

State of Alaska
 Department of Natural Resources
 DIVISION OF GEOLOGICAL SURVEY
 P. O. Box 80007, College, Alaska 99701

INFORMATION CIRCULAR
 NUMBER 5

Revised
 July 8, 1971

G E N E R A L A L A S K A N
M I N E R A L I N F O R M A T I O N

MINERAL PRODUCTION

The total value of mineral production in Alaska during the period 1950 through 1970 is 1560.3 million dollars. The average value per year for the same period is 74.3 million dollars. Gold accounts for 6.1 percent of the total value produced during the period, coal for 8.0 percent, mercury for 0.5 percent, and petroleum and natural gas for 62.6 percent. The remaining 22.8 percent of the total value is distributed among the production of antimony, copper, lead, platinum, tin, uranium, silver, gem stones, sand and gravel, barite, and peat.

Production of Major Commodities Since 1950

Dollar Value (Thousands)

<u>Year</u>	<u>Gold</u>	<u>Mercury</u>	<u>Coal</u>	<u>Oil & Gas</u>	<u>Total all Production (Millions)</u>
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	881	100(1)	4,647	227,129	257.6
1970	1,378	1,260	5,278	256,670	299.4
	<u>\$108,422</u>	<u>\$8,490</u>	<u>\$125,400</u>	<u>\$976,859</u>	<u>\$ 1,560.3</u>

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

Precious Metals

Lode gold production has not been important in Alaska since World War II and the amount of placer gold produced has declined to a small amount. Gold mine operators in Alaska face the same problems as gold mine operators elsewhere in the United States. Rising labor and equipment costs coupled with low gold prices have made gold mining unprofitable. During 1970, the volume of production and the total value of production showed an unexpected increase over 1969. Exploration for gold increased during 1969 and 1970 and this should result in increased production in future years.

Alaska has never been noted as a silver-producing state and most of the silver produced has been recovered as a by-product of gold mining operations. Future silver production is a possibility because of recent discoveries in South-Central Alaska.

The Goodnews Bay Mining Company is the only major platinum producer in the United States. The platinum is recovered from placer deposits by dredging. Exploration for lode sources within the Placer Concentrations is a continuing task.

Base Metals

Alaska produces mercury from three or four small mines. Active exploration, including several drilling projects, is underway on several prospects in the Kuskokwim River drainage.

Tin production is minor at the present time. The tin produced comes from a small placer operation on the Seward Peninsula. Both lode and placer tin deposits are known in Alaska, and one lode is being actively developed at present.

Production of other base metals is unimportant at the present time, but the possibility of significant production in the near future of copper, molybdenum, nickel, lead, and zinc is very encouraging. Deposits are being actively explored at a number of places, by major companies. Southeastern Alaska is receiving the most attention at the present time.

Large low-grade iron deposits are known at several places in Alaska. Until recently associated titanium hampered development of this resource, but recent technological advances have reduced this problem. Consequently there is renewed interest in Alaska's iron resources.

Coal

Major coal production is now confined to the Nenana coal field in the Healy River area. The Evan Jones mine near Palmer in the Matanuska field closed in May 1968 because fuel needs for military bases in the Anchorage area are now supplied by natural gas. Increased power demands in Fairbanks and nearby military installations are creating a growing market for coal from the Nenana field. The mine-mouth power plant of Golden Valley Electric Association went on steam in 1968. It utilizes Healy Valley coals near the mine with a consequent savings in transportation costs. Coal prospecting is underway in the Beluga coal field west of Anchorage, and in the Arctic in the Kukpowruk River area. Other coal fields in Alaska are not being developed at present.

Oil and Gas

Oil and gas are the mainstays of the Alaskan mineral industry. Alaska ranks about eighth among the oil producing states. The discovery of oil in Prudhoe Bay on the Arctic Slope in 1968 added at least ten billion barrels of oil to Alaska's reserves.

Present production from wells in and near Cook Inlet is about 200,000 barrels per day. Development drilling is still underway both in the Inlet and on the Slope.

Prospecting

Prospecting activity is moderately high at present. This interest has been primarily in the base metals in the more readily accessible areas. One feature of this activity, which should make it especially important in discovery of new ore bodies, is the entry into the prospecting field of the large mining companies with modern methods and equipment.

The number of individual independent prospectors appears to be declining. Some of the active mining companies have adopted the practice of hiring qualified men for prospecting favorable areas. Mining capital has become more receptive to investment in mining ventures in Alaska, which means that a prospector should have a better chance to sell his discovery.

Several government agencies offer aid to prospectors and miners. The Division of Geological Survey, with headquarters in College, maintains an assay laboratory and other analytical facilities. Samples of Alaskan minerals are identified free of charge. Mining engineers and geologists stationed at College give technical information and advice; field examinations are made upon properly approved requests of owners, or on open ground where information indicates the need for such work. The Division also maintains contact with mining companies and other investors who are interested in investment in mining properties in Alaska. These services of the DGS also help bridge the large gap between discovery and production. Very few of the other states have similar free assay services, and samples there must be sent to custom assayers. One commercial assay laboratory is located in Anchorage.

The U. S. Geological Survey conducts geological investigations in all parts of Alaska and disseminates the information gained in the form of bulletins and circulars. The Survey is also carrying out a topographic and geologic mapping program. U. S. Geological Survey maps can be purchased by mail from its office at 310 First Avenue, Fairbanks, Alaska, or from the Denver Federal Center, Denver, Colorado. Geological information can be obtained from the U. S. Geological Survey, Alaskan Geology Branch, 345 Middlefield Road, Menlo Park, California, 94205, and from State of Alaskan geologists at the Division of Geological Survey offices located at College. Mining Information Specialists are stationed at Division offices in Juneau, Anchorage, and Ketchikan. The Division of Oil and Gas is at 323 East Fourth Avenue, Anchorage.

The U. S. Bureau of Mines examines specific properties and areas to determine their commercial possibilities. This program consists of diamond and placer drilling and metallurgical tests of ores. Technical and statistical information is also given upon request. The Bureau's Alaskan address is Box 550, Juneau, Alaska, 99801.

The University of Alaska conducts a mining short course on the University campus each year and conducts mining extension courses in Alaskan towns and villages throughout the winter months. These courses cover basic geology, mineral identification, and mining and prospecting methods, and are generally well attended. A geochemical prospecting course is also conducted at a number of locations. No educational prerequisites are necessary to take these courses. Further information can be obtained by writing to the Division of Statewide Services, University of Alaska, College, Alaska, 99701.

For those wishing to go deeper into the subject of prospecting or desiring to know the main essentials of claim staking or mining law in Alaska, we have two other information circulars available on request: No. 1, "Proper Claim Staking in Alaska" and No. 6, "Alaskan Prospecting Information".

ALASKAN MINERALS

The following is by no means a complete listing of the valuable minerals known in Alaska. It is confined to commodities that are produced now, have been in the past, or are known to have commercial possibilities.

Precious Metals

Gold -- Gold has been displaced as the major mineral produced in Alaska by oil. Practically all gold production at present is from placer deposits, although lode mines have been very important in the past. The main lode production areas were in the Juneau District and the Willow Creek District, with minor production coming from several other districts including Ketchikan, Fairbanks, Nome, and the Kenai Peninsula. Placer gold is being produced in varying amounts in nearly all parts of Alaska. Most of the better placer deposits are in ancient stream channels, now covered with gravel and permafrost, sometimes to depths of over 100 feet. The permafrost is usually removed by alternate natural thawing and washing off the thawed material by hydraulic giants. In the larger operations, the permanently frozen gravel is thawed by driving pipes into it and circulating water through it.

Platinum -- The placer platinum deposits at Goodnews Bay are the only primary source of the metal under the United States flag. They have been known since 1926 and large scale production has continued since construction of the first dredge there in 1934. Minor quantities of platinum are found with gold in many Alaskan placer deposits.

Silver -- Small proportions of silver are found alloyed with all Alaskan gold. This is the source of the present production. Silver also occurs with lead ores in many parts of Alaska, and has been mined in this form, but never by itself. Known deposits in Alaska consisting primarily of silver are relatively few.

Base Metals

Copper -- Alaska was a major copper producer from deposits in the Prince William Sound region, the Nizina District, and on Prince of Wales Island for many years. Production began in the early 1900's and continued until the famous Kennecott mines were shut down in 1938. There is no production at present; however, the prospecting possibilities are good and the increased interest that has developed will bring about new mining. Several new copper deposits are being drilled and otherwise explored. Kennecott completed shaft-sinking on a large and promising copper property north of the Kobuk River and is continuing the evaluation of the ore body by drilling. Large areas are being prospected in various parts of Alaska by geochemical and other methods for copper.

Tin -- Tin is found in placer deposits in many locations in Alaska, but the Seward Peninsula is the area of most importance. Lode tin deposits are common there and considerable tin placer mining has been done in the past. However, because of economic conditions, placer tin mining has been mostly at a standstill since 1953. The only significant lode operation that has ever existed under a U. S. flag was forced to close in 1955. This was the U. S. Tin Corporation Mine at Lost River. The Lost River area has received renewed attention and investigations in recent years, and a large private exploration program is being pursued there at present.

Large placer tin reserves were outlined by drilling near Cape Mountain in 1952 and 1953, and make an attractive-appearing mining possibility. Placer tin has also been found in the Hot Springs District, Melozitna District, Fairbanks District, and others. Many years ago, a piece of tin "float" was found along Lynn Canal in Southeastern Alaska, indicating a possible source of lode tin somewhere in that area.

Mercury -- A large belt of cinnabar prospects extends from around the Red Devil Mine near Sleetmute on the Kuskokwim River to the Marsh Mountain prospect near Dillingham. Exploratory and prospecting activities in this belt have been at a fairly high level, but the Red Devil has been the only substantial producer.

Chromium -- The Kenai Chrome Company, a major chrome producer, shut down its operation early in 1958 upon expiration of the government purchase program. The company was left holding several thousand tons of ore and concentrates which it had thought would be purchased. The chromite production has all come from the Red Mountain area near Seldovia, but other chromite is known to exist on Baranof Island in Southeastern Alaska, near the Richardson Highway south of Tonsina, and other localities.

Iron -- The increasing demand for iron ores has made some of the large Southeastern Alaskan magnetite deposits appear especially promising. Because of the low-unit value only the larger and more readily accessible deposits will be mined first. Among the favorable bodies of magnetite are those at Klukwan, Port Snettisham, Union Bay, Duke Island, Bradfield Canal area, and several on Prince of Wales Island. Large discoveries of iron have been made near Lake Iliamna, southwest of Anchorage.

Nickel -- An interesting belt of nickel deposits in Southeastern Alaska extends from Yakobi Island south along the west coast of Chichagof and Baranof Islands to Snipe Bay. The large Yakobi Island deposits saw an intensive drilling program in 1958, and a much-publicized deposit exists at Funter Bay on Admiralty Island. Favorable nickel deposits are also known on Spirit Mountain in the Copper River country and in the Salcha River area, Fairbanks District. A large nickel discovery was made in Glacier Bay National Monument in 1958, which has been the subject of several drilling programs of varying size. It is still under active investigation.

Tungsten -- Tungsten in the form of the mineral scheelite is found in both lode and placer deposits. Only minor attempts have been made to recover this valuable mineral from placer deposits, and it is often considered a nuisance because it makes difficult the cleaning of placer gold concentrates. The Seward Peninsula has extensive placer scheelite deposits as well as known lode occurrences, and this mineral should some day become important to mining in that area. Other lode deposits are known in the Willow Creek and Fairbanks District as well as in several districts in Southeastern Alaska.

Lead-Zinc -- Lead and zinc, which generally occur together, are found in all parts of Alaska. These are low-unit value metals which must occur near low-cost transportation to be mineable. There are several known deposits of these minerals in Interior and Northwestern Alaska which have proved unprofitable mining ventures because of high transportation costs. A few deposits were successfully mined in Southeastern Alaska before World War II. The main hope for lead or zinc mining in Alaska is that there will be sufficient silver or copper with it to "sweeten" it enough to pay the transportation bill.

Antimony -- Antimony is plentiful in Alaska. It exists in nearly every district in the form of the mineral stibnite. The recent elevated price of antimony caused several exploration operations to start, but the market is again softening.

Molybdenum -- There are known molybdenite occurrences on St. Lawrence Island, in the Willow Creek District, the Fairbanks District, near Hayes Glacier, various districts in Southeastern Alaska, and in several other sections. Although no molybdenum has been produced, some of the prospects are promising and are being investigated.

Manganese -- There has been no production of manganese in Alaska, however, deposits of this metal are known. In Southeastern Alaska the one or two known deposits with possible commercial value will become more important if the demand for manganese increases.

Bismuth -- Small amounts of native bismuth occur with placer gold in some of the Alaskan gravels. One interesting lode occurrence near Nome contains both the native metal and the sulfide, bismuthinite; however, there has been no commercial production to date here or elsewhere in the State.

Nonmetallics

Asbestos -- A small amount of asbestos of filter grade was shipped during the war from the deposits on Dahl Creek in the Shungnak District. This is the only commercial production that is known. Other occurrences have been found in widely separated parts of Alaska and some of these appear to have promise. Asbestos, of certain grades, brings as much as \$1500 per ton. As is the case with most other nonmetallic materials, the value of asbestos is determined by chemical and physical properties and the uses to which it can be put. A deposit of paligorskite (mountain leather) is known on Lemesurier Island in Southeast Alaska. There are also asbestos deposits in the Eagle Quadrangle in Interior Alaska near the Canadian border.

Barite -- Some rather small deposits of barite exist in Alaska, and one in Southeast Alaska near Petersburg is in production.

Jade -- Occurrences of nephrite, a variety of jade, have been known for many years in the Shungnak District of the upper Kobuk River, where it occurs with asbestos in ultrabasic rocks. Jade from these deposits was used by the Eskimos to make implements and tools. Today the Shungnak Village Eskimos have a jade shop and produce jade articles and carvings. Small amounts of jade have been recovered for many years from gold placers on Dahl Creek and by Eskimos from the Shungnak River where it occurs as small stones and large boulders. There has been some production from one other property in the district. Much of the Kobuk jade is of exceptional quality and very attractive jewelry has been made from it. There have been reports of jade from the Marshall District of the lower Yukon and from Southeastern Alaska. Interest in jade products is increasing.

Sulphur -- Volcanic deposits of sulfur have long been known on the Alaska Peninsula and the Aleutian Islands. Large bodies of metallic sulfides also exist in various districts.

Mica -- Deposits of mica are known on the Seward Peninsula and in Southeast Alaska. Samples from some of these deposits have been sufficiently high-grade to meet market standards but no sales have been made to date. A deposit on Sitklan Island, south of Ketchikan, has been under development from time to time.

Graphite -- A deposit of graphite of possible commercial value located south of Imuruk Basin on the Seward Peninsula has been known for many years. Samples of graphite from other areas have been submitted to the DGS offices.

Clay -- Extensive clay beds of good quality exist in the Anchorage and Healy areas. Some of this clay has been used on a small scale for brick making.

Pumice -- Pumice from Augustine Island in Lower Cook Inlet and Katmai National Monument has been used in Anchorage as a light-weight concrete aggregate, but not extensively.

Building Stone -- A market for building stone has developed in relatively recent years in the Anchorage and Fairbanks areas. Several locations close to highway transportation have stone suitable for this purpose and a small industry has developed. This should become more important with increasing population.

Also in Alaska are deposits of silica, rare earths, gypsum, garnet, marble, fluorite, calcite, kyanite, bentonite, and unlimited reserves of high-calcium limestone.

Radioactives

Alaska first produced uranium in 1957 from a high-grade deposit discovered in 1955 on Bokan Mountain in the Ketchikan district. A Climax Molybdenum Company subsidiary, Kendrick Bay Mining Company, mined the deposit that year but did not operate in 1958. In 1959, the Jott Mining Company started mining late in the fall but found the operation could not be continued through the winter because of weather conditions. The ore was shipped shortly after January 1, 1960. Production was resumed in 1962 for a short run by Bay West, Inc., of Grand Junction, Colorado. Now the property is being produced by Newmont Mining Company. Other promising uranium properties lie in the near vicinity and may also come into production eventually. Uranium prospects are also located in other parts of Alaska, and among the most interesting is a property at Brooks Mountain, Seward Peninsula, where the mineral zeunerite is found.

Coal

Major coal production has been limited to fields along the Alaska Railroad which are accessible to ready market. Two of these, the Matanuska and the Healy Fields, have produced virtually all the coal mined in Alaska today. The only other mining is carried on intermittently on a very limited scale. Some coal has been produced by the Eskimos near Point Barrow for their own use, and a few tons are mined from the Kenai Field near Homer.

Extensive coal deposits have been known in Alaska for many years. A large portion of the deposits contain lignite to subbituminous coals, but there are also large

quantities of bituminous and some anthracite. The Matanuska coals are bituminous and the Healy coals subbituminous. Our largest coal fields are in Northern Alaska. Much of this coal is bituminous, and some is coking quality. Because of the distance from markets, there has been practically no use of the coal, but consideration is being given to mining this coal for the Japanese market. Shipping in the Bering Sea and the Arctic Ocean is limited to a short summer season, and harbors in the coal area are nonexistent. Any large-scale year-round coal mining project would, therefore, involve serious storage and loading problems. In spite of these problems, investment capital continually shows interest in these fields for export purposes.

The Bering River Field, east of Cordova, contains large reserves of semi-bituminous anthracite, and coking coals. Here, also there is a transportation problem and mining costs are likely to be high because of broken and faulted beds. Because of the high grade, these deposits are valuable and will probably be mined. In 1968, four tons of coal from the Bering River field were sent to Japan for testing. The Beluga Field west of Anchorage has attracted considerable attention. Exploration projects are in progress on a number of State coal prospecting permits there. A mine-mouth power plant is generating in the Healy field; power from it is transmitted to Fairbanks

Offshore Mining and Prospecting

Activity in offshore prospecting permits for the locatable minerals continued to increase. There was very little increase in total acreage because of a large number of terminations at the end of the first two year period when the first rentals were due. This year several important exploration programs were conducted on permits. During the year 38 affidavits of work were filed claiming rental credit of nearly \$905,000 on 215 permits. Most permittees either drop their permits at the end of the two year period or file work affidavits to be credited against rental. This year, rental of \$30,838.47 was paid to the State of Alaska.