the vicinity of Chicken Mountain and Flat (outside the Iditarod-George Planning Block). The area includes Otter, Willow, Happy, and Bonanza Creeks. The area trends north-south for about 16-mi and is 8-mi-wide. The primary elements consist of antimony, chromium, gold, mercury, and tungsten with smaller areas containing cobalt and lead. This trend of mineralization may extend into the Iditarod-George Planning Block. Placer gold occurs in all the streams draining Chicken Mountain. Several creeks presently have active placer mines.

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

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

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

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

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

TABLE 5. - Multi-element mineralized areas of the Iditarod-George study area (see figure 7 for locations)

Principal area	Subarea	Elements	Size (miles)
George R/Granite Mtn......................		Au	30x40
	Big Waldren F/ Moose Ck.	Au,Co,Zn,Ni	9x30
	Big Waldren F..	Au,Co,Zn	9x15
	Granite Mtn....	Au,Co,Cr,Cu, Mo,Sb,Sn,Ti, Zn	6x7
	Eldorado Ck/ L.Waldren F.	Au,Zn	8x13
	L.Waldren F....	Au,Co,Zn	3x8
	Upper George R.	Au,Cu	9x12
	Beaver Ck.trib.	Au,Zn	2x5
	Julian Ck......	Au,Hg,Sn	2x4
	Lower George R.	Au,Hg	2x2
Sleetmute/DeCourcy.......................		Hg	16x60
	Barometer Mtn..	Hg,Mo,Sb	4x6
	Eightmile/ Fuller Ck.	Hg,Au	6x11
	Willis Ck......	Hg,Ti	1x4
	Creek west of Willis Ck.	Hg,Zn	2x3
	2nd Creek west of Willis Ck.	Hg,Ni	1x4
	Eightmile/ Downey Ck.	Hg,Mo	1x2
	California Ck (south).	Hg,Zn	1x2
	California Ck..	Hg,Au	1x5
	Georgetown.....	Hg,Cu,Mn,Pb	2x2
	Downey Ck......	Hg,Co	6x8
	Downey/Central Ck.	Hg,Co,Mo,Ni	2x4
	Crooked Ck.....	Hg,Au,Cr	4x16
	Crooked/Donlin Ck.	Hg,Au,Cr,Sb, Sn	4x5
	Juninggulra Mtn.	Hg,Sb	2x3
	DeCourcy Mtn...	Hg,Sb	3x4
	Little Ck......	Hg,Au	2x4
Horn Mtns/Oguohaydok Ridge.		Ti	14x40
	E.Horn Mtns....	Ti,Mn	10x40
	Horn Mtns SE trib.	Ti,Mn,Pb	4x10
	Oguohaydok Ridge.	Ti,Mn,Pb	2x2

TABLE 5. - Multi-element mineralized areas of the Iditarod-George study area -- Continued

Principal area	Subarea	Elements	Size (miles)
Horn Mtns/Oguohaydok Ridge--Continued.			
	Sue Ck.........	Ti,Co,Ni	4x8
	W.Horn Mtns....	Ti,Co,Ni,W	2x3
	Getmuna Ck.....	Ti,Pb	6x10
Chicken Mtn/Flat..........................		Au,Cr,Hg,Sb,W	8x16
	Flat...........	Au,Cr,Hg,Pb,Sb,W	2x6
	Chicken Mtn....	Au,Co,Cr,Hg,Sb,W	1x2
Russian Mtns/Cobalt Ck....................		Cr,Ti	5x12
	Russian Mtns...	Cr,Au,Pb,Sb,Ti,W,Zn	5x5
Molybdenum Mtn............................		Au,Cr,Cu,Mo,Ni,Sb,W	4x4
Portage Mtns..............................		Co	4x8
	SW side........	Co,Pb,Ti	4x4
	NE side........	Co,Ti	4x4
Portage/Russian Mtns......................		Co,Ti	3x6
NW Molybdenum Mtn.........................		Co,Cu	3x6
Mosquito Mtn..............................		Ti	6x24
	Molybdenum/ Mosquito Mtn.	Ti,Cr	2x6
Saddle Mtn................................		Au,Hg,W	2x5
Getmuna Ck................................		Mn,Pb	5x8
N.Fork George R...........................		Ni	14x16
	Michigan Ck....	Ni,Co,Zn	3x6
S.Fork George R...........................		Co,Ni	8x12

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

SINGLE ELEMENT MINERALIZED AREAS

Numerous single element mineralized areas have been identified in the study area (fig. 7,table 6). Swinging Dome shows chromium. Cobalt occurs in three areas including Ruby Creek, a tributary to the Innoko River, and the area from Smith Creek to Haystack Butte. Mercury has been identified approximately 3-mi northwest of Kolmakof along the north side of the Kuskokwim River. The area between New York Creek and Sue Creek contains titanium. Nickel occurs along a tributary to Owhat River and along an area west of Canoe Mountain. Northwest of Canoe Mountain is an area with zinc. Placer gold occurs along New York Creek-Murray Gulch, the Oskawalik River, and the Stony River.

Coal occurs in the area between Flat (39) and Iditarod and along the Innoko River (40) approximately 12-mi northeast of Shageluk.

Two areas may contain oil and gas, the Holitna Basin along the southeast portion of the study area, and the Bethel Basin along the southwest portion.

Minor geothermal activity has been identified in the vicinity of Otter Creek approximately 1-mi north of the town of Discovery.

Sand and gravel occurs along stream and river valleys which contain Recent flood-plain, glacial, or gravel deposits (fig. 4).

CONCLUSIONS

Seven lode mines, 15 placer mines, 10 lode prospects, 10 placer prospects, 9 lode occurrences, 12 placer occurrences, 2 coal deposits, 1 gemstone(?) occurrence, and 1 sand and gravel pit occur in the Iditarod-George study area. The mineral resources can be classified as: 1) lode mercury-antimony; 2) lode gold-silver; 3) lode antimony; 4) lode molybdenum; 5) lode copper-lead-zinc; 6) lode gemstone; 7) placer gold; 8) placer tungsten; 9) placer mercury; 10) coal; 11) oil and gas; 12) geothermal activity; and 13) sand and gravel.

In 1983, the Bureau collected 172 stream sediment samples and 3 rock samples in and near the planning block to supplement the historic data. From these data it was possible to identify 14 areas having multi-element mineralization, 12 areas having single element mineralization, 2 areas that contain coal, 2 areas that may contain oil and gas, 1 geothermally active area, and sand and gravel deposits along all stream and river valleys.

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

TABLE 6. - Single element mineralized areas of the Iditarod-George study area (see figure 7 for locations)

Area	Element	Size (miles)
Swinging Dome	Cr	2x6
Ruby Creek	Co	3x5
Innoko River trib	Co	4x8
Haystack Butte	Co	2[illegible]
Owhat River	Ni	4x6
Kolmakof	Hg	2x3
New York Ck/Murry Gulch	Au	4x6
New York/Sue Creeks	Ti	2x4
Canoe Mtn.(west)	Ni	2x3
Canoe Mtn.(north)	Zn	2x3
Oskawalik River	Au	26x30
Stony River	Au	7x20
Flat/Iditarod	Coal	4x8
Innoko River	Coal	5x8
Holitna Basin	Oil&gas	unmeasured
Bethel Basin	Oil&gas	unmeasured
Discovery	Geothermal	1x1
steam valleys	Sand&gravel	unmeasured

River drainage, the Crooked Creek drainage, and the George River drainage.

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

REFERENCES

1. Wahrhaftig, C. Physiographic Divisions of Alaska. U. S. Geol. Surv. Prof. Paper 482, 1965, 52 pp.

2. Cady, W. M., R. E. Wallace, J. M. Hoare, and E. J. Webber. The Central Kuskokwim Region, Alaska. U. S. Geol. Surv. Prof. Paper 268, 1955, 132 pp.

3. Spurr, J. E. A Reconnaissance in Southwestern Alaska in 1898. U. S. Geol. Surv. 20th Annu. Rep., 1900, pp. 31-264, 7 pts.

4. Smith, P. S. The Lake Clark-Central Kuskokwim Region, Alaska. U. S. Geol. Surv. Bull. 655, 1917, 162 pp.

5. Smith, P. S. and A. G. Maddren. Quicksilver Deposits of the Kuskokwim Region. U. S. Geol. Surv. Bull. 622-H, 1915, pp. 266, 272-291.

6. Maddren, A. G. Gold Placers of the Lower Kuskokwim with a note on Copper in the Russian Mountains. U. S. Geol. Surv. Bull. 622-H, 1915, pp. 292-360.

7. Wimmler, N. L. Placer Mining in Alaska in 1924. AK. Territorial Dept. of Mines MR 195-7, 1924, pp. 1-21, 94-102.

8. -----. Placer Mining in Alaska in 1925. AK. Territorial Dept. of Mines MR 195-8, 1925, pp. 1-17, 106-109.

9. Holzheimer, F. W. Notes on Mining Activity Iditarod District 1926. AK. Territorial Dept. of Mines MR 73-3, 1926, pp. 17-24.

10. Roehm, J. C. Summary Report of Mining Investigations in the Bristol Bay, Bethel, and Otter Precincts. AK. Territorial Dept. of Mines IR, 1937, 9 pp.

11. -----. Summary Report of Mining Investigations in the Aniak-Tuluksuk, Goodnews Bay, and Kuskokwim Mining Districts. AK. Territorial Dept. of Mines IR, 1939, 14 pp.

12. -----. Summary Report of Mining Investigations in the Otter, Innoko, and Nulato Precincts. AK. Territorial Dept. of Mines IR, 1939, pp. 1-5.

13. -----. Summary Report of Mining Investigations in the Bethel, Otter, Innoko, and Kenai Precincts. AK. Territorial Dept. of Mines IR, 1940, 6 pp.

14. Joesting, H. R. Strategic Mineral Occurrences in Interior Alaska. AK. Territorial Dept. of Mines Pamphlet No. 1, 1942, 46 pp.

15. Webber, B. S., S. C. Bjorklund, F. A. Rutledge, B. I. Thomas, and W. S. Wright. Mercury Deposits of Southwestern Alaska. BuMines RI 4065, 1947, 57 pp., illus., incl. index and geol. maps.

16. Williams, J. A. Mining Operations in the Otter Recording District, Fourth Division. AK. Territorial Dept. of Mines MF 73-4, 1950, 5 pp.

17. Maloney, R. P. Investigation of Mercury-Antimony Deposits near Flat, Yukon River Region, Alaska. BuMines RI 5991, 1962, 44 pp., 8 figs.

18. Sainsbury, C. L. and E. M. MacKevett Jr. Quicksilver Deposits of Southwestern Alaska. U. S. Geol. Surv. Bull. 1187, 1965, 89 pp.

19. Jasper, M. W. Property Examination Report - Willis Cinnabar Property. AK. Territorial Dept. of Mines PE 82-3, 1955, 19 pp.

20. -----. Property Examination Report - Kolmakof Cinnabar Prospect. AK. Territorial Dept. of Mines PE 82-4, 1955, 14 pp.

21. -----. Preliminary Property Examination Report - Park's Cinnabar Prospect. AK. Territorial Dept. of Mines PE 82-5, 1956, 12 pp.

22. -----. Cinnabar Province, Kuskokwim Region. AK. Territorial Dept. of Mines MI 194-1, 1962, 26 pp.

23. -----. Resume' of 1963 Field Investigations and Mining Activity in Third and Section of Fourth Judicial Districts. AK. Territorial Dept. of Mines IR, 1963, pp. 14-16.

24. -----. Harvison Mercury Prospect, in Report for the Year 1963. AK. Territorial Dept. of Mines, 1963, pp. 51-52.

25. Malone, K. Mercury Occurrences in Alaska. BuMines IC 8131, 1962, 57 pp., 22 figs.

26. Kimball, A. L. Reconnaissance Sampling of Decomposed Monzonite for Gold near Flat, Alaska. BuMines OFR 6-69, 1969, 39 pp., 4 figs.

27. Carnes, R. D. Active Alaskan Placer Operations, 1975. BuMines OFR 98-76, 1976, 91 pp.

28. Roehm, J. C. Preliminary Report of the Red Devil Group (Quicksilver Prospect) Kuskokwim District, Alaska. AK. Territorial Dept. of Mines PE 82-1, 1939, 5 pp.

29. MacKevett, Jr., E. M. and H. C. Berg. Geology of the Red Devil Quicksilver Mine, Alaska. U. S. Geol. Surv. Bull. 1142-G, 1963, pp. G1-G16, illus., tables, geol. maps.

30. Maddren, A. G. Gold Placer Mining Developments in the Innoko-Iditarod Region. U. S. Geol. Surv. Bull. 480-I, 1911, pp. 236-270.

31. Brooks, A. H. The Mining Industry in 1909. U. S. Geol. Surv. Bull. 442-A, 1910, pp. 20-46.

32. Eakin, H. M. Gold Placers of the Innoko-Iditarod Region. U. S. Geol. Surv. Bull. 542-G, 1913, pp. 293-303.

33. U. S. Bureau of Mines and U. S. Geological Survey. Principles of a Resource/Reserve Classification for Minerals. U. S. Geol. Surv. Circ. 831, 1980, 4 pp.

34. Smith, P. S. Occurrence of Molybdenum Minerals in Alaska. U. S. Geol. Surv. Bull. 926-C, 1942, pp. 161-210.

35. West, W. S. Reconnaissance for Radioactive Deposits in the Lower Yukon-Kuskokwim Region, Alaska, 1952. U. S. Geol. Surv. Circ. 328, 1954, 10 pp. illus., incl. geol. map.

36. Joint Federal-State Land Use Planning Commission, Resource Planning Team, Minerals Section, Anchorage, Alaska. Preliminary Draft. Inventory Report. Minerals, Energy, and Geology, Yukon Region., March 1974, 148 pp.

37. Waring, G. A. Mineral Springs of Alaska, with a chapter on the Chemical Character of some surface waters of Alaska, by R. B. Dole, and A. A. Chambers. U. S. Geol. Surv. Water-Supply Paper 418, 1917, pp. 70-71.

38. Gove, P. B. (Chief Ed.) Webster's Third International Dictionary of the English Language, Unabridged. G. & C Merriam Company Pub., Springfield, Mass., 1976, 1775 pp.

39. Brooks, A. H. The Alaskan Mining Industry in 1913. U. S. Geol. Surv. Bull. 592-A, 1914, pp. 45-74.

40. Maddren, A. G. The Innoko Gold-Placer District, Alaska, with accounts of the Central Kuskokwim Valley and the Ruby Creek and Gold Hill placers. U. S. Geol. Surv. Bull. 410, 1910, 87 pp.

41. State of Alaska. MinFile (Automated system for Alaska mining claim information taken from Kardex filing system). Div. of Geol. and Geophysical Surv., College, AK., 1983.

42. U. S. Bureau of Mines. Minerals Availability System, Deposit Listing. U. S. BuMines, Unpublished Rep. (Available at Bureau of Mines, Juneau, Alaska), 1983.

43. U. S. Bureau of Land Management. History Analysis Report. Mining Claim Recordings/Surveys/Patents/Contests. Unpublished Computer Abstract Report available at BLM State Office, Anchorage, AK., May 31, 1983.

44. Gates, G. O. Analysis of Alaska Coals. BuMines Tech. Paper 682, 1946, pp. 30-31, 75.

45. Smith, P. S. Mineral Resources of the Lake Clark-Iditarod Region. U. S. Geol. Surv. Bull. 622-H, 1915, pp. 247-271.

46. Mertie, Jr., J. B. and G. L. Harrington. The Ruby-Kuskokwim Region, Alaska. U. S. Geol. Surv. Bull. 754, 1924, 129 pp., 2 figs., 5 pls. incl. maps.

47. Mertie, Jr., J. B. Mineral Deposits of the Ruby-Kuskokwim Region, Alaska. U. S. Geol. Surv. Bull. 864-C, 1936, pp. 115-255, 1 fig., 6 pls. incl. geol. sketch map.

48. Cobb, E. H. Synopsis of the Mineral Resources and Geology of Alaska. U. S. Geol. Surv. Bull. 1307, 1974, 53 pp.

49. Eakin, H. M. The Iditarod-Ruby Region, Alaska. U. S. Geol. Surv. Bull. 578, 1914, 45 pp.

50. Brooks, A. H. The Mining Industry in 1911. U. S. Geol. Surv. Bull. 520-A, 1912, pp. 17-44.

51. -----. The Alaskan Mining Industry in 1914. U. S. Geol. Surv. Bull. 622-A, 1915, pp. 15-68.

52. -----. The Alaskan Mining Industry in 1915. U. S. Geol. Surv. Bull. 642-A, 1916, pp. 16-71.

53. Mertie, Jr., J. B. and G. L. Harrington. Mineral Resources of the Ruby-Kuskokwim Region: in Brooks, A. H. and others, Mineral Resources of Alaska Report on Progress of Investigations in 1915. U. S. Geol. Surv. Bull. 642, 1916, pp. 223-266.

54. Smith, S. S. The Mining Industry in the Territory of Alaska during the calendar year 1916. BuMines B. 153, 1917, 89 pp.

55. Brooks, A. H. The Alaskan Mining Industry in 1916. U. S. Geol. Surv. Bull. 662-A, 1918, pp. 11-62.

56. Martin, G. C. The Alaskan Mining Industry in 1917. U. S. Geol. Surv. Bull. 692-A, 1919, pp. 11-42.

57. Brooks, A. H. The Alaskan Mining Industry in 1920. U. S. Geol. Surv. Bull. 722-A, 1922, pp. 7-67.

58. -----. The Alaskan Mining Industry in 1921. U. S. Geol. Surv. Bull. 739-A, 1923, pp. 1-44.

59. Brooks, A. H. and S. R. Capps. The Alaskan Mining Industry in 1922. U. S. Geol. Surv. Bull. 755-A, 1924, pp. 3-49.

60. Brooks, A. H. Alaska's Mineral Resources and Production, 1923. U. S. Geol. Surv. Bull. 773-A, 1925, pp. 3-25, 46-49.

61. Smith, P. S. Mineral Industry of Alaska in 1924. U. S. Geol. Surv. Bull. 783-A, 1926, pp. 1-30.

62. Moffit, F. H. Mineral Industry of Alaska in 1925. U. S. Geol. Surv. Bull. 792, 1927, pp. 1-39.

63. Smith, P. S. Mineral Industry of Alaska in 1926. U. S. Geol. Surv. Bull. 797-A, 1929, pp. 1-50.

64. -----. Mineral Industry of Alaska in 1927. U. S. Geol. Surv. Bull. 810-A, 1930, pp. 1-64.

65. -----. Mineral Industry of Alaska in 1928. U. S. Geol. Surv. Bull. 813-A , 1930, pp. 1-72.

66. -----. Mineral Industry of Alaska in 1929. U. S. Geol. Surv. Bull. 824-A, 1932, pp. 1-81.

67. -----. Mineral Industry of Alaska in 1930. U. S. Geol. Surv. Bull. 836-A, 1933, pp. 1-83.

68. -----. Mineral Industry of Alaska in 1931. U. S. Geol. Surv. Bull. 844-A, 1933, pp. 1-82.

69. -----. Mineral Industry of Alaska in 1932. U. S. Geol. Surv. Bull. 857-A, 1934, pp. 1-91.

70. -----. Mineral Industry of Alaska in 1933. U. S. Geol. Surv. Bull. 864-A, 1934, pp. 1-94.

71. -----. Mineral Industry of Alaska in 1934. U. S. Geol. Surv. Bull. 868-A, 1936, pp. 1-91.

72. -----. Mineral Industry of Alaska in 1935. U. S. Geol. Surv. Bull. 880-A, 1937, pp. 1-95.

73. -----. Mineral Industry of Alaska in 1936. U. S. Geol. Surv. Bull. 897-A, 1938, pp. 1-107.

74. -----. Mineral Industry of Alaska in 1937. U. S. Geol. Surv. Bull. 910-A, 1939, pp. 1-113.

75. -----. Mineral Industry of Alaska in 1938. U. S. Geol. Surv. Bull. 917-A, 1939, pp. 1-113.

76. -----. Mineral Industry of Alaska in 1939. U. S. Geol. Surv. Bull. 926-A, 1941, pp. 1-106.

77. -----. Mineral Industry of Alaska in 1940. U. S. Geol. Surv. Bull. 933-A, 1942, pp. 1-102.

78. White, M. G. and P. L. Killeen. Reconnaissance for Radioactive Deposits in the Lower Yukon-Kuskokwim Highlands Region, Alaska. U. S. Geol. Surv. Circular 255, 1953, 18 pp., illus., incl. geol. sketch maps.

79. State of Alaska. Annual Placer Mining Application, Land Use, and Water Use Permits and Mining License. 1983.

80. Malone, K. Mercury Potential of the United States by BuMines (Author of Chap. 3 on Alaska), BuMines IC 8252, 1965, pp. 31-59.

81. Mertie, Jr., J. B. The Occurrence of Metalliferous Deposits in the Yukon and Kuskokwim Regions, Alaska. U. S. Geol. Surv. Bull. 739-D, 1923, pp. 149-165.

82. Koschmann, A. H. and M. H. Bergendahl. Principal Gold-Producing Districts of the United States. U. S. Geol. Surv. Prof. Paper 610, 1968, 283 pp.

83. Cobb, E. H. Metallic Mineral Resources Map of the Iditarod Quadrangle, Alaska. U. S. Geol. Surv. Misc. Field Studies Map MF-363, 1972, 1 sheet, scale 1:250,000.

84. -----. Placer Deposits of Alaska. U. S. Geol. Surv. OFR 508, 1972, 132 pp., 1 map.

85. -----. Summary of References to Mineral Occurrences (other than mineral fuels and construction materials) in the Iditarod and Ophir Quadrangles, Alaska. U. S. Geol. Surv. OFR 76-576, 1976, 101 pp.

86. Eberlein, G. D., R. M. Chapman, H. L. Foster, and J. S. Gassaway. Map and Table Describing Known Metalliferous and Selected Non-metalliferous Mineral Deposits in Central Alaska. U. S. Geol. Surv. OFR 77-168-D, 1977, 132 pp., 1 map, scale 1:1,000,000.

87. Martin, G. C. The Alaskan Mining Industry in 1918. U. S. Geol. Surv. Bull. 712-A, 1920, pp. 11-52.

88. Roehm, J. C. Preliminary Report of Golden Horn Mine, Iditarod Mining District, Alaska. AK. Territorial Dept. of Mines PE 73-1, 1937, 11 pp.

89. Holzheimer, F. W. Mining Activity, Otter Creek, Iditarod District, Alaska. AK. Territorial Dept. of Mines MR. 73-1, 1926, 7 pp.

90. Berg, H. C. and E. H. Cobb. Metalliferous Lode Deposits of Alaska. U. S. Geol. Surv. Bull. 1246, 1967, 254 pp.

91. Brooks, A. H. The Future of Alaska Mining. U. S. Geol. Surv. Bull. 714-A, 1921, pp. 5-57.

92. Smith, P. S. Past Lode-Gold Production from Alaska. U. S. Geol. Surv. Bull. 917-C, 1941, pp. 159-212.

93. Wedow, Jr., H., M. G. White, and R. M. Moxham. Interim Report on an Appraisal of the Uranium Possibilities of Alaska. U. S. Geol. Surv. Trace Elements Memorandum Rep. 235 (OFR 51), 1951, 124 pp.

94. Overstreet, W. C. The Geologic Occurrence of Monazite. U. S. Geol. Surv. Prof. Paper 530, 1967, 327 pp.

95. Cobb, E. H. Metallic Mineral Resources Map of the Sleetmute Quadrangle, Alaska. U. S. Geol. Surv. Misc. Field Studies Map MF-368, 1972, 1 sheet, scale 1:250,000.

96. Holzheimer, F. W. Miscellaneous Notes on the Kuskokwim River District, Alaska. AK. Territorial Dept. of Mines MR 194-2, 1926, 6 pp.

97. Wright, W. S. and F. A. Rutledge. Red Devil Mercury - Antimony Mine, Sleetmute, Alaska. BuMines Supplemental Report, 1947, 31 pp.

98. Lund, M. J. Red Devil Mercury Mine Reactivated, in Alaska Industry, ed. by R. G. Knox. Alaska Ind. Publ., v. 1, No. 8, Aug. 1969, pp. 24, 25, 70.

99. Alaska Division of Geological Survey. Report for the year 1970. AK. Div. of Geol. Surv., College, AK., 1970, 86 pp.

100. -----. Annual Report 1971. AK. Div. of Geol. Surv., Anchorage, AK., 1972, 109 pp.

101. Alaska Division of Geological and Geophysical Surveys. Annual Report 1972. AK. Div. of Geol. and Geophysical Surv., College, AK., 1973, pp. 43-46.

102. Eakins, G. R., T. K. Bundtzen, M. S. Robinson, J. G. Clough, C. B. Green, K. H. Clautice, and M. A. Albanese. Alaska's Mineral Industry, 1982. AK. Div. of Geol. and Geophysical Surv. Spec. Rep. 31, 1983, 63 pp.

103. Bain, H. F. Alaska's Minerals as a Basis for Industry. BuMines IC 7379, 1946, 89 pp.

104. Joesting, H. R. Supplement to Pamphlet No. 1 - Strategic Mineral Occurrences in Interior Alaska. AK. Territorial Dept. of Mines Pamphlet No. 2, 1943, 28 pp.

105. Erspamer, E. G. and R. R. Wells. Selective Extraction of Mercury and Antimony from Cinnabar-Stibnite Ore. BuMines RI 5243, 1956, 15 pp., 1 fig.

106. Wells, R. R., M. M. Johnson, and F. T. Sterling. Recovering Mercury from Cinnabar-Stibnite Ore by Flotation and Fluidized-Bed Roasting. BuMines RI 5433, 1958, 19 pp., 6 figs.

107. Pennington, J. W. Mercury, A Materials Survey, with a chapter on Resources by E. H. Bailey. BuMines IC 7941, 1959, 92 pp.

108. Chapman, R. M. and H. T. Shacklette. Geochemical Exploration in Alaska, in Geological Survey Research, 1960. U. S. Geol. Surv. Prof. Paper 400-B, 1960, pp. B104-B107.

109. U. S. Geological Survey. Geological Survey Research 1964. U. S. Geol. Surv. Prof. Paper 501-A, 1964, pp. A1-A367.

110. Bailey, E. H. and M. Smith. Mercury - Its Occurrence and Economic Trends. U. S. Geol. Surv. Circ. 496, 1964, 11 pp.

111. Shacklette, H. T. Bryophytes Associated with Mineral Deposits and Solutions in Alaska. U. S. Geol. Surv. Bull. 1198-C, 1965, pp. C1-C18.

112. Hawley, C. C., E. E. Martinez, and J. Marinenko. Geochemical Data on the South Ore Zone, White-Mountain Mine, and on the gold Content of other Mercury Ores, Southwestern Alaska, in Some Shorter Mineral Resources Investigations in Alaska. U. S. Geol. Surv. Circ. 615, 1969, pp. 16-20.

113. Roehm, J. C. Preliminary Report of the Barometer Group, Kuskokwim Precinct, Alaska. AK. Territorial Dept. of Mines PE 82-2, 1939, 4 pp.

114. Holzheimer, F. W. The Quicksilver Resources of the Kuskokwim River Region, Alaska. AK. Territorial Dept. of Mines MR 73-2, 1926, 7 pp.

115. Sainsbury,, C. L. and E. M. MacKevett Jr. Structural Control in Five Quicksilver Deposits in Southwestern Alaska, in Geological Survey Research 1960. U. S. Geol. Surv. Prof. Paper 400-B, 1960, pp. B35-B38.

116. Brooks, A. H. and G. C. Martin. The Alaskan Mining Industry in 1919. U. S. Geol. Surv. Bull. 714-A, 1921, pp. 59-95.

117. Brooks, A. H. Alaska's Mineral Supplies. U. S. Geol. Surv. Bull. 666-P, 1919, pp. 89-102.

118. Maloney, R. P. Soil Sampling of the Egnaty Creek Mercury Prospect, Kuskokwim River Basin, Alaska. BuMines OFR 16-68, 1968, 6 pp., 4 figs.

119. -----. Trenching and Sampling of the Rhyolite Mercury Prospect, Kuskokwim River Basin, Alaska. BuMines RI 6141, 1962, 43 pp., 11 figs.

120. U. S. Bureau of Mines. DeCourcy Mountain Mercury Deposit, Iditarod, Alaska. BuMines War Miner. Rep. 223, 1944, 13 pp.

121. Cobb, E. H. Placer Deposits of Alaska. U. S. Geol. Surv. Bull. 1374, 1973, 213 pp.

122. Dall, W. H. Alaska and Its Resources. New York, Arno Press Inc., 1970, Reprint of 1870 ed., p. 477.

123. Petroff, I. Report on the Population, Industries, and Resources of Alaska. U. S. Dept. of the Interior Census Office, Washington: Government Printing Office, 1884, pp. 13, 77, 90.

124. Brooks, A. H. The Mining Industry in 1910. U. S. Geol. Surv. Bull. 480-B, 1911, pp. 21-42.

125. Wedow, Jr., H., M. G. White, and R. M. Moxham. Preliminary Summary of Reconnaissance for Uranium and Thorium in Alaska, 1952. U. S. Geol. Surv. Circ. 248, 1953, 15 pp.

126. Hoare, J. M. and W. L. Coonrad. Geology of the Russian Mission Quadrangle, Alaska. U. S. Geol. Surv. Misc. Geol. Inv. Map I-292, 1959, 1 sheet, scale 1:250,000, with text.

127. Ebbley, Jr., N. and W. S. Wright. Antimony Deposits in Alaska. BuMines RI 4173, 1948, 41 pp., 23 figs.

BIBLIOGRAPHY

Alaska Division of Geological and Geophysical Surveys. Annual Report 1973. AK. Div. of Geol. and Geophysical Surv., College, AK., 1974, 59 pp.

-----. Biennial Report 1974-75, AK. Div. of Geol. and Geophysical Surv., College, AK., 1976, 53 pp.

Alaska Division of Mines and Geology. Report for the year 1968. AK. Div. of Mines and Geology, College, AK., 1968, 67 pp.

-----. Report for the year 1969. AK. Div. of Mines and Geology, College, AK., 1969, 68 pp.

Alaska Division of Mines and Minerals. Report for the year 1960. AK. Div. of Mines and Miner., Juneau, AK., 1960, 88 pp.

-----. Report for the year 1961. AK. Div. of Mines and Miner., Juneau, AK. 1961, 108 pp.

-----. Report for the year 1962. AK. Div. of Mines and Miner., Juneau, AK., 1962, 119 pp.

-----. Report for the year 1963. AK. Div. of Mines and Miner., Juneau, AK., 1963, 87 pp.

-----. Report for the year 1964. AK. Div. of Mines and Miner., Juneau, AK., 1964, 107 pp.

-----. Report for the year 1965. AK. Div. of Mines and Miner., Juneau, AK., 1965, 99 pp.

-----. Report for the year 1966. AK. Div. of Mines and Miner., Juneau, AK., 1966, 115 pp.

-----. Report for the year 1967. AK. Div. of Mines and Miner., Juneau, AK., 1967, 98 pp.

Alaska Territorial Department of Mines. Repoct of the Commissioner of Mines to the Governor for the biennium ended December 31, 1936. AK. Territorial Dept. of Mines, Juneau, AK., 1937, 67 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1938. AK. Territorial Dept. of Mines, Juneau, AK., 1939, 64 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1940. AK. Territorial Dept. of Mines, Juneau, AK., 1941, 92 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1944. AK. Territorial Dept. of Mines, Juneau, AK., 1945, 48 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1946. AK. Territorial Dept. of Mines, Juneau, AK., 1946, 50 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1948. AK. Territorial Dept. of Mines, Juneau, AK., 1948, 50 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1950. AK. Territorial Dept. of Mines, Juneau, AK., 1950, 57 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1952. AK. Territorial Dept. of Mines, Juneau, AK., 1952, 66 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1954. AK. Territorial Dept. of Mines, Juneau, AK., 1955, 110 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1956. AK. Territorial Dept. of Mines, Juneau, AK., 1957, 103 pp.

-----. Report of the Commissioner of Mines to the Governor for the biennium ended December 31, 1958. AK. Territorial Dept. of Mines, Juneau, AK., 1958, 83 pp.

Barnes, D. F. Bouguer Gravity Map of Alaska. U. S. Geol. Surv. OFR 76-70, 1976, 1 map.

-----. Preliminary Bouguer Gravity Map of Central Alaska. U. S. Geol. Surv. OF Map 77-168-C, 1977, 1 map, scale 1:1,000,000.

Barnes, F. F. Coal Resources of Alaska. U. S. Geol. Surv. Bull. 1242-B, 1967, pp. B1-B36.

Beckwith, H. R. Report on Alaska Mines and Minerals, Inc., Red Devil Operation. 1965, 46p. (Unpublished mining engineering feasibilty study, released from confidentiality 1971).

Beikman, H. M. Preliminary Geologic Map of the Southeast Quadrant of Alaska. U. S. Geol. Surv. Field Studies Map MF-611, 1974, 2 sheets, scale 1:1,000,000.

-----. Geologic Map of Alaska. U. S. Geol. Surv., 1980, 2 Sheets, Scale 1:2,500,000.

Brooks, A. H. The Mining Industry in 1907. U. S. Geol. Surv. Bull. 345-A, 1908, pp.30-53.

-----. The Mining Industry in 1908. U. S. Geol. Surv. Bull. 379-A, 1909, pp. 21-62.

-----. Geologic Features of Alaskan Metalliferous Lodes. U. S. Geol. Surv. Bull. 480-C, 1911, pp. 43-93.

-----. The Mining Industry in 1912. U. S. Geol. Surv. Bull. 542-A, 1913, pp. 18-51.

-----. Antimony Deposits of Alaska. U. S. Geol. Surv. Bull. 649, 1916, 67 pp.

Bundtzen, T. K., G. R. Eakins, and C. N. Conwell. Review of Alaska's Mineral Resources 1981. AK. Div. of Geol. and Geophysical Surv. Summ. Rep., 1982, 30 pp.

-----. Review of Alaska's Mineral Resources. AK. Div. of Geol. and Geophysical Surv., 1982, 52 pp., 4 pls.

Bundtzen, T. K., and W. G. Gilbert. Outline of Geology and Mineral Resources of Upper Kuskokwim Region, Alaska. Paper in proceedings of the 1982 Symposium, Western Alaska Geology and Resource Potential (Anchorage, AK, Feb. 18, 1982), J. of the AK. Geol. Soc., v.3, 1983, pp. 101-117.

Bundtzen, T. K., and C. N. Conwell. Madhatters of the Kuskokwim quicksilver mines. Alaska Mines and Geology, v.31, No. 1, 1982. pp.1-4.

Churkin, Jr., M. Paleozoic and Precambrian rocks of Alaska and their roles in its Structural Evolution. U. S. Geol. Surv. Prof. Paper 740, 1973, 64 pp.

Clark, A. L., H. C. Berg, E. H. Cobb, D. G. Eberlien, E. M. MacKevett Jr., and T. P. Miller. Metal Provinces of Alaska. U. S. Geol. Surv. OFR, 1972, 3 pp., 3 maps.

-----. Metal Provinces of Alaska. U. S. Geol. Surv. Misc. Field Inv. Map I-834, 1974.

Cobb, E. H. Antimony, Bismuth, and Mercury Occurrences in Alaska. U. S. Geol. Surv. Mineral Inv. Resource Map MR-11, 1960a, scale 1:2,500,000.

-----. Chromite, Cobalt, Nickel, and Platinum Occurrences in Alaska. U. S. Geol. Surv. Mineral Inv. Resource Map MR-8, 1960b, scale 1:2,500,000.

-----. Copper, Lead, and Zinc Occurrences in Alaska. U. S. Geol. Surv. Miner. Inv. Resour. Map MR-9, 1960c, scale 1:2,500,000.

-----. Molybdenum, Tin, and Tungsten Occurrences in Alaska. U. S. Geol. Surv. Miner. Inv. Resour. Map MR-10, 1960d, scale 1:2,500,000.

-----. Lode Gold and Silver Occurrences in Alaska. U. S. Surv. Miner. Inv. Resour. Map MR-32, 1962, scale 1:2,500,000.

-----. Industrial Minerals and Construction Materials Occurrences in Alaska. U. S. Geol. Surv. Miner. Inv. Resour. Map MR-41, 1964a, scale 1:2,500,000.

-----. Metallic Mineral Resources Map of the Holy Cross Quadrangle, Alaska. U. S. Geol. Surv. Misc. Field Studies Map MF-376, 1972, 1 sheet, scale 1:250,000.

-----. Nickel Occurrences in Alaska. U. S. Geol. Surv. Miner. Inv. Resour. Map MR-63, 1974, scale 1:2,500,000.

-----. Summary of References to Mineral Occurrences (other than mineral fuels and construction materials) in the Dillingham, Sleetmute, and Taylor Mountains Quadrangles, Alaska. U. S. Geol. Surv. OFR 76-606, 1976, 92 pp.

-----. Summary of References to Mineral Occurrences (other than mineral fuels and construction materials) in the Candle, Holy Cross, Norton Bay, Nulato, and Unalakleet Quadrangles, Alaska. U. S. Geol. Surv. OFR 76-866, 1976, 102 pp.

-----. Placer Deposits Map of Central Alaska. U. S. Geol. Surv. OFR 77-168B, 1977, 64 pp., 1 map, scale 1:1,000,000.

-----. Placer Gold Occurrences in Alaska. U. S. Geol. Surv. OFR 81-1326, 1981, 34 pp., 1 map, scale 1:2,500,000.

-----. Lode Gold and Silver Occurrences in Alaska. U. S. Geol. Surv. OFR 82-406, 1982, 31 pp., 1 map, scale 1:2,500,000.

-----. Occurrences of Tungsten Minerals in Alaska. U. S. Geol. Surv. OFR 82-785, 1982, 11 pp., 1 map, scale 1:2,500,000.

-----. Occurrences of Molybdenum Minerals in Alaska. U. S. Geol. Surv. OFR 82-798, 1982, 8 pp., 1 map, scale 1:2,500,000.

-----. Occurrences of Copper Minerals in Alaska. U. S. Geol. Surv. OFR 82-1029, 1982, 33 pp., 1 map, scale 1:2,500,000.

-----. Occurrences of Lead Minerals in Alaska. U. S. Geol. Surv. OFR 83-73, 1983, 21 pp., 1 map, scale 1:2,500,000.

-----. Occurrences of Zinc Minerals in Alaska. U. S. Geol. Surv. OFR 83-199, 1983, 18 pp., 1 map, Scale 1:2,500,000.

Cobb, E. H. and D. R. St. Aubin. Occurrences of selected Critical and Strategic Mineral Commodities in Alaska. U. S. Geol. Surv. OFR 82-719, 1982, 24 pp.

Cobb, E. H. and R. Kachadoorian. Index of Metallic and Nonmetallic Mineral Deposits of Alaska compiled from published reports of Federal and State agencies through 1959. U. S. Geol. Surv. Bull. 1139, 1961, 363 pp., illus.

Collier, A. J. The Coal Resources of the Yukon, Alaska. U. S. Geol. Surv. Bull. 218, 1903, 71 pp.

Cook, D. J. and P. D. Rao. Distribution, Analysis, and Recovery of Fine Gold from Alluvial Deposits. Miner. Ind. Res. Lab. and Dept. of Miner. Eng., Univ. of AK., M.I.R.L. Rep. No. 32, 1973, Reprinted 1979, 102 pp.

Dadisman, S. V. Radiometric Ages of Rock in South-Central Alaska and Western Yukon Territory. U. S. Geol. Surv. OFR 80-183, 1980.

Decker, J. E. and J. M. Hoare. Sedimentology of the Cretaceous Kuskokwim Group, Southwest Alaska, in Coonrad, W. L. (ed.). U. S. Geological Survey in Alaska; accomplishments during 1980. U. S. Geol. Surv. Circ. 844, 1981, pp. 81-83.

Decker, J. E. and S. Karl. Preliminary Aeromagnetic Profiles of Central Alaska. U. S. Geol. Surv. OFR 77-168-F, 1977, 1 sheet, scale 1:1,000,000.

Eakins, G. R. Uranium in Alaska. AK. Div. of Geol. and Geophysical Surv. Geol. Rep. No. 38, 1969, 49 pp. 1 map.

Eakins, G. R. and C. L. Daniels. Survey of Mineral Activity in Alaska, 1977. AK. Div. of Geol. and Geophysical Surv. AOF 122, 1980, 32 pp.

-----. Survey of Mineral Activity in Alaska, 1978. AK. Div. of Geol. and Geophysical Surv. AOF 123, 1980, 14 pp.

Eakins, G. R. and R. B. Forbes. Investigation of Alaska's Uranium Potential. AK. Div. of Geol. and Geophysical Surv. Spec. Rep. 12, 1976, 372 pp., 5 maps.

Eberlein, G. D., J. S. Gassaway, and H. M. Beikman. Preliminary Geologic Map of Central Alaska. U. S. Geol. Surv. OF Map 77- 168-A, 1977, 1 sheet, scale 1:1,000,000.

Eberlein, G. D. and W. D. Menzie. Maps and Tables Describing Areas of Metalliferous Mineral Resource Potential of Central Alaska. U. S. Geol. Surv. OFR 78-1-D, 1978, 43 pp., 2 pls, scale 1:1,000,000.

Fernald, A. T. Geomorphology of the Upper Kuskokwim Region, Alaska. U. S. Geol. Surv. Bull. 1071-G, 1960, pp. 191-279, illus., geol. maps.

Fowler, H. M. Report of Investigations in the Innoko, Nulato, Bethel, Goodnews Bay, Wasilla, Chisana, and Ketchikan Mining Districts, Alaska. AK. Territorial Dept. of Mines IR, 1950, pp. 4-6.

Freeman, V. L. Examination of Uranium Prospects, 1956; in Contributions to Economic Geology of Alaska. U. S. Geol. Surv. Bull. 1155, 1963, pp. 29-33.

Gassaway, J. S. and B. S. Abramson. Map and Table Showing Known Coal Deposits in Central Alaska. U. S. Geol. Surv. OFR 77-168-G, 1977, 1 sheet, scale 1:1,000,000.

-----. Map and Table Showing Distribution of Known Thermal Springs and Selected Igneous Rocks in Central Alaska. U. S. Geol. Surv. OFR 77-168-H, 1977, 1 sheet, scale 1:1,000,000.

Grantz, A. and I. Zietz. Possible Significance of Broad Magnetic Highs over Belts of Moderately Deformed Sedimentary Rocks in Alaska and California. U. S. Geol. Surv. Prof. Paper 400-B (Art. 158), 1960, pp. B342-B347, incl. aeromagnetic map and profiles.

Hawley, C. C. Mineral Belts and Districts, Prospective Regions and Land Status in Alaska. 1973, 41 pp., 3 maps.

Heiner, V. D. Alaska Mining History. A Source Document Written for the University of Alaska Museum, Office of History and Archaeology, Alaska Division of Parks, Anchorage, Alaska. History and Archaeology Series No. 17 Misc. Pub., 1977, 463 pp.

Herreid, G. Structural Geology of the Red Devil Mine: Alaska Mines and Minerals. Inc., 1960, 11p., plates, unpublished.

-----. Geology of the Red Devil Mine, Alaska: 1965, 33p. Unpublished AIME talk.

-----. Tectonics and Ore Deposits in Alaska. AK. Div. of Mines and Miner. Rep. for the Year 1964, 1965e, pp. 61-70, illus.

Hietanen A. and R. C. Erd. Ferroaxinites from the Feather River Area, Northern California, and from the McGrath and Russian Mission Quadrangles, Alaska. U. S. Geol. Surv. J. of Res., v. 6, No. 5, Sept-Oct. 1978, pp. 603-610.

Hoare, J. M. Geology and Tectonic Setting of Lower Kuskokwim-Bristol Bay Region, Alaska. Am. Assoc. of Petroleum Geol. Bull., v. 45, No. 5, May 1981, pp. 594-611, 3 figs., 1 table.

Hoare, J. M. and E. H. Cobb. Metallic Mineral Resources Map of the Russian Mission Quadrangle, Alaska. U. S. Geol. Surv. Misc. Field Studies Map MR-444, 1972, scale 1:250,000.

-----. Metallic Occurrences (other than mineral fuels and construction materials) in the Bethel, Goodnews, and Russian Mission Quadrangles, Alaska. U. S. Geol. Surv. OFR 77-156, 1977, 98 pp.

Hoare, J. M., W. H. Condon, and W. W. Patton Jr. Occurrence and Origin of Laumontite in Cretaceous Sedimentary Rocks in Western Alaska, in Geological Survey Research 1964. U. S. Geol. Surv. Prof. Paper 501-C, 1964, pp. C74-C78.

Hollick, A. The Tertiary Floras of Alaska, with a chapter on the geology of the Tertiary deposits, by P. S. Smith. U. S. Geol. Surv. Prof. Paper 182, 1936, pp. 24-34.

Holzheimer, F. W. Lode Prospects in the Russian Mountains Kuskokwim River Region, Alaska. AK. Territorial Dept. of Mines MR-81-1, 1926, 13 pp.

-----. Quicksilver Resources of the Kuskokwim River District. AK. Territorial Dept. of Mines MR-82-1, 1926, 52 pp.

-----. Occurrences of Coal on the Yukon River, Alaska. AK. Territorial Dept. of Mines MR 194-1, 1926, 10 pp.

-----. Miscellaneous Notes on the Kuskokwim River District, Alaska. AK. Territorial Dept. of Mines MR 194-4, 1926, 6 pp.

Hurlburt, Jr., C. S. Dana's Manual of Mineralogy. 18th ed., Wiley, 1971, 579 pp.

Imlay, R. W. and R. L. Detterman. Jurassic Paleobiogeography of Alaska. U. S. Geol. Surv. Prof. Paper 801, 1973, 34 pp.

Jaffe, H. W., D. Gottfried, C. L. Waring, and H. W. Worthing. Lead-Alpha Age Determinations of Accessory Minerals of Igneous Rocks (1953-1957). U. S. Geol. Surv. Bull. 1097-B, 1959, pp. 65-148.

Joint Federal-State Land Use Planning Commission, Resource Planning Team, Minerals Section, Anchorage, Alaska. Preliminary Draft. Inventory Report. Minerals, Energy, and Geology, Southwest Region, March 1974, 92 pp.

Jones, D. L. and N. J. Silberling. Mesozoic Stratigraphy - The Key to Tectonic Analysis of Southern and Central Alaska. U. S. Geol. Surv. OFR 79-1200, 1979, 37 pp.

Maddren, A. G. Gold Placers of the Innoko District. U. S. Geol. Surv. Bull. 379-E, 1909, pp. 238-266.

Maloney, R. P. Microfilming of Mining Records in the Kuskokwim and Yukon River Basins, Alaska. BuMines OFR 11-69, 1969, 26 pp., 2 figs.

-----. Sampling for Gold in River Bars, Kuskokwim River Basin, Alaska. BuMines OFR 16-69, 1969, 10 pp., 2 figs.

Martin, G. C. The Mesozoic Stratigraphy of Alaska. U. S. Geol. Surv. Bull. 776, 1926, 493 pp.

Matzko, J. J. and V. L. Freeman. Summary of Reconnaissance for Uranium in Alaska, 1955, in Contributions to Economic Geology of Alaska. U. S. Geol. Surv. Bull. 1155, 1963, pp. 33-49.

Merrill, Jr., C. W. and R. P. Maloney. Kolmakof Mercury Deposits. BuMines OFR 21-75, 1974, 21 pp.

Mertie, Jr., J. B. The Nushagak District, Alaska. U. S. Geol. Surv. Bull. 903, 1938, 96 pp.

-----. Economic Geology of the Platinum Minerals. U. S. Geol. Surv. Prof. Paper 630, 1969, 120 pp.

Metz, P. A. Comparison of Mercury-Antimony-Tungsten Mineralization of Alaska with Strata-Bound Cinnabar-Stibnite-Scheelite Deposits of the Circum-Pacific and Mediterranean Regions. AK. Div. of Geol. and Geophysical Surv. GR-55i, 1977.

Metz, P. A. and D. B. Hawkins. A Summary of Gold Fineness Values from Alaska Placer Deposits. School of Miner. Ind., Miner. Ind. Res. Lab., Univ. of AK., Fairbanks., M.I.R.L. Rep. No. 45, 1981, 63 pp., 27 figs., 1 pl.

Miller, D. J., T. G. Payne, and G. Grye. Geology of Possible Petroleum Provinces in Alaska, with an annotated bibliography by E. H. Cobb. U. S. Geol. Surv. Bull. 1094, 1959, 131 pp.

Nelson, C. H., E. A. Jenne, and D. H. Sorg. Mercury Dispersal in Kuskokwim River and Bay, in Cobb, E. H., ed., The United States Geological Survey in Alaska; accomplishments during 1975. U. S. Geol. Surv. Circ. 733, 1976, pp. 43-44.

Overstreet, W. C., G. L. Crenshaw, A. E. Hubert, S. Rosenblum, and R. J. Smith. Experimental Results of Atomic Absorption Analysis for Indium and Thallium in 803 Nonmagnetic Concentrates from Alaska. U. S. Geol. Surv. OFR 75-253, 1975, 78 pp.

Pan, K. L., W. C. Overstreet, K. Robinson, A. E. Hubert, and G. L. Crenshaw. Equivalent Uranium and Selected Minor Elements in Magnetic Concentrates from the Candle Quadrangle, Solomon Quadrangle, and Elsewhere in Alaska. U. S. Geol. Surv. Prof. Paper 1135, 1980, 115 pp.

Patten, Jr., W. W. Map and Table Describing Areas of Interest for Oil and Gas in Central Alaska. U. S. Geol. Surv. OFR 78-1-F, 1978, 2 pp., 2 sheet, scale 1:1,000,000.

Pewe, T. L. Quaternary Geology of Alaska. U. S. Geol. Surv. Prof. Paper 835, 1975, 145 pp.

Ransome, A. L. and W. H. Kerns. Names and Definitions of Regions, Districts, and Subdistricts in Alaska. BuMines IC 7679, 1954, 91 pp.

Shew, N. and F. H. Wilson. Map and Tables Showing Radiometric Ages of Rocks in Southwestern Alaska. U. S. Geol. Surv. OFR 81-886, 1981, 25 pp., 1 pl., scale 1:1,000,000.

Smith, P. S. Past Placer-Gold Production from Alaska. U. S. Geol. Surv. Bull. 857-B, 1933, pp. 93-98, 1 table.

-----. Areal Geology of Alaska. U. S. Geol. Surv. Prof. Paper 192, 1939, 100 pp.

-----. Fineness of Gold from Alaska Placers. U. S. Geol. Surv. Bull. 910-C, 1941, pp. 147-272.

Smith, S. S. The Mining Industry in the Territory of Alaska during the calendar year 1915. BuMines B. 142, 1917, 65 pp.

U. S. Bureau of Mines. Alaska 1:250,000 scale Quadrangle Maps Showing Mineral Deposit Locations, Principle Minerals, and Number and Type of Claims. BuMines OFR 69-73, 1973.

-----. Alaska's Mineral Potential. ed. by R. Bottge. A Situation Rep. by the AFOC, BuMines, Juneau, Alaska and C. C. Hawley (under contract), 1978.

U. S. Department of Energy. Index of Open File Reports, B. M. Dennis, Wm. Graham, and J. Schmidt of Bendix Field Engineering Corp., Grand Junction, CO., 1982, Preliminary Map PM-36 AK.,

U. S. Energy Research and Development Administration - Grand Junction, CO. Aerial Gamma-Ray and Magnetic Survey of the Bethel and Yukon Areas, Alaska. Bendix Field Engineering Corporation, prepared by Texas Instruments Inc., Airborne Geophysical Services, Dallas, Texas. GJBX-5(77), 1977, Final Rep., v. 2.

U. S. Geological Survey. Geological Survey Research, 1961; Synopsis of Geologic and Hydrologic results. U. S. Geol. Surv. Prof. Paper 424-A, 1961, pp. A40-A44.

-----. Summary of Investigations, Geological Survey Research 1963; prepared by members of the Conservation, Geologic, and Water Resources Divisions. U. S. Geol. Surv. Prof. Paper 475-A, 1963, pp. A5, A101-A103.

-----. Mercury in the Environment. U. S. Geol. Surv. Prof. Paper 713, 1970, 67 pp.

-----. Geological Research 1976. U. S. Geol. Surv. Prof. Paper 1000, 1976, pp. 82-89, 150.

U. S. Geological Survey, Bureau of Mines, and the Bureau of Land Management. An Assessment of Mineral Resources in Alaska, printed at the request of Henry M. Jackson, Chairman, Committee on Interior and Insular Affairs, U. S. Senate, 93rd Cong., 2d Sess., 1974, 69 pp.

U. S. Geological Survey and State of Alaska Department of Natural Resources. Mineral and Water Resources of Alaska. Senate Committee on Interior and Insular Affairs, 88th Cong., 2d Sess., 1964, 179 pp.

University of Alaska. Fourth Annual Conference on Alaskan Placer Mining, ed. by B. W. Campbell, J. J. DiMarchi, E. N. Wolff. School of Miner. Ind., Miner. Ind. Res. Lab., Univ. of AK-Fairbanks, M.I.R.L. Rep. No. 61, 94 pp.

-----. Mineral Terranes of Alaska. A 1:1,000,000 scale Map Series, Arctic Environ. Inf. and Data Center, 1979, pls. A-F.

Wilson, F. H. Some Plutonic Rocks of Southwestern Alaska, a data compilation, 1977. U. S. Geol. Surv. OFR 77-501, 1977, 9 pp., 4 sheets.

Wilson, F. H. and D. L. Turner. Radiometric Age Map of Alaska - Southwestern Alaska. AK. Div. of Geol. and Geophysical Surv. OFR AOF-84, 1975, 12 pp., map.

APPENDIX A. - SAMPLE ANALYTICAL RESULTS

Explanation

Sample Number/Year	:	Refers to field sample number and year sample was taken.
Map Sample Number	:	Refers to sample location shown on figure 6.
Material Type	:	Refers to type of material collected at the sampling site. The following material types were collected. Stream Sed - Stream sediment SL/SS/CG - Slate, sandstone, conglomerate Maf Volc - Mafic volcanic rock Fel Plut - Felsic plutonic rock Fel Plut/Q - Felsic plutonic rock with quartz veins
Rock Type	:	Refers to rock types in the area of sampling as shown on the geologic map (fig. 4). The rock types mapped as being present are: Qal - Unconsolidated deposits Meta Sed - Metasedimentary rocks, including all non-igneous rocks Maf Volc - Mafic volcanic rocks Fel Int - Felsic intrusive rocks
Rock Age	:	Refers to the geologic age of the underlying rock group as shown on the geologic map (fig. 4).
Quad 4 mile/1 mile	:	Refers to the 1:250,000 and 1:63,360 scale USGS quadrangle maps covering the area. Russian M.: Russian Mission
Sec/T/R/Mer	:	Refers to section, township, range, and meridian in which sample was collected.
Location	:	Refers to geographic location of sampling site.
Project Name	:	Refers to the Project the sample was taken for.

Sample Type	:	Refers to the type of sample taken. The following sample types were taken. Rock Specimen - A sample taken as a specimen of a particular rock type. Rock Grab - A collection of mineral and rock fragments taken at random from an outcrop or float. Rock Chip - A sample taken in a regular series of ore chips or rock chips taken in a continuous line or at uniformly spaced intervals. Stream Sediment - A sample of silt, sand, and/or clay taken along a stream bed.
E. Sp	:	Refers to semiquantitative emission spectrographic technique analysis. Given in parts per million (ppm) unless otherwise noted.
Geochem	:	Refers to quantitative atomic absorption spectrophotometric technique analysis for all elements except mercury which was analyzed by a mercury vapor detection instrument. Given in parts per million (ppm).

Map sample number/sample number cross-reference list

Map sample number	Sample number	Map sample number	Sample number	Map sample number	Sample number	Map sample number	Sample number
1	6642	51	6614	101	6682	151	6526
2	6641	52	6671	102	6683	152	6527
3	6629	53	6670	103	6511	153	6552
4	6628	54	6656	104	6510	154	6551
5	6627	55	6657	105	6572	155	6553
6	6647	56	6664	106	6573	156	6528
7	6640	57	6665	107	6574	157	6529
8	6626	58	6595	108	6575	158	6550
9	6646	59	6597	109	6514	159	6530
10	6645	60	6598	110	6571	160	6549
11	6644	61	6621	111	6689	161	6531
12	6643	62	6622	112	6688	162	6532
13	6649	63	6619	113	6658	163	6533
14	6630	64	6620	114	6659	164	6534
15	6502	65	6617	115	6591	165	6548
16	6501	66	6618	116	6590	166	6547
17	6503	67	6615	117	6589	167	6535
18	6504	68	6616	118	6592	168	6546
19	6650	69	6672	119	6588	169	6545
20	6648	70	6668	120	6593	170	6544
21	6625	71	6669	121	6587	171	6543
22	6604	72	6666	122	6586	172	6542
23	6605	73	6667	123	6570	173	6536
24	6606	74	6596	124	6569	174	6537
25	6607	75	6594	125	6568	175	6538
26	6507	76	6677	126	6567	176	6539
27	6508	77	6676	127	6566	177	6541
28	6505	78	6675	128	6565	178	6540
29	6506	79	6673	129	6564	179	6599
30	6654	80	6674	130	6582	180	6600
31	6652	81	6680	131	6563		
32	6653	82	6681	132	6583		
33	6651	83	6679	133	6562		
34	6624	84	6678	134	6561		
35	6601	85	6663	135	6560		
36	6602	86	6662	136	6559		
37	6608	87	6660	137	6584		
38	6609	88	6661	138	6558		
39	6515	89	6512	139	6585		
40	6516	90	6513	140	6519		
41	6518	91	6577	141	6520		
42	6509	92	6576	142	6521		
43	6517	93	6578	143	6557		
44	6655	94	6579	144	6556		
45	6623	95	6686	145	6522		
46	6603	96	6687	146	6523		
47	6610	97	6580	147	6555		
48	6612	98	6581	148	6524		
49	6611	99	6684	149	6554		
50	6613	100	6685	150			

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

Sample Number/Year	6504/83	6505/83	6506/83
Map Sample Number	18	28	29
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / B-2	Iditarod / B-2	Iditarod / B-2
Sec/T/R/Mer	26/ 28N/ 41W/Sew	13/ 27N/ 40W/Sew	18/ 27N/ 39W/Sew
Location	Little Waldren Fork	Big Waldren Fork	Trib Big Waldren Fork
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream Sediment	Stream Sediment	Stream Sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1500		1000		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	150		100		50	
Calcium	0.15%		0.2%		0.2%	
Cadmium	<50		<50		<50	
Chromium	70		70		100	
Cobalt	5		5		5	
Copper	15	30	10	30	15	25
Gallium	10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		2%	
Lanthanum	20		20		20	
Lead	<10	20	<10	25	<10	15
Manganese	500		300		200	
Magnesium	1%		1%		1%	
Mercury	-	0.25		0.29		0.29
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		50		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	150		150		150	
Yttrium	<10		<10		<10	
Zinc	<200	110	<200	90	<200	85
Zirconium	100		100		100	

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

Sample Number/Year	6510/83	6511/83	6512/83
Map Sample Number	104	103	89
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Tertiary	Tertiary	Tertiary
Quad 4 mile/1 mile	Russian M./ C-4	Russian M./ C-4	Russian M./ C-4
Sec/T/R/Mer	32/ 19N/ 60W/Sew	32/ 19N/ 60W/Sew	34/ 20N/ 59W/Sew
Location	Trib. Arhymot Lake	Trib. Aryhmot Lake	Trib. Paimiut Slough
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream Sediment	Stream Sediment	Stream Sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	4
Arsenic	<200		<200		<200	
Barium	200		500		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		50		20	
Calcium	0.07%		0.3%		0.3%	
Cadmium	<50		<50		<50	
Chromium	10		50		30	
Cobalt	<5		<5		<5	
Copper	2	20	10	20	10	20
Gallium	<10		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		1.5%		1.5%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	<10	20
Manganese	300		300		200	
Magnesium	0.2%		0.5%		0.5%	
Mercury		0.34		0.24		0.24
Molybdenum	<2		2		<2	
Niobium	<20		<20		<20	
Nickel	<5		20		10	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		100		<100	
Tin	<10		<10		<10	
Titanium	1000		2000		1500	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	30		70		50	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	55	<200	60
Zirconium	50		150		100	

Sample Number/Year	6513/83		6514/83		6515/83	
Map Sample Number	90		109		39	
Material Type	Stream Sed		Stream Sed		SL/SS/CG	
Rock Type	Qal		Qal		Meta Sed	
Rock Age	Tertiary		Tertiary		Tertiary	
Quad 4 mile/1 mile	Russian M./ D-3		Russian M./ C-3		Iditarod / B-2	
Sec/T/R/Mer	34/ 20N/ 59W/Sew		17/ 18N/ 59W/Sew		29/ 26N/ 40W/Sew	
Location	Trib. Paimiut Slough		Trib. Kuskokwim R.		Granite Mtn.	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Rock Grab	
Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	8
Arsenic	<200		<200		<200	
Barium	500		200		70	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		10000	
Calcium	0.3%		0.2%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		20		500	
Cobalt	<5		<5		<5	
Copper	7	20	7	25	5	15
Gallium	10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		3%	
Lanthanum	20		20		20	
Lead	<10	15	<10	20	10	20
Manganese	300		200		150	
Magnesium	0.5%		0.2%		3%	
Mercury		0.13		0.22		0.13
Molybdenum	3		<2		2	
Niobium	<20		<20		20	
Nickel	20		5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		30	
Titanium	3000		1500		7000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	50		50		200	
Yttrium	<10		<10		<10	
Zinc	<200	60	<200	70	<200	10
Zirconium	100		50		200	

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

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

Sample Number/Year	6519/83	6520/83	6521/83
Map Sample Number	140	141	142
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-6	Sleetmute/ D-6	Sleetmute/ D-6
Sec/T/R/Mer	18/ 20N/ 48W/Sew	17/ 20N/ 48W/Sew	17/ 20N/ 48W/Sew
Location	Trib. Kuskokwim R.	Trib. Kuskokwim R.	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		50		30	
Calcium	0.3%		0.3%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		50		100	
Cobalt	<5		<5		<5	
Copper	10	25	10	30	7	25
Gallium	15		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		1.5%	
Lanthanum	20		20		20	
Lead	10	15	<10	20	<10	15
Manganese	300		200		200	
Magnesium	0.7%		0.5%		0.5%	
Mercury		0.25		0.18		0.20
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		15	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		2000	
Tungsten	<50	<2	<50	2	<50	2
Vanadium	50		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	70	<200	100	<200	80
Zirconium	100		100		70	

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

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

Sample Number/Year	6528/83	6529/83	6530/83
Map Sample Number	156	157	159
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-5	Sleetmute/ D-5	Sleetmute/ D-5
Sec/T/R/Mer	21/ 21N/ 46W/Sew	26/ 21N/ 46W/Sew	35/ 21 N/ 46W/Sew
Location	Trib. Kuskokwim R.	Downey Creek	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	700		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		50	
Calcium	0.3%		0.2%		0.15%	
Cadmium	<50		<50		<50	
Chromium	100		50		100	
Cobalt	5		<5		<5	
Copper	10	20	15	30	7	25
Gallium	15		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		2%	
Lanthanum	20		20		20	
Lead	<10	10	<10	15	<10	25
Manganese	200		200		200	
Magnesium	0.5%		0.5%		0.7%	
Mercury		0.13		0.40		0.15
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		70	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	80	<200	80
Zirconium	100		100		200	

Sample Number/Year	6531/83	6532/83	6533/83
Map Sample Number	161	162	163
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-5	Sleetmute/ D-5	Sleetmute/ D-5
Sec/T/R/Mer	04/ 20N/ 46W/Sew	09/ 20N/ 46W/Sew	10/ 20 N/ 46 W/Sew
Location	Trib. Kuskokwim R.	Trib. Kuskokwim R.	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		70	
Calcium	0.2%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	70		70		100	
Cobalt	<5		<5		<5	
Copper	10	30	10	20	10	20
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	15	<10	15	<10	15
Manganese	300		200		500	
Magnesium	0.3%		0.7%		0.7%	
Mercury		0.33		0.19		0.19
Molybdenum	<2		5		2	
Niobium	<20		<20		<20	
Nickel	10		50		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		3000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	70		70		100	
Yttrium	<10		<10		<10	
Zinc	<200	80	<200	65	<200	60
Zirconium	70		100		150	

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

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

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

Sample Number/Year	6543/83	6544/83	6545/83
Map Sample Number	171	170	169
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-4	Sleetmute/ D-4	Sleetmute/ D-4
Sec/T/R/Mer	21/ 20N/ 45W/Sew	20/ 20N/ 45W/Sew	19/ 20N/ 45W/Sew
Location	Willis Creek	Trib. Kuskokwim R.	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	4
Arsenic	<200		<200		<200	
Barium	500		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.15%		0.1%		0.7%	
Cadmium	<50		<50		<50	
Chromium	70		50		200	
Cobalt	<5		<5		<5	
Copper	20	35	10	35	15	30
Gallium	10		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		1.5%		5%	
Lanthanum	20		20		<20	
Lead	<10	25	<10	20	10	10
Manganese	300		300		500	
Magnesium	0.7%		0.15%		1.5%	
Mercury		0.47		0.39		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		5000	
Tungsten	<50	<2	<50	2	<50	<2
Vanadium	70		70		70	
Yttrium	10		<10		10	
Zinc	<200	100	<200	105	<200	80
Zirconium	150		100		500	

Sample Number/Year	6546/83	6547/83	6548/83
Map Sample Number	168	166	165
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-5	Sleetmute/ D-5	Sleetmute/ D-5
Sec/T/R/Mer	23/ 20N/ 46W/Sew	11/ 20N/ 46W/Sew	11/ 20N/ 46W/Sew
Location	Eightmile Creek	Trib. Kuskokwim R.	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	3
Arsenic	<200		<200		<200	
Barium	500		700		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		50		50	
Calcium	0.2%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	70		150		100	
Cobalt	<5		<5		<5	
Copper	15	30	15	30	15	30
Gallium	15		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		3%		3%	
Lanthanum	<20		70		20	
Lead	10	20	10	15	10	20
Manganese	200		300		300	
Magnesium	0.3%		1%		0.7%	
Mercury		0.47		0.50		0.10
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		5000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	<10		10		10	
Zinc	<200	90	<200	80	<200	85
Zirconium	100		500		200	

Sample Number/Year	6549/83	6550/83	6551/83
Map Sample Number	160	158	154
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-5	Sleetmute/ D-5	Sleetmute/ D-5
Sec/T/R/Mer	36/ 21N/ 46W/Sew	26/ 21N/ 46W/Sew	21/ 21N/ 46W/Sew
Location	Trib. Kuskokwim R.	California Creek	George R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	5	<100	5	<100	3
Arsenic	<200		<200		<200	
Barium	500		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		20		50	
Calcium	0.2%		0.2%		0.07%	
Cadmium	<50		<50		<50	
Chromium	70		70		70	
Cobalt	<5		<5		<5	
Copper	15	30	10	30	20	25
Gallium	10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		3%	
Lanthanum	20		<20		<20	
Lead	10	25	<10	25	<10	20
Manganese	500		200		1500	
Magnesium	0.7%		0.3%		0.7%	
Mercury		0.24		0.26		0.38
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		2000		3000	
Tungsten	<50	2	<50	<2	<50	2
Vanadium	100		70		70	
Yttrium	10		<10		<10	
Zinc	<200	100	<200	70	<200	75
Zirconium	100		100		100	

Sample Number/Year	6552/83	6553/83	6554/83
Map Sample Number	153	155	149
Material Type	Stream Sed	SL/SS/CG	Stream Sed
Rock Type	Qal	Meta Sed	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-5	Sleetmute/ D-5	Sleetmute/ D-5
Sec/T/R/Mer	20/ 21N/ 46W/Sew	21/ 21N/ 46W/Sew	26/ 21N/ 47W/Sew
Location	Steamboat Creek	Georgetown	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Rock chip 2'	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		70		50	
Calcium	0.3%		7%		0.2%	
Cadmium	<50		<50		<50	
Chromium	70		150		100	
Cobalt	<5		<5		<5	
Copper	10	20	30	25	15	30
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		3%		2%	
Lanthanum	20		<20		20	
Lead	10	20	10	30	10	20
Manganese	300		200		200	
Magnesium	0.7%		3%		0.7%	
Mercury		0.19		1.0		0.72
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	3	<50	<2	<50	<2
Vanadium	70		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	65	<200	60	<200	60
Zirconium	200		100		100	

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

Sample Number/Year	6558/83	6559/83	6560/83
Map Sample Number	138	136	135
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-6	Sleetmute/ D-6	Sleetmute/ D-6
Sec/T/R/Mer	23/ 20N/ 49W/Sew	23/ 20N/ 49W/Sew	29/ 20N/ 49W/Sew
Location	Trib. Kuskokwim R.	Trib. Kuskokwim R.	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		1500		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		70		70	
Calcium	0.5%		1%		1.5%	
Cadmium	<50		<50		<50	
Chromium	100		150		200	
Cobalt	<5		<5		<5	
Copper	7	15	10	20	7	20
Gallium	10		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		5%		7%	
Lanthanum	20		70		100	
Lead	10	5	10	5	10	10
Manganese	300		1000		1500	
Magnesium	1%		2%		2%	
Mercury		0.30		0.33		0.18
Molybdenum	<2		<2		<2	
Niobium	<20		<20		20	
Nickel	10		30		30	
Scandium	<10		10		10	
Silver	<1		<1		<1	
Strontium	<100		200		200	
Tin	<10		<10		<10	
Titanium	3000		5000		7000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	10		15		20	
Zinc	<200	50	<200	50	<200	50
Zirconium	300		300		500	

Sample Number/Year	:	6561/83		:	6562/83		:	6563/83
Map Sample Number	:	134		:	133		:	131
Material Type	:	Stream Sed		:	Stream Sed		:	Stream Sed
Rock Type	:	Qal		:	Qal		:	Qal
Rock Age	:	Cretaceous		:	Cretaceous		:	Cretaceous
Quad 4 mile/1 mile	:	Sleetmute/ D-6		:	Sleetmute/ D-6		:	Sleetmute/ D-6
Sec/T/R/Mer	:	29/ 20N/ 49W/Sew		:	30/ 20N/ 49W/Sew		:	31/ 20N/ 49W/Sew
Location	:	Trib. Kuskokwim R.		:	Jungyuk Creek		:	Trib. Kuskokwim R.
Proj. Name	:	GEORGE-IDITAROD		:	GEORGE-IDITAROD		:	GEORGE-IDITAROD
Sample Type	:	Stream sediment		:	Stream sediment		:	Stream sediment

Element		E. Sp	Geochem		E. Sp	Geochem		E. Sp	Geochem
Antimony	:	<100	<2	:	<100	<2	:	<100	<2
Arsenic	:	<200		:	<200		:	<200	
Barium	:	1500		:	1500		:	2000	
Beryllium	:	<2		:	<2		:	<2	
Bismuth	:	<10		:	<10		:	<10	
Boron	:	100		:	70		:	70	
Calcium	:	2%		:	1%		:	1.5%	
Cadmium	:	<50		:	<50		:	<50	
Chromium	:	200		:	100		:	150	
Cobalt	:	<5		:	<5		:	<5	
Copper	:	10	45	:	7	20	:	10	20
Gallium	:	50		:	<10		:	30	
Germanium	:	<20		:	<20		:	<20	
Gold	:		<0.02	:		<0.02	:		<0.02
Iron	:	7%		:	3%		:	7%	
Lanthanum	:	70		:	70		:	70	
Lead	:	20	5	:	<10	15	:	10	10
Manganese	:	700		:	500		:	1500	
Magnesium	:	3%		:	2%		:	3%	
Mercury	:		0.32	:		0.34	:		0.19
Molybdenum	:	<2		:	<2		:	<2	
Niobium	:	20		:	<20		:	20	
Nickel	:	30		:	20		:	30	
Scandium	:	20		:	10		:	20	
Silver	:	<1		:	<1		:	<1	
Strontium	:	200		:	100		:	200	
Tin	:	<10		:	<10		:	<10	
Titanium	:	7000		:	7000		:	7000	
Tungsten	:	<50	<2	:	<50	<2	:	<50	<2
Vanadium	:	200		:	150		:	150	
Yttrium	:	20		:	20		:	20	
Zinc	:	<200	50	:	<200	60	:	<200	55
Zirconium	:	300		:	300		:	300	

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

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

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

Sample Number/Year	6573/83	6574/83	6575/83
Map Sample Number	106	107	108
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Tertiary	Tertiary	Tertiary
Quad 4 mile/1 mile	Russian M./ C-3	Russian M./ D-2	Russian M./ D-2
Sec/T/R/Mer	31/ 19N/ 58W/Sew	01/ 19N/ 58W/Sew	01/ 19N/ 58W/Sew
Location	Trib. Kuskokwim R.	Trib. Paimiut Slough	Trib. Paimiut Slough
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	2
Arsenic	<200		<200		<200	
Barium	2000		700		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	70		50		70	
Calcium	5%		0.7%		1.5%	
Cadmium	<50		<50		<50	
Chromium	200		70		100	
Cobalt	<5		<5		<5	
Copper	15	15	10	20	10	15
Gallium	70		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	5%		5%		7%	
Lanthanum	100		30		50	
Lead	20	15	<10	15	10	15
Manganese	700		500		700	
Magnesium	3%		1%		1.5%	
Mercury		0.17		0.20		0.12
Molybdenum	<2		<2		<2	
Niobium	20		<20		20	
Nickel	10		20		10	
Scandium	15		<10		<10	
Silver	<1		<1		<1	
Strontium	500		100		200	
Tin	<10		<10		<10	
Titanium	7000		3000		7000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	150		150		150	
Yttrium	50		20		30	
Zinc	<200	50	<200	50	<200	50
Zirconium	500		200		500	

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

Sample Number/Year	6579/83	6580/83	6581/83
Map Sample Number	94	97	98
Material Type	Stream Sed	SL/SS/CG	Fel Plut/Q
Rock Type	Qal	Meta Sed	Fel Int
Rock Age	Cretaceous	Tertiary	Tertiary
Quad 4 mile/1 mile	Russian M./ D-2	Russian M./ D-1	Russian M./ D-1
Sec/T/R/Mer	08/ 20N/ 56W/Sew	16/ 20N/ 55W/Sew	16/ 20N/ 55W/Sew
Location	Trib. Paimiut Slough	Molybdenum Mtn.	Molybdenum Mtn.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Rock grab	Rock grab

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	3	<100	4
Arsenic	<200		<200		<200	
Barium	700		1000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	50		50		70	
Calcium	0.7%		0.03%		0.15%	
Cadmium	<50		<50		<50	
Chromium	100		300		200	
Cobalt	<5		5		<5	
Copper	10	30	50	80	50	90
Gallium	20		15		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		7%		1.5%	
Lanthanum	50		<20		20	
Lead	10	15	<10	20	10	15
Manganese	1000		150		200	
Magnesium	1%		1.5%		0.2%	
Mercury		0.22		0.65		0.72
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	15		70		30	
Scandium	<100		200		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		200	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	10
Vanadium	100		150		30	
Yttrium	10		10		<10	
Zinc	<200	60	<200	80	<200	20
Zirconium	300		150		150	

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

Sample Number/Year	6585/83	6586/83	6587/83
Map Sample Number	139	122	121
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Sleetmute/ D-6	Sleetmute/ C-7	Sleetmute/ C-8
Sec/T/R/Mer	14/ 20N/ 49W/Sew	19/ 17N/ 51W/Sew	28/ 17N/ 52W/Sew
Location	Trib. Kuskokwim R.	New York Creek	Trib. Kuskokwim R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	500		500		500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.3%		0.3%		0.5%	
Cadmium	<50		<50		<50	
Chromium	50		70		70	
Cobalt	<5		<5		<5	
Copper	5	25	10	25	7	15
Gallium	10		10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1.5%		2%		2%	
Lanthanum	20		<20		20	
Lead	<10	15	<10	20	<10	15
Manganese	300		300		300	
Magnesium	0.5%		0.5%		0.7%	
Mercury		0.46		0.37		0.22
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	8
Vanadium	70		100		70	
Yttrium	<10		<10		<10	
Zinc	<200	70	<200	75	<200	80
Zirconium	100		150		150	

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

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

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

Sample Number/Year	6597/83	6598/83	6599/83
Map Sample Number	59	60	179
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / A-4	Iditarod / A-4	Iditarod / B-4
Sec/T/R/Mer	05/ 24N/ 46W/Sew	05/ 24N/ 46W/Sew	05/ 25N/ 45W/Sew
Location	N.F. George R.	Trib. N.F. George R.	Michigan Creek
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	2	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	300		300		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		70	
Calcium	0.07%		0.15%		0.2%	
Cadmium	<50		<50		<50	
Chromium	50		50		150	
Cobalt	<5		<5		<5	
Copper	7	25	7	30	20	30
Gallium	<10		<10		20	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		3%	
Lanthanum	<20		<20		30	
Lead	<10	20	<10	25	<10	25
Manganese	150		200		700	
Magnesium	0.3%		0.5%		0.7%	
Mercury		0.19		0.18		0.25
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		30		50	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	2000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		70		150	
Yttrium	<10		<10		10	
Zinc	<200	80	<200	80	<200	100
Zirconium	70		100		200	

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

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

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

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

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

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

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

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

Sample Number/Year	6621/83	6622/83	6623/83
Map Sample Number	61	62	45
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / A-4	Iditarod / A-4	Iditarod / B-4
Sec/T/R/Mer	04/ 23N/ 45W/Sew	04/ 23N/ 45W/Sew	15/ 25N/ 47W/Sew
Location	Trib. George R.	George R.	Little Eldorado Creek
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	3	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	1000		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		20	
Calcium	0.15%		0.15%		0.3%	
Cadmium	<50		<50		<50	
Chromium	150		100		70	
Cobalt	<5		<5		<5	
Copper	7	15	15	20	10	15
Gallium	<10		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		3%	
Lanthanum	<20		20		20	
Lead	<10	15	<10	25	<10	20
Manganese	300		300		300	
Magnesium	1%		0.5%		0.7%	
Mercury		0.35		1.2		0.34
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	50		30		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	150		100		100	
Yttrium	<10		<10		<10	
Zinc	<200	75	<200	75	<200	70
Zirconium	150		150		150	

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

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

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

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

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

Sample Number/Year	6648/83	6649/83	6650/83
Map Sample Number	20	13	19
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Tertiary	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / B-5	Iditarod / C-5	Iditarod / B-5
Sec/T/R/Mer	33/ 27N/ 48W/Sew	05/ 28N/ 48W/Sew	25/ 27N/ 49W/Sew
Location	Trib. Iditarod R.	Zimmerman Creek	Fairbanks Creek
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	4	<100	2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		500		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		20		30	
Calcium	0.5%		0.5%		0.5%	
Cadmium	<50		<50		<50	
Chromium	300		50		100	
Cobalt	<5		<5		<5	
Copper	10	5	7	20	10	15
Gallium	20		<10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		2%		2%	
Lanthanum	20		20		20	
Lead	10	15	<10	15	<10	15
Manganese	300		300		300	
Magnesium	0.7%		0.5%		0.7%	
Mercury		0.23		0.24		0.24
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	50		10		30	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		3000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		700		100	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	70	<200	60
Zirconium	100		150		150	

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

Sample Number/Year	6654/83	6655/83	6656/83
Map Sample Number	30	44	54
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Iditarod / B-6	Iditarod / B-6	Iditarod / A-6
Sec/T/R/Mer	21/ 26N/ 51W/Sew	18/ 25N/ 51W/Sew	06/ 24N/ 52W/Sew
Location	Trib. Reindeer R.	Trib. Reindeer R.	Trib. Reindeer R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	2	<100	2
Arsenic	<200		<200		<200	
Barium	500		500		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		20		20	
Calcium	0.5%		0.5%		0.3%	
Cadmium	<50		<50		<50	
Chromium	50		50		70	
Cobalt	<5		<5		<5	
Copper	5	10	7	15	7	15
Gallium	<10		<10		10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		2%		2%	
Lanthanum	20		20		20	
Lead	<10	20	<10	15	<10	10
Manganese	300		200		300	
Magnesium	0.5%		0.5%		0.5%	
Mercury		0.19		0.25		0.21
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	5		5		20	
Scandium	<10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		2000		3000	
Tungsten	<50	<2	<50	<2	<50	2
Vanadium	70		70		70	
Yttrium	<10		<10		<10	
Zinc	<200	50	<200	50	<200	45
Zirconium	150		150		150	

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

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

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

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

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

Sample Number/Year	6672/83	6673/83	6674/83
Map Sample Number	69	79	80
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Holy Cross/ A-1	Holy Cross/ A-1	Holy Cross/ A-1
Sec/T/R/Mer	02/ 23N/ 54W/Sew	03/ 22N/ 54W/Sew	10/ 22N/ 54W/Sew
Location	Trib. Reindeer R.	Trib. Paimiut Slough	Trib. Paimiut Slough
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	70		2000		1500	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	<10		70		50	
Calcium	0.05%		1.5%		1%	
Cadmium	<50		<50		<50	
Chromium	<10		150		70	
Cobalt	<5		<5		5	
Copper	<2	20	15	15	15	15
Gallium	<10		30		30	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	1%		5%		5%	
Lanthanum	20		50		50	
Lead	<10	20	15	15	10	15
Manganese	100		1000		1000	
Magnesium	0.03%		2%		1.5%	
Mercury		5.0		0.35		0.18
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	<5		30		30	
Scandium	<10		10		10	
Silver	<1		<1		<1	
Strontium	<100		500		300	
Tin	<10		<10		<10	
Titanium	300		7000		7000	
Tungsten	<50	25	<50	<2	<50	<2
Vanadium	30		150		150	
Yttrium	<10		20		20	
Zinc	<200	50	<200	60	<200	70
Zirconium	<20		300		150	

Sample Number/Year	6675/83		6676/83		6577/83	
Map Sample Number	78		77		76	
Material Type	Stream Sed		Stream Sed		Stream Sed	
Rock Type	Qal		Qal		Qal	
Rock Age	Cretaceous		Cretaceous		Cretaceous	
Quad 4 mile/1 mile	Russian M./ D-1		Russian M./ D-1		Russian M./ D-1	
Sec/T/R/Mer	28/ 22N/ 54W/Sew		28/ 22N/ 54W/Sew		24/ 22N/ 55W/Sew	
Location	Trib. Paimiut Slough		Trib. Paimiut Slough		Trib. Paimiut Slough	
Proj. Name	GEORGE-IDITAROD		GEORGE-IDITAROD		GEORGE-IDITAROD	
Sample Type	Stream sediment		Stream sediment		Stream sediment	
Element	**E. Sp**	**Geochem**	**E. Sp**	**Geochem**	**E. Sp**	**Geochem**
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	700		700		1000	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	20		30		30	
Calcium	0.3%		0.7%		0.7%	
Cadmium	<50		<50		<50	
Chromium	70		300		70	
Cobalt	<5		<5		<5	
Copper	7	20	7	15	7	15
Gallium	20		15		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		5%		3%	
Lanthanum	30		70		30	
Lead	10	15	10	20	10	15
Manganese	500		500		300	
Magnesium	1%		1.5%		1%	
Mercury		0.17		0.13		0.23
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	20		20		<5	
Scandium	<10		10		<10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	3000		7000		3000	
Tungsten	<50	<2	<50	<2	<50	<2
Vanadium	70		100		100	
Yttrium	<10		30		<10	
Zinc	<200	60	<200	60	<200	50
Zirconium	150		300		150	

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

Sample Number/Year	6681/83	6682/83	6683/83
Map Sample Number	82	101	102
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Russian M./ D-2	Sleetmute/ D-7	Sleetmute/ D-7
Sec/T/R/Mer	19/ 21N/ 55W/Sew	04/ 20N/ 52W/Sew	04/ 20N/ 52W/Sew
Location	Trib. Paimiut Slough	Kolmakof R.	Kolmakof R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	<2	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		300		700	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	30		30		30	
Calcium	0.7%		0.2%		0.5%	
Cadmium	<50		<50		<50	
Chromium	150		20		100	
Cobalt	<5		<5		<5	
Copper	10	20	7	20	7	20
Gallium	15		<10		15	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	3%		1.5%		3%	
Lanthanum	20		20		20	
Lead	10	15	<10	15	10	5
Manganese	700		1000		700	
Magnesium	1%		0.2%		0.7%	
Mercury		0.24		0.51		0.47
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		<5		20	
Scandium	10		<10		<10	
Silver	<1		<1		<1	
Strontium	100		<100		<100	
Tin	<10		<10		<10	
Titanium	5000		1500		5000	
Tungsten	<50	<2	<50	2	<50	2
Vanadium	150		70		100	
Yttrium	20		<10		<10	
Zinc	<200	55	<200	90	<200	65
Zirconium	150		70		150	

Sample Number/Year	6684/83	6685/83	6686/83
Map Sample Number	99	100	95
Material Type	Stream Sed	Stream Sed	Stream Sed
Rock Type	Qal	Qal	Qal
Rock Age	Cretaceous	Cretaceous	Cretaceous
Quad 4 mile/1 mile	Russian M./ D-1	Russian M./ D-1	Russian M./ D-1
Sec/T/R/Mer	29/ 20N/ 54W/Sew	29/ 20N/ 54W/Sew	28/ 20N/ 55W/Sew
Location	Cobalt Creek	Trib. Cobalt Creek	Trib. Owhat R.
Proj. Name	GEORGE-IDITAROD	GEORGE-IDITAROD	GEORGE-IDITAROD
Sample Type	Stream sediment	Stream sediment	Stream sediment

Element	E. Sp	Geochem	E. Sp	Geochem	E. Sp	Geochem
Antimony	<100	5	<100	<2	<100	<2
Arsenic	<200		<200		<200	
Barium	1000		1000		300	
Beryllium	<2		<2		<2	
Bismuth	<10		<10		<10	
Boron	200		20		20	
Calcium	0.7%		0.7%		0.3%	
Cadmium	<50		<50		<50	
Chromium	300		500		50	
Cobalt	<5		<5		<5	
Copper	10	35	10	15	3	10
Gallium	<10		10		<10	
Germanium	<20		<20		<20	
Gold		<0.02		<0.02		<0.02
Iron	2%		5%		1%	
Lanthanum	20		20		<20	
Lead	<10	10	10	10	<10	10
Manganese	500		1000		200	
Magnesium	1%		1.5%		0.3%	
Mercury		0.73		0.39		0.27
Molybdenum	<2		<2		<2	
Niobium	<20		<20		<20	
Nickel	30		50		5	
Scandium	10		<10		<10	
Silver	<1		<1		<1	
Strontium	<100		<100		<100	
Tin	<10		<10		<10	
Titanium	7000		3000		2000	
Tungsten	<50	2	<50	<2	<50	<2
Vanadium	100		100		70	
Yttrium	15		<10		<10	
Zinc	<200	50	<200	70	<200	50
Zirconium	300		100		100	

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

APPENDIX B. - MINERAL PROPERTY SUMMARIES

Explanation

MINE	:	Ore shipments made and/or placer gold recovered over a period of several years.
PROSPECT	:	Development work done but no ore shipped.
OCCURRENCE	:	Mineralization exists but no signs of development.
LOCATION	:	Refer to figure 5 for location of the property identified by the "Map #".
QUADRANGLE	:	Refers to USGS quadrangles, 1:250,000 and 1:63,360.
REFERENCE NUMBERS	:	Because the properties are not catalogued under one system, each carries several reference numbers. With the expection of Map # these are cited in the bibliography.
KX # (41)1/	:	State of Alaska MinFile (Kardex).
MAS # (42)	:	U.S. Bureau of Mines Minerals Availability System.
BLM # (43)	:	U.S. Bureau of Land Management. History Analysis Report.
MAP #	:	U.S. Bureau of Mines project number designation for the property location on figure 5 map.

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

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1925 - Examined by USGS and a sample taken (44).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Semiconsolidated beds of gray shale and sandstone, thought to be of Tertiary age, with some thin beds of lignite. The lignite is not very coaly, but rather woody in appearance. These beds extend as low bluffs along the northwest bank for about a mile, and in this distance no lignite beds of sufficient thickness to be worked for fuel were observed.
In the hills to the southeast of this locality, lignite reportedly occurs in thicker beds (40).

BUREAU WORK:

Analysis of coal by Gates showed coal to be anthracite. The Btu values ranged from 10,470 to 15,320 (44).

REFERENCES:

40-42, 44

OCCURRENCE NAME (other names): Old Town Occurrence COMMODITIES: Sand and Gravel
Iditarod Slough Claim

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1959 - Claims staked by Fred Demientieff (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quaternary flood-plain and gravel deposits (2).

REFERENCES:

2, 41-42

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1913 - Development work done (39).

1914 - Property was lying idle. Excavations were filled with water (45). Coal had been used locally as fuel in the roadhouse but was unsatisfactory in a blacksmith forge (45). Sample taken by USGS (44).

1914-1915 - During the winter another coal prospect was opened nearby. A 30-ft shaft was sunk. Additional work was to be done during the winter of 1915-1916 (46).

RESERVES:

No data available.

OPERATING DATA:

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

GEOLOGIC SETTING:

A coal bed strikes N60°E and dips 45° to 50°SE (45, 52). It varies from 15- to 40-in-thick with a shale roof and slate floor (45, 52). The coal is normally a lignite or a subbituminous coal, similar to the other known Upper Cretaceous coals and it has been metamorphosed locally into an anthracite as a result of deformation and shearing (45). A short distance away another coal seam strikes N38°E and dips 80°SE and is up to 2-ft thick (46).

BUREAU WORK:

Analysis of coal by Gates in 1946 showed coal to be anthracite (44). The Btu values were not determined.

REFERENCES:

4, 39, 41-42, 44-48, 52

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

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

LOCATION: Quadrangle: Iditarod B-4
Meridian: Seward

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1908 - First gold was discovered in the area on Christmas Day by W. A. Dikeman and John Beaton. It was discovered in a 12-ft-deep hole to bedrock about 12-mi above the mouth of Otter Creek. They located several claims for about 1-mi along the creek (30).

- The discovery consisted of a pay streak 4-ft-thick and 50- to 60-ft-wide which averaged 7 to 10 cents to the pan. The gold was fairly fine, of a uniform size, and evenly distributed (40).

1909 - Thousands of prospectors flocked to the Otter Creek area (31). Claims covered almost all of Otter Creek, its tributaries, and adjacent streams (30).

1909-1910 - During the winter some gold was mined from small underground drifts (30).

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

- A few thousand dollars worth of gold was mined from Black Creek, a tributary to Otter Creek (30).

- The productive area on Otter Creek consisted of the area 1.5-mi downstream from the mouth of Granite Creek (30). About 2,500 people entered the Iditarod district in 1910 (49).

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

- Mining took place on Otter Creek, Black Creek, and Glen Gulch (50).

1912 - Three claims, leased in small tracts to 10 operators, were worked. Heavy steam machinery was used in open-cut work. About 450 men were employed. Otter Creek was the largest producer. A single plant worked on Black Creek. Considerable production was reported from Glen Gulch, but work was halted before end of season due to exhaustion of available placer ground (32). The deposits of Glen Gulch are mainly near a single claim (49).

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

- Preparations for a dredge on Otter Creek were made (39).

1914 - According to notes from A. G. Maddren, a gasoline-powered dredge was installed on Discovery Claim by Riley and Marston. It was a small flume washing-type that had been previously used in the Nome district. It had a capacity of 2,000- to 2,500-yd^3 in 24 hours on 250 to 300 gallons of fuel. Many of the water-front buildings of Discovery were removed because of its operation. A double shift of about 12 men was employed.

- Several open-cut scraping and hoisting plants were in operation on claims, Nos. 1 above and 1 below Discovery claim. The largest plant used a bottomless scraper of 2.5-yd^3 capacity. About 30 men were employed at these plants (51).

- In Black Creek, 500 to 1,000 lbs of cinnabar pebbles were said to collect in the sluice boxes for every 3 to 4 days of shoveling-in operations (5).

- Two men worked a small hydraulic plant at the mouth of Glen Gulch and six to eight men worked a plant on Black Creek (51).

- According to unpublished notes by Maddren, quartz-stibnite-bearing veins were uncovered on Glen Gulch and Black Creek. These veins were said to occupy fissures in the monzonite and range in width from 2- to 12-in. Some cinnabar and pyrite also was reported with the vein, and scheelite was found in the placer concentrates (52).

1915 - Mining continued on Otter Creek and Glen Gulch and two plants were working on Black Creek (53).

1916 - Mining continued (54). A new 2.5-ft^3 revolving-screen flume dredge, built by the Union Construction Company was installed by the Otter Creek Dredging Co. at the mouth of Black Creek (55).

1917 - Mining continued on Otter Creek but the dredge had many breakdowns (56). Beaton and Mathieson of North American Dredging Co. moved their stocker type 3.5-ft^3 bucket-line dredge from Black Creek to Otter Creek where it operated through 1931 (47).

1920 - The dredges were operated on Otter Creek from May to mid-November and worked on ground about 13-ft-deep (57).

1921 - Beatson and Donnelly, and J. E. Riley Investment Co. both operated their dredges for 140 days (58).

1922 - The two dredges mentioned above continued mining and worked 163 and 167 days (59).

- J. Warren discovered gold quartz at the head of Glen Gulch and a stamp mill was installed with considerable ore mined (59).

1923 - Northern Alaska Dredging Co. and J. E. Riley Investment Co. operated dredges (60).

1924 - North American Dredge Co. and J. E. Riley Investment Co. operated dredges (61).

1925 - The two dredges mentioned above continued operating (62).

1926 - Dredging continued (63).

1927 - Dredging continued (64).

1928 - Dredging continued. Peter Miskovich was mining with a hydraulic elevator and employed 4 men (65).

1929 - One dredge operated 2-mi from Flat and the other operated on the old town site of Flat. Peter Miskovich and Martin W. Roslund were both hydraulicking (66).

1930 - Two dredges continued operating and three placer camps were hydraulicking (67).

1931 - Two dredges continued working and four placer camps were hydraulicking (68).

1932 - The J. E. Riley Investment Co. dredge continued working and several camps continued hydraulicking. One of the largest hydraulicking operations was that of Peter Miscovich (69).

1933 - The J. E. Riley Investment Co. dredge continued working and Miscovich and Roslund continued hydraulicking (70).

- Peter Miscovich's deposit on Glen Gulch was worked by three hydraulic giants, with a hydraulic lift that elevates the gravel 12-ft from the bottom of the cut to the top of the dump box. One nugget over 6 ounces was found (47).

- The Riley Investment Co's. dredge continued operation as it has for every year since it's installation in 1914, and had worked up and down Otter Creek several times (47).

1934 - The J. E. Riley Investment Co. dredge continued working and Miscovich and Roslund continued hydraulicking (71).

1935 - The dredge continued working and five other camps operated (72).

1936 - Dredging continued and at least a dozen other outfits mined Otter Creek and its tributaries. Peter Miscovich employed 10 men and used two bulldozers (73).

1937 - Dredging continued by the Riley Investment Co. and the North American Dredging Co. returned to Otter Creek with their dredge. Peter Miscovich put a new dragline plant in operation (74).

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

- In the early part of the season, the Riley Investment Co.'s dredge underwent a major overhaul and a new diesel power plant was installed. Another mine started work April 24 and had a 175 day season (75).

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

1939 - The two dredges continued work as did the Peter Miscovich operation (76).

1940 - Mining continued (77).

1947 - Field investigations were conducted in the area by White and Killeen of the USGS (78).

1955 - Reconnaissance study made by Bureau engineer R. P. Maloney; placer concentrate samples were taken (17).

1956 - Mining continued by the North American Co., and the Otter Dredging Co., and by the Miscovich brothers.

- The Bureau prospected for lode sources of cinnabar found in Otter Creek. A short adit on a quartz vein near the head of Black Creek was caved. Reports indicate that none was encountered. (17).

- The Bureau exposed over 10,000-ft of bedrock by bulldozer trenches in the Glen and Black Gulch areas. Several veins showing fair gold values were uncovered (17).

1961 - Claims staked by John Stevens.

1975 - John A. Miscovich mined on Otter Creek (27).

1980 - Mining done by Miscovich and Walsh.

1982 - Mining has continued on Otter Creek from 1909 to the present. In 1982 General Crude and Union Carbide Minerals lost their lease and option. John Miscovich had 81 claims (41).

- The estate of John Stevens and Robert W. Browne had some claims in the area along with John E. and Richard S. Fullerton of Flat Creek Placers (43).

1983 - In 1983 active claims were owned by the estate of John Stevens and Robert W. Browne; John E. and Richard S. Fullerton of Flat Creek Placers; and John Miscovich (43). Mining was done by Otter Creek Co. which is owned by Miscovich and family. Mr. Walsh lost his partnership at the end of this season.

PRODUCTION

Year	Troy oz gold	Oz silver	$ gold produced	
1910	?	?	$200,000 (Otter Creek)	(30)
prior to 1916		149 (Black Creek)		(42)
1915-1966	265,125 (Otter Creek) 21,011 (Black Creek)	-		(26)
prior to 1959	10,421 (Glen Creek)	1,231 (Glen Creek)		(42)
prior to 1969		30,028 (Otter Creek)		(42)
TOTAL (from Otter Creek area)	296,557	31,408		

RESERVES:

No data available.

OPERATING DATA:

Two dredges have operated on Otter Creek along with mechanical steam scrapers, hydraulicking plants, sluice boxes, and some shafts and drift mining (51, 53). Current methods include use of a bulldozer, front-end loader, backhoe, and a Misco-Giant with a 4-in-diameter nozzle (79).

GEOLOGIC SETTING:

A Tertiary quartz monzonite underlies most of the Otter Creek drainage area and has intruded steeply northward dipping Cretaceous sandstone and shale of the Kuskokwim Group. The productive ground forms a 0.25- to 0.5-mi-wide paystreak south of the present channel. The placers are mainly shallow stream placers, but the bench placers grade imperceptibly into those on the valley floor, so both ancient and recent placers may be present.

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

During placer mining two types of veins were uncovered. One type contained quartz stringers in or near the monzonite pluton with high grade gold and scheelite. The other type consisted of stibnite-cinnabar-bearing quartz veins with lower gold fineness values within the country rock at greater distances from the intrusive (17, 30, 47, 78).

BUREAU WORK:

Placer concentrate, bedrock, and float samples on Otter and Black Creeks and Glen Gulch were collected in 1955. Samples contained 0.08 to 59.9 pct mercury, <0.05 to 30.2 pct antimony, nil to 0.48 pct WO_3, nil to 4.57 oz gold/ton, and nil to 4.63 oz silver/ton (17).

Trenching and sampling for lode cinnabar was conducted during 1956. No significant cinnabar mineralization was found in place (80).

REFERENCES:

4-5, 14, 17, 25-27, 30-32, 39-43, 45-84

PROSPECT NAME (other names): Malamute Gulch Prospect COMMODITIES: Au, Hg, Sn, W,
Weco Mining Co. Cr, Rare Earths

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1926 - Staked by Fred Lusher (63).

1929 - Mining reported (66).

1930 - Mining reported (67).

1931 - Mining reported (68).

1933 - Mining reported (70).

1934 - Mining reported (71).

1972 - Restaked by Weco Mining Co. (41).

RESERVES:

No data available.

OPERATING DATA:

70-ft adit (caved) (47).

GEOLOGIC SETTING:

Bedrock is decomposed monzonite overlain by about 35-ft of poorly sorted material that is largely vesicular basalt fragments. The adit followed quartz stringers with arsenopyrite, and gold (47). Cinnabar was reported to be associated with the quartz veins by local prospectors (17).

The vein appears to have the same strike as the lode at the head of Glen Gulch, N25°E (47).

REFERENCES:

17, 25-26, 41-42, 47, 63, 66-68, 70-71, 78, 80, 83, 85

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

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1924 - H. Galneck and partner ground-sluiced on Malamute Pup (7).

1926 - Some production reported (63).

1930- Mining reported (67).

1931 - Mining reported (68).

1933 - Hydraulic plant was operated by Lusher on Malamute Creek (70). Mining being done on Virgin Association. A line of 20 sluice boxes was used (47).

1934 - Hydraulic plant in operation by Lusher (71).

1956 - Field investigations were conducted by the Bureau (17).

PRODUCTION

Year	Oz of gold	Oz of silver	
Up to 1952	1,907	241	(42)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant with a line of 20 sluice boxes operated (47).

GEOLOGIC SETTING:

Bedrock is decomposed monzonite overlain by about 35-ft of poorly sorted material that is largely vesicular basalt fragments. Cobbles up to 15-in across are common but large boulders are rare. The placer gold occurs mainly on or near bedrock (47). Placer concentrates contained gold, scheelite, ferberite, chromite (probably derived from small ultramafic dikes), realgar, cinnabar, allanite, and cassiterite (17).

BUREAU WORK:

Two placer concentrate samples taken in 1956 contained 0.25 to 1.76 pct mercury, <0.05 to 0.05 pct antimony, 0.32 to 1.8 pct tungsten, 0.34 to 3.37 oz gold/ton, and 0.84 to 2.05 oz silver/ton (17).

REFERENCES:

7, 17, 25-26, 41-42, 47, 63, 67-68, 70-71, 78, 80, 83-84

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Claims are on lower part of Granite Creek (30).

1920 - Frank Salen worked on Granite Creek (47, 70).

1922 - The Finn boys were hydraulicking.

1924 - Placer gold was mined (61).
Salen hydraulicked with six men (7).

1925 - Frank Salen hydraulicked (8).

1926 - Open cut mine operated on Granite Creek (63).

1930 - Camp existed on Granite Creek (67).

1931 - Camp existed on Granite Creek (68).

1933 - A hydraulic plant was operated by Salen (70). Work took place from the mouth of Granite Creek upstream to the then-present cut and on claim 2 above Discovery; a 10,000 ft^2 cut along the east bench was worked some years ago. Open-cut methods were mainly used and an automatic dam was built. A hydraulic jet operated and a line of 24 sluice boxes was used (47).

1934 - Hydraulic plant operated by Salen (71).

1935 - Considerable placer gold recovered (72).

1937 - Frank Salen and Associates hydraulicked (74).

1940 - This camp was one of largest producing camps in the Iditarod district (77).

PRODUCTION

Year	Oz of gold	Oz of silver
Up to 1956	4,004	614 (42)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant, using a hydraulic jet and 24 sluice boxes operated (47).

GEOLOGIC SETTING:

Granite Creek valley is mainly Cretaceous sandstone and argillite with some granite dikes in the upper part. At the site of the 1933 operations, the bedrock consists of fine-grained dark gray sandstone that strikes N45°E and dips steeply northwest. The gravel was 8- to 12-ft-thick and consists mainly of angular to subangular fragments with a few boulders up to 18-in across. About 2-ft of bedrock had to be mined for good gold recovery. The gold is fine-grained but shotty and somewhat iron-stained. The pay streak was 130-ft-wide (47). Some chromite probably derived from small ultramafic dikes, has been reported from Granite Creek (84).

Gold-bearing quartz veins occur in the upper part of Granite Creek (78).

Gold fineness values from three assays averaged 853 parts gold and 134 parts silver (47).

REFERENCES:

7-8, 26, 30, 41-42, 47, 61, 63, 67-68, 70-72, 74, 77-78, 83-84

MINE NAME (other names): Flat Creek Mine COMMODITIES: Au, Ag, Hg, Sb, W
Yukon Gold Company - Placer

LOCATION: Quadrangle: Iditarod B-5 Sec 09, 16, 21, 28 T 27N R 47W
Meridian: Seward
Geographic: A southern tributary to Otter Creek about 2.5 mi below Discovery

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Claims located and staked by E. M. Carroll, M. S. Collins of the Spruce Creek Mining Co. (41).

- Prospecting was done with steam drill on upper Flat Creek and some ground was tested near the mouth by groundsluicing or washing out open-cuts into the frozen deposits (30).

1911 - Became the largest producer of gold in region (50).

1912 - Yukon Gold Dredging installed the first dredge in the district on the Marietta claim group near the head of the creek. Eight other claims were worked by steam plants using open-cut methods and hoisting in buckets to the sluice boxes. Above the head of Flat Creek five claims were worked by five plants doing groundsluicing and shoveling into sluice boxes. About 400 men were employed (32).

1913 - Dredging continued and a second dredge was built and also operated (39). Two placer mines were operating on a bench claim using open-cut scraping and hoisting methods (51).

1914 - The large electrically driven dredge of Yukon Gold Co. continued operating employing about 60 men (51).

1915 - Mining continued (54).

1916 - Mining continued (55).

1917 - Mining continued (47).

1918 - Last year that the Yukon Gold Co. dredge operated (47).

1920 - Mining continued (57).

1921 - Mining continued (58).

1922 - Mining continued (59).

1923 - Mining continued (60).

1924 - The Alpha Mining Co. operated (61).

1926 - Mining continued (63).

1928 - Mining continued (65).

1929 - North American Dredge Co. had a dredge mining on the site of the old town of Flat and Strandberg and Son had a hydraulic plant near the head of the creek (66).

1930 - The dredge and three other outfits, including Strandberg and Son, were mining (67).

1931 - Mining continued (68).

1932 - Dredging continued. David Strandberg, and Yost and Nash operated hydraulic plants and a dragline scraper was also mining (69).

1933 - Dredging continued. Strandberg and Sacco and Scott operated hydraulic plants and Northland Development Co. operated a mechanical shovel or scraper (70).

- Charles Yost and partner operated a hydraulic plant on the Idaho association (47).

- Two men worked on an open-cut mine at the Hilltop association (47).

- Strandberg and Co. operated a dragline scraper plant on the Wildcat association (47).

- Northland Development Co. operated a dragline excavator plant on the Bonanza association (47).

- North American Dredging Co. operated their dredge on the lower end of Flat Creek (47).

1934 - Mining continued (71).

1935 - Mining continued by dredge and by five other outfits (72).

1936 - Dredging continued and four other operators, including Uotila and Scott, and the Stuver Bros., each employed a crew of four men. One crew mined with a bulldozer and the other three piped into sluice boxes (73).

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

1937 - A new dragline plant of Awe and Durant operated as did the hydraulic plants of Stuver Bros., Walter Sakow, and Pat Savage (74).

1939 - Mining continued (76).

1940 - Mining continued (77).

1947 - Field investigations were conducted in area by USGS (78).

1955 - Field reconnaissance studies were conducted by the Bureau (17).

1956 - Field investigations were continued by the Bureau (17, 25).

- North American Dredging Co. operated a floating dredge and Gus Backstrom and Julian Stuver were hydraulicking (17).

1957 - Dredging terminated in about 1957 (86).

1967 - A Bureau sampling program was conducted (26).

1975 - Richard S. Fullerton of Flat Creek Placers operated a hydraulic plant, bulldozer, and dragline (27).

1983 - Ellen M. O'Carroll of Spruce Creek Mining Company, and Mary Savage Collins; and John E. and Richard S. Fullerton of Flat Creek Placers had active claims on Flat Creek (43).

PRODUCTION

Year	Troy ounces of gold	Gold produced	
1910		$300,000	(30)
1918		$ 84,000 (claim at head of hill)	(87)
1915-66	240,572		(26)

RESERVES:

No data available.

OPERATING DATA:

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

GEOLOGIC SETTING:

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

The placer deposits constitute residual placers which grade into eluvial bench and stream placers. The gravels composed of sand/silt, pebbles and boulders, are 10- to 25-ft-deep. The richest concentrations of gold are 3- to 4-mi above the mouth where it rests on and within the hard blocky fractured sedimentary bedrock. The best paystreak is the lowermost 1- to 3-ft-thick layer of gravel and up to 6-ft down in the fractures of the sedimentary rocks (26, 30, 47, 49, 53, 86).

BUREAU WORK:

One sample of float from tailings taken in 1955 contained 31.2 pct mercury, 0.41 oz gold/ton, and 0.15 oz silver/ton. Prospected for lode sources of cinnabar in 1956. No significant cinnabar mineralization was found in place (80).

Sampling by auger was done in 1967. Samples contained from nil to 0.03 oz gold/ton, nil to 0.38 oz silver/ton (26).

REFERENCES:

15, 17, 25-27, 30, 32, 39, 41-43, 45, 47, 49-51, 53-55, 57-61, 63, 65-74, 76-78, 80, 82, 84, 86-87.

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

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Discovered a few years after the discovery of placer gold on Otter Creek in 1908, by placer miners mining in Glen Gulch (88).

1912 - Mining done (88).

1914 - Mohawk Claim is located on the flat summit between Glen Gulch and Slate Creek. Shaft and pits not accessible. Shaft reported to be 35-ft-deep (52).

1914 - Several small quartz-stibnite-cinnabar veins on lower part of Glen Gulch. Another zone occurs at the head of Glen Gulch. Open-cut work was done, but it was abandoned as the mineralization was discontinuous (5).

1921 - Rasmus Nielson drove a short prospect tunnel and discovered the vein upon which the recent development has been done. With his partner Jerome Warren they sank a 50-ft shaft, and had 280-ft of drifts and a 50-ft adit (88).

1922 - Second shaft sunk to a depth of 128-ft and 67-ft of drifts made (88).

- Mining continued (88).

1923 - N. L. Wimmler of USGS made a detailed report (89).

- Mining continued (88).

1924 - Mining continued.

1925 - Mining continued (88).

- 10.5 tons of ore was shipped to Tacoma Smelter with a return of $4,159.75 (88).

1926 - Property was idle.

1933 - The property changed owners and the main shaft was extended 35-ft. Justis Johnson and Patty Savage became the owners. A new mill was planned. A 6 x 7 in Dodge crusher with a No. 1 Straub ten-stamp mill were used before plate amalgamation. Eleven tons were shipped to smelter during the season. The workings below the main level were filled with water and ice (89).

1934 - W. E. Dunkie optioned the property and formed the Golden Horn Mining Co. The operation started August 1 with B. B. Neiding managing it. The 128-ft shaft was sunk to a depth of 228-ft. Over 500-ft of drifting was done, a raise put in, and considerable stoping between the four levels (88). A stamp mill was shipped to Flat in the fall of 1934 (47). A hoist and compressor were installed along with other equipment (71).

1935 - Development and mining continued until the option was dropped on July 1 (88). Considerable ore was mined, but the quantity of free gold was found insufficient to make the work profitable (47). Pumps were removed from the mine (17). 250 tons of ore that averaged 5 to 6 oz gold/ton was shipped to smelter (88).

1936 - Mine owners were Gustus Johnson, P. Savage, R. Nielson, and Minnie Warren Engquist (88). Two shipments of ore were sent to the smelter; one was 15 tons, and the other 6 tons.

1937 - 40-ton ore shipment made. An owner disagreement suspended operations in the summer. By August 23 the mine filled with water to 50-ft level (88).

1955 - Workings were inaccessible but samples were taken from the mine dump by Bureau engineer R. P. Maloney (17).

1956 - Robert F. Lyman and Roger Markle of Red Devil, Alaska became the owners. Trenching and sampling was conducted in the area by the Bureau (17).

PRODUCTION

Date	Ore mined	Returns	
1925	10.5 tons	$ 4,159.75	(88)
1926	11 tons	?	(89)
1934-35	250 tons	50,000.00	(88)
1936	15 tons	2,927.16	(88)
	6 tons	707.35	(88)
1937	40 tons	?	(88)
	332.5 tons	$ 55,164.26	

Maloney mentions ore shipments made in 1922, 1935, 1936, and 1937 (17).

A total of 528 tons contained: 2,706 oz gold
2,620 oz silver
9,336 lbs lead
653 lbs zinc

RESERVES:

No data available.

OPERATING DATA:

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

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

Mining equipment included a 6 x 7 in Dodge crusher, No. 1 Straub Ten-stamp mill, amalgamation plates, 60 hp Erie boiler, Atlas 10 x 12 in single steam engine, American Hoist and Derrick Company double drum hoist, Blacksmith shop with tools, bunk house, and mess hall (88).

GEOLOGIC SETTING:

Irregularly distributed quartz veins occur at or near the contact of early Tertiary quartz monzonite stock with late Cretaceous sandstone and shale. Mineralization includes arsenopyrite, stibnite, cinnabar, gold, silver, pyrite, chalcopyrite, galena, sphalerite, scheelite, and an oxide of nickel (88).

A smelter assay (Tacoma) of a 29,272-lb shipment of ore in 1935 contained 6.29 oz gold/ton, 6.59 oz silver/ton, 1.0 pct lead, trace zinc, 10.33 pct arsenic, and 0.24 pct antimony (89).

BUREAU WORK:

Bureau personnel trenched and sampled the property in 1955. Samples taken from the ore dump contained from nil to 0.07 pct mercury, <0.05 to 0.52 pct antimony, <0.02 to 0.15 pct tungsten, <0.02 to 0.07 pct copper, <0.02 to 0.26 pct lead, trace to 2.8 oz gold/ton, and 0.02 to 5.16 oz silver/ton (17).

REFERENCES:

4-5, 14, 17, 26, 41-42, 45-47, 52-53, 71-72, 74, 83-85, 88-90

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

COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod B-5

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Mining and testing done by ground-sluicing. A few thousand dollars worth of gold was mined during the course of preliminary development work (30).

1911 - Mining continued.

1912 - Considerable production occurred. Two plants, 20 men, and a drill were on Willow Creek (32).

1913 - Mining continued.

1914 - Mining continued.

1915 - The first drag-line excavator used in Alaska was operated on Willow Creek. It had a 60-ft boom, 1.5-ft^3 bucket and a 60-hp boiler. The average daily capacity was expected to exceed 1,000 yd^3 (52). Another plant was operating underground with a bucket hoist (53).

1916 - Mining continued.

1917 - Mining continued.

1918 - Mining continued.

1919 - Mining continued.

1920 - Mining continued.

1921 - Willow Creek was one of the chief producers along with Otter, Flat, and Chicken Creek (58).

1922 - Willow Creek was one of chief producers in the district (59). Hanley and Olson conducted drifting operations in ground 24-ft-deep. Three outfits operated hydraulic plants. Loranger and Co. operated their steam scraper plant. Karry Johnson and Mentchler Bros. operated their drag line excavator.

1923 - Mining continued.

1924 - Bolanger and Co. operated a small hydraulic elevator. J. Laranger operated a Bogley scraper. Frank Manley's dragline excavator was not operated (7).

1925 - Loranger and Co. wheeled to a self-dumper. Frank Manley constructed a 10-mi-long water ditch from Bonanza Creek to Willow Creek and did some drilling on Willow Creek (8).

1926 - Mining continued.

1917 - Mining continued.

1928 - Several camps worked with Frank Manley and Joseph Loranger operating the largest camp (65).

1929 - Several camps worked with Frank Manley and Joseph Loranger operating the largest camp (66).

1930 - Several camps worked with Frank Manley and Joseph Loranger operating the largest camp (67).

1931 - Two drag-line scrapers were operated, the larger by Manley and Loranger (68).

1932 - LaChance and Thibault operated a large hydraulic plant (69).

1933 - LaChance and Thibault operated their hydraulic plant and Loranger and Jensen operated their scraper (70).

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

- The present operators have worked here since 1919 and have mined both the creek and bench placers. As of 1933, the creek placers were about worked out (47).

1934 - Several thousand dollars worth of gold were recovered. The Iditarod Mining Co. used a scraper. Hydraulic plants were operated by Loranger and Jensen, Belanger, and Thibault and LaChance (71).

1935 - Considerable gold was recovered by three outfits. A mechanical shovel with a 100-ft boom and 3-yd^3 bucket was set up (72).

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

Pete Jensen mined below Northland with a dragline scraper with a 100-ft boom (73).

1937 - Northland Development Co. and the Iditarod Mining Co. mined with draglines (74).

1938-1939 - Northland Development Co. and Iditarod Mining Co. mined (75, 76).

1940 - Mining continued (77).

1961 - Claims staked by John and Richard Fullerton (43).

1966 - Claims staked by John and Richard Fullerton (43).

1970 - Claims staked by John and Richard Fullerton (43).

1983 - Claims staked by John and Richard Fullerton were active (43).

PRODUCTION

Year	Oz of gold	Income from sale	
1910	?	A few thousand dollars	(30)
1912	?	Considerable production	(32)
1921	?	Chief producer	(58)
1934	?	Several thousand dollars	(71)

RESERVES:

No data available.

OPERATING DATA:

The mining is done using hydraulic methods (giants with 1.5-in or 3-in nozzles). Giants are used to move the gravel towards the sluice box and one is used for stacking tailings. A Bucyrus drag-line excavator is also used. It had a 1.5-yd^3 bucket and power for it is furnished by a 60-hp steam boiler (47). Also another operator had a dragline excavator with a 100-ft-long boom and 3-yd^3 bucket (72). A Bogley scraper, a small hydraulic elevator, a steam scraper plant, bucket hoist, and a bulldozer were used.

GEOLOGIC SETTING:

The main placer area is along the southeast side of the creek between 3- to 4-mi from its head. The alluvium averages 16- to 18-ft-thick (49).

The bedrock is Cretaceous slate with a few basaltic dikes. The gravels are mainly sandstone and slate with minor amounts of monzonite, basalt and vein quartz. About 10- to 14-ft of frozen silts, clays, and muck overlie the 3- to 10-ft-thick gravels. The muck thins rapidly towards the creek where the gravels are more rounded. The gold occurs mainly on or within 1- to 2-ft of bedrock (53).

Possible gold sources include a monzonite intrusive that crops out in the upper part of Happy Gulch, a tributary, where the sedimentary rocks are altered and numerous quartz veinlets occur within a mile of the contact. Another source may be a ridge of altered sedimentary rock that extends between Willow and Gold Creek (28).

Four assays of gold show an average fineness of 877.5 parts gold and 115 parts silver (47).

REFERENCES:

7-8, 30, 32, 39, 41-43, 46-47, 49, 51-54, 57-59, 61, 63, 65-78, 82-83

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

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Claims staked by Cassidy and Dettouse.

- Open-cut, ground sluice, pick and shovel mining during August and September (30).

1912 - Five claims worked: two creek placers, and three on ground of residual placer type. Used open-cut methods without steam machinery. Approximately 50 men were employed (32).

1913 - Mining done (39).

1914 - Open-cut pit mining conducted (49). Work done on Hilltop Association Group (51).

1915 - Open-cut hydraulic mining done at the head of the creek (54).

1916 - Mining done (55).

1920 - Mining done (57).

1922 - Mine was one of chief producers of the Iditarod district (59).

1923 - Mining done (60).

1924 - Mining done (61).

1926 - Mining done with production reported (63).

1929 - Mining done with production reported (66).

1930 - Drag-line scraper installed in creek, six men employed by Olson and Co. (67).

1931 - Largest producer of placer gold (other than the dredges) in the Iditarod district. Ten men were employed (68).

1932 - Mining proceeded, gold produced (69).

1933 - Mining proceeded, gold produced. Prospecting with a Keystone drill took place (47).

1934 - Mining proceeded (71).

1935 - Mining proceeded (72).

1936 - Mining proceeded, twelve men were employed, using a bulldozer and two drag-line scrapers (73).

1937 - Mining continued (74).

1939 - Mining continued (76).

1940 - Mining continued (77).

PRODUCTION

Year	Gold recovered	Silver recovered	
1926	Production reported		
1929	Production reported		
1931	Largest output of gold		
1932	Production reported		
1933	Production reported		
up to 1966	106,486 oz	1,735 oz	(26)

RESERVES:

No data available.

OPERATING DATA:

Methods and equipment used were open-cuts, ground-sluicing, pick and shovel, hydraulicking, drag-line scraper with 1-yd^3 bucket and 55-ft beam, caterpillar shovel with 0.5 yd^3 capacity and a dump box with sluice box.

GEOLOGIC SETTING:

In the upper part of Happy Gulch Cretaceous shale and sandstone are intruded by a quartz monzonite stock. Contact metamorphism extends out to 1-mi from the contact. The sedimentary rocks have been silicified and contain numerous quartz veinlets (30).

The iron-stained monzonite is sheared and mineralized. Several quartz veinlets from 1/8- to 2-in-wide cut the monzonite and carry free gold. Several iron-stained joint planes are possible gold sources also. The monzonite is deeply weathered, often to a depth of 5- to 10-ft and greater in places (53). Residual placers grade downward into stream placers (47). Gold doesn't occur at the mouth of Happy Creek (53).

The gold is rough and angular and is concentrated in more or less discontinous layers of gravels and sands from 6- to 24-in-thick, and mixed with boulders near the bottom of 5- to 10-ft-thick unconsolidated deposits (30).

These deposits increase in thickness upstream to 50-ft-deep in some places. The gravel consists of sandstone, argillite, slate and monzonite clasts. Cinnabar occurs in some of the residual placers (47).

Assays of eight samples contained average fineness values of 864 parts gold and 126 parts silver (47).

BUREAU WORK:

Three placer concentrate samples taken in 1955 contained 0.49 to 17.9 pct mercury, <0.05 to 0.05 pct antimony, 0.1 to 0.8 pct tungsten, 6.63 to 38.89 oz gold/ton, and 1.64 to 7.35 oz silver/ton (25).

REFERENCES:

4-5, 14-15, 17, 25-26, 30, 32, 39, 41-42, 45-47, 49, 51-55, 57, 59-61, 63, 66-69, 71-74, 76-78, 83-84

OCCURRENCE NAME (other names): Chicken Creek Dome Occurrence

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1926 - Neilson staked lode claim (41).

1956 - The Bureau collected 279 soil samples from upper Chicken Creek area (17).

1958-60 - James A. Walper and L. C. Johns had lode claims in area (41).

1971 - Weco Mining Corporation staked claims (43).

1971-81 - James A. Walper had claims in area (41).

1983 - Weco Mining Corporation claims were active (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quartz-cinnabar-stibnite veins occur along the border of a monzonite stock at the head of Chicken Creek (52) this intrudes Cretaceous graywacke and slate country rock.

BUREAU WORK:

Soil samples collected in 1956 contained from 5 to >1,000 ppm antimony (17).

REFERENCES:

17, 41-43, 52-53, 83

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

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1911 - Mining done (50).

1912 - Mining done and prospecting with a drill conducted. Two plants operated with a total of twelve men (49).

1913 - Mining done (39).

1914 - Steam derricks installed to handle large residual granitic boulders (43).

1915 - Mining continued with open-cut hydraulicking (54).

1916 - Mine was one of the richest placer mines in the Iditarod district (54).

1917 - Mining continued (91).

1918 - Mining continued.

1919 - Mining continued.

1921 - Mine was one of major producers along with Otter, Flat and Willow Creeks (57).

1923 - Mining continued.

1924 - Chicken Creek Mining Co. was one of four largest mines out of 21 mines that operated in 1924 (61).

1925 - Mining continued.

1926 - Mining done by open-cut method (63).

1928 - Black Bear Mining Co. had one of the largest camps with over twelve men (65).

1929 - Chicken Creek Mining Co., with William Duffy and about 20 men was the largest hydraulic and open-cut placer mine in the district (66).

1930-31 - Chicken Creek Mining Co., operated employing about 15 men (67-68).

1932 - Several camps hydraulicked and did well (69).

1933 - Mining continued (70). A hydraulic plant located at the head of the creek worked the semiresidual placers. The operators had been mining at the site since 1924. 10 to 20 men were employed (47).

- At the lower end of the creek there was an open-cut shoveling operation. A dam was built 2,200-ft above the mouth. Three men worked (47).

1934 - Mining continued (71).

1935 - Mining continued (72).

1936 - Mining continued.

1937 - Duffy & Co. used a bulldozer pushing the gravel to the boxes and downstream, Captain Becker and associates, hydraulicked (74).

1940 - Mine was one of the largest producers in the Iditarod district along with Otter, Flat, Slate, Black, Granite, Happy and Willow Creek (77).

1956 - The Bureau collected 279 soil samples from upper Chicken Creek area (17).

PRODUCTION

Year	Oz gold	Oz silver
up to 1956	12,755	2,024 (42)

RESERVES:

No data available.

OPERATING DATA:

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

GEOLOGIC SETTING:

Chicken Creek heads in the same monzonite intrusive as Flat and Happy Creeks. The monzonite intrudes Cretaceous shale and sandstone that have been metamorphosed to argillite and quartzite. Several veins and veinlets occur, with some having fair gold values (80). Residual placers at the headwaters grade downward to alluvial placers. At the upper end the bedrock is decomposed monzonite with overburden averaging 18-ft on the bench and up to 47-ft in the center of the valley. The gold is mainly in the lower 4- to 5-ft of overburden. The gold is fine, angular, and equidimensional; nuggets are uncommon (47).

At the lower end of Chicken Creek the bedrock is sandstone and argillite. The gravel is mainly sandstone and argillite with minor monzonite. Overburden is up to 90-ft-deep here at the mouth (47).

Based on five assays from 1929 production the average fineness was 862 parts gold and 128 parts silver in a thousand (47).

BUREAU WORK:

Soil samples taken in 1956 contained from 5 to <1,000 ppm antimony (17).

REFERENCES:

2, 17, 25-26, 32, 39, 41-42, 45-47, 49-55, 57, 60-61, 63, 65-72, 74, 77-78, 80, 83-84, 91

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

COMMODITIES: Au, Ag, Hg, W - Placer

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1915 - Small placer operations mined on lower end of Slate Creek (53).

1932 - Mining done.

1933 - Utilla and Ogris established a new drag-line plant (70); eight men were employed (47).

1934 - Mining continued (71).

1935 - Mining continued (72).

1936 - Mining continued by Uotila and Ogris with a crew of twelve men (73).

1937 - Gus Uotila obtained a new drag-line plant (74).

1939 - Mining continued (76).

1940 - Slate Creek was one of largest producing camps along with Otter, Flat, Black, Granite, Happy, Willow, and Chicken Creeks (77).

RESERVES:

No data available.

OPERATING DATA:

A caterpillar drag-line excavator with a 55-ft boom and 1-yd^3 bucket was used. Sluice boxes and a giant were used to wash the gravels (47).

GEOLOGIC SETTING:

The bedrock is mainly Cretaceous slate, but the west fork heads in monzonite. Some granitic dikes and quartz veins occur, with one quartz vein containing stibnite. Placer gold occurs in the lower part of the gravel, which may be as much as 10-ft-thick under another 20-ft of muck; very little gold occurs on bedrock. The paystreak was up to 600-ft-wide and in 1933 ranged in tenor from 20 to 45 cents per square foot of bedrock (47).

Analyses of concentrate samples showed up to 8.51 oz gold/ton and 2.61 oz silver/ton with enough mercury and tungstic oxide to suggest very small amounts of cinnabar and scheelite (47).

BUREAU WORK:

Two placer concentrates taken in 1955 by Bureau personnel contained 0.08 to 0.28 pct mercury, <0.05 pct antimony, <0.02 to 0.03 pct tungsten, 0.82 to 8.51 oz gold/ton, and 0.35 to 2.61 oz silver/ton (17).

REFERENCES:

12-13, 16-17, 26, 41-42, 46-47, 53, 70-74, 76-78, 83, 85

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

COMMODITIES: Au, Ag, Hg - Placer

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1929-32 - Mining done (47).

1933 - A small hydraulic plant was operated on the west fork of Discovery Claim by one man. Prince Creek has never been a large producer of placer gold (47).

1937 - Claims staked by Alvin Agoff of Prince Creek Mining Company (43).

- Small hydraulic plant was operated at the head of Prince Creek (74).

1955 - Property was examined by Bureau personnel (17).

1956 - Mining done (85).

1975 - Alvin H. Agoff of Prince Creek Mining Company operated (27).

1983 - Alvin H. Agoff had active mining claims (43).

RESERVES:

No data available.

OPERATING DATA:

A hydraulic plant was in operation and a gin pole, boom, and hand hoist were constructed to move boulders up to 10 tons (47). In later years a bulldozer and non-float plant were used (27).

GEOLOGIC SETTING:

Prince Creek flows southward from the same monzonite intrusive stock that heads Flat, Happy, Chicken, and Slate Creeks where residual placers containing gold had developed on decomposed monzonite. Adjacent to the monzonite is banded agrillite. Overburden is up to 30-ft-thick in places. The gravel is coarse and angular and consists of argillite, sandstone, and monzonite. In one cut a clay layer acts as a false bedrock (47). Placer cinnabar occurs in upper Prince Creek (17).

BUREAU WORK:

One grab sample of stream float taken in 1955 (17) and showing 1/16-in cinnabar stringers in fine-grained basalt contained 2.1 pct mercury, <0.1 pct antimony, and <0.01 oz gold/ton.

REFERENCES:

12, 17, 26-27, 41-43, 47, 74, 83, 85

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

LOCATION:	Quadrangle: Iditarod A-3	Sec 19, 29, 30, 31	T 25N	R 43W
	Meridian: Seward	Sec 02, 04, 05, 08-11, 13-22, 24, 25, 28-30, 36	T 25N	R 44W
		Sec 20, 23, 24, 26, 29, 32, 35	T 26N	R 44W
		Sec 25,36	T 25N	R 44W

Geographic: Tributary to the George River

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION

1911 - Prospects located (50).

1974 - Claims restaked (41).

1976 - Six claims staked by Glenn Bass (43).

1979 - Claims staked by L. Marshall, J. Sumpter, and L. D. Anderson of Big Three Mining (43).

1980 - Claims staked by Glenn Bass (43).

1981 - Claims staked by Glenn Bass and Alburn Anderson (43).

- Claims staked by Larry E. Bass and Kenneth Dennison (43).

1983 - Claims staked by L. Marshall, J. Sumpter, and L. D. Anderson were inactive (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Bedrock consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur along the divide between Michigan Creek and Julian Creek. The source of gold is probably quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 41-43, 50, 85

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

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

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

Geographic: Located along the George River including several tributaries.

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1979 - Claims staked by L. D. Anderson, L. Marshall, R. Eckert, and J. Sumpter of the Big Three Mining Co. (43).

1983 - Claims were active (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur in the vicinity. The source of gold is probably in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 41, 43

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

LOCATION: Quadrangle: Iditarod A-3

Sec 05, 06, 07, 08, 17, 18	T 24N	R 44W
Sec 13	T 24N	R 45W
Sec 34	T 25N	R 44W

Meridian: Seward
Geographic: Tributary to the George River.

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1911 - Mining done (50).

1920 - Hydraulic plant installed (50).

1974 - Claims staked by L. E. Wyrick (43).

1979 - Claims located and staked by K. McCracken (43).

- Three claims staked by Betty Ballard (43).

- Four claims staked by Charlton Webb and Barbara Wyrick (43).

- Eight claims staked by L. E. Wyrick (43).

1980 - Six claims staked by Leona Cornwall, Mary Myhr, and Betty Ballard (43).

- Two claims staked by J. P. Russell (43).

1981 - Four claims staked by Leona Cornwall, Mary Myhr, and Betty Ballard (43).

- Claims staked by L. E. Wyrick (43).

1983 - Mining done on ten claims by L. E. Wyrick (43).

- Ballard claims were active (43).

RESERVES:

No data available.

OPERATING DATA:

Washing plant, sluice box, bulldozer, and front-end loader used (79).

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. Rhyolite intrusive bodies occur at the head of the creek. The source of gold is probably in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

Average depth of overburden is 12 ft.

REFERENCES:

2, 41-43, 50, 79, 85

MINE NAME (other names): Julian Creek Mine

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

LOCATION: Quadrangle: Iditarod A-3 Sec 26, 27, 35, 36 T 25N R 44W
Meridian: Seward Sec 04, 05 T 24N R 44W

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1910 - Prospects reported (30).

1911 - Mining done (50).

1911-39 - Mining occurred sporadically (83).

1914 - No one permanently settled on creek (45).

1917 - Mining occurred (82).

1924 - Anderson and Remus mined (7).
Robert, Richard, Ronald, and Raymond Vanderpool, Richard Wilmarth and Ted Maining owned claims (41).

1931 - Mining done (68).

1932 - Mine was especially productive with seven or eight men working (69).

1933 - An open-cut hydraulic plant was operated with five men (47).

1934 - Mining continued employing seven men (71).

1935 - A camp of eight men was the principal producing camp in the Georgetown district (72).

1936 - Mining done (73). Miscovich and Rodman owned claims (41).

1937 - Miscovich and Rodman operated the principal producing camp in the Georgetown district (74).

1938 - One large camp continued mining (75).

1939 - Mining continued (76).

1947 - One half mile upstream from the mouth the mining operation is owned by Harry Steen and operated in partnership with Sture Stenberg (78).

1959 - No gold production reported from Georgetown district (82).

1955? - Placer mines have been operated intermittently for 20 to 30 years (2).

1979 - Earle Foster, Larry Anderson, James Sumpter, Lynwood Marshall, and Kenneth McCracken staked claims (41).

- Claims staked by Richard Wilmarth (43).

1924-82 - Intermittent mining activity occurred (41).

1982 - Claims staked by David L. Wilmarth, Richard Wilmarth, and Virgil Wilmarth (43).

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

- Claims staked by Foster, Anderson, Sumpter, Marshall, and McCracken were closed (43).

RESERVES:

No data available.

OPERATING DATA:

Open-cut hydraulic plant with sluice-box, front-end loader, bulldozer, and hydraulic giant with a 3-in nozzle (79).

GEOLOGIC SETTING:

Bedrock consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes (78). Rhyolite intrusive bodies occur along the divide at the head of Julian Creek. The source of gold and other heavy minerals is probably in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact. Concentrates contain gold, cinnabar, pyrite, cassiterite and traces of monzonite (2).

REFERENCES:

2, 7, 12, 30, 41-43, 45, 47, 50, 68-69, 71-76, 78-79, 82-85, 92-94

PROSPECT NAME (other names): George River Prospect COMMODITIES: Au-Placer
George Creek,
Beaver Creek,
Marietta Creek
Troy Resources Corporation

LOCATION: Quadrangle: Iditarod B-3
Meridian: Seward

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1911 - Mining done on Beaver and Marietta Creeks (50).

1920 - Mining done on George River (57).

1924 - Kirk and Riley were owners of George River, George Creek, Beaver Creek, and Marietta Creek claims (41).

1979 - Troy Resources Corporation located several claims (43).

1983 - Mining occurred employing two people. Troy Resources had 109 claims (43).

RESERVES:

No data available.

OPERATING DATA:

1- to 5-in floating suction dredge employed (79).

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by a few narrow porphyritic granite dikes. The source of gold is in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 41-43, 50, 57, 79, 85

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

COMMODITIES: Au-Placer

LOCATION: Quadrangle: Iditarod B-3
Meridian: Seward

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1974-75 - Richard Wilmarth staked Willow Creek one to five claims (41).

1976 - Jack and Clyde Hayden staked claims (41).

1983 - Jack and Clyde Hayden's claims were active (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The source of gold is in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 41-43

OCCURRENCE NAME (other names): Moose Creek Occurrence COMMODITIES: Au-Placer
Big Three Mining

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1979 - Claims located by L. D. Alderson, Lynwood Marshall, James Sumpter, Richard A. Pellett, Richard J. Pellett, Walter Yates, Earle C. Foster, Big Three Mining (43).

1981 - Claims located by Kelly R. Dolphin of Munther Creek Mining Co. (43).

1983 - Claims of Anderson, Marshall, Sumpter, Pellett, Yates, Foster (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The source of gold is in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 43

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

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

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
23			AA030790

HISTORY AND PRODUCTION:

1979 - Glenn Bass located claim (43).

1983 - Glenn Bass's claim was active (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous sandstone and slate intruded by porphyritic granite dikes. The gold is in quartz fracture fillings in breccia zones near the sedimentary rock and altered intrusive rock contact (2).

REFERENCES:

2, 43

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1970 - Stony River claims 1 to 32 staked by Dan Shaklovitz, Zelma Monroe, M. S. Dismuke (41).

1970-76 - Various activity years (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional stream sediments consist of Quaternary age deposits derived from lower Paleozoic and Cretaceous rocks (2).

REFERENCES:

2, 41-42

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1952 - Claim located and staked by Nick Mellick and George H. Willis (43).

1983 - Claims located and staked by Mellick and Willis were closed (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

A small amount of cinnabar occurs in the Cretaceous graywacke and shale behind Mellick's Trading Post near Sleetmute (2).

REFERENCES:

2, 18, 42-43, 95

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

LOCATION: Quadrangle: Sleetmute C-4 W 1/2 Sec 25 T 19N R 44W
Meridian: Seward
Geographic: Located approximately 0.25-mi below Sleetmute near the Kuskokwim River.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
26		0020820023	

HISTORY AND PRODUCTION:

Before 1942 - Prospect was known and owned by Herschell and Hortense Landru (14).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Rich float, containing cinnabar and metacinnabarite, has been found but has not been traced to its source. The country rock and intruding dike are similar to those at Red Devil (14).

REFERENCES:

14, 42, 95

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1955 - Mention of Vermillion and Mercury claims (2).

1965 - Dorr Holloway staked Mercury 1-5 placer claims near the mouth of McCally Creek (41).

RESERVES:

No data available.

OPERATING DATA:

Several trenches noted.

GEOLOGIC SETTING:

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

The prospects have been trenched and small amounts of cinnabar, chiefly as stringers along bedding in the shale, have been found (2, 18).

REFERENCES:

2, 18, 41-42, 95-96

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

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

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1933 - Discovered and staked by Hans Halverson (28).

- Examined by Roehm of the Territorial Department of Mines.

- A few years after 1933 - A half interest was acquired by Nick Mellick and more claims staked making a total of nine claims (97).

1939 - Groundsluicing into bank was still carried on. A 95-ft-long tunnel was driven with a short crosscut. The retort from the Parks property was to be moved and rebuilt at Red Devil (28).

Before 1940 - Eleven flasks of mercury, from the creek float and overburden, were retorted with several used Johnson McKay tubes (97).

1940 - Mellick and Halverson took out enough ore during development work to keep two retorts busy for three months. Each had a 1 ton per day capacity (77).

- The two "D" retorts produced 158 flasks of mercury (97).

1941 - Mapping was done by the USGS from 1941 to 1946 (2).

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

- In the fall Harold Schmidt and L. J. Stampe leased the property. The New Idria Quicksilver Mining Co. sub-leased it forming the New Idria-Alaska Quicksilver Mining Co. with Harold Schmidt as superintendent. 135 flasks of mercury were produced (97).

1942 - Property was examined by Bureau personnel. Trenching and sampling were done. Mining continued producing 117 flasks of mercury (97).

1940-42 - During this period mercury ore was mainly obtained from ground-sluicing overburden above the ore zone (97).

1942-43 Winter - Norman Ebbley of the Bureau supervised underground exploration amounting to 204-ft of drifting and cross-cutting and 25-ft of shaft sinking (97).

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

1944 - 1,096 flasks of mercury were recovered from 2,652 tons of ore by June 30. Then operations were curtailed due to poor market conditions for the remainder of the year (97).

1945 - In February a contract to extend the shaft was granted to Kuskokwim Mining Co., that consisted of Harold Schmidt, L. J. Stampe, Earl Ellington and Glen Franklin. They extended the shaft 44-ft. In the summer they obtained a sub-lease to mine ore and use the furnacing equipment (97).

1945-46 - The mine was operated for two four month seasons. Development work consisted of 499-ft of drifting, 155-ft of crosscuts and 112-ft of shafts/winzes (97).

1946 - The company suffered a loss because of the unforeseen low mercury price at the end of the year, so operations were shut down (97). Robert F. Lyman held a lease on the property and produced about 500 flasks (22).

1947 - On January 21, Harold Schmidt and L. J. Stamp bought all mining and furnacing equipment. They continue to hold their lease on the property. Examined by Bureau personnel (97).

1947-51 - Work was limited to annual assessment requirements (22).

1949 - New Idria-Alaska sold all mining and furnacing equipment to Robert F. Lyman (25).

1952 - Claims located and staked by Hans Halverson, Nick Mellick, of Alaska Research Company (43).

- DeCoursey Mountain Mining Company acquired lease on the property (22). It was aided by a loan from the Defense Minerals Exploration Administration (DMEA) (29).

1953 - DeCoursey Mountain Mining Co. dewatered mine and started operations (22).

1953-54 - They produced 1,084 flasks of mercury from 2,500 tons of ore (22).

1954 - Mine and mill equipment destroyed by fire in October. A controlling interest was sold to Brewis and White, a Canadian mining company, who named the mine DeCoursey Brewis (98).

1955 - DeCoursey Brewis rebuilt the plant (22).

1956 - Claims staked by Hans Halverson (43).

1957 - The Dolly series of ore bodies was discovered and the Dolly shaft was sunk 1,082-ft northwest of the main shaft (32). The mine produced more than 5,000 flasks of mercury and became one of the largest producers in the United States (18).

1959 - DeCoursey Mountain Mining Co. changed its name to Alaska Mines and Minerals, Inc. (29). The DeCoursey Brewis name was changed to Consolidated Brewis (98).

1961 - The mine consists of nine unpatented claims. The Kusko No. 1-5 were held by Alaska Mines and Minerals, Inc. and the Red Devil Nos. 1-4 were held by Halverson and Mellick who leased them to the Alaska Mines and Mineral, Inc. Robert F. Lyman, manager; Roger A. Markle, resident engineer; and Gordon Herreid, geologist were all members of Alaska Mines and Minerals, Inc. (25).

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

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

- In October, Don Holloway and Mariano Juancorena obtained a one-year lease. Jack Neubauer joined them and miners were hired. They drove a 100 ft adit in Red Devil Gulch and had 40 tons of high-grade ore stockpiled (23).

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

1964-69 - Inactive (98).

1966 - The price of mercury rallied to $780 per flask and the company decided to seek financing to start up operations. At this time they owned over 50 claims, but only four had been worked (98).

1968 - Plans were made to put in a flotation plant at a cost of $300,000 with assistance from Matanuska Valley Bank. Nissho-Iwai Co. Ltd. and Nomura Mining Co. Ltd., Japanese companies, agreed to add $225,000 for opening and exploration. They were to buy the cinnabar concentrate and ship it to Japan (98).

1969 - Open pit mining was to begin in July. Ray Wolfe was president of Alaska Mines and Minerals (98).

1970 - No. 1 producer in Alaska. Production from Red Devil was from both open pit and underground workings. The mill operated at maximum capacity for most of the year. Stibnite was recovered by flotation. A crew of 34 was employed (99).

1971 - On the first of June the mine was shut down because of the drop in the mercury price (100).

1972 - The mine remained closed as the mercury price dropped to a 20 year low at $150 per flask in February (101).

1981 - The mine was closed and flooded.

PRODUCTION

Year	Flasks of mercury	Tons of ore	Income from sale	
1933-40	11	---	---	
1940	158	---	---	
1941	135	---	---	
1942	117	---	---	
1943-44	1,096	2,652	$ 171,717.70	
1945	962	1,514	114,825.49	
1946	491	872	40,156.28	(97)
1953-54	1,084	2,500	---	
1956-60	19,800	47,250	---	
1961	3,200 (approx.)	---	---	(22)
1962-63	4,800	---	---	(98)
1969-71	3,146 (approx.)	---	---	(102)
Total	35,000 (approx.)			(102)

RESERVES:

As of March 1943 it was estimated that seven leases had 11,360 tons of ore containing 45.3 lbs of mercury per ton plus 15,900 tons containing 36.7 lbs of mercury per ton. The ore contained antimony in almost equal amount and a small percentage of arsenic (103).

OPERATING DATA:

In the early years development consisted of surface trenching and hydraulic sluicing of the overburden. Up to 1947 development consisted of 139-ft of shafts and 2,170-ft of drifting and crosscutting on four levels. The main shaft was 99-ft-deep (97).

By 1958, the underground workings consisted of a total of about 9,600-ft of shafts, adits, crosscuts, drifts, winzes, and raises. The main shaft was inclined at 63° for a distance of 507-ft downslope and 143-ft vertically. Five main levels connected with the main shaft (29).

By 1969, the mine consisted of an airfield, and a well equipped camp with a modern furnacing plant consisting of a retort plant with 40 tons per day capacity, two 650-kw Ingersoll-Rand light plants, several 340,000 gallon fuel oil tanks, machine shops, offices, dormitories, apartments and a flotation plant that could process 100 tons of ore per day (98).

GEOLOGIC SETTING:

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

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

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

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

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

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

The ore shoots are composed of stibnite-cinnabar-quartz. The dimensions of the shoots are 1-in to 1-ft-wide and and 5- to 30-ft-long. Cinnabar may constitute from 0- to 40-pct of the ore shoot, quartz from 1- to 10-pct, and stibnite the rest. Adjacent to the ore shoots, cracks in the host rock carry 1/16- to 1/4-in-wide vuggy veinlets of quartz, white clay, and cinnabar. This halo may extend out to 50-ft before cinnabar disappears, but the quartz-clay veinlets continue on (25).

Ore genesis sequence (25)

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

BUREAU WORK:

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

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

Examined by Bureau personnel in 1947 (97).

REFERENCES:

2, 14-15, 18, 22-23, 25, 28-29, 41-43, 77, 80, 90, 95-113, 115

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

LOCATION: Quadrangle: Sleetmute D-4 NW 1/4 Sec 06 T 19N R 44W
Meridian: Seward
Geographic: Located approximately 1-mi from the south bank of the Kuskokwim River and about 1.75-mi northwest of the Red Devil deposit at the 400-ft elevation.

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1921 - Cinnabar was discovered and the Barometer Nos. 1-6 claims located by Hans Halverson (25).

1922 - A 122-ft tunnel was driven (113).

1923 - Property sold to E. W. Parks for $1,000. Surface trenching and stripping were done (113).

- A Johnson-McKay pipe retort was installed and a small amount of production was made mainly from the detrital material below the deposit (15).

1931 - Dr. Carter optioned the property and drove a 40-ft crosscut (113).

- Property examined by Otto Rohlphs (Mining Engineer, Seattle) (15).

1932 - Option was dropped by Dr. Carter (113).

1938 - Property leased to A. C. Skidmore and 10 flasks of mercury were retorted from float ore and ore in a pit at the lower deposit. The lease lapsed at the end of the season (15).

1939 - Assessment work done (15).

1940 - Six flasks of mercury produced (2).

1942 - Exploration by the Bureau with trenching and sampling done (25).

1943 - Exploration continued by the Bureau (22).

1954 - Claims staked by Frederick Woelkers III (43).

mid-1950's - Leased by Alaska Mines and Minerals Inc.; the property then consisted of Barometer Nos. 1-10 unpatented claims (22, 25).

1956 - Claims staked by Frederick Woelkers III (43).

1957 - Claims staked by Frederick Woelkers III (43).

1957 and 1958 - Trenching and sampling done by the DMEA program failed to find new ore (25).

1961 - During assessment work, John Murphy and George Willis mined 50 to 75 tons of ore exposed in 1959 stripping (22).

1962 - Claims staked by Frederick Woelkers III (43).

PRODUCTION

Year	Flasks of mercury	Tons of ore	
1923	small amount produced		(15)
1938	10	25	(15)
1940	6		(2)
1961	not known	50-75	(22)

RESERVES:

No data available.

OPERATING DATA:

Development consists of a 122-ft adit, 80-ft of crosscuts, pits and trenches. Single-tube Gould D and Johnson-McKay retort furnaces, (2) and a Pacific Foundry retort were used (113).

GEOLOGIC SETTING:

The country rock is mainly Cretaceous shale with some graywacke and sandstone. The sedimentary rocks strike between N. 20° to 60°W at the upper deposit and N. 10°W at the lower deposit. Hydrothermally altered intrusive rocks are associated with mineralization. Cinnabar occurs along bedding joints and in fault and fracture zone openings. The cinnabar occurs irregularly and realgar and stibnite also occur (2).

BUREAU WORK:

Trenching and sampling were done in 1942 and 1943. Sample results contained 0.1 to 16.5 lbs per ton mercury, trace to 2.5 pct antimony, and 0.01 to 0.67 pct arsenic (15).

REFERENCES:

2, 14-15, 22, 25, 41-43, 57, 80, 90, 95, 103, 111, 113-114

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

LOCATION: Quadrangle: Sleetmute D-4   SW1/4 Sec 30 T 20N R 44W
Meridian: Seward
Geographic: Located approximately 1.5-mi southeast of Parks along the north side of the Kuskokwimm River.

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1970 - Located and staked by Carl R. Henery (43).

1978 - Thomas L. Roehmer, owner (41).

1983 - Claim located by Henery was closed (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke, sandstone, and shale intruded by andesite dikes and sills (2).

REFERENCES:

2, 41-43

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

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

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
31		0020820026	

HISTORY AND PRODUCTION:

No data available.

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The country rock consists of Cretaceous graywacke and shale of the Kuskokwim Group. Cinnabar occurs in a breccia zone and in vugs near the upper contact of a silica-carbonate altered sill. Localized graphite fragments also occur in altered biotite basalt (2).

REFERENCES:

2, 18, 42, 95

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

LOCATION: Quadrangle: Sleetmute D-4 NW 1/4 Sec 24 T 20N R 45W
Meridian: Seward
Geographic: Located 1.25-mi north of the Kuskokwim River 12-mi downstream from Sleetmute at the 600- to 750-ft elevation

REFERENCE NUMBERS:

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

HISTORY AND PRODUCTION:

1909 - Discovered by Oswald Willis and Jack Fuller (114) who staked 15 claims (22).

1910 - After being idle, property was restaked (114).

1914 - Development work done (5).

1914-18 - Two flasks of mercury were produced in a retort made from galvanized sheet iron and oil drums (2).

1921 - Development work done (57).

1926 - Development work done (63).

1940 - W. G. Culver and Associates leased the property (77).

1942-58 - Only assessment work was done (8).

1942 - Examined by Bureau personnel who excavated six bulldozer trenches and exposed four dikes (18).

1943 - After Fuller's death (19) George H. Willis, nephew, acquired half interest. The Bureau continued their trenching and sampling program (22).

1951 - Nine of the original claims were dropped (22).

1952 - Claims staked by Nick Mellick and George H. Willis (43).

1953 - The six claims left were amended and relocated (22).

1953-54 - Extensive stripping was done with bulldozer equipment by George Willis (22).

1954 - Claims staked by George H. Willis (43).

- Examined by Jasper of the Territorial Department of Mines. Samples contained nil to 13.4 lbs per ton mercury (19).

1957 - Alaska Mines and Mineral Co. acquired property (22).

1958 - Willis excavated trenches in an area 1,300-ft by 1,000-ft and stockpiled some ore (18).

1959 - Property leased to Alaska Mines and Minerals Inc. by current owner George Willis, nephew of Oswald Willis (18).

- USGS mapped the property (18). Sample results include 34.53 ppm mercury in one sample.

PRODUCTION

Year	Flasks of mercury	
1914-1918	2	(2)

RESERVES:

No data available.

OPERATING DATA:

Development consists of several trenches, open cuts, and eight adits. Four adits are less than 50-ft-long, one is 100-ft-long, and one is 200-ft-long (22).

GEOLOGIC SETTING:

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

Cinnabar and stibnite occur along the hanging-wall side of the sills and in the adjacent sedimentary rocks. The shale and brecciated argillite are the most productive host rock. Some mineralization occurs along fractures in the dikes also (15, 19). Very minor amounts of disseminated pyrite are present (19).

The dikes strike N 30°W and dip 55 to 80° to the southwest. The sedimentary rocks strike N 60°W and dip 45 to 80°southwest (original bedding overturned) (2). One sample of shale contained 75 lbs per ton mercury (19).

BUREAU WORK:

Trenched and sampled in 1942 and 1943. Samples contained nil to 13.4 lbs per ton of mercury (15).

REFERENCES:

2, 5, 14-15, 18-19, 22, 25, 29, 41-43, 57, 63, 77, 80, 90, 95, 103, 114-115

MINE NAME (other names): Alice & Bessie Mine   COMMODITIES: Hg
Parks Prospect

LOCATION: Quadrangle: Sleetmute D-4   NE 1/4 Sec 25 T 20N R 45W
Meridian: Seward
Geographic: Located on the north bank of the Kuskokwim River approximately 15-mi above Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
33	82-10	0020820002	
	82-20		

HISTORY AND PRODUCTION:

1906 - E. W. Parks made discovery and located the Alice & Bessie lode claims (21).

1906-1914 - Development work done (60).

1914 - A 200-ft adit was driven (21). 700 lbs of mercury were produced (5).

1916 - Development continued (55).

1919 - Retort plant was installed and 30 men were employed and some cinnabar ore was retorted (116).

1920 - Productive mining continued (57).

1921 - No productive operations, underground development work done (58).

1923 - Operations were shut down with a total of 120 flasks of mercury produced since 1906 (103).

1926 - Mining continued (63).

1929 - Mining continued and ore recovered was retorted in a home-made furnace that was in operation for about two weeks (66).

1930 - Mining continued and a small amount of ore was retorted for a short time in a homemade furnace (67).

1931 - Approximately 60 tons of ore mined and milled (68). Property examined by a private mining engineer and samples taken. No results were released.

1932 - Approximately 35 tons of ore mined and milled (69).

1933 - Mining continued (70).

1934 - Negotiations began for starting new developments on an enlarged scale (71).

1935 - Work was started on extensive prospecting by a mining engineer and small crew (72).

1936 - Following the death of Parks, W. E. Dunkle leased the property and extended the cross-cut to 525 ft. The main ore zone was 450-ft from the portal and a 240-ft drift was driven into it (21). Five men were employed (73).

- Property examined by S. R. Capps of USGS (73).

1937 - Following Dunkle's work, annual assessment work was done by Mr. Park's estate and/or his associates (21).

1942 - Sampled and trenched by Bureau personnel (15).

- George H. Willis acquired a half interest (21).

1954 - Robert F. Lyman bought the remaining half interest from Nick Mellick, and Willis and Lyman staked eight more claims (21).

1955 - Examined by Jasper of the Territorial Department of Mines (21).

1957 - Cordero Mining Co. optioned the property and extended trenches, sank an inclined shaft and explored the main underground dike with percussion long-hole drilling (18).

1958 - Cordero dropped their option (18).

1959 - Sainsbury and C. M. Taylor of USGS mapped the property (18).

1960 - Owned by Nick Mellick and George Willis; Mellick's interest was under purchase contract to Robert Lyman (18).

1961 - Total production to date was about 175 flasks of mercury (80).

PRODUCTION

Year	Flasks of mercury	
1906-1914	9.2	(21)
1915-1923	110.8	(103)
1924-1961	64.2	(80)
TOTAL	174.2	(80)

RESERVES:

No data available.

OPERATING DATA:

Development consists of trenches, open cuts, shafts, a 525-ft adit, a 240-ft drift, and a 45-ft-deep inclined shaft. A Johnson-McKay furnace, and a small Scott furnace were used for retorting. A small monitor was used for ground sluicing (21).

GEOLOGIC SETTING:

The property is located on the northeast limb of the Sleetmute anticline. The country rock consists of graywacke and shale of the Kuskokwim Group of Cretaceous age. The sedimentary rocks have been intruded by andesite, diabase, and granitic sills and dikes (21).

The cinnabar mineralization is associated with altered andesite dikes and sills. The ores occur in brecciated zones near the contacts, with cinnabar and stibnite being the principle ore minerals. A few narrow stringers of pyrite also occur. Quartz and ferruginous carbonates occur as gangue minerals (47).

BUREAU WORK:

Trenching and sampling was done in 1942. The samples contained trace to 39 lbs per ton mercury, trace to 0.36 pct antimony, and trace to 0.048 pct arsenic (15).

REFERENCES:

2, 4-5, 14-15, 18, 21-23, 25, 29, 41-42, 46-47, 51-53, 55, 57-58, 60, 63, 66-73, 77, 80-81, 90-91, 95, 103, 107, 112, 114, 116-117

PROSPECT NAME (other names): Fairview Prospect   COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-4   N 1/2 Sec 02 T 19N R 45W
Meridian: Seward
Geographic: Located approximately 1.25-mi south of the Kuskokwim River near the headwaters of McCally Creek at an elevation of approximately 900 ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
34	82-19	0020820022	
	82-32		

HISTORY AND PRODUCTION:

1935 - First staked (15).

1942 and 1943 - Trenching and sampling done by Bureau personnel (15).

1965 - Owned by Alaska Mines and Minerals Inc. (25).

1969 - Claims staked by R. Saunders, International Nuclear Mines (41).

RESERVES:

No data available.

OPERATING DATA:

Development consists of pits and trenches. The three longest trenches, 125, 130, and 175-ft-long were hand dug by the Bureau in 1943 (18).

GEOLOGIC SETTING:

The country rock consists of Cretaceous graywacke and shale of the Kuskokwim Group which have been intruded by a rhyolite dike that strikes N 60°W and dips northeast. The dike is at least 1,000-ft-long and 120-ft-wide (15). Cinnabar and stibnite occur in a fracture zone cutting across the dike (25).

This occurrence is unique in that here, mercury is rarely found in association with the albite rhyolite (2).

BUREAU WORK:

Trenched and sampled in 1942 and 1943. Samples contained up to 8 lbs per ton mercury (15).

REFERENCES:

2, 15, 18, 25, 41-42, 80, 95, 103

PROSPECT NAME (other names): Fuller Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-4 Sec 03, 09, 10, 16, 17, 20, 29, 32 T 19N R 45W
Meridian: Seward Sec 27, 34 T 20N R 45W

Geographic: Located on Fuller Creek approximately 4-mi west of Red Devil.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
35		0020820013	

HISTORY AND PRODUCTION:

Some reported production in early days (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous shale and graywacke cut by rhyolite dikes (2).

REFERENCES:

2, 42, 95

PROSPECT NAME (other names): Cinnabar Chief Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-4 SW 1/4 Sec 09 T 19N R 45W
Meridian: Seward
Geographic: Located approximately 4-mi west of Red Devil near Fuller Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
36	82-16	0020820033	

HISTORY AND PRODUCTION:

1926 - G. C. Bettles of the Kuskokwim Mercury Co. did prospecting, but development work failed to find economic amounts of ore and work was suspended in August (63).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Bedrock consists of Cretaceous graywacke and shale intruded by rhyolite dikes (2).

REFERENCES:

2, 14, 41-42, 63

PROSPECT NAME (other names): Eightmile Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-5 Sec 04, 05 T 19N R 46W
Meridian: Seward Sec 13, 23, 24, 26, 27, 33, 34 T 20N R 46W

Geographic: Located approximately 3-mi up Eightmile Creek, a tributary on the southside of the Kuskokwim River

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
37		0020820017	

HISTORY AND PRODUCTION:

Some reported production in early days (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous shale and graywacke cut by rhyolite dikes (2).

REFERENCES:

2, 42, 95

PROSPECT NAME (other names): California Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-5 Sec 19, 20, 21 T 21N R 45W
Meridian: Seward Sec 24, 25 T 21N R 46W

Geographic: Located approximately 2-mi up California Creek, a tributary on the north side of the Kuskokwim River

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
38		0020820014	

HISTORY AND PRODUCTION:

Some reported production (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

A sheet of porphyritic rhyolite crops out across the headwaters of California Creek dipping steeply to the north-northwest across the bedding. Basaltic and dioritic bodies occur nearby (2).

REFERENCES:

2, 42, 95

PROSPECT NAME (other names): Harvison Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute D-5 SW 1/4 Sec 25 T 22N R 46W
Meridian: Seward
Geographic: Located on a ridge crest on the east side of the George River approximately 3-mi south of the East Fork junction.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
39	82-23	0020820007	

HISTORY AND PRODUCTION:

1963 - John Harvison, Dorr Holloway, and R and H Mining Co. staked 11 claims (41).

- Soil sampling, panning, and trenching were done. A 30-ft open cut was timbered and lagged and a winze was sunk on the ore-shoot. During excavating 5- to 6-tons of 12- to 15-pct mercury was sorted out (24).

RESERVES:

No data available.

OPERATING DATA:

Trenching was done with a John Deere tractor. There is a 30-ft-long open cut with a 3.5-ft-deep winze started (24).

GEOLOGIC SETTING:

Small lenses and pods of cinnabar occur in brecciated silicified Cretaceous shaly sandstone. The sandstone is cut by a dike or sill (90).

REFERENCES:

24, 41-42, 90, 95

OCCURRENCE NAME (other names): R and H Mining Occurrence COMMODITIES: Unknown (Hg?)

LOCATION: Quadrangle: Sleetmute D-5 NW 1/4 Sec 33 T 22N R 46W
Meridian: Seward
Geographic: Located approximately 4.5-mi north of Georgetown.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
40			AA033505-033509
			AA038778-038781

HISTORY AND PRODUCTION:

1968 - Located and staked by R and H Mining (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and slate of the Kuskokwim Group (2).

REFERENCES:

2, 43

PROSPECT NAME (other names): Egnaty Creek Prospect COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute D-5 SW 1/4 Sec 34 T 21N R 47W
Meridian: Seward
Geographic: Located on the south side of the Kuskokwim River approximately 9-mi down river from Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
41	82-26 82-27	0020820001	

HISTORY AND PRODUCTION:

1966 - John Murphy and George Willis staked claims (41).

1966-1967 - Reconnaissance work done by the Bureau included augering, trenching, diamond drilling, and soil sampling (118).

1974 - Active (41).

RESERVES:

No data available.

OPERATING DATA:

Augering, trenching, diamond drilling, and soil sampling were done (118).

GEOLOGIC SETTING:

Country rock consists of Cretaceous Kuskokwim Group sandstone and graywacke with shale interbeds. Bedding strikes approximately S 35°W and dips 45 to 50°S. Disseminated cinnabar occurs and a few select samples assayed about 1 pct mercury. Arsenic and antimony were found in trace amounts (118).

BUREAU WORK:

Soil sampling was done in 1966-67. No analysis of sample results was completed besides plotting on a map (118).

REFERENCES:

41-42, 95, 118

PROSPECT NAME (other names): Central Creek Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute D-6 Sec 18, 19, 20, 28, 29, 32 T 21N R 47W
Meridian: Seward
Geographic: Located approximately 7-mi west of Georgetown

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
42		0020820015	

HISTORY AND PRODUCTION:

Some reported production (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is Cretaceous Kuskokwim Group shale and graywacke cut by rhyolite dikes (2).

REFERENCES:

2, 42, 95

PROSPECT NAME (other names): Oskawalik River Prospect COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute C-5

Sec 18, 19, 30, 31	T 18N	R 46W
Sec 05, 06, 08, 09, 10, 13, 14, 15	T 18N	R 47W
Sec 31	T 19N	R 47W
Sec 19, 20, 21, 25, 26, 27, 30, 36	T 19N	R 46W
Sec 15, 16, 22, 23, 24, 25	T 19N	R 49W

Meridian: Seward
Geographic: A tributary to the Kuskokwim River approximately 9-mi south of Crooked Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
43	82-40	0020820036	

HISTORY AND PRODUCTION:

Some production reported in early days near Henderson Mountain (2).

1980-1982 - Staked by Tim Pearia, Sumeck Mining Co., Buckstock Mining Co., Hall Green, Gil Green, and Oskawalik Enterprises (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock consists of Cretaceous shale and graywacke of the Kuskokwim Group; several rhyolite intrusions occur in the area (2).

REFERENCES:

2, 41-42, 95

MINE NAME (other names): Quartz Gulch Mine COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 19 T 23N R 48W
Meridian: Seward Sec 13, 24 T 23N R 49W
Geographic: Located on Quartz Gulch, a tributary to Donlin Creek.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
44			

HISTORY AND PRODUCTION:

1910 - $1400 worth of gold was mined from claim No. 1 near the mouth (6).

1912 - Produced $29,000 worth of gold; $23,000 of it was mined from the stream gravels in the summer and the rest from short drifts in the bench gravels during winter (6).

1913 - Two men mined on the claim and produced about $3000 worth of gold (6).

1914 - Two men mined on the claim and produced about $3000 worth of gold (6).

PRODUCTION

Year	Production of placer gold	
1910	$ 1,400	
1912	29,000	
1913	3,000 ±	
1914	3,000 ±	
TOTAL	$ 36,400 ±	(6)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (2) with short drifts into the bench gravels (6).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2). The opencut mining was done in stream gravels 6- to 7-ft-deep and the bench gravels were 20- to 25-ft-deep (6).

REFERENCES:

2, 6, 83

PROSPECT NAME (other names): Quartz Prospect COMMODITIES: Au, Ag

LOCATION: Quadrangle: Iditarod A-5 SE 1/4 Sec 19 T 23N R 48W
Meridian: Seward
Geographic: Located on the southern side of a high hill between Dome Creek and Quartz Gulch.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
45		0020730017	

HISTORY AND PRODUCTION:

Before 1955 - The lode was known in the area but was not mined (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some of the rhyolite bodies. Assays show gold values of about $10.00 per ton and a small amount of silver (2).

REFERENCES:

2, 42, 90, 95

MINE NAME (other names): Donlin Creek Mine
Dome Creek
Ophir Creek

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

LOCATION: Quadrangle: Iditarod A-5
Meridian: Seward

Sec 06, 07 T 23N R 48W
Sec 13, 14, 22, 23, 27, 33, 34 T 23N R 49W

Geographic: Located approximately 13-mi north of the village of Crooked Creek. A tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
46	73-22	0020730007	AA029244-029252

HISTORY AND PRODUCTION:

1909 - Gold first discovered on Crooked Creek (6).

1910 - Prospecting was done (30).

1911 - Mining done (50).

1914 - Placers examined by Maddren of USGS (6).

1920 - Some reported production (57).

1924 - Mining done (61).

1926 - Mining done by open-cut methods (63).

1927 - Mining done (64).

1928 - Two miners operated a small hydraulic plant on bench gravel (65).

1929 - Mining bench gravels by means of a hydraulic plant.

- A small amount of gold was recovered (66).

1930 - Mining bench gravels by means of a hydraulic plant.

- A small amount of gold was recovered (67).

1931 - A small amount of gold was recovered (68).

1932 - Mining continued (69).

1933 - Mining continued by two camps. One camp consisted of two men with a hydraulic plant working just below Snow Gulch (70).

1934 - Mining continued (71).

1935 - Mining continued (72).

1936 - Mining continued (73).

1937 - Mining done by one or two camps that employed eight to ten men.

- One camp produced some gold (74).

1938 - Three or four camps mined (75).

1939 - Mining continued (76).

1956 - Mining from 1910 to 1956 (85).

1969 - Claims located by Robert E. Lyman (43).

1983 - Claims located by Robert E. Lyman were closed (43).

PRODUCTION

Year	Oz gold recovered	Oz silver recovered
prior to 1932	4170	119
up to 1955	$125,000 (approximately) (2)	

RESERVES:

No data available.

OPERATING DATA:

Hydraulic plant and open-cut methods were employed.

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dips southwest and has several rhyolite intrusions. Several small quartz and calcite veins occur in the rocks next to the rhyolite and pyrite occurs locally. The source of gold appears to be quartz fracture fillings in breccia zones at the contacts of silicified and sericitized rhyolite with the sedimentary rocks. Richest deposits occur where bench gold has been concentrated by gulches cutting through the benches. Minerals found in the concentrates include magnetite, garnet, scheelite, cassiterite, pyrite, cinnabar, and stibnite (2).

Float specimens of rhyolite breccia containing quartz and stibnite were found at one locality (90).

REFERENCES:

2, 6, 30, 41-43, 45, 47, 50, 57, 61, 63-77, 82-85, 90, 112

MINE NAME (other names): Ruby Gulch Mine   COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5   SW 1/4 Sec 23 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek approximately 0.5-mi below Snow Gulch

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
47	73-22 73-28	0020730015	

HISTORY AND PRODUCTION:

1911 - Mining done near the mouth of Ruby Gulch (6).

1953 - Claims staked by R. Lyman and Tom Belanger (41).

PRODUCTION

Year	Gold recovered
1911	$3,000.00 (6)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2). Both stream and bench gravels are mined (6). Gold values range from 5 cents to $3.00 per ft^2 near the mouth and seven assays ranged from 902 to 910 fine (2).

REFERENCES:

2, 6, 41-42, 83

PROSPECT NAME (other names): Queen Gulch Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 25, 26 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
48	73-22	0020730015	
	73-78		

HISTORY AND PRODUCTION:

1910-1911 - Approximate time when mining started (2).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2).

REFERENCES:

2, 6, 41-42, 83

OCCURRENCE NAME (other names): Queen Occurrence COMMODITIES: Sb

LOCATION: Quadrangle: Iditarod A-5 SW 1/4 Sec 25 T 23N R 49W
Meridian: Seward
Geographic: Located in the Donlin Creek area near the western edge of the top of the hill between Queen and Snow Gulches.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
49		0020730018	

HISTORY AND PRODUCTION:

The lode is known in the area but has not been mined (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quartz and stibnite float was found over an area of about 20 by 40-ft, near the apparent contact of rhyolite and interbedded Cretaceous graywacke and shale. Quartz and stibnite blades fill openings in brecciated rhyolite (2).

REFERENCES:

2, 42, 83, 85, 90

PROSPECT NAME (other names): Lewis Gulch Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 26, 27 T 23N R 49W
Meridian: Seward
Geographic: Tributary to Crooked Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
50	73-22	0020730014	

HISTORY AND PRODUCTION:

1910-1911 - Approximate time when mining started (2).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2).

REFERENCES:

2, 6, 41-42, 83

PROSPECT NAME (other names): Crooked Creek Prospect COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5

Sec	19, 29, 30, 32	T 21N	R 48W
Sec	02, 03, 11, 12, 13, 24	T 21N	R 49W
Sec	03, 04, 09, 10, 16, 21, 28, 33	T 22N	R 49W

Meridian: Seward
Geographic: Tributary to Kuskokwim River. Located approximately 18-mi below Georgetown.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
51	73-78	0020730013	
	73-79		
	73-80		

HISTORY AND PRODUCTION:

1909 - Placer gold discovered (6).

1953 - Claims staked by R. Lyman and T. Belanger (41).

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2).

Prospects of placer gold occupy about 7-mi of Crooked Creek's middle length (6).

The productive mining is practically confined to the lower courses of three tributaries, Quartz, Snow, and Ruby Creeks. The gold occurs in bench gravels that lie along the east side of Crooked Creek, which have been entrenched by the lower courses of the side streams. Also the gold occurs in the stream gravels of these streams, where the gold has been reworked from the bench gravels (6).

REFERENCES:

2, 6, 41-42, 83

MINE NAME (other names): Snow Gulch Mine COMMODITIES: Au - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 30, 31, 32 T 23N R 48W
Meridian: Seward Sec 14, 23, 24, 25 T 23N R 49W
Geographic: Tributary to Donlin Creek

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
52	73-22		AA029244-29248 AA029252

HISTORY AND PRODUCTION:

1910 - First mining in Crooked Creek Valley was done here at about 1000 ft above the mouth of Snow Gulch (6).

1911 - Mining done (6).

1912 - Mining done (6).

1983 - Mining reported to have been done the last several years and preparations were being made in 1983 for start-up of mining again in 1984 (personal communication by a former employee).

PRODUCTION

Year	Recovery of placer gold
1910	$2,000
1911	$ 600
1912	$2,300
TOTAL	$4,900 (6)

RESERVES:

No data available.

OPERATING DATA:

Hydraulic methods were mainly used (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that dip southwest and are intruded by rhyolite. The rhyolite forms domes trending northwest. Small quartz and calcite veinlets occur in the sedimentary rocks next to the rhyolite; abundant pyrite occurs near some rhyolite bodies (2).

The eastern contact of the igneous intrusive rock cuts across Snow Gulch about 1.25-mi above its mouth (6).

For about 1.25-mi above its mouth the stream gravels yielded appreciable gold (6).

REFERENCES:

2, 6, 41-42

PROSPECT NAME (other names): Rhyolite Prospect COMMODITIES: Hg, Sb

LOCATION: Quadrangle: Sleetmute D-7 NW 1/4 Sec 36 T 22N R 50W
Meridian: Seward
Geographic: Located on the southern flank of Juninggulra Mountain 35-mi southwest of Flat at 500-ft elevation

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
53	82-22	0020820008	AA031213-031230
	82-29		
	82-31		

HISTORY AND PRODUCTION:

1953 - Small stringers of cinnabar in rhyolite were found three miles from Juninggulra Mountain (119).

1956 - Discovered by Robert Lyman and Joe Stuver (119).

1957 - Owners did bulldozer trenching, stream panning, and dug several pits (119).

- Optioned to the Cordero Mining Co. (18).

1958 - Property was briefly examined by Bureau personnel (119).

1959 - Exploration by bulldozer trenching was done by Bureau personnel (119).

- Mapped by Sainsbury and Taylor of USGS.

1960 - No production had yet been recorded (18).

1971 - Claims were staked by Henry W. Waterford (43).

RESERVES:

No data available.

OPERATING DATA:

Development consists of several bulldozer trenches and prospect pits.

GEOLOGIC SETTING:

The country rock consists of interbedded graywacke and shale of the Cretaceous Kuskokwim Group. The sedimentary rocks srike N70°E and dip 80°N.

These are intruded by several basalt and rhyolite dikes and sills. Cinnabar is usually associated with basalt dikes and sills that have been hydrothermally altered to silica-carbonate rock. The dikes are from a few inches to over 50-ft-thick. Cinnabar occurs as small and erratic lenses and is 1/4- to 1/2-in-wide stringers several feet or less in length.

Mineralization occurs within the dikes and sills and along the contact. Locally a few feet of the altered sedimentary rock contains erratic lenses and blebs of cinnabar. Only trace amounts of antimony and arsenic occur with the cinnabar (119).

BUREAU WORK:

Trenched and sampled in 1959. Sample results contained <0.02 to 54.0 pct mercury, <0.05 to 66.3 pct antimony, and <0.05 to 0.06 pct arsenic (119).

REFERENCES:

18, 41-43, 80, 90, 95, 112, 119

OCCURRENCE NAME (other names): Return Creek Occurrence COMMODITIES: Hg - Placer

LOCATION: Quadrangle: Iditarod A-5 Sec 27, 28, 31, 32 T 23N R 50W
Meridian: Seward Sec 36 T 23N R 51W
Geographic: Located on the south side of DeCourcy Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
54	73-12	0020730020	

HISTORY AND PRODUCTION:

1953 - Claims staked by R. Lyman, DeCourcy Mining Co. (41).

1953-1908 - Occasional activity occurred (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Quaternary alluvium derived from Cretaceous sedimentary rocks (2).

REFERENCES:

2, 41-42

MINE NAME (other names): DeCourcy Mountain Mine COMMODITIES: Hg, Sb
Corona

LOCATION: Quadrangle: Iditarod A-5 SW 1/4 Sec 21 T 23N R 50W
Meridian: Seward
Geographic: Located at the head of Return Creek on DeCourcy Mountain, 35-mi south of the town of Iditarod at an elevation of about 900-ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
55	73-11	0020730019	AA027467-027469
	73-13		AA027471-027475

HISTORY AND PRODUCTION:

1910-1911 - Discovered in the winter by Matt DeCourcy (2).

1919 - Staked by Matt DeCourcy (2).

1920 - Claims under development by Fidelity-Kuskokwim Quicksilver Co. which shipped in 60 tons of supplies including retorts. Underground development consisted of a 50-ft shaft (57).

1921 - The Thrift Mining Co. installed a four-tube retort and some mercury was produced (58).

1923 - Mining done (60).

1924 - Incomplete records show 45 flasks of mercury were produced from 14 tons of hand-sorted ore between 1921-1924 by the Thrift Mining Co. (25).

1924-1926 - C. F. Lindfors and associates retorted ore from the upper vein system, but production was small (120).

- The Johnson and Lindfors adits were driven.

- The old four-tube retort broke down in 1924, but a 12 tube mill was to be installed in the next season with a rated capacity of 5 tons a day (61).

- The mine was called the Corona during this period (25).

1925 - Largest producer of mercury in the region (47) with 38 flasks of mercury produced from 45 tons (25).

1926 or 1927 - Lindfors died and deposit reverted to open ground (25).

1927 - John Brink located three claims, Last Chance 1, 2, and 3 (120).

- Frederick J. Woeklers III located three claims (43).

- About 157 flasks of mercury were produced from open cuts prior to 1927 (14).

1928 - Harry Brink located five claims, Snowbird Nos. 1 to 5 (120).

1929 - Frederick J. Woelkers III located five claims (43).

1932 - Mining continued intermittently from 1920 to 1932 with about 150 flasks of mercury produced (2).

1942 - Examined by Cady and Webber of USGS; previous production was less than 200 flasks of mercury (15).

- An engineer of the Reconstruction Finance Corporation visited the property. 80 flasks of mercury were produced from surface float.

- In May, Robert F. Lyman acquired a lease and option on the eight claims for $20,000.

- In August, he formed a partnership, DeCourcy Mountain Mining Co. (25) with Kenneth M. Johnston and Frank C. Rocheleau.

- In October, Lyman and Rocheleau purchased Johnston's interest for $15,000 (120).

1943 - Examined by the Bureau, which did trenching and mapping. The New DeCourcy adit was started and driven 160-ft and one high-grade stope was mined. 109 tons of hand-sorted ore contained approximately 600 pounds of mercury per ton and 212 flasks of mercury were retorted from it this year. A 1,038-ft-long airstrip was completed with Bureau assistance. Amended locations were filed during October by Harry Brink (120).

- Operations were financed by a loan from Reconstruction Finance Corporation and 700 flasks of mercury were produced. Hand-sorted ore treated in a small furnace ran 30 pct mercury (103).

1944 - DeCourcy Mountain Mining Co. did trenching and stripping exploration (15).

- Contract with Metals Reserve Co. terminated (107).

1945 - No mining done (15).

1946 - Lyman bought Rocheleau interest and now is the sole owner of the property (15).

1949 - Operations resumed in 1942 and continued through 1949 raising the total production to over 1,200 flasks of mercury. The ore was treated in a wood-burning two-tube Gould D - retort furnace (2).

1951 - Lyman sold the property to DeCourcy Mountain Mining Co. who explored the deposit under a Defense Minerals Exploration Administration (DMEA) loan of $368,920 (25, 107).

1953-1954 - DeCourcy Mountain Mining Co. drilled 2,614-ft of diamond drill hole logged by Gordon Herreid of Alaska Mines and Minerals, Inc. (25).

1957 - During exploration work, 1953 to 1957, observations were made by MacKevett and R. S. Velikanje of the USGS (18).

1959 - Trenches were caved and underground workings were observed to be full of ice (18).

1961 - The mine was inactive and owned by Alaska Mines and Minerals Co., owners of the Red Devil Mine (18).

1962 - No production has occurred since 1949.

- Alaska Mines and Minerals Inc., a successor to DeCourcy Mountain Mining Co. (through DeCourcy-Brewis Minerals, Ltd.) held the property (25).

- The property comprised 14 unpatented claims, Last Chance Nos. 1-3, Snowbird Nos. 1-5, Tunnel lode, Swextu, Swexde, Nexto, Nexde, and Swexa (25).

- There has been no recorded production since 1949 and Frederick Woelkers III claims are active (43).

PRODUCTION

Year	Tons of ore	Flasks of mercury	
1921-1924	14	45	(25)
1925	45	38	(25)
prior to 1927	--	157	(14)
prior to 1942	--	200	(15)
1943	109	212	(120)
1942-1949	--	1,200	(25)
prior to 1965	--	1,366	(80)
TOTAL		1,534	(86)

RESERVES:

1943 - Estimated at 6,970 tons containing 32.3 lbs mercury per ton with additional inferred tonnage of 7,600 tons containing 31.4 lbs mercury per ton (120).

1959 - Inferred reserves amount to several thousand flasks of mercury (107).

OPERATING DATA:

Development consists of 2,614-ft of diamond drill holes, trenches, open-cuts, and underground workings consisting of adits, drifts, crosscuts, shafts, and stopes. The adits are 910-ft-long, 200-ft-long, 175-ft-long, a caved 85-ft-long adit, and another short adit (18). The shaft is 50-ft-deep (57).

GEOLOGIC SETTING:

Interbedded Cretaceous graywacke and shale of the Kuskokwim Group are intruded by Tertiary sills and dikes of basalt, diabase, and andesite. These intrusives have been hydrothermally altered into a silicified silica-carbonate rock that weathers to a yellowish-brown color.

The cinnabar mineralization is associated with this alteration. Cinnabar occurs in joints, fractures, fault zones, and breccias along the igneous-sedimentary contacts, and along bedding surfaces. The ore bodies generally parallel the strike (or are within 20 degrees of it) and dip 55 to 80°. The ore bodies pinch and swell from a few inches to over a foot and are up to 15-ft-long. Fissures and pore space filling were the dominant processes in ore formation, but these have been modified by replacement locally. Ore minerals consist of cinnabar and minor stibnite, cervantite, and arsenopyrite, in a gangue of quartz-silica, carbonate, and clay minerals. The main ore shoots occur in a zone 2,000-ft-long by 250-ft-wide by a 360-ft vertical range.

The largest producer was the Tunnel vein. It averaged 3.2-ft-thick, was 200-ft-long at the surface, and was 130-ft in depth. It occurred in a shale zone and striked N 10° to 15° E and dipped 65°E across the strata. Bedding here is strikes N5°E and dips 65°W.

A high grade sample contained 654 lbs of mercury and 17.2 lbs of antimony per ton (2, 15, 103, 120).

BUREAU WORK:

Trenched and sampled in 1943. Samples contained nil to 653.6 lbs per ton mercury and nil to 0.86 pct antimony (120).

REFERENCES:

2, 14-15, 18, 25, 41-43, 47, 57-58, 60-61, 77, 80, 83-86, 90, 103-104, 107, 114, 120-121

OCCURRENCE NAME (other names): Little Creek Occurrence COMMODITIES: Au, Ag, Hg - Placer

LOCATION: Quadrangle: Iditarod A-6 Sec 06, 07, 08, 17, 20, 21, 29, 32 T 20N R 51W
Meridian: Seward
Geographic: A tributary to the Iditarod River 7-mi east of Mosquito Mountain

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
56	73-10	0020730009	AA029286-029288
	73-81		AA029290-029309
			AA042100-042115

HISTORY AND PRODUCTION:

1910 - Prospects were found (30).

1910-1911 - Prospects yielded 1 to 2 cents worth of fine gold per pan from some of the gravels (6).

1949 - Four claims staked by Douglas P. Lyman (43).

1951 - Four claims staked by Douglas P. Lyman (43).

Before 1955 - Assays from a few cents to $1.00 a ft^2 of bedrock are reported to have been taken (2).

1972 - 15 claims staked by Douglas P. Lyman (43).

1981 - 16 claims staked by Lyman Mining Co. (43).

1983 - Claims staked by Douglas P. Lyman were closed (43).

RESERVES:

No data available.

OPERATING DATA:

Several 12-ft-deep test shafts were sunk to bedrock and several crosscuts have been made (2).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale that strikes N40°E and dips 70°NE. The Iditarod basalt overlies the sedimentary rocks. Sills and dikes of basalt, altered to silica-carbonate rock, intrude the sedimentary rocks. Gold occurs as an evenly distributed pay streak. Cinnabar is also associated with the gold (2).

REFERENCES:

2, 6, 30, 41-43, 112

OCCURRENCE NAME (other names): James L. Walker Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Holy Cross A-1 Sec 01, 02 T 23N R 54W
Meridian: Seward
Geographic: Located on the northwest side of Saddle Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
57	72-08		AA039361-039366

HISTORY AND PRODUCTION:

1979 - James L. Walker located six claims - Lucky Lady 1-6 (41).

1980 - Property was active (41).

1983 - Claims staked by James L. Walker were closed (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and shale intruded by quartz monzonite stocks (2).

REFERENCES:

2, 41, 43

OCCURRENCE NAME (other names): Horn Mountains Occurrence COMMODITIES: W - Placer

LOCATION: Quadrangle: Sleetmute C-7 Sec 17, 18, 20 T 19N R 51W
Meridian: Seward Sec 12, 13 T 19N R 52W
Geographic: Located along west side of Horn Mountains

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
58		0020820031	

HISTORY AND PRODUCTION:

1955 - Placer scheelite is reported by Harry Brink of Aniak (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and shale intruded by quartz monzonite stocks (2).

REFERENCES:

2, 42, 95

OCCURRENCE NAME (other names): Frank Lee Occurrence   COMMODITIES: Au - Placer

LOCATION: Quadrangle: Sleetmute C-7   Sec 08,17 T 17N R 51W
Meridian: Seward
Geographic: Northern tributary to New York Creek approximately 3-mi northeast of Napaimiut.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
59	82-38		AA026737-026740

HISTORY AND PRODUCTION:

1973 - Located by Frank Lee (43).

1983 - Claims staked by Frank Lee are closed (43).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of Cretaceous graywacke and shale intruded by quartz monzonite (2).

REFERENCES:

2, 41, 43

MINE NAME (other names): Murray Gulch Mine
New York Creek
Dobnik Mining

COMMODITIES: Au, Ag - Placer

LOCATION: Quadrangle: Sleetmute C-7 Sec 07, 17, 18, 20 T 17N R 51W
Meridian: Seward Sec 02, 11, 12, 24 T 17N R 52W

Geographic: Located approximately 2.5-mi northeast of Napaimiut.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
60	82-05	0020820011	AA026731-026736
	82-28		AA026741-026746
	82-33		

HISTORY AND PRODUCTION:

1910 - Placer gold discovered (6).

1910-1914 - Prospecting was done along the lower three-fourths of a mile of Murray Gulch and near the mouth of the gulch with the valley of New York Creek. Good coarse gold prospects were found in stream gravels and bench gravels but no systematic mining began (6).

1911 - First shaft was sunk about 15-ft to bedrock. Two buckets of gravel from the bottom contained coarse gold valued at $30; the largest nugget was valued at $3.65 and the smallest piece at 30 cents (6).

1912 - Small drifts yielded 75 cents to the square foot (6).

1914 - A. G. Maddren (USGS) investigated placer deposits on New York Creek. One man prospected bench gravels along left side of Murray Gulch by digging trenches. The gravels showed 75 cents of gold to the square foot of bedrock. Plans were to ground-sluice the gravels by digging a 4,000-ft-long water ditch (6).

1915 - One small plant operated on New York Creek (52).

1916 - A hydraulic plant was installed on New York Creek near end of season. A placer mine was worked on Mary (Murray ?) Creek. This was the first production on Mary Creek (55).

1920 - Reports of production from New York Creek (57).

1938 - Claims staked by Rudolph Dobnik and Alta Jacoby (43).

1971 - Claims staked by Adolph Dobnik (43).

1983 - Mining done by Alta Jacoby, Rudy and Adolph Dobnik on 12 claims (43).

PRODUCTION

Year	Gold produced	
1911	$30 (hand picked)	(6)
1912	$300	(6)
1914	$80 (hand picked)	(6)
1910-1915	$1000	(6)
1910-1955	A few thousand dollars	(2)

RESERVES:

No data available.

OPERATING DATA:

Development consists of shafts, trenches, and drifts. A hydraulic plant was operated. A small prospecting boiler was used to thaw frozen ground with steam (6). Current methods include use of a drag-line, bulldozer, front-end loader, and sluice box (79).

GEOLOGIC SETTING:

The country rocks in the area consist of interbedded Cretaceous graywacke and shale that dips northwest with rhyolite dikes striking northwest across upper Murray Gulch.

All the placer gold found in Murray Gulch has been found downstream from these dikes. The gold is probably closely related to these intrusives.

Unconsolidated sediments along the stream consist mainly of silt overlying gravels that rest on bedrock. The deposits are about 35-ft-deep at the mouth and become less deep upstream. A large part of the sediments are frozen.

Bench gravels were also prospected at two levels. A lower one 15-ft above and 50-ft back from present flood plain and one 70-ft above and 260-ft back from the creek. The gold found here is rough with little wear by stream washing (2, 6).

REFERENCES:

2, 6, 41-43, 52, 55, 57, 79, 84, 95

OCCURRENCE NAME (other names): Fishwheel 1-8 Occurrence COMMODITIES: Au - Placer

LOCATION: Quadrangle: Sleetmute C-8 Sec 23, 26 T 17N R 52W
Meridian: Seward
Geographic: Located along the north side of the Kuskokwim River just north of Napaimiut

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
61	82-33B	0020820019	

HISTORY AND PRODUCTION:

1970 - Claims staked (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

The regional geology consists of interbedded Cretaceous graywacke and shale intruded by rhyolite dikes (2).

REFERENCES:

2, 41-42

MINE NAME (other names): Kolmakof Mine   COMMODITIES: Hg

LOCATION: Quadrangle: Sleetmute C-8   NW 1/4 Sec 01 T 17N R 54W
Meridian: Seward
Geographic: Located on a bluff along the north side of the Kuskokwim River 5-mi downstream from Kolmakof.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
62	82-02	0020820012	AA033443-033504
	82-04		
	82-13		AA038777
	82-24		AA038782-038787

HISTORY AND PRODUCTION:

1829 - It is believed that cinnabar specimens were from the Kuskokwim River region, an area explored by the Russians as early as 1829 (25).

1838 - Russians knew of cinnabar at this locality as early as 1838 (2).

1870 - The Russians reported to Dall that cinnabar occurred in the Cretaceous strata of the Alexander Archipelago. The location was possibly incorrectly reported by the Russians to cover up the true location along the Kuskokwim (5, 122).

1884 - Petrof reported occurrences of cinnabar veins with antimony along the Kuskokwim River and assays showed a valuable discovery (123).

1890 - Cinnabar veins were reported to be exposed at various points along the river, but their remoteness prevented thorough examination or development (5).

1898 - Mineralization was noted by Spurr, who mentioned that a trader, Mr. Lind, had found a cinnabar vein several years before. Mr. Lind spent about $2000 in mining some of the ore and getting it to San Francisco, but lost money on the venture because of the small quantity and low price (3).

? - Mr. Rabideau was reported to have held property for many years; he produced a small amount of mercury in his homemade retort (20).

1907 or 1908 - Property optioned or relocated by Gordon Bettles of Nome and Bettle adit was driven (20).

1909 or 1910 - Two flasks of mercury recovered (2).

1914 - Examined by Maddren (USGS). No work was being done (5).

1944 - Examined by Webber of the Bureau. Twenty-nine trenches and open cuts totalling 600-ft in length were dug over a 350-ft strike length (15).

Before 1953 - Property held for several years by Willie Rabideau, son of an old-timer (20).

1954 - Property relocated by Western Alaska Mining Co. (20).

- The Territorial Department of Mines laid out a surface exploration program and the company excavated eight trenches (20).

1958 - A Bureau engineer sampled the trenches using a 3-in posthole auger and 145 samples were taken (25).

1960 - Property owned by Western Alaska Mining Co. of Spenard, Alaska (18).

1965-67 - Claims located and staked by R and H Mining Company (43).

1969-70 - Claims staked by R and H Mining Company (43).

PRODUCTION

Year	Flasks of mercury	
1890's	? (small shipment made)	(3)
1909 or 1910	2	(2)

RESERVES:

No data available.

OPERATING DATA:

Development consisted of one adit (now caved), one shaft (destroyed by a dozer cut), one 80-ft-deep inclined shaft (filled with water), and over 21 trenches (sloughed in) (20).

GEOLOGIC SETTING:

The country rock consists of interbedded Cretaceous graywacke and shale of the Kuskokwim Group that strikes N 30°E and dips 35 to 60°NW on the average.

Altered andesite sills are associated with the cinnabar mineralization. The largest is 25- to 30-ft-thick and is exposed 400-ft along strike. The sills are altered to a silica-carbonate rock. Quartz is the principal gangue mineral. Cinnabar ore occurs as fracture fillings in brecciated zones, mainly on the hanging wall, and is disseminated in both the sill and adjacent graywacke. Some pyrite occurs also in the sill. One 0.5-in-thick cinnabar veinlet continues at least 250-ft within the sill. Pods of ore are up to 6-in-thick and 6-ft-long. No stibnite was found (2, 5, 15, 20).

BUREAU WORK:

Examined and trenched in 1944. Samples contained from 12 to 404 lbs mercury per ton (15).

Examined and sampled in 1958 by R. P. Malone. The work was not conclusive but did indicate the possibility of mineralization away from the crest of the river bluff (80).

REFERENCES:

2-3, 5, 14-15, 18, 20, 22, 25, 41-43, 80, 90, 95, 122-124

OCCURRENCE NAME (other names): Ptarmigan Occurrence COMMODITIES: Gemstone

LOCATION: Quadrangle: Russian Mission C-1 NW1/4 Sec 25 T 18N R 55W
Meridian: Seward
Geographic: Located on the south side of Russian Mountains.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
63	81-33	0020810006	

HISTORY AND PRODUCTION:

1960 - Located and staked by C. Abruska, N. Philip, and S. Tom (41).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Semiprecious silicates in Cretaceous graywacke and shale (2).

REFERENCES:

2, 41-42

PROSPECT NAME (other names): Mission Prospect
Konechney Prospect

COMMODITIES: Au, Ag, Cu
Pb, W, U, Sb?

LOCATION: Quadrangle: Russian Mission C1 NW 1/4 Sec 17 T 18N R 54W
Meridian: Seward
Geographic: Located 20-mi below Kolmakof at the headwaters of Mission Creek at an elevation of 2,000- to 2,350-ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
64	81-17	0020810005	

HISTORY AND PRODUCTION:

1914 - Prospects of placer gold were reported on Mission Creek, but no activity was reported during 1914 (6).

- A deposit of gold-bearing antimony (stibnite) was reported to occur in the upper part of Mission Creek (6).

1920 - Discovered and staked by Joe Konechney of Aniak (35).

1944 - R. E. Wallace and E. J. Webber of the USGS examined the property (35).

1952 - W. S. West and G. M. Haselton of the USGS examined property (35, 93, 125).

1954 - Development work had occurred almost continuously since discovery of the property in 1920 (35).

RESERVES:

No data available.

OPERATING DATA:

Development consisted of two adits with a total of about 900-ft of underground workings. The portal of the upper adit is caved and the lower adit is iced shut. Several surface pits and trenches are slumped in (35).

GEOLOGIC SETTING:

The country rock at the prospect is a Tertiary quartz monzonite probably of Oligocene or early Miocene age. This stock has intruded Cretaceous graywacke and slate.

The ore deposit consists of fissure veins and breccia filling within the quartz monzonite and nearly vertical basalt dikes striking N25°W.

A mineralized zone paralleling the strike of the dikes extends 1,000-ft and is 200-ft-wide. It consists of quartz veins and thin breccia and gouge layers.

Mineralization includes arsenopyrite, chalcopyrite, pyrite, pyrrhotite, malachite, azurite, chrysocolla, galena, hematite, ilmenite, limonite, magnetite, metazeunerite, and scheelite.

Assays show 1.0 pct copper, 0.1 oz of gold/ton, and 1.0 oz of silver/ton (35, 125).

REFERENCES:

2, 6, 35, 41-42, 90, 93, 125-126

PROSPECT NAME (other names): Cobalt Creek Prospect COMMODITIES: Cu, Au, Pb, Sn Ag, Zn, Ni

LOCATION: Quadrangle: Russian Mission C1 NE 1/4 Sec 08 T 18N R 54W
Meridian: Seward
Geographic: Located on the northeast side of the Russian Mountains in upper Cobalt Creek at an elevation of 1,550- to 1,750-ft.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
65	81-18	0020810001	

HISTORY AND PRODUCTION:

1899 - Prospect discovered by Indians who reported their findings to white men. It was staked but abandoned soon afterward (6).

1900 - Rediscovered in 1900 by Gordon Bettles (2).

1913 - Four claims known as the February group were staked and a log cabin was built nearby (6).

1914 - Examined by A. G. Maddren of USGS.

- A shaft was sunk to 25-ft during the first part of the year then continued to 40-ft during the 1914-1915 winter (6).

1952 - Examined by W. S. West and G. M. Haselton of the USGS. The workings consisted of three shallow shafts and several trenches and pits, most of them caved (35).

RESERVES:

No data available.

OPERATING DATA:

Development consists of three shallow shafts, several trenches, and pits, most of them are caved in (35).

One shaft was 40-ft-deep (6).

GEOLOGIC SETTING:

The mineral deposit occurs in a porphyritic quartz monzonite. A fissure quartz vein strikes N20°W, dips 80 to 85° to the SW, and is traceable for about 4,000 ft. Its width averages about 3-ft with a maximum width of 5-ft and minimum of 30-in occurring in a 40-ft-deep shaft at the north end. Associated breccia zones occur mainly in the hanging wall.

Mineralization consists of chalcopyrite, arsenopyrite, pyrite, malachite, and stibnite. A dump sample assayed 11.0 pct copper, <0.25 oz gold/ton, and traces of silver. Two samples from a shallow shaft about 1,000-ft west of the fissure vein are reported to assay 1.40 and 1.22 pct tin. A trace amount of nickel is also reported (6, 35, 51).

REFERENCES:

2, 6, 35, 41-42, 51, 57, 90-91, 93, 126

OCCURRENCE NAME (other names): Brink Occurrence COMMODITIES: Mo

LOCATION: Quadrangle: Russian Mission D1 SE 1/4 Sec 21 T 20N R 55W
Meridian: Seward
Geographic: Located on the upper Owhat River about 1-mi east of Black Mountain.

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
66	81-03	0020810009	

HISTORY AND PRODUCTION:

1918-1919 - D. E. Stubbs sent the USGS float specimens that contained molybdenite and powellite (?) in quartz. Location unknown (77).

1939 - Claims staked by H. Brink, D. Leach, and R. Strassel (41).

1955 - Molybdenite reported by Harry Brink on upper Owhat River (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

Country rock is part of a small granitic pluton. Float specimens contained molybdenite and powellite (?) in quartz (2, 77, 126).

REFERENCES:

2, 41-42, 77, 90, 126

OCCURRENCE NAME (other names): Black Mountain Occurrence COMMODITIES: Sb, Au, Ag

LOCATION: Quadrangle:Russian Mission D1 NE 1/4 Sec 30 T 20N R 55W
Meridian: Seward
Geographic: Located near the summit of Black Mountain south of Molybdenum Mountain

REFERENCE NUMBERS:

Map #	Kx#	MAS#	BLM#
67	81-30	0020810010	

HISTORY AND PRODUCTION:

1944 - Examined by Webber of the Bureau. Two claims were located, Discovery Claim No. 1 and Black Mountain No. 2 (127).

1955 - Claims recorded at Aniak (2).

RESERVES:

No data available.

OPERATING DATA:

No data available.

GEOLOGIC SETTING:

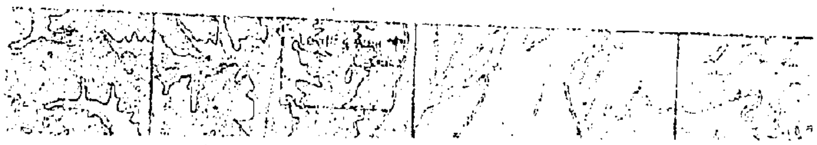
A 200-ft-long, 2-in-wide stibnite vein occurs within a shaly Cretaceous sandstone and roughly parallels a granite contact about 50-ft to the northeast (127).

BUREAU WORK:

Examined by Webber in 1944. A sample along the 50-ft central section of the vein assayed 48.9 pct antimony, 0.02 oz gold/ton, and 0.2 oz silver/ton (127).

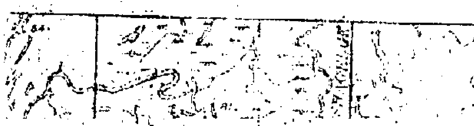
REFERENCES:

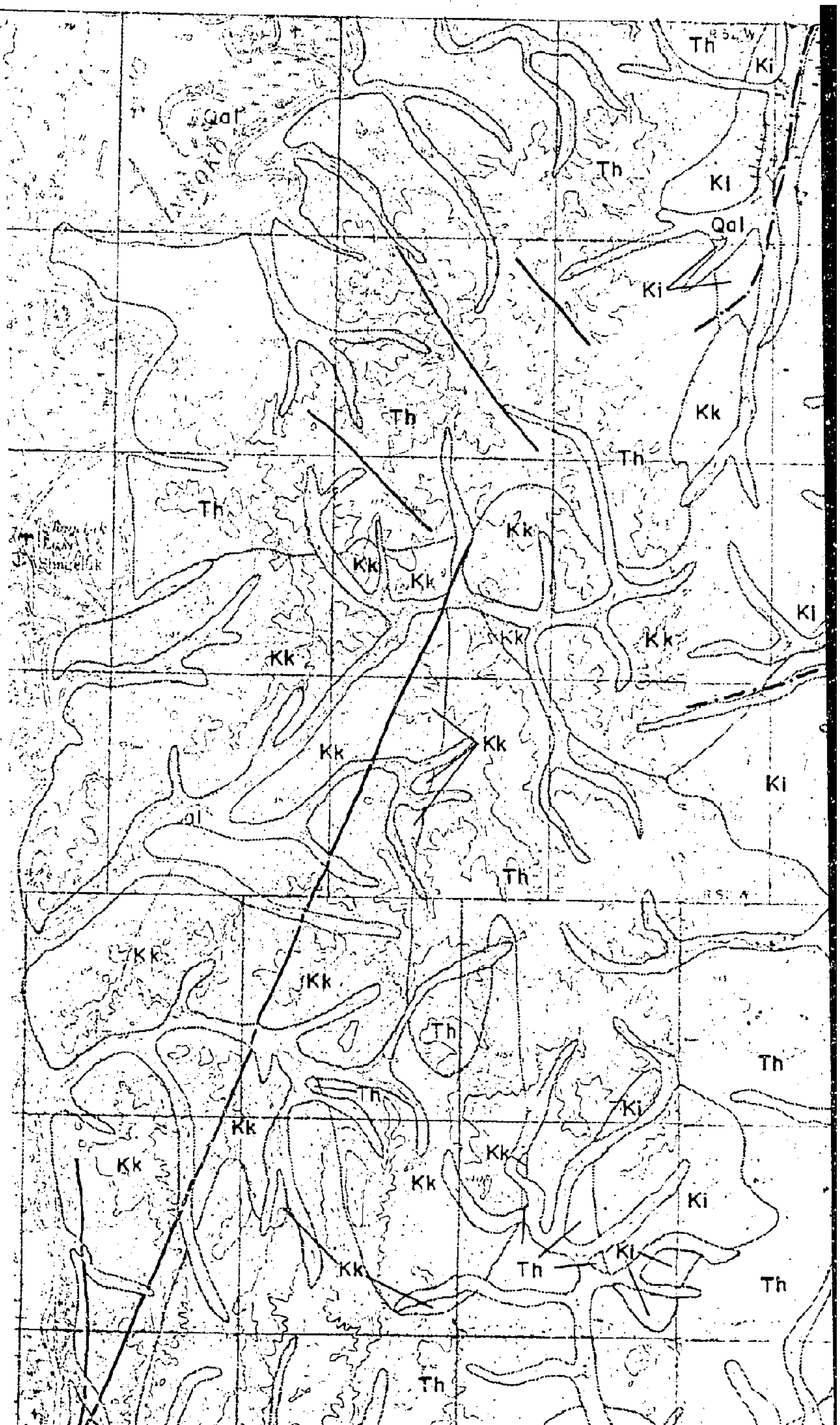
2, 41-42, 90, 126-127



LEGEND

Quaternary	Recent	Qal	Flood-plain deposits of gravel, sand, silt, a... intermixed wood, peat, and other vegetal mat...
Quaternary	Pleistocene	Qg	Glacial deposits of morainal till and outwash...
Tertiary(?)	Pliocene(?)	Qc	Gravel and associated small quantities of s... silt that lie on the rock benches and form t...
Tertiary	Miocene(?), Oligocene(?) and Eocene(?)	Th	**Holokuk basalt** Bassalt flows and interbedded basaltic de...
			Getmuna rhyolite group
		Tgl	Rhyolite lava
		Tgt	Tuff
		Tqm	**Quartz monzonite** Forms stocks, chiely of quart monzonite, but w... range from granodiorite to granite
		Tqd	**Quartz diabase** Forms dikes, sills, and small stocklike bodi... range from basalt to granodiorite
		Tba	**Basalt dike and sills** Forms dikes and sills, some of which are colum...
		Tr	**Albite rhyolite** Forms sheets, dikes, and sills
		Ki	**Iditarod basalt** Basalt flows, underlain by thin sedimentary bre... may include some basalt sills
Cretaceous	Lower(?) and Upper Cretaceous		**Kuskokwim group**
		Kk	Interbedded graywacke, shale, basal breccia, an... conglomerate
		Kkh	Altered to hornfels, in contact-metamorphic zon... adjacent to stocks of igneous rocks





avel, sand, silt, and
other vegetal matter

al till and outwash gravel

all quantities of sand and
enches and form terraces

odded basaltic detritus

monzonite, but which
ranite

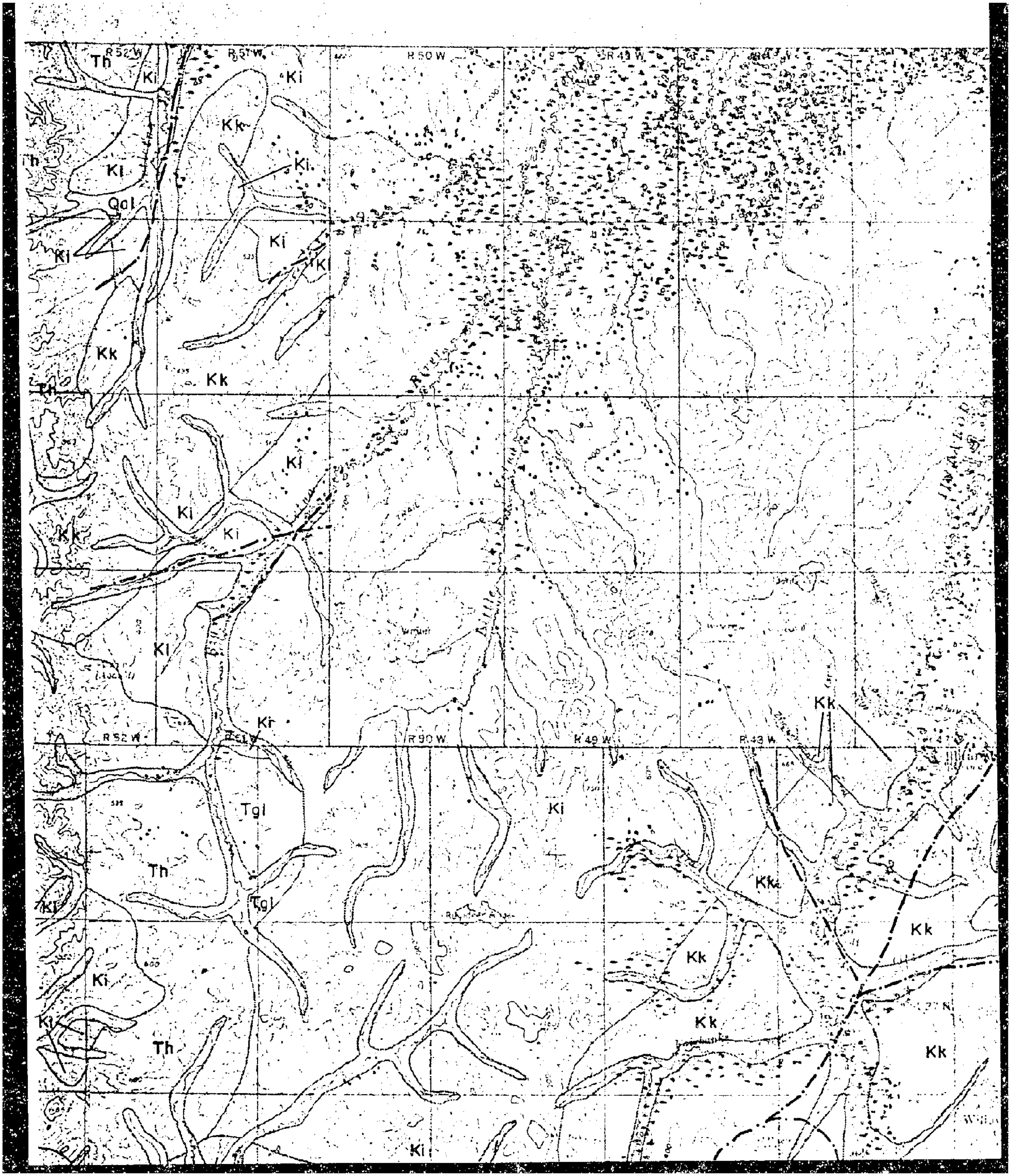
all stocklike bodies which
diorite

of which are columnar

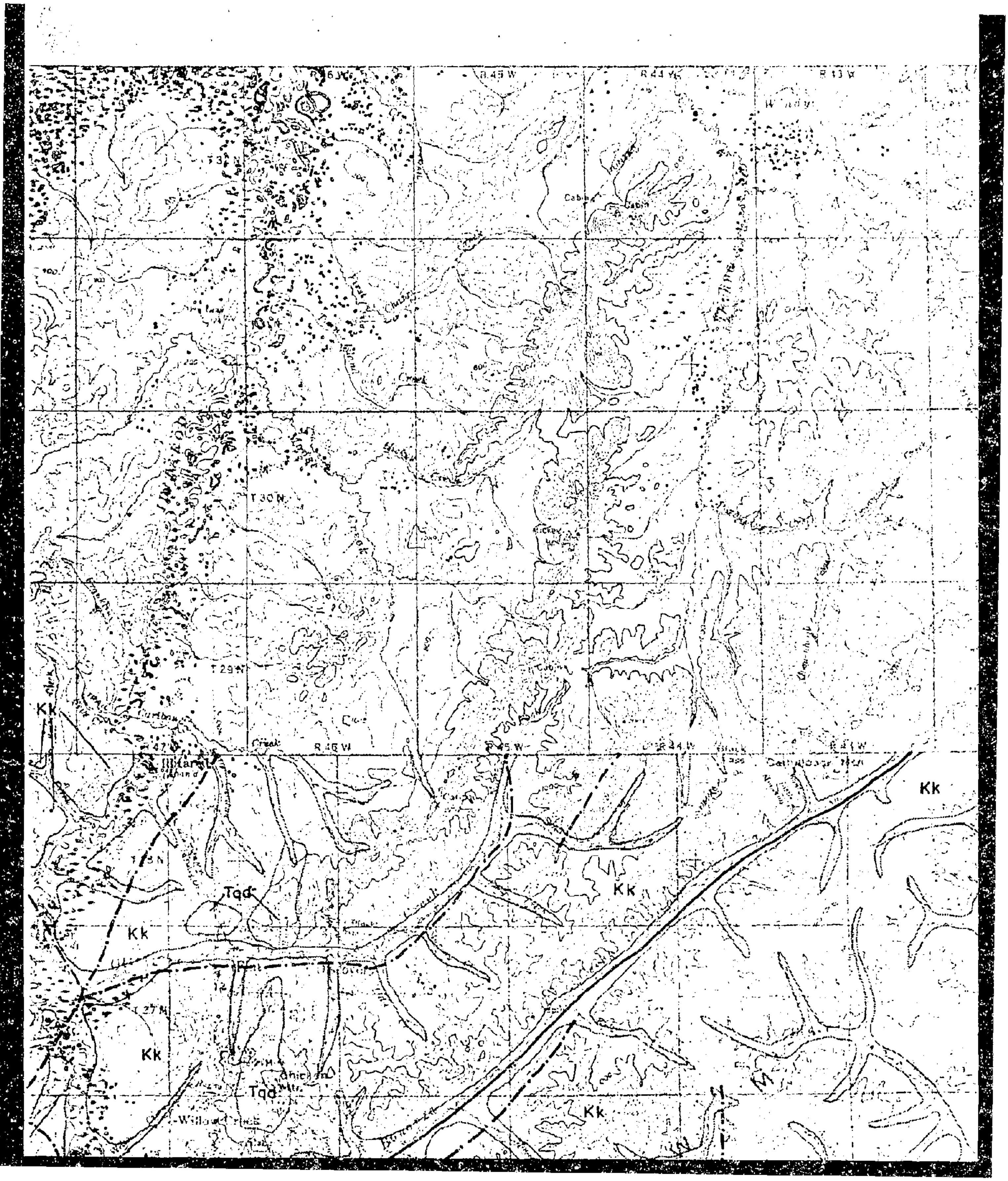
in sedimentary breccia;
ls

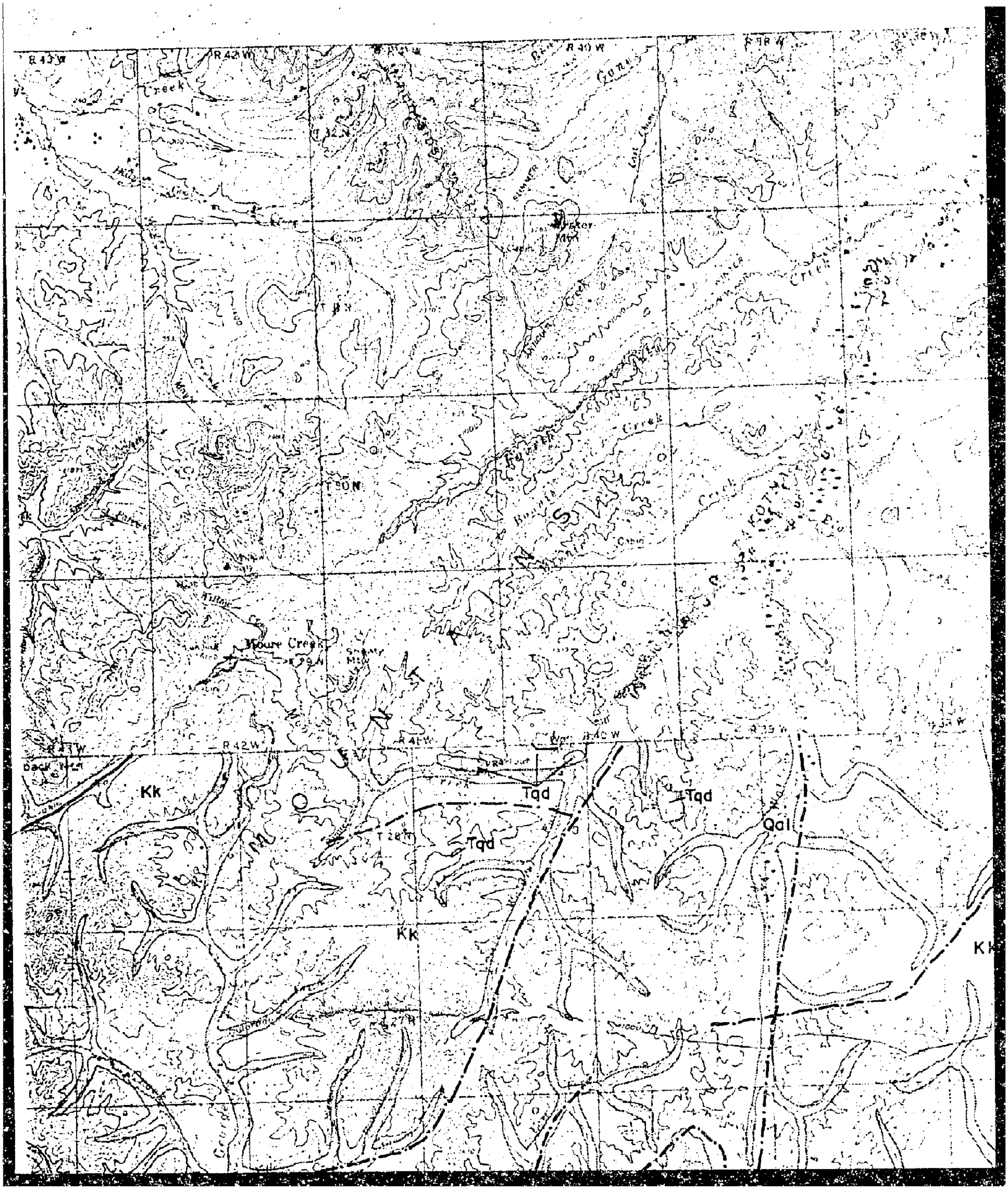
s, basal breccia, and

t-metamorphic zones
s rocks

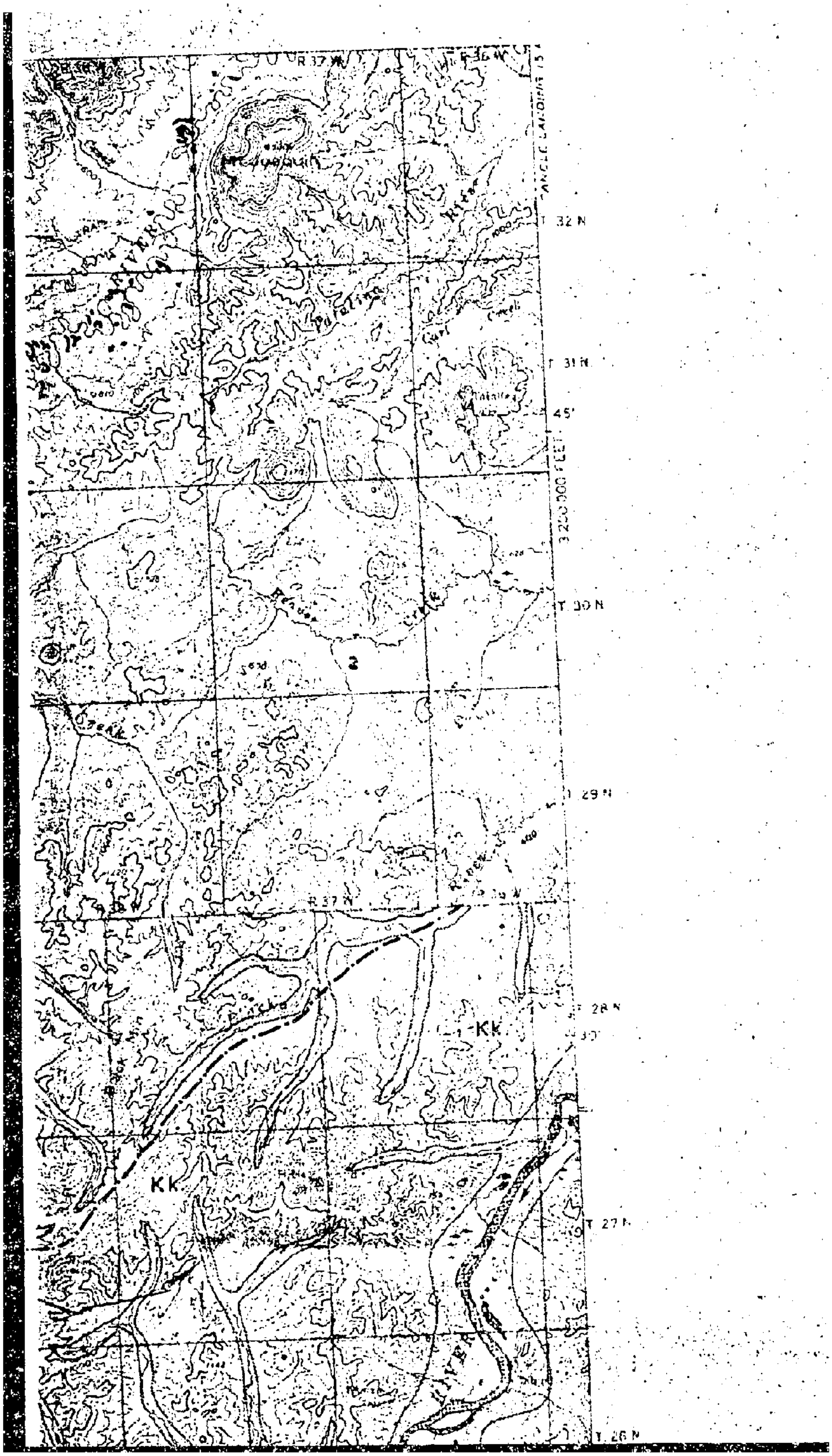


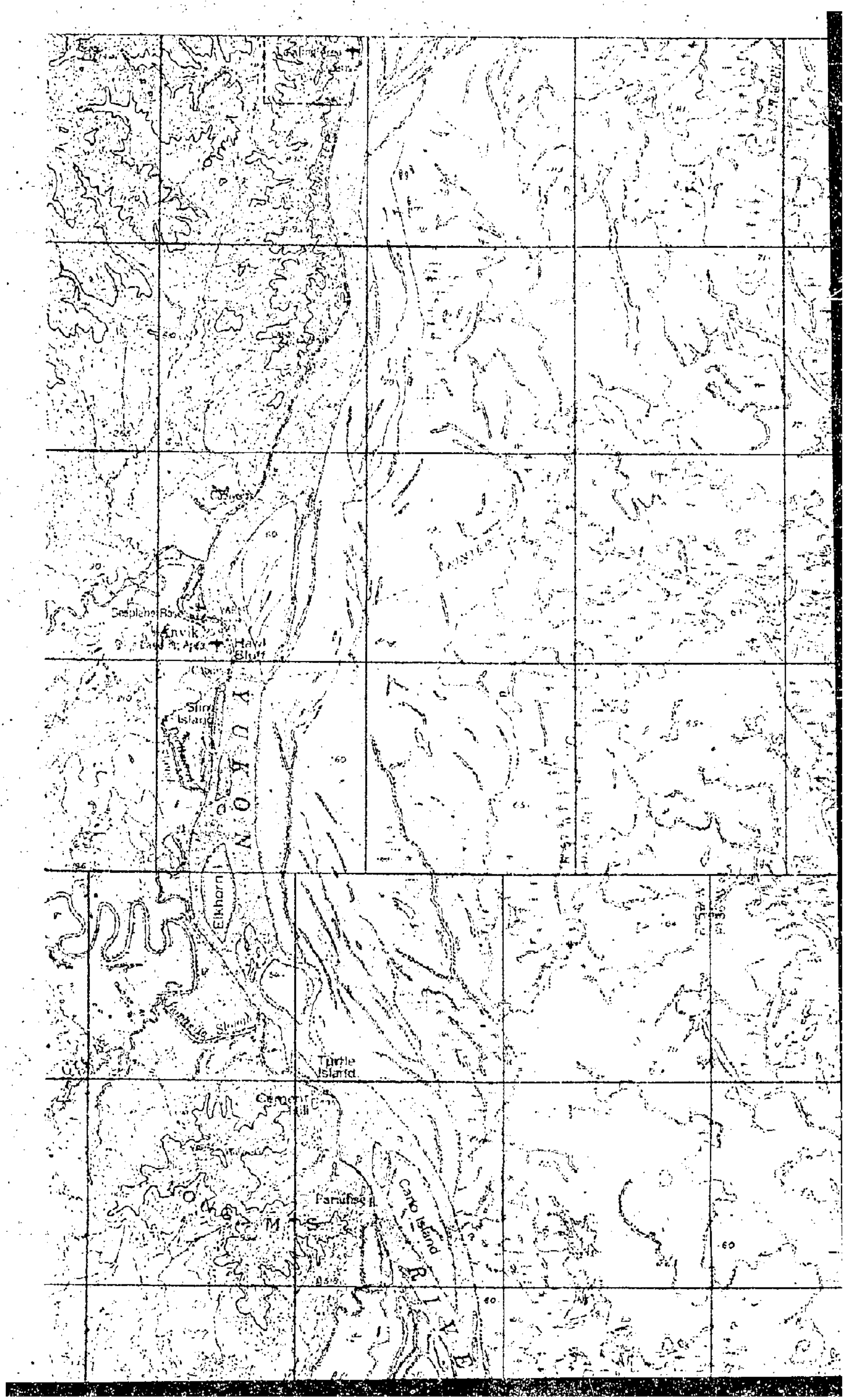
R 52 W
R 51 W
R 50 W
R 49 W
Th
Ki
Kk
Qal
River
Little
Trail
R 48 W
Tgl
T 27 N

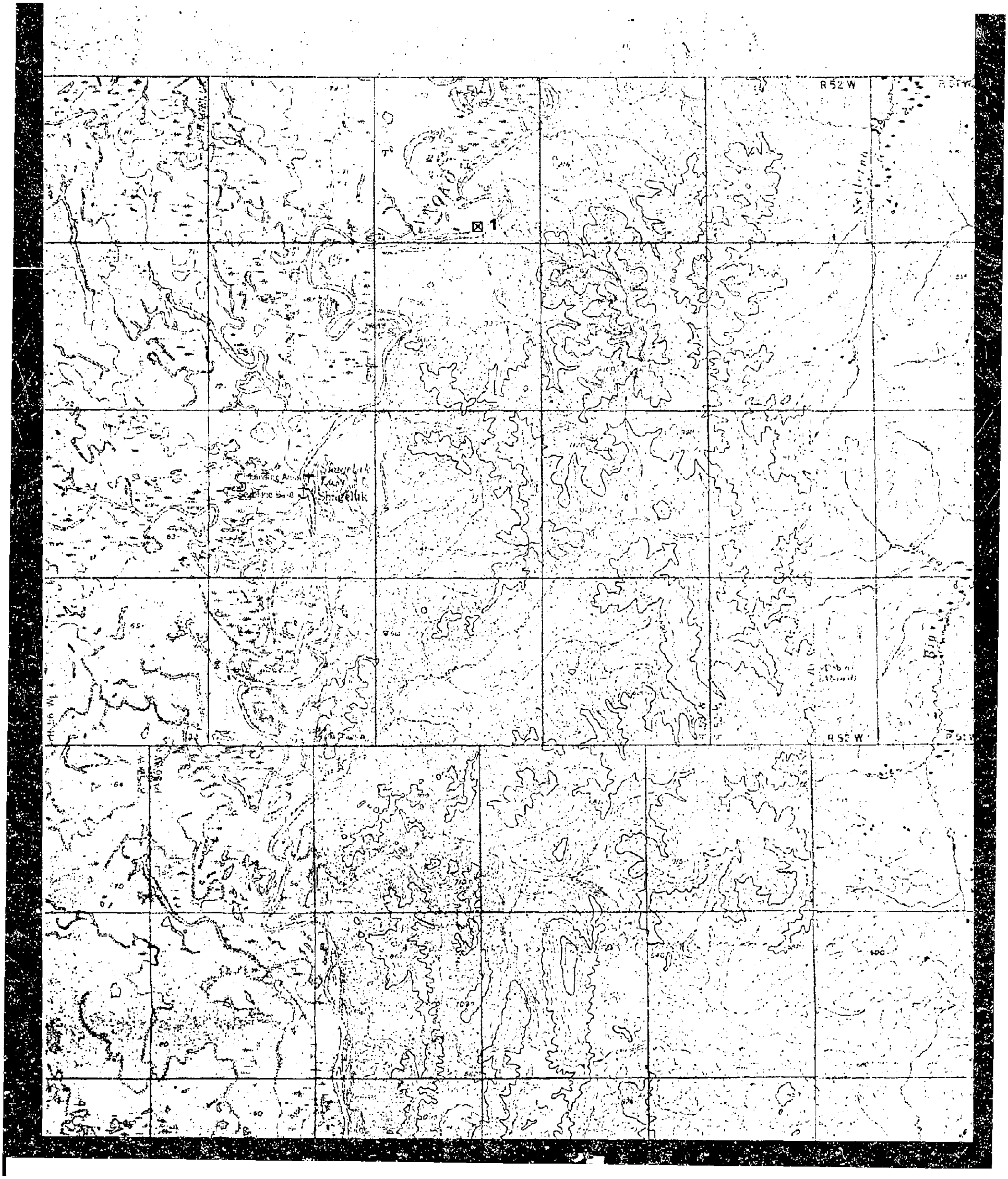

Kk
Tqd
T 30 N
T 29 N
R 46 W
R 45 W
R 44 W
R 43 W
Cabin
Creek

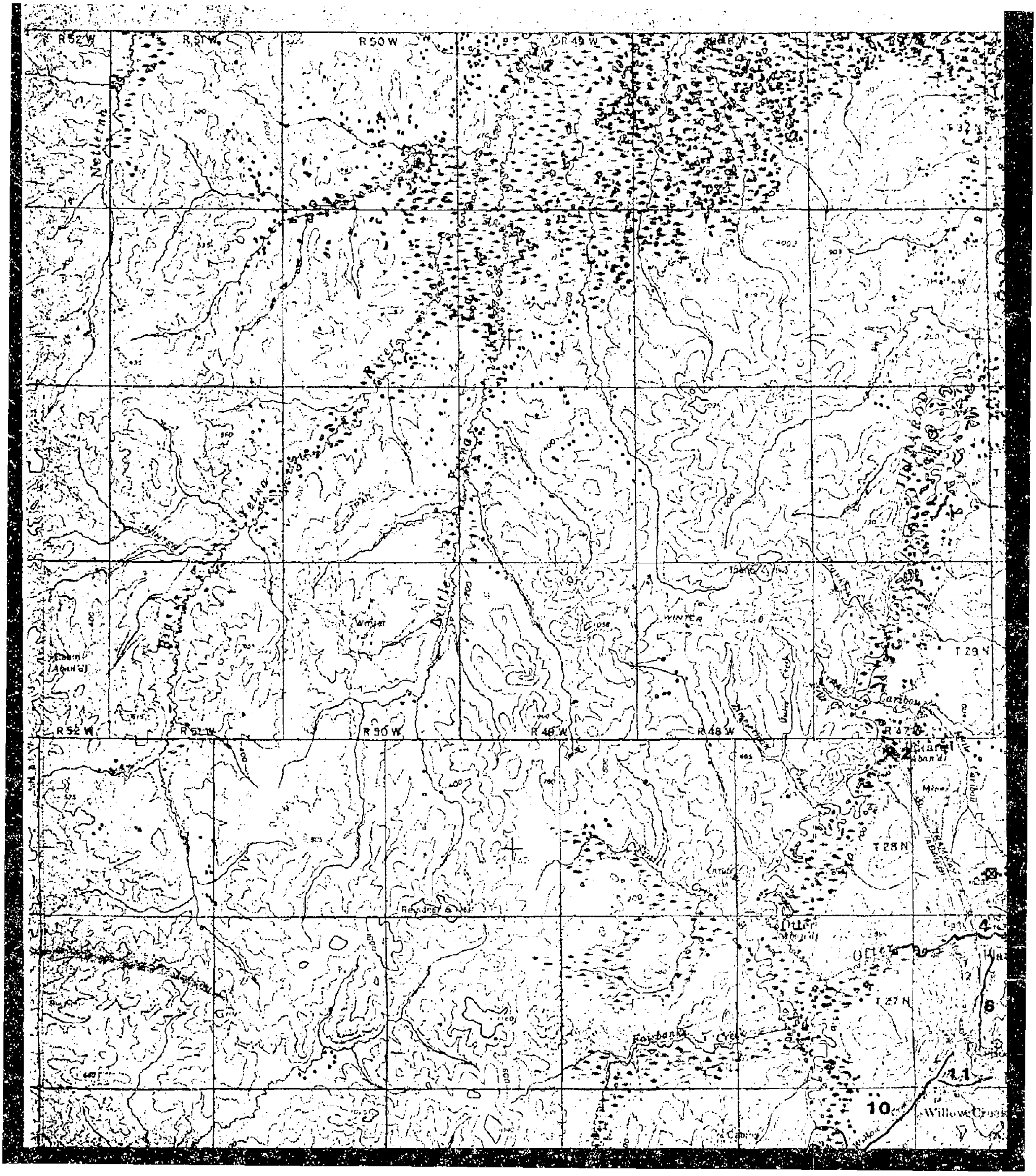


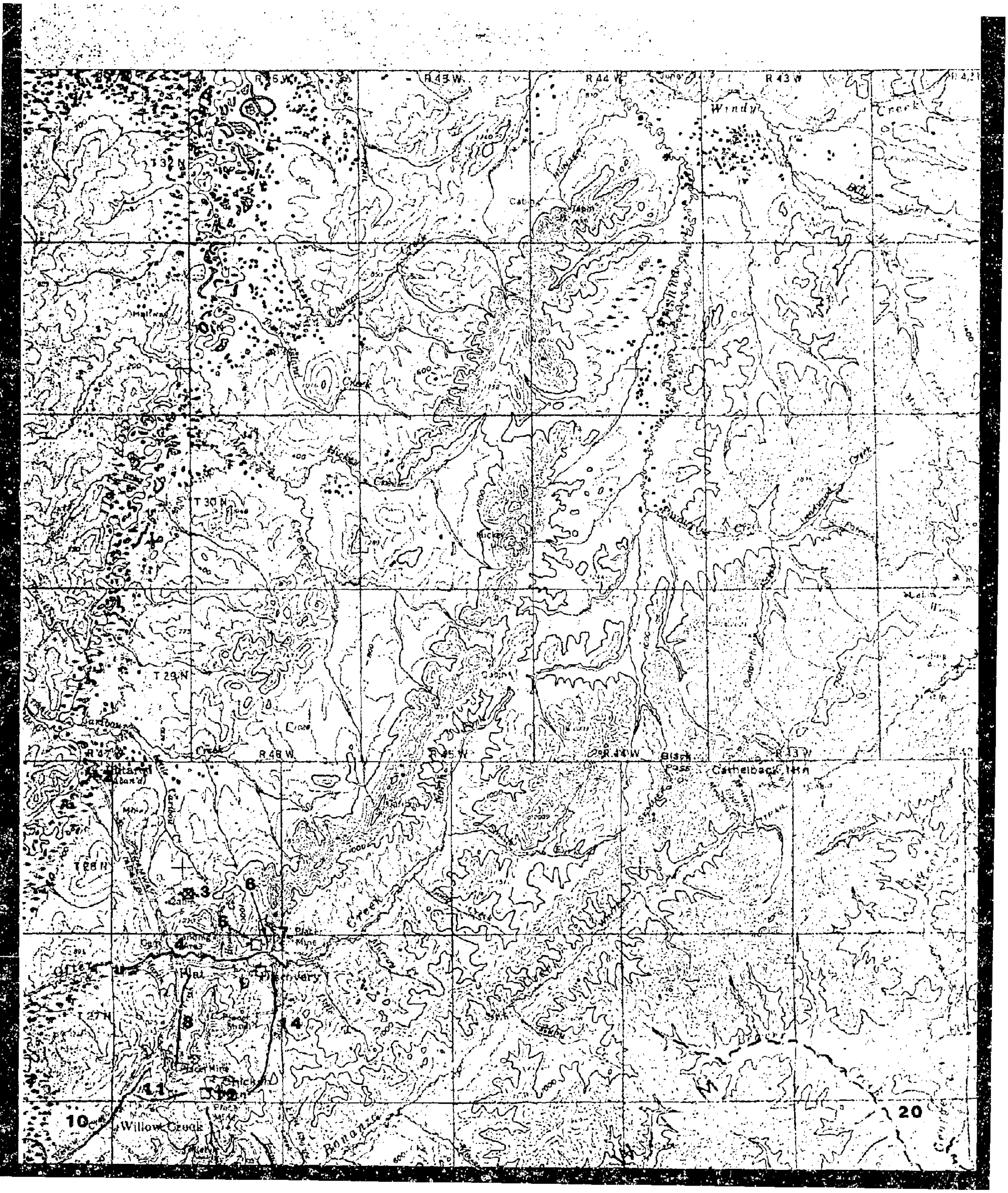
R 43 W
R 42 W
R 40 W
T 32 N
T 30 N
T 29 N
Moore Creek
Creek
R 42 W
R 41 W
Kk
Tqd
Tqd
Tqd
Qal
T 28 N
Kk
T 27 N
Kk

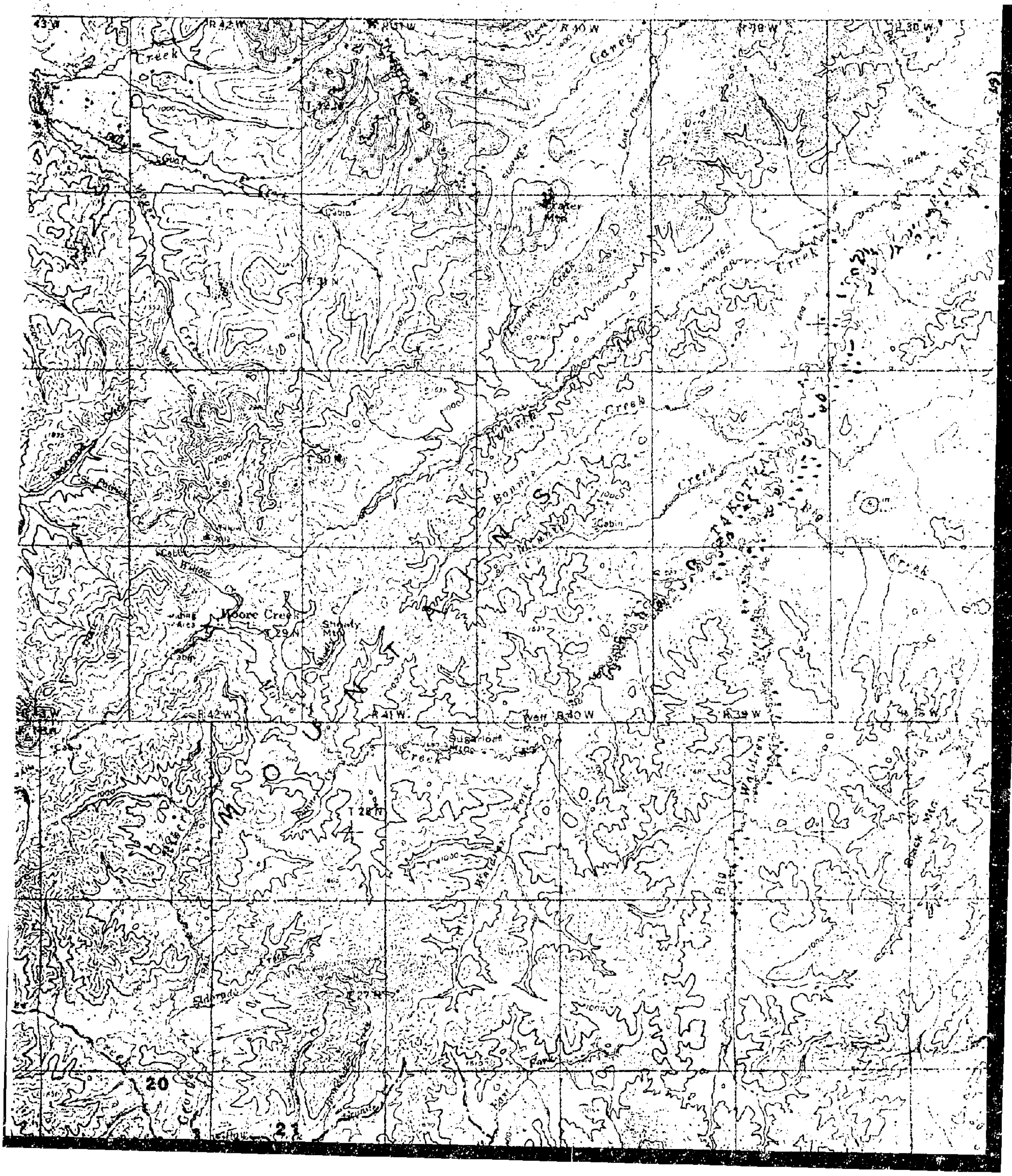

R 37 W
R 36 W
T 32 N
T 31 N
45'
T 30 N
T 29 N
R 37 W
T 28 N
Kk
Kk
T 27 N
T 26 N

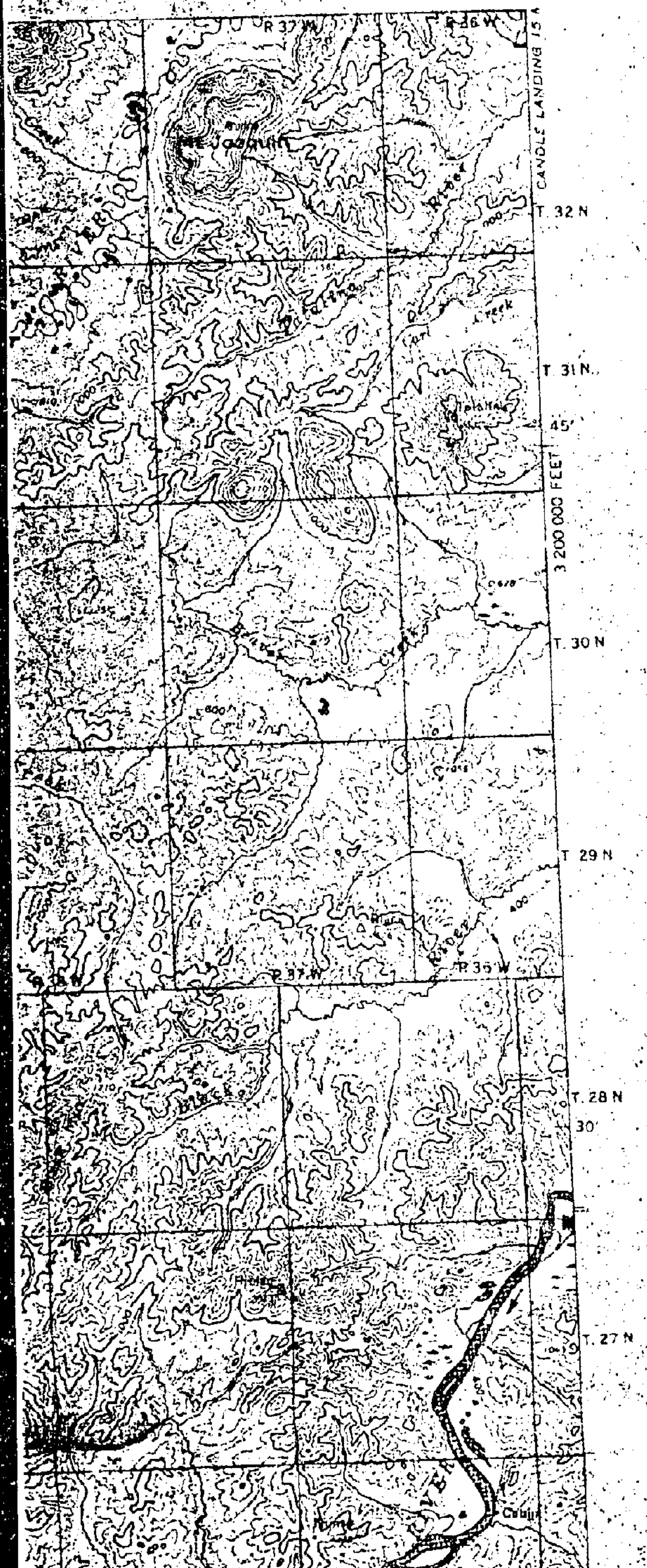

Seaplane Base
Anvik
Elkhorn
Turtle Island
Paradise
Carlo Island


R 52 W
1
Shageluk
R 52 W


R 52 W
R 51 W
R 50 W
R 49 W
R 48 W
R 47 W
T 29 N
T 28 N
T 27 N
WINTER
Caribou
Otter
Fairbanks Creek
Willow Creek
10
11
4
6


R 45 W
R 44 W
R 43 W
Windy
Creek
T 30 N
T 29 N
Caribou
Black Pass
Camelback Mtn
3
4
5
6
7
Discovery
8
14
Chicken
11
12
10
Willow Creek
Bonanza
20


R 42 W
R 40 W
Crater Mtn
T 30 N
Moore Creek
T 29 N
Shady Mtn
R 41 W
R 40 W
R 39 W
Sugarloaf Mtn
T 28 N
T 27 N
20
21


R 37 W
R 36 W
CANDLE LANDING 1:5
T. 32 N
T. 31 N.
45'
3 200 000 FEET
T. 30 N
T. 29 N
R 37 W
R 36 W
T. 28 N
30'
T. 27 N
T. 26 N

Cretaceou | Lower(?) and Upper Cretaceo

Kuskokwim group

Kk — Interbedded graywacke, shale, basal breccia, an conglomerate

Kkh — Altered to hornfels, in contact-metamorphic zon adjacent to stocks of igneous rocks

Km — Pyroxene diorite, gabbro, pyroxenite, and diab

Carboniferous | Mississippian(?)

Pc — Chert, minor limestone, and quartz sandstone

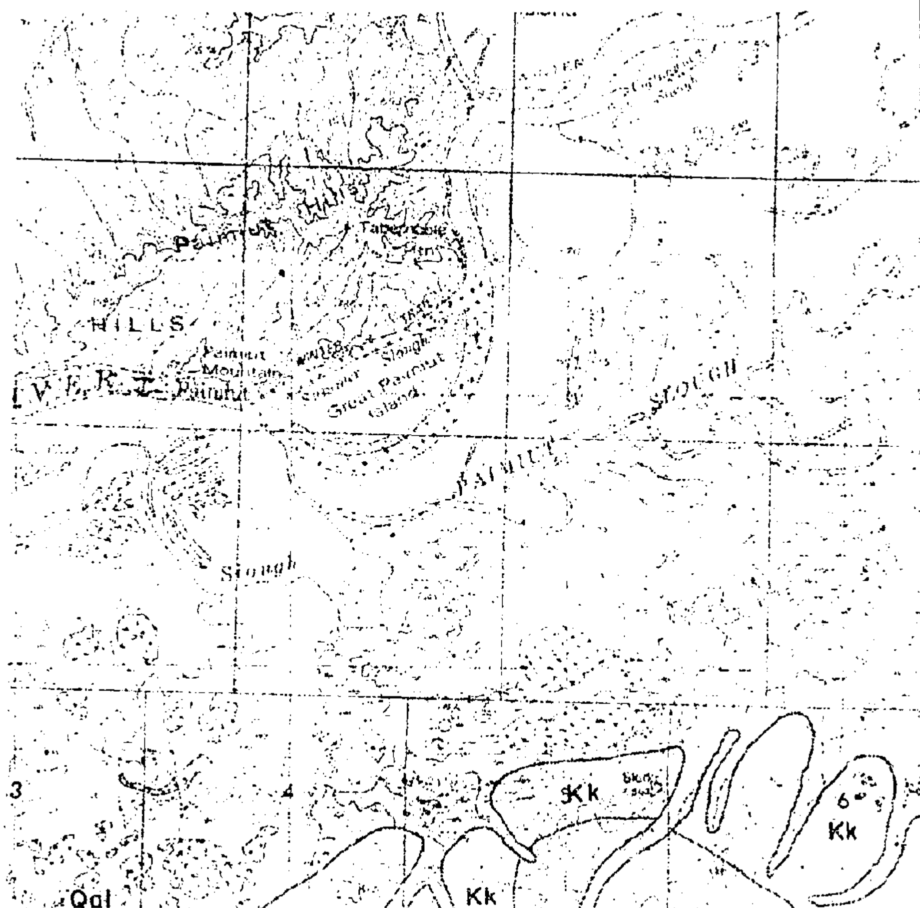
Contact, dashed where approximate

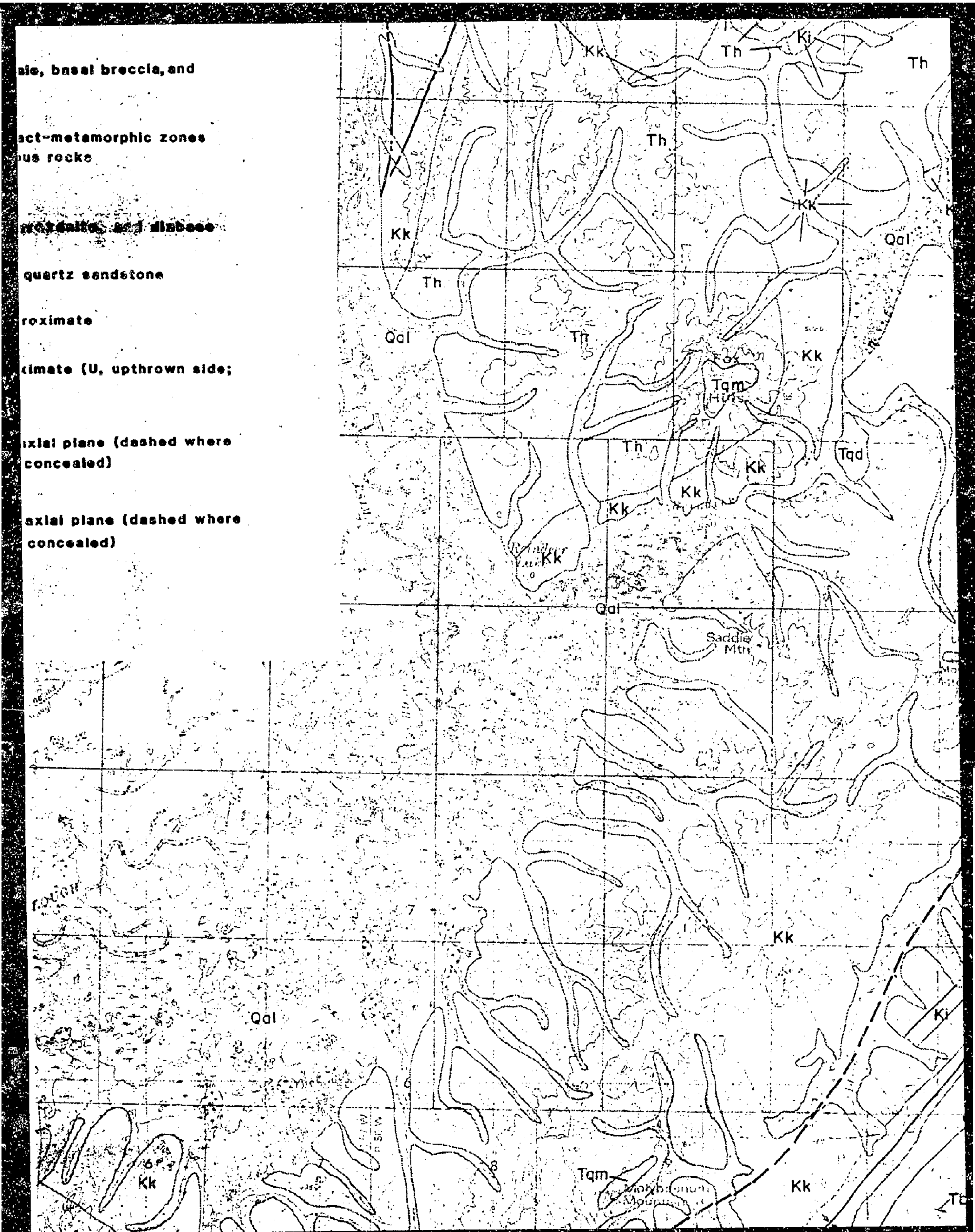
U / D — Fault, dashed where approximate (U, upthrown D, downthrown side)

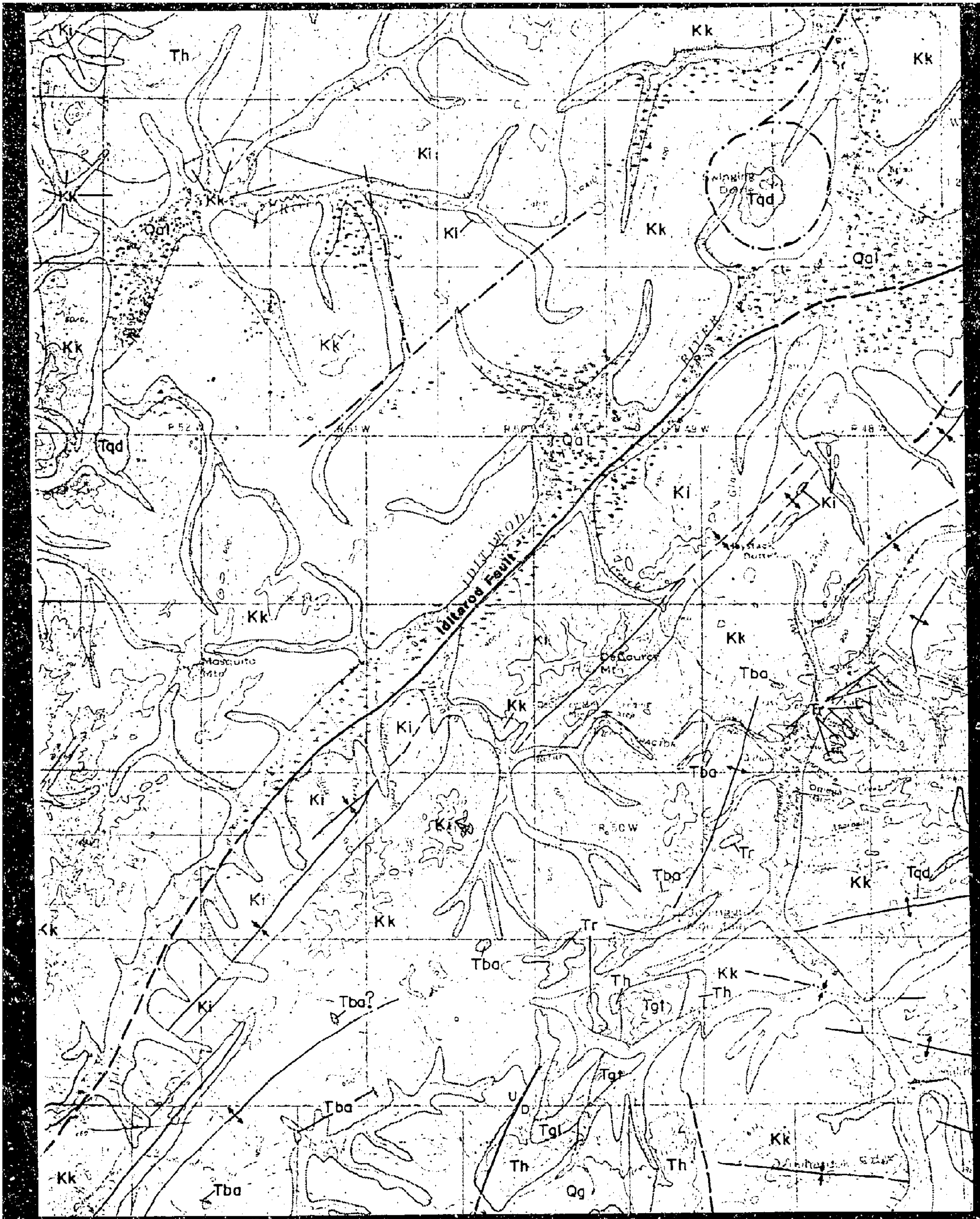
Anticline, showing trace of axial plane (dashed approxmate, dotted where concealed)

Syncline, showing trace of axial plane (dashed approximate, dotted where concealed)

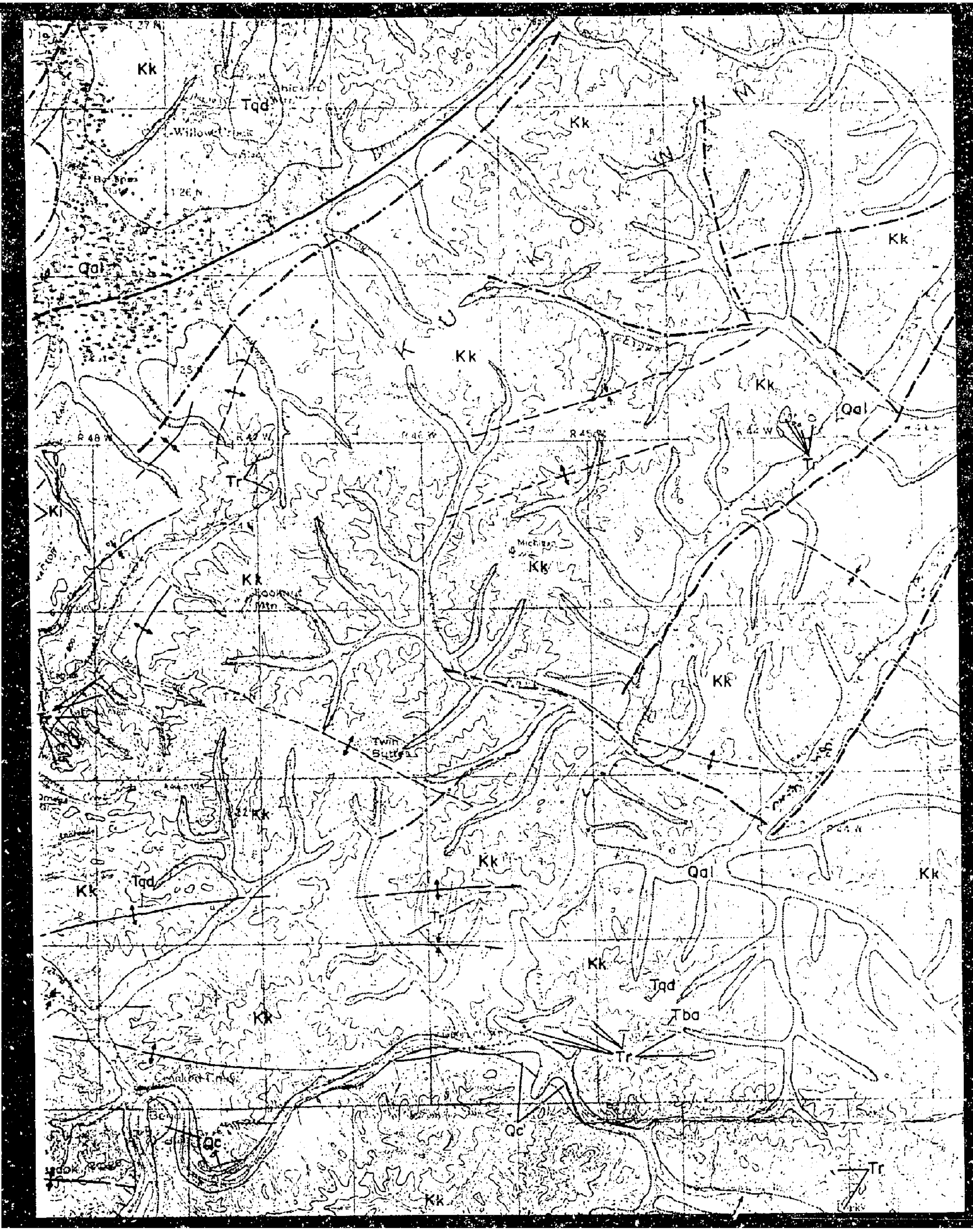
Air photo lineament



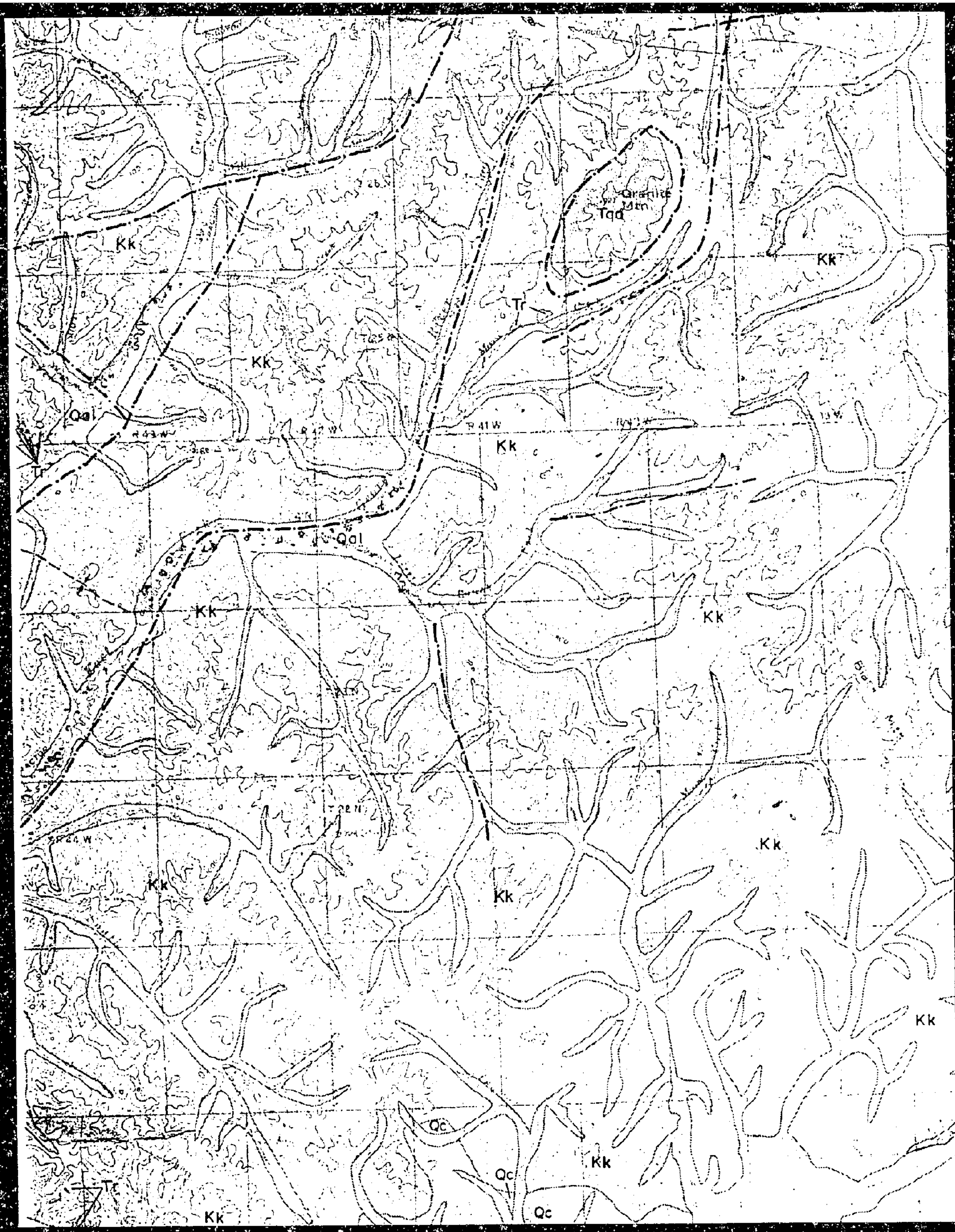

ale, basal breccia, and
act-metamorphic zones
ous rocks
quartz sandstone
roximate
ximate (U, upthrown side;
axial plane (dashed where
concealed)
axial plane (dashed where
concealed)
Kk
Th
Ki
Qal
Tqm
Tqd
Saddle
Mtn
Kk
Tqm
Ki
7
8

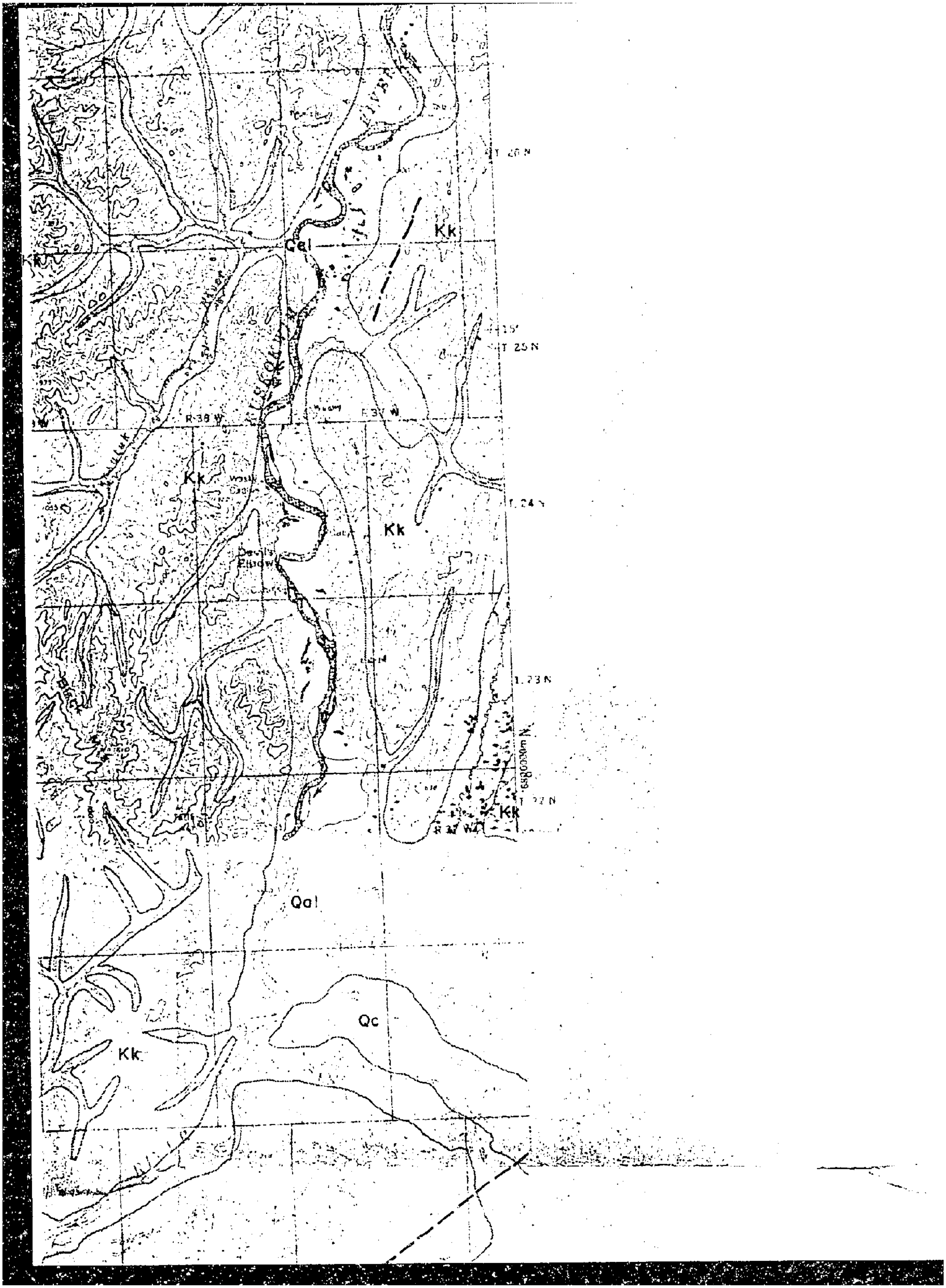


Ki
Th
Kk
Qal
Tqd
R 52 W
R 51 W
R 49 W
R 48 W
Iditarod Fault
Mosquito Mtn
DeCourcy Mtn
Haystack Butte
Tba
Tr
R 50 W
Tba?
Tgt
Tgl
U
D
Qg

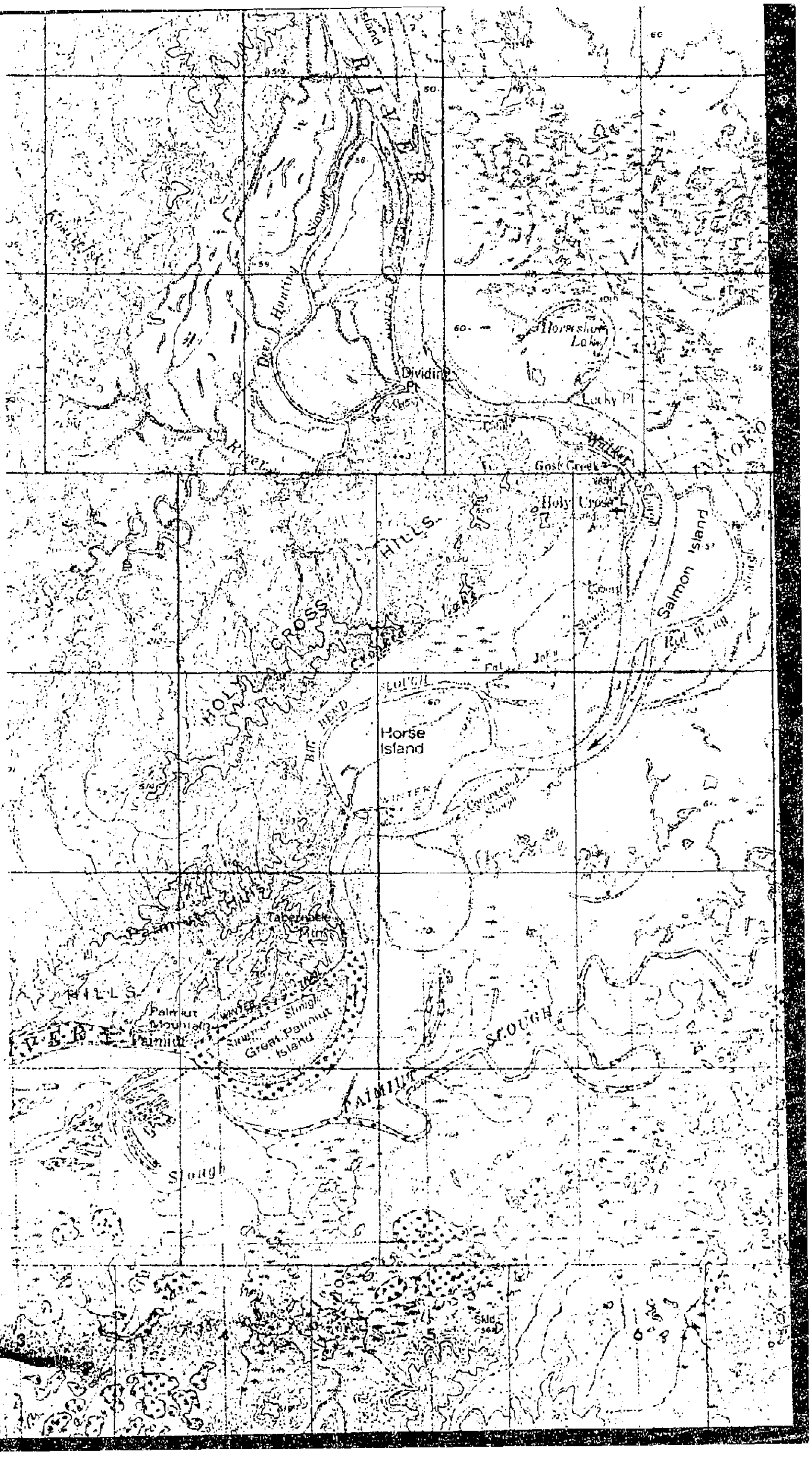


Kk
Tqd
Willow Creek
Qal
Kk
Kk
Kk
Kk
Qal
R 48 W
R 47 W
R 46 W
R 45 W
R 44 W
Tr
Tr
Ki
Michigan
Kk
Kk
Lookout
Mtn.
Kk
Twin
Buttes
Kk
Kk
Qal
Kk
Tqd
Kk
Tr
Kk
Tqd
Tba
Kk
Tr
Qc
Qc
Tr
Kk

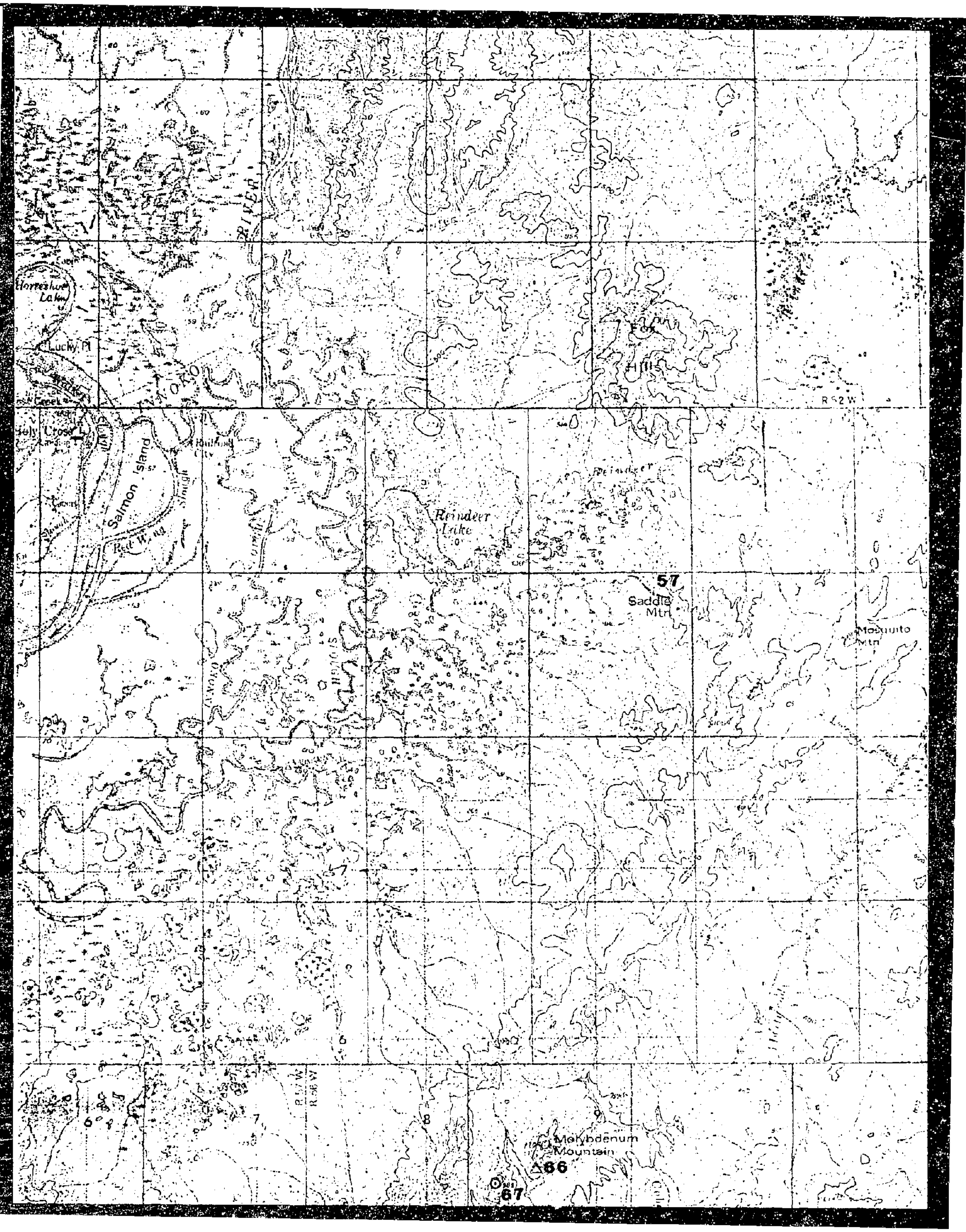

Kk
Granite Mtn
Tqd
Tr
Qal
R 43 W
R 42 W
R 41 W
Qc
Tc



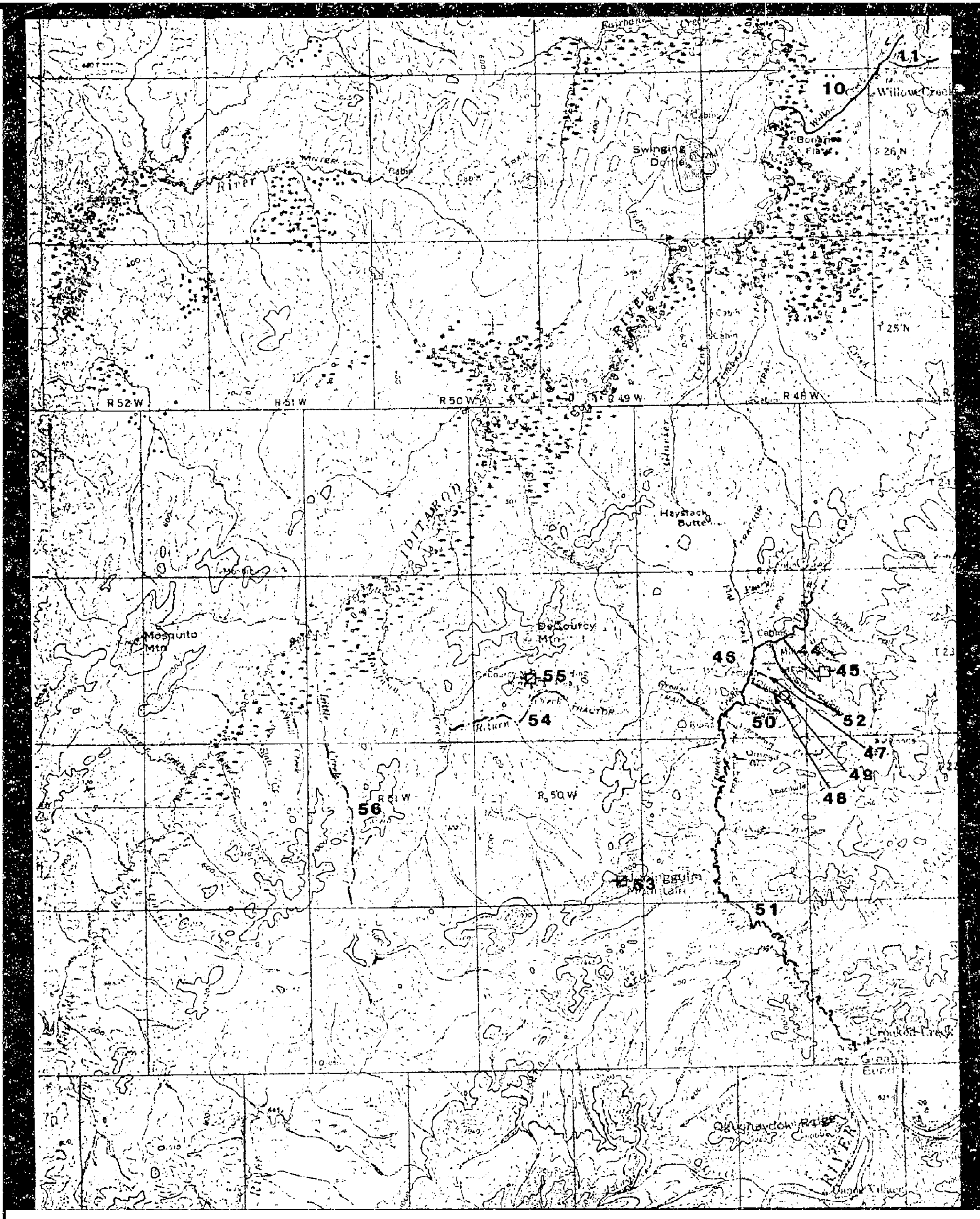
Kk
Cal
Kk
Kk
Devil's Elbow
Qal
Qc
Kk
R 38 W
R 37 W
T 26 N
T 25 N
T 24 N
T 23 N
T 22 N
Kk



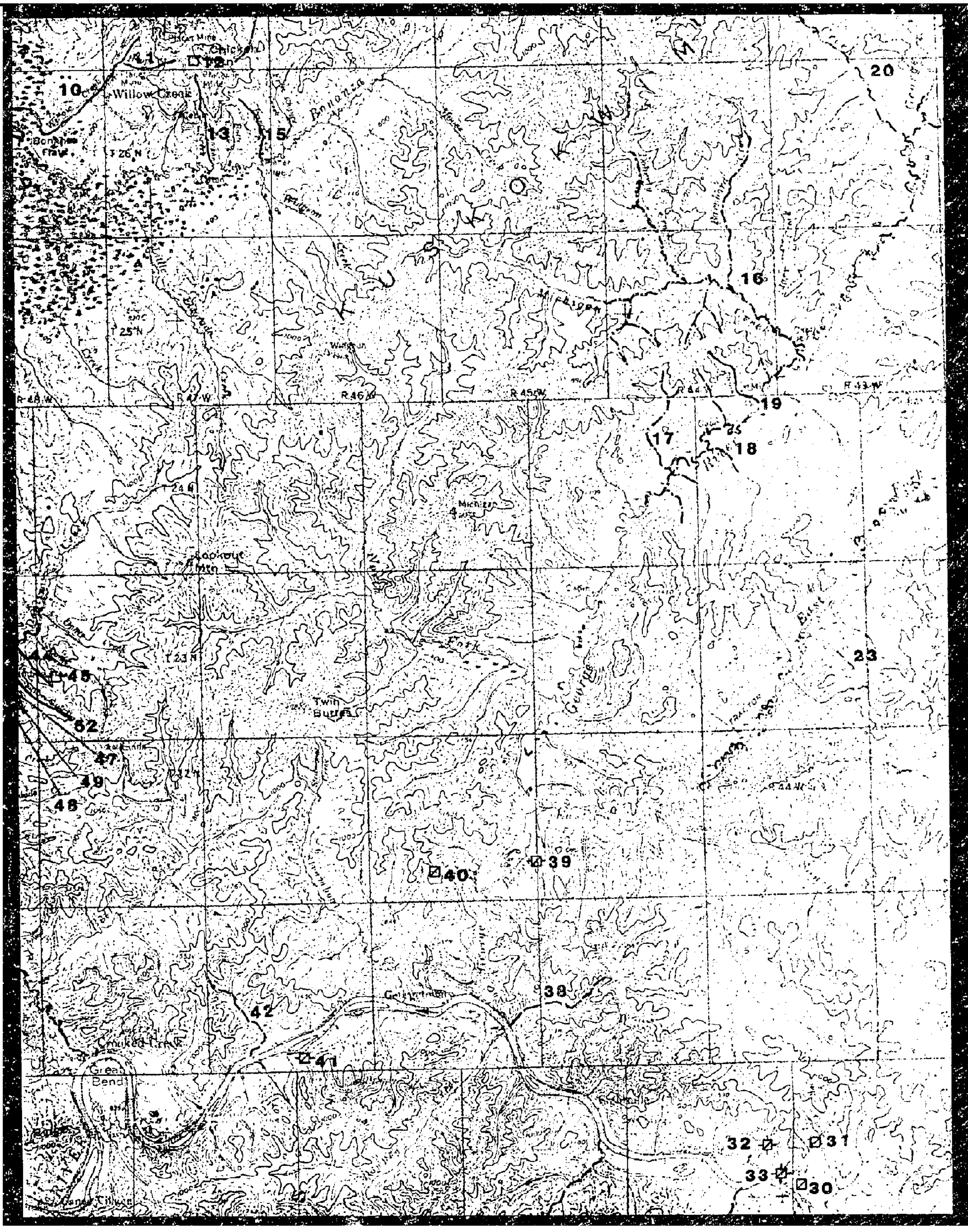
RIVER
Horseshoe Lake
Dividing Pt
Lucky Pt
Gost Creek
Holy Cross
HILLS
CROSS
HOLY
Salmon Island
Horse Island
BIG BEND SLOUGH
Tabernacle Mtn
HILLS
Paimiut Mountain
Great Paimiut Island
SLOUGH
PAIMIUT
Slough



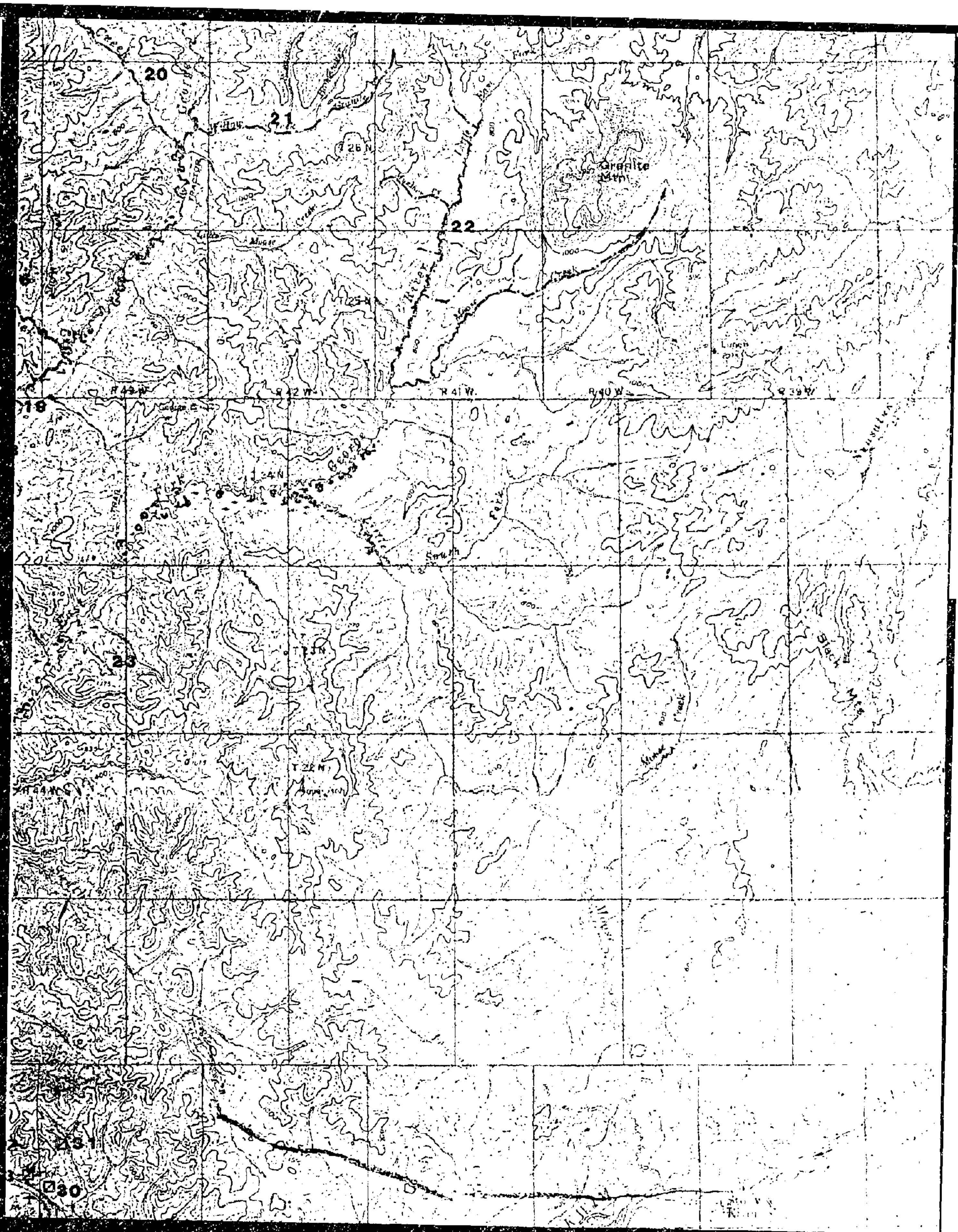
Horseshoe Lake
Lucky Pl
Holy Cross
INNOKO
RIVER
Salmon Island
Slough
Red Wing
Reindeer
Reindeer Lake
57
Saddle Mtn
Mosquito Mtn
R52W
R57W
R56W
6
7
8
9
Molybdenum Mountain
66
67

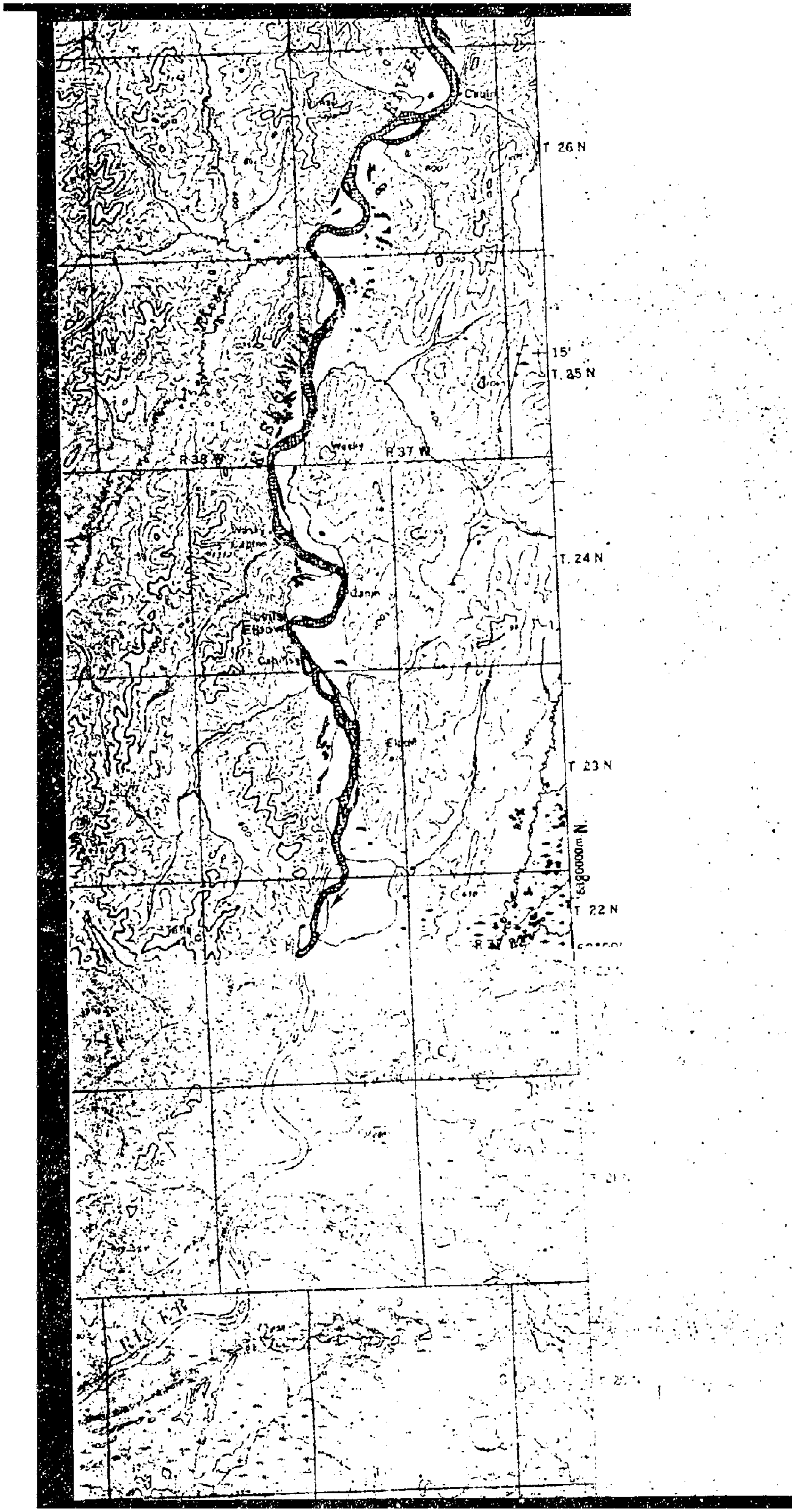


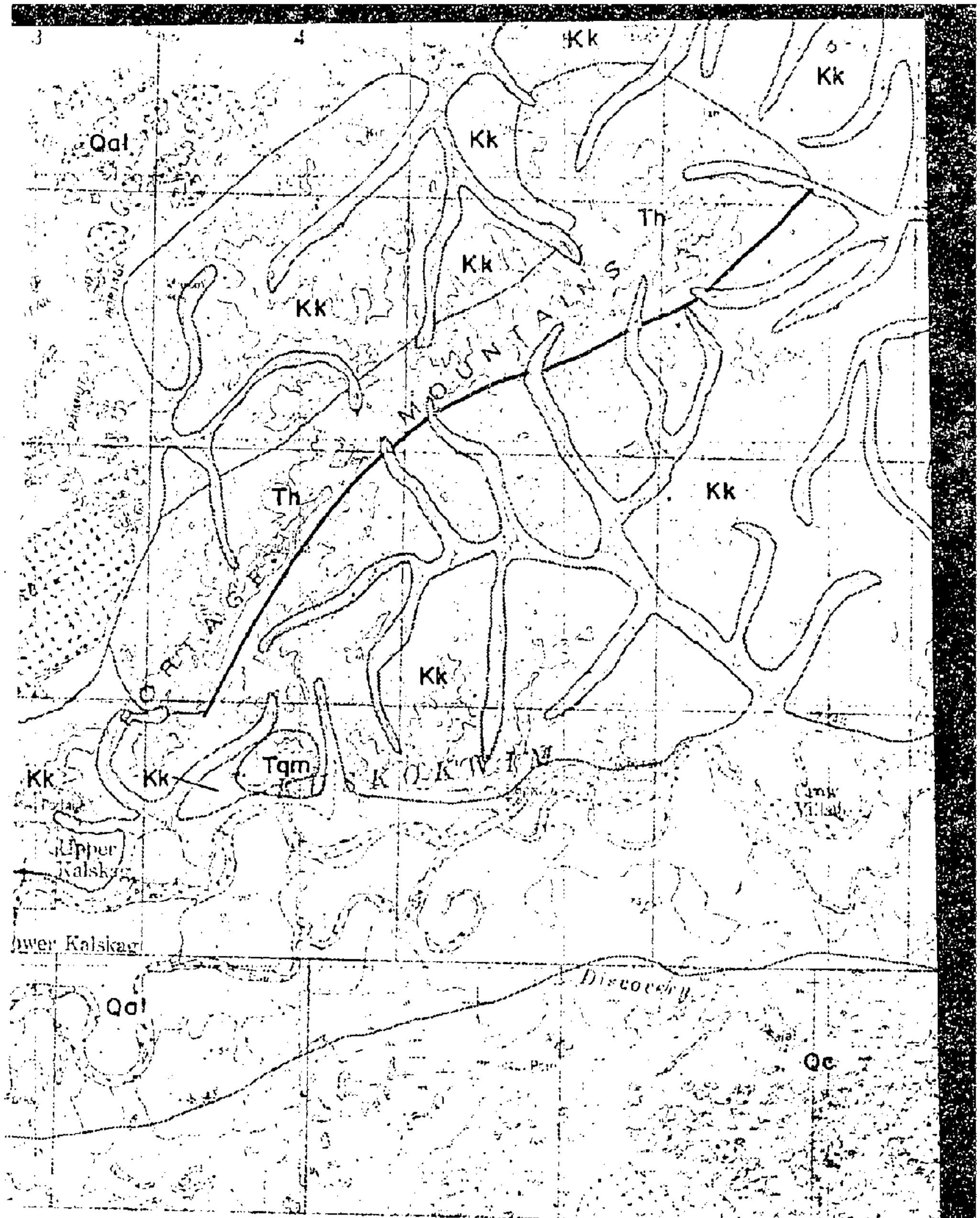
11
10
Willow Creek
Swinging Dome
Bonanza Flats
T 26 N
T 25 N
River
RIVER
R 52 W
R 51 W
R 50 W
R 49 W
R 48 W
IDITAROD
Haystack Butte
Mosquito Mtn
DeCourcy Mtn
46
44
45
55
52
54
50
47
49
48
R 51 W
R 50 W
56
53
51
Crooked Creek
Oklahoma Ridge



10
Willow Creek
12
11
13
15
Bonanza
20
16
19
18
17
Michigan
R 43 W
T 26 N
T 25 N
R 48 W
R 47 W
R 46 W
R 45 W
T 24 N
Lookout Mtn
T 23 N
Fork
Twin Buttes
23
52
47
49
48
45
44
40
39
38
42
41
Crooked Creek
Great Bend
32
31
33
30

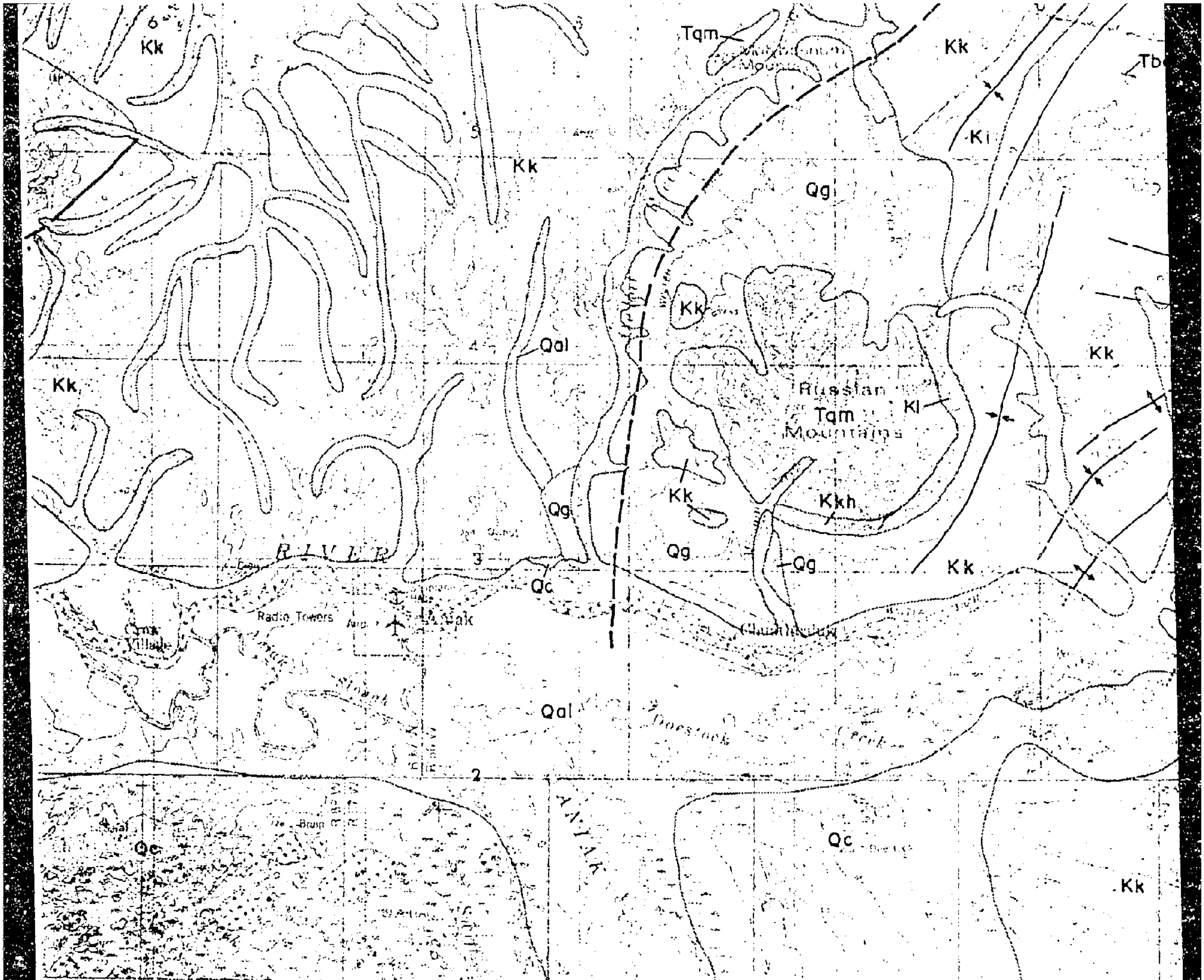

20
21
22
Granite Mtn
T 26 N
T 25 N
R 42 W
R 41 W
R 40 W
R 39 W
19
T 24 N
South
Fork
23
T 23 N
T 22 N
R 44 W
30


T 26 N
15'
T. 25 N
R 38 W
R 37 W
T. 24 N
T 23 N
T 22 N



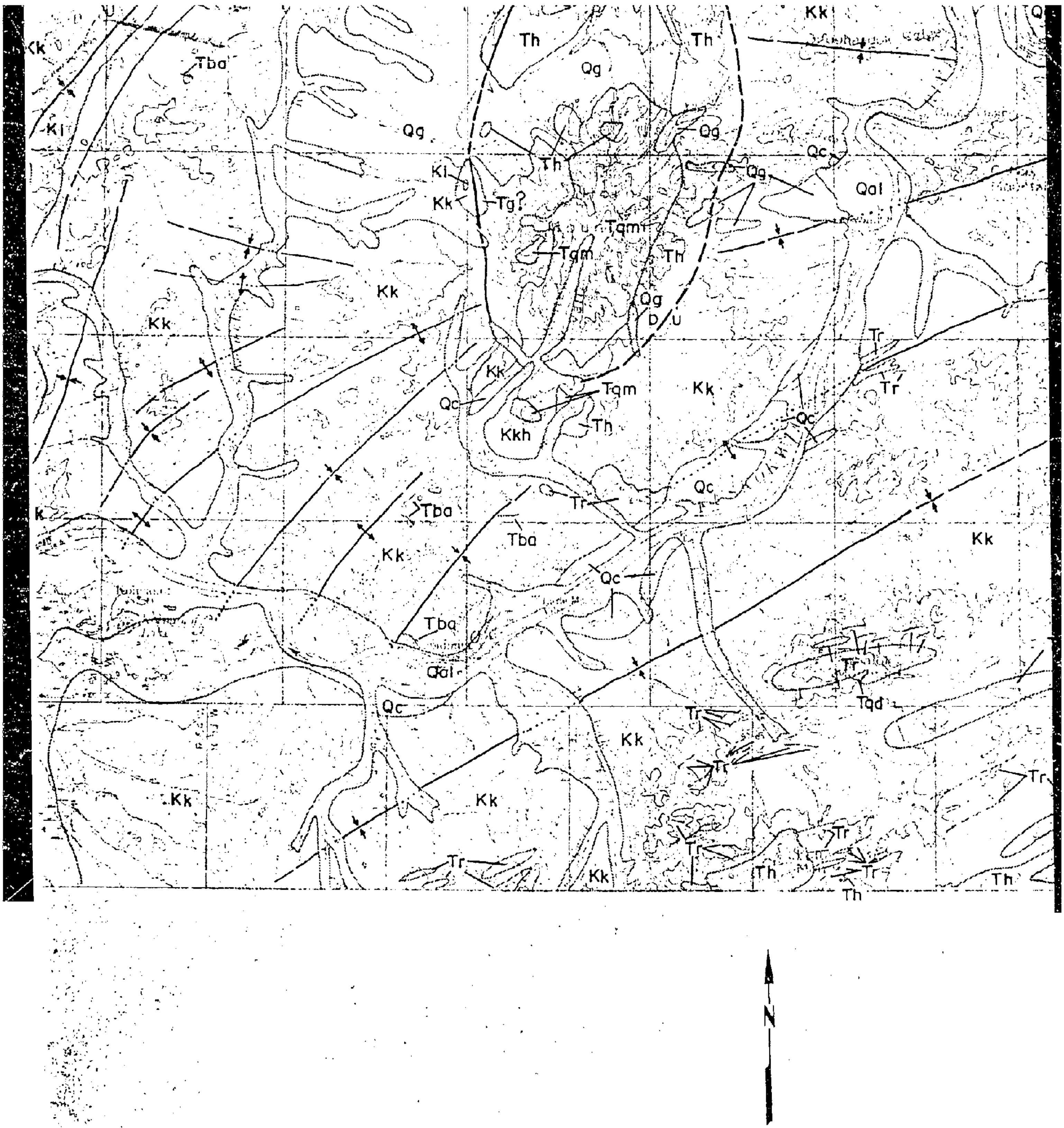
Base map adapted from U.S.G.S. Sleetmute, Iditarod, Holy Cross and Russian Mission 1:250,000 quadrangles

Geology taken from Cady, Wallace, Hoare, and Webber, 1955, and U.S. Energy Research and Development Administration, 1977



ditarod,
quadrangles

nd Webber, 1955,
Administration, 1977.



Kk
Kl
Tba
Th
Qg
Qc
Qal
Tg?
Tqm
Kkh
Tr
Tqd
D
U
N

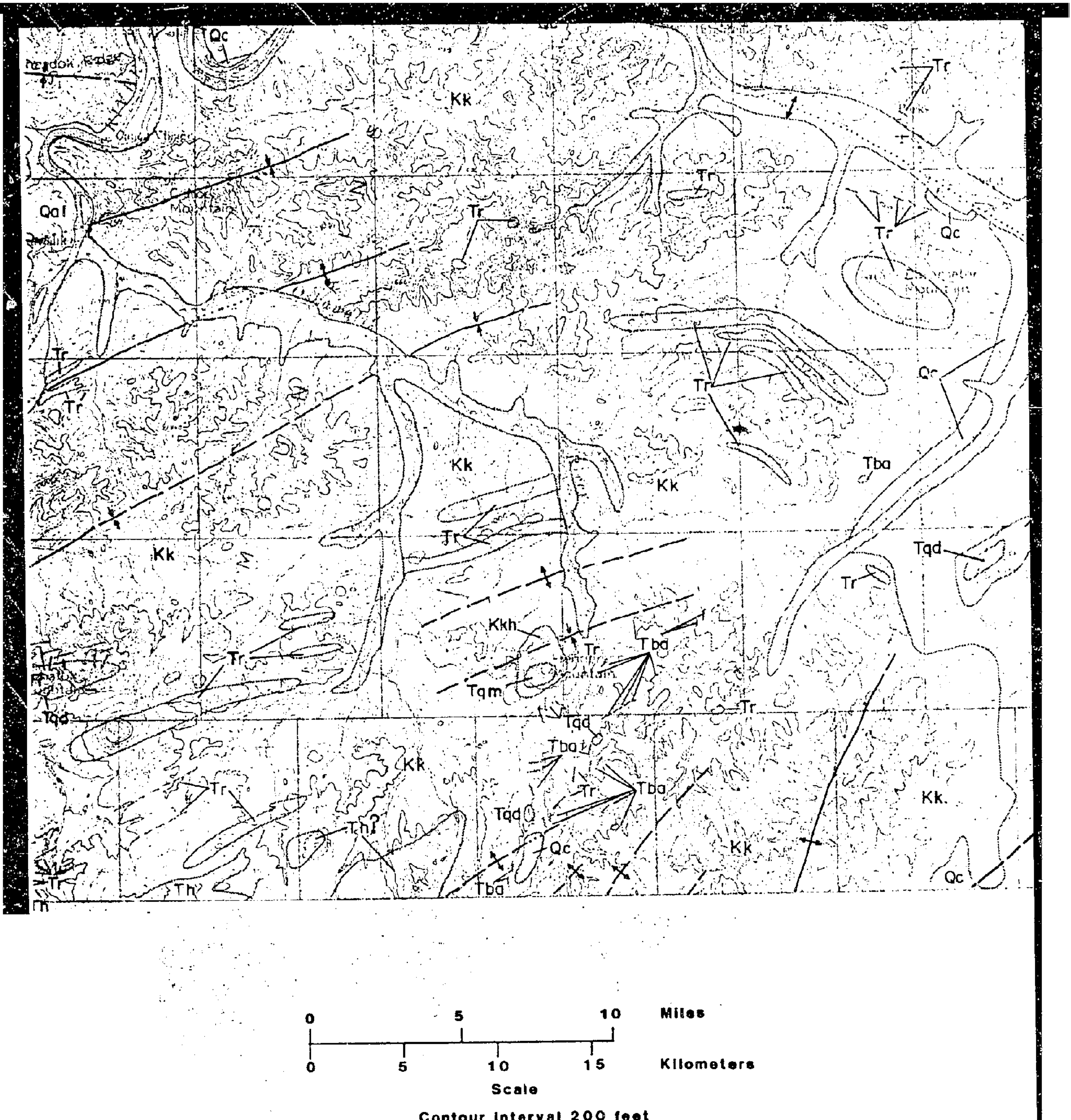
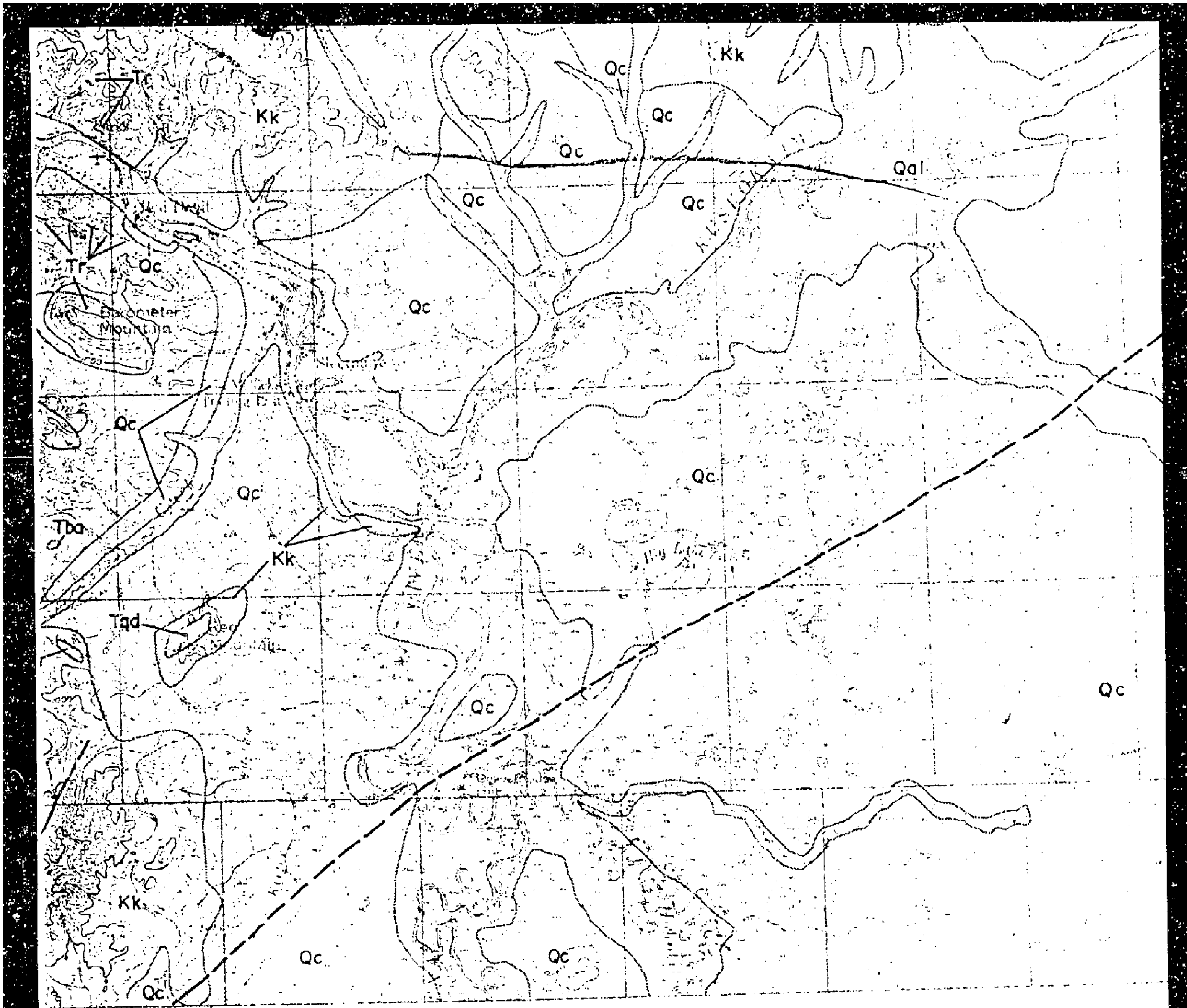
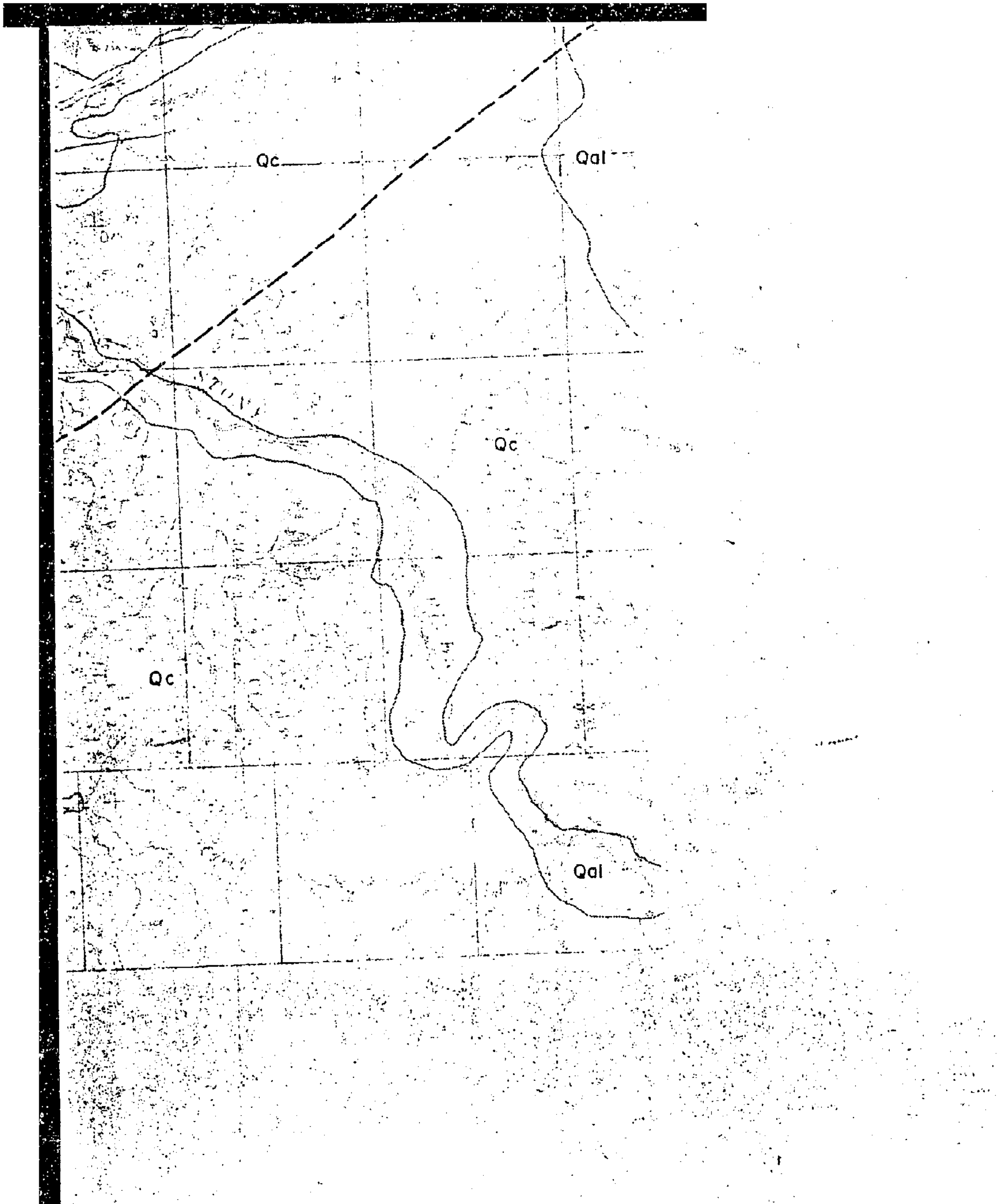

Qc
Kk
Tr
Qal
Qc
Tr
Tr
Tr
Qc
Tr
Tba
Kk
Kk
Tr
Kk
Tqd
Tr
Kkh
Tr
Tba
Tr
Tqm
Tqd
Tr
Tqd
Tba
Kk
Tr
Tba
Tqd
Th?
Qc
Kk
Kk.
Tr
Th
Tba
Qc
0
5
10
Miles
0
5
10
15
Kilometers
Scale
Contour interval 200 feet

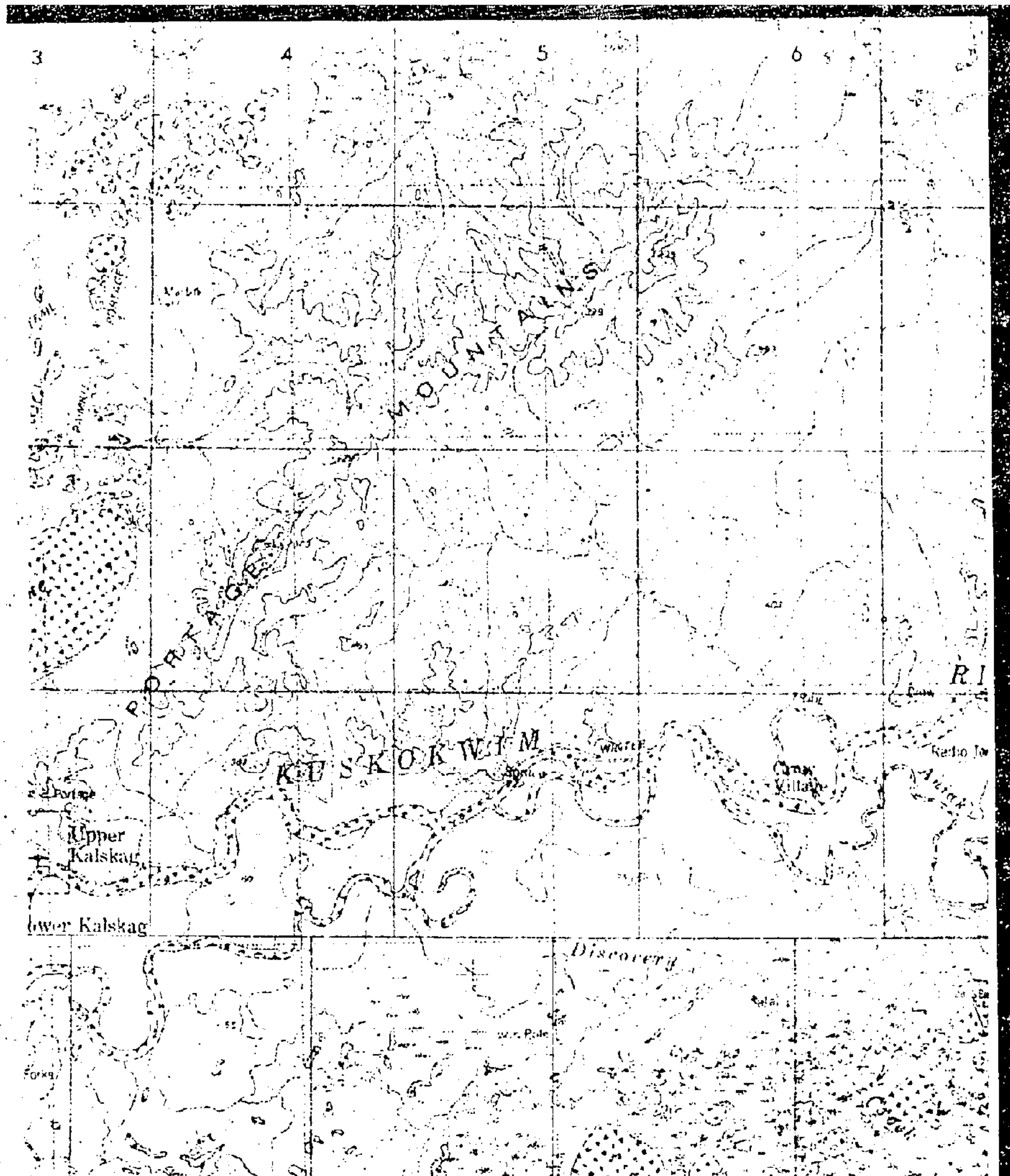
Figure 4. Ger



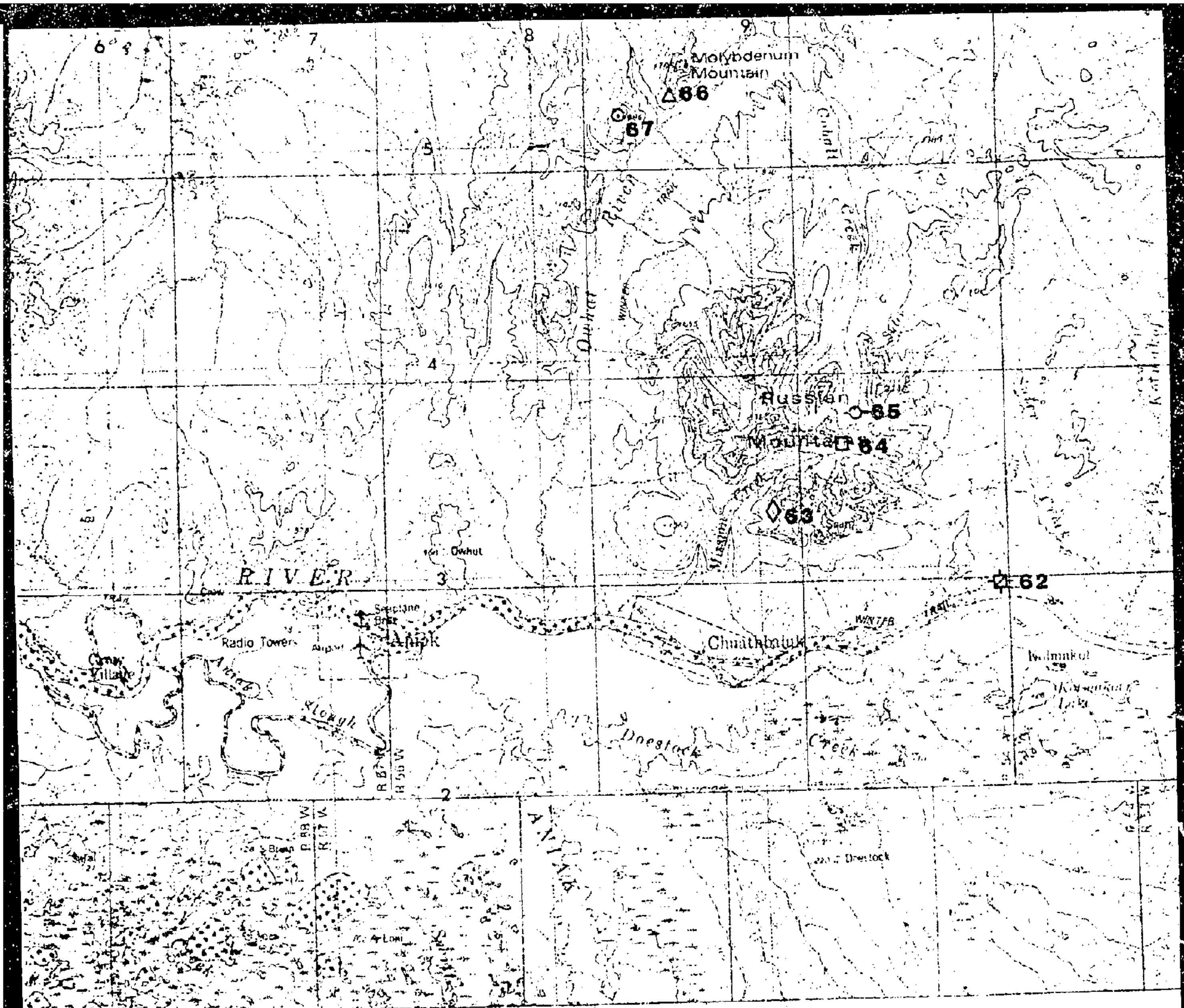
e 4. Generalized geology of the Iditarod-Georg



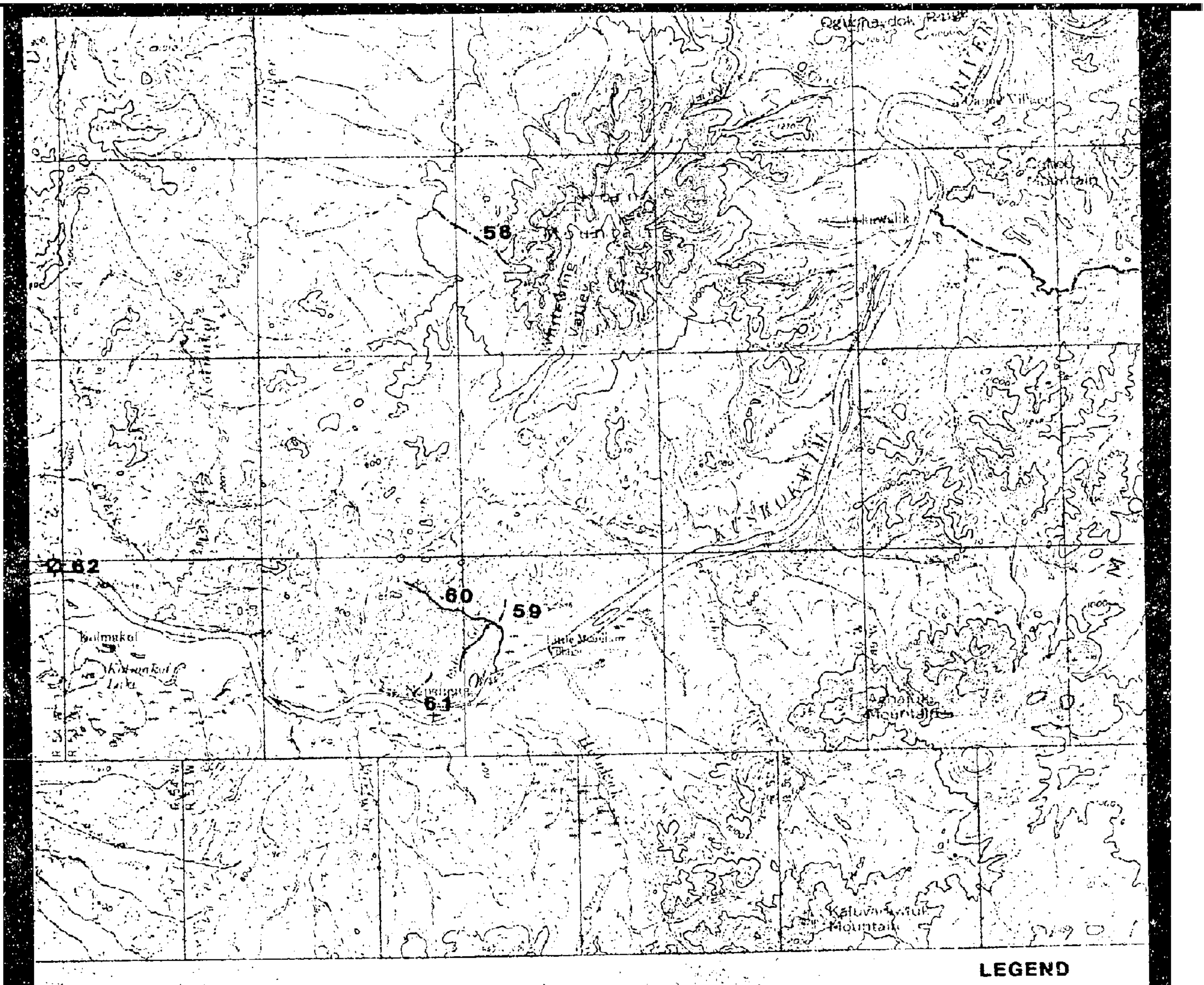
-George study area



Base map adapted from U.S.G.S. Sleetmute, Iditarod, Holy Cross and Russian Mission 1:250,000 quadrangles

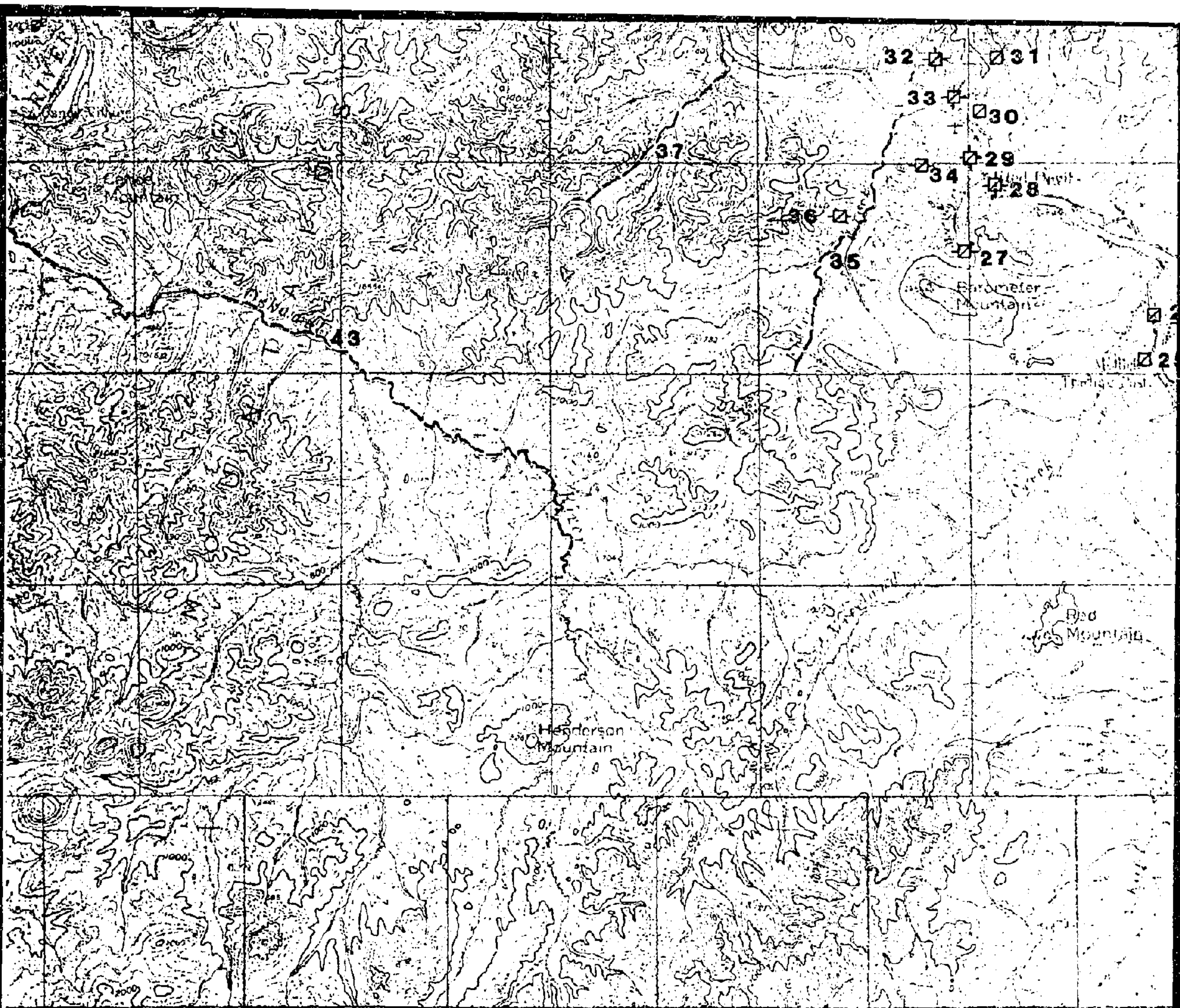

Molybdenum Mountain
66
67
Russian Mountain
65
64
63
62
RIVER
Radio Tower
Aniak
Chuathbaluk
Slough
Doestock
Creek
Owhut

od,
angles



LEGEND

Antimony occurrence	Gold mine
Coal occurrence	Mercury occurre
Coal prospect	Mercury prospe
Copper prospect	Mercury mine
Gold occurrence	Molybdenum oc
Gold prospect	Gemstone occ



LEGEND

Gold mine

Mercury occurrence

Mercury prospect

Mercury mine

Molybdenum occurrence

Gemstone occurence

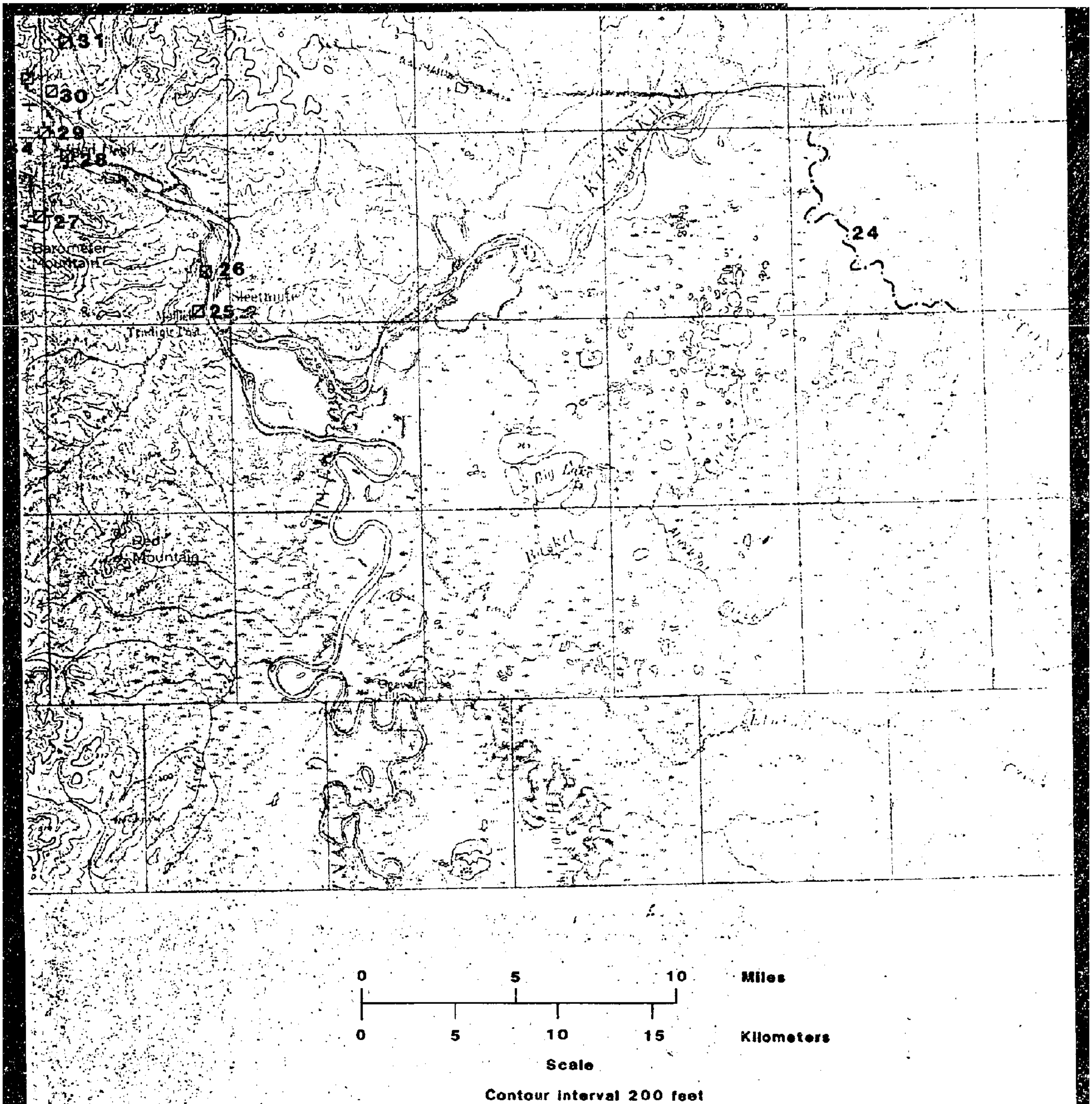
Placer occurrence

Placer prospect

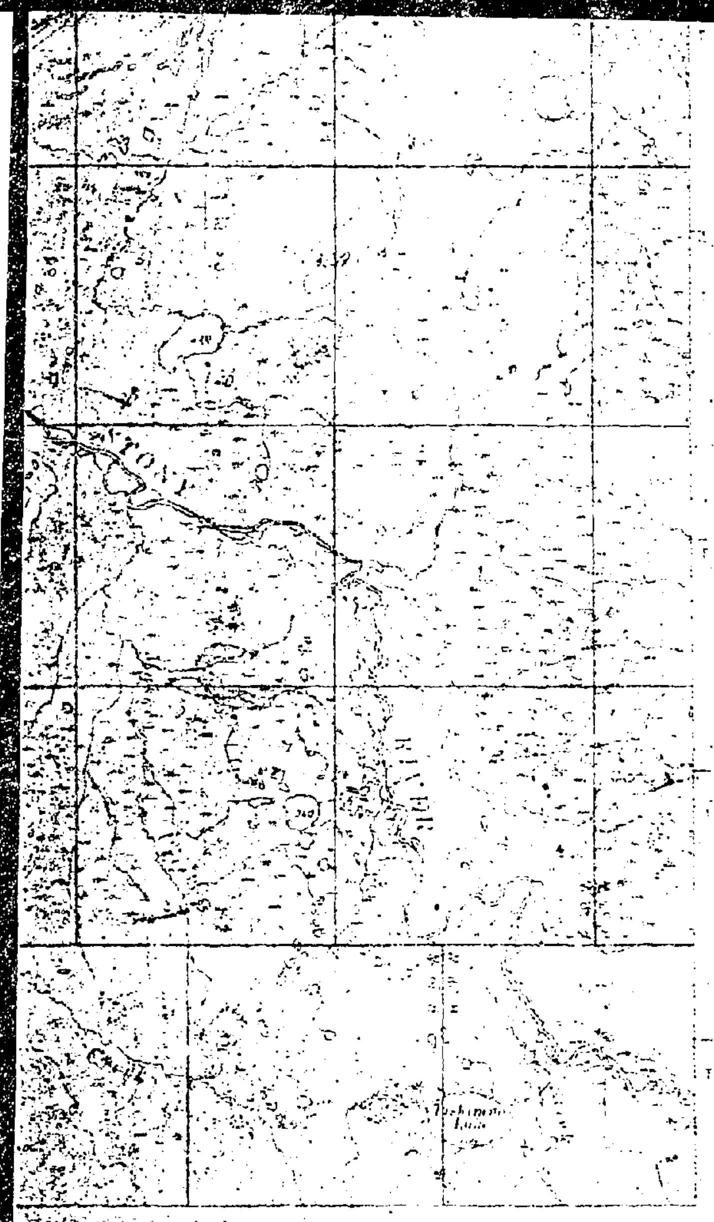
Placer mine

Sand & gravel

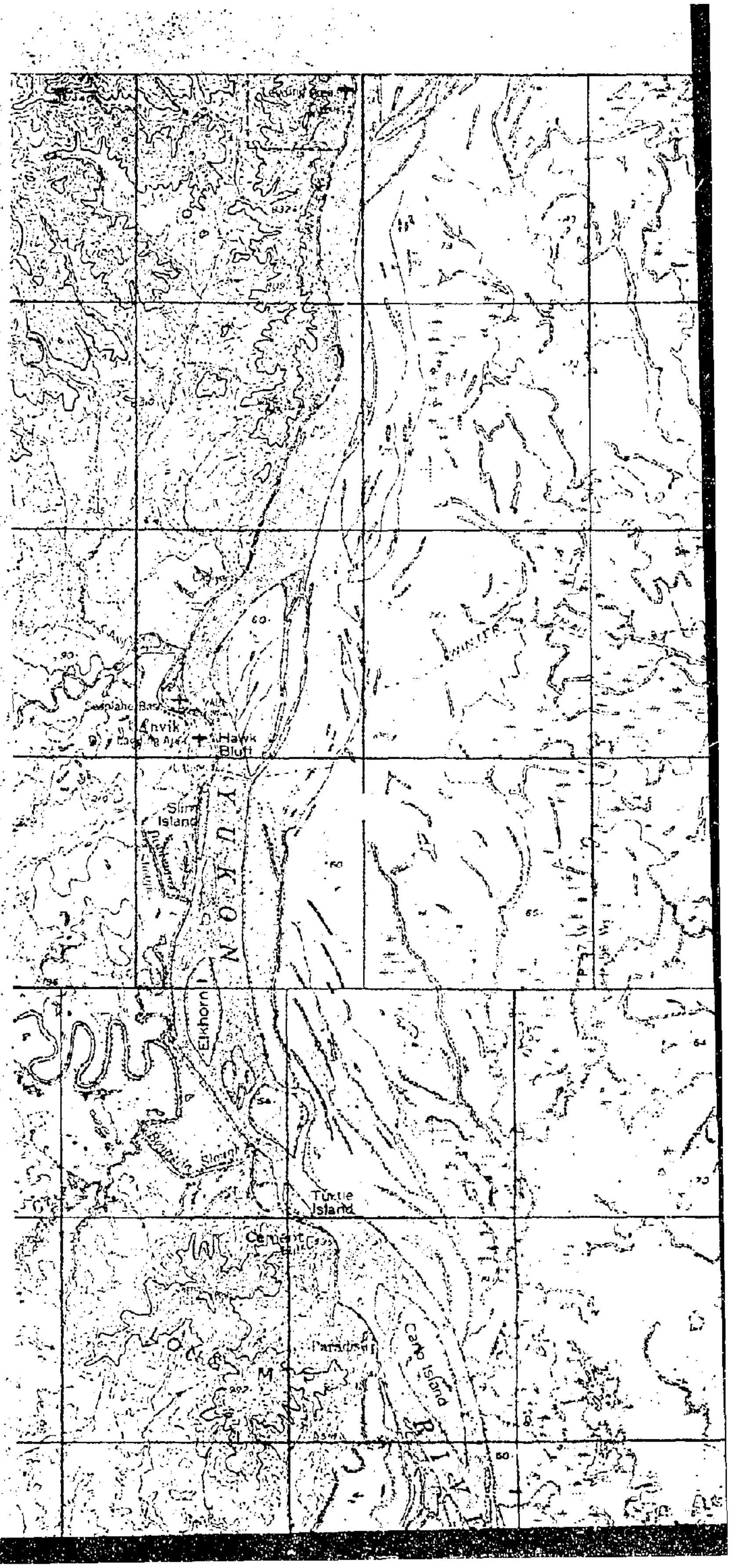
Figure 5. M

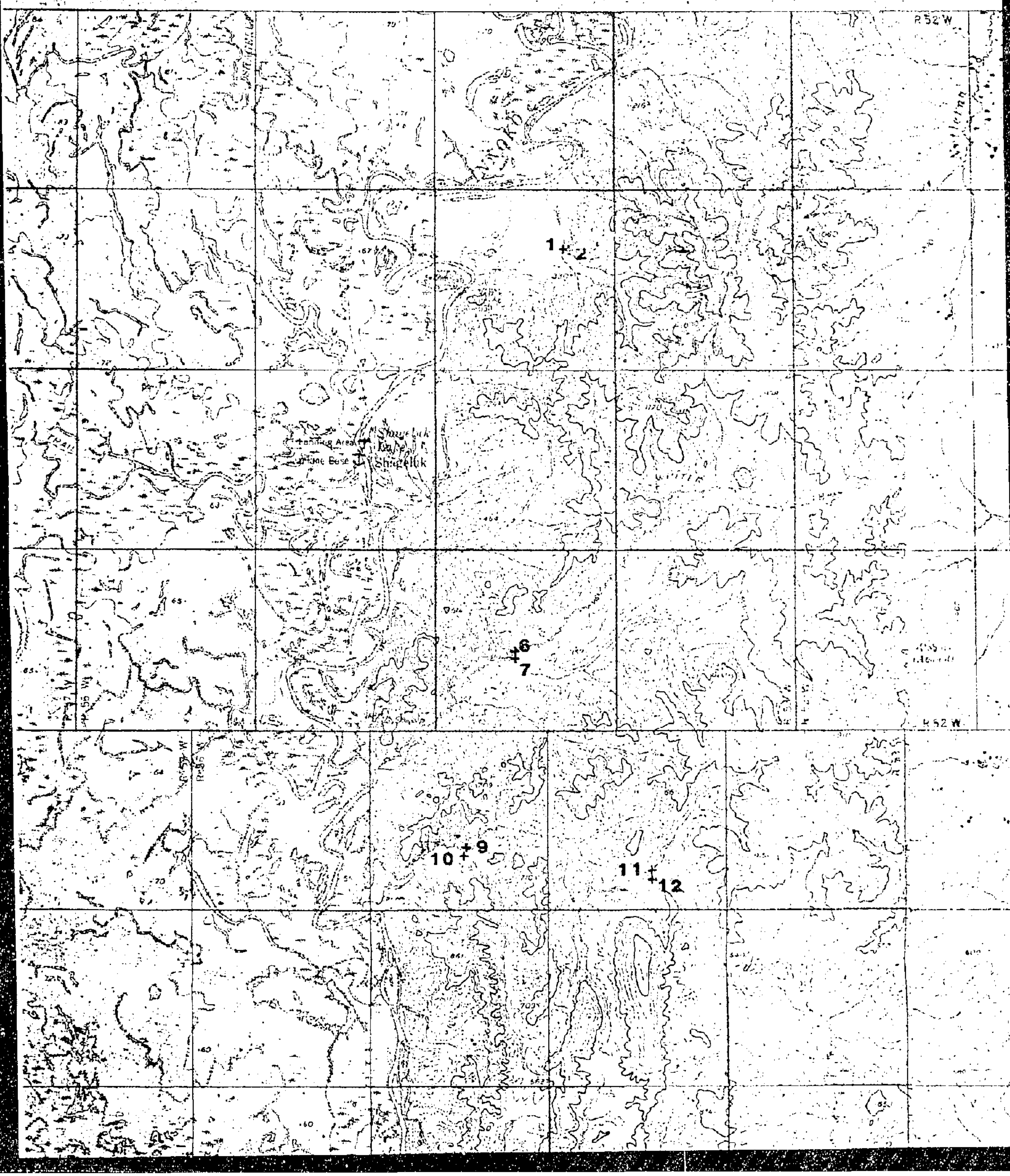


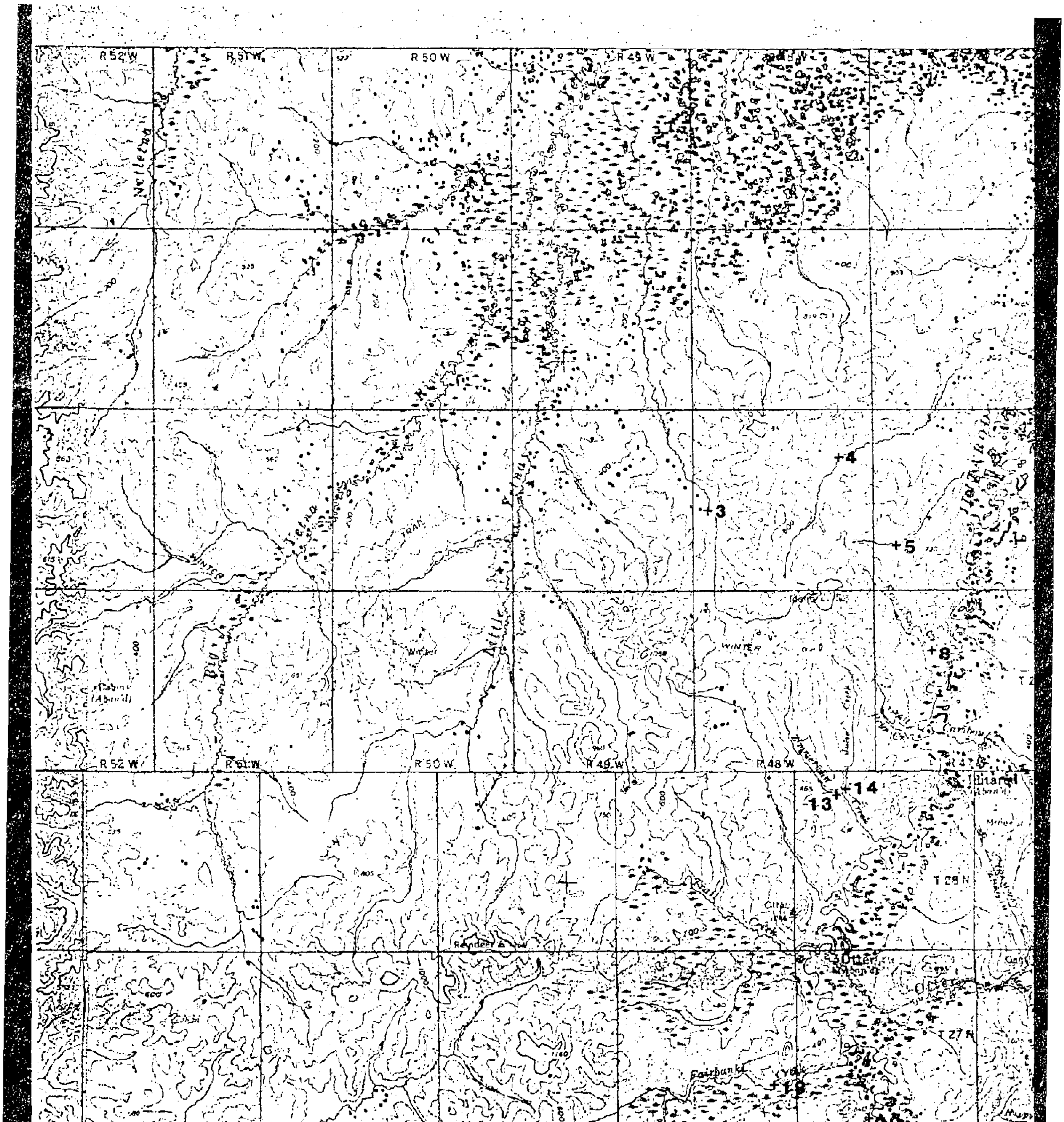
ure 5. Mines, prospects, and occurrences of t



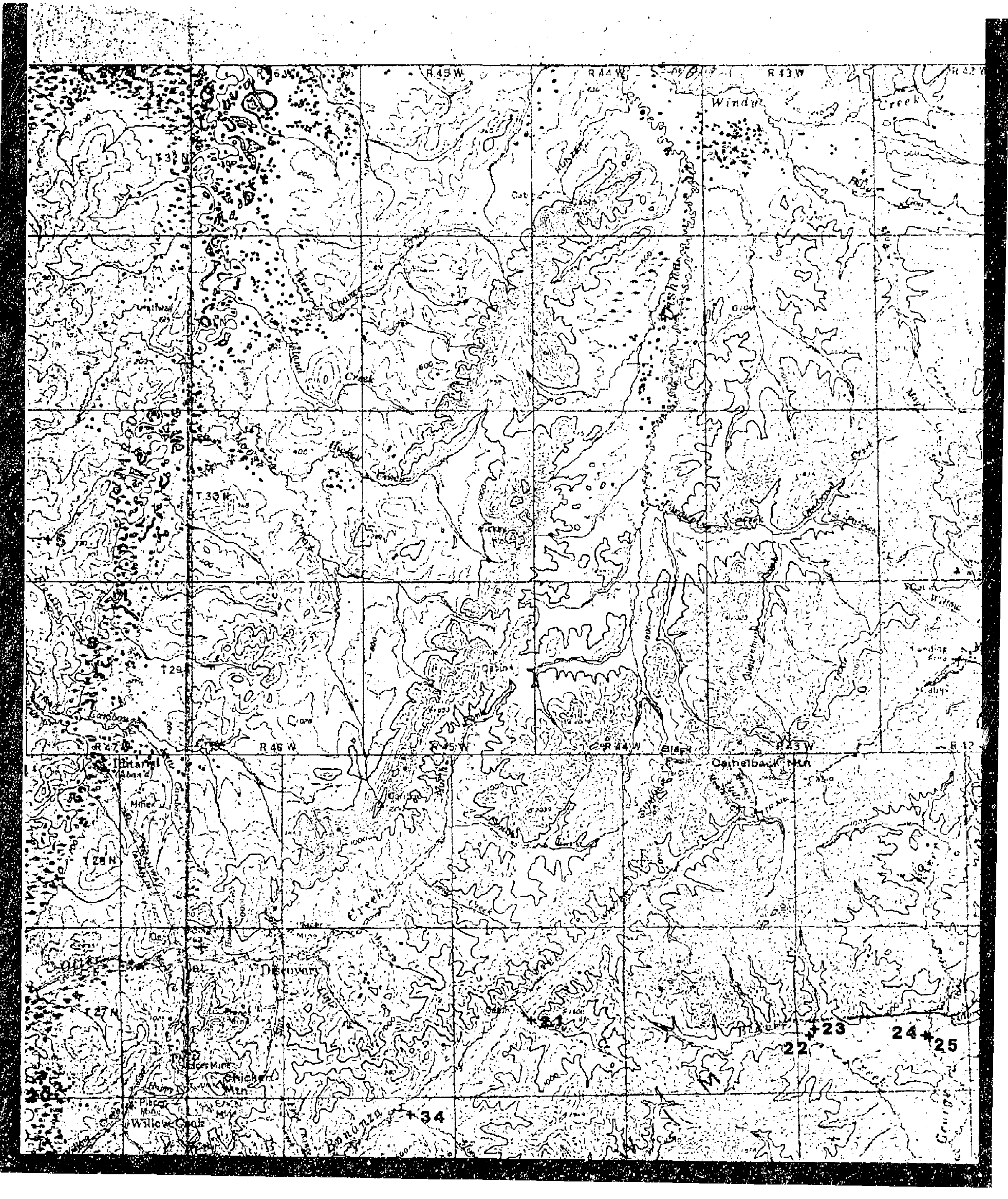
s of the Iditarod-George study area

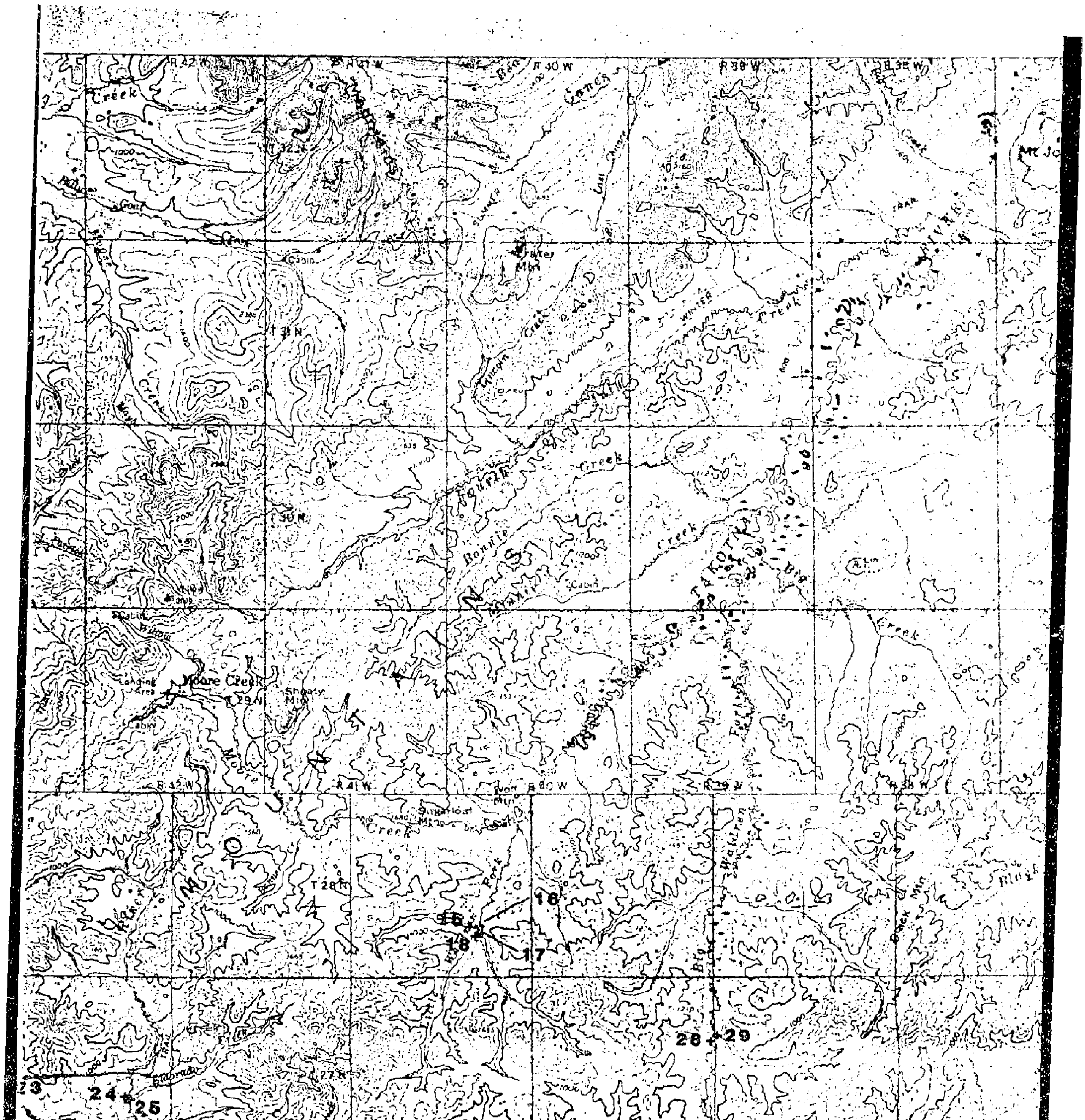

Anvik
Hawk Bluff
Slim Island
YUKON
Elkhorn
Turtle Island
Cement
Paradise
Camp Island

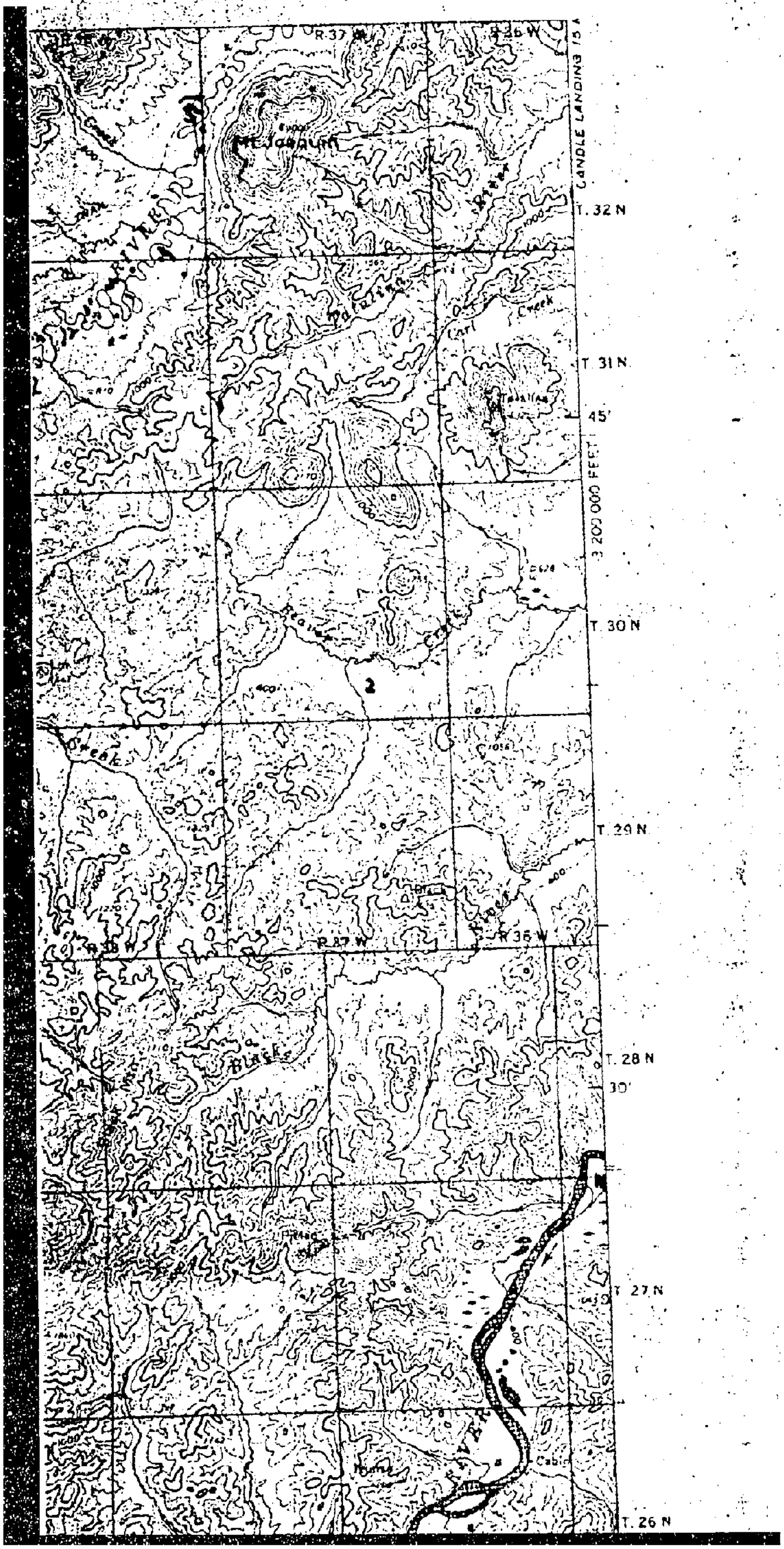

R 52 W
1
2
Landing Area
Plane Base
6
7
R 52 W
10
9
11
12

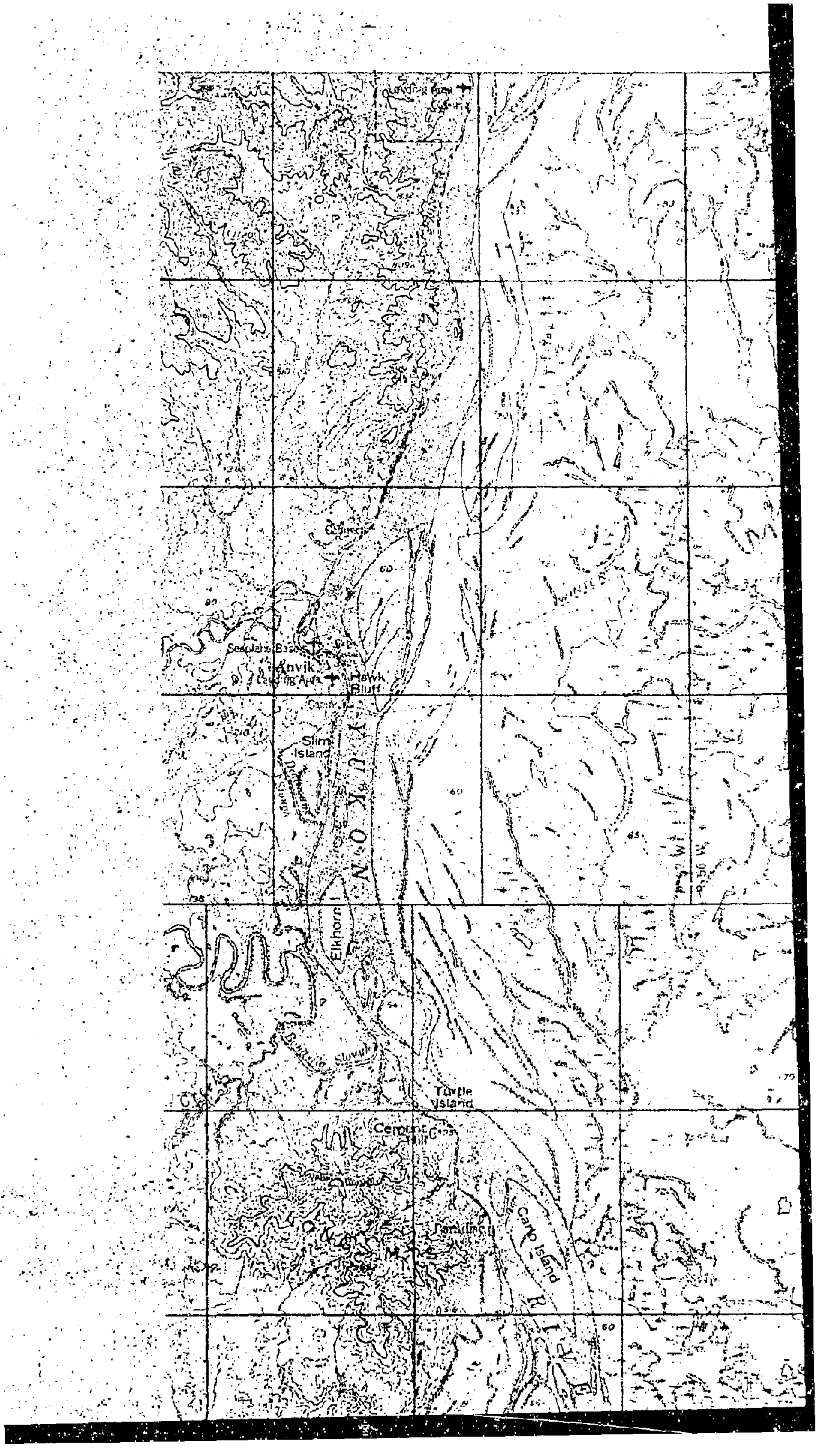


R 52 W
R 51 W
R 50 W
R 49 W
R 48 W
+3
+4
+5
+8
+13
+14
+19
+20
WINTER
TRAIL
Big
Little
T 28 N
T 27 N
Otter
Fairbanks
Willow

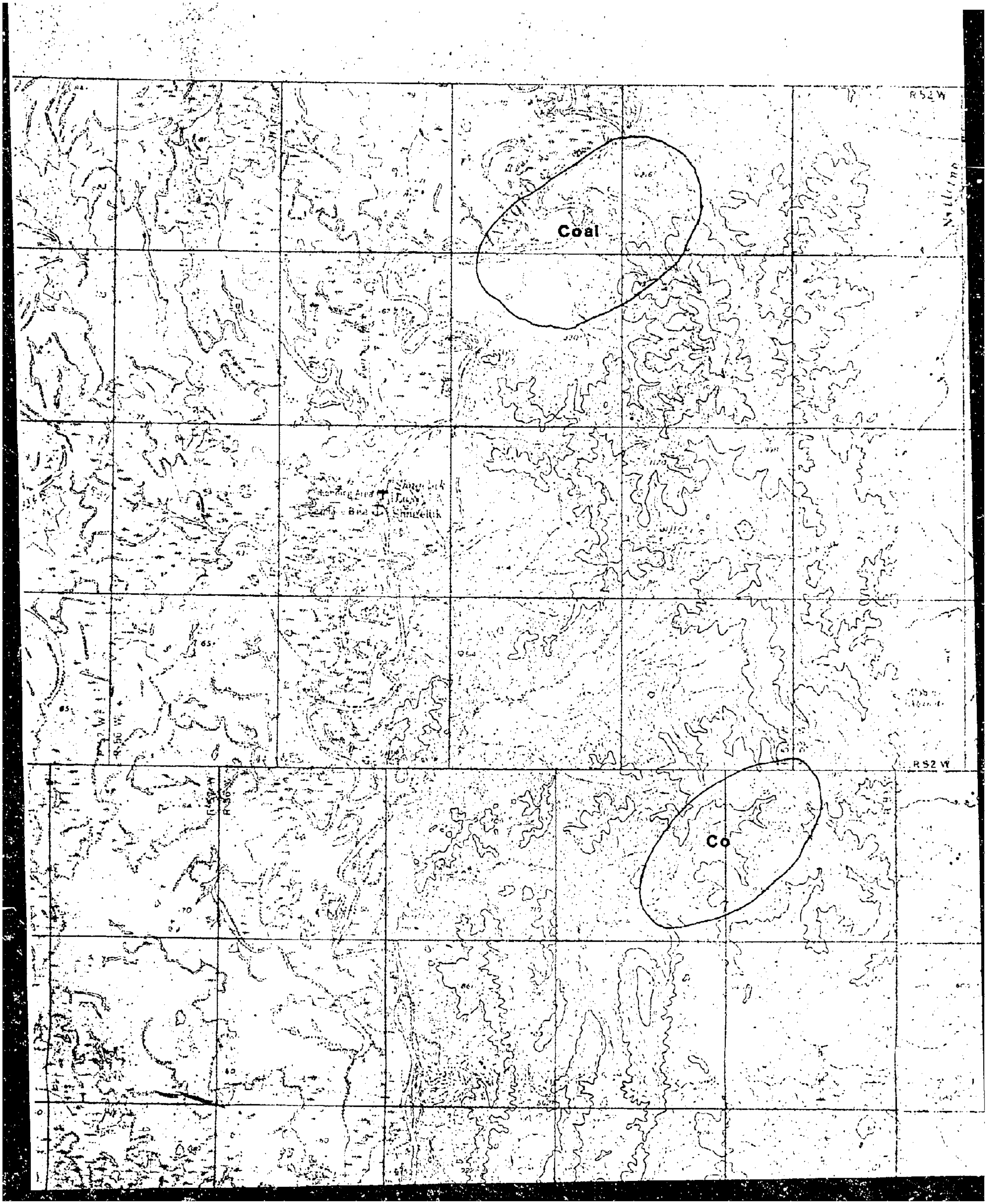

R 45 W
R 44 W
R 43 W
Windy
Creek
T 31 N
T 30 N
T29
T 28 N
T 27 N
R 47
R 46 W
R 45 W
R 44 W
R 43 W
Camelback Mtn
Discovery
Creek
Chicken Mtn
Willow Creek
Bonanza
21
22
23
24
25
34


R 42 W
R 41 W
R 40 W
R 39 W
R 38 W
T 32 N
T 30 N
T 29 N
T 28 N
T 27 N
Creek
Cabin
Moore Creek
Landing Area
Shorty Mtn
Sugarloaf Mtn
Bonnie Creek
Big
16
17
18
23
24
25
26
27
28
29

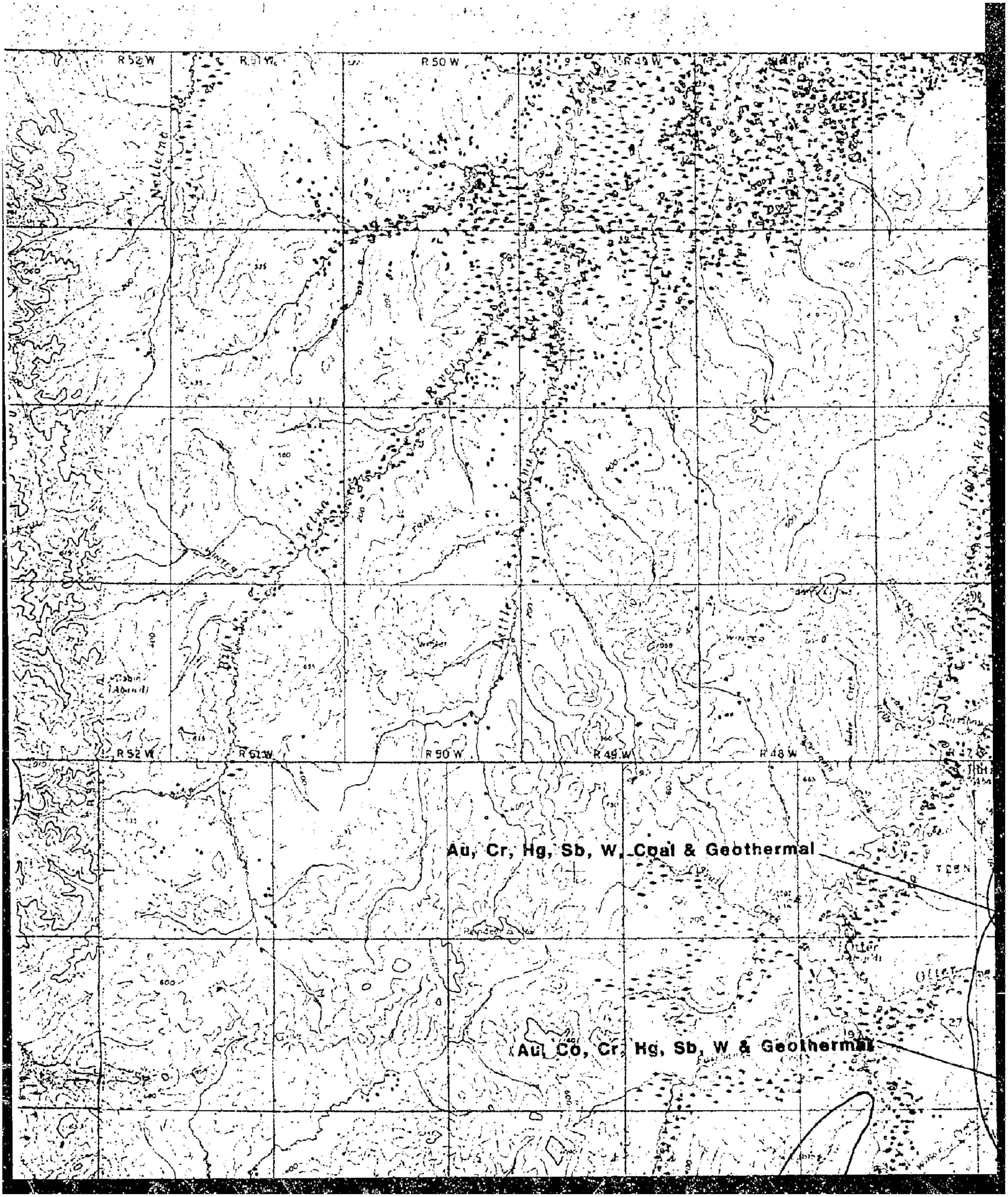

R.37 W
R.36 W
T. 32 N
Mt. Joaquin
Carl Creek
T. 31 N
45'
3 200 000 FEET
T. 30 N
Creek
T. 29 N
R.37 W
R.36 W
Black
T. 28 N
30'
T. 27 N
Cabin
T. 26 N

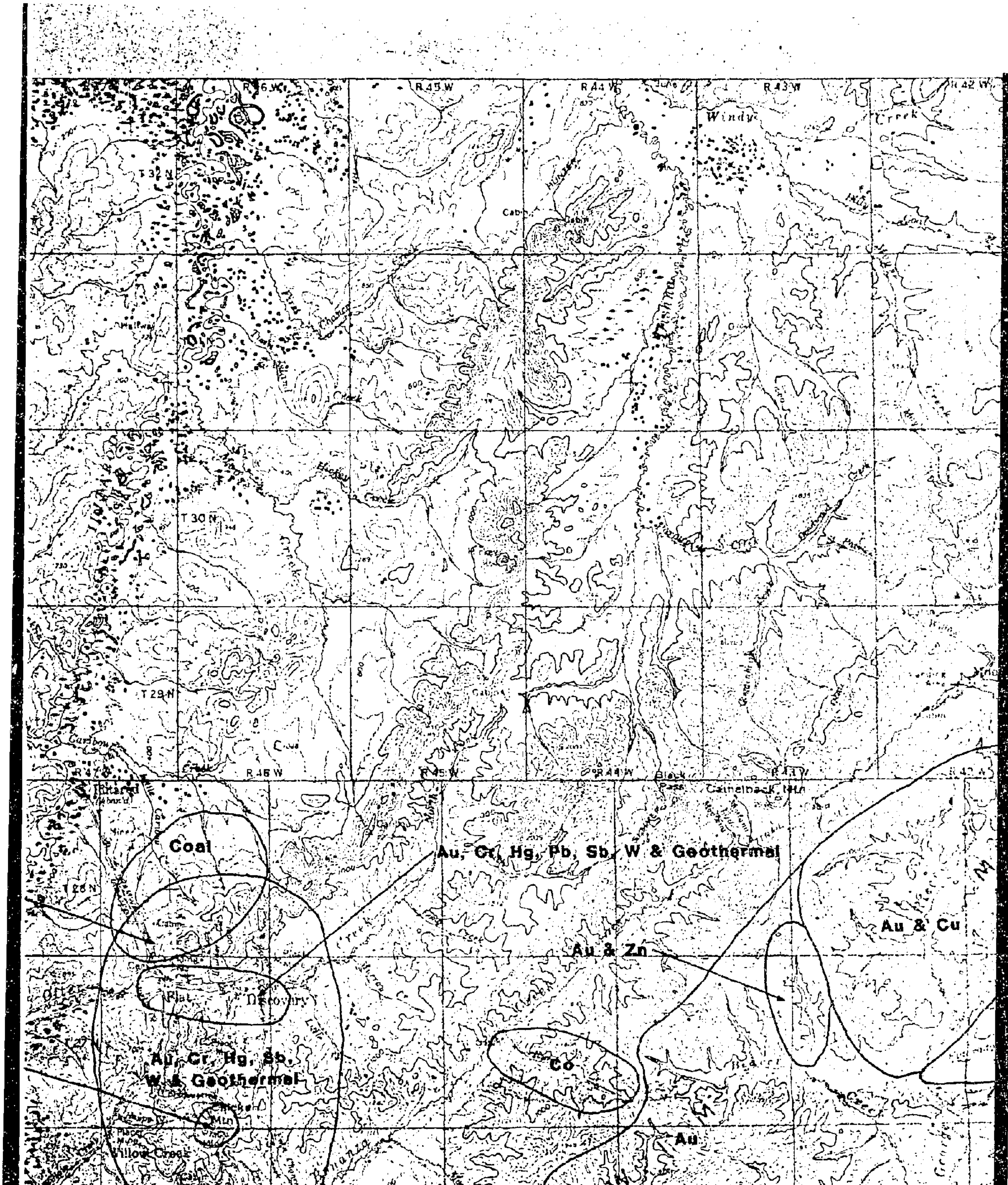


Seaplane Base
Anvik
Hawk Bluff
Slim Island
YUKON
Elkhorn
Turtle Island

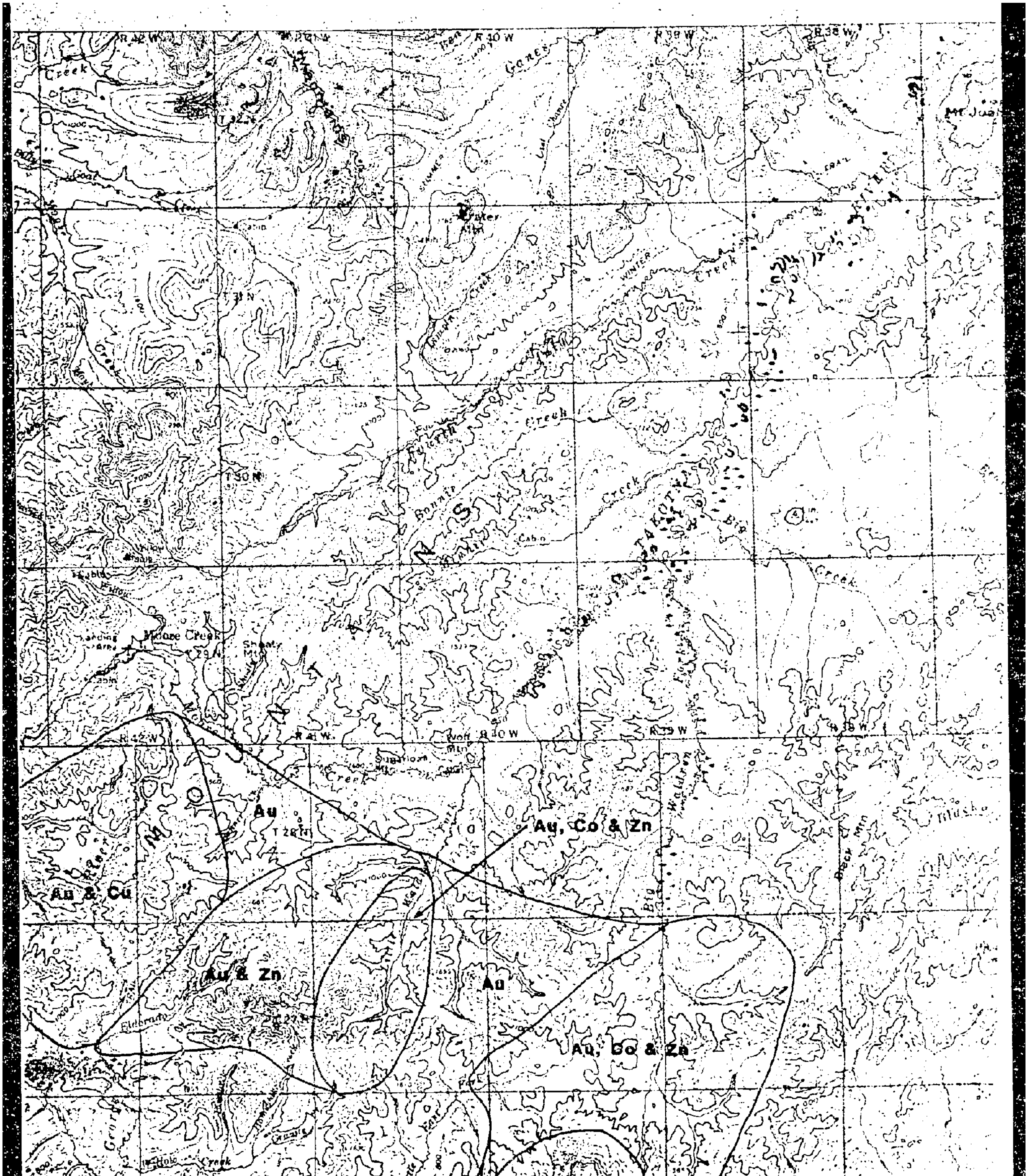


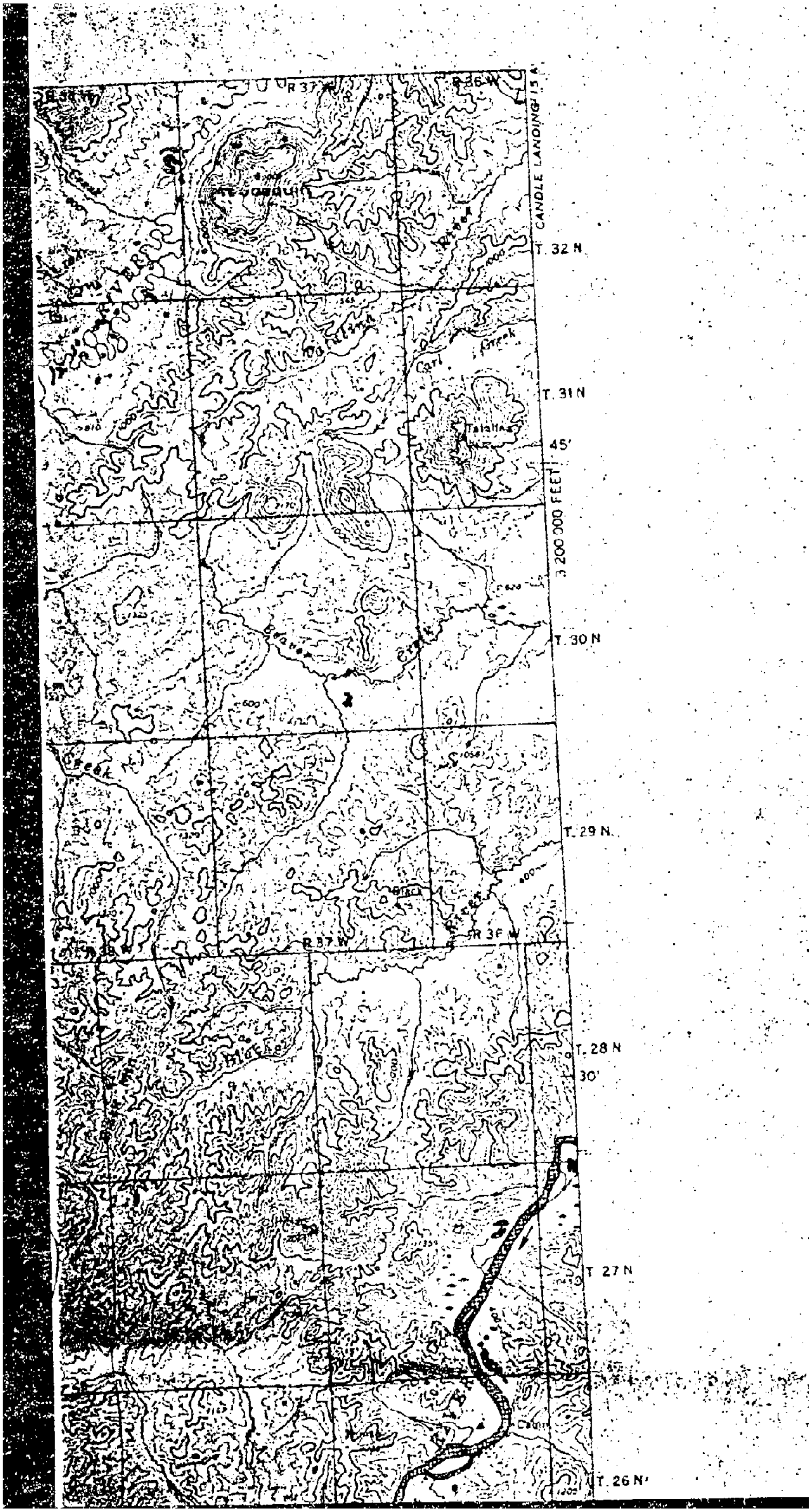
Coal
Co
R 52 W
R 52 W

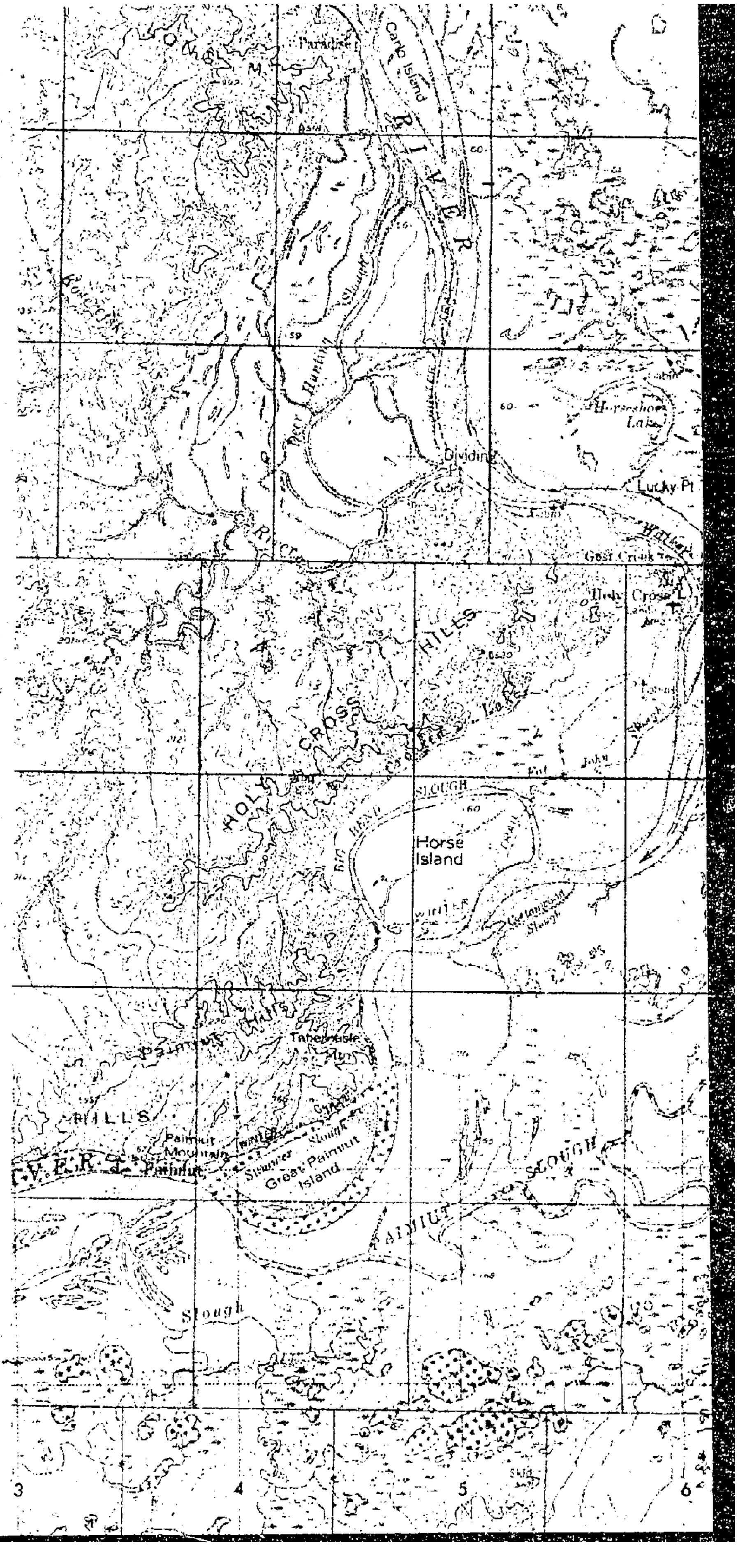

R 52 W
R 50 W
R 52 W
R 50 W
R 49 W
R 48 W
TRAIL
Au, Cr, Hg, Sb, W, Coal & Geothermal
Au, Co, Cr, Hg, Sb, W & Geothermal



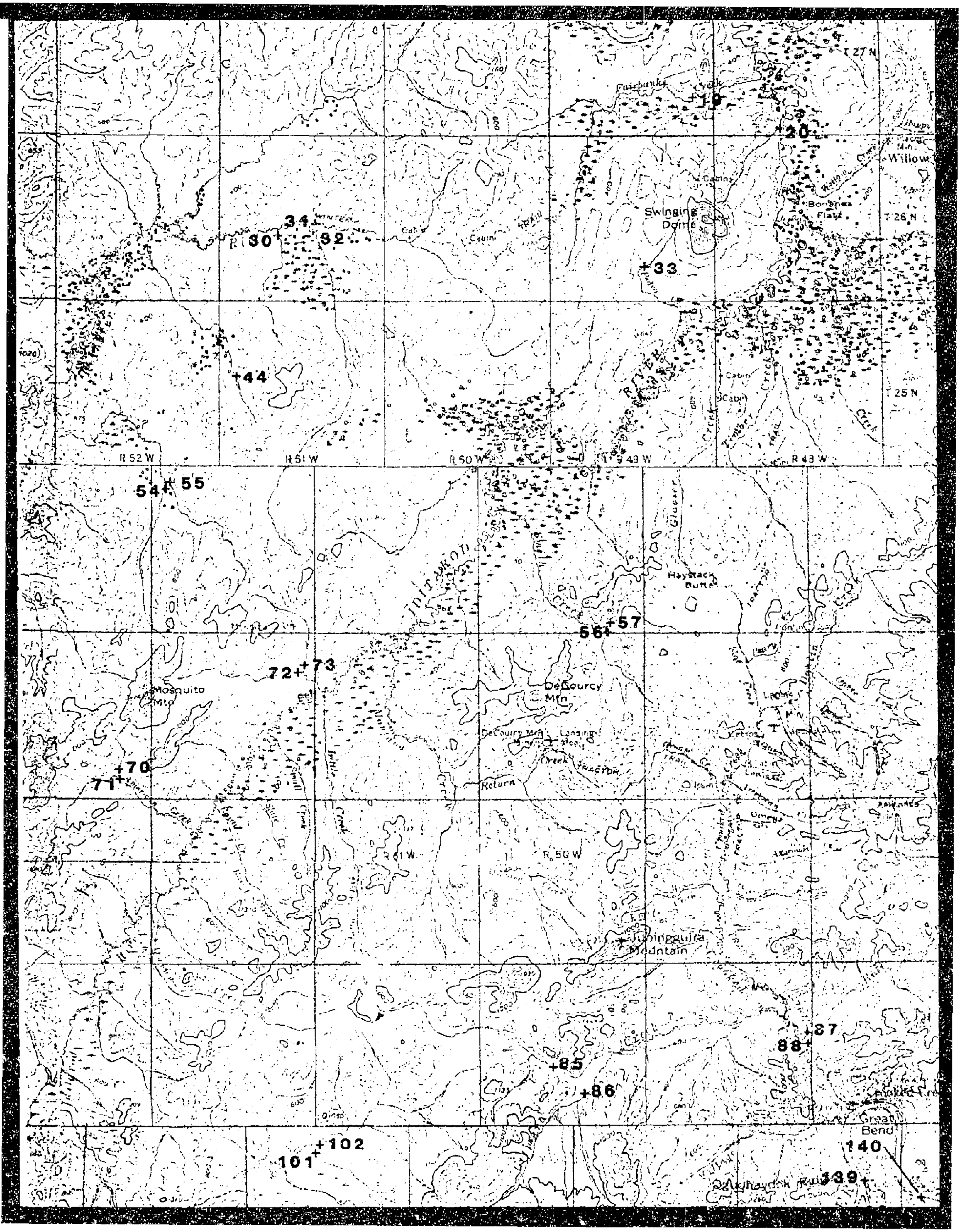
R.46 W.
R.45 W
R.44 W
R.43 W
R.42 W
Windy
Creek
Cabin
T 30 N
T 29 N
T 28 N
Caribou
Camelback Mtn
Coal
Au, Cr, Hg, Pb, Sb, W & Geothermal
Au & Cu
Au & Zn
Discovery
Au, Cr, Hg, Sb,
W & Geothermal
Co
Au
Willow Creek


R 42 W
R 40 W
R 39 W
R 38 W
Creek
Crater Mtn
T 30 N
Fourth of July Creek
Moore Creek
T 29 N
Sheaty Mtn
Big Creek
R 42 W
R 41 W
R 40 W
R 39 W
R 38 W
Sugarloaf Mtn
Au
T 28 N
Au, Co & Zn
Au & Cu
Au & Zn
Au
Au, Co & Zn
Eldorado
Creek

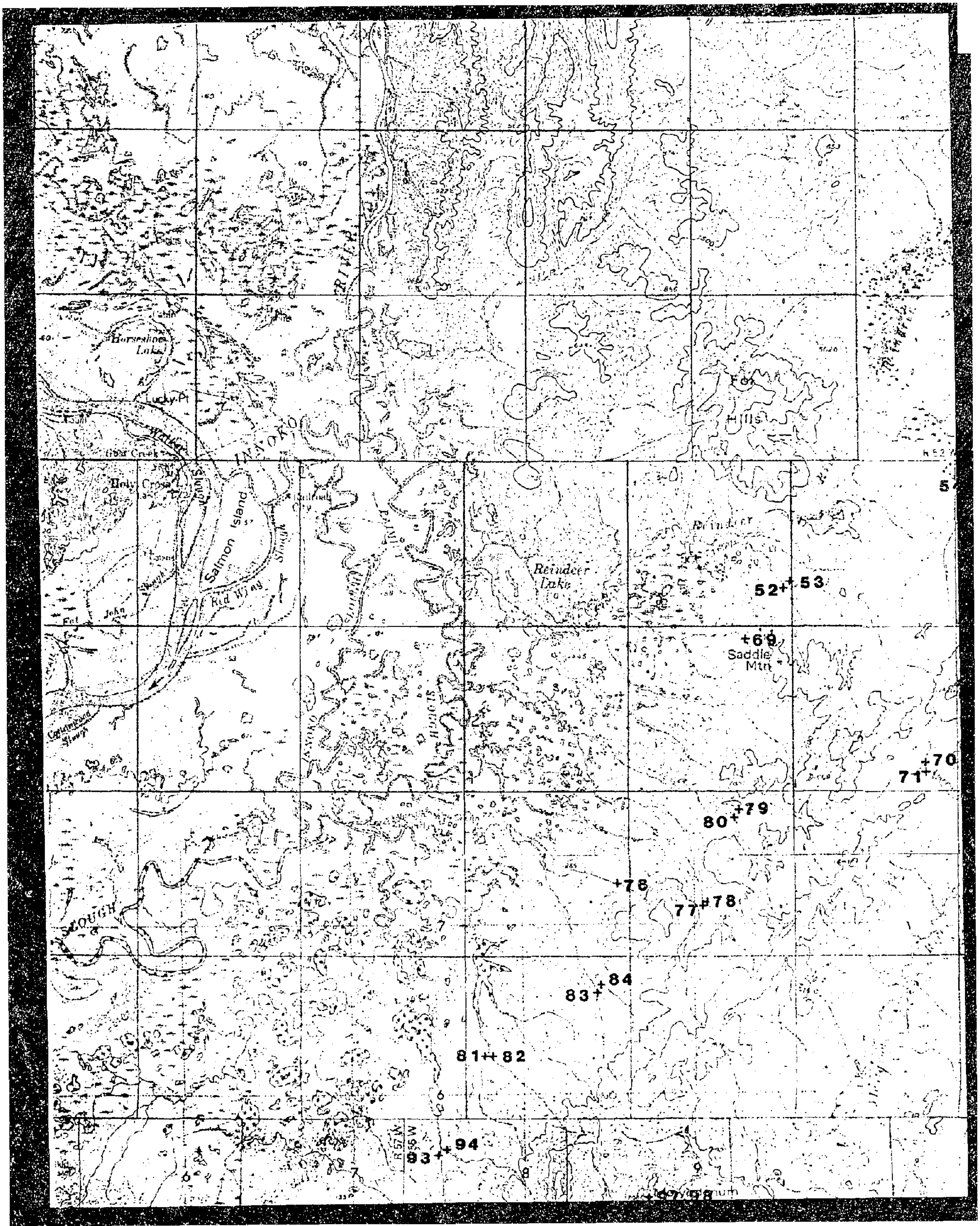

R 37 W
R 36 W
CANDLE LANDING (15 A)
T. 32 N
T. 31 N
45'
3 200 000 FEET
Beaver Creek
T. 30 N
T. 29 N
R 37 W
R 36 W
T. 28 N
30'
T. 27 N
T. 26 N

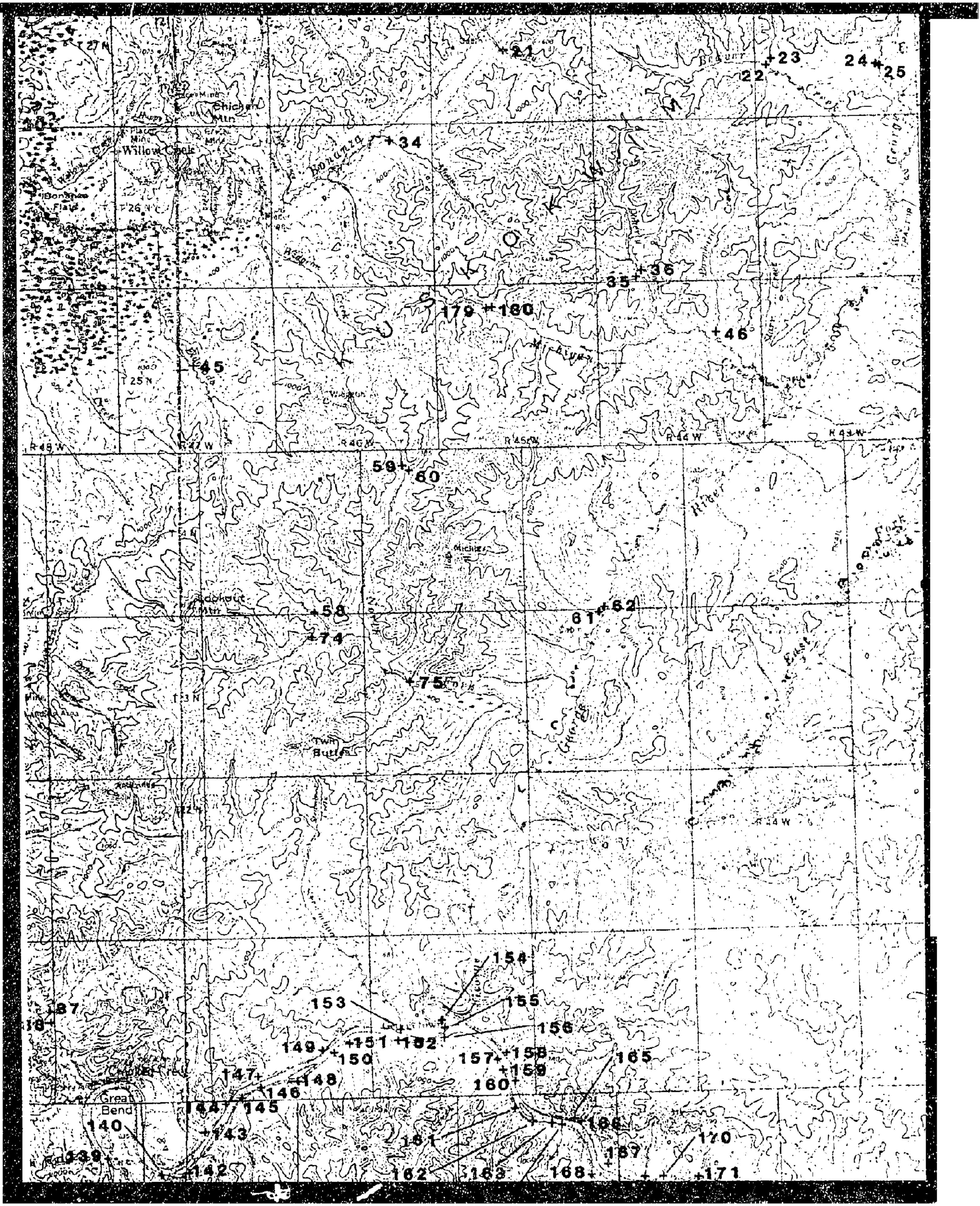


Paradise
RIVER
Horseshoe Lake
Dividing
Lucky Pt
Holy Cross
HOLY CROSS HILLS
Horse Island
Tabernacle Mtn
HILLS
Paimiut Mountain
Great Paimiut Island
SLOUGH
Slough
3
4
5
6



T 27 N
Fairbanks Creek
+19
+20
Willow
Cabins
Swinging Dome
Bonanza Flats
T 26 N
31
R 30+
32
Cabin
+33
+44
Cabin
T 25 N
R 52 W
R 51 W
R 50 W
R 49 W
R 48 W
54+
55
Haystack Butte
56+
57
72+
73
Mosquito Mtn
DeCourcy Mtn
DeCourcy Mtn Landing
TRACTOR
Creek
Return
+70
71+
R 51 W
R 50 W
Juningguira Mountain
+87
88+
+85
+86
Great Bend
101+
102
140
139+


Horseshoe Lake
Lucky Pt
INNOKO
RIVER
Holy Cross
Salmon Island
Slough
Red Wing
Reindeer Lake
Reindeer
Fox
Hills
52
53
69
Saddle Mtn
70
71
80
79
76
77
78
SLOUGH
Cottonwood Slough
83
84
81
82
R 57 W
R 56 W
93
94



21
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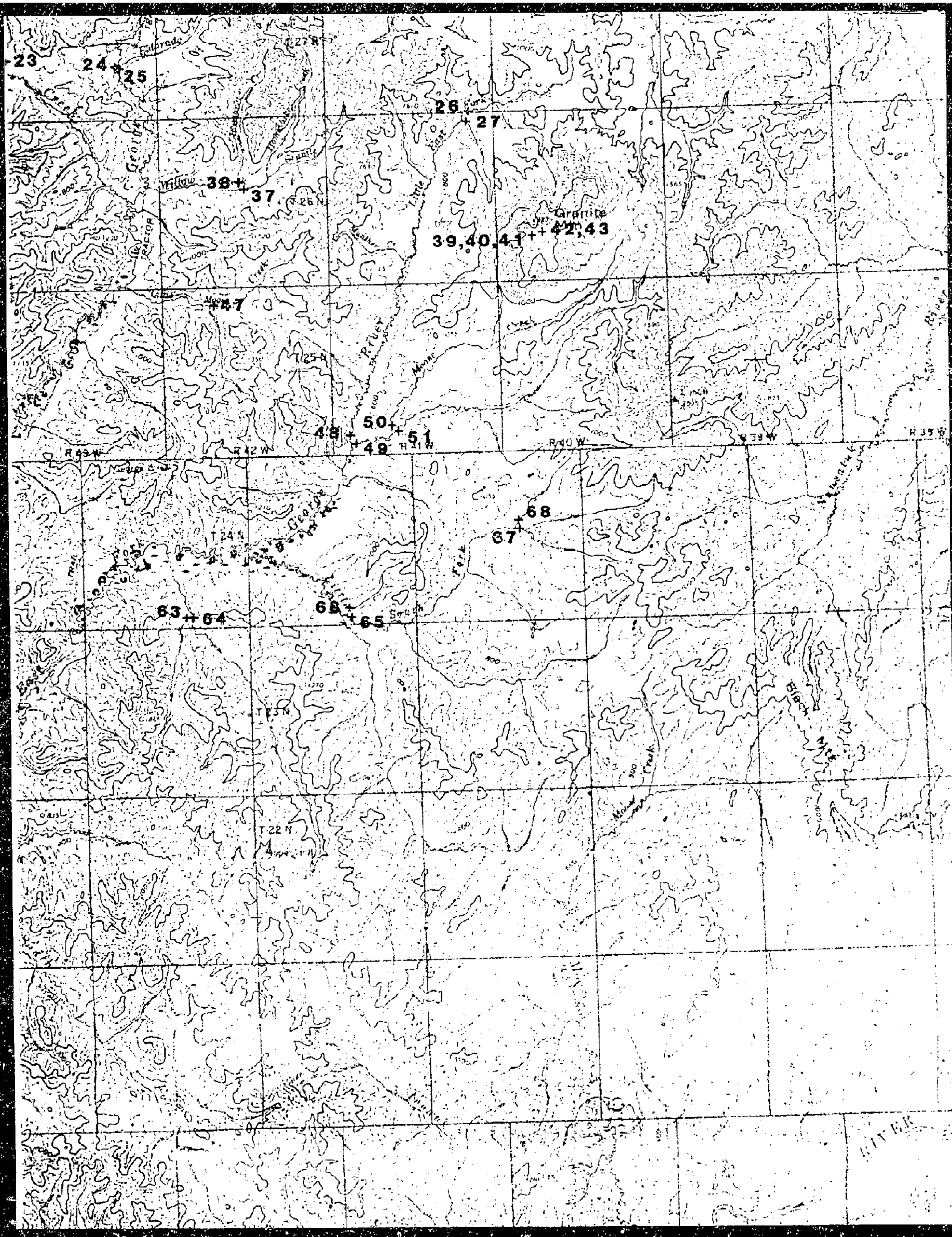
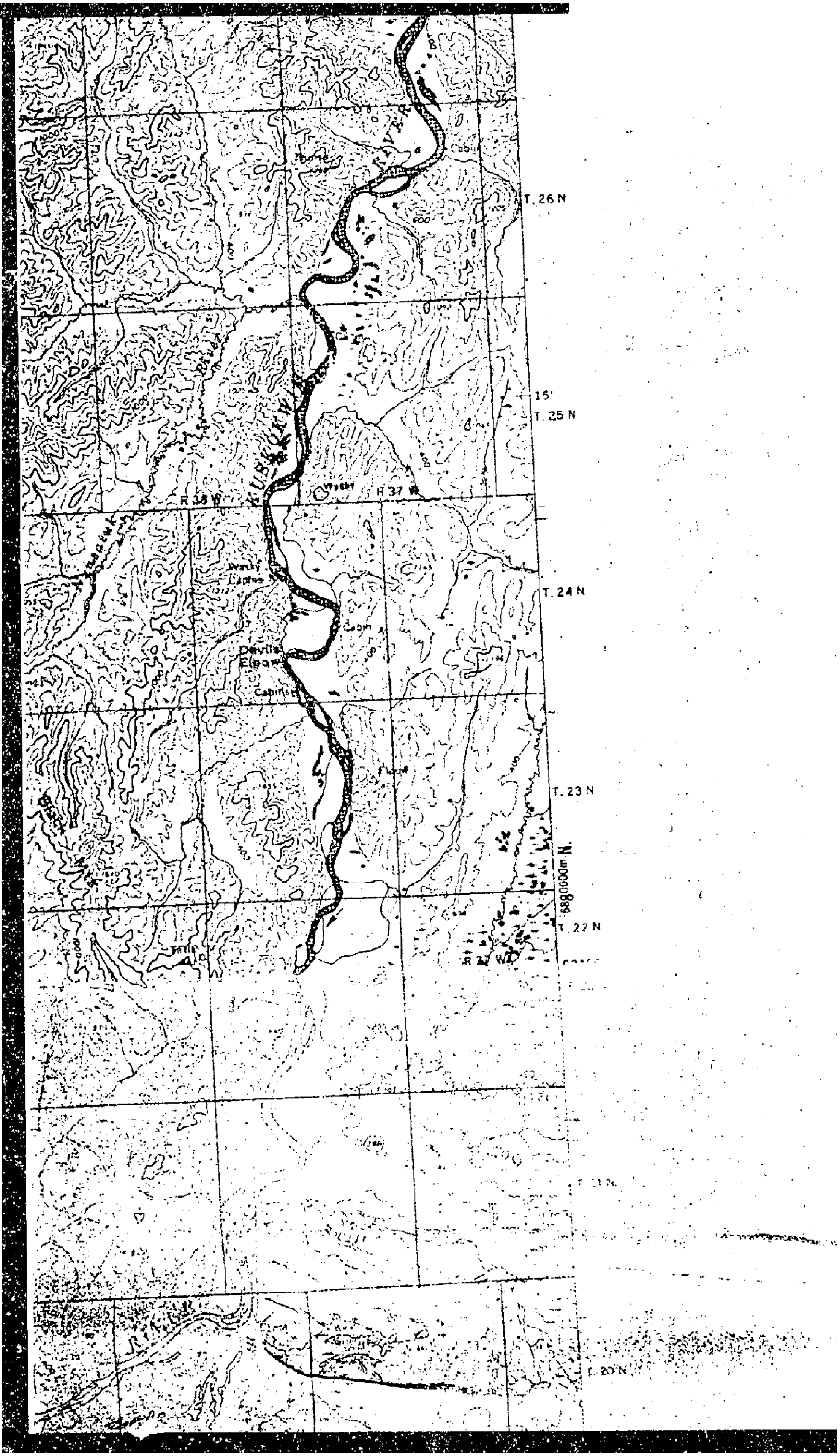
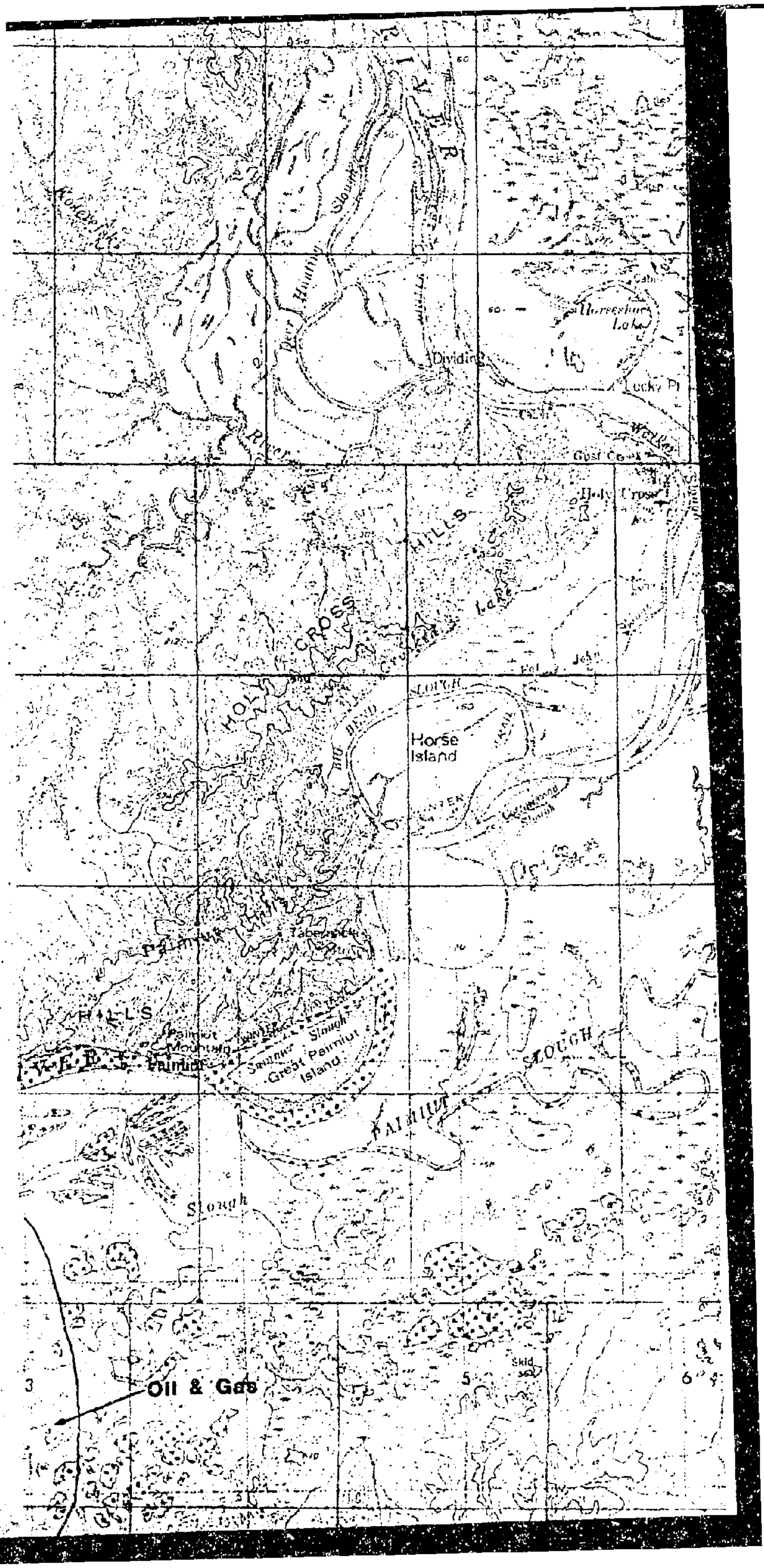
165
166
167
168
170
171
179
180
Chicken Mtn
Willow Creek
Bonanza
Beaver
Creek
George
T 27 N
T 26 N
T 25 N
R 48 W
R 47 W
R 46 W
R 45 W
R 44 W
R 43 W
River
Lookout Mtn
Twin Buttes
Fork
East
Great Bend

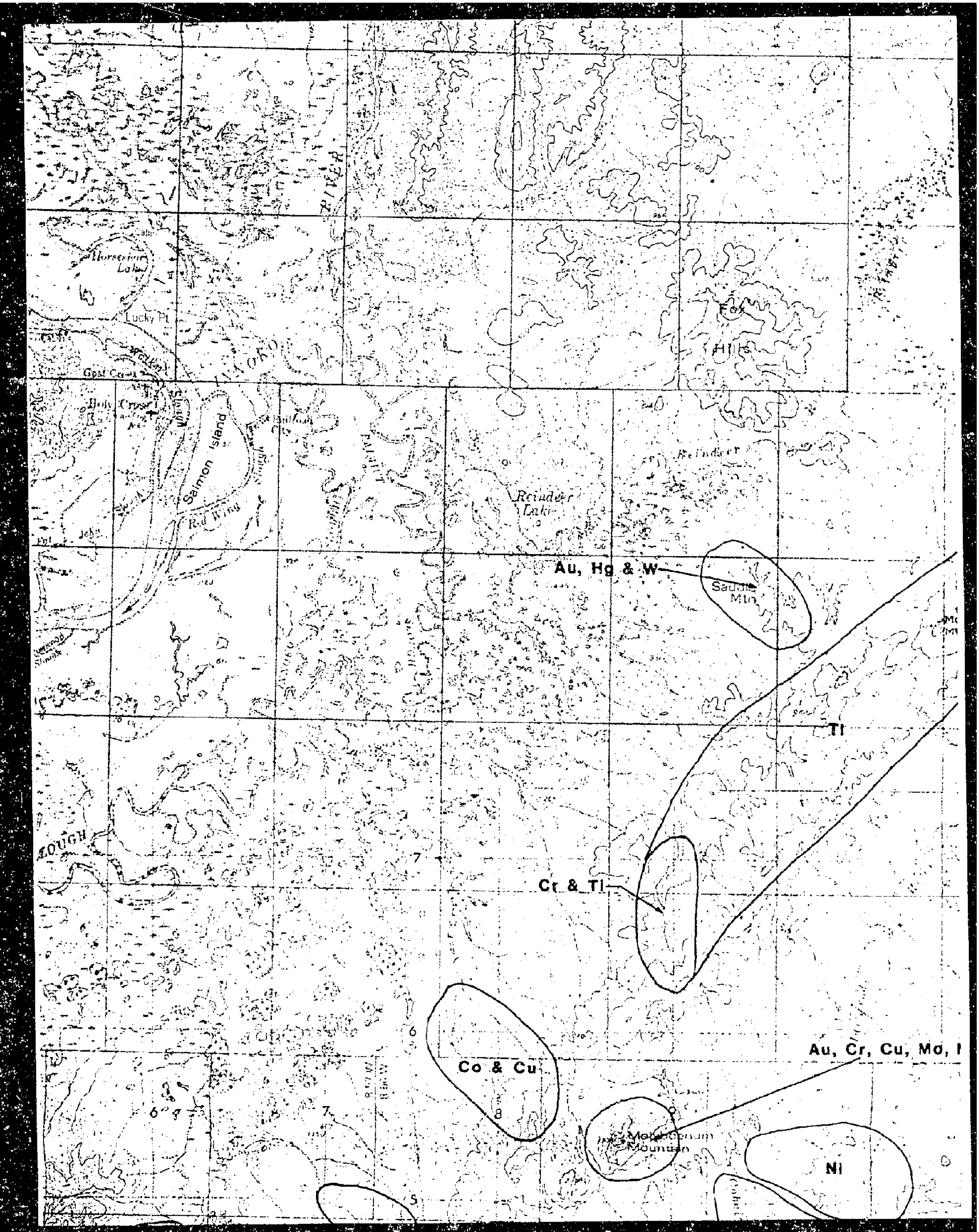


23
24
25
26
27
36
37
39,40,41
42,43
Granite
47
48
49
50
51
63
64
65
66
67
68
T 24 N
T 22 N
R 42 W
R 40 W
R 39 W
Little
George
South
Fork
Creek
Black

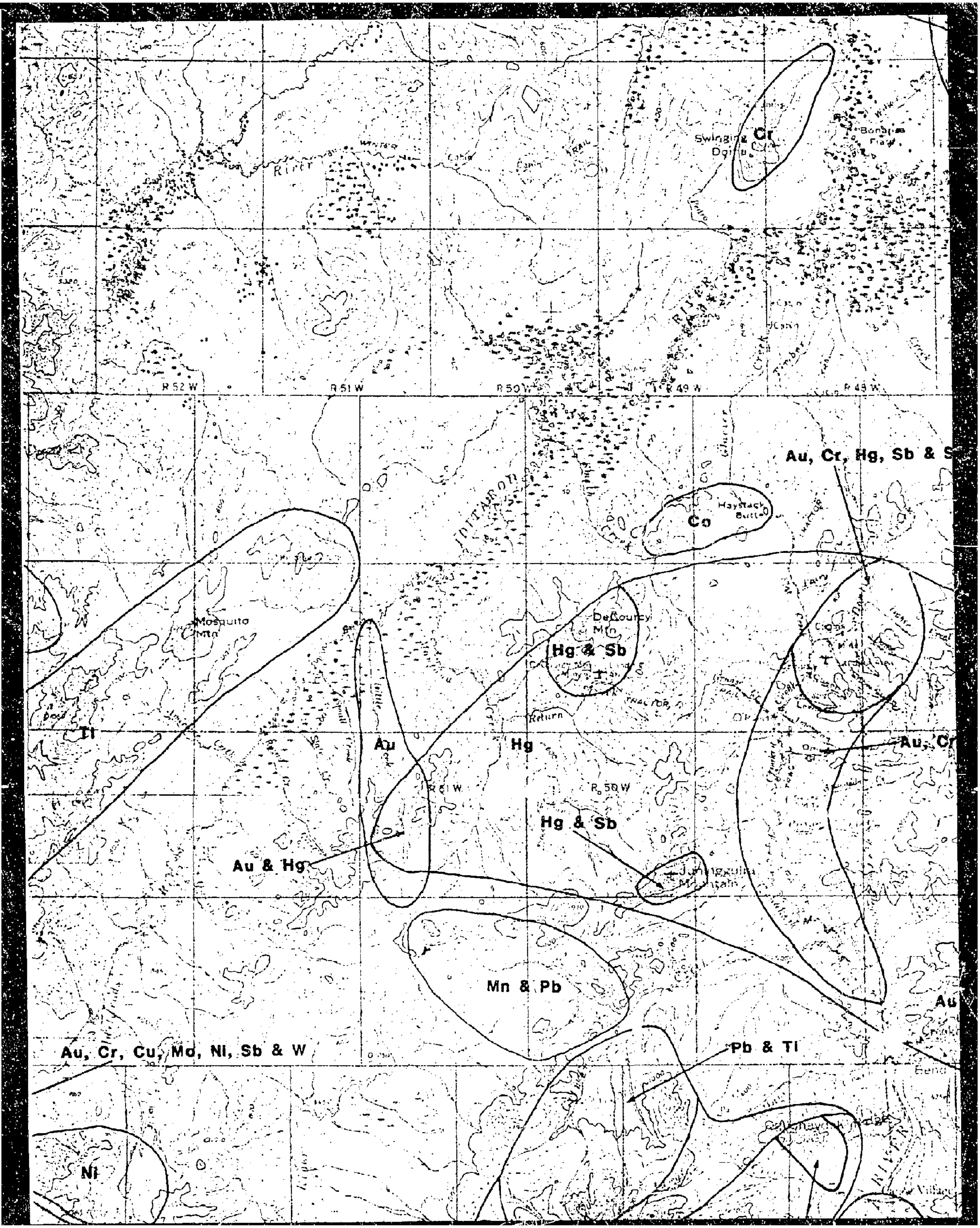

T. 26 N
15'
T. 25 N
R 38 W
R 37 W
T. 24 N
Devils Elbow
Cabin
T. 23 N
5880000m N.
T. 22 N
T. 20 N



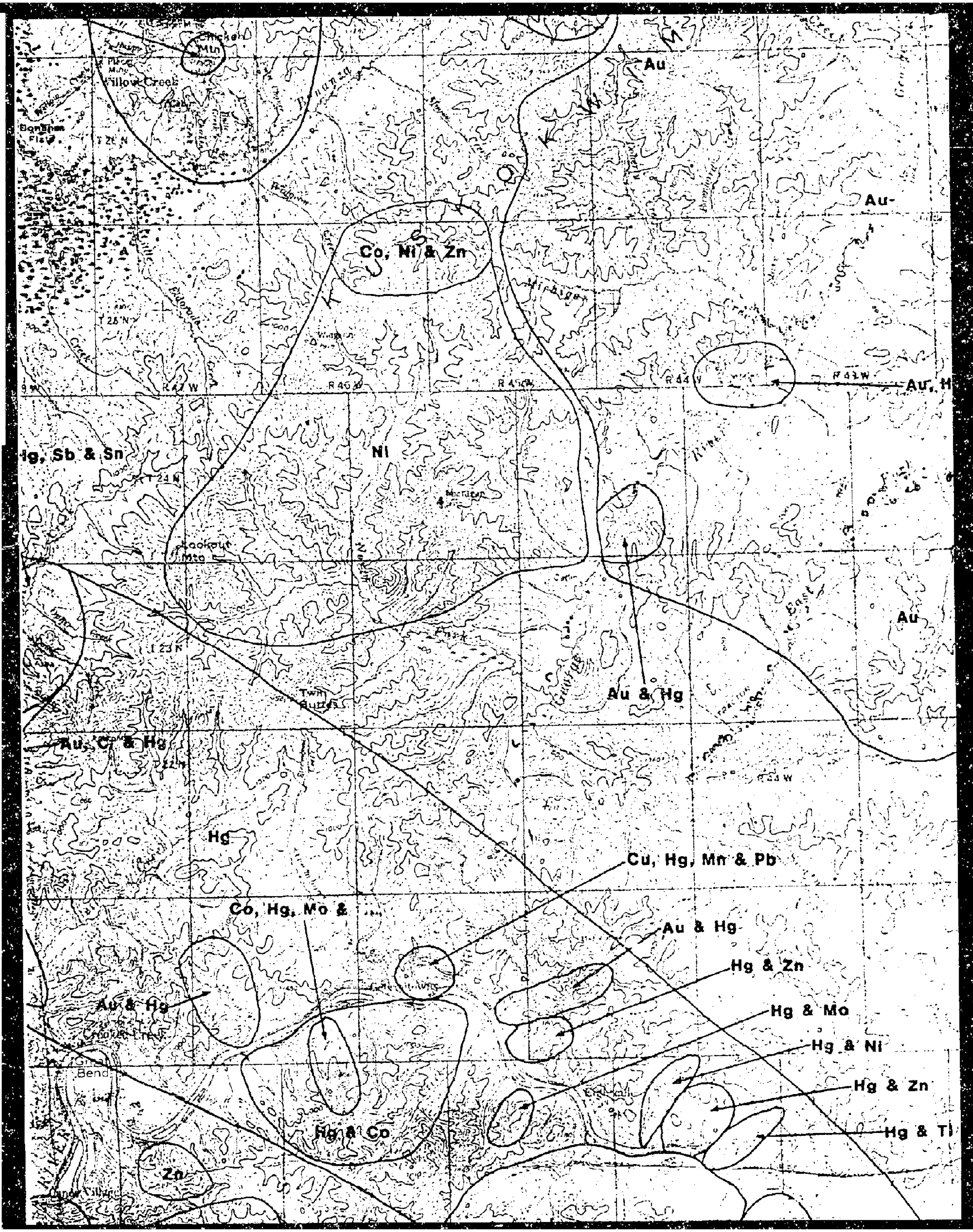
RIVER
Deer Hunting
Slough
Horseshoe Lake
Dividing
Lucky Pt
River
Holy Cross
HILLS
HOLY CROSS
Lake
Horse
Island
Great Paimiut
Island
Paimiut
Mountain
Paimiut
SLOUGH
Slough
HILLS
Oil & Gas
Skid
3
5
6



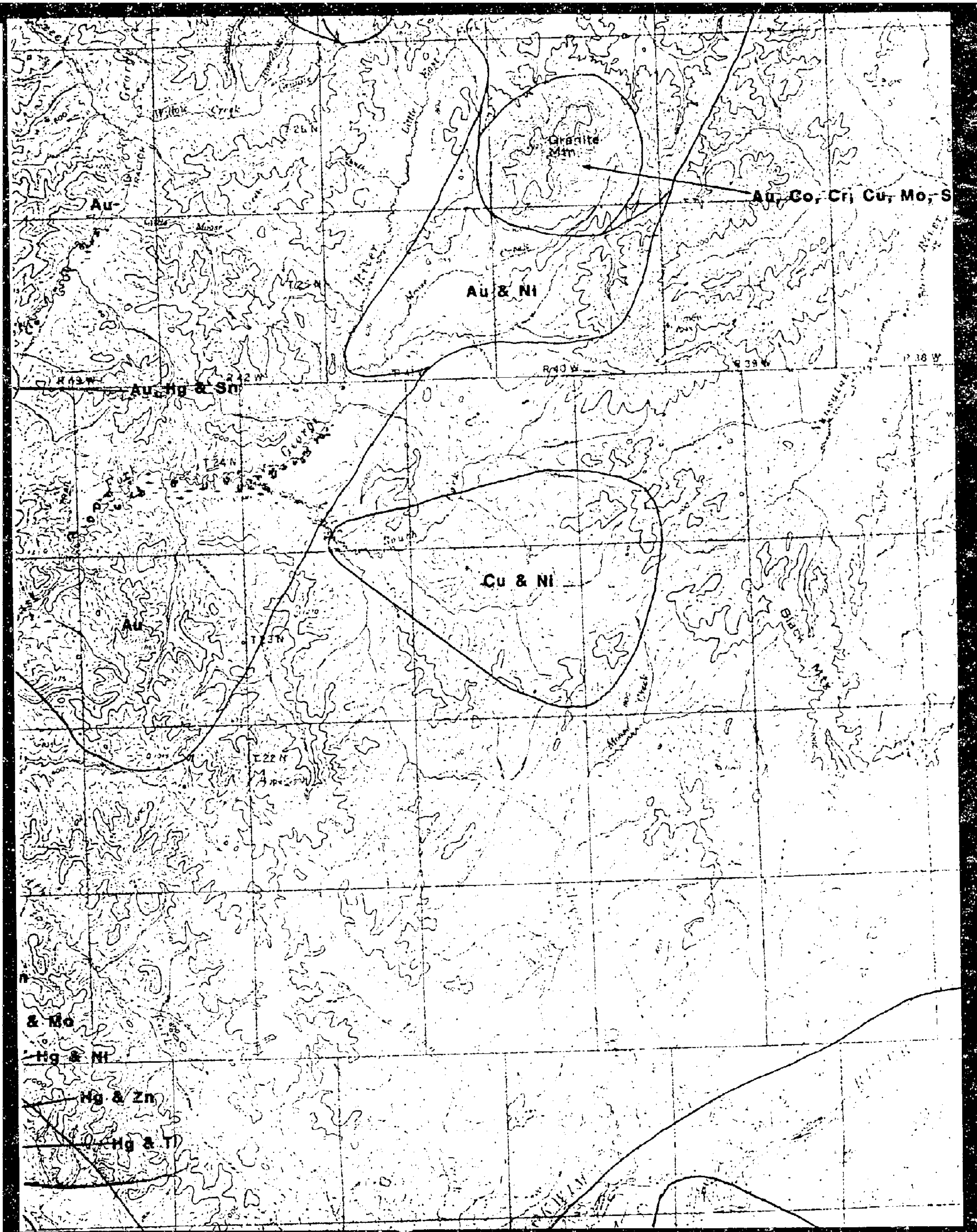
Horseshoe Lake
Lucky Pt
Holy Cross
Salmon Island
Red Wing
Reindeer Lake
Reindeer
Fox Hills
Au, Hg & W
Saddle Mtn
Tl
Cr & Tl
Co & Cu
Au, Cr, Cu, Mo, I
Molybdenum Mountain
Ni



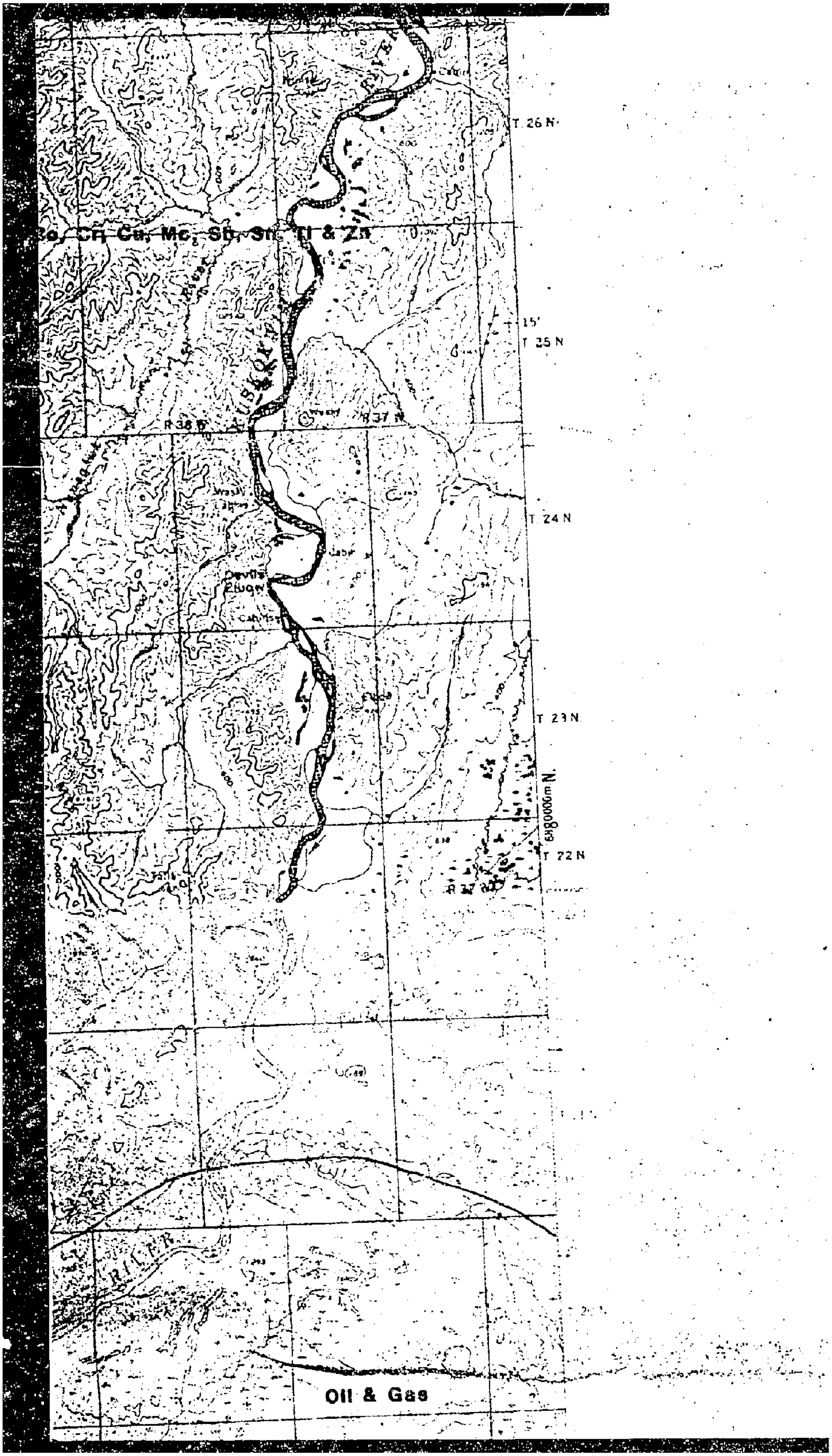
Cr
Swinging Dome
Bonanza Flats
R 52 W
R 51 W
R 50 W
R 49 W
R 48 W
Au, Cr, Hg, Sb & S
Haystack Butte
Co
Mosquito Mtn
DeCourcy Mtn
Hg & Sb
Ti
Au
Hg
Au, Cr
R 51 W
R 50 W
Hg & Sb
Au & Hg
Mn & Pb
Au
Au, Cr, Cu, Mo, Ni, Sb & W
Pb & Ti
Ni

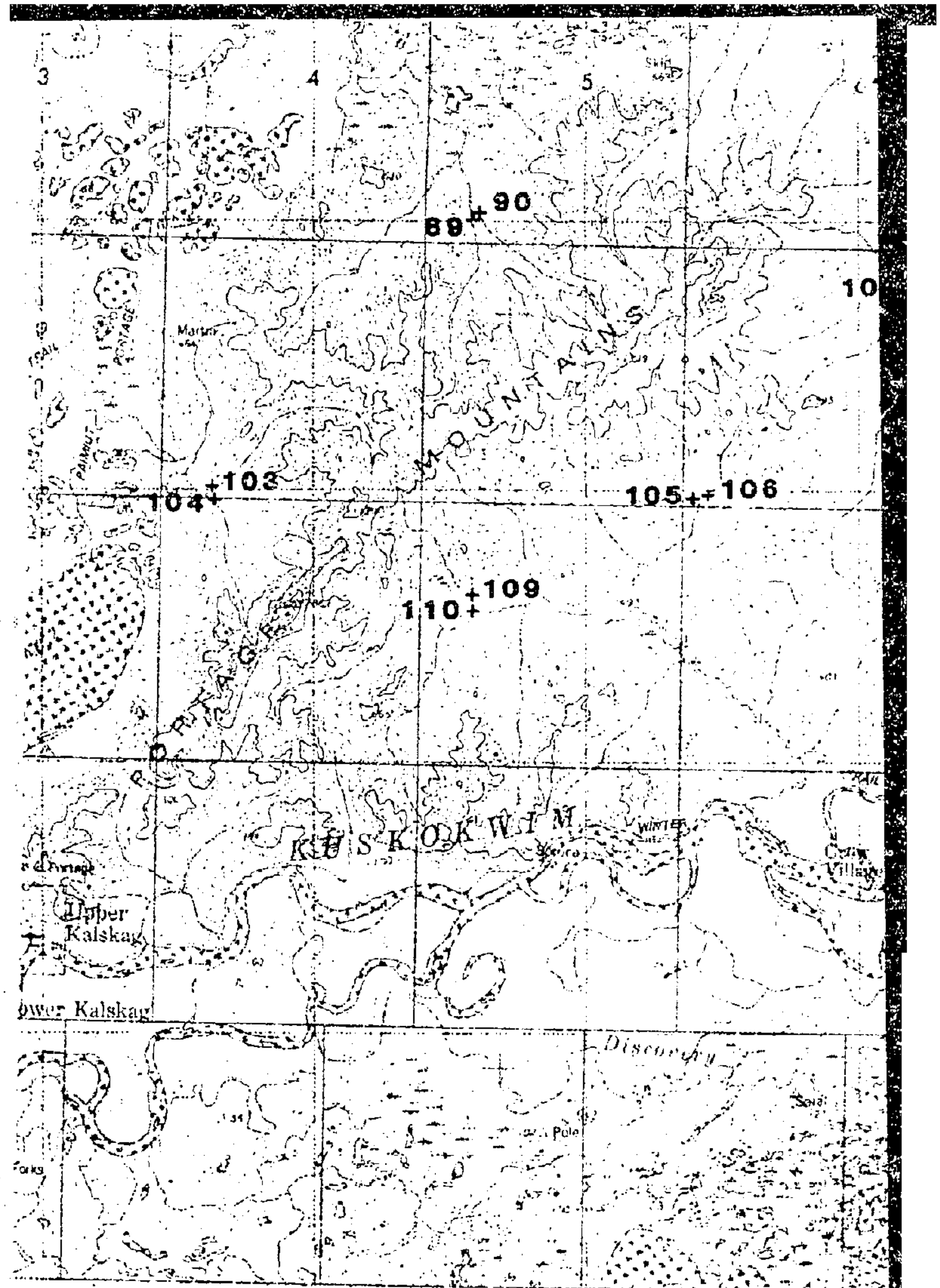


Au
Au-
Co, Ni & Zn
Au, H
Hg, Sb & Sn
Ni
Au
Au & Hg
Au, Cr & Hg
Hg
Cu, Hg, Mn & Pb
Co, Hg, Mo &
Au & Hg
Hg & Zn
Au & Hg
Hg & Mo
Hg & Ni
Hg & Zn
Hg & Co
Hg & Ti
Zn
Willow Creek
Lookout Mtn
Twin Buttes
Michigan
Great Bend
R 47 W
R 46 W
R 45 W
R 44 W
R 43 W
T 24 N
T 23 N
T 22 N

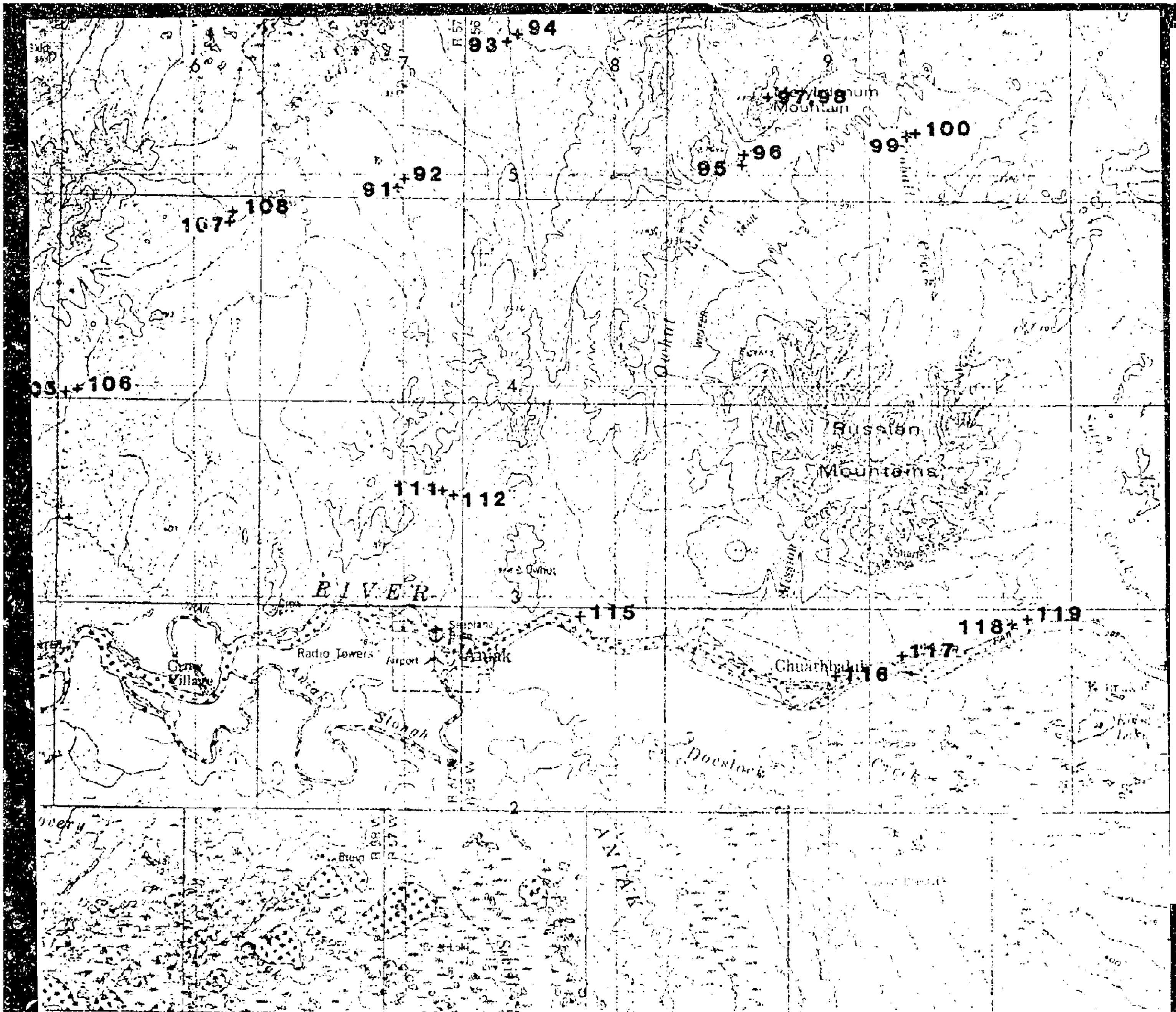


Granite Mtn
Au, Co, Cr, Cu, Mo, S
Au
Au & Ni
Au, Hg & Sn
Cu & Ni
Au
& Mo
Hg & Ni
Hg & Zn
Hg & Tl
T 24 N
T 23 N
T 22 N
R 40 W
R 39 W
R 38 W
Black Mts


Cu, Mo, Sb, Sn, Ti & Zn
T. 26 N
15'
T. 25 N
R 37 W
T. 24 N
Devils Elbow
T. 23 N
6880000m N.
T. 22 N
RIVER
Oil & Gas

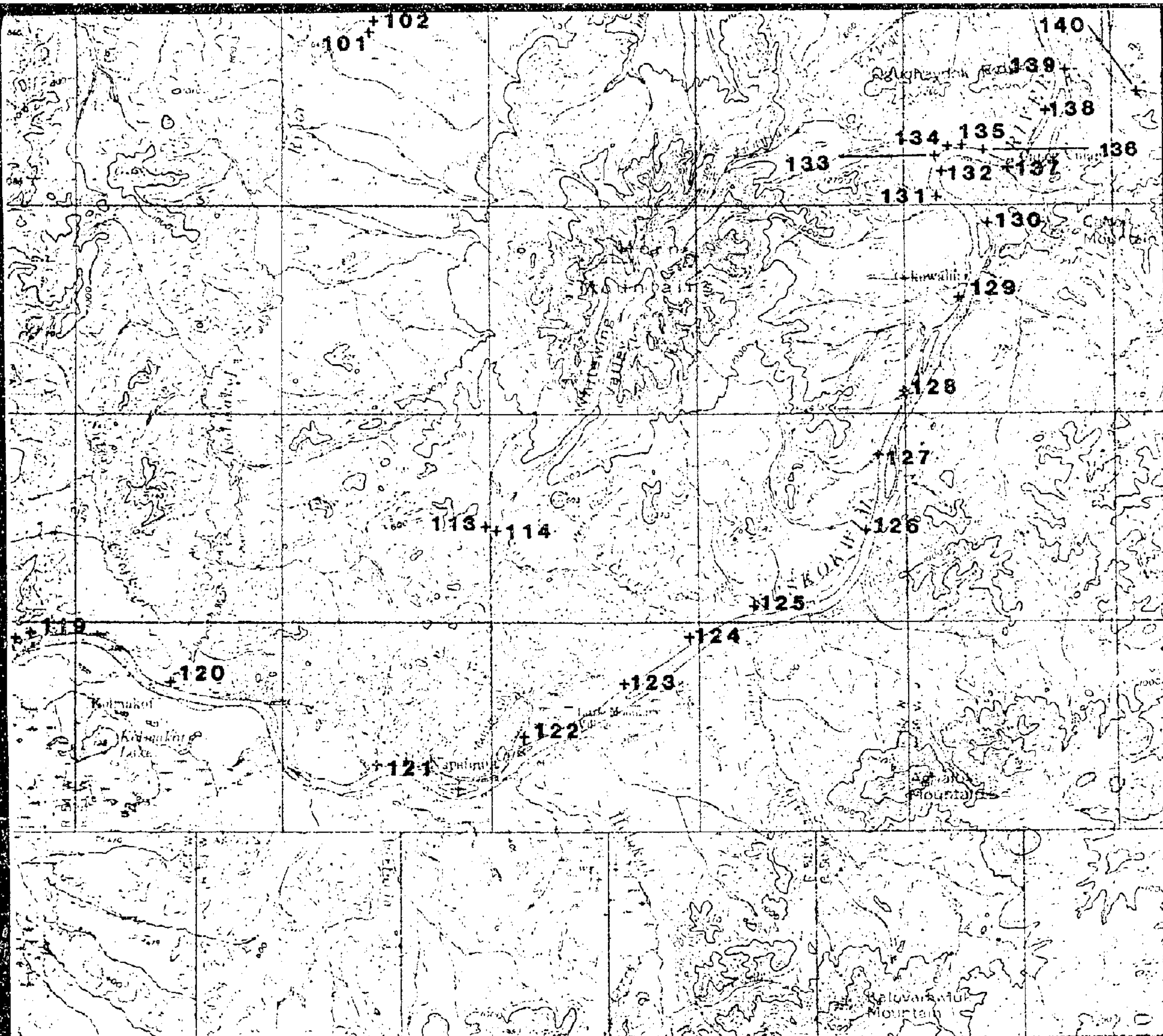


Base map adapted from U.S.G.S. Sleetmute, Iditarod, Holy Cross and Russian Mission 1:250,000 quadrangles



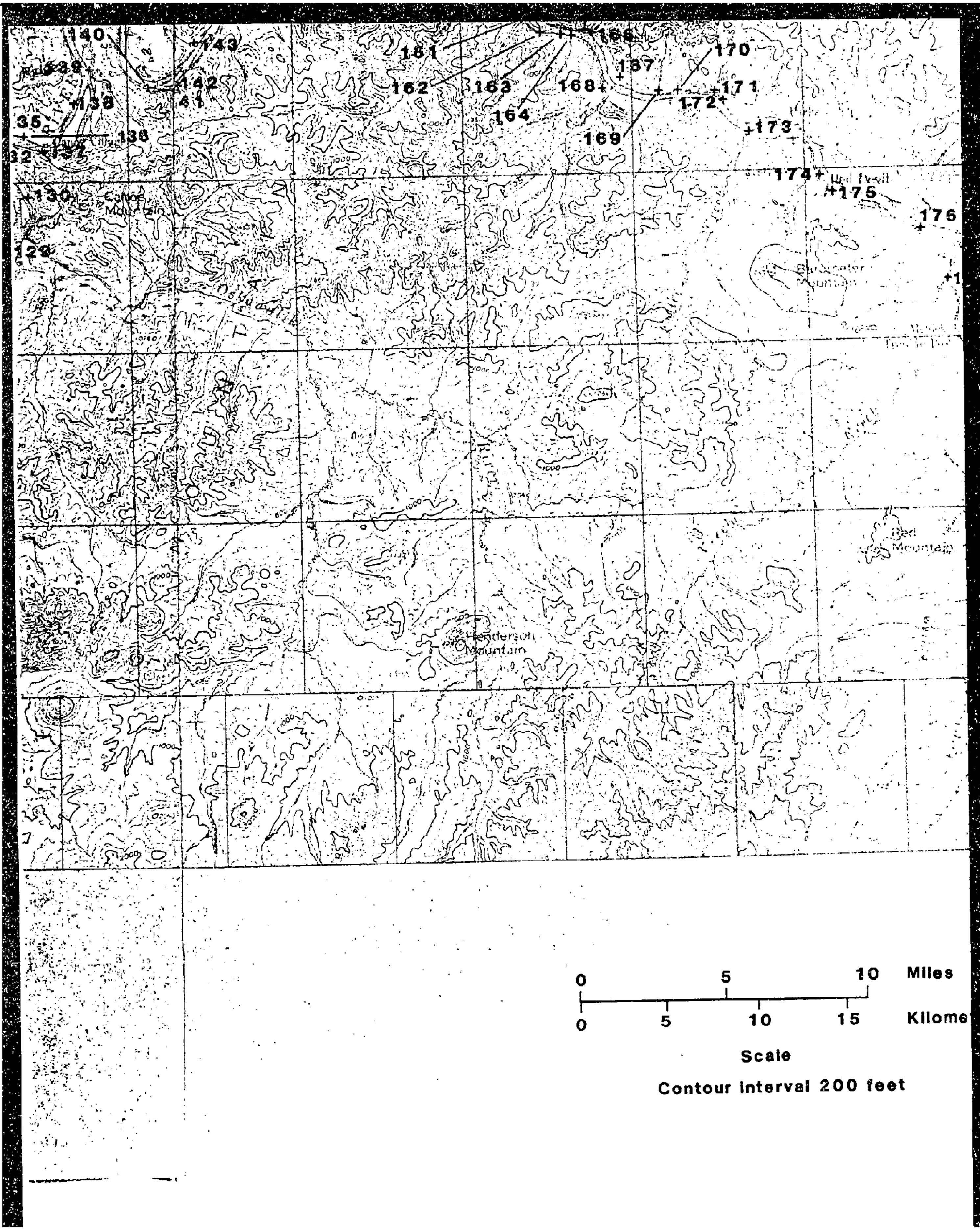
ltsrod,

adrangles



LEGEND

+ 160 Sample site



140
143
142
41
138
35
136
32
137
161
166
167
170
162
163
168
171
172
164
169
173
174
175
176
130
Canoe Mountain
129
Henderson Mountain
Red Mountain
0
5
10
Miles
0
5
10
15
Kilome
Scale
Contour interval 200 feet

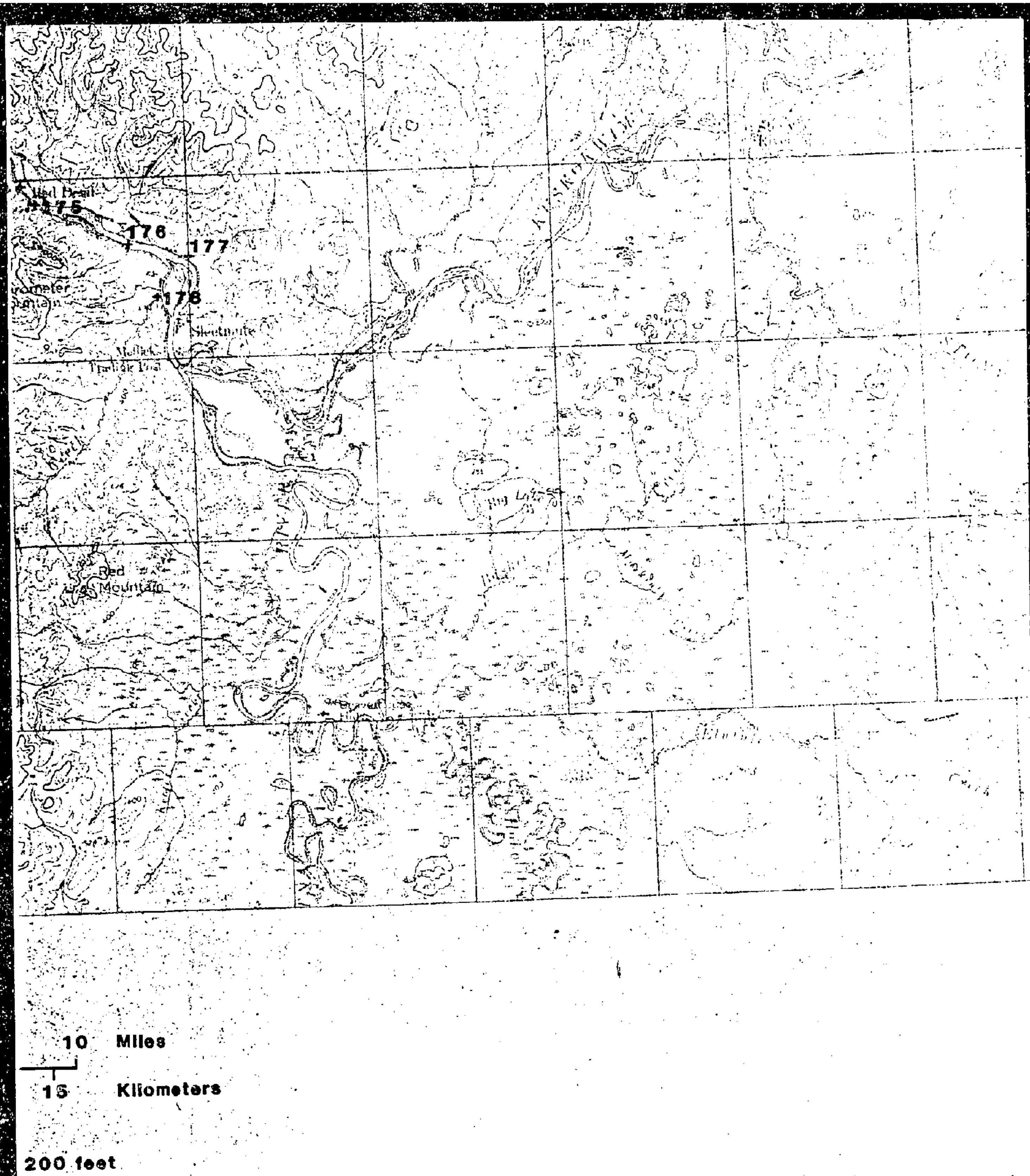
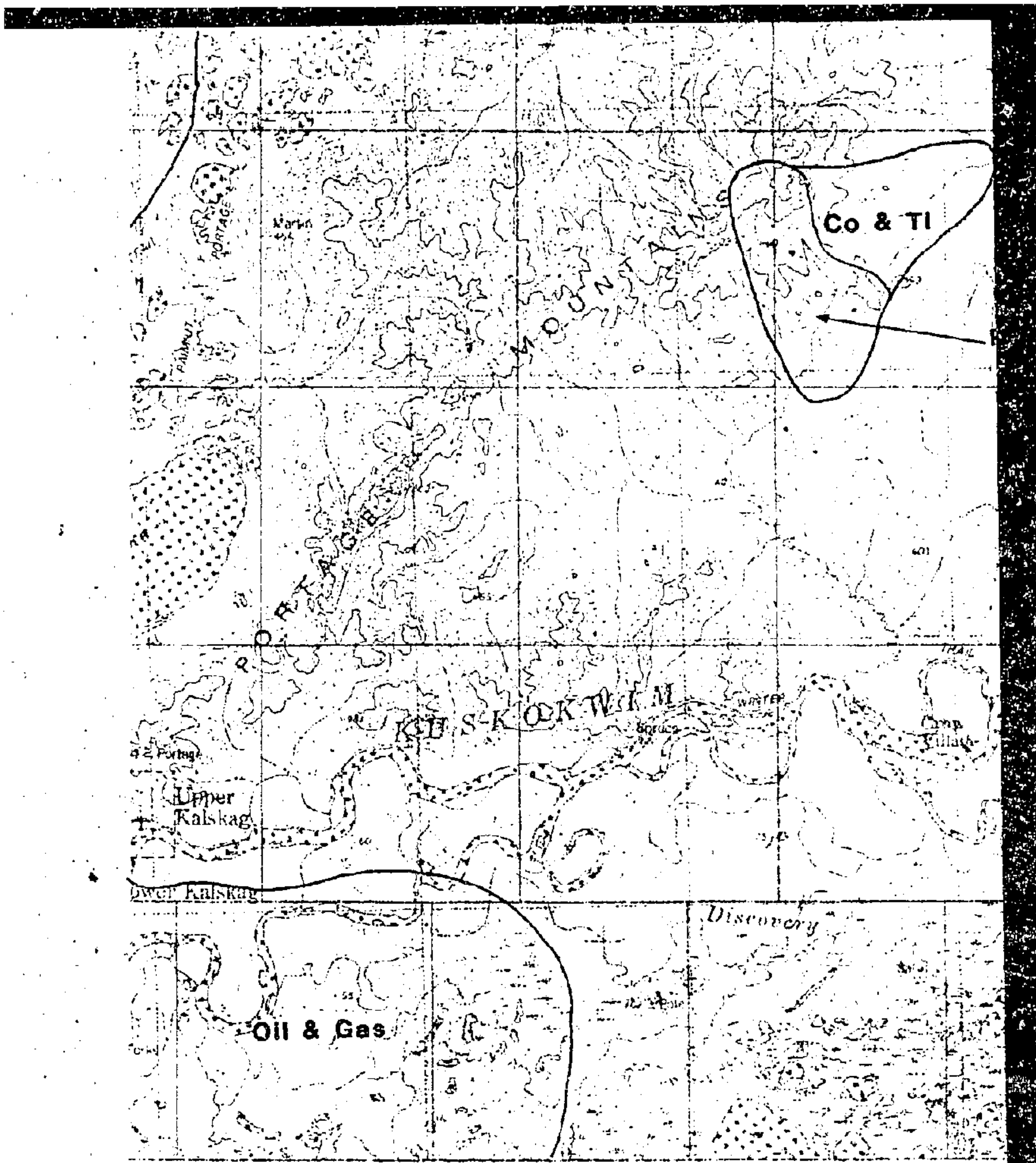
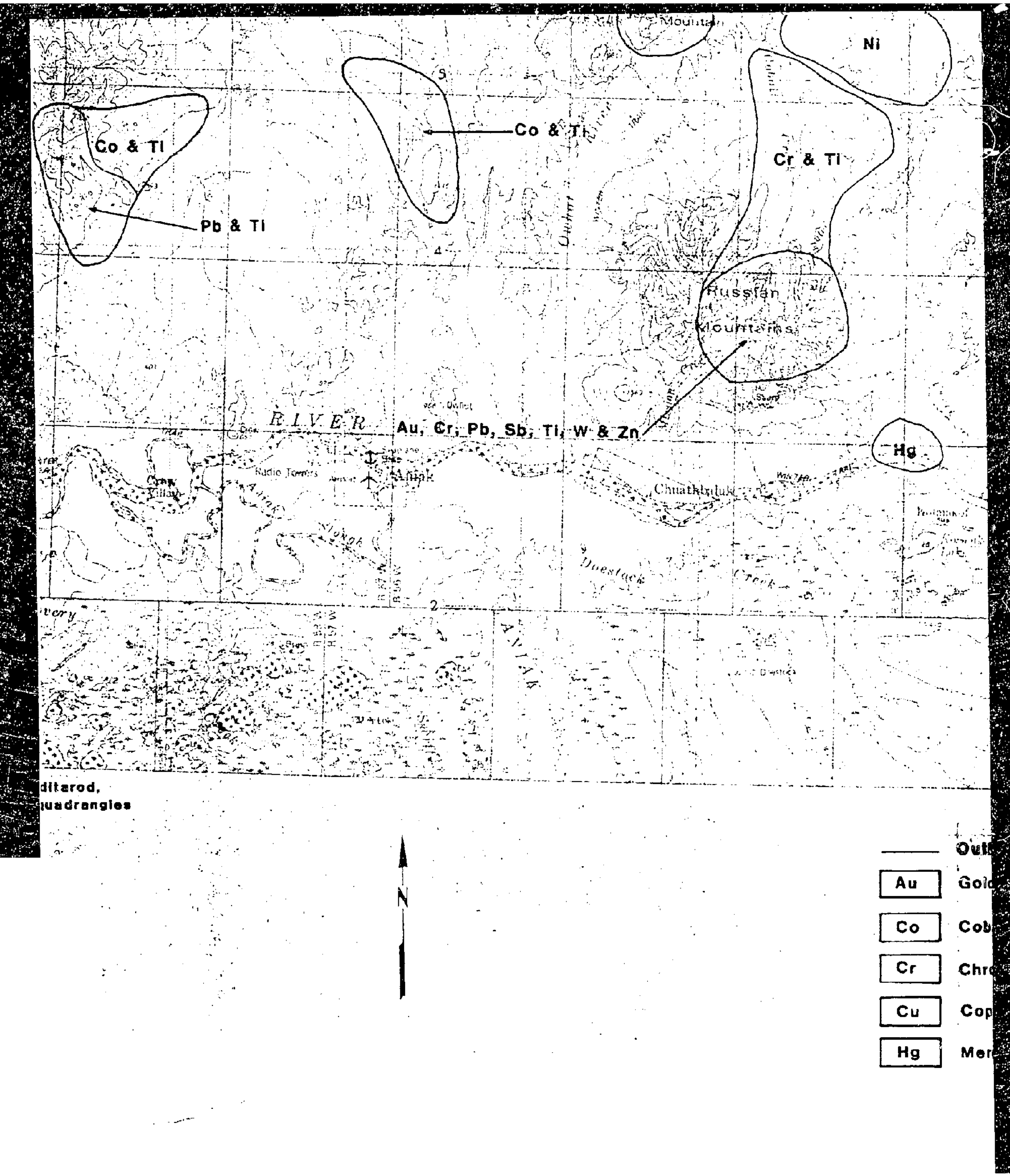


Figure 6. Sample sites

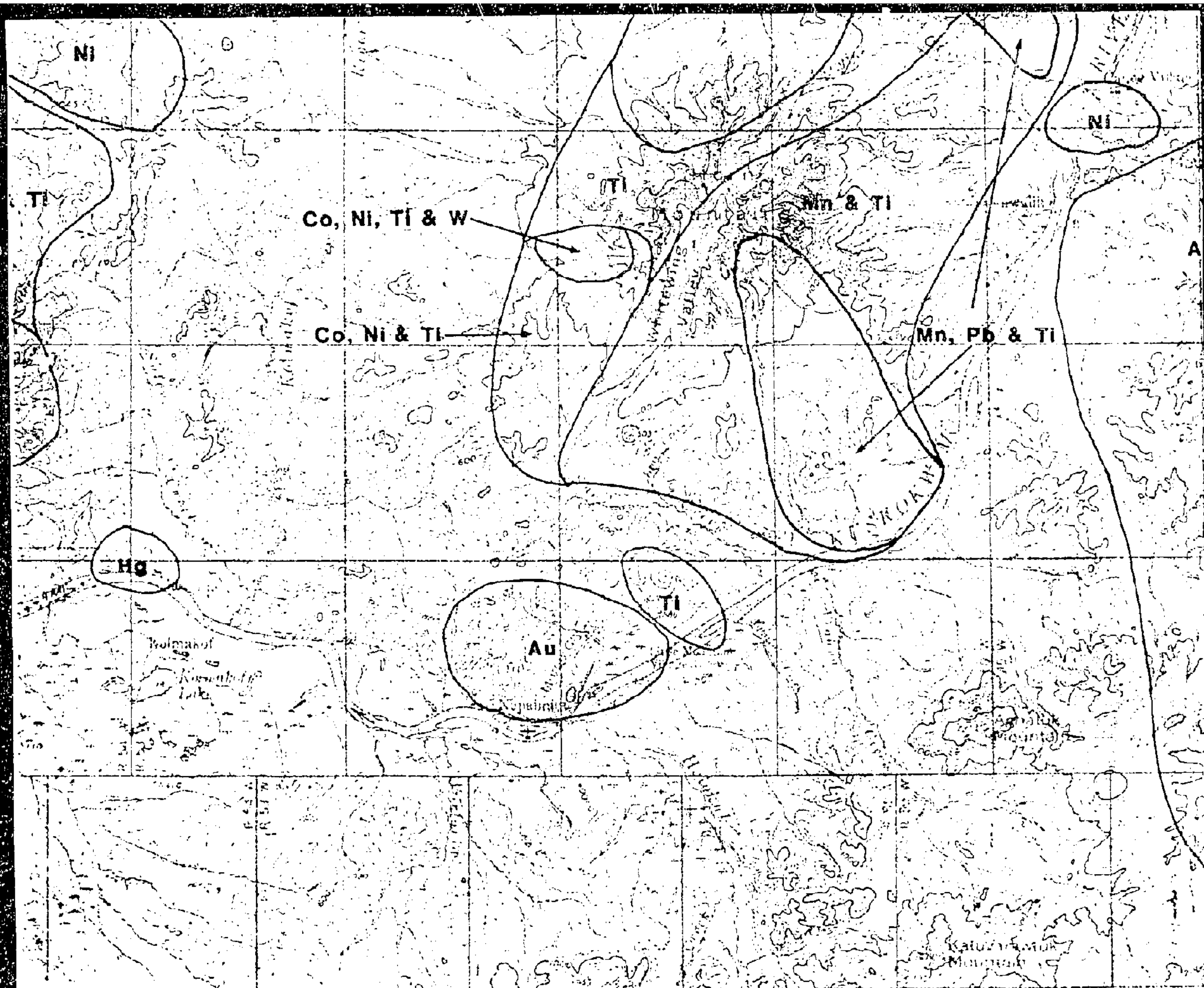
ple sites of the Iditarod-George study are



Base map adapted from U.S.G.S. Sleetmute, Iditarod, Holy Cross and Russian Mission 1:250,000 quadrangles



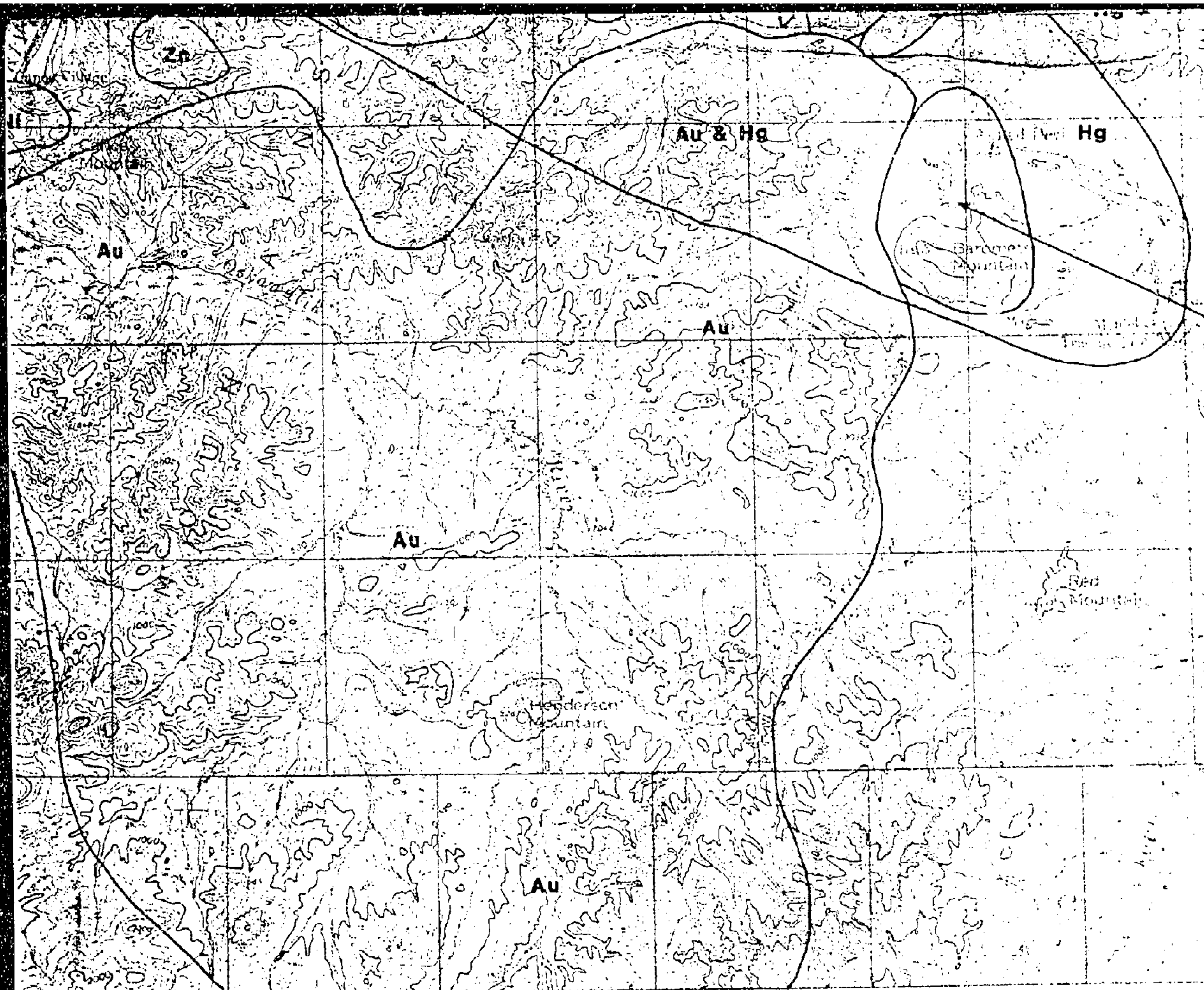
ditarod,
quadrangles



LEGEND

Outline of mineralized area

Au	Gold
Co	Cobalt
Cr	Chromium
Cu	Copper
Hg	Mercury
Mn	Manganese
Mo	Molybdenum
Ni	Nickel
Pb	Lead
Sb	Antimony
Sn	Tin
Ti	
W	
Zn	



Ti	Titanium
W	Tungsten
Zn	Zinc

0 5
0 5 10

Scal

Contour interv

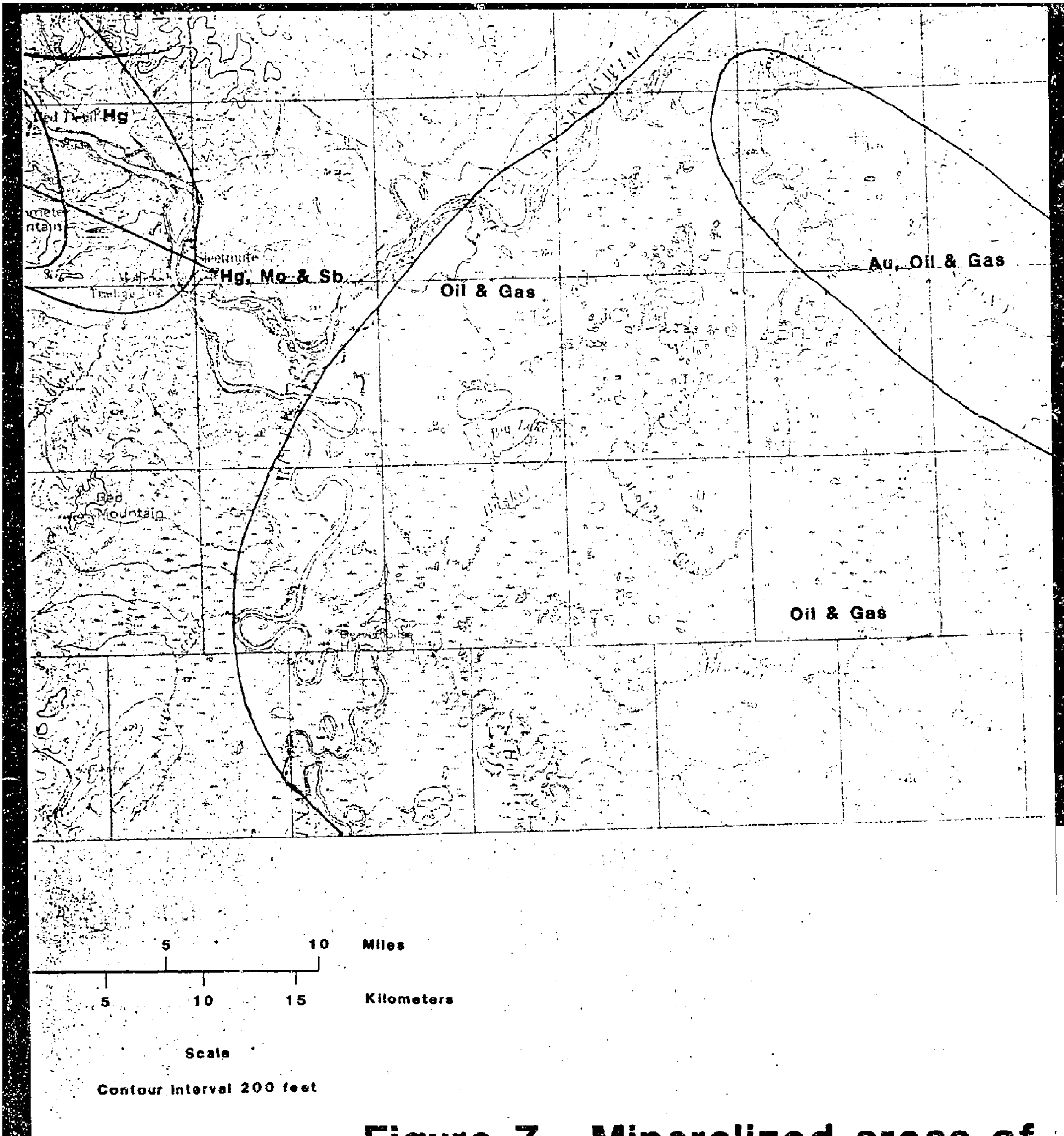
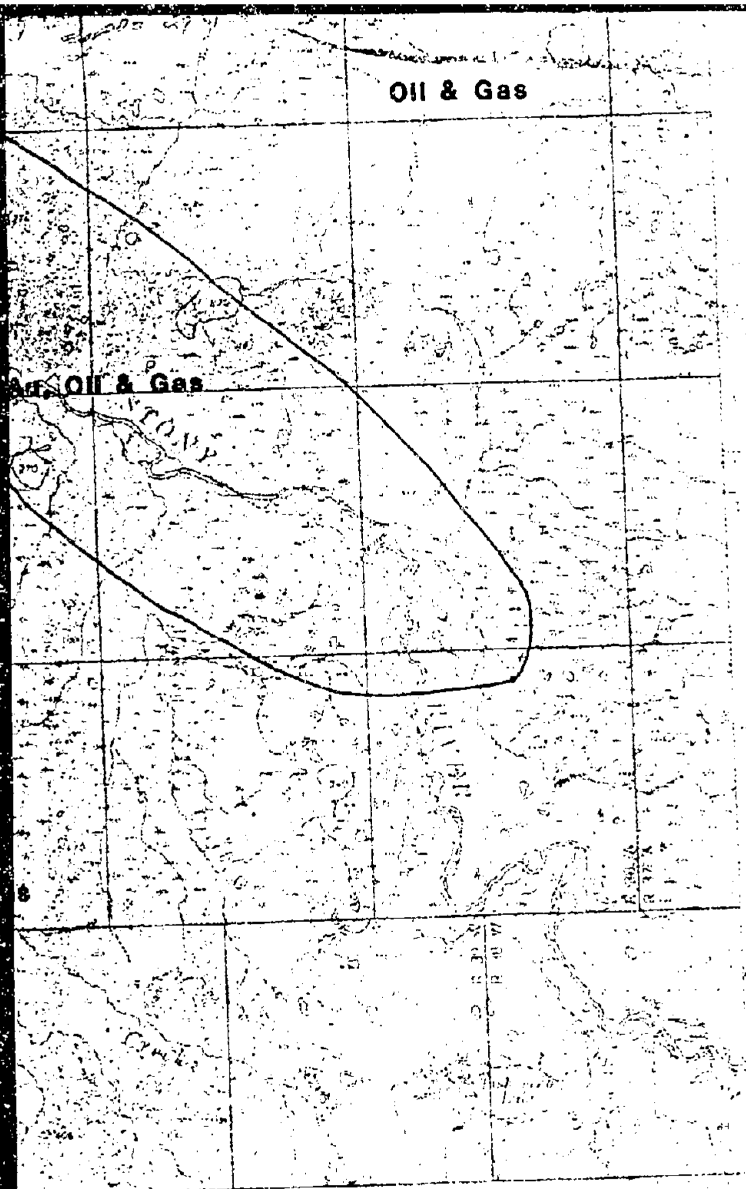


Figure 7. Mineralized areas of



reas of the Iditarod-George study area