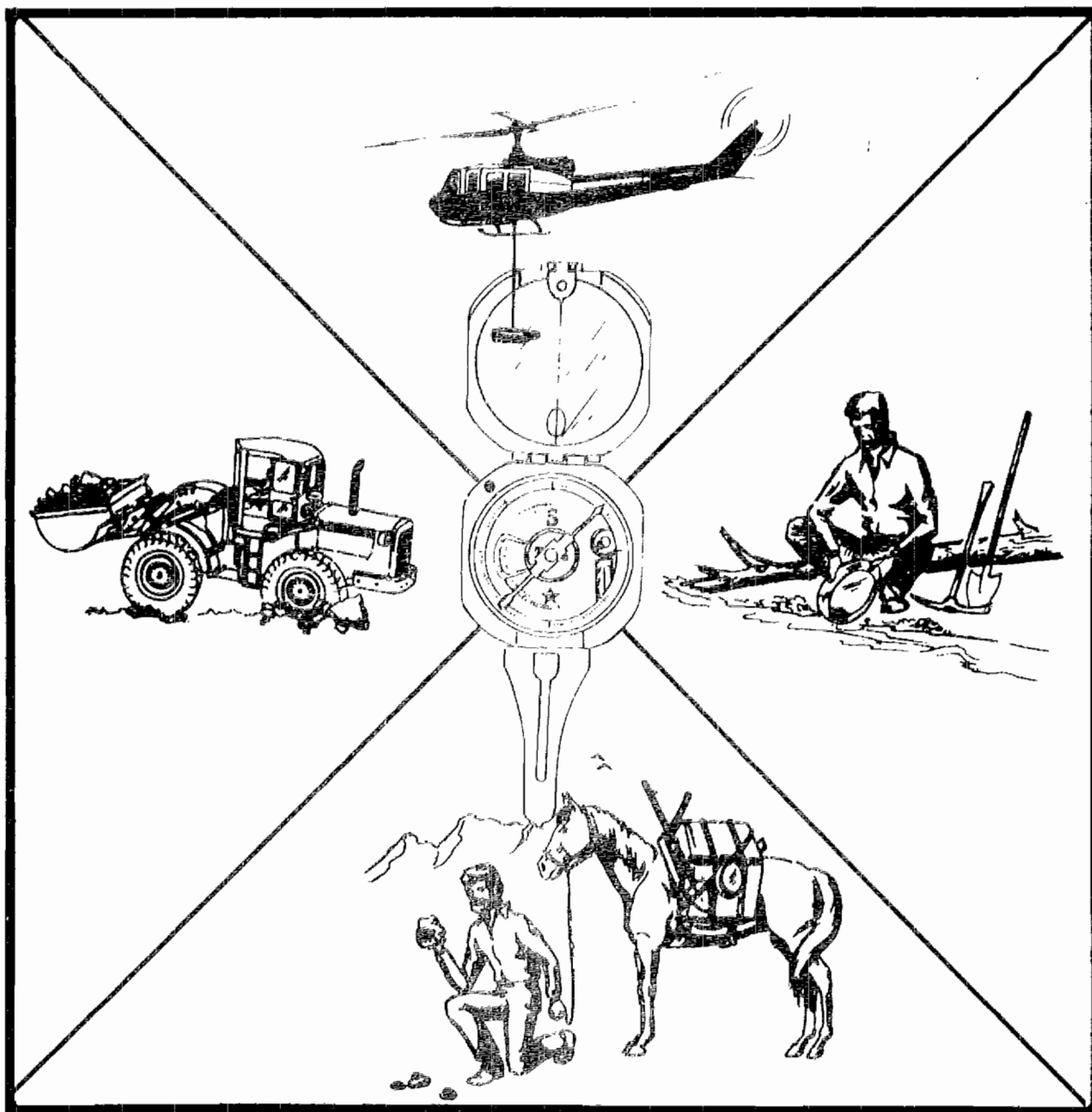


STATE OF ALASKA  
Department of Natural Resources

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DIVISION OF MINES & GEOLOGY

REPORT FOR THE YEAR  
1969

STATE OF ALASKA

Keith H. Miller – Governor

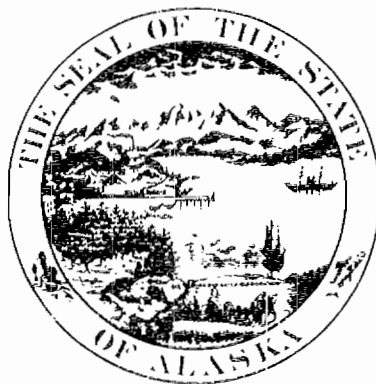
DEPARTMENT OF NATURAL RESOURCES

Thomas E. Kelly – Commissioner

**DIVISION OF MINES & GEOLOGY**

James A. Williams – Director

Report for the Year  
1969



P. O. Box 5-300  
College, Alaska 99701

## D I V I S I O N   O F   M I N E S   A N D   G E O L O G Y   S T A F F

December 31, 1969

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Robert E. Anderson	Mining Engineer
Jeffrey J. Knaebel	Mining Engineer
Crawford E. Fritts	Acting Chief Mining Geologist
Gilbert R. Eakins	Mining Geologist
Gordon Herreid	Mining Geologist
Eddie R. Chipp	Mining Geologist
Paul L. Anderson	Laboratory Supervisor
Namok Cho	Assayer Chemist
Michael Mitchell, Jr.	Geochemical Analyst
Donald R. Stein	Assayer
Marley Klingener	Mineral Laboratory Technician
Judith R. Burleson	Editor/Research Geologist
Charlotte M. Renaud	Cartographer
Mary E. Shrewsbury	Mining Information Specialist
Mary L. Hartley	Secretary
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## ANCHORAGE MINING INFORMATION OFFICE, 3001 PORCUPINE DRIVE

Joan Miller	Mining Information Specialist
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## JUNEAU MINING INFORMATION OFFICE, ROOM 509 GOLDSTEIN BLDG., POUCH M

Helen Hensel	Mining Information Specialist
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# STATE OF ALASKA

## DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINES AND GEOLOGY

KEITH H. MILLER, GOVERNOR

BOX 5-300—COLLEGE 99701

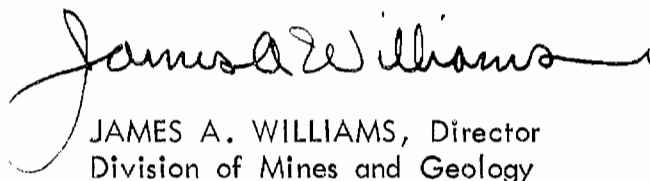
Honorable Thomas E. Kelly, Commissioner  
Department of Natural Resources  
Pouch M  
Juneau, Alaska 99801

Dear Sir:

On behalf of the employees of the Division of Mines and Geology, it is a pleasure to transmit to you this Annual Report of the Division covering the calendar year 1969. The report summarizes mining production, exploration, and developments during the year. The activities and accomplishments of the Division are outlined; our geological investigations and laboratory work are briefly described, and details on information and services available to the public are included.

This Division will continue to foster and assist the growth of the mining industry in the best interests of the State.

Respectfully submitted,



JAMES A. WILLIAMS, Director  
Division of Mines and Geology

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## F O R E W O R D

For convenience the State has been divided into six arbitrary units (fig 1). The boundaries of these units are based on bedrock geology, topography, parallels of latitude, and meridians of longitude. The five units are as follows:

1. Arctic Alaska, including the Brooks Range and other parts of the State north of the Arctic Circle.
2. Interior Alaska, including that part of the State south of the Arctic Circle, north of the Alaska Range, and east of meridian 153° W.
3. Western Alaska, including the Seward Peninsula, Pribilof Islands, and other parts of the State south of the Arctic Circle, northwest of the Alaska Range, and west of meridian 153° W.
4. Southwestern Alaska, including the Aleutian Islands, Kodiak Island, and the Alaska Peninsula south of parallel 59° N.
5. South-Central Alaska, including the Alaska Range, adjacent mountainous terrain, and intermediate lowlands.
6. Southeastern Alaska, including all of the State east of meridian 141° W.





D I V I S I O N   O F   M I N E S   A N D   G E O L O G Y  
G E N E R A L

The goals and objectives of the Division of Mines and Geology are to aid and promote the mineral industry in Alaska. The authority and functions of the Division, as delegated by the Commissioner of Natural Resources, are in Alaska Statutes, Title 27. Division personnel do whatever possible to foster and encourage mineral exploration and mineral production in the best interests of the State. The firm establishment of a solid mining industry is a basic aim of the Division of Mines and Geology. The Division can be looked upon as a data gathering agency where many kinds of information are collected, interpreted and communicated to the mining industry and the general public.

Some of the services that the Division provides to the citizens of Alaska are described below. The Division is responsible for administering laws pertaining to mineral production and is responsible for mine safety. The analytical laboratory stimulates discoveries and aids Alaskan prospectors and miners by providing free assays and a mineral identification service. Field investigations include geologic mapping, geochemical sampling, and other functions of a state geologic agency; field reports and geologic maps are a principal product of the Division. Technical assistance and advice is freely given in the field or office to miners, prospectors, and others seeking advice.

Another important function of the Division is a continual survey of mineral resources and mining operations; this information is disseminated for those interested in the development of Alaska's mineral resources. Although the Division is required to foster and promote the best interests of the mining, mineral, and related industries, it also has a responsibility to those who invest in these industries. The Division provides an important service by maintaining an active file of all known mineral deposits, mining claims, and claim owners in the State.

The Division works with individuals and groups who are interested in conservation of natural resources and those who feel that certain changes in the mining laws are essential. In these matters the Division does whatever possible to protect the best interests of the mining industry with an awareness of the need for wise policies to assure efficient use of natural resources. The Division of Mines and Geology works closely with the Division of Lands by providing technical help and advice on mineral leasing, prospecting permits, and related matters administered by the Division of Lands.

An Editor-Researcher was added to the staff of the Division of Mines and Geology in 1969. The new position was added in order to provide more efficient service to the mining industry and the general public through library maintenance, thorough answers to inquiries, Division report editing and completion of research projects.

During the 1969 summer season Division field personnel consisted of four geologists and three engineers. Eleven areas were investigated. Tables 1 and 2 on the following pages show a concise picture of Division organization, personnel and functions as well as a summary of work accomplished in 1969 and plans for 1970.

Table 1  
Organization, Functions, and Costs - Division of Mines and Geology 1969

DIRECTOR				
	<u>Office of Director</u>	<u>Mining Branch</u>	<u>Geology Branch</u>	<u>Laboratory Branch</u>
PERSONNEL	Editor/Researcher Cartographer Three Mining Information Specialists Secretary Clerk Two Clerk Typists	Chief Mining Engineer Two Mining Engineers Three Summer Assistants	Chief Mining Geologist Three Mining Geologists Four Summer Assistants	Lab Supervisor/ X-Ray Mineralogist Assayer Chemist Assayer Geochemical Analyst Mineral Lab Technician
FUNCTIONS	Kardex file of claim locations and annual labor  Publishing and distribution of information circulars, special reports, lab reports, field reports, monthly bulletin, and annual report  budget, finance, and all Division records	Prospect examination  mine safety inspections  Geologic mapping and geochem sampling with written reports  Technical advice and assistance to prospectors, miners, and companies	Ore deposit investigations  Ore province evaluation  Regional and detailed geologic mapping and geochem sampling with written reports  Technical advice and assistance to prospectors, miners, and companies	Assaying, geochemical and X-ray analyses  Mineral identification  Lab reports on analytical methods and pertinent information  Technical advice and assistance to prospectors, miners, and companies
COSTS	\$144,800	\$93,100	\$100,500	\$84,200
Total Division Appropriation (FY 69-70): \$422,600				

Table 2  
Summary of 1969 Work - Division of Mines and Geology

DIRECTOR

<u>Office of Director</u>	<u>Mining Branch</u>	<u>Geology Branch</u>	<u>Laboratory Branch</u>
Processed 6624 claim location notices, 1143 affidavits and mining documents. Total of 24,624 mining claims on file.	Visited two prospecting and exploration sites.	Continued uranium investigations.	Made determinations ranging from simple identification to x-ray, spectrograph and diffraction analyses, heavy liquid and magnetic separation, atomic absorption quantitative analyses and fire assays for gold, silver, and other noble metals.
Published seven professional reports, an annual report, and twelve monthly bulletins (circulation 2300).	Carried out 31 coal mine inspections.	Detailed geologic mapping and geochemical sampling of six areas, encompassing approximately 300 square miles. Over 911 geochemical samples were collected.	Performed research on Division geochemical samples for analysis by optical emission spectrograph and atomic absorption.
Distributed 2635 professional reports and 4570 information circulars.	Administered 13 Prospector Assistance Programs.		Installed several new instruments that increased efficiency and latitude of lab activities.
Assisted 1725 visitors and answered 2467 information requests.	Summarized Prospector Assistance Programs through 1967 for public use.		Received and processed over 1300 samples from the public.
Accounting, budgeting, and maintenance of all Division records.	Completed information circular on sale and lease of mining property.		
	Geologic mapping and geochemical sampling of four areas encompassing approximately 1700 square miles. Over 1200 stream sediment samples were collected.		

## MINING BRANCH REPORT PREVIEWS

Geology and Geochemistry of Parts of the Bendeleben A-5 and A-6 Quadrangles,  
Seward Peninsula, Alaska

R. R. Asher, Chief Mining Engineer

Approximately six weeks were spent mapping 70 square miles and stream sediment sampling 100 square miles in the north central part of the Bendeleben A-5 quadrangle and the eastern edge of the Bendeleben A-6 quadrangle on the Seward Peninsula. The project area is along the southern edge of the Bendeleben Mountains near the divide between Belt Creek and the Libby River. There are no known ore deposits in the region.

The area is largely tundra-covered and mapping was done on the basis of float and frost-riven rubble. Metamorphic rocks of Precambrian age are dominant. These include biotite gneiss and schist of the Kigluaik Group, schists of the Nome Group, and a sequence of black graphitic slates named Slates of the York Region. Epidote-bearing calcareous rocks and crystalline meta-limestone are interbedded in the schists. The metamorphic rocks are intruded by coarse gneissic granite with associated tourmaline-rich pegmatite. Fine-grained quartz monzonite to granite is exposed in places; it is probably younger than the gneissic granite. Rhyolite dikes, diorite dikes, irregular small bodies of diorite, and other highly-altered, igneous dikes are present. Several northeast, northwest, and east-west trending faults were mapped. Dikes and other linear features do not conform to any obvious pattern or system of structural control.

The upper reaches of both Belt Creek and the Libby River are in a broad valley that forms a remarkably straight lineament bisecting the area. There is no evidence that the linearity is the result of structural control; the feature is most likely related to glaciation.

Halos of epidote-bearing, calcareous hornfels are locally associated with the margins of granitic intrusives. Tiny flakes of graphite are abundantly distributed through the altered rocks. The halos are spotty in distribution and variable in width. No sulphide-bearing rocks or veins were discovered.

Stream sediment samples anomalous in lead and zinc were found, but analyses of rock samples from the apparent sources of the anomalies do not show significant metal content. Further analytical work is in progress.

Geology and Geochemistry of Part of the Eagle A-1 Quadrangle,  
Fortymile District, Alaska

R. R. Asher, Chief Mining Engineer

During August and early September, 1969, 40 square miles near Boundary, Alaska, on the Taylor Highway were geologically mapped. Stream sediment samples were collected in the same area. The district is well known for placer gold production, but there are no known lode deposits.

Two map units are recognizable. The lower unit consists of hornblende gneiss, biotite gneiss, amphibolite, marble, and biotite schist. Above this unit is a series of quartz sericite or muscovite schist, phyllite, siliceous graphitic schist, and quartzite. The above units were originally defined by Helen Foster of the U. S. Geological Survey.

Early workers in the region included all of the metamorphic rocks in the area under the general heading Birch Creek Schist of Precambrian age. More recent work by the U. S. Geological Survey has shown that part of the rocks may be Paleozoic in age.

The metamorphic rocks are intruded by pegmatite, aplite, and quartz monzonite dikes of probable Mesozoic age. A mass of serpentized ultramafic rocks of probable Mesozoic age crops out near the southeast boundary of the quadrangle.

The general strike of the rocks is north to northeast and the dip is to the west. Near fault zones and along the borders of the ultramafic body, rock attitudes are more variable. Faults are marked by breccia zones and fault gouge. Most of the faults strike north.

Pyrite is an abundant constituent of the schist in the upper unit. At several localities pyrite is especially plentiful and gossan zones have developed. Below some of the gossan zones stream sediment samples are anomalous in lead and zinc. Further analytical work is in progress and more extensive study of field data may reveal exploration targets.

Geology and Geochemistry of the Wells Mountain Area,  
Talkeetna Mountains Quadrangle, Alaska

Robert E. Anderson, Mining Engineer

Approximately 50 days were spent mapping and sampling in the Wells Mountain section of the Talkeetna Mountains quadrangle. A total of 100 square miles were mapped and over 400 samples were collected. The lithology of the area includes granites, greenstones, and some relatively recent lava flows. The effects of glaciation can be seen throughout the area; hanging valleys are common and major creeks flow through U-shaped valleys. Evidence of a former hot spring was found at one locality. Field tests indicate anomalous values from stream sediment samples. Laboratory work now being carried out may indicate future exploration targets.

Geochemical Survey and Geological Reconnaissance of the White River Area,  
South-Central Alaska

Jeff Knaebel, Mining Engineer

Greenstones in the headwaters region of the White River area are of interest for possible undiscovered copper deposits. During the summer of 1969, 1500 square miles were geochemically surveyed in detail along with a geological reconnaissance. The center of this area is about 60 miles southeast of Nabesna, in the McCarthy quadrangle.

The northeastern part of the area is dominated by volcanic rocks of Carboniferous age (basalts, agglomerate, tuffs) and subordinate sedimentary rocks and meta-sediments (shales, conglomerates, argillites, phyllites). Igneous rocks ranging in composition from granite to andesite porphyry intrude the volcanics and sedimentary rocks. The northwestern and southern parts of the area are composed primarily of layered volcanic rocks and greenstones with minor occurrences of limestone, argillite, and shale.

At the north edge of the area a mineralized (pyrite, chalcopyrite) contact zone was mapped along a prominent shear system where a granitic intrusion contacts argillite. Minor mineralization was found in altered sedimentary rocks for about 2 1/2 miles along the shear zone.

Ptarmigan Creek has cut a valley within which granite porphyry, gabbro, and andesitic porphyritic plugs and dikes intrude basalts, agglomerates, tuffs, and argillites. A small gabbro plug at the junction of Ptarmigan and Beaver Creek shows pyrite and chalcopyrite mineralization near contacts with argillites and phyllites. This area and the previously mentioned contact zone offer marginal promise for further exploration.

The greenstones were examined from Frederika Glacier (west of Skolai Pass) to the headwaters of the White River, and down the White River to the Yukon Border. No broad geochemical anomalies were indicated by field tests, but two minor copper anomalies were found near the headwaters of the White River. Minor amounts of chalcocite in amygdulites is the probable cause of these anomalies. Minor occurrences of native copper and chalcocite not associated with geochemical anomalies were also observed.

A total of 789 stream sediment samples were taken on over 300 streams and trickles. Dithionite field tests were made for cold extractable copper, lead, and zinc. Atomic absorption tests for total copper, lead, and zinc, and thirty-element emission spectrometry tests are currently underway.

#### GEOLOGY BRANCH REPORT PREVIEWS

##### Geology and Geochemistry of the Cosmos Hills, Western Arctic Alaska

Crawford E. Fritts, Acting Chief Mining Geologist

A 2-year program of detailed geologic mapping and geochemical sampling in approximately 150 square miles in the Cosmos Hills was completed in 1969. The area studied is near Kobuk about 300 miles northwest of Fairbanks. It includes Bear Creek Mining Company's copper prospect at Bornite and most of the old Shungnak mining district, which has produced placer gold, jade, and some asbestos. Approximately one third of the area studied is in the Shungnak D-2 quadrangle and is described in Division of Mines and Geology Geologic Report 37. The remaining area is in the Ambler River quadrangle and will be described in Division of Mines and Geology Geologic Report 39. A total of 236 geochemical samples were collected from 20 main streams. Geochemical sampling was primarily limited to areas not staked by the mining company.

Bedrock in the mapped area includes: 1) thousands of feet of weakly to moderately metamorphosed pelitic rocks, graywacke, tuff, basalt, limestone, and dolomite of known or probable Devonian age, 2) hundreds to thousands of feet of weakly metamorphosed conglomerate, sandstone, mudstone, and basalt of Late Cretaceous age, 3) a 1 1/2-mile-wide pluton of gneissic granite of Early Cretaceous age, and 4) numerous sill-like bodies of serpentinite as much as 400 feet thick, some of which intrude strata of Late Cretaceous age. The serpentinite cannot be Jurassic(?) in age as previously supposed, and may be as young as Tertiary.

The Cosmos Hills window described in Report 37 is still the most important geologic structure in the area, but is more complex than previously thought. This structure is 19 to 20 miles long and 1 1/2 to more than 8 miles wide. It extends east-southeast across the boundary between the Ambler River and Shungnak quadrangles. Mapping in 1968 at the southeastern end of the window suggested that it is bounded by two major, low-angle overthrust faults, but mapping in 1969 revealed a third overthrust fault beneath the main copper-bearing dolomite and limestone sequence exposed near and west of Bornite. The total stratigraphic thickness of this carbonate sequence is believed to be at least 3000 feet, but more than 2000 feet of strata in the lower part of the sequence have been removed by overthrust faulting near the Kobuk-Bornite road. Displacements on these faults are measured in miles. The overthrust faulting was preceded and followed by large-scale, high-angle faulting.

Copper mineralization near Bornite is summarized on the basis of general field observations and previous literature rather than confidential data collected by the mining company. The mineralization is confined largely to dolomite breccia within the main carbonate sequence. The principal copper deposit has been described as stratiform. The most important primary

copper minerals are chalcopyrite, bornite, and subordinate chalcocite, which are associated with abundant fine-grained pyrite. Typical secondary minerals are malachite, azurite, and iron oxides. Some of the pyrite shows framboidal and colloform structures indicative of a sedimentary origin. This sulfide mineral, therefore, is believed to be at least partly syngenetic. The origin of the copper sulfides, on the other hand, is debatable. Sulfur isotope studies led one previous author to conclude that the copper is epigenetic. He visualized deposition from hydrothermal solutions of magmatic origin but unknown source. A lack of evidence for significant hydrothermal alteration of adjacent host rock, however, has caused other geologists to reject that interpretation and favor a syngenetic origin.

#### Geology and Geochemistry of the Wild Lake Area, Arctic Alaska

E. R. Chipp, Mining Geologist

The Wild Lake area, 40 miles north of Bettles and 40 miles west of Wiseman in the Brooks Range, contains some of the westernmost gold placers known in the Wiseman-Chandalar gold belt. About 35 days were spent mapping 45 square miles. A total of 115 stream sediment samples and 23 rock samples were collected for geochemical analysis.

Bedrock includes a thick sequence of calcareous mica schist overlain by phyllite, mica schist, and the Skajit Limestone, of Middle(?) and Upper Devonian age. The Skajit is a complex assemblage of limestone and dolomite with interbeds of calc-schist, greenschist, and phyllite. Greenstone dikes intrude the Skajit in the southern part of the mapped area.

Mineralization in the area is structurally and lithologically controlled. Quartz-carbonate and quartz-tourmaline veins are localized within and near northeast-trending, high-angle faults. Copper sulfides occur sparingly along with low gold and silver values. Thin beds of calc-schist and limestone within the phyllite and calc-schist units are altered. These beds also contain minor copper sulfides, gold, and silver. Locally silicified and altered Skajit Limestone beds are stained by copper carbonates.

#### Summary of the Chandalar Area

E. R. Chipp, Mining Geologist

Part of the Chandalar gold district in the Brooks Range of northern Alaska was studied during 47 days in July and August of 1969. Geologic mapping of 63 square miles and preliminary analysis of 181 stream sediment and rock samples delineate certain obvious controls for gold mineralization.

Bedrock consists mainly of pelitic schists of Devonian age. Two main lithologic units are mapped; the lower plate sequence with local beds of slate and siltstone in a thick section of schist intruded by greenstone, and the upper plate sequence of schist with mappable phyllite and quartzite schist beds. Biotite or garnet bearing schists occur near one greenstone intrusive in the lower plate sequence, but most of the schists are in the quartz-albite-muscovite-chlorite subfacies of the greenschist facies of regional metamorphism.

The gross structure is a homocline dipping northwest to northeast and cut by a thrust fault dipping less steeply northeast. A slight angular discordance exists between the upper and lower thrust plates. Open folds, mostly in lower plate rocks in the upper Big Creek area, trend north northeast along with numerous micro-folds and crenulations. Pressure, and possibly displacement is suggested from the east southeast. High-angle, northwest-trending faults are the loci for short, discontinuous quartz veins within phyllite beds of the upper thrust plate.



Most of the mineralized area occurs within a north northeast trending zone including upper Big Creek, Tobin Creek, Little Squaw Creek, and Big Squaw Creek. Arsenopyrite or scorodite ( $\text{FeAsO}_4 \cdot 2\text{H}_2\text{O}$ ) in sheared and brecciated quartz veins are the best surficial guides to gold content. Chandalar Gold Mining and Milling Company had just completed their mill in September, 1969, and planned to process 100 tons per day from the Mikado lode in upper Tobin Creek.

#### Petrified Forest, Unga Island, Alaska

Gilbert R. Eakins, Mining Geologist

A general-interest report concerning petrified wood on the northwest coast of Unga Island was announced in the 1968 Annual Report, but publication was postponed until this year. The unusual size and abundance of petrified stumps and logs, some of which are nine feet in diameter, suggest that the area be classified as a park or wilderness area. The report will include a brief description of the locality, and its geology. Also contained in the report are photographs of wood specimens, which have been identified as belonging to the genus *Metasequoia* by R. A. Scott of the U. S. Geological Survey.

#### A Sulfur Deposit, Stepovak Bay, Alaska Peninsula

Gilbert R. Eakins, Mining Geologist

The occurrence of a low grade sulfur deposit near Stepovak Bay has been known for many years, but has never been mapped. The deposit is approximately seven miles from the head of the bay and is exposed on nearly vertical slopes at an approximate elevation of 3,000 feet. During 1969 the area was visited, but a snow field with numerous crevasses prevented access by foot. Low clouds usually obscure the locality, but one flight permitted viewing and photographing of the deposit and associated active fumaroles. At the present time the deposit is not of commercial interest due to its low grade and inaccessibility.

#### An Experiment in Biogeochemical Prospecting for Uranium, Bokan Mountain Area, Prince of Wales Island

Gilbert R. Eakins, Mining Geologist

Unusual conditions over large parts of Alaska offer difficulties to uranium prospectors using radiometric instruments. Some of these difficulties are the presence of forest or tundra, heavy rainfall, permafrost, complex geologic structure, and widespread metamorphism. Such conditions prompted the writer to spend one month collecting plant, mulch, stream sediment, and lichen samples in the Bokan Mountain uranium district to determine their usefulness in locating uranium in the State. The radioactive minerals of the Bokan Mountain district are associated with a small peralkaline granite stock of Mesozoic age which has intruded an older monzonite pluton.

This report will include a discussion of the geology of the area, biogeochemical prospecting methods, maps showing the Ross-Adams mine workings, radiometric surveys, fracture patterns, sample locations, and results of the analyses of various types of materials sampled.

#### A Geochemical Investigation in the Kontrashibuna Lake Area, Lake Clark Quadrangle, Alaska

Gilbert R. Eakins, Mining Geologist

Three weeks were spent collecting stream sediment samples and mapping geology around Kontrashibuna Lake. The presence of a contact-metamorphic copper-iron deposit on Kasna Creek offered an opportunity to test the geochemical prospecting method. Maps showing the rock types around the perimeter of the lake and geochemical sample locations are included. Results of sample analyses are discussed. Tables show the values of copper, lead, and zinc obtained by atomic absorption and the results of thirty-element spectrographic analysis.

Geology and Geochemistry of the Sinuk District,  
Seward Peninsula, Alaska

Gordon Herreid, Mining Geologist

The Sinuk gossans have been known for many years, but surface showings have not been rich enough to encourage drilling or mining. The district contains numerous mineralized localities indicated by gossans, showings of sulfide ore minerals, and geochemical anomalies. The progress of geological and geochemical mapping done in the Sinuk district by the author during 1965 and 1966 were reported in Division of Mines and Geology Reports 24 and 29. This year's report includes the previous work and additional mapping done in 1968 and 1969. A total of 140 square miles have been mapped during 122 days in the field. Geochemical anomalies of possible economic significance found on Aurora Creek and near the Quarry and Galena prospects have been reported (Herreid, 1966 and 1968). A re-discovered mineralized zone at the head of the placer on Oregon Creek is reported here for the first time.

The marble masses that cap the hills have been thrust from the west over the schist. Evidence for thrusting is: 1) discordance between bedding planes in the marble and those in the underlying schist, 2) discordance of bedding planes in the marble with its basal contact, 3) local presence of sheared marble at the base of the massive marble, and 4) variation of rock type below the marble. The marble is cut by many steep faults having moderate throw (probably 200 feet or less) and dips of about 65°.

The stronger gossans are localized near steep faults that cut the marble thrust sheet(s). The American Lode gossan is a replacement of marble and schist along a steep fault. The Monarch gossan, the largest in the district, is in marble along similar steep faults, about 300 feet above a basal thrust. Steep faults at the Monarch extend 3 1/2 miles south to the Quarry prospect, which is located along the basal thrust. The steep faults evidently controlled circulation of mineralizing fluids.

Mafic dikes and plugs (now greenstone) constitute a source of mineralization in the district. This is shown at the Aurora Creek prospect, where sulfide minerals along with introduced silica and dolomite occur along a mafic dike and extend outward along a favorable calcareous horizon in the schist. It is also shown at the head of the gold placer on Oregon Creek, where silicification, dolomitization, and minor sulfide mineralization near mafic plugs and dikes indicate that they are the probable source of gold.

It is probable that all of the mineral deposits in the Sinuk district are related to mafic intrusives. The gossans in the marble and the low grade sulfide-bearing deposits along the thrust probably lie above Aurora Creek-type deposits in the underlying schist.

Approximately 435 geochemical stream sediment and soil samples have been taken in the Sinuk map area. Sampling of the various gossans shows local anomalies at the American Lode, Monarch, Cleveland Creek, and Iron Creek gossans.

Geology and Geochemistry of the Spirit Mountain Area,  
Valdez Quadrangle, Alaska

Gordon Herreid, Mining Geologist

The Spirit Mountain nickel prospect has been known for many years, but the surrounding geology has not been studied in detail. An area of 18 square miles was mapped around the prospect. The nickel-copper showings are associated with peridotite, pyroxenite, and gabbro dikes in marble and quartzite country rock along a steeply north dipping thrust zone at least a mile wide. A diorite batholith lies south of the prospect. Bedrock is a typical eugeosynclinal assemblage of pillow basalt, cherty sediments, siltstone, and limy quartzite. Two and one-half miles northeast of the prospect, rusty weathering cherty sediments along diorite dikes carry minor amounts of copper.

One hundred forty geochemical stream sediment samples were taken in the area and are now being analyzed.

#### LABORATORY BRANCH NOTE ABSTRACTS

The following are brief introductions to Laboratory Notes number 10 through 15 written by the laboratory staff of the Division of Mines and Geology during 1969. These notes are of a specialized nature and are primarily for laboratory use. Xeroxed copies of the notes are available on request.

##### Lab Notes - 10

#### Semi-Quantitative Uranium Analysis by X-Ray Spectrography

Paul L. Anderson, Laboratory Supervisor

In the past the Laboratory has used only the radiation counter to estimate uranium. The counter is sensitive to radiation from sources other than uranium and so the estimate was one of "equivalent uranium" (eU). There has existed a need for a method for the determination of uranium per se. This investigation was designed to that end.

##### Lab Notes - 11

#### Potential Geochemical Sample Contamination from Cloth Sample Bags

Paul L. Anderson, Laboratory Supervisor

It has been suggested that cloth sample bags be used for field collection of geochemical samples. There is some hesitation in using cloth bags fearing that the cloth or the polishing compound (probably kaolin) may carry elements that would contaminate the samples. The experiment investigates that problem.

##### Lab Notes - 12

#### Comparison Analysis

Paul L. Anderson, Laboratory Supervisor

A sample of heavy sulfide ore was acquired and has been subjected to a comparison of analyses by various methods and laboratories. This approach is useful to indicate, but not to define, analytical accuracy.

##### Lab Notes - 13

#### Some Experiments in the Geochemistry of Copper and Zinc

Paul L. Anderson, Laboratory Supervisor

In conversations with the field geologists and engineers one concludes that the confidence in the field geochem test is accompanied with many reservations. The present atomic absorption analysis for "total" copper, lead, and zinc is both accurate and precise for the purpose of geochem interpretations.

But a question arises about the usefulness of "total" metal obtained from a hot acid leach of the sample. The reason for questioning the usefulness of total metal relates to geochem theory. Considering the theory of stream sediment sampling, should we be more interested in only that portion of the total metal that is adsorbed metal. If our purpose is to be able to infer the presence of subsurface ore bodies by water samples then maybe we should be more interested in the epigenetic metal (ionic metal attached to clay particles by ion exchange forces) content rather than total metal content. With the above in mind the writer performed a number of experiments which have some bearing on the question of the analytical values and use of: 1) total metal (syngenetic) by hot acid digestion, 2) epigenetic metal determined by the ammonium citrate-dithizone xylene field test, 3) epigenetic metal determined by the field test as run in the lab on dried and screened samples, 4) a method of determining epigenetic metal by atomic absorption, and 5) epigenetic/syngenetic ratios.

#### Lab Notes - 14

##### Dithizone Field Test - Some Suggestions

Paul L. Anderson, Laboratory Supervisor  
and  
Robert Pelz, Field Assistant

During the course of the Laboratory's work on our various geochemical procedures some pertinent factors about the dithizone field test resulted. Included in these notes are comments on the variations obtained and some suggestions as to how to reduce the variation and obtain greater confidence in the method.

#### Lab Notes - 15

##### A Geochemical Orientation Study for Lead and Zinc in the Fairbanks, Alaska Area

Paul L. Anderson, Laboratory Supervisor

Comment: Lab Notes 15 is felt to be of particular value for those conducting geochemical studies. Included below are the abstract, introduction, purpose and scope, and conclusions reached. Xeroxed copies of the complete report are available upon request.

##### Abstract

A geochemical orientation survey in a zone of known lead and zinc mineralization near Fairbanks, Alaska was conducted. One hundred ninety two stream sediment samples were collected at 300 foot intervals. The samples were analyzed for "total" copper, lead, and zinc by atomic absorption after an acid digestion of the minus 80 mesh material. Colorimetric field tests were run on the same samples.

The colorimetric field test correlated with zinc mineralization and proved to be a valid test if carefully ran. Duplicate samples taken five to ten feet apart indicated extreme variation in metal values over short distances in anomalous zones. Composite samples over 20-50 foot distances yielded much greater confidence in a single sample. The analytical precision was found to be about five ppm for copper, lead, and zinc. The preferred sampling interval when prospecting for lead mineralization in this area is about one quarter mile. Various methods of geochemical data interpretation are compared. The most instructive method is a plot of the logarithm of metal values versus cumulative percent of samples for these data.

## Introduction

Much of the Division's work involves the techniques of exploration geochemistry. A great deal has been written about the many variables and methods of control in geochemical exploration for lead and zinc. The results of different case histories are not always consistent, which is predictable because each study deals with a unique environment. Only a small proportion of the exploration geochemistry papers deal with sub-Arctic environments like the area of this study.

An orientation survey is usually conducted around a known source of mineralization. The purpose is to define the preferred methods for sampling, analytical techniques and interpretation procedures in order to effectively use exploration geochemistry in similar environments, or to simply extend outward from the area studied.

## Purpose and Scope

Some of the questions this study investigated include: 1) the sensitivity and quality of the colorimetric field test for heavy metals, 2) the preferred techniques and pitfalls within the colorimetric field test, 3) the geochemical detection of mineralization by a devised method of acid digestion of the sample and determining copper, lead, and zinc by atomic absorption spectrophotometry as a "total" metal analysis, 4) the correspondence between milliliters of dye in the field dye test and the atomic absorption's determination of the metal level in the dithizone extract, 5) to provide some information about the preferred sample interval, 6) to provide information about the reliability of individual samples, and 7) to provide information about the techniques of geochemical data interpretation.

## Conclusions

1. The colorimetric field test is a valid test for the detection of zinc in stream sediments if the analysis is very carefully run. One should be willing to run, more than once, samples giving color in order to better characterize the sample. The field test is very ineffective for the detection of lead per se except for the common association between lead and zinc.
2. Lead has a narrow dispersion. In anomalous zones lead values dropped to half their value in an average of 750 feet. Sample spacings of no more than 1/4 mile is recommended for lead surveys.
3. Zinc presented greater dispersion than lead. In anomalous zones zinc values dropped to half their value in about 1100 feet. Sample spacing could therefore be greater than for lead. However, the zinc values were far less extreme and so a somewhat finer method of data interpretation would be required for zinc.
4. Both lead and zinc showed two populations of metal values; an anomalous population and a non-anomalous population. Both populations for both metals had an apparently log-normal frequency distribution. The use of a data interpretation scheme with a log transform of the concentration values is preferred for log-normally distributed populations. Use of log concentration vs cumulative percent samples yielded the clearest presentation for lead and zinc. Statistical treatment, when extreme values are present, confuses the pattern because the mean and standard deviation are both strongly affected by extreme values. From the statistical treatment two zones anomalous in lead and zinc were defined, both on Fox Creek. From the log values-cumulative percent of samples plot several anomalous zones on Flume and Seattle Creeks were also discovered.
5. No copper anomalies were found. The copper values seemed to be normally and not log-normally distributed.

6. In anomalous zones metal values were highly erratic based on data from duplicate samples. It is strongly suggested that composite samples over at least 20-50 feet comprise a sample. This would help greatly to make an individual sample have more significance.
7. Analytical precision was as follows:

<u>Element</u>	<u>Standard Deviation</u>	<u>N</u>
Cu	3	18
Pb	6	18
Zn	7	18

Such spreads would not contribute significantly to error in data interpretation.

#### PROSPECTOR ASSISTANCE PROGRAM

##### General

The Division of Mines and Geology received and answered 25 requests for information about the Prospector Assistance Program during 1969. Of those who requested information 15 responded with applications that outlined a prospecting program. The Screening Board rejected two of these applications because the program goals were not sufficiently clear. The Screening Board also recommended that two other programs be given low priority, because of the past record of the applicants. Consequently 11 applications were approved; two others were approved on the condition that reimbursement would be made if funds were still available after other programs were reimbursed. Six applications had to be rejected because of lack of funds to cover the estimated reimbursement cost; the applicants did not wish to accept the condition that reimbursement would be made if funds were still available when they submitted their program. The total appropriation for 1969 was \$25,000; cost data are presented in Table 3.

Members of the Screening Board for the 1969 programs were:

Lawrence E. Heiner	Mineral Industry Research Laboratory, University of Alaska
Dr. Donald Cook	College of Earth Sciences and Mineral Industry, University of Alaska
Leo Mark Anthony	College of Earth Sciences and Mineral Industry, University of Alaska
Eddie R. Chipp	State Mining Geologist
Gilbert R. Eakins	State Mining Geologist
Gordon Herreid	State Mining Geologist
Robert E. Anderson	State Mining Engineer

Regulations covering the Prospector Assistance Program provide that submitted programs will be held confidential for a period of two years. Programs that have been submitted through 1967 have been summarized and the summaries are available to the public at our Fairbanks, Anchorage, and Juneau offices. If the summary of a particular program is of sufficient interest to an individual the entire program can be made available to him.

Table 3

**PROSPECTORS ASSISTANCE PROGRAM**

NAME	LOCALITY PROSPECTED	MAN DAYS	CLAIMS STAKED	SAMPLES ASSAYED	ACTUAL PROSPECTING EXPENDITURES				REIMBURSED BY STATE
					Travel	Food	Equipment & Misc.	Expense Per Man Day	
Edwin E. Hudson Wayne Wittrock Richard Geraghty	Livengood	162	0	13	—	\$ 677.59	\$2,863.39	\$21.86	\$2,655.00
James A. Walper and 7 others	Southeast Alaska	800	75	?	\$6,183.00	\$5,760.00	\$ 934.75	\$16.10	\$4,000.00
TOTAL		962	75	13	\$6,183.00	\$6,437.59	\$3,798.14	—	\$6,655.00
AVERAGE PER MAN DAY		—	—	—	\$ 6.43	\$ 6.69	\$ 3.95	—	\$ 6.92

### Costs

The costs presented below are based on an average of expenditures by participants in the State Prospector Assistance Program. The prospecting programs used in the calculation represent a broad range of activities from reconnaissance prospecting by one man with minimal equipment to a crew of men utilizing heavy equipment for stripping overburden. Consequently the cost for any individual prospecting venture may vary considerably from the average, depending on the scale of the program.

The average expense for 1963-1968 is \$22.55 per man day. In that six-year period total expenditures were \$126,386 covering 5632 man days. The cost to the State during that time was \$84,915 or about 67 percent of the total. The average expense for 1969, \$17.06 per man day, is based on only two programs submitted to date:

Average costs for the program are given below:

	<u>Average Cost Per Man Day</u>		
	<u>1963-1967</u>	<u>1963-1968</u>	<u>1969*</u>
Transportation	\$ 8.61	\$ 7.90	
Food	3.97	3.70	
Equipment and Supplies	10.01	10.95	
Total**	<u>\$22.59</u>	<u>\$22.55</u>	<u>\$17.06</u>

\*Data for the year 1969 are incomplete; only those programs reported by participants as of January 10, 1969 are included in the average.

\*\*Includes cost of heavy equipment operation.

Transportation includes aircraft, tracked vehicles, rubber tired equipment, and boats used to travel to and from prospecting areas and to transport supplies and equipment. Food includes groceries and other staple consumable items. Supplies include tools, camping equipment, prospecting equipment, fuel, and general supplies. Each year more heavy equipment is used to explore claims staked under the program than in previous years; thus there is a general increase in the cost of equipment and supplies.

Travel is mainly by charter aircraft. Small fixed-wing aircraft are available for charter in most Alaskan towns. Charter rates for a Piper Cruiser range from \$30 to \$40 per hour; charter rates for a Cessna 180 range from \$50 to \$60 per hour. Helicopters are available in Ketchikan, Juneau, Anchorage, and Fairbanks; charter rates range from \$135 to \$150 per hour with a minimum guaranteed flying time of three hours per day.

### REPORTS PUBLISHED DURING 1969

#### Geologic Reports

- No. 33    Geologic and Geochemical Study, Solomon C-5 Quadrangle, Seward Peninsula, Alaska, by R. R. Asher, April 1969. Price \$1.00.
- No. 34    Geology and Geochemistry, Diana Lakes Area, Western Talkeetna Mountains, Alaska, by R. E. Anderson, June 1969. Price \$1.00.
- No. 35    Geology and Geochemistry, Sithylemenkat Lake Area, Bettles Quadrangle, Alaska, by Gordon Herreid, June 1969. Price \$1.00.



No. 37      Geology and Geochemistry in the Southeastern Part of the Cosmos Hills, Shungnak D-2 Quadrangle, Alaska, by Crawford E. Fritts, June 1969. Price \$1.00.

No. 38      Uranium in Alaska, by G. R. Eakins, May 1969. Price \$1.00.

#### Geochemical Reports

No. 18      Geology and Geochemistry of Part of the Iron Creek Area, Solomon D-6 Quadrangle, Seward Peninsula, Alaska, by R. R. Asher, April 1969. Price \$1.00.

No. 19      Preliminary Geochemistry and Geology, Little Falls Creek Area, Talkeetna Mountains Quadrangle, Alaska, by Robert E. Anderson, March 1969. Price \$1.00.

#### DIVISION PROGRAMS FOR 1970

The purpose of the Division of Mines and Geology is to help establish mining industry in Alaska. Areas selected for investigation are those judged likely to contain an ore deposit, or those areas where a better understanding of the geologic setting will aid in exploration. Field investigations result in publications that contain geologic interpretations, geologic maps, geochemical data, and discussions of possible exploration targets. The areas mentioned below have been selected on the basis of economic potential or geologic complexity. The plans are tentative and may be modified or changed later in the season because of unforeseen events or demands. The amount of field work undertaken in 1970 will depend on the number of field personnel available, appropriations received, and other duties that the Division may be called upon to perform.

#### Mining Branch

Interior Alaska - Three areas in the Fortymile District will be investigated. These include Mount Fairplay in the Tanacross quadrangle, and Kechumstuk Creek and Canyon Creek in the Eagle quadrangle. Broad reconnaissance studies by the U. S. Geological Survey indicate favorable geology in these areas. This project is designed to see if prospecting and exploration by private industry in the vicinity would be worthwhile. One other project will be conducted in Interior Alaska by the Mining Branch of the Division, but the location has not been definitely decided at this time.

Western Alaska - Geological mapping together with geochemical reconnaissance will continue near Mount Bendeleben in the Bendeleben quadrangle on the Seward Peninsula. An investigation in the Bendeleben A-5 quadrangle was conducted during the summer of 1969. This project will be a continuation eastward of the previous season's work.

Southeastern Alaska - A project is planned in the Dixon Entrance quadrangle on Prince of Wales Island. Geochemical sampling, geologic mapping, and evaluation of prospects will be conducted in the vicinity of a regional fault that extends from Nichols Bay northwest through Tah Bay. Stream sediment samples will also be collected from streams flowing into the numerous coves and inlets along the coast line.

#### Geology Branch

Arctic Alaska - Recent work by the Division near Bornite has shown that Cretaceous strata of the Kobuk trough and copper-bearing dolomitic limestone of the Brooks Range geanticline both have been involved in large-scale overthrust faulting. The main structural features undoubtedly extend eastward toward the proposed North Slope transportation corridor. Copper anomalies have also been reported along the northern edge of the trough. A new project may be started along this important tectonic boundary to study the relationship between regional geology and copper mineralization.

Interior Alaska - The Bonifield district south of Fairbanks contains copper, bismuth, and arsenic in addition to placer and lode gold deposits. The district is near the northern flank of the Alaska Range along a major tectonic lineament. Granitic rocks are exposed in and south of the area. The general geology of the district is known, but detailed mapping of mineralized ground has not been done. The Division plans to undertake detailed geological mapping and geochemical sampling in the entire district.

South-Central Alaska - A helicopter-supported project in the Talkeetna Mountains near Cantwell has been tentatively planned to gather and evaluate geological and geochemical data. This area is between several other areas in which work by the U. S. Geological Survey has been planned, undertaken, or completed. It is considered favorable for copper and molybdenum mineralization. The size, duration, and success of the project, however, depend upon the availability of funds for helicopter support.

Southeastern Alaska - Uranium mineralization and radioactive anomalies at several localities will be examined as part of the long-range uranium program begun by the Division in 1968. This work will be done on the mainland as well as on Prince of Wales Island. Hydrogeochemical and geobotanical methods will be tested to determine their usefulness for uranium prospecting in this region. Barite deposits will also be studied.

Near Hetta Inlet on Prince of Wales Island, copper mineralization has occurred in numerous places close to the Mount Jumbo granodiorite stock. Considerable mining was done prior to World War I, and much prospecting has been done in rocks of the Wales Group. The Division plans detailed geologic mapping of these rocks and prospects as well as concurrent geochemical sampling.

The Hyder district northeast of Ketchikan has yielded gold, silver, lead, zinc, and tungsten, primarily from the Riverside mine. Mineralization is primarily confined to veins that cut schist inclusions in granodiorite. Regional geology has been mapped by Buddington (1929) and tungsten mineralization has been studied by Byers and Sainsbury (1956). Underground work also has been done by the U. S. Bureau of Mines. However, no geochemical data from the area have been published. Thus a field project in or near this district is being considered by the Division, but may be postponed in favor of work in less thoroughly studied parts of the State.

# GOVERNMENT ACTIVITY IN ALASKA, 1969

## AREAS STUDIED

### Arctic Alaska

Chukchi Sea (USGS)	Offshore seismic, magnetic, and depth profiling (cooperative project with U. S. Coast Guard)
Northeastern Brooks Range (USGS)	Detailed stratigraphic and structural studies; reconnaissance geologic mapping
North Slope and Central Brooks Range (USGS)	Permafrost and related engineering geologic studies along proposed TAPS alignment
Cosmos Hills (DM&G)	Geologic and geochemical study
Wild Lake Area (DM&G)	Geologic and geochemical study
Chandalar Quadrangle (DM&G)	Geologic and geochemical study

### Interior Alaska

Livengood Quadrangle (USGS)	Reconnaissance geologic mapping and mineral resource evaluation
Livengood-Bettles Area (USGS)	Permafrost and related engineering geologic studies along proposed TAPS alignment
Fairbanks District (USGS)	Detailed geologic mapping and ore genesis studies
Yukon-Tanana Upland (USGS)	Reconnaissance geologic mapping and mineral resource evaluation
Ester Dome, Fairbanks District (USBM)	Investigation of lode gold deposits
Fortymile District-Eagle (DM&G)	Geologic and geochemical study

### Western Alaska

Hogatza Project (USGS)	Detailed and reconnaissance geologic mapping and mineral resource evaluation
Seward Peninsula (USGS)	Reconnaissance geologic mapping
St. Lawrence Island (USGS)	Reconnaissance geologic mapping and mineral resource evaluation in western part of island
Bering Sea (USGS)	Offshore sampling; seismic, magnetic, and depth profiling

Bendeleben Quadrangle (DM&G)                      Geologic and geochemical study

Sinuk Area (DM&G)                      Geologic and geochemical study

#### Southwestern Alaska

Stony River/Kuskokwim River (USGS)                      Collection of data for the Alaska gravity map

Tikchik Lakes Area (USGS)                      Geologic mapping and geochemical studies

Amchitka Island (USGS)                      Engineering geologic studies related to AEC nuclear test site activities

Kolmokof Area Kuskokwim Region (USBM)                      Evaluation of mercury potential in the area

Unga Island (DM&G)                      Petrified forest investigation

Stepovak Bay (DM&G)                      Sulfur deposit investigation

#### South-Central Alaska

Eastern Alaska Range (USGS)                      Detailed geologic mapping and geochemical investigations

Central Alaska Range (USGS)                      Detailed geologic studies of placer deposits

Valdez Creek Area (USGS)                      Detailed geologic mapping and mineral resource evaluation

Anchorage Quadrangle (USGS)                      Detailed bedrock geologic mapping and geochemical studies in western Chugach Mountains

Southern Alaska Range (USGS)                      Reconnaissance geologic mapping and mineral resource evaluation near south fork of Kuskokwim River

Cook Inlet Area (USGS)                      Reconnaissance geologic mapping and field checking; Augustine Island, Barren Islands, and Iliamna Bay

Southern Wrangell Mts. (USGS)                      Mineral resource evaluation and detailed geologic mapping

Valdez to Fairbanks Route (USGS)                      Engineering geologic studies along proposed TAPS alignment

Anchorage-Cook Inlet Area (USBM)                      Analization of opportunities for economic mineral development created by the availability of petroleum and natural gas in South-Central Alaska

White River (DM&G)	Geologic and geochemical study
Lake Clark Quadrangle (DM&G)	Geologic and geochemical study
Spirit Mountain Valdez Quadrangle (DM&G)	Geologic and geochemical study
Wells Mountain Talkeetna Mts. Quadrangle (DM&G)	Geologic and geochemical study

#### Southeastern Alaska

Porcupine-Haines Area (USGS)	Detailed geologic mapping and mineral resource investigations
Juneau Project (USGS)	Detailed geologic mapping of gneissic rocks in Juneau icefield
Thomas Bay- Endicott Arm Area (USGS)	Reconnaissance geologic mapping and geochemical studies
Western Prince of Wales Island and offshore islands (USGS)	Detailed and reconnaissance geologic mapping and mineral resource evaluation
Dall Island (USGS)	Reconnaissance geologic mapping and geochemical studies
Boca de Quadra (USGS)	Detailed geologic mapping focused on metamorphic problems and structure
Yakutat (USGS)	Reconnaissance geologic mapping and mineral resource evaluation, emphasizing regional structure and metamorphic stratigraphy
Bokan Mountain- Prince of Wales (DM&G)	Biogeochemical prospecting for uranium
General (USGS)	Collection of data for the Alaska gravity map along the mainland coast of southeastern Alaska and around some offshore islands

"USGS" - United States Geological Survey

"USBM" - United States Bureau of Mines

"DM&G" - Division of Mines and Geology

## USGS AND USBM REPORTS PUBLISHED DURING 1969

The USGS and USBM publications listed below were released in 1969. Open file reports are usually available for study at the various USGS, USBM, and Division of Mines and Geology offices in Alaska. Copies of open file reports can usually be obtained at private expense. USGS numbered bulletins and professional papers may be purchased from the U. S. Government Printing Office or over the counter at the USGS Public Inquiry Office in Anchorage. USGS circulars are free. USBM information circulars and reports of investigations may be purchased from the Publication Distribution Office, U. S. Bureau of Mines, Pittsburgh, Pa. Division publications are listed elsewhere in this report.

## USGS Professional Papers

- No. 625-D Lode Mines and Prospects in the Fairbanks District, Alaska, by R. M. Chapman and R. L. Foster.
- No. 650-B Geological Survey Research 1969, Chapter B. (Contains the following article that is not available separately.) Radiocarbon dating of ash deposits on Amchitka Island, Alaska, by H. T. Shacklette and Meyer Rubin. p. B81.
- No. 678 Permafrost and related engineering problems in Alaska, by O. J. Ferrians, Jr., Reuben Kachadoorian, and G. W. Greene.

## USGS Circulars

- No. 611 Asbestos occurrence in the Eagle C-4 quadrangle, Alaska, by H. L. Foster.
- No. 614 Metalliferous deposits near Granite Mountain, eastern Seward Peninsula, Alaska, by T. P. Miller and R. L. Elliott.
- No. 615 Some shorter mineral resource investigations in Alaska.
- No. 617 Results of geological and geochemical investigations in an area northwest of the Chulitna River, central Alaska Range, by C. C. Hawley, A. L. Clark, M. A. Herdrick, and S. H. B. Clark.

## USGS Bulletins

- No. 1271-G Reconnaissance geology of the Eagle A-1 and A-2 quadrangles, Alaska, by H. L. Foster.
- No. 1274-D The coal-bearing group in the Nenana coal field, Alaska, by Clyde Wahrhaftig, J. A. Wolfe, E. B. Leopole, and M. A. Lanphere.
- No. 1274-I Six new Paleozoic and Mesozoic formations in east-central Alaska, by E. E. Brabb.
- No. 1274-K Summary of Cretaceous stratigraphy in part of the McCarthy quadrangle, Alaska, by D. L. Jones and E. M. MacKevett, Jr.
- No. 1275 Coal resources of the United States, January 1, 1967, by Paul Averitt.

## USGS Open File Reports

Geochemical investigations at Antimony Creek antimony prospect, northern Talkeetna Mountains, Alaska, by C. C. Hawley, A. L. Meier, and R. L. Miller.

Metallic mineral resources maps of nine Alaska quadrangles (Holy Cross, Kotzebue, Melozitna, Norton Bay, Nulato, Prince Rupert, Survey Pass, Taku River, Unalakleet), compiled by E. H. Cobb.

Bathymetry and isopach map of stratified Holocene sediments of Nuka Bay, Alaska, by Erk Reimnitz and Roland Von Huene.

Preliminary geologic map of Mt. Michelson quadrangle, Alaska, compiled by H. N. Reiser and I. L. Tailleux.

Preliminary geologic map of the Black River quadrangle, east-central Alaska, compiled by E. E. Brabb.

Geochemical analyses of stream-sediment and rock samples, Tanacross quadrangle, Alaska, by S. H. B. Clark and H. L. Foster.

Metallic mineral resources map of the Cordova quadrangle, Alaska, compiled by E. H. Cobb.

Metallic mineral resources map of the McCarthy quadrangle, Alaska, compiled by E. M. MacKevett, Jr., and E. H. Cobb.

Metallic mineral resources map of the Seldovia quadrangle, Alaska, compiled by E. H. Cobb.

Metallic mineral resources map of the Talkeetna Mountains quadrangle, Alaska, compiled by E. H. Cobb.

Principal facts on electrical soundings near Anchorage, Alaska, by D. B. Jackson and A. A. R. Zohdy.

Analyses of outcrop and stream sediment from the Yakutat and Mt. St. Elias quadrangles, Alaska, by E. M. MacKevett, Jr., and George Plafker.

Preliminary geologic map of the Eagle D-2 and D-3 quadrangles, Alaska, by S. H. B. Clark and H. L. Foster.

Metallic mineral resources maps of eleven Alaska quadrangles (Afognak, Beaver, Bering Glacier, Bettles, Karluk, Kenai, Middleton Island, Taylor Mountains, Trinity Islands, Tyonek, Yakutat), compiled by E. H. Cobb.

Preliminary geologic map of Annette Island, Alaska, by H. C. Berg.

Data on wells in the Matanuska-Susitna Borough area, Alaska, by A. J. Feulner.

Results of stream sediment sampling in western Candle and southern Selawik quadrangles, Alaska, by R. L. Elliott and T. P. Miller.

Results of stream sediment sampling in the northern Melozitna, the Hughes, and the southern Shungnak quadrangles, west-central Alaska, by T. P. Miller.

Aeromagnetic maps of parts of the southern Alaska Range, by B. L. Reed and L. A. Anderson.

Metallic mineral resources map of the Anchorage quadrangle, Alaska, compiled by E. H. Cobb and N. A. Matson, Jr.

Metallic mineral resources map of the Gulkana quadrangle, Alaska, compiled by N. A. Matson, Jr.

Metallic mineral resources map of the Nabesna quadrangle, Alaska, compiled by N. A. Matson, Jr.

## T H E   M I N I N G   I N D U S T R Y

### MINERAL PRODUCTION

Total mineral production in 1969 is estimated at \$244.8 million as compared to \$226.7 million in 1968. Crude oil and natural gas from the Kenai Peninsula and offshore Cook Inlet fields were again the leading mineral commodities, accounting for \$219 million or 89 percent of total mineral production. Production of coal, sand, gravel, silver, and gold all decreased in 1969. Mineral production in Alaska has now reached a cumulative total of \$2,191,878,000. Table 4 below presents a comparison of mineral production in 1968 and 1969.

Table 4  
Mineral Production in Alaska

	1968		1969 (1)	
	Quantity	Value (Thousands)	Quantity	Value (Thousands)
Antimony---short tons antimony content	3	Withheld		
Barite-----thousand short tons	Withheld	Withheld	95	Withheld
Coal-----thousand short tons	812	5034	4,647	278
Gold-----troy ounces	21,262	835	16,000	679
Natural Gas-----million cubic feet	47,343	4,388	49,424	8,364(2)
Petroleum, Crude -----thousand barrels	66,204	186,695	74,698	210,372
Sand and Gravel----thousand short tons	18,013	20,366	13,542	15,105
Silver-----thousand troy ounces	4	8	1	2
Undistributed (3)		<u>9,425</u>		<u>10,028</u>
TOTALS		226,751		244,828

(1) Figures for 1969 are preliminary and subject to revision.

(2) Marketed gas only, lower 1969 unit value reflects Alaska use for petrochemical plant feed and for liquefaction plant feed.

(3) Includes copper, gem stones, mercury, peat, platinum group metals, stone, and tin.

Note: The above statistics were prepared under a cooperative agreement for the collection of mineral data between the Bureau of Mines, U.S. Department of the Interior, and the Division of Mines and Geology of the Alaska Department of Natural Resources. Figures for coal are presented on authority of the Division of Mines and Geology only.



Table 5  
Production of Major Commodities Since 1949  
Dollar Value (Thousands)

Year	Gold	Mercury	Coal	Oil and Gas	Total all Production (Millions)
1950	\$ 10,125	\$	\$ 3,033	\$	\$ 17.9
1951	8,387		3,767		19.5
1952	8,420	6	5,779		26.3
1953	8,882	8	8,452		24.3
1954	8,699	277	6,442		24.4
1955	8,725	12	5,759		25.4
1956	7,325	853	6,374		23.4
1957	7,541	1,349	7,296		30.2
1958	6,525	774	6,931		20.9
1959	6,262	851	6,869	311	20.5
1960	5,887	940	6,318	1,496	21.9
1961	3,998	816	5,868	17,776	34.7
1962	5,784	711	6,409	31,657	54.2
1963	3,485	76	5,910	33,760	67.8
1964	2,045	95	5,008	35,490	66.1
1965	1,479	104	6,095	35,614	83.2
1966	956	101	6,953	50,418	86.3
1967	803	79	7,178	95,455	134.6
1968	835	78 (1)	5,034	191,083	221.7
1969 (2)	<u>679</u>	<u>100 (1)</u>	<u>2,788</u>	<u>218,736</u>	<u>244.6</u>
	106,642	7,230	128,273	711,796	1,247.9

(1) Estimate - no data available 1968 or 1969.

(2) 1969 figures are preliminary and subject to change.

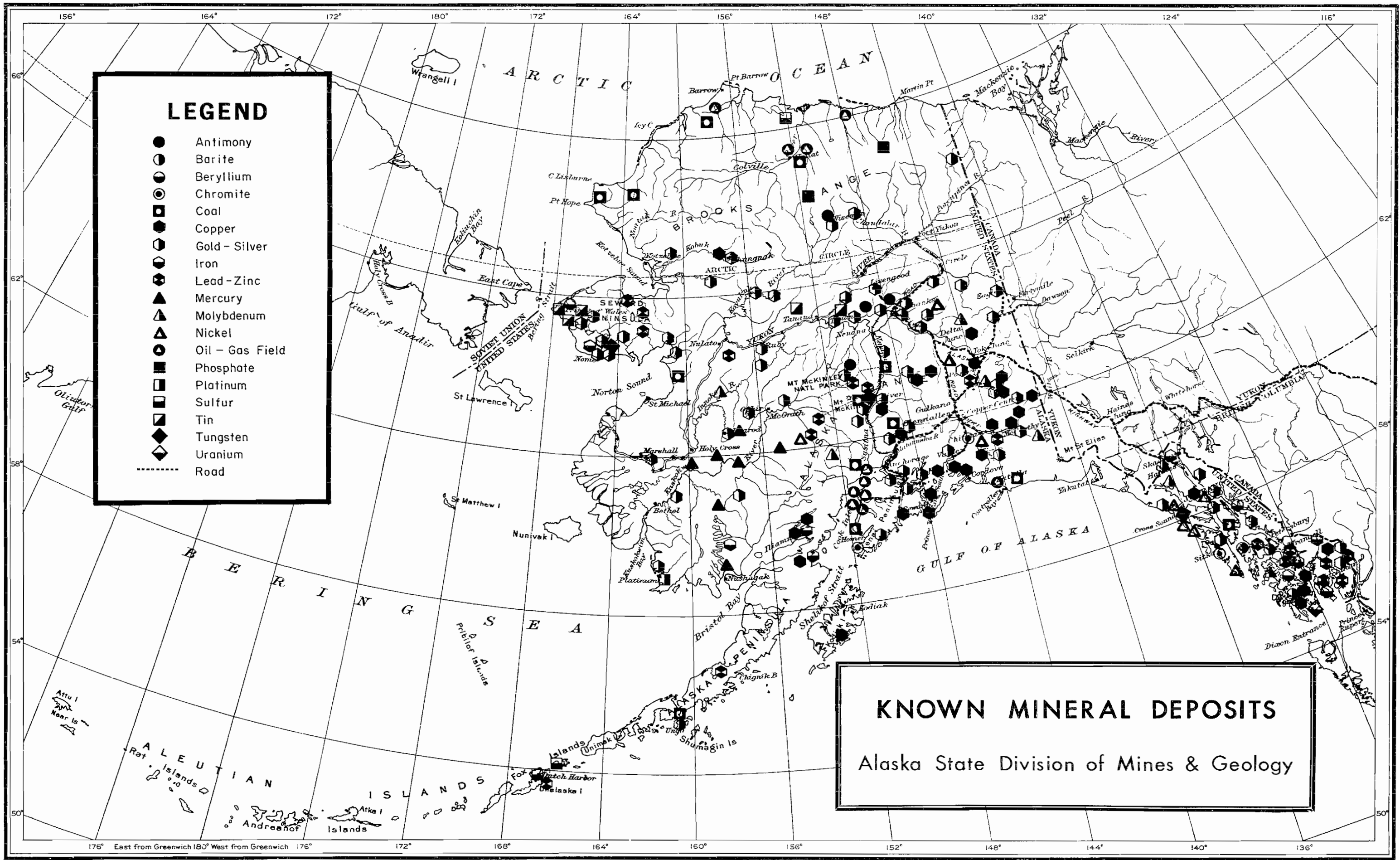


Table 6  
Physical Volume of Alaska Mineral Production (1)

Mineral	Quantity	Years
Total Gold-----troy ounces	29,960,262	1880-1969
Total Silver-----troy ounces	19,075,012	1906-1969
Copper-----short tons	690,011	1880-1967
Coal-----short tons	21,281,000	1951-1969
Sand and Gravel-----short tons	171,543,970	1958-1969
Crude Petroleum-----42 gal bbls	159,789,671 (2)	1958-1969
Natural Gas-----million cubic feet	275,299	1948-1969
Stone-----short tons	10,893,000 (3)	1921-1966
Mercury-----760 lb flasks	34,999 (4)	1902-1969
Tin-----short tons	2,400 (3)	1902-1966
Chromite----- (approx. 45%CR <sub>2</sub> O <sub>3</sub> )-----long tons	29,000	1917-1957
Tungsten-----short ton units WO <sub>3</sub>	7,000	1916-1958
Antimony----- (approx. 53% Sb)-----short tons	3,446 (4)	1928-1969
Lead-----short tons	25,014	1906-1968

- (1) Except platinum, uranium, barite, and other commodity figures which are confidential, 1969 production estimated and included in total.
- (2) Only other crude petroleum recorded production was from the Katalla area. From 1901 to 1932, 154,000 barrels of oil were produced there.
- (3) Production data, if any, withheld in 1967, 1968, and 1969.
- (4) Estimate - no data available 1968 - 1969.

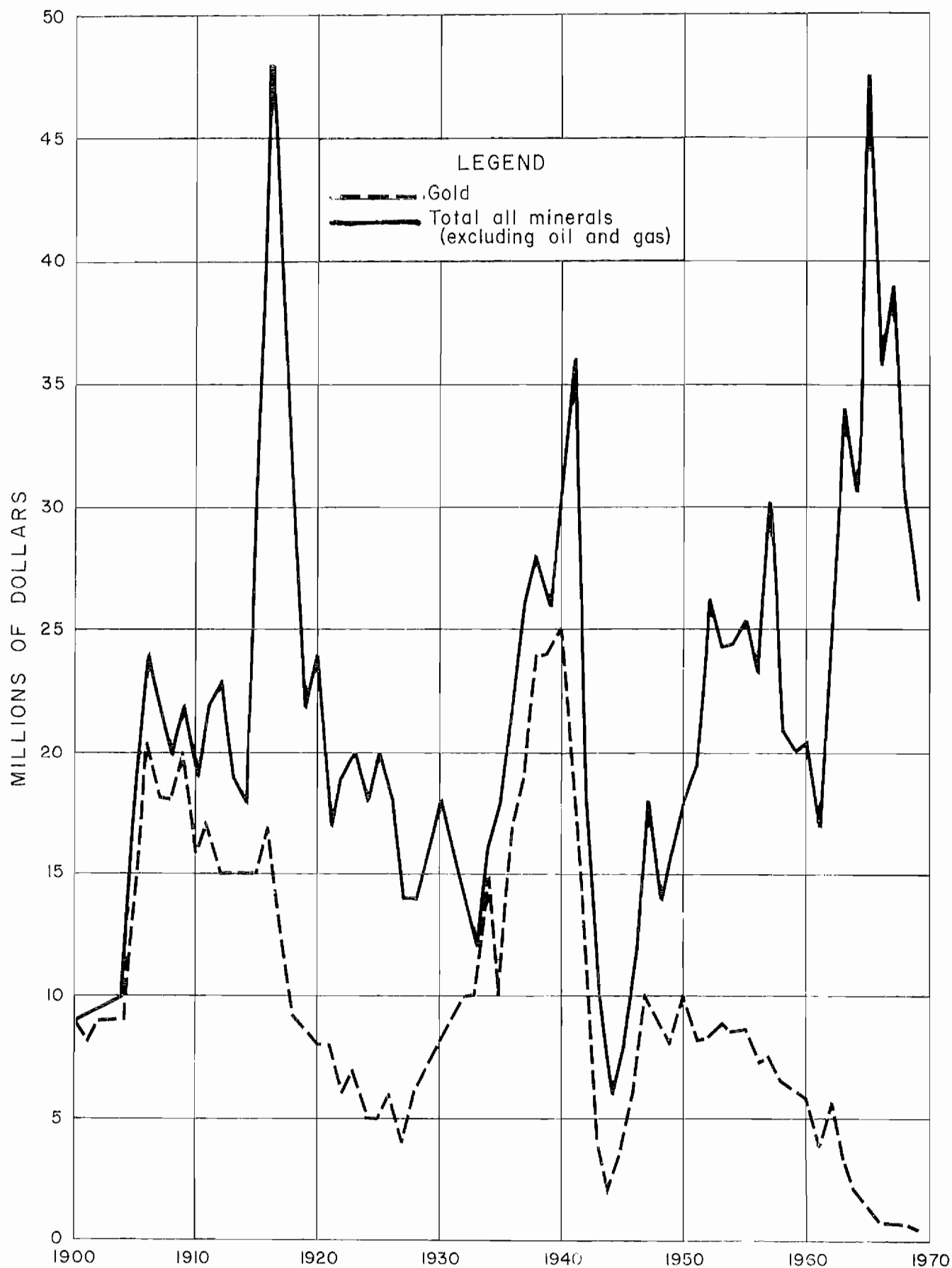


Figure 2

# **ANNUAL MINERAL PRODUCTION IN ALASKA 1900 - 1969**

### Precious Metals

Gold production decreased in 1969 by approximately 5000 troy ounces. This decrease appears to be primarily due to the steady decline in gold prices on the free market. The year ended with the price at a new low of \$35.27, which is equivalent to the "official price" of the U.S. Government. As a result of lower production and prices the value of gold produced in Alaska was \$155,000 less than in 1968. The United States Smelting, Refining, and Mining Company's gold dredge continued operating on the Hogatza River. Offshore placer exploration and development was carried out by Shell Oil Co., American Smelting and Refining Co., Aurora Mining Co., Inlet Oil, Rowan Drilling, and International Nuclear Corp. This increased exploration can be expected to result in increased production within the next few years. Goodnews Bay Mining Co. continued to produce platinum, while International Nuclear explored possible platinum sources in Icy Bay.

### Base Metals

Mercury was produced during 1969 but production figures are not available. Robert Lyman continued operating his White Mountain mine with success and Diamond Shamrock continued work on the old Schaffer property on Cinnabar Creek. The Red Top mine was also reported to be in production during 1969. Mercury exploration continued throughout the State and production should increase in future years. The Lee Brothers continued to mine tin at Goodwin Gulch on the Seward Peninsula and accounted for the only tin production in the State. Extensive copper exploration was carried out throughout the State with major expenditures in Southeast Alaska. Hanna Mining Co. optioned patented claims covering the old Kennecott Mother Lode property in the McCarthy district and Bear Creek Mining continued work at Bornite.

### Coal

Coal production decreased this year. The Henana field produced all the commercial coal used in the State during 1969. Increased interest in coal by Japanese companies has renewed hopes of developing the Bering River field. The Japanese companies have also shown interest in developing the Arctic Kukpowruk River coals.

## PROSPECTING AND EXPLORATION

### Arctic Alaska

It is estimated that approximately \$1,080,000 were spent in 1969 for exploration in Arctic Alaska. Lack of accurate information makes this a very approximate estimate.

Development of the Chandalar gold mining and milling facilities continued. A shakedown run of ore was processed by the mill.

Bear Creek Mining Co. continued drilling and geologic studies of its Bornite copper property. The company continued exploration elsewhere along the southern flanks of the Brooks Range, and staked claims north of the Bettles River.

Reed Mineral Exploration Co. was reported to be working in Arctic Alaska, as was ALVenCo, a syndicate under the direction of Clyde Wetherell of Anchorage.

Activity by individual prospectors in this part of Alaska was apparently light.

### Interior Alaska

Exploration expenditures in Interior Alaska during 1969 are estimated at \$750,000.

Busty Belle Mines, Inc., continued development work on their property in the Fox area.

Glen Exploration, Inc. installed gold recovery machinery on the firm's placer gold property in the Kantishna district.

ASARCO, Earth Resources, Inc., and Cache Creek Mining Co. were reported to be doing reconnaissance work. Cassiar Asbestos Corp. investigated asbestos near Eagle. International Minerals and Chemical Corp. conducted drilling on a gold lode prospect. International Nuclear worked in the region, and a large number of small mining firms and prospectors were active.

### Western Alaska

Exploration expenditures in Western Alaska in 1969 are estimated to be \$2,500,000. A great deal of these expenditures were for offshore prospecting in the vicinity of Nome. A large amount was spent by Alaska Mines and Minerals, Inc. in looking for new ore at the Red Devil mercury mine.

The following companies were prospecting and drilling offshore in the Nome area: Amerada Petroleum, Auric Mining Co., Aurora Mining Co., Inlet Oil Co., Ocean Science and Engineering, Occidental Minerals Corp., Rowan Drilling Co., and the Shell-ASARCO joint venture. Some useful information has been brought to light by the experience of the operators engaged in drilling from offshore ice. When ice thickness and weather conditions are good, drilling can be done far from shore. When weather is bad, ice begins to soften, or ice may shift and drilling must be done close to shore. It has long been known that the ice can move out from shore very suddenly, but until recently many of these movements were not understood. A correlation between these movements and tide fluctuations has now been made. Normally tidal fluctuations at Nome are not more than a foot, but occasionally the water will rise several feet because of distant storm conditions, wind, or other causes. It is after the water subsides from an unusually high level that the ice moves out suddenly.

Mercury prospecting in the Kuskokwim area continued to be vigorous. R & H Mining Co. had a new discovery in the area. Diamond Shamrock continued work on Cinnabar Creek. Jack Egnaty, Julius Sirilo, and consultant James Wylie were active in the region.

Alaskamin had a large crew in Western Alaska. Hewmont Mining Co. was reportedly active on Seward Peninsula. PCE Exploration and Western Exploration were also working in Western Alaska.

Others active in Western Alaska included International Nuclear, Rhinehart Berg, T.J. Almasy, Willie Foster, Hugh Lindfors, and Don Roberts.

### Southwestern Alaska

Exploration expenditures for this division in 1969 are estimated to be \$110,000.

Sinclair Oil Co. was reported to be doing reconnaissance work on the Alaska Peninsula.

Truman Emberg again prospected beach sands on the Alaska Peninsula.

### South-Central Alaska

Exploration expenditures in South-Central Alaska during 1969 are estimated to be \$1,320,000.

The Danali copper prospect was developed with more underground work and drilling by Cities Service Minerals Corp. This company also did reconnaissance work south of the Alaska Range.

Anchorage geologist Kirk Stanley conducted a drilling program and reconnaissance work.

Hanna Mining Co. investigated the Mother Lode property in the McCarthy district.

Wallace McGregor of Salt Lake City was active in this area with a crew of geologists including Dr. Fred Humphrey, who did detailed studies of the Orange Hill property. The McGregor joint venture did some drilling and sampling on a prospect east of the Chisana River.

Cortella Coal Corp. of Cordova continued their work in the Bering River coal field. The Morgan Coal Co. of Indianapolis worked in the Beluga coal field. American Exploration worked in the Beluga coal field and did research. The company plans to station geologist Benno Patsch in Anchorage permanently. Starky Wilson of Dallas, Texas conducted a drilling program in the Beluga coal field.

St. Eugene Mining Co. continued development of their property in the Kaska Creek area south of Lake Clark and did reconnaissance work in other parts of South-Central Alaska.

Trans Pacific Resources, Inc. conducted a mapping program on the Tuxedni iron deposit, Cook Inlet.

Gordon Burdick and Martin Radovan both worked in the McCarthy area. Moore and Dohney continued to explore for gold in the Chitina area. Alaska Yukon Minerals Co. worked in the Copper River country.

Others active in South-Central included R. S. Richards (who worked with his associates in several areas), R.H. McGill, and Ron Sume.

### Southeastern Alaska

Southeastern Alaska was the busiest region in 1969. Exploration expenditures for the region are estimated to be \$3,910,000.

ALVenCo, under the direction of Clyde Wetherell, was very active in several areas of Southeastern as well as other parts of the State.

Humble Oil had an elaborate float camp with a heliport and a laboratory equipped with a crusher and atomic absorption unit. Work was done in Groundhog Basin, in the Ross Mountain area on Prince of Wales Island, and other areas of that island.

El Paso Natural Gas Co. has opened a hardrock mineral exploration office and laboratory in Ketchikan. A staff of six or seven will be employed on a year-round basis. During the summer El Paso had 14 men in reconnaissance exploration on Prince of Wales Island and the mainland. One property was drilled. The lab is chiefly for analyzing stream sediments and other geochemical samples.

ASARCO did some drilling on the Red River property, Boca de Quadra area, and examined other properties.

Inlet Oil conducted an extensive offshore exploration program.

Newmont Mining continued work on the Bokan Mountain uranium prospect. The drilling contract was held by McPherson of Colorado. Encouraging results are reported, and more work at Bokan Mountain is expected next season. With Union Pacific Railroad as a partner, Newmont did a feasibility study of its Brady Glacier nickel property. Deeper drilling and underground work is planned for this project.

Marcona Corp. drilled the Snettisham iron deposit and took 20 tons of bulk samples. It is reported that development of the project hinges on negotiation of satisfactory sales agreements with Japanese steel producers, and that preliminary planning calls for two processing lines, each capable of handling 15,000,000 tons per year of crude ore.

International Nuclear Corp., under the direction of Phil Holdsworth, was very active in the area. Field crews were helicopter supported, and an atomic absorption unit was used in the field.

Paramount Mining Co. examined properties and did some drilling. Shareholders of the company were told at the annual meeting that a joint project with United Copper Co. in the Ketchikan district may lead to the development of a large open pit mine.

Dynasty Exploration Ltd. was active on McLean Arm in the Ketchikan district.

Property examinations were made by Phelps Dodge, Utah Construction and Mining, Falconbridge, Copper Range Co., and Mobil Oil.

Prospector Jim Walper of British Columbia was again very active and was able to raise company interest on a new prospect on Hump Island, near Ketchikan.

Phelps Dodge mapped and did geochemical work on their Hunatak molybdenum property.

Others active in Southeastern Alaska include Alaska Drilling and Construction Co., Kelly Adams, Don Ross, Dave McCrillis, Bill Huff, Larry Heiner, John Brockway, John Ballard, Cambridge Mining Corp. of Toronto, the Baseys, the Boedeckers, Bonanza Gold, Inc., Carl Bradley, W. A. Hawkins, Ken Eichner, Angus Lillie, Bill Hibberd, Jack Johnstone, Herman Kloss, Olan McCoy, Fred Magill, James Mardis, Mineral Basin Mining Corp., O.H. Newlun, Paul Pieper, "Tiger" Olsen, Red Dotson, and Joe Thomas.

#### General

It is estimated that approximately \$580,000 were spent in 1969 in general investigations and reconnaissance that cannot be assigned to any particular region because of lack of information.

Companies active in general Alaska exploration include ALVenCo, Anaconda, Copper Range, USSR&M, AMAX, Asbestos Corp., Cyprus Mines, Guggenheim, Hecla, Homestake, International Mine Service, U.S. Steel, Inlet Oil, and Ocean Science and Engineering.

Indications are that 1970 will bring even greater exploration activity to Alaska than 1969 did. Union Carbide and Chemical plans to have one party in Southeastern and one in the Interior next season. The Anaconda Co., New Jersey Zinc, and National Lead have shown interest in Alaska, as have many others.

The U.S. Geological Survey remains active throughout the State supporting field parties with fixed wing aircraft, helicopters, and tracked vehicles, which results in efficient operations capable of reaching otherwise inaccessible terrain.

Total estimated exploration expenditures in the State in 1969 is \$10,250,000, a gain of \$5,740,000, or 127 percent over 1968. According to Division records, 6624 new claims were recorded as of January 1, 1970.



Table 7  
Alaska Exploration Expenditures by Geographic Division

<u>Division</u>	<u>1969 (\$)</u>	<u>1968 (\$)</u>	<u>Change (\$)</u>	<u>Change (%)</u>
Arctic	1,080,000	710,000	+ 370,000	+ 52
Southwestern	110,000	50,000	+ 60,000	+120
Interior	750,000	120,000	+ 630,000	+520
Western	2,500,000	1,240,000	+1,260,000	+102
South-Central	1,320,000	850,000	+ 470,000	+ 55
Southeastern	3,910,000	1,540,000	+2,370,000	+154
General (1)	<u>580,000</u>	<u>(1)</u>	<u>                    </u>	<u>                    </u>
TOTAL	10,250,000	4,510,000	+5,740,000	+127

(1) In 1968 General expenses were distributed elsewhere

NOTE: These estimates are very approximate. Some of the changes from 1968 may be due to variation in completeness of data.

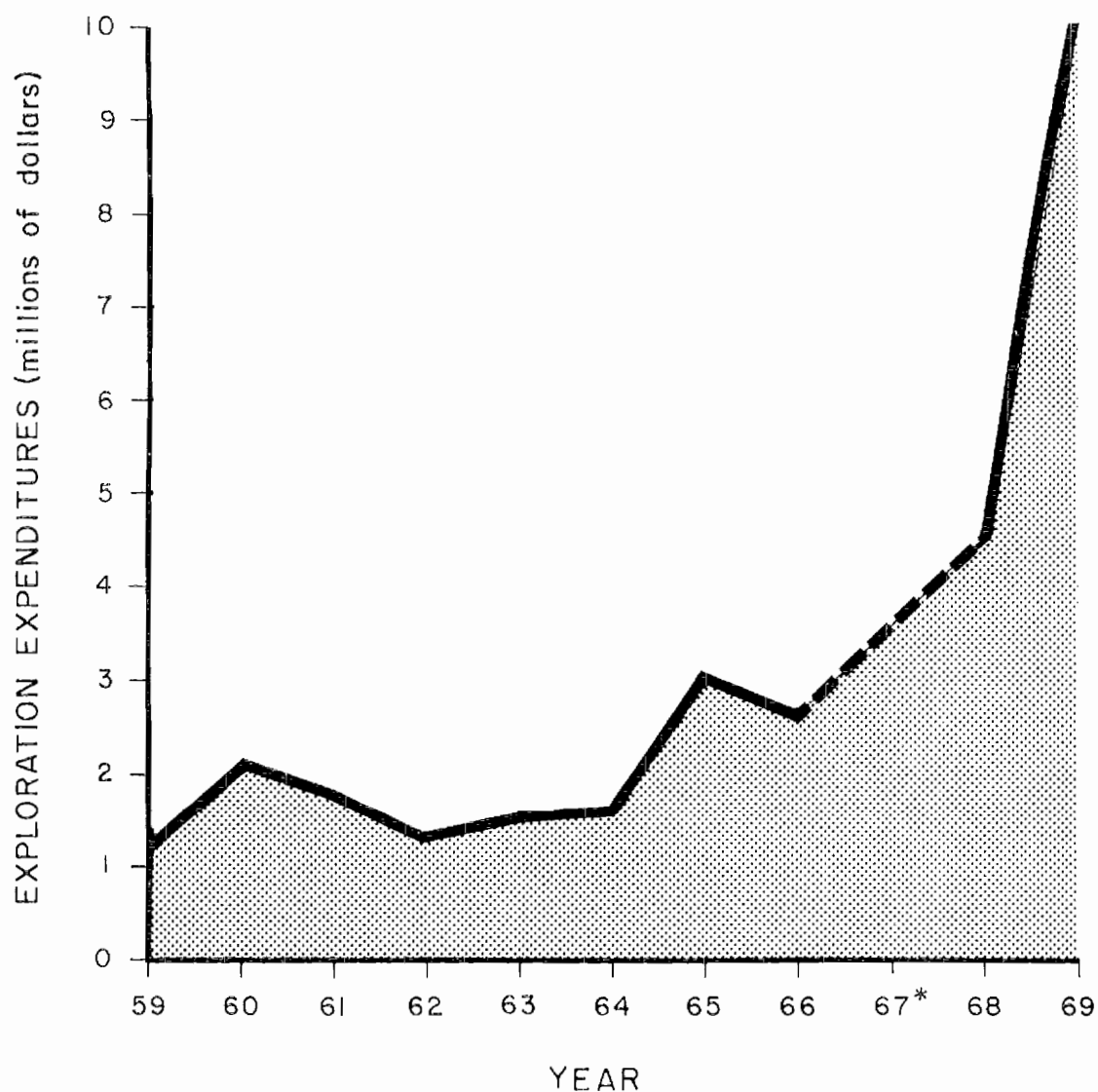


Figure 3

**EXPLORATION EXPENDITURES IN ALASKA  
1959-1969\*\***

## P R O S P E C T O R S    M I N E R S    C O N S U L T A N T S    C O M P A N I E S

## PROSPECTORS AND MINERS ACTIVE DURING 1969

Name and Address	Location of Mines & Recording Districts	Approx. Crew	Type of Operation
Agoff, S. E. Flat	Prince Creek Mt. McKinley	1	Nonfloat
Alaska Barite Co. 345 Sixth Avenue Suite 202 Anchorage	Castle Island Petersburg	20	Open pit mine barite production
Alaska Exploration Co. 506 Sixth Avenue Anchorage	Norton Sound Cape Nome	1	Offshore prospecting
Alaskamin 525 Failing Bldg. Portland, Oregon	Post River Bowser Creek	12	Exploration
Alaska Mines & Minerals, Inc. Ray Wolfe Box 422 Anchorage	Red Devil Mine Kuskokwim	22	Mercury development
Alaska Yukon Minerals Co. 111 East Fifth Avenue Anchorage	Copper River region Chitina	2	Prospecting
Almasy, Theodore J. McGrath	Nixon Fork area Mt. McKinley	1	Prospecting
AlVenCo Clyde Wetherell 2805 Bering Anchorage	Alaska General Several	18	Prospecting, drilling
AMAX Exploration Inc. 601, 535 Thurlow Street Vancouver, B.C.	Alaska general Several	1	Investigations
Amerada Petroleum Box 2040 Tulsa, Oklahoma	Bering Sea Cape Nome	1	Offshore prospecting
American Exploration & Mining Co. Russ Building San Francisco	Alaska general Several	2	Investigations
American Smelting & Refining Co. 504, 535 Thurlow Street Vancouver, B.C.	Alaska general Several	6	Property exploration

Ames, Robert 1220 Fifth Avenue Fairbanks	Ready Bullion Creek Fairbanks	1	Small scale hand
Anaconda P.O. Box 1764 Spokane, Washington			Investigating prospects
Anderson, Red Manley Hot Springs	Glen Gulch Manley Hot Springs	2	Nonfloat
Asbestos Corp. Ltd. 814, 837 W. Hastings Vancouver, B.C.	Alaska general Several	3	Exploration
Au Limited Henry Warner Box 674 College	Porcupine Creek Fairbanks	2	Placer development
Auric Mining Co. Nome	Bluff Cape Nome	4	Offshore drilling
Aurora Mining Co. Nome	Bluff Cape Nome	4	Offshore drilling
Ballard, John D. Box 920 Sitka	Chichagof Island Sitka	3	Prospecting
Basey, Bill & Martin, Lloyd Box 1173 Ketchikan	George Inlet Ketchikan	2	Lode exploration
Bear Creek Mining Company 1135 W. 8th Anchorage	Kobuk region & Alaska Range Several	40	Drilling and recon
Berg, Rhinehart Kobuk	Kugruk Fairhaven	4	Exploration, drilling
Blair, Boyd 320 Lakeview Trailer Court Fairbanks	Eva Creek Fairbanks	2	Gold lode development
Bliss, Patrick J. & Sons 129 E. 11th Anchorage	Ungalik Creek Cape Nome	3	Bucket line dredge
Boedecker, Bill, Joines, and Evert Hollis	Hollis Ketchikan	2	Prospecting
Boese, Earl Wiseman	Linda Creek Fairbanks	2	Nonfloat

Bonanza Gold, Inc. E. 15 Walton Spokane, Washington	Prince of Wales Island Ketchikan	4	Iron lode development
Bonnell, Frank 1057 W. 80th Street Los Angeles, California	Kantishna district Fairbanks	1	Lode prospecting
Bookwalter, Vern Nome	Buster Creek Cape Nome	2	Nonfloat
Bradley, Carl Wrangell	S. E. Alaska Several	1	Prospecting
Brockway, John T. 1737 Glacier Avenue Juneau	Baker Peak Sitka	1	Copper development
Bruce, Farrell Box 10149 Klatt Station Anchorage	Chicken Fairbanks	1	Lead-silver development
Bunker Hill Box 29 Kellogg, Idaho	Alaska general Several	1	Investigations
Burdick, Gordon McCarthy	McCarthy McCarthy	2	Copper development
Burns, John Boundary	Poker Creek (40-Mile) Fairbanks	1	Nonfloat
Busty Belle Mine Tury Anderson & Associates 101 E. Street Fairbanks	Fairbanks Fairbanks		Lode development
Cache Creek Exploration Co. 701 Welch Road Palo Alto, California	Interior Alaska Fairbanks	7	Recon exploration
Cambridge Mining Corp. Ltd. 1130 Bay Street Toronto, Canada	Seal Cove Ketchikan	5	Drilling
Canyon Creek Mining Co. Jens Kvamme & Sons Akiak	Canyon Creek Kuskokwim	4	Hydraulic
Cassiar Asbestos Corp. Cassiar, B.C.	Eagle Fairbanks	5	Prospect investigation
Casto, Steve 33 Mile Haines	Porcupine Creek Haines	1	Small scale hand

Chandalar Gold Mining Co. Box 1332 Fairbanks	Chandalar District Fairbanks	10	Nonfloat and mill construction
Cities Service Mineral Corp. 61 Broadway New York	Denali Highway area Talkeetna	23	Copper lode development
Copper Range Co. 4401 Wallingford Ave. N Seattle, Washington	Alaska general Several	2	Prospect investigations
Cortella Coal Corporation Box 745 Cordova	Bering River Field Carbon Creek	8	Coal development
Craig, Glenn Juneau	Canyon Creek Fairbanks	4	Nonfloat
Cyprus Mines Corp. 822-510 W. Hastings St. Vancouver, B.C.	Alaska general Several	2	Investigations
Diamond Shamrock Corp. 300 Union Commerce Bldg. Cleveland, Ohio	Cinnabar Creek Mt. McKinley	10	Mercury lode development
Dotson, R. L. Ketchikan	Southeast Alaska		Prospecting
Duval Corporation 506-602 W. Hastings Street Vancouver, B.C.	Orange Hill Fairbanks	10	Drilling copper prospect
Dynasty Exploration Ltd. 330-355 Burrard Street Vancouver, B.C.	McLean Arm Ketchikan	8	Exploration
Earth Resources 90 Park Avenue New York	Interior Alaska Fairbanks	8	Recon exploration
Edgecumbe Exploration Co. C.T. & G.H. Morgan Box 758 Sitka	Silver Bay Sitka	2	Gold lode maintenance
Egnaty, Jack Sleetmute	George River Kuskokwim	1	Prospecting
El Paso Natural Gas 1014 Water Street Ketchikan	Southeastern General	11	Recon exploration & drilling
Emberg, Truman E. Dillingham	Egegik Bay to Ugashik Bay Alaska Peninsula	4	Beach sand prospecting

Emerson, Fred Haines	Porcupine Creek Haines	1	Small scale hand
Empire Jade Co. Gene Joiner Kotzebue	Jade Creek Noatak-Kobuk	1	Jade recovery and cutting
Falconbridge (St. Eugene Mining Co.) 504, 1112 West Pender Street Vancouver, B.C.	Central Alaska Several	8	Recon exploration
Farrell, Ed & Rainey, Del Fairbanks	Boulder Creek Manley Hot Springs	2	Placer prospecting
Ferguson, Bill Box 985 Fairbanks	Ester Dome Fairbanks	2	Gold lode development
Foster, Willie Nome	Hannum Creek Fairhaven	3	Nonfloat and lode prospecting
Fullerton Brothers Flat	Willow Creek Mt. McKinley	3	Nonfloat
Garrughi, Ron Fairbanks	Alatnar	2	Nonfloat
Gates, Tex Ophir	Colorado Creek Mt. McKinley	3	Nonfloat
Gilbertson, George 314 Charles Street Fairbanks	Dan Creek McCarthy	2	Nonfloat
Goodnews Bay Mining Co. 422 White Building, Seattle or Platinum	Salmon River & Tribs. Bethel	40	Platinum dredge
Guggenheim Exploration Co. Inc. G. A. Dirom 4554 West Sixth Avenue Vancouver, B.C.	Alaska general Several	1	Investigations
Hanna Mining Corp. 1300 Leader Building Cleveland, Ohio	Alaska general Several	7	Exploration
Hansen, Burnett F. Eagle	Ben Creek Fairbanks	1	Nonfloat
Hapeman, Fred Chicken	Fortyfive Pup (40-Mile) Fairbanks	1	Nonfloat
Hassel Mining Co. Harold Hassel Box 1071 Fairbanks	Ready Bullion Creek Fairbanks	2	Nonfloat

Hawkins, W. A., Eichner, Ken and Lillie, Angus Ketchikan	Southeast Alaska Several	2	Prospecting
Hay and Day Mining Co. Hubbard, A.	Cinnabar Creek Mt. McKinley	5	Open pit cinnabar mining
Hecla Mining Co. 1105-900 W. Hastings Street Vancouver, B.C.	Alaska general Several	1	Investigations
Heiner, Larry Petersburg	Southeastern Alaska Several	1	Prospecting
Hibberd, Bill 1723 A. Tongass Ketchikan, Alaska	Southeastern Alaska Several	1	Prospecting
Hill, Howard 221 2nd Avenue Fairbanks	Platte Creek Nenana	2	Nonfloat
Hogendorn, Jack Deering	Inmachuck River Fairhaven	1	Hydraulic
Holloway, Dorr and Rehard, Robert Box 16 Aniak	Kolmakof Property Kuskokwim	4	Mercury exploration and drilling
Homestake Mineral Devel. Co. 304, 535 Thurlow St. Vancouver, B.C.	Alaska general Several	1	Investigations
Hudson, Edwin and Wittrock, Wayne 817 Lakeview Trailer Court Fairbanks	Livengood Fairbanks	3	Gold lode prospecting
Huff, J. W. Box 837 Ward Cove	S. E. general	2	Prospecting
Humble Oil & Refining Co. P.O. Box 120 Denver, Colorado	S. E. Alaska General	18	Recon exploration, drilling
Inlet Oil 345 6th Ave., Suite 202 Anchorage	Goodnews Bay district Bethel	10	Offshore prospecting
International Mineral and Chemical Corp. Old Orchard Road Skokie, Illinois	Fairbanks district Fairbanks	4	Investigations and drilling



International Mine Service, Ltd. Box 1052 Whitehorse	Alaska general Several	1	Investigations
International Nuclear Corp. Phil R. Holdsworth 1009 Mendenhall Apts. Juneau	S. E. Alaska Several	10	Recon exploration
Johnstone, Jack	Prince of Wales Island Ketchikan	2	Prospecting
Jurgeleit, Art & Jo Haines	Porcupine Creek Haines	1	Small scale hand
Kilbury, Claude E. 2415 E. Hemlock Ketchikan	Unuk River	1	Nonfloat
Kiwalik Mining Company Nome	Kiwalik Cape Nome	2	Dredge
Kloss, Herman K&D Lode Sunset Cove	Sunset Cove Juneau	1	Prospecting
Lanning, Tony Manley Hot Springs	Thanksgiving Creek Manley Hot Springs	1	Nonfloat
Larsen, Clifford P.O. Box 1875 Fairbanks	McKinley Park Nenana	1	Nonfloat
Larson, Ken Box 1388 Ketchikan	S. E. Alaska Several	1	Prospecting
Lee, Richard Nome	Tin City Cape Nome	5	Nonfloat tin production
Leonard, Harry B. A.C. Mining Co. Wiseman	Vermont Creek Fairbanks	1	Small scale hand
Lindfors, Hugo Nome	Rocky Mtn. Creek Cape Nome	1	Development
Lucky Seven Mining Co. Walter E. Roman Box 141 Fairbanks	Fish Creek Fairbanks	7	Nonfloat
Lyman, Robert Lyman Mining Co. McGrath	White Mountain Kuskokwim	4	Cinnabar production
March, Fred	Koyukuk River	2	Nonfloat

Marcona Iron Co. 1 Maritime Plaza San Francisco, Calif.	Snettisham Juneau		Drilling iron deposit
M and M Mining Co. Box 1591 Anchorage	Taylor Creek Kuskokwim	2	Nonfloat
McCanse, Ed Ronde Valley Lumber Co. P.O. Box 608 Union, Oregon	Klery Creek Noatak-Kobuk	4	Dredge
McCay, Alan V. Box 513 Wrangell	S. E. Alaska Several	2	Prospecting
McCrillis, Dave Alaska Drilling & Construction Company Box 2325 Ketchikan	S. E. Alaska General	50	Contract drilling and geological work
McGee, L. 836 Lindley Way Reno, Nevada	Tofty Manley Hot Springs	5	Nonfloat
McGregor, Wallace Box 6351 Salt Lake City	Alaska general Several	7	Recon exploration
Magill, Fred Petersburg	Admiralty Island Petersburg	1	Prospecting
Magnuson, Warren Ophir	Gaines Creek Mt. McKinley	3	Dredge
Mardis, James E. General Delivery Anchorage	Glacier Bay Juneau	1	Prospecting
Marvel Creek Mining Co. Awe, Charles Aniak	Marvel Creek Bethel	4	Dredge
Meldrum, Billy Chicken	Chicken Creek (40-Mile) Fairbanks	1	Stripping
Miettunen, Ray 332 Dunbar Fairbanks	Alder Creek (40-Mile) Fairbanks	1	Nonfloat
Mineral Basin Mining Corp. Moa, Arthur Box 126 Hyder	Mt. View Property Ketchikan	2	Lode development

Miscovich, Andrew 779 8th Fairbanks	Porcupine Creek Fairbanks	2	Nonfloat
Miscovich, John Otter Dredging Co. Flat	Otter Creek Mt. McKinley	1	Nonfloat
Mobil Oil Company 612 S. Flower Street Room 1342 Los Angeles, California	S. E. Alaska Several	2	Exploration
Morgan Coal Co. Indianapolis	Beluga Field	2	Exploration
Moore, Norman 326 Baranof St. Fairbanks, and Dohney, Edward Box 604 College	Chistochina River Chitina	2	Lode gold exploration
Munz, William Nome	Dahl Creek Noatak-Kobuk	1	Jade recovery
Newlun, O. H. Box 623 Ketchikan	Prince of Wales Island Ketchikan	1	Prospecting
Newmont Exploration Ltd. 300 Park Avenue New York	Alaska general Several	30	Drilling nickel and uranium prospect and recon exploration
North American Dredge Co. John Stevens Flat	Otter Creek Mt. McKinley	1	Dredge
Northland Mines Charles W. Monroe Box 876 Big Delta	Nowitna Mt. McKinley	1	Prospecting
Occidental Minerals Corp. 6073 West 44th Avenue Wheat Ridge, Colorado	Bering Sea Cape Nome		Offshore prospecting
O'Carroll, Michael J. 14615 - 25th S.W. Seattle	Spruce Creek Nulato	3	Nonfloat
Ocean Science & Engineering 4905 Del Ray Avenue Washington, D.C.	Norton Sound Cape Nome	9	Offshore prospecting
Olive Creek Mines Carl Parker Box 552 Fairbanks	Amy Creek Fairbanks	4	Nonfloat

Olson, Henry T. "Tiger" Taku Harbor	Juneau & Admiralty Districts	1	Prospecting
Ott, Martin H. 332 N. Boundary Fairbanks	Chicago Creek Manley Hot Springs	1	Nonfloat
Pacific Construction Company Lundgren, Jim 707 Steese Fairbanks	Steamboat Creek Fairbanks	3	Prospecting
Pannick, Harry General Delivery Fairbanks	Flume Creek Fairbanks	2	Nonfloat
Paramount Mining Co. 505 Burrard Street Vancouver, B.C.	Gravina Island Ketchikan	4	Exploration
Parker, Albert Box 289 Juneau	Glacier Bay Juneau	2	Gold lode maintenance
Parker, Fred Deering	Inmachuck River Fairhaven	4	Nonfloat
PCE Explorations, Ltd. Murray Watts Nome	Seward Peninsula General	3	Prospecting
Pedersen, Steve Council	Ophir Creek Cape Nome	2	Dredge
Phelps Dodge Corp. Box 991 Douglas, Arizona	Muir Inlet Juneau	4	Exploration
Pieper, Paul Box 1294 Ketchikan	S. E. Alaska Several	1	Prospecting
Prospector John Box 271 Skagway	Skagway Skagway	1	Small scale hand
Radovan, Martin McCarthy	Glacier Creek McCarthy	1	Copper lode prospecting
Rainbow Mining Co. Ed Dalton Box 990 North Pole	Fairbanks Fairbanks	2	Drilling
Ramnaud, John Chicken	Fortymile River Fairbanks	1	Nonfloat

Rasmussen, C. T. Alaska Red Top Mine, Inc. 7933 Jewell Lake Road Anchorage	Marsh Mountain Bristol Bay	4	Mercury production
Redstone Mining Co. Carl Heflinger 409 Clara Street Fairbanks	Livengood Creek Fairbanks	4	Nonfloat
R & H Mining Co. P.O. Box 16 Aniak	Interior Alaska	4	Mercury
Rhode Island A. W. Pringle Manley Hot Springs	Rhode Island Creek Manley Hot Springs	3	Nonfloat
R. S. Richard & Associates Box 1817 Anchorage	N. Fork Kashwitna River & Alaska Peninsula area Several	3	Copper, iron & gold prospecting
Roberts, Don O. Box 1700 Fairbanks	Seward Peninsula Cape Nome	1	Prospecting
Robinson, George F. Chicken	Jack Wade Creek (40-Mile) Fairbanks	1	Stripping
Rosander, Toivu Ophir	Yankee Creek Mt. McKinley	3	Placer drilling
Ross, Don Box 2307 Ketchikan	S. E. Alaska Several	1	Prospecting
Rowan Drilling Company, Inc. 3023 Humble Building Houston, Texas	Bering Sea Cape Nome	10	Offshore prospecting
Ruby Mining Co. Al Kangus Ruby	Long Creek Nulato	2	Nonfloat
Shell-ASARCO Shell Bldg; 100 Bush Street San Francisco, California	Bering Sea Cape Nome	10	Offshore prospecting
Sinclair Oil Co. Box 584 Anchorage	Alaska Peninsula Several	6	Prospecting
Sirilo, Julius Box 625 Bethel	Aniak district Kuskokwim	1	Prospecting

Smith, Arthur W. Box 3-252 Eastchester Branch Anchorage	White River McCarthy		Prospecting
Stanley, Kirk W. 7003 Mink Place Anchorage	Slana district Chitina	25	Drilling
Stevens, John Flat	Otter Creek Mt. McKinley	1	Dredge
Stout, Al Eagle	Eagle Fairbanks	2	Nonfloat
St. Eugene Mining Co. 504, 1200 W. Pender St. Vancouver, B.C.	Kasna Creek Iliamna	2	Copper development
Sune, Ron K. General Delivery Anchorage	Knik Glacier Palmer	1	Prospecting
Thomas, Joe Sitka	Chichagof Mine Sitka	2	Development
Thermal Energy Company 4681 First National Bank Building Dallas, Texas	Various Several		Holding extensive coal deposits
Tweet, N. B. & Sons Teller	Kougarok River Cape Nome	6	Nonfloat
Tweiten, Oscar Box 162 Fairbanks	Chatham Creek Fairbanks	1	Small scale hand
United Copper Company Markham, R. V.	Gravina Island Ketchikan	3	Exploration
U. S. Steel Corp. 525 William Penn Place Pittsburgh, Pa.	Alaska general Several	2	Development
U.S.S.R. & M. Co. Box 1170 Fairbanks	Hogatza River Nulato	20	Gold dredge and Alaska exploration general
Utah Construction & Mining Company 718-510 W. Hastings Street Vancouver, B.C.	Alaska general Several	6	Exploration
Vetter, Rudy & Adolph 1425 Ash Street Fairbanks	Cleary Summit Fairbanks	1	Gold lode development

Vogler, Joe (Joseph E.) Box 7 Fairbanks	Deadwood Creek Fairbanks	2	Nonfloat
Walper, James A. 25212 12th Ave. RR3 Alder Grove, B.C.	S. E. Alaska Ketchikan	8	Prospecting
Warwick, Bill (William W.) 315 5th Avenue Fairbanks	Fortymile Fairbanks	1	Mercury development
Western Exploration Locke Jacobs Suite 5A, 428 4th Avenue Anchorage	Seward Peninsula and Western Alaska	4	Prospecting
Weston, Dave (David M.) Box 1938 Fairbanks	Dome Creek (40-Mile) Fairbanks	1	Nonfloat
Wigger, Walter 900 Park Drive Fairbanks	Eva Creek Fairbanks	2	Nonfloat
Wilson, Starkey A. 852 Wilson Building Dallas, Texas	Beluga Coal Field Anchorage	3	Drilling
Wolff, Ernest and Coben, Dan Box 5-165 College	Woodchopper Creek Manley Hot Springs	2	Prospecting
Woodman, I. N. Box 573 Valdez	Tonsina Lake area Valdez	1	Prospecting
Worthington, John Ketchikan	Prince of Wales Island Ketchikan	1	Prospecting
Wright, Virgil J. Box 980 Sitka	Herbert Groves Island Sitka	1	Prospecting
Wylie, James R. Box 208 Aptos, California	Kuskokwim Kuskokwim	6	Prospecting

"Nonfloat" indicates mechanical placer gold operation using draglines and/or bulldozers to transport gravel to nonfloating washing plant, bedrock sluiceboxes, or elevated sluices.

"Hydraulic" indicates placer gold operation in which gravel is excavated and transported to sluiceboxes solely by water jets from hydraulic nozzles.

"Small scale hand" indicates placer gold operation in which gravel excavation and transportation is accomplished by hand or ground sluicing.

#### ACTIVE COAL MINES

<u>Name and Address</u>	<u>Location of Mines &amp; Coal Field</u>	<u>Approx. Crew</u>	<u>Type of operation</u>
Alaska Matanuska Coal Co. (Paul Omlin) Box 13 Palmer	Premier Mine Matanuska Field	2	Strip
Usibelli Coal Mines, Inc. Usibelli	Healy Creek Nenana Field	45	Strip
Vitro Minerals Corp. Box 1070 Fairbanks	Healy Creek Nenana Field	37	Strip



CONSULTANTS  
(Available for Work in Alaska)

Adamson, Robert S.  
Dolmage, Campbell & Associates Ltd.  
Suite 808 - 900 W. Hastings Street  
Vancouver 1, B.C., Canada

Alaska Drilling & Construction Co.  
David McCrillis  
Box 2325  
Ketchikan, Alaska 99901

Alaska Exploration Corporation  
Gerald Ganopole  
Suite 210, 700 Bldg.  
Anchorage, Alaska 99501

Alaska Geological Consultants  
2227 Spenard Road  
Anchorage, Alaska 99503

Alaska Mineral Lab (Assaying)  
2229 Spenard Road  
Anchorage, Alaska 99503

AlVenCo  
Clyde Wetherell  
639 I Street  
Anchorage, Alaska 99501

Anderson, Eskill  
W. 924 22nd Avenue  
Spokane, Washington 99203

Anderson & Kelly  
606 Idaho Building  
P. O. Box 1411  
Boise, Idaho 83701

Archer, Cathro & Associates  
#1 Bentall Centre  
Vancouver 1, B.C., Canada

Bacon-Crowhurst  
1111 W. Georgia Street  
Vancouver 1, B.C., Canada

Bechtold, Ira C.  
1987 Skyline Vista Drive  
La Habra, California 90631

Beckwith, H. Rea  
Box 119  
Anchorage, Alaska 99501

Behre Dolbear & Company, Inc.  
11 Broadway  
New York, New York 10004

Beistline, Earl H.  
Box 148  
College, Alaska 99701

Boyd, Glen A., P. E.  
Route 3, Box 6377  
Lake Sammamish  
Issaquah, Washington 98027

Bradley, Waring  
1639 Sunrise Drive  
Anchorage, Alaska 99504  
Phone 279-3903

Colp, Douglas  
1101 Gilliam Way  
Fairbanks, Alaska 99701

Cook, Donald J.  
Box 5-93  
College, Alaska 99701

Daily, Arthur F.  
488 Fairbanks Avenue  
Oakland, California 94610

Dickinson-Oswald & Associates  
433 9th Avenue  
Anchorage, Alaska 99504  
(Land Surveyors)

Gardner, R. C. & Associates  
615 S. Flower Street  
Suite 303  
Los Angeles, California 90017

Heiner, Lawrence E.  
Box 5-433  
College, Alaska 99701

Heinrichs Geoexploration Company  
P. O. Box 5671  
Tucson, Arizona 85703

Herbert, Charles F.  
Box 1464  
Anchorage, Alaska 99501

Hoskins, C. B.  
621 West Galer Street  
Seattle, Washington 98119

Hubbell & Waller Engineering Corp.  
10 Harrison St., P. O. Box 9305  
Seattle, Washington 98109

Jasper, Martin W.  
3007 W. 30th Avenue  
Anchorage, Alaska

Lehmann, Ernest K.  
1705 Emerson Avenue South  
Minneapolis, Minnesota 55403

Lindgren Exploration Company  
338 South Walker Avenue  
Wayzata, Minnesota 55391

McGregor, Wallace  
Box 6351  
Salt Lake City, Utah 84106

Matsumoto, Tak  
3313 Doris Drive  
Anchorage, Alaska 99503

Moerlein, George A.  
Box 40, Star Route A  
Anchorage, Alaska 99502

Noble and Ruckmick  
1475 East California Blvd.  
Pasadena, California 91106

O'Neill, William A.  
505-8th Avenue  
Anchorage, Alaska

Pilgrim, Earl R.  
Box 1896  
Fairbanks, Alaska 99701

Renshaw, A. L., Jr.  
1850 Wickersham Drive  
Anchorage, Alaska 99502

Renshaw, Dan  
1329 "S" Street  
Anchorage, Alaska 99501

Ryan, Irene E.  
Box 84, Star Route A  
Anchorage, Alaska 99502

Saunders, Robert H.  
P. O. Box 1801  
Fairbanks, Alaska 99701

Seraphim, R. H.  
427-470 Granville  
Vancouver 2, B.C., Canada

Schmidt, Ruth A. M.  
1040 C Street  
Anchorage, Alaska 99501

Smyth, S. K.  
Kelly Pittelko Fritz & Forssen  
Suite 900, 424 'G' St.  
Anchorage, Alaska 99501

Stevenson, William G.  
509, 475 Howe Street  
Vancouver, B.C.

Thompson, Raymond M.  
5752 South Jasmine  
Englewood, Colorado 80110

Utermohle, George E., Jr.  
Box 5338  
Fairbanks, Alaska 99701

Western Exploration  
Locke Jacobs  
428 4th Avenue, 5-A  
Anchorage, Alaska 99501

Wilson, L. Kenneth  
400 Montgomery Street  
San Francisco, California 94104

Wilson, Starkey A.  
852 Wilson Building  
Dallas, Texas

Wolff, Ernest  
Box 5-165  
College, Alaska 99701

Wylie, James R.  
Box 208  
Aptos, California 95003

COMPANIES\*  
(Interested in Alaska Mining Possibilities)

Alaskamin Inc.  
525 Failing Building  
Portland, Oregon  
William P. Murray

American Exploration & Mining Co.  
2300 Russ Building  
San Francisco, California 94104  
Robert G. Garwood

American Smelting & Refining Co.  
504, 535 Thurlow Street  
Vancouver 5, B.C., Canada  
Thomas C. Osborne

American Metals Climax (AMAX)  
601, 535 Thurlow Street  
Vancouver 5, B.C., Canada  
R. A. Barker

Anaconda American Brass  
Brittania Beach, B. C. or  
116, 744 West Hastings Street  
Vancouver 1, B.C., Canada  
Glenn Waterman

Arrow Inter-America Corporation  
304-535 Thurlow Street  
Vancouver 5, B.C., Canada  
F. B. Whiting

Asbestos Corp. (Explorations) Ltd.  
814, 837 West Hastings Street  
Vancouver 1, B.C.

Atlantic Richfield Co.  
Box 59, Anchorage, 99501  
or Box 749, Dallas, Texas 75221

Atlas (or Dynasty) Exploration Co.  
328, 355 Burrard  
Vancouver, B.C., Canada  
John Brock

Bear Creek Mining Co.  
E. 7621 Sprague  
Spokane, Washington  
David M. Snyder

Bunker Hill Company  
P. O. Box 29  
Kellogg, Idaho 83837  
Foster Howland

Cache Exploration Co.  
701 Welch Road  
Palo Alto, California 94304  
Robert L. Foster

Canex (Placer Development, Ltd.)  
800, 1030 West Georgia Street  
Vancouver 5, B.C., Canada  
A. G. Horton

Cassiar Asbestos Corp.  
Cassiar, B.C., Canada  
W. N. Plumb

Cities Service Minerals Corp.  
61 Broadway  
New York, N. Y. 10006  
Owen Kingman

Conwest Exploration Co.  
901, 675 West Hastings Street  
Vancouver 2, B.C.

Copper Range Exploration Co., Inc.  
4401 Wallingford Avenue, N.  
Seattle, Washington 98103  
C. Phillips Purdy, Jr.

Cordero Mining Co.  
131 University Avenue  
Palo Alto, California  
J. Eldon Gilbert

Cyprus Mines Corp.  
822, 510 West Hastings Street  
Vancouver 2, B.C., Canada  
Donald W. Tully

Diamond Shamrock Corp.  
300 Union Commerce Building  
Cleveland, Ohio 44115  
Don Deardorf

Duval Corp.  
506, 602 West Hastings Street  
Vancouver 2, B.C., Canada  
Robert Gale

Dynasty Exploration Ltd.  
330, 355 Burrard Street  
Vancouver, B.C.

\*Best company contact man listed where known.

Eagle Richer Industries, Inc.  
Box 910  
Miami, Oklahoma

Earth Resources  
90 Park Avenue  
New York, N. Y. 10016

Hanna Mining Co.  
200, 1200 West Pender Street  
Vancouver, B.C., Canada  
Alex G. Jones

Hedra Mining Co.  
1105, 900 West Hastings Street  
Vancouver, B.C., Canada  
Phil Conley

Homestake Mineral Development Co.  
504, 535 Thurlow Street  
Vancouver 5, B.C., Canada  
L. G. White

Humble Oil and Refining Co.  
10624 Kensington  
Spokane, Washington 99218  
Rennell Campbell

International Minerals & Chemical Corp.  
5401 Old Orchard Road  
Skokie, Illinois 60076  
Peter O. Sandvik

International Nuclear Corp.  
1009 Mendenhall Apts.  
Juneau, Alaska 99801  
Phil R. Holdsworth

International Mine Services Ltd.  
Box 1052  
Whitehorse, Yukon  
John McMullin

J. R. Simplot Co.  
Box 2777  
Boise, Idaho 83701  
Joe Jammett

Kerr McGee Oil Industries  
Kerr McGee Building  
Oklahoma City, Oklahoma 73102

McGregor, Wallace  
Box 6351  
Salt Lake City, Utah 84106

National Lead Company  
48 North Tucson Blvd.  
Tucson, Arizona 85716  
James D. Loghry

Newconex Canadian Exploration Ltd.  
914, 525 Seymour Street  
Vancouver 2, B.C.  
Paul W. Richardson

New Jersey Zinc  
Room 905  
525 Seymour Street  
Vancouver 2, B.C.,  
Mr. MacDonald

Newmont Exploration, Ltd.  
300 Park Avenue  
New York, N. Y. 10022  
Robert B. Fulton

P. C. F. Explorations, Ltd.  
420-459 Bay Street  
Toronto, Ontario

Penarroya  
126 Rue St-Pierre  
Quebec 2, Canada

Phelps Dodge Corp.  
Box 991  
Douglas, Arizona  
Elmer A. Winter

Shell Canadian Exploration Co.  
815 East Fourth South  
Salt Lake City, Utah 84102

Shell Oil Co.  
100 Bush Street  
San Francisco, or 1008 Sixth  
Los Angeles, California 90054

Silver Standard  
808, 602 West Hastings Street  
Vancouver 2, B.C., Canada  
William Dunn

**STRAUS EXPLORATION, INC.**  
4554 West 6th Avenue  
Vancouver 8, B.C., Canada  
Gavin Dirom

Sinclair Oil Company  
Box 521  
Tulsa, Oklahoma 74102  
Merril Nielson

Springer & Associates  
 502, 1200 West Pender Street  
 Vancouver 1, B.C., Canada  
 Karl J. Springer

St. Eugene Mining Corp.  
 (Falconbridge)  
 504, 1112 West Pender Street  
 Vancouver 1, B.C., Canada  
 Alex Smith

Standard Oil Co. (Indiana)  
 910 South Michigan  
 Chicago, Illinois 50580  
 P.W. Pitcher

Superior Oil Co.  
 1 East First Street  
 Reno, Nevada

Texas Gulf Sulphur Co.  
 701, 1281 West Georgia Street  
 Vancouver 5, B.C., Canada  
 J. Russell Lowdon

Utah Construction & Mining Co.  
 718, 510 West Hastings Street  
 Vancouver 2, B.C., Canada  
 E.S. Rugg

U.S. Steel Corp.  
 Box 510  
 Provo, Utah  
 J.K. Hayes

Union Oil Company of California  
 2805 Denali Street  
 Anchorage, Alaska 99503  
 E.D.B. Laudeman

U.S. Smelting Refining & Mining Co.  
 Box 1170  
 Fairbanks, Alaska 99701  
 or  
 235 East 42nd Street  
 New York, New York 10017

Western Exploration  
 Suite 5-A  
 428 4th Avenue  
 Anchorage, Alaska 99501  
 Locke Jacobs

P R E V I O U S   R E P O R T S  
(Division of Mines and Geology and Preceding Agencies)

- \*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1912.
- \*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1913.
- \*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1914.
- \*Report of the Territorial Mine Inspector to the Governor of Alaska for the year 1915.
- \*Report of William Maloney, Territorial Mine Inspector, to the Governor of Alaska for the year 1916.
- \*Report of the Territorial Mine Inspector to the Governor of Alaska for the year 1917.
- \*Annual Report of the Territorial Mine Inspector to the Governor of Alaska, 1920.
- \*Annual Report of the Territorial Mine Inspector to the Governor of Alaska, 1921.
- \*Annual Report of the Mine Inspector to the Governor of Alaska, 1922.
- \*Annual Report of the Mine Inspector to the Governor of Alaska, 1923.
- \*Report upon Industrial Accidents Compensation and Insurance in Alaska for the biennium ending December 31, 1924.
- \*Report of the Territorial Mine Inspector, calendar years 1925-26.
- \*Report of cooperation between the Territory of Alaska and the United States in making mining investigations and in the inspection of mines for the biennium ending March 31, 1929.
- \*Report of cooperation between the Territory of Alaska and the United States in making mining investigations and in the inspection of mines for the biennium ending March 31, 1931.
- \*Mining Investigations and Mine Inspection in Alaska, biennium ending March 31, 1933.
- \*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1936.
- \*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1938.
- \*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1940.
- \*Report of the Commissioner of Mines to the Governor, two biennia ended December 31, 1944.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1946.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1948.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1950.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1952.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1954.
- \*Out of Print. On file in certain public and University libraries.

- \*Report of the Commissioner of Mines, biennium ended December 31, 1956.
- \*Report of the Commissioner of Mines, biennium ended December 31, 1958.
- \*Report of the Division of Mines and Minerals for the year 1959.
- \*Report of the Division of Mines and Minerals for the year 1960.
- \*Report of the Division of Mines and Minerals for the year 1961.
- \*Report of the Division of Mines and Minerals for the year 1962.
- \*Report of the Division of Mines and Minerals for the year 1963.
- Report of the Division of Mines and Minerals for the year 1964.
- Report of the Division of Mines and Minerals for the year 1965.
- \*Report of the Division of Mines and Minerals for the year 1966.
- Report of the Division of Mines and Minerals for the year 1967.
- Report of the Division of Mines and Geology for the year 1968.
- \*Joesting, Henry R., Strategic Mineral Occurrences in Interior Alaska, Pamphlet #1, May 1942.
- \*Joesting, Henry R., Supplemental to Pamphlet #1 - Strategic Mineral Occurrences in Interior Alaska; Pamphlet #2, March 1943.
- \*Anderson, Eskil, Mineral Occurrences other than Gold Deposits in Northwestern Alaska; Pamphlet #5-R, May 1944.
- \*Stewart, R. L., Prospecting in Alaska (26-page pamphlet) December 1944. (Revised to November 1949)
- \*Glover, A. E., Industrial Minerals as a Field for Prospecting in Alaska, including a Glossary of Elements and Minerals (82-page booklet) March 1945. (Revised to May 1946)
- \*Anderson, Eskil, Asbestos and Jade Occurrences in the Kobuk River Region, Alaska; Pamphlet #3-R, May 1945.
- \*Roehm, J. C., Some High Calcium Limestone Deposits in Southeastern Alaska; Pamphlet #6, March 1946. Mimeographed copies are available.
- Information Circular #1: Proper Claim Staking in Alaska; Revised March 1, 1968.
- Information Circular #2: Mineral Rights of Aliens in the State; Revised March 1, 1968.
- Information Circular #3: Hand Placer Mining Methods; Revised March 5, 1968.
- Information Circular #4: Uranium Prospecting in Alaska; Revised March 7, 1968.
- Information Circular #5: General Alaskan Mineral Information; Revised February 18, 1969.
- Information Circular #6: Alaskan Prospecting Information; Revised March 8, 1968.

\*Information Circular #7: Compulsory Assessment Work Affidavits; Discontinued.

Information Circular #8: Exploration Companies and Available Consultants; Revised June 19, 1969.

Information Circular #9: Alaska Rockhound Information, Revised August 1, 1969.

Information Circular #10: Skin Diving for Gold in Alaska; Revised April 2, 1968.

Information Circular #11: List of Reports Issued by the Division of Mines and Geology and Corresponding Preceding Agencies; Revised January 6, 1970.

Information Circular #12: Services of the Division of Mines and Geology; Revised June 17, 1969.

Information Circular #13: Dangers in Old Mine Openings, November 6, 1962.

Information Circular #14: Mining Laws Applicable in Alaska; Revised November 15, 1966.

Information Circular #15: A Prospectors Guide to the Sale and Lease of Mineral Properties; June 12, 1969.

Race, William H., The Mineral Industry of the Kenai-Cook Inlet-Susitna Regions, 1962.

\*Report No. PE 85-22: Report on Preliminary Investigation of the Kings River Area Limestone Deposits, Anchorage Quadrangle, by Martin W. Jasper and Miro Mihelich, State Mining Engineers, January 1961.

Report No. PE 65-1: Report on the Mespelt Mine of Strandberg Mines, Inc., Nixon Fork District Medfra Quadrangle, Alaska, by Martin W. Jasper, State Mining Engineer, February 1961.

Alaska's New Mining Law for State Lands, by James A. Williams, Director, State Division of Mines and Minerals, December 1961 (Reprinted from Mining Engineering Magazine).

Geology and Ore Deposits of Alaska, by Gordon Herreid, Geologist, State Division of Mines and Minerals, December 1961 (Reprinted from Mining Engineering Magazine).

Tectonics and Ore Deposits in Alaska, by Gordon Herreid, Mining Geologist, State Division of Mines and Minerals. Presented at the 1964 Alaska AIME conference, College, Alaska, March 19, 1964.

A Possible Guide to Metal Deposits of Alaska, by Charles F. Herbert, Deputy Commissioner, State Department of Natural Resources. Presented at the 1964 Alaska AIME conference, College, Alaska, March 20, 1964.

\*Map: Better-Known Mineral Deposits, Possible Petroleum Provinces, and Existing Roads.

Map: M.I. Report 194-1; A Preliminary Map of the Bedrock Geology of the Fairbanks Mining District, Alaska, by Robert B. Forbes and Jim M. Brown, Department of Geology, College of Earth Sciences and Mineral Industry, University of Alaska for the Division of Mines and Minerals, December 1961. Price \$1.00

\*Geologic Report #1: Preliminary Report on Geologic Mapping in the Coast Range Mineral Belt, by G. Herreid. This report formerly included in Annual Report of the Division of Mines and Minerals for the year 1962. Price \$1.00



\*Geologic Report #2: Bedrock Geology of the Rainbow Mountain Area, Alaska Range, Alaska; an M.S. thesis prepared by Larry G. Hanson of the University of Alaska in cooperation with the Division of Mines and Minerals, November 1963. Price \$1.00

\*Geologic Report #3: Geology of the Portage Creek-Susitna River Area, by Donald Richter, 1963. (2 large sheets) Price \$1.00

Geologic Report #4: Geology and Mineral Deposits of the Denali-Maclaren River Area, Alaska, by M. A. Kaufman, May 1964. (19 pages & large map) Price \$1.00

\*Geologic Report #5: Geology of the Niblack Anchorage Area, Southeastern Alaska, by G. Herreid, May 1964. (10 pages & large map) Price \$1.00

\*Geologic Report #6: Geology and Mineral Deposits of the Ahtell Creek Area, Slana District, Southcentral Alaska, by Donald H. Richter, May 1964. (17 pages & large map) Price \$1.00

Geologic Report #7: Geology of the Dry Pass Area, Southeastern Alaska, by G. Herreid and M. A. Kaufman, June 1964. (16 pages) Price \$1.00

Geologic Report #8: Geology of the Paint River Area Iliamna Quadrangle, Alaska, by D. H. Richter and G. Herreid, January 1965. (18 pages & map) Price \$1.00

\*Geologic Report #9: A Geologic and Geochemical Traverse Along the Nellie Juan River, Kenai Peninsula, Alaska, by G. Herreid, August 1965. (2 pages & map) No Charge

\*Geologic Report #10: Geology of the Bluff Area, Solomon Quadrangle, Seward Peninsula, Alaska, by G. Herreid, June 1965. (21 pages & large map) Price \$1.00

\*Geologic Report #11: Geology of the Omilak-Otter Creek Area, Bendeleben Quadrangle, Seward Peninsula, Alaska, by G. Herreid, June 1965. (12 pages & large map) Price \$1.00

\*Geologic Report #12: Geology of the Bear Creek Area, Seward Peninsula, Candle Quadrangle, Alaska, by G. Herreid, May 1965. (16 pages & map) Price \$1.00

\*Geologic Report #13: Geology and Geochemical Investigations Near Paxson, Northern Copper River Basin, Alaska, by A. W. Rose and R. H. Saunders, June 1965. (35 pages) Price \$1.00

Geologic Report #14: Geology and Mineral Deposits of the Rainy Creek Area, Mt. Hayes Quadrangle Alaska, by A. W. Rose. (51 pages & map) Price \$1.00

Geologic Report #15: Geology and Mineralization of the Midas Mine and Sulphide Gulch Areas Near Valdez, Alaska, by A. W. Rose, March 1965. (21 pages & map) Price \$1.00

\*Geologic Report #16: Geology and Mineral Deposits of Central Knight Island, Prince William Sound, Alaska, by D. H. Richter, July 1965. (37 pages & maps) Price \$1.00

Geologic Report #17: Geology and Geochemistry of the Hollis and Twelvemile Creek Areas, Prince of Wales Island, Southeastern Alaska, by G. Herreid and Arthur W. Rose, April 1966. (32 pages with numerous maps and figures) Price \$1.00

Geologic Report #18: Geology of Chromite-Bearing Ultramafic Rocks Near Eklutna, Anchorage Quadrangle, Alaska, by A. W. Rose, May 1966. (20 pages, maps and figures) Price \$1.00

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Mine Safety Regulations, 1963, from the Alaska Administrative Code.

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Laboratory Notes No. 2: Laboratory test of zinc in water and ice.

Laboratory Notes No. 3: AAS analyses of gold and silver in high antimony samples.

Laboratory Notes No. 4: Digestion of heavy sulfide ores for AAS analyses.

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Laboratory Notes No. 6: Improved mercury analyses by XRS.

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