STATE OF ALASKA
Department of Natural Resources
DIVISION OF MINES AND GEOLOGY

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MINES BULLETIN

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IN THIS ISSUE:

STOCK SALE

Alaska Mines and Minerals Inc., of Anchorage, Alaska, filed a registration statement with the SEC on December 8, seeking registration of 3,500,000 common shares of which 1,608,678 will be offered for public sale at $3 per share and 500,000 to John F. Firestone at $1 per share.

An additional 1,391,322 of outstanding shares may be offered by the holders thereof. Of the proceeds to the company from its sale of stock, $1,000,000 will be used to retire debentures, $600,000 for accumulated interest on debentures retired, and $500,000 for payment of current and non-current liabilities. The balance will be used for exploration, plant expansion, mine development, and operating reserve.

The company has active claims for mercury and antimony on the Kuskokwim River in the Sleetmute quadrangle and for mercury on Montana Creek in the Iditarod quadrangle.

NEW COAL MINE SUPERINTENDENT

William B. Hall, President of Vitro and Senior Vice President of Earth Resources Company, has announced the appointment of Robert E. Anderson as mine superintendent of Vitro's Cripple Creek coal mine.

Anderson is a graduate of Washington State University and has worked for Phelps Dodge Corporation and the Anaconda Company. He has spent the last two years as a Mining Engineer for the Alaska State Division of Mines and Geology.

Anderson will be replacing C. E. McGuire, who has been mine superintendent since 1965. McGuire will become mine superintendent at the newly discovered Earth Resources Company Cuba, New Mexico copper mine near Albuquerque.

REMOTE SENSING SYMPOSIUM

The State of Alaska in cooperation with the U. S. Department of the Interior held a Remote Sensing Symposium in Anchorage, December 8 through 11. Lecture topics covered the entire range of remote sensing techniques used for the management and exploitation of natural resources. Discussion of policy in natural resource management were offered by Hollis Dole, Assistant Secretary of the Interior; Thomas E. Kelly, Alaska Commissioner of Natural Resources, and Keith Miller, Governor of Alaska. A copy of the proceedings may be obtained by writing Mr. R. H. Eakins, Department of Economic Development, Pouch EE, Juneau, Alaska 99801. The following abstracts are based on notes taken at the symposium by Division personnel and are somewhat incomplete.

"Mineral Resources - A Technical or Social Problem"
Hollis Dole, Assistant Secretary of Interior

At the present time the value of minerals consumed per person per year in the U. S. is estimated at $150. The U. S. Bureau of Mines estimates that this rate of consumption will triple by the year 2000. Increased mineral exploration is needed in order to keep pace with this consumption rate.

Exploration for minerals is more efficient and less costly with good geologic maps, better geochem and geophysics, and the use of rapid analyses. At the present time detailed geologic maps are available for only 25% of the U.S., and much less than that for Alaska. Less than 1/3 of Alaska is mapped on a scale of 1" = 4 mi., and completion is many years in the future.

It is necessary to understand the geologic framework to achieve orderly development of Alaska's resources. The demand for minerals is now ahead of the knowledge required to develop minerals carefully. Although present Alaskan mineral production is less than 10% of the U. S., Alaska is foreseen as a great supplier of the nations mineral needs.

Alaska's position is unique because science and technology can afford the opportunity for orderly development of resources. There is a requirement for a complete inventory of the resource potential of the State. An optimum balance is necessary between remote sensing and basic geologic mapping.

"Plans for Developing Alaska Oil and Mineral Potential"
Thomas E. Kelly, Commissioner State Department of Natural Resources

Mr. Kelly pointed out the State's position on several important issues: he noted that while the mining laws of 1872 are in need of modification the State does not support a competitive leasing system. He also stated that the administration is not in favor of lowering the depletion allowance, because Alaska will be affected much more than other states. Although the State has many more acres to select from the public domain, most mineralized areas of Alaska will remain on Federal lands.

The Department of Natural Resources has four different methods to help in orderly resource development. Geologic mapping is the most important technique, especially more detailed and complete mapping. Aerial photos with high resolution are needed. An aerial photo program of the North Slope may be approved for next year. Color photography would probably be the most useful. Geophysical programs will be employed in potentially mineralized areas. In the past proposed magnetometer surveys have failed because too much cooperation with Federal agencies was sought. Geophysical work will also help in selection of State lands. The fourth method is the collection of geochemical data.

"Theme Speaker"
Max Brewer, Director, Naval Arctic Research Lab, Pt. Barrow, Alaska

Most natural resource development has been on a "crash" basis because the large expenditures up to the point of discovery make rapid capital recovery necessary. Such "crash" programs are not too feasible in Northern Alaska because of a number of factors, but the main one is lack of knowledge about the Arctic environment. For example, permafrost does not have definite unchangeable characteristics. It varies from one location to the next; Tanana Valley permafrost is warm (32°) and any minor disturbance will cause it to melt. Other permafrost areas are much colder and minor disturbances have far less effect.

"Geologic Research in the Alaskan Arctic Environment"
George Gryc, Chief, Alaska Geology Branch, USGS

Geologic mapping progress: 40% of the State is mapped in some form. Twenty five percent of the State's area is covered by published maps. Less than 1% of the State is covered on a scale of 1:63,360. Mapping at 1:250,000 is to be completed in about 20 years.

In 1965 the Heavy Metals Program was initiated. It is aimed at more specific targets and immediate results. Attention has been drawn to new and unexplored areas. Geochemical laboratory facilities have been provided in Anchorage during the last three field seasons and four helicopters are used per season. Forty-eight reports and 44 metallic mineral resource maps have been published since 1965.

Other programs are engineering studies; the latest report on permafrost is in Professional Paper 678. Reconnaissance gravimetric studies are completed with observations approximately every 20 square miles. Marine programs have emphasized the offshore Nome placers and basin delineations. The Chukchi Sea appears to be an equivalent North Slope basin.

Mr. Gryc cautioned that remote sensing may provide part of the answers but are not ends in themselves. Each system should be tried on its own basis and is most useful when combined with ground truth.

"Exploration for Mineral Resources"
Keenan Lee PhD, Colorado School of Mines

Remote sensing capabilities have grown faster than the knowledge necessary to apply them. The greatest need is for trained people to use the sensors.

Some economic targets have surface manifestations of color and texture differences that can be seen by photographic techniques; infra red and radar photography are useful in some cases. It is most important to know the imagery properties of what you are looking for in order to apply infra red effectively. Infra red should be flown low, repeatedly, and under different conditions. Ability of infra red photography to locate uranium deposits because of radiation has not been demonstrated.

Photographic film is now and will remain the prime data source. The use of color photography is growing. Low sun angle photos are very valuable and their use should increase. Thermally conductive phenomena image poorly, whereas convective phenomena image well.

The most advanced remote sensing techniques are not "survey" techniques. Aeromag is a survey technique. For effective employment of others (infra red, radar, etc.), it is necessary to have a good definition of a particular problem, and then choose a technique to solve that particular problem.

Panel Discussion - Minerals and Oil

The following points were brought out during a panel discussion which answered questions from the floor.

An aeromagnetic map of the State could be made for about $1 million if flown from 15-20,000 feet at a 2-3 mile spacing. Some of the experts thought a low level, closely spaced program would be more useful. This might be done for $10 to $20 per line mile at an altitude of 1000 feet and 1/2 mile spacing in hilly and mountainous terrain. Aeromag should be a unique program. Any effort to use it simultaneously with other sensing techniques will increase the cost and degrade the data of both systems. It is useful for geologists to have aeromag work in advance of mapping. The final map is more accurate and can be completed more quickly if aeromag data can be studied before the field work is begun.

In mountainous terrain, airborne EM work costs $30-$40 per line mile. Ground EM costs four times this much. Airborne EM surveys have been very successful in Canada. The discovery of a massive sulfide orebody worth billions of dollars was brought about by such a survey. EM is not proven for porphyry copper type mineralization. There are many (15 to 20) different EM systems. Knowledge, care, and experience are required to choose the best.

NEW PUBLICATIONS

The Alaska Division of Mines and Geology, Department of Natural Resources, has released the publications described below. The reports are $1.00 each and may be obtained from the Division of Mines and Geology, Box 5-300, College, Alaska 99701.

Geochemical Report No. 18: GEOLOGY AND GEOCHEMISTRY OF PART OF THE IRON CREEK AREA, SOLOMON D-6 QUADRANGLE, SEWARD PENINSULA, ALASKA

This report covers the Iron Creek area of the Kruzgemapa River drainage in the Seward Peninsula. Stream sediment geochemical samples were collected and a geologic map prepared. Major rock types are mica schist, massive limestone and subordinate black slate. Copper is localized in the limestone near schist contacts. The known copper deposits are too low grade to be of economic interest, but the associated schist may carry economic concentrations of gold. East of Iron Creek and near the head of Sherrett Creek, the samples indicate an unexposed intrusive with associated beryllium. The report contains 11 pages of text and 8 pages of sample analyses. All maps are included within the text. Chief Mining Engineer, Roderick R. Asher authored the report.

Geochemical Report No. 19: PRELIMINARY GEOCHEMISTRY AND GEOLOGY, LITTLE FALLS CREEK AREA, TALKEETNA MOUNTAINS QUADRANGLE, ALASKA

This report covers a northeast-trending group of metasedimentary and metavolcanic rocks found in the C-3, C-4, B-3, and B-4 quadrangles of the Talkeetna Mountains. Stream sediment copper anomalies and rock sample gold anomalies are found associated with three stream drainages in this area. Field evidence discounts earlier ideas that the copper source is a pyritic phyllite cross-cut by the drainages, and suggests instead that vein mineralization is the source as evidenced by float containing copper-rich vein material. No copper-bearing veins were found in place as most of the area is covered by talus. The report contains 16 pages of text, 4 tables and 5 illustrations. The author is Robert E. Anderson, Division Mining Engineer.

Geologic Report No. 33: GEOLOGIC AND GEOCHEMICAL STUDY, SOLOMON C-5 QUADRANGLE, SEWARD PENINSULA, ALASKA

This report covers the Solomon C-5 quadrangle, which is approximately 25 miles east of Nome on the Seward Peninsula. Metamorphosed sedimentary rocks are the most abundant rock type in the quadrangle. Greenstone bodies and a basalt dike have intruded the metamorphics. Geologic mapping and sediment sampling show that mineralization is concentrated along northwest fractures that cross the entire quadrangle. The report includes 30 pages of text, 9 tables and graphs, and one geological-geochemical map. The author is Roderick R. Asher, Chief Mining Engineer of the Division.

Geologic Report No. 34: GEOLOGY AND GEOCHEMISTRY, DIANA LAKES AREA, WESTERN TALKEETNA MOUNTAINS, ALASKA

Covered in this report is the western edge of the Talkeetna Mountains between Iron Creek and Sheep River. The lithology of the area includes highly fractured granodiorite and greenstone with some later volcanics and related rocks. The granodiorite forms a discordant northwest-trending stock which interrupts the general northeast structural trend of the Talkeetna Mountains. Computer trend-surface analyses of geochemical data indicates possible hydrothermal mineralization at depth in several locations. These areas could be possible sites for future exploration. The report contains 20 pages of text and numerous maps and tables. Robert E. Anderson, Division Mining Engineer, is the author.

Geologic Report No. 35: GEOLOGY AND GEOCHEMISTRY, SITHYLEMENKAT LAKE AREA, BETTLES QUADRANGLE, ALASKA

Studied in this report is an area of 44 square miles along the eastern margin of the Koyukuk Basin. Rocks in the area include two Alpine ultramafic intrusive belts containing pyroxenite, peridotite, gabbro, and diabase. Schist and an intrusive granite batholith also underlie the area. Several samples anomalous in tin were found in the areas underlain by granite and thus the region may hold promise as a tin province. The report contains 22 pages of text and several tables, maps, and graphs. The author is Gordon Herreid, Division Mining Geologist.

Geologic Report No. 37. GEOLOGY AND GEOCHEMISTRY IN THE SOUTHEASTERN PART OF THE COSMOS HILLS, SHUNGNAK D-2 QUADRANGLE, ALASKA

The area studied in this report is five miles south of Bornite, Alaska, in the Shungnak D-2 quadrangle. Four main stratigraphic formations ranging in age from Early Paleozoic to Cretaceous are recognized. The most important geologic structure is a window 20 miles long and five to eight miles wide bounded by two major low-angle overthrust faults. Dolomitic limestone beneath the overthrust plates contains chalcopyrite, bornite, and chalcocite of economic interest at Bornite. The report contains 33 pages of text and numerous figures. Crawford E. Fritts, Division Mining Geologist, is the author.

Geologic Report No. 38: URANIUM IN ALASKA

The geology of Alaska is favorable for uranium deposits, and large areas remain untested. This report has been prepared to assist those interested in the search for uranium in the State. All radioactive mineral investigations in Alaska conducted to date by Federal and State agencies are summarized in tabular form. The regions from which the richest and largest numbers of radioactive samples have been collected are southeastern Alaska and the Seward Peninsula. Particular areas discussed are (1) the Bokan Mountain uranium-thorium area, including the Ross-Adams mine, (2) the Hyder mining district, (3) Skagway, (4) Hope Creek in the Fairbanks district, (5) the Brooks Mountain and Ear Mountain areas on the Seward Peninsula, and (6) the Selawik Basin and vicinity in western Alaska. Other areas believed by the writer to warrant investigation are the Ketchikan, Petersburg, and Wrangell districts of southeastern Alaska and the Ogilvie Mountains near the Canadian border north of the Yukon River. Phosphate beds in the northern foothills of the Brooks Range contain low grade uranium. The report contains 46 pages of text and various tables, plus an extensive four page bibliography. The author of the report is Gilbert R. Eakins, Division Mining Geologist.

METAL MARKET PRICES

	Dec. 22	Month Ago	Year Ago
Copper, per lb.	52.4¢	51.9¢	41.7¢
Lead, Per lb.	16.3¢	15.5¢	13.0¢
Zinc, per lb.	16.0¢	16.0¢	13.5¢
Tin, per lb.	180.2¢	177.5¢	163.2¢
Nickel, per lb.	$1.28	$1.03	94.0¢
Platinum, per oz.	$130-135	$130-135	$120-125
Mercury, per flask	$490-498	$515-520	$532-537
Antimony ore, Stu equivalent	$17.86-18.75	$13.39-13.62	$6.25-6.34
Beryllium powder, 98%	$54-66	$54-66	$54-66
Chrome ore, long ton	$31-35	$31-35	$31-35
Molybdenum conc, per lb.	$1.72	$1.72	$1.62
Titanium ore, per ton	$20-21	$20-21	$20-21
Tungsten, per unit	$43.00	$43.00	$43.00
Silver, New York, per oz.	174.1¢	189.9¢	193.5¢
Gold, per oz.	$35.27	$37.10	$41.90
Barite (drilling mud grade from E/MJ November)	$12-16	$12-16	----