PRELIMINARY EVALUATION OF SAMPLE DATA FROM THE PROPOSED CHUKCHI IMURUK NATIONAL RESERVE (now BERING LAND BRIDGE NATIONAL PRESERVE), ALASKA

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UNITED STATES DEPARTMENT OF THE INTERIOR

James G. Watt, Secretary

BUREAU OF MINES

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FOREWARD

This is one of a series of reports that describe mineral assessments of certain lands in Alaska. This report is a preliminary comment that summarizes and interprets data compiled as the basis for a planned Bureau of Mines field investigation. As such, this report is based principally on data developed during a contract study for the Bureau of Mines although it does include some information developed by the Bureau of Mines. Some of the details have been omitted or condensed but the pertinent basic data is unchanged. All data sources are identified. It is intended that these preliminary comments will be followed by a field investigation which will be reported first in a summary report and later in a detailed report of investigation.

It is important to remember that Alaska has not been seriously explored for minerals other than gold--except in a few limited areas. 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 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 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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PRELIMINARY EVALUATION OF GEOCHEMICAL DATA FROM THE PROPOSED CHUKCHI IMURUK NATIONAL RESERVE (now BERING LAND BRIDGE NATIONAL PRESERVE), ALASKA

by

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ABSTRACT

Water and waterborne sediment samples from the originally proposed Chukchi Imuruk National Reserve (now called the Bering Land Bridge National Preserve), Alaska, were analyzed for the Bureau of Mines. The antimony, bismuth, gold, lead, silver, uranium, and zinc contents of the sediment samples were studied to determine if samples with anomalous element concentrations were present, to outline the distribution of the anomalous samples, and to evaluate the use of the geochemically anomalous samples as indicators of known and potential zones of mineralization. Extensive uranium and zinc geochemical anomalies were identified in the southeastern part of the proposed reserve. Less extensive geochemical anomalies of gold and other elements were also identified. Some anomalous samples came from areas of known mineralization and suggest that the trends extending into the proposed withdrawal may have associated mineralization.

INTRODUCTION

As a result of actions prescribed by the Alaska Native Claims Settlement Act (85 Stat. 688), the National Park Service proposed that Congress legislatively establish a 2,708,043 acre Chukchi Imuruk National Reserve. Changes

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of the original boundaries and designation to Bering Land Bridge National Preserve resulted with the passage of the Alaska National Interest Lands Conservation Act (P. L. 96-487). This study was designed to indicate potentially mineralized areas that may be included within the originally proposed withdrawal.

Four hundred ninety two water and 452 waterborne sediment samples, which were collected at 517 sites by Los Alamos Scientific Laboratory (LASL) to evaluate the uranium potential of the proposed Chukchi Imuruk National Reserve, were analyzed for the Bureau of Mines by LASL to determine the content of thirteen elements in water and forty-three elements in sediment samples (1) 2/. The antimony, bismuth, gold, lead, silver, uranium, and zinc concentrations in stream sediments were reviewed briefly for this report. The antimony, gold, and zinc contents had been determined by the neutron activation method, uranium by delayed neutron counting, and bismuth, lead and silver by X-ray fluorescence.

Location

The Chukchi Imuruk National Reserve as originally proposed is spread across north-central Seward Peninsula (Figure 1). The proposed reserve is highly irregular in shape and lies between latitudes 65°05'N and 66°40'N and longitudes 167°30'W and 162° 30'W. It is along and immediately south of the Arctic Circle and is covered by portions of the Bendeleben, Teller, Shishmaref, and Kotzebue National Topographic Map Series quadrangle map sheets (1:250,000-scale), as shown on Figure 1. The land boundaries are better shown on Figure 2.

2/ Underlined numbers in parenthesis refer to items listed in the reference section of this report.

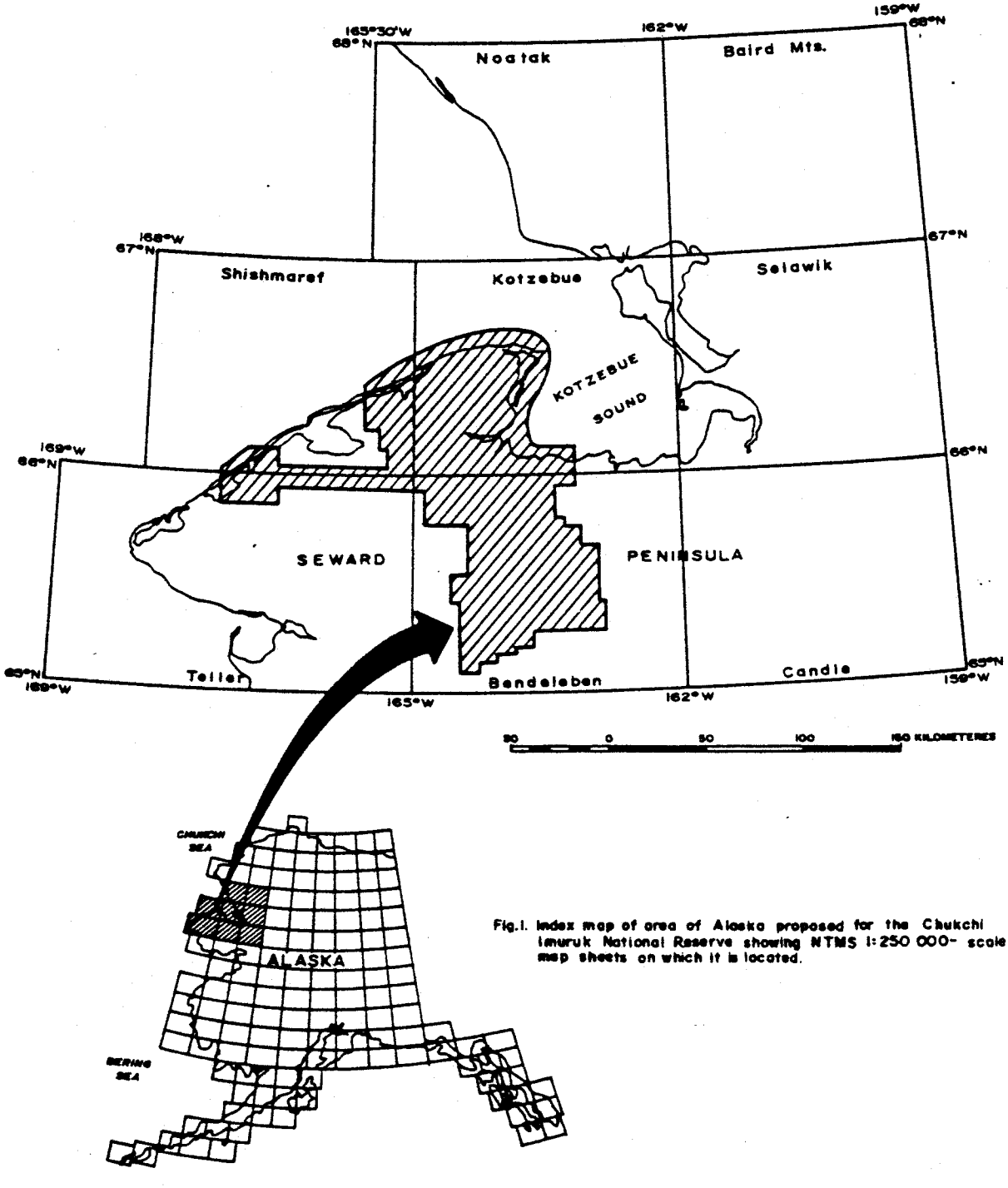

Fig. 1. Index map of area of Alaska proposed for the Chukchi Ianuruk National Reserve showing NTMS 1:250 000- scale map sheets on which it is located.

Purpose and Scope

The concentrations of selected elements in sediment samples were studied to determine element abundances, identify anomalous samples, and determine if surface expressions of potential zones of mineralization were present. The distribution of samples containing anomalously high concentrations of these elements was defined. Multi-element analyses were obtained only for samples from within the proposed reserve.

DATA PRESENTATION

The sampling and analytical procedures and analytical results have been published by LASL(1). The antimony, bismuth, gold, lead, silver, uranium, and zinc contents in stream sediments showed significant variation and were selected for study. Histograms were used to study the frequency distribution of the element values. The threshold values, here arbitrarily defined as values greater than those in the first major population grouping on histograms, were determined for the elements. The presence of gold and/or silver in surface samples was thought to be anomalous and significant in a region with extensive placer gold mining history, such as the Seward Peninsula. The highest concentration of the selected elements and the determined threshold values were:

	Highest Value(ppm)	Threshold(ppm)
Antimony	26.	7
Bismuth	8.	5
Gold	1.12	detectable
Lead	188.	20
Silver	7.	detectable
Uranium	79.3	8
Zinc	516.	300

Single and multiple element populations were revealed on the histograms. The uranium and zinc values were grouped as two populations. Four hundred twenty samples contained less than 8 ppm uranium; twenty-one of the samples contained more than 8 ppm uranium. In one population, twenty-four percent of the samples contained less than 50 ppm zinc; zinc values of the second population ranged from 50 ppm to 450 ppm. The mode of the zinc values was in the 101 ppm to 150 ppm range. Detectable gold was present in twenty samples; eighteen samples contained less than 0.15 ppm gold, the other two samples contained 0.48 ppm and 1.12 ppm gold. Fifteen samples contained between 6 ppm and 8 ppm bismuth; three hundred and sixty two samples contained less than 5 ppm bismuth. One sample contained 26 ppm antimony; sixty-three samples contained less than 15 ppm antimony. One sample contained 188 ppm lead; the other samples contained less than 20 ppm lead. Two samples contained 5 ppm and 7 ppm silver; three hundred sixty-two samples contained less than 5 ppm silver.

The distribution of samples containing anomalously high element concentrations within the proposed withdrawal is shown on Figure 2. Characteristic patterns are used to show the distribution of samples containing anomalous concentrations of an element. Overlapping patterns indicate that several elements are present in anomalous concentrations in a sample.

DATA INTERPRETATION

Regional and local geochemical anomalies are present within the proposed reserve. Uranium and zinc form the most extensive anomalies. Most of the uranium-bearing samples occur in the southern part of the study area. The

zinc-bearing samples occur north of and parallel to the most extensive uranium anomaly. Detectable gold concentrations occur in samples from three areas in the northern part of the reserve. Anomalously high gold, bismuth, and antimony concentrations occur in one sample from the northern end of the eastern boundary of the proposed withdrawal. Other samples containing anomalously high single element concentrations occur at apparently randomly distributed one station locations.

The geochemical trends appear to be in part related to underlying rock types. The most extensive uranium anomaly is spatially closely related to granitic rocks and a zone of undifferentiated metamorphic rocks that contain numerous dikes and sills of granitic composition (2).

Samples from drainages and beaches with anomalous gold concentrations point to areas that may have a potential for placer gold. Several of the geochemically anomalous zones are adjacent to existing lode or placer mineral claims. These anomalies are related to known zones of mineralization and, in a general way, may define their areal extent.

CONCLUSIONS

Widely spaced waterborne sediment samples effectively identify geochemically anomalous zones within the proposed withdrawal. Some zones appear to be related to underlying rock types; others are spatially related to areas of mining activity. The geochemically anomalous zones that are related to mineralization may identify extensions of the near-surface mineralization. These zones are favorable for mineral exploration.

REFERENCES

1. Sharp, Robert R., Jr. Results of Element Analyses of Water and Waterborne Sediment Samples from Area of Alaska Proposed for the Chukchi Imuruk National Reserve, Selawik National Wildlife Refuge, and Cape Krusenstern National Monument. Los Alamos Scientific Laboratory Information Report LA-7503-MS. 1978. pp. 155

2. Hawley, C. C. and Associates, Inc. Uranium Evaluation of the Seward-Selawik Area, Alaska. Issued by U. S. Department of Energy, Grand Junction Office, Report GJBX-105(78). 1978. pp. 89