

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

PRELIMINARY GEOLOGIC AND MINERAL
EVALUATION OF THE AMBLER RIVER DRAINAGE

(For the Bureau of Outdoor Recreation Wild and Scenic River Study)

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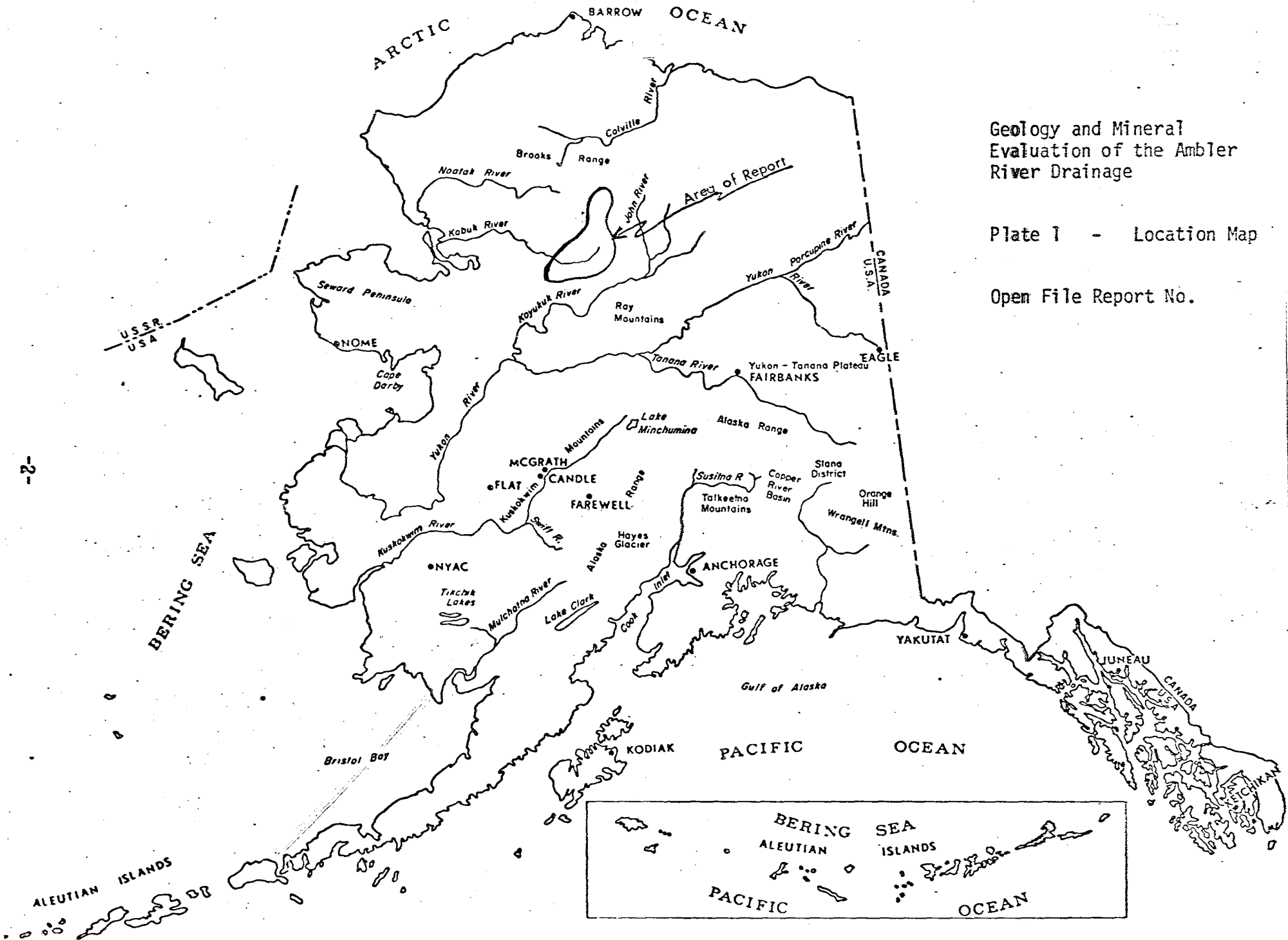
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TABLE OF CONTENTS

	Page
Table of Contents	1
Location Map	2
Introduction	3
Summary and Recommendations	3
Regional Geology	4
Economic Geology	5
Bibliography	7

NOTE: The geologic map for this report is under separate file number Alaska Open File 36:

'Preliminary geologic map of southeastern Ambler River and parts of Survey Pass quadrangles, Alaska'



Geology and Mineral
Evaluation of the Ambler
River Drainage

Plate 1 - Location Map

Open File Report No.

PRELIMINARY
GEOLOGIC AND MINERAL EVALUATION OF THE AMBLER RIVER
DRAINAGE BASIN, ALASKA

INTRODUCTION

This report has been written to assist the Wild and Scenic River task force of the U.S. Bureau of Recreation in considering the suitability of certain priority Alaskan rivers for inclusion in the national system.

Geologic file research followed by field check and geochemical sampling will result in recommendations concerning the possible economic mineral areas of the river drainage. The final results and recommendations will be submitted as appendices to this report before August, 1973.

The Alaska Geological Survey conducted a mapping and geochemical sampling program in the Ambler River region in 1972. The results of this work, including a geologic map and a report on the geochemical sampling are currently being processed for release in open file format. This material will be added to this report as appendices before August, 1973.

SUMMARY AND RECOMMENDATIONS

The Ambler River drains an area of the Brooks Range that is known to have a very high potential for mineral production. The geology of the area is similar to regions of mineral production elsewhere in the world. There are probably significant reserves of copper, and there are indications of lead, zinc, gold, chromium, nickel, molybdenum, and uranium mineralization in the area.

The mineral resource potential of the Ambler River drainage is sufficient for serious consideration in evaluation of the area for land use planning. Provision for extraction of the minerals and prospecting for reserves should be included in any proposed classification of the land.

REGIONAL GEOLOGY

The geology of the Ambler River area consists of a series of structural and stratigraphic belts trending across the area in a NW-SE direction. The southernmost belt consists mainly of quartzitic schists, and also includes a varied assemblage of glaucophane-bearing rocks, quartzites, porphyroblastic schists, and tabulate bodies of intrusive(?) granitic rocks. In the vicinity of the Ambler River, these rocks are folded in a broad arch known as the Kalurivik Arch. A complex synclinorium is separated from the Kalurivik Arch by the Walker Lake Fault, a high angle reverse fault that appears to die out a few miles west of the Ambler River. Units within the synclinorium consist of chloritic quartzites, calcareous quartzites, calc-silicate schists, and thin, discontinuous marbles.

The most prominent feature in the area is the Redstone-Shishakshinovik Arch, a broad complex uplift with a core of Cretaceous granites. The granitic rocks intrude a complex of metamorphic rocks, including schists, quartzites phyllites, and some massive carbonate units. Contact zones of irregular shape and size surround the granitic intrusions.

North of the plutonic belt, the structure is characterized by imbricate thrust sheets of carbonate rocks thrust over a complex of metamorphic and carbonate rocks. The horizontal displacements of the thrust sheets is probably many tens of miles, and may be much more.

The Ambler River drains a terrane that is largely made up of carbonate rocks, and the river gravels are mostly derived from the carbonate units. The carbonate rocks do not support as much vegetation as the more iron and mineral-rich pelitic and metamorphic rocks in adjacent drainages. Consequently, the gravel bars and stream terraces of the Ambler River

valley are more free of the choking brush and swampy sloughs than is typical of this part of the Brooks Range. This greatly increases the scenic values of the river, and also results in the gravel bars being relatively free from mosquitoes and black flies during the summer months. Apparently these pesty insects prefer the more brushy areas and the tundra to the broad, white gravel bars along the Ambler River.

ECONOMIC GEOLOGY

Indications of mineralization are common in the Ambler River drainage. Each of the structural-stratigraphic belts mentioned above has some occurrences of mineralization, and geochemical sampling has indicated that the mineralization is concentrated along several trends.

In the thrust belt, the mineralization includes azurite and malachite. The mineralization is apparently along the planes of the thrust faults in a manner similar to occurrences elsewhere in the world. The extent of the mineralization is unknown at present.

In the Redstone-Shishakshinovik Arch, mineralization of several types has been found. Copper minerals in the form of azurite, malachite, and chalcopryrite have been found in carbonate rocks and quartz veins near the granites. Galena and molybdenite have been found in the granites and in the contact aureole around the Shishakshinovik pluton. The uranium mineral, metatorbernite, was found in one location in the contact zone of that pluton. Geochemical sampling has indicated anomalous values for copper, lead, and zinc in the area, and some of the highest values occur in the vicinity of Ulaneak Creek, one of the tributaries of the Ambler River.

South of the Walker Fault, the schist belt appears to offer the best prospects for production of minerals. Geochemical sampling indicates a zone of very high copper values through this trend. Mineralization has

not been found in outcrop, but iron-stained zones are common, and gossans indicate that the minerals have probably been leached out of the rocks near the surface.

There are numerous patented mining claims in the schist belt, including some on the Ambler River drainage. These claims are owned by Bear Creek Mining Co., and this company has been conducting geologic exploration in the region and core drilling for a number of years. There are no figures available for the mineral reserves on these claims, but the continued interest of a major mining exploration company indicates that significant reserves probably exist in the area.

The geologic associations in the Ambler River region are typical of a number of areas of mineralization elsewhere in the world. At the southern edge of the Ambler River quadrangle, the rocks consist of schists, volcanics, carbonates, cherts, and serpentinites. The assemblage is typical of ophiolite sequences, and may be indicative of plate collision in the context of plate tectonic theory. In any case, such associations are known producers of a number of minerals in other parts of the world.

At the south edge of the Ambler River quadrangle, in the vicinity of the Cosmos Hills, a number of different minerals have been produced at one time or another. Copper, gold, asbestos, and nephritic jade have all been produced in the area. A copper deposit of major size is known to exist at Bornite, and is within sight of the Ambler River, although not on the drainage itself. Bear Creek Mining Co. has a large, permanent camp established at Bornite, and has conducted subsurface mining operations at the site in the 1960's. The mine is currently flooded and not in production. There are also indications of lead, zinc, chromium and nickel in the area.

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