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MINERAL DEPOSITS OF THE KANUTI RIVER AREA: A SUMMARY REPORT

By Karen H. Clautice, Alaska Field Operation Center,
Fairbanks, Alaska

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FOREWORD

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

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

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

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by

Karen H. Clautice 1/

ABSTRACT

A review of available literature and industry data on the proposed Kanuti National Wildlife Range and surrounding area shows several types of mineral occurrences in three rock type areas:

1. Granites of Cretaceous age and intruded metasedimentary rocks.

   A tungsten prospect is at the head of the south fork of Bonanza Creek. Tin, uranium and placer gold also are reported. Zinc, copper and lead may occur as stratabound deposits in the metamorphic units.

2. Sedimentary and volcanic rocks

   A lead-zinc prospect is within largely unexplored volcanic rocks that extend into the Highlands. A coal seam is located within 15 miles of the pipeline haul road. Sedimentary uranium deposits may occur in sandstone and conglomerate units directly underlying volcanic rocks.

3. Mafic/ultramafic igneous rocks

   One chromite prospect and a small chromite occurrence are found in the Caribou Mountain area. Minor asbestos is also reported in the Caribou Mountain and Sithylemenkat Lake areas. Other commodities that may occur include nickel, copper, and gold.

1/ Geologist, Alaska Field Operations Center, Fairbanks, Alaska

INTRODUCTION

This study, part of the on-going minerals availability program of the Bureau of Mines, Alaska Field Operation Center, addresses the Kanuti Flats and the Kokrines-Hodzana, Figure 1. Included in this area is the proposed Kanuti National Wildlife Refuge. All locatable, saleable or leaseable minerals except sand and gravel are considered.

This is a preliminary evaluation based on a review of the literature available on this region and on industry information. Previous studies have included geologic mapping at 1:250,000 scale (9) 2/, trace element sampling (8, 2, 5) and airborne magnetic (13) and gamma-ray surveys (12). The results and conclusions are indicative of the type of deposits and commodities that may be present but should not be considered conclusive with respect to this region's mineral potential.

GENERAL ROCK TYPES

The study region (figure 2) is immediately south and east of Bettles. It is crossed by the Alyeska pipeline and includes the Kanuti River Flats and the Kokrines-Hodzana Highlands. As shown in figure 3, this region is underlain by three distinct rock type areas: (1) a series of granitic intrusives with their metasedimentary host rocks comprising the Kokrines-Hodzana Highlands; (2) sedimentary and volcanic rocks predominantly within the Kanuti River Flats but also found within the Highlands; and (3) a belt of mafic/ultramafic igneous rocks and associated sedimentary rocks that are aligned along a major structural hinge line between the highlands and the flats.

The first area, located in the eastern portion of the study region, is composed of metasedimentary rocks intruded by granitic plutons. Coarse pegmatite dikes are locally abundant on the perimeters of the plutons (7).

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

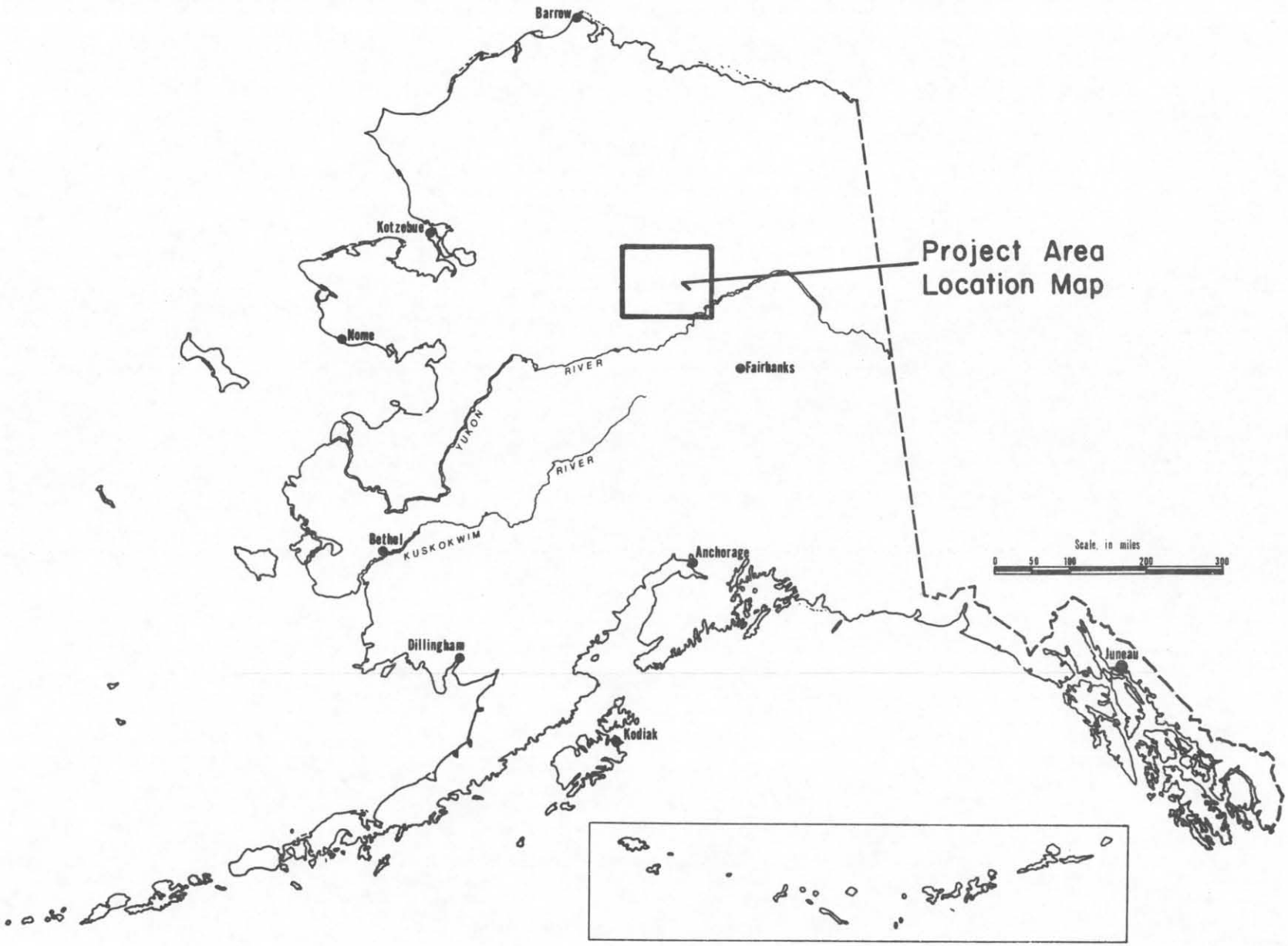
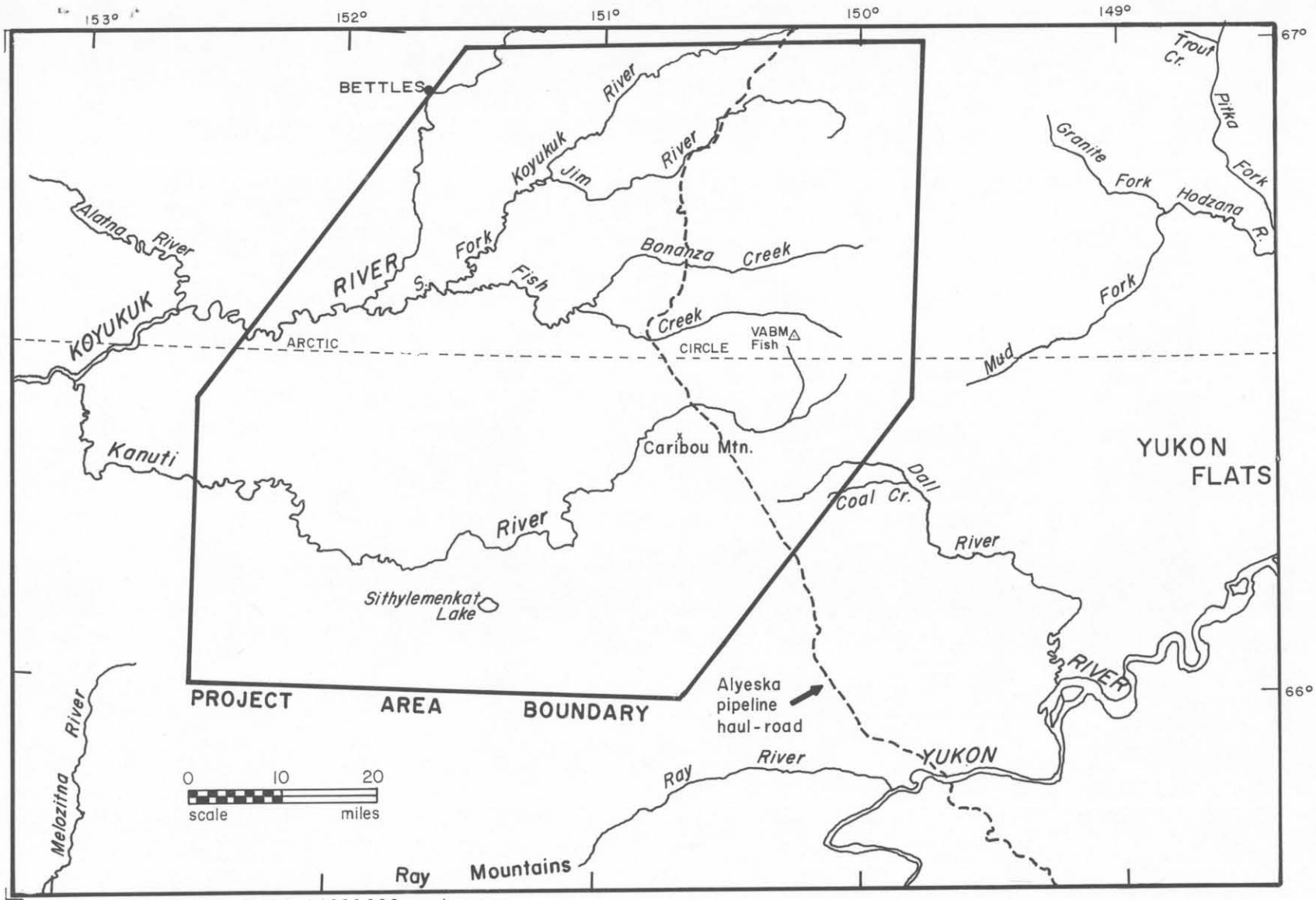
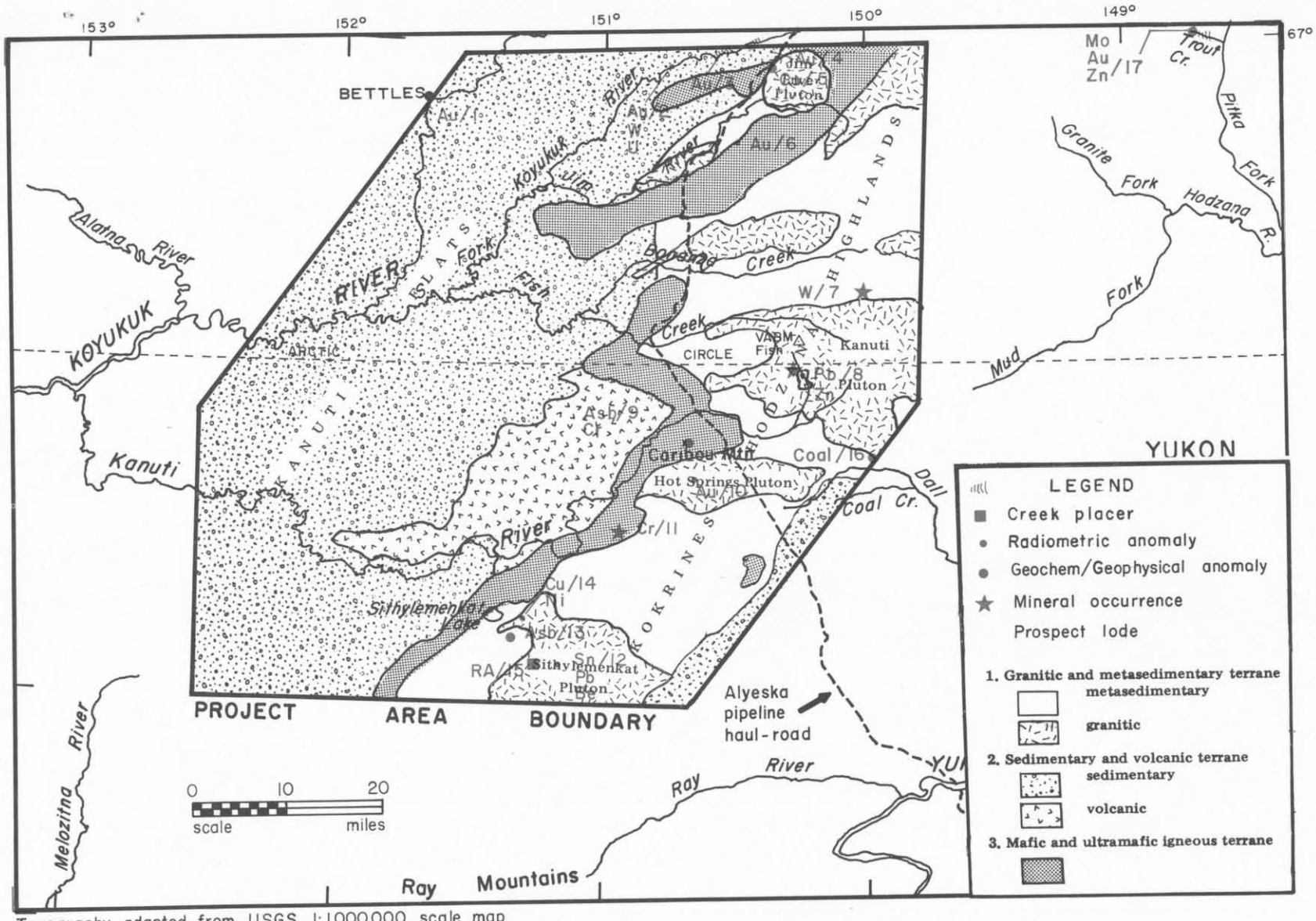


FIGURE 1.-Index map of Alaska



Topography adapted from USGS 1:1000000 scale map

FIGURE 2.- Study area



Topography adapted from USGS 1:1000000 scale map

Geology adapted after Patton and Miller, 1973 (7)

FIGURE 3.- Rock type map of the Kanuti River area

The second area is composed of sedimentary and volcanic rocks predominantly within the Kanuti Flats. It includes highly deformed relatively recent marine volcanics, graywacke and mudstone and younger, gently deformed non-marine conglomerate, sandstone and shale with coal seams and ash fall tuffs. Overlying these units along the Kanuti River is an extensive area of volcanic breccia, flows and tuffs (7). The northern and western portions of this area are largely covered by glacial drift (7).

The third area, located along the margin of the Highlands and the Flats is composed of an assemblage of mafic and ultramafic rocks. These rocks include altered pillow basalt, gabbro, serpentinized periodotite, dunite and chert (7). Varying amounts of serpentinization has been noted in the ultramafic rocks of the Caribou Mountain area possibly as a result of the emplacement of the nearby granitic plutons (5).

MINERAL INFORMATION

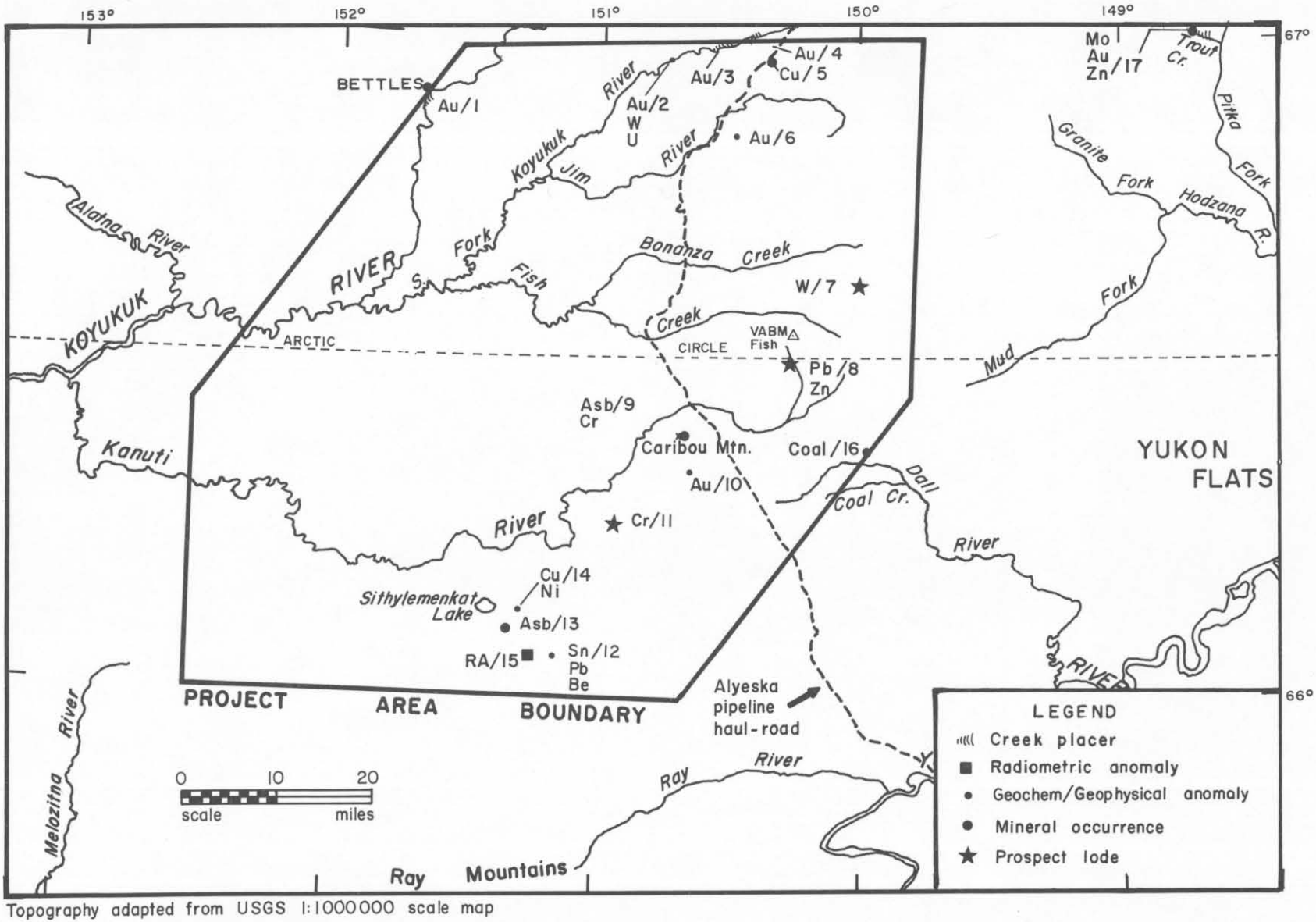
The mineral occurrence within each of the three rock type areas are discussed below and shown on figure 4. Summary data for each occurrence are in the Appendix.

Mineral Deposits in Granitic and Associated Metasedimentary Rocks

A tungsten prospect (no. 7, figure 4) is located on the divide at the head of the south fork of Bonanza Creek. The tungsten bearing mineral, scheelite, is reported to occur along an intrusive contact zone in several showings 8 feet to 12 feet in width and up to 3,000 feet in length. The grade is reported to average up to two percent WO_3 (3, 14).

A molybdenum and zinc occurrence has been reported in similar rocks 25 miles east of the study area on Trout Creek (no. 17) (1).

Reconnaissance trace element sampling (8) in this region indicates tin, beryllium, lead, boron and gold associated with the plutons (nos. 6, 10, 12).



Topography adapted from USGS 1:1000000 scale map

FIGURE 4.- Mineral deposits of the Kanuti River area

An aerial gamma-ray survey conducted in this region is 1976 (12) showed several reas associated with the granitic plutons, particularly in the area of the Sithylemenkat pluton (no. 15) that merit additional study to determine if uranium enrichment occurs.

Deposit types that may occur within this series include; (1) strata-bound deposits of copper, lead and zinc within the metasedimentary rocks, (2) granite contact and vein deposits which could be enriched in tin, tungsten, molybdenum and uranium; and (3) rare earth, beryllium and uranium associated with the locally abundant pegmatites; (4) placer deposits of tin.

Uranium exploration is currently underway immediately south of the study area in the Ray Mountains.

Mineral Deposits in Sedimentary and Volcanic Rocks

A lead-zinc prospect (no. 8) occurs within a felsic volcanic unit that extends into the Highlands (7). Two hundred claims were staked here in 1972, but apparently have not been kept valid (10). The extent of mineralization is unknown. This same rock unit is mapped over an extensive area along portions of the Kanuti River.

Occurrences of coal are reported 15 miles from the pipeline haul road near Dall River (no. 16). A chip sample taken across a 10 foot section tentatively was ranked as subbituminous. Neither top nor bottom of the section was exposed (11).

Potential deposits include sedimentary uranium within the non-marine sequences which underlie felsic volcanic breccia, flows and tuff. In a study by Patton and Miller (7), it was suggested that in these same non-marine rock units, residual deposits of nickel may occur in the vicinity of the ultramafic and mafic rocks.

Mineral Deposits Associated with Mafic/Ultramafic Igneous Rocks

Ultramafic rocks are known in several locations within the northeast trending belt of mafic rocks, particularly south of Caribou Mountain. Although very little exploration has taken place within these units, several mineral occurrences can be attributed to them. One chromite prospect and a small chromite occurrence (nos. 9, 11) are located in the Caribou Mountain area (5, 10). Anomalous copper values and a small amount of copper mineralization have been reported in the northern portion of this belt (no. 5) in the tributaries to the Jim River and the south fork of the Koyukuk River (8). Small showings of asbestos are found in the Caribou Mountain and Sithylemenkat Lake areas (nos. 9, 13). In the Caribou Mountain area serpentization as a result of granitic intrusion could possibly result in the formation of more extensive deposits of asbestos (5).

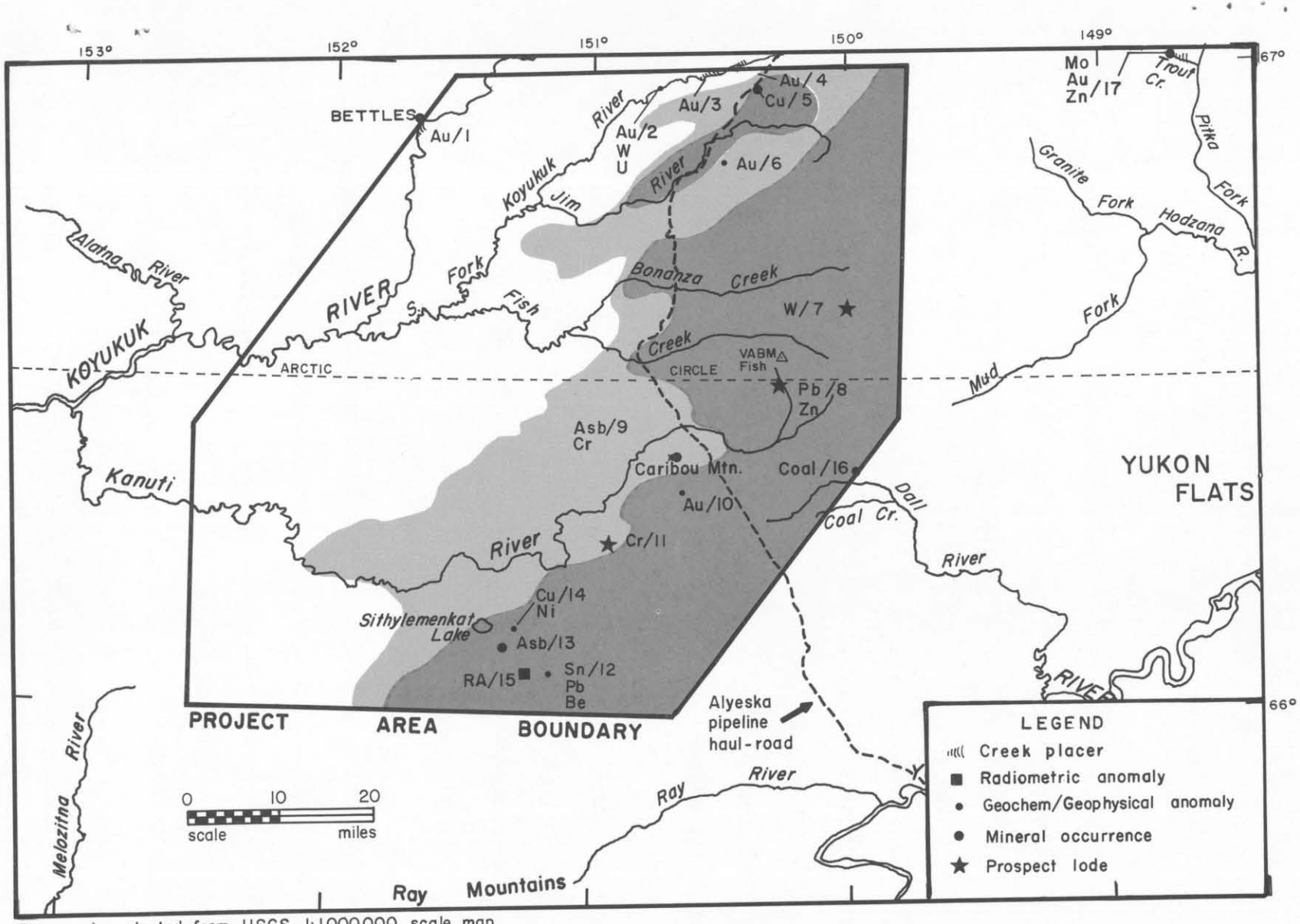
MINERAL POTENTIAL

Based on known mineral deposits and occurrences, the eastern portion of the study region is more favorable for mineralization than areas to the west (figure 5). Considering the scarcity of data this may, at least in part, merely represent less exploration.

ON-GOING STUDIES

Areas of favorability as presented in figure 5 will continue to change and become more definitive as new information is generated. The Bureau of Mines will attempt to improve the data base through field examinations and monitoring of exploration by industry.

During the 1978 field season field examinations including reconnaissance sampling and mapping are planned for the Kanuti River region. The first objective will be to better define areas previously identified as enriched in tungsten. The reported tin, molybdenum and uranium will also be investigated.



Topography adapted from USGS 1:1000000 scale map

Highly favorable for metallic and related nonmetallic deposits

Favorable for metallic and related nonmetallic deposits

Unfavorable for metallic and related nonmetallic deposits except for deposits in sedimentary basins, including uranium

FIGURE 5.- Mineral potential map of the Kanuti River area

Further examination will include deposits associated with mafic and ultramafic rocks, lead and zinc in volcanic and sedimentary units along the Kanuti River and the coal occurrence on Dall River.

CONCLUSION

The Kanuti River area and the Kokrines-Hodzana Highlands include several areas in the eastern portion of the study region that appear favorable for mineral deposits and merit more investigation:

1. Granitic and metasedimentary rocks
   - -Tungsten minerals on the divide at the head of the south fork of Bonanza Creek.
   - -Possible uranium enrichment associated with the granitic rocks.
   - -The tin, beryllium, lead, zinc, molybdenum and gold in the granitic rocks or intruded metasediments.
2. Sedimentary and volcanic rocks.
   - -Lead and zinc minerals at the headwaters of the Kanuti River
   - -Coal exposed in the Dall River valley.
   - -Sandstones underlying volcanic rocks may be favorable for uranium deposition.
3. Mafic/ultramafic igneous rocks.
   - -Chromite mineralization in the vicinity of Caribou Mountain.
   - -Asbestos showings near Sithylemenkat Lake and Caribou Mountain.
   - -Copper and gold mineralization in the region of the Jim River and the south fork of the Koyukuk River.

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APPENDIX: Summary Mineral Data

(refer to figure 4 for map location)

Map Location No.	Commodity	Remarks
1.	Gold	Small scale gold placer mining, some production in 1937 (1).
2.	Gold, tungsten, uranium	Traces of bismuth, copper, lead, tin, tungsten and uranium bearing minerals in gold placer concentrate (15). Gold production in early 1900's was about 6,000 oz. of gold. In 1940's heavy equipment was used; no data on amount of production (1).
3.	Gold	Small scale gold placer mining in early 1900's and 1930's (1).
4.	Gold	Thick deposits of washed gravel containing some gold. About $5,000 of placer gold produced before 1909 (6).
5.	Copper	Small amounts of chalcopyrite in gabbro. Tributaries to the Jim River and South Fork of the Koyukuk in this area generally anomalous in copper (8).
6.	Gold	Anomalous gold in a stream sediment (8).
7.	Tungsten	Scheelite with minor chalcopyrite and pyrrhotite in calc-silicate along intrusive contact. Several showings up to 3,000' long and 8-12' wide. Grade average up to 2% WO_3. Similar to major recent discoveries in Yukon, Canada (3, 14).
8.	Lead, zinc	Galena, sphalerite, and pyrite disseminated in oxidized and silicified rhyolite (7). In 1972, 200 lode claims were staked but have not been active since then (10).
9.	Asbestos	Small occurrences of asbestos. Veinlets to 4 mm in length (5).
10.	Gold	Anomalous gold in stream sediments (8).

Map Location No.	Commodity	Remarks
11.	Chromium	Eight claims staked for chromium in 1975. Currently active (10).
12.	Tin, lead, beryllium	Highly anomalous tin, lead, and beryllium in stream sediments (7). Gold also anomalous (8).
13.	Asbestos	A few black, weathering, cross-fiber asbestos veinlets (1/8 inch) (2).
14.	Copper, nickel	Portion of northeast trending belt of ultramafic rocks locally anomalous in copper and nickel (2).
15	Radiometric anomaly	Several radiometric anomalies in the Sithylemenkat pluton areas showing significant equivalent uranium enrichment over equivalent thorium and potassium (12).
16.	Coal	Ten foot stratigraphic section of coal exposed on the left limit of Coal Creek one mile above Dall River. Neither top nor bottom of section was exposed. Tentative rank is subbituminous B (11, 4).
17.	Gold, molybdenum, zinc	Small placer operation. Ore specimen consisted of quartz, pyrite, sphalerite and molybdenite (1).