STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINES & MINERALS

REPORT FOR THE YEAR

1960

JUNEAU, ALASKA

STATE OF ALASKA

W. A. Egan, Governor

Department of Natural Resources

Phil R. Holdsworth, Commissioner

DIVISION OF MINES AND MINERALS

J. A. Williams, Director

Report

For the Year

1960

Juneau, Alaska

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DECEMBER 31, 1960

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FOREWORD

The development and utilization of Alaska's mineral resources have particular significance to her economic future. The question as to which of our natural resources should receive priority development might be debated, but no one will dispute the fact that Alaska's future lies in the development of all her natural resources at the earliest possible time to the greatest extent practicable and in keeping with proper conservation practices. Illustrations of the importance of a strong mineral production economy to a State can be found in the rapid development of the countries adjoining the Persian Gulf, and in the financing of Venezuelan roads, harbors, and other improvements by income from petroleum production. Mining has certainly been one of the chief reasons for the tremendous development of Canada since the War. On the other hand, witness the economic troubles that have beset Bolivia since the decline of her tin mines through her nationalization procedures.

Mineral production is normally a continuing and expanding activity when viewed over wide areas, and returns from mining are best applied when they are allowed to be used for developing deeper and lower grade deposits. Capital investment required for working low-grade or inaccessible ore bodies is large per unit of output, and as a result, long periods of production are needed to provide a return on the investment. But with long periods of production comes the stabilizing influence of steady payrolls, tax revenues, dependable raw-material supplies, and other benefits to the economy. The most significant elements in Alaska's future, then, appear to be large operations on our low-grade deposits. We present in this report a few of our ideas and our efforts to bring new mineral production into being.

THE DIVISION OF MINES AND MINERALS

Organization

The Division of Mines and Minerals is one of the three Divisions in the Department of Natural Resources. To work more efficiently and to meet additional responsibilities and increased functions delegated to the Division of Mines and Minerals through the provisions of the 1959 Organization Act, the Division has been reorganized into five branches: (1) Administration, (2) Mining, (3) Metallurgy, (4) Petroleum, and (5) Geology.

Mr. James A. Williams, Director, supervises all of the branches. The Director and the Administration Branch are stationed in the Alaska Office Building at Juneau. The Administration Branch is staffed by Mrs. Jean Crosby, Administrative Assistant, Mrs. Dorothy C. Soley, Mineral Analyst, and Mrs. Judith Endell, Secretary.

The Mining Branch is staffed by Miro Mihelich, Mining Engineer at Juneau; Martin W. Jasper, Mining Engineer, and Wiley D. Robinson, Coal Mine Inspector, at Anchorage; and Robert H. Saunders, Mining Engineer at College.

The Metallurgy Branch is composed of Ralph E. Pray, Assayer at Ketchikan; Irwin W. Mitchell, Assayer at Anchorage; Donald R. Stein, Assayer at College; and Willow M. Burand, Assayer-Engineer at Nome.

The Petroleum Branch is at Anchorage and includes Richard V. Murphy, Petroleum Engineer, Donald D. Bruce, Petroleum Geologist, and Mrs. Bobby Jo Brasch, Clerk-Stenographer.

At present, the Geology Branch is not staffed, but it is necessary for reasons pointed out later in this report that geologists, a draftsman, a geophysi-

cist, and additional clerical help be employed in the future to be stationed at Anchorage, Fairbanks, and Juneau.

General Functions

Since all mineral substances are included in the studies of the Division of Mines and Minerals, and since Alaska probably has a greater diversity of mineral and rock types than any other area on earth, the work of the Division is very broad. Although not mined today, many of Alaska's mineral deposits are important as future producers. It is necessary to know how and when these potentially valuable deposits may become useful and marketable. Staff members of the Division must keep alert on the occurrences of all minerals, their possible usefulness, and their sources, Alaskan and worldwide.

To learn adequately of the State's mineral deposits, whether currently economic or not, basic studies in geology are imperative. These studies include geological surveys, mapping, laboratory research, careful mineralogical determinations and the analyses of various related scientific problems. Furthermore, economic development by industry should be carefully followed. The utilization of minerals by industry must be understood and the specifications of mineral raw materials learned. As this information is acquired, the scientific and economic factors may be integrated. These are some of the steps which can be performed by the Division leading toward the establishment of a stable minerals industry.

The scope of work by the State Division of Mines and Minerals supplements, or should supplement, that of the U. S. Geological Survey and the U. S. Bureau of Mines, with both of whom the Division cooperates and works in close harmony. Without this mutual understanding and cooperative endeavor, the progress of the Division of Mines and Minerals would be more limited. As it now operates, the public benefits by the service which the Division of Mines and Minerals renders as a clearing house for information from all sources regarding the minerals and mineral products of Alaska.

Duties and Activities

Some of the principal duties of the Division of Mines and Minerals are as follows:

1. Inventory all the mineral deposits of Alaska giving location of deposit, complete bibliography and current ownership.

2. Make a record of the activities of mining and mineral industries, their productivity, and the methods used in processing minerals to make them useful.

3. Provide the public with authentic information on the geology and mineralogy of Alaska, its mineral resources, mining activities and usefulness of its minerals in industry.

4. Administer the laws with respect to mining, mine safety, oil well drilling and conservation of oil and gas.

5. Stimulate discoveries of minerals by assisting prospectors and others with professional advice, identification and analyses of minerals and ores, examination of deposits, prospecting equipment rental, and geophysical surveys.

6. Promote greater development and utilization of Alaska's mineral deposits by giving information and assistance to companies seeking new sources of minerals and mining investment opportunities.

7. Work for needed changes in mining, petroleum, land, and tax laws which will encourage establishment of new mineral industry in the State.

8. Protect investors in Alaska's mineral industry from fraudulent promotions.

9. Cooperate with other State and Federal agencies in matters of mutual interest in the mineral,

solid fuel, petroleum and natural gas industries.

10. The Director and appropriate other members of the Division of Mines and Minerals are members, or represent Alaska, on the following regulatory committees and conservation commissions:

(1) The Alaska Oil and Gas Committee
(2) Alaska Coal Miners Examining Board
(3) Interstate Oil Compact Commission
(4) Alaska Map Advisory Committee.

The Director also attends national meetings of the American Mining Congress and other American and Canadian professional and industrial societies concerned with minerals, solid fuels, and petroleum and natural gas industries. Constant efforts are made at these gatherings to interest representatives of companies in the mineral possibilities of Alaska.

The State Oil and Gas Committee is composed of James A. Williams (Chairman), Director of the Division of Mines and Minerals; Phil R. Holdsworth, Commissioner of the Department of Natural Resources, Donald D. Bruce, State Petroleum Geologist; Richard V. Murphy, State Petroleum Engineer; and Joseph Rudd, Assistant District Attorney, Department of Law, the Committee's Legal Counsel. This committee holds hearings and makes decisions concerning requests of the industry for exceptions or changes to regulations.

Alaska is a full member of the Interstate Oil Compact Commission which acts as an interstate advisory body, furnishing facilities for member states by cooperative action to conserve oil and gas by prevention of physical waste from any cause. The Director of the Division of Mines and Minerals represents Alaska at the annual meetings of this Commission. As petroleum is one of the most vital natural resources, the responsibility for producing it without waste rests upon the oil and gas producing states.

The Coal Miners Examining Board did not meet during 1960.

To provide the public with requested information and perform duties specified by law, the following procedures are found to be effective:

(a) Maintaining public displays and collections of Alaska minerals and rocks at the district offices and Juneau headquarters.

(b) Maintaining reference libraries of Alaskan publications issued by the U. S. Geological Survey, U. S. Bureau of Mines, and Atomic Energy Commission at the district offices and Juneau headquarters. These libraries also contain unpublished examination reports and economic studies by the Division's engineers and others on mineral deposits throughout the State. Except for a very few confidential reports, the unpublished works are open to the public. Examination reports of properties made by the Division's engineers are made public only by authorization of the property owners.

(c) Maintaining files of topographic, geologic, mine, and mineral maps, and oil well logs and other information of the State. Oil well information is kept confidential for two years before its release.

(d) Central recording at Juneau of all mining claim locations and assessment work affidavits. At the end of 1960, there was a total of 21,300 documents in the files, 2,165 being received during 1960. The average number of documents received and processed each year varies from 2000 to 3000.

(e) Publishing technical reports, information circulars and a monthly news and information bulletin. The monthly Mines Bulletin, circulation 1,675 during 1960, is primarily intended to keep the Alaskan mineral and petroleum industry informed; however, it serves as an excellent contact for all industry with Alaska, as the Mines Bulletin is circulated nationwide, and to Canada, Japan, and other countries.

(f) Answering inquiries of the public by personal interview, by correspondence, by telephone, and by providing the public with authentic published data.

Special Projects and Studies

A continuing program of investigations of high alumina clays and shale deposits was initiated during the year. To reduce dependence on imported bauxites by the domestic aluminum industry, there has been a resurgence of attempts by government agencies and other investigators to recover cell grade alumina from clays and shales. This research has shown that alumina of a grade acceptable for electric reduction to aluminum metal can be prepared from clays and shales. Development of an economic process and proven source of aluminiferous clays or shales in Alaska in conjunction with production of low cost power from some of the vast hydroelectric projects contemplated in the State would be a definite incentive for the establishment of an aluminum industry in Alaska.

A draft of proposed regulations to govern the mining or mineral leasing of locatable minerals on State-owned lands was prepared during the year by R. H. Saunders, Mining Engineer of the Division staff. Locatable minerals can be staked on State-owned domain the same as on Federal domain, however, claims staked on State-owned lands can never be patented. Certain classifications of State-owned lands prohibit normal staking and only mineral leasing will be allowed in these cases. The new regulations are quite liberal and depart rather widely from traditional mining law in an effort to make Alaskan mining ventures attractive to exploration companies. This subject of regulations is dealt with further in "Cooperation with Other Agencies."

In process is a comprehensive study of the current costs of all phases of producing and marketing mineral products of Alaska. Purpose of the study is two-fold: (1) arouse and induce active interest by venture capital and the mining industry in Alaskan mineral deposits and their production; (2) provide accurate authentic information to venture capital and the mining industry so that costs and risks of mineral development and exploitation in Alaska may be compared with other areas of the world outside of the

contiguous 48 states. This study is scheduled for completion and publication during 1961.

Partially completed for publication is a study of elements in the economic development of the Cook Inlet-Kenai Peninsula area. This report is scheduled for completion and publication early in 1961.

Also partially completed is a study of the geology and distribution of ore deposits in the Hyder District. Evaluation of the probable effectiveness of geophysical methods for further investigation of the lead, zinc, tungsten, copper, silver, and gold deposits there is in progress.

A mutual exchange of official information concerning minerals and fuels of Alaska and consumption, demand, and marketing specifications for these products by Japanese Industry was initiated during the year with the Japanese Ministry of International Trade and Industry. Japan requires increasing amounts of imported minerals and fuels to serve its industrial complex. Official information about Alaska's known and undeveloped mineral resources accessible to Japanese Industry will serve to spur interest in Alaska as a possible source for Japanese requirements. The mining industry of Alaska will also benefit by informed contact with a potential Japanese market, and it is likely that some of Alaska's undeveloped mineral deposits will be utilized.

The Division of Mines and Minerals conducts a continuing survey of mining activities. The two criteria most commonly used to measure the value of the State's mineral industry are (1) the figures showing mineral production, and (2) the activities of mining as indicated by mineral exploration, development, exploitation and beneficiation of the State's mineral resources. For this reason, surveys of mining activities constitute an important part of the Division's work. Other data including safety conditions pertaining to mining activities are also secured during other types of field investigations. All the information thus obtained is made currently available for ready reference and can be processed and assembled

at any time for publication.

A comprehensive study of present safety regulations of other states in all mineral and fuel industries, industrial mines and quarries, and all underground excavations not connected with production of minerals or fuels was completed during the year. Regulations reflecting needs of modern mining and present day equipment and practice are being drafted by the Division of Mines and Minerals to modernize Alaska's regulations and safety enforcement.

The Division is searching for a source of suitable rock carving material, such as talc or serpentine, for the establishment of a new carving industry with simple equipment among the Eskimos. Such an industry is thriving among certain Canadian Eskimos. One possible source has been found thus far, and will be further investigated.

District Offices and Laboratories

The Division maintains district offices and assay laboratories at Ketchikan, Anchorage, College, and Nome. The facilities at College have become inadequate and the laboratory quarters have long been completely unsatisfactory. The buildings at Ketchikan and Nome, though old, are adequate.

The necessity of providing space for the proposed addition of a core storage and library facility and office and lab space for additional geologists, a draftsman, and a clerk-stenographer to the staff presently stationed at the Anchorage office requires the enlargement of this facility. At present this building is utilized to the utmost to serve as offices for the mining engineer, petroleum engineer, petroleum geologist, coal mine inspector, assay laboratory, and library. A valuable collection of Alaskan fossils and minerals cannot be displayed because of lack of space.

The facilities at College are entirely inadequate and unsuitable for efficient performance of duties by

the assayer, and are not located so as to provide maximum service to the public. The assay laboratory is in the basement of a condemned building on the University campus, making a move of this lab imperative when the building is razed as scheduled. It is hoped that funds will be provided sufficiently in advance of the necessary move of the laboratory that modern, efficient quarters for an office of the mining engineer, assay laboratory and related facilities may be combined in the same building in Fairbanks.

The district office at Ketchikan is in an old building which was remodeled into a suitable office and assay laboratory. It was necessary to install a new roof on half of this building during 1960; the other half of the roof will require replacement in the near future.

The Nome District Office and Laboratory is adequate for serving the public in this area. The office space at Nome is shared with the Department of Revenue resulting in decreased expense to both agencies.

All of the Division's laboratories are equipped with basic laboratory equipment and materials suitable for investigating chemical properties of rocks. Only the laboratory at College is equipped with a spectrograph used for qualitative determinations of trace elements undetectable by chemical methods. All laboratories have Geiger counters; however, only the Ketchikan laboratory has a fluorimeter necessary for quantitative determination of uranium.

The District Offices at Ketchikan, Anchorage, College, and Nome also serve as rental depots for portable diamond drills, bits and rods; gas operated jackhammers; drill steel and bits; Geiger counters; mineral lights; and other small equipment suitable for exploration and sampling. Rental of this equipment to the public was authorized by Chapter 129 of the 1955 Legislature. This equipment has been fully utilized by many prospectors. The rental charges for the equipment are moderate with the proceeds from rental returned to Alaska's General Fund.

Metallurgy Branch

The assayers at the District Offices at Anchorage, College, Ketchikan, and Nome reported upon 1,662 samples of minerals, ores and rocks submitted for analysis or identification by the public. A total of 1,911 chemical, spectrographic and coal analyses as well as mineral identifications were completed to report gold, silver, cobalt, copper, iron, mercury, manganese, molybdenum, nickel, lead, platinum, antimony, titanium, tungsten, uranium, zinc, beryllium, limestone, and tin. The number of analyses completed during 1960 represents a 20 percent decrease from the previous year and a 47 percent decrease from the average number of analyses for the four previous years.

Analyses of samples submitted by the public are performed free of charge except for coal analyses. This service to the public encourages and assists prospectors and miners in their search for mineral deposits, and is a barometer of prospecting activity in the State. The assayers also act as sources of information and advice to geological and mining activities in their Districts, limited only to the extent that they ordinarily do not make field examinations. In the Nome District assaying duties are combined with property examinations by an assayer-engineer.

The assayers also provide other services and information to the public.

Mining Branch

A total of 58 field examinations of mineral deposits and surveys of mining operations, and 54 coal mine safety and petroleum operations inspections were completed during the year by members of the staff. Deposits investigated included those of gold, silver, bismuth, copper, cobalt, iron, lead, zinc, molybdenum, nickel, tin, uranium, and nonmetallics such as limestone, gypsum, silica, fire clay, peat, and coal.

Geological and engineering reports have been, or will be written on field examinations made.

Technical assistance and professional advice in exploration, phases of operations, and marketing was given to prospectors and mining companies requesting this service. Reports, recommendations, and advice were given to assist negotiations for the acquisition of mineral deposits by prospective purchasers.

Reconnaissance of mineral access road routes to Slate Creek, MacLaren River, Valdez Creek, and Rampart were made under the 1960 Pioneer Access Road Program by Division engineers. The Division of Mines and Minerals recommended the construction of 103 miles of these roads, estimated to cost $600,000, which were on the original priority list. Construction of the Lignite-Kantishna road was approved by the Commissioners of Natural Resources and Public Works. The others (Teller-Lost River and Eureka-Rampart) are being reviewed as to cost in relation to their relative benefit value and the allotted funds. Roads being constructed under a 1959 law are the MacLaren River and Caswell-Kashwitna River roads.

A geophysical investigation utilizing electromagnetic methods to determine the possible occurrence of lenses of massive auriferous arsenopyrite on or near an argillite-granite contact obscured by overburden was completed on the J and J Claims near Ketchikan. An area 1500 feet along, and 600 feet transverse to, the strike of the contact was surveyed. Anomalies indicative of the presence of sulfides as massive lenses as well as disseminations were recorded in the area surveyed. The electromagnetic survey was made possible by the cooperation of the U. S. Bureau of Mines who loaned the Division their Sharpe SE 100 Electromagnetic Survey Unit, and the U. S. Coast Guard who furnished the "Walkie Talkies" necessary for the work.

Petroleum Branch

Through the provisions of the State Organiza-

tion Act of 1959, all duties and functions of the former Oil and Gas Conservation Commission were delegated to the Division of Mines and Minerals. The original Oil and Gas Section established at the Anchorage District Office has been redesignated as the Petroleum Branch in the reorganization of the Division.

A Petroleum Engineer and Petroleum Geologist comprise the entire staff of the Petroleum Branch at present. Duties of the Branch include advance approval of drilling permits specifying equipment and material to be used; periodic inspections of drilling operations to assure orderly and efficient development of oil and gas fields; maintenance of official records of production; and enforcement of rules and regulations governing the conservation of oil and gas in Alaska. The Petroleum Branch also accumulates and correlates stratigraphic, geologic, and production records for use in engineering studies, and will assit the petroleum industry of Alaska to improve production techniques of any given field to obtain optimum production rates consistent with maximum recovery of oil and controlled expenditure of reservoir energies.

The Petroleum Branch cooperates closely with the State Division of Lands, giving it technical advice on oil operations and information on land areas with petroleum-favorable geologic conditions, enabling the Division of Lands to effectively classify lands and determine how to offer them for the greatest financial benefit of the State.

In cooperation with the Division of Lands, the Petroleum Branch of the Division of Mines and Minerals approved the technical data submitted within the folowing development contracts during 1960: (1) Kuskokwim-Shell Oil Co. contract involving approximately 450,000 acres which called for a well to be spudded by January 1, 1962. On December 19, 1960, the Shell Oil Co. notified both the Federal and State governments that the Company had elected to terminate the development contract; (2) Kvichak Bay - the 327,840 acres in this contract are located in the Nushagak basin region at

the northeast end of Bristol Bay. The contract states that the Pure Oil Co. will spud the first well prior to January 1, 1963, with a possible delay until July 1, 1963, unless a similar well is started within the Nushagak Bay Development Contract area prior to the same dates; (3) Nushagak Bay - this contract covering 353,440 acres is situated about 30 miles west of the Kvichak Bay contract area with Pure Oil Co. as operator. The previous two contracts have been disapproved by the U. S. Geological Survey and resubmittal will be offered.

In 1960 four unit agreements were approved by the State: (1) Dangerous River - this unit is located in southeast Alaska about 25 miles southeast of Yakutat and includes 49,228 acres with the Colorado Oil and Gas Corporation as operator; (2) Falls Creek - Standard Oil Company of California is operator of this 16,749 acre unit located some 15 miles south of the Kenai Gas Unit. Falls Creek No. 1 was drilling at a depth of 6,474 feet at the close of 1960; (3) Swan Lake - this unit area of 107,520 acres is the largest yet formed in Alaska and is located just east of the Soldotna Creek unit area with Standard Oil Company of California as operator; (4) Iniskin - approval of a two-year extension of this 51,705 acre unit was given to the operator, Alaska Consolidated Oil Company. Plans call for drilling operations to be resumed by June, 1961.

Under the provisions of the Alaska Oil and Gas Conservation Act, as amended by Chapter 75, SLA 1960, the records for wells drilled in Alaska which had passed the required two years' confidential period were released by the Division of Mines and Minerals on June 15th. The method of release is by sale by private local reproducing firms, since the Division does not have the facilities for printing or selling the records.

On May 17, 1960, the Division of Mines and Minerals held a hearing in Anchorage on proposed amendments, additions, and deletions to the Oil and Gas Conservation Regulations, Title 11 AAC. Approximate-

ly six weeks prior to the hearing, copies of the proposed amendments, additions, and deletions were mailed to all operators and individuals on the Division's oil and gas mailing list. Five major oil companies suggested changes and two approved the proposals as submitted.

As a result of the hearing, the Division adopted new rules and regulations for the conservation of crude oil and natural gas on Deviation and on Secondary Recovery and Pressure Maintenance Operations. Other changes included additional definitions, submission of well records to conform with the change in the law, and abandonment of seismic holes.

A hearing was held in Anchorage on November 21, 1960, at which Standard Oil Company of California, Western Operations, Inc., as operator of the Swanson River Field, petitioned the State for exception to the 160-acre well spacing provided for under the Alaska Oil and Gas Conservation Regulations, Title 11, AAC. The application asked for 80-acre well spacing for the Hemlock Zone of the Swanson River Field where justified by reservoir development.

In support of the petition the operator submitted technical evidence in order to establish lack of reservoir continuity. Examination of the submittal by the State Oil and Gas Committee showed the necessity of closer well spacing to properly drain the field and such finding was concurred with by the Oil and Gas Supervisor, Alaska Region, U. S. Geological Survey. An order was issued on November 25, 1960, allowing the operator to drill on 80-acre well spacing as petitioned.

Safety

The Division of Mines and Minerals through the Department of Natural Resources is directly responsible by law for enforcement of safe operating practice, equipment and conditions in coal, metal, industrial mineral mines and quarries, and all underground excavations, even though not connected with mining. The

Division shares equal responsibility with the U. S. Bureau of Mines for the inspection and enforcement of safety regulations and conditions in Alaska's coal mines. During the year the State Coal Mine Inspector made monthly inspections of all coal mining operations.

In addition to geological, engineering, and other types of examinations, the Division's mining engineers made safety inspections of tunneling and shaft projects as well as operating lode mines to insure compliance with law and safety regulations.

Although the Division of Mines and Minerals is directly charged with the inspection and enforcement of safe operating equipment and practice in all mineral and solid fuel industries, which includes petroleum and natural gas, the State Organization Act of 1959 delegated responsibility for safety in industrial operations to the State Department of Labor. The overlapping of responsibility for safety inspections and practice of the petroleum industry is being resolved in cooperation with the industry by the Commissioners of the Departments of Labor and Natural Resources. Safety statistics concerning the industry have been collected for 1960 by the Division.

Initiated by the Division of Mines and Minerals during the year is an analysis of injury statistics as an aid in preventing accidents in metal and nonmetallic mines. Accident prevention is not only for saving life and avoiding suffering and loss by the employee, but also serve the purpose of reducing compensation and production costs for the operator. Both objectives can be achieved in the same manner. The welfare of the employees and maintenance of profitable production are given the attention of those in charge of most operations. Exceptions may be found, but operations are few at which the safety and welfare of employees are disregarded in the attempt to gain increased profits. Most operators are gratified to find ways to add to the safety and efficiency of the operations under their charge.

Analyses of safety statistics for the various

types of mining and petroleum and natural gas industries will be made to show injury frequency rates, injury severity rates, fatality rates, and trends in these rates. The standard method of recording and measuring work injury experience of the American Standards Associations, Inc., adopted by the Federal Bureau of Mines in 1956, will be used by the Division.

Redrafting of present safety regulations and rules of enforcement for the minerals and fuels industries of Alaska, after a comprehensive study of the subject, is underway by the Division of Mines and Minerals. The redraft of safety regulations and rules will embody the best practice based on experiences of other states to meet the safety problems presented by changed techniques, equipment, and materials used in the present-day minerals and fuels industries.

Cooperation with Other Agencies

During the year, the Division of Mines and Minerals cooperated with the Department of Public Works in conduct of the Pioneer Access Road Program. An appropriation of $1,000,000 was made to the Department of Public Works to construct, relocate, or repair pioneering access roads into and within areas rich in any or all natural resources or to mining prospects of commercial promise presently inaccessible to truck haulage. Provisions of the act are that the Commissioner of Natural Resources assign priorities to proposed access roads and the Department of Public Works allocate funds and arrange for the construction. The Division's engineers made field reconnaissance of preliminary routes of some of the proposed mineral access roads, and the Division recommended construction of 103 miles of these roads estimated to cost $600,000. Construction of one of these roads was approved by the Commissioners of Natural Resources and Public Works.

Joint public hearings were held with the Division of Lands concerning proposed regulations to govern mining and leasing of locatable minerals on State-owned lands. The regulations, drafted by the Division of Mines and Minerals to be administered by the

Division of Lands, have been redrafted to incorporate the sentiment expressed at the hearings and by correspondence of the public and mining industry. The redraft version of the regulations will also be subject to joint hearings, and review by the public and mining industry unable to attend the hearings, before adoption. Though these regulations will be the primary responsibility of the Division of Lands, the Division of Mines and Minerals will be called on continuously for technical help and advice in their administration. By the end of 1960, the State had applied for 6,330,236.46 acres of Federal land with tentative approval given on 666,043.63 acres. Final patent has been issued to the State on 58,102.16 acres. The State of Alaska was authorized by the Statehood Act to select 104.5 million acres within 25 years.

Technical assistance and advice was given to the State Supreme Court in officially establishing claim recording district boundaries and other matters. The Division cooperated as well in pertinent matters with the Departments of Revenue, Labor, and Fish and Game.

Complete cooperation was experienced between the Securities and Exchange Commission and the Division of Mines and Minerals in protection of investors from fraudulent mining promotions and enterprises.

The Division has a formal agreement with the U. S. Bureau of Mines for the mutual cooperative exchange of information. This eliminates duplication of work and results in more complete service to the public at decreased cost. Utmost cooperation by both agencies is also experienced in fields and effort not specifically covered by the formal agreement.

In addition to maintaining facilities at the District Offices for the public's use of "open file" unpublished reports by the U. S. Geological Survey concerning Alaska, there is a free exchange of information on matters of mutual interest between the Division and the U. S. Geological Survey. Tentative arrangements have been made with the U. S. Geologi-

cal Survey for the cooperative preparation of the following maps: (1) a mineral resource map showing the distribution of gold, silver and platinum in Alaska; (2) a map of Alaska showing claim recording districts with boundaries as defined by Supreme Court Order No. 12. This map would also incorporate the outlines of the USGS quadrangle maps and other pertinent information.

The Atomic Energy Commission continues to advise the Division of their activities in Alaska and supplies published information for inclusion in the reports of the District Offices available to the public.

The U. S. Bureau of Land Management and the U. S. Forest Service cooperate fully in supplying information on the status of mineral lands and claims. In turn, the Division of Mines and Minerals has rendered valuable assistance to these agencies by supplying mining claim ownership information and reports on mineral deposits and mineral areas to them in the administration of Public Law 167. This law has to do with the determination of surface rights in the multiple use program of public lands.

Of inestimable value to the State in the selection of lands under the Statehood Act is the Central Recording function of the Division of Mines and Minerals. The land selection program of the Division of Lands is greatly facilitated, and the work of the U. S. Bureau of Land Management in this program is simplified, by the Division's ability, through central recording of all mining claims in Alaska, to immediately furnish information on claim location and ownership in the land areas selected for the State. Land included within the boundaries of valid mining claims cannot be acquired by the State. Early elimination of these conflicts from tentative selections prevents later costly delays and extra work.

Expenditures

Estimated expenditures of $170,000 by the Division of Mines and Minerals during 1960 show a decrease of 10.5 percent over 1959 in spite of an advance in costs, prices of equipment and supplies, and salaries. Part of this decrease is attributable to the lack of a mining engineer on the staff for half the year in the First District.

Looking back over the past ten years, it is found that the Division's average annual appropriation has cost the State about 6 mills per dollar value of the average annual mineral production. For 1960, the Division's annual appropriation was 8 mills per dollar value of total mineral production in the State. In studying the following tabulation these factors must be considered: (1) the Petroleum Branch was activated in 1959; and (2) the value of gold and silver, which accounted for 54.5 percent of the total value of Alaska's mineral production, was obtained from a fixed price of these metals during the period.

Year	Alaska's Mineral Production (Millions)	Expenditures		Purchasing Power Of The Dollar, Consumer Prices '47-'49 = 100
		By DM&M (Thousands)	Per Value Alaska Mineral Prod. (Mills)	
1950	$17.900	$143	8.0	97.3
1951	$19.500	$115	5.9	90.1
1952	$26.302	$115	4.9	88.1
1953	$24.252	$118	4.9	87.4
1954	$24.407	$118	4.8	87.1
1955	$25.412	$140	5.3	87.3
1956	$23.408	$140	6.0	86.1
1957	$30.153	$146	4.8	83.2
1958	$20.892	$146	7.0	81.0
1959	$20.495	$188	9.2	80.3
1960	$21.344	$170	8.0	80.0

The figures for 1960 are preliminary estimates. The purchasing power of the dollar, consumers prices, does not include Alaska and Hawaii. This index is for all commodities except farm products and food.

A study of the relationship of expenditures by

the Division of Mines and Minerals to the value of Alaska mineral production must take into account functions of the Division. Although impossible to measure accurately, it is to be emphasized that about 70 percent of the effort and therefore monies expended have been required by administrative duties, service to the public, and regulatory activities of the Division, with the remaining 30 percent of effort devoted to the assistance of the mineral industry and the inducement of new mining ventures. A greater proportion of the Division's effort toward inducement of new mining ventures would be possible by availability of funds for recommended additions to the staff and improvements in facilities with a resultant reduction in the ratio of State expenditures to value of minerals produced.

Recommendations

Some research and much study have been given to the problems of (1) improving usefulness of the Division of Mines and Minerals to the public and the solid fuels, minerals, petroleum and natural gas industries with a minimum of cost to the State; and (2) increasing the utilization of Alaska's mineral resources by aiding the establishment of a stable, progressive, major mining and oil industry commensurate with the indicated potential wealth of Alaska's known, unknown, and untouched mineral wealth.

To improve usefulness of the Division of Mines and Minerals to the public and industry, as well as aid in the establishment of an enlarged stable mining and petroleum industry, requires not only an increase in amount and types of service offered by the Division, but the improvement and enlargement of existing facilities and equipment of the Division, and the employment of necessary professional and technical personnel. The following recommendations should be considered as minimum requirements of a program intended to fulfill the above objectives. Fulfillment of these recommendations is, of course, contingent on the availability of appropriated funds. We recommend:

(1) The Anchorage District Office building be enlarged to provide office and laboratory space for the addition of geologists and others to the present staff utilizing this already overcrowded office, and for a permanent oil well core storage place and library. A continuous study of drill cores and cutting samples obtained throughout the State would prove of inestimable value to the geologists of the Division and of companies exploring for oil in increasing the effectiveness of their search for new discoveries.

(2) Activation and staffing of a Geology Branch in this Division. To learn adequately of the State's economic mineral deposits, basic studies in geology are imperative. The Geology Branch would supplement the work of the U. S. Geological Survey by providing economic geology as an addition to detailed topographic and geologic mapping done by the Federal agency. Two economic geologists, an engineering geologist, a water resource geologist, a geophysicist, and a draftsman would form the nucleus of this Branch. Student geologists from the University of Alaska could be employed as summer field assistants, or under suitable conditions, could do advanced geological thesis work on a contract basis, the thesis to be published by the Division of Mines and Minerals. The Geology Branch would cooperate to the utmost with the U. S. Geological Survey in programs whose objectives would be the accumulation of geological data pertaining to the search for new deposits of commercial minerals, and filling the needs of the present industry. Areas of economic mineral promise would be investigated and mapped, possible industrial sites would be searched for and studied, and water resources for all purposes would be investigated with or without the cooperation of the Federal agencies. Economic mineral studies of all types could be pursued. Reports and maps on all these investigations would be published.

(3) Initiation of a survey and evaluation of the mineral resources which will be lost to the State by the inundation of large land areas in proposed hydroelectric projects of the State. There is immediate need by Alaska for this study, concurrent with engineering and economic feasibility studies of hydroelectric pro-

jects being conducted. A cooperative agreement to share work, functions, proportionate cost and personnel under the overall direction of the Commissioner of Natural Resources and the Director of the Division of Mines and Minerals and appropriate officials of the U. S. Geological Survey and U. S. Bureau of Mines should be completed for this purpose.

(4) A progressive and expanded program of mineral studies and economic investigations with publication of these studies by the Division of Mines and Minerals. Such publications would include economic mineral reports on certain areas, such as the one on Cook Inlet-Kenai area now in preparation, and reports on certain minerals such as mercury or iron for all, or large sections, of the State. The employment of economic geologists for the Geology Branch as outlined in Recommendation No. 2 above will enable the rate of publication to be accelerated.

(5) A program should also be started of publishing most of the Division's many unpublished geological and engineering reports on mining prospects. These could be published as rapidly as additional personnel and funds would allow. Arrangements could be made to sell these publications with the proceeds to go into a revolving fund to help pay future printing costs, if the Legislature so wishes. This could also be done with the publications recommended in No. 4 above.

(6) Purchase of advanced analytical equipment, such as X-ray diffractometers, should be made, and, operators properly trained, to facilitate a greater volume of rock and mineral analyses to be made by the Division for field investigators, both public and private. This would be another definite step in determining indications of the presence of commercial minerals. Such equipment might also be utilized by private industry under suitable arrangements.

(7) The Division of Mines and Minerals is considering possible areas of cooperation with the University of Alaska in fields of geophysical and metallurgical research applicable to Alaska's economic mineral development problems. Such mutual projects could

utilize facilities and talents of the students and faculty of the University. Definite fields of research have not yet been selected, but the Division suggests among others the three following projects which would be of definite help to Alaska's mineral economy: (a) economic reduction of the titanium content of Alaska's low-grade iron ores to make them more attractive to current markets, (b) development of inexpensive and rapid geophysical methods and equipment particularly adapted to the search for mercury deposits, and (c) development of coal byproducts which could be profitably produced in the Matanuska, Beluga, or Healy Coal Fields in conjunction with either or both (1) power from a mine-mouth power plant and (2) utilization of natural gas. Studies of coal gasification and petrochemical manufacture might evolve from this project.

(8) Suitable quarters should be acquired in Fairbanks for the public service functions of the Fourth District Office. This would include combined space for the assay laboratory, office of the field engineer, and other related facilities to which easy and frequent access is needed by the mining public for better service. Providing space for the assay lab is an imminent need created by the scheduled loss of the present inadequate laboratory. These new quarters could, but need not, include space for the above recommended research projects. It is presumed that the University would provide space and facilities for such cooperative research.

THE MINING INDUSTRY

Production

The estimated value of Alaska's total 1960 mineral production is $21,344,000, an increase of four percent over that of 1959. Gold was again the leading mineral commodity in terms of value produced; estimated production of gold in 1960 exceeded that of 1959 by 1,000 ounces. Gold production in 1960 was 109,272 ounces less than in 1950 when 289,272 ounces were produced; a decrease of 37.8 percent from that year.

The most significant development during the year in Alaska's mineral production was the five-fold increase over 1959 in value of petroleum and natural gas.

Mercury production increased an estimated 707 flasks from the previous year, an increase of 19 percent, although value of production only increased by ten percent, reflecting a decrease averaging $17.00 per flask from the 1959 average price.

Production of coal increased slightly; sand and gravel remained unchanged in value or quantity from 1959.

Platinum dredging continued during the year, experiencing better than anticipated values and washing more yardage because of less clay in the ground dredged.

Total mineral and fuel production for 1960 and the values of the major commodities produced during the period 1950 through 1960 are shown on the folowing two tables. Total value of Alaskan mineral production at marketed prices since 1880 has now reached $1,226,221,000.

TABLE 1 - MINERAL PRODUCTION IN ALASKA

	1959		1960 (1)	
	Quantity	Value (Thousands)	Quantity	Value (Thousands)
Clay----------short tons	180	$ 1	1,000	$ 8
Coal, bituminous----thousand short tons	660	5,869	669	5,950
Copper (2)----------short tons	36	22	17	11
Gold (2)----------thousand troy ounces	179	6,262	180	6,300
Mercury----------76-pound flasks	3,743	851	4,450	938
Natural Gas----------million cubic feet	133	16	225	26
Petroleum, crude----------thousand barrels	187	295	600	1,470
Sand and Gravel----thousand short tons	5,859	5,265	5,892	5,345
Silver (2)----------thousand troy ounces	21	19	23	21
Stone----------thousand short tons	89	377	80	300
Undistributed (3)----------	---	1,517	---	975
Total----------	---	$20,494	---	$21,344

(1) All figures for 1960 are preliminary and subject to revision.
(2) Recoverable content of ores, etc.
(3) Undistributed includes gem stones, platinum group metals, uranium ore.

Note: Above statistics prepared under a cooperative agreement for the collection of mineral data between the Bureau of Mines, United States Department of the Interior, and the Division of Mines and Minerals, Department of Natural Resources, State of Alaska. The values of coal and undistributed commodities are presented on authority of the Division of Mines and Minerals only.

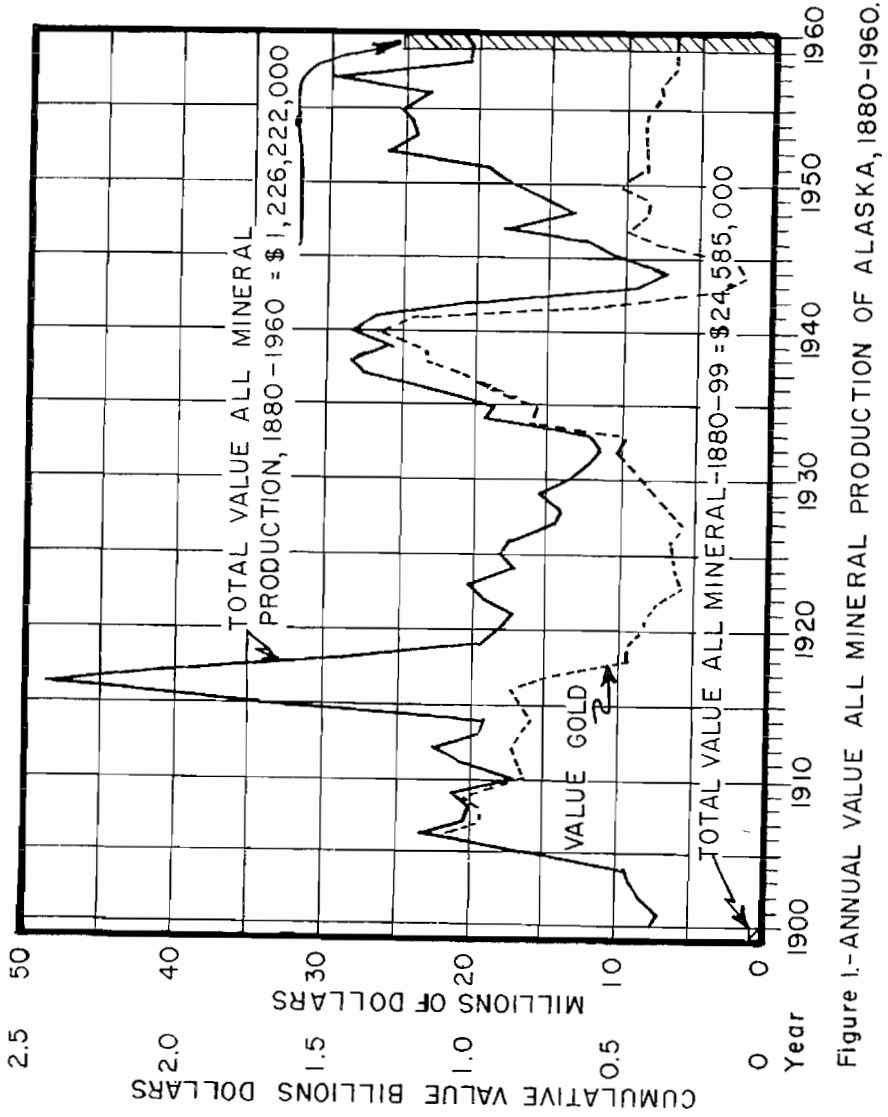

Figure 1.-ANNUAL VALUE ALL MINERAL PRODUCTION OF ALASKA, 1880-1960.

Table 2
PRODUCTION MAJOR COMMODITIES
DOLLAR VALUE (Thousands)

Year	Gold	Mercury	Coal	Oil & 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	6,300	938	5,950	1,496	21.3
	$87,191	$5,068	$66,652	$1,807	$254.1

Gold, which had a constant fixed price during 1950 to 1960 inclusive, comprises 34.4 percent of the total value of production for the period. Silver, with a total value of $314,000 as recoverable content of ores, was produced at an average ratio of one ounce of silver per 7.2 ounces of gold during the same period. In terms of value produced, the ratio is $1.00 worth of silver to every $278 worth of gold.

Coal, the second greatest in value of total production, accounted for 26.2 percent of the value for this period. The value of mercury accounted for nearly two percent of the total, while petroleum and natural gas in two years of production accounted for nearly one percent of the total value of all minerals and fuels produced in Alaska during 1950 to 1960, inclusive. The remaining 39.9 percent of the value of mineral production during this time included antimony, chromite, copper, lead, platinum, tin, tungsten, uranium, zinc, gem stones, sand and gravel, clay, and stone.

The ratio of value of Alaska's mineral contribution to the total U. S. production during 1950-1960 averaged $1.00 per every $654 of national production. Since 1953, when Alaska and Hawaii mineral production was included in the national figures, Alaska's mineral production contributed value at the ratio of $1.00 per $675. A greater proportion of the value of national mineral production could be obtained by either increasing production of Alaskan minerals; or, allowing the price of gold through a free market or by subsidy seek its own price level. It is believedif the price of gold were allowed to seek its own price level, it would increase directly as the wholesale price index and decreased purchasing power of the dollar. Any planning for a subsidy by government, state of national, should take these factors into account before establishing amounts or limits of a subsidized price for gold.

Prospecting and Exploration

The total monies expended in prospecting for and exploration of metallic and nonmetallic mineral deposits in Alaska during 1960 by private interests is estimated to be $2,100,000, an increase of 36.4 percent from 1959. Of this total, 64 percent or $1,340,000 was spent in Southeastern Alaska, $160,000 (8 percent) in Central, and $ 600,000 (28 percent) in Northwestern and elsewhere in the State by prospecting syndicates and large mining companies.

Federal agencies made important contributions to geological knowledge as well as investigating mineral and fuel deposits of Alaska. According to published reports, the U. S. Geological Survey and the U. S. Bureau of Mines expenditures during 1960 for topographic and geologic mapping, geological studies, and mineral resource investigations total $2,855,000 in Alaska.

A summary of expenditures for prospecting and exploration of minerals and solid fuelds and a barometer of prospecting activity is contained in Table 3 and Figure 2.

Table 3

PROSPECTING, EXPLORATION AND ALLIED EXPENDITURES

GROUP	AREA	EXPENDITURES			CLAIMS	
		TOTAL	PERCENTAGE GROUP	PERCENTAGE TOTAL	NEW	HELD BY ANNUAL WORK
Private	S.E.	$1,340,000	64	-	272	1554
	C.	160,000	8	-	194	1666
	N.W.	600,000	28	-	501	3993
Total		$2,100,000	100	42.5	967	7213
Federal	Alaska	2,855,000	100	57.5	-	-
Total	All Alaska	$4,955,000	-	100.0	967	7213

Note: Abbreviations S.E., C., N.W., denote Southeastern, Central, and Northwestern respectively. Expenditures on other and general areas throughout Alaska are included with Northwestern.

Compared to the average number of new claims staked during 1953 to 1959 inclusive, new claims staked in 1960 were 718 less in number, a decrease of 42.5 percent from that average. Assessment work required to hold mining claims increased in number by 287 claims, or 4.1 percent, over the average during this same seven-year period. During 1960, 311 fewer claims were staked and assessment work completed on 1129 fewer claims, than in 1959. These statistics represent a decrease in new locations of 24.3 percent, and a decrease of 13.5 percent in assessment work from the previous year. Figure 2 shows pertinent information on claims staked and claim assessment work affidavits of record in the Division of Mines and Minerals.

Prospecting - As has been experienced throughout the

entire national mining industry, hardly any men of the practical, hardy, "old-fashioned" prospector type are still physically active in prospecting Alaska. In a large measure, this group of practical and hardy discoverers of nearly all the major mines, is being replaced by many individuals who prospect as an avocation or hobby. Both the old fashioned as well as the "1960" prospector have received encouragement and assistance in the form of sample identifications and analyses, technical advice, and prospecting equipment rentals from the Division of Mines and Minerals. Some of the "1960" prospectors were rewarded by encouraging results which will be further studied by the Division's engineers during the forthcoming year. Of importance in awakening interest in the search for mineral deposits by the public, and increasing the number as well as the competency of prospectors in Alaska has been the educational instruction on fundamentals of mineralogy, geology, prospecting, placer mining methods and lapidary given to the public by some members of the staff of the Division. The Mining Extension course ably taught by Leo Mark Anthony and others, and which is provided for the public of many cities and towns of Alaska by the University of Alaska, has also been of importance in increasing the number as well as the knowledge of the "1960" prospectors.

Although not strictly prospecting, several large companies and Federal Agencies had geologists and mining engineers active on preliminary reconnaissance and examinations during the year throughout Alaska. Tin deposits on the Seward Peninsula, beryllium prospects on the Seward Peninsula and in Southeastern, Alaska, and silver-lead deposits in the Ruby District were under study or examination by the U. S. Bureau of Mines during 1960. Geophysical work on the iron deposits of Southeastern Alaska was also done by the Bureau. The U.S. Geological Survey also contributed important geological studies beneficial to further investigation of mineral resources during the year, and published several reports of their work.

Capably directed systematic programs of prospecting favorable areas of Alaska was resumed during

the year by Moneta Porcupine Mines, Ltd., Fremont Mining Co., and others. The well-financed groups utilize helicopters, geophysical, geochemical and other advanced prospecting techniques, in addition to the time proven method of on-the-ground-investigation by practical, experienced "old-fashioned" prospectors. Prospectors and geologists on foot usually work the likely areas delineated by the more scientific approach to discovery of minerals. Although several discoveries by these groups must of necessity remain confidential until more complete information is released by the discoverers, information published in technical journals reports that high grade silver mineralization was discovered by Sunshine Mining Co. participating in helicopter reconnaissance in an area northwest of McKinley Park.

It is interesting to note that more than once where a systematic coverage of a favorable area or mining district has been completed with only mediocre results by one of the expert groups, another group prospecting the identical area has met with success and vice versa; it is entirely possible that others will also make discoveries in this same area. The progressive annual recession of glaciers in Southeastern and elsewhere in Alaska for the past 50 years has exposed to the prospector many previously concealed new rock outcrops which may contain ore deposits.

A discovery of major importance to the industrial minerals industry and economy of Alaska was made when Frank Luster, a guide, directed the attention of Permanente Cement Company's field team to extensive deposits of high purity limestone on the East Fork of Kings River in the Castle Mountain area. These deposits occur in a readily accessible area not previously geologically mapped or studied by a government agency or private interests.

Several inquiries were received by the Division during the year regarding "Prospectors Assistance" as provided for in Ch. 117, SLA 1957. This law has not been repealed, but there are no funds for it at present. Experience of the Division of Mines and Miner-

als has shown that very few qualified resident prospectors are interested in the program.

Individual prospectors declined in number from the previous year; however, numerous serious inquiries regarding prospecting information on gold from all parts of the nation have been answered by the Division and indicate that the number of prospectors in Alaska should increase appreciably in the forthcoming year. The possibility that the statutory price of gold may be increased because of higher prices for gold on the world market, and the pressing demand for this metal, have again made prospecting for gold attractive, especially in Alaska. Many inquiries have been received by "scuba divers" regarding possible rivers or creeks where skin diving methods are practicable. Several large companies had engineers in the field looking for gold placer deposits on beaches and creeks. Some of the companies acquired or staked claims and announced intentions to sample their ground by drilling in the forthcoming year.

Exploration - Major exploratory projects in metals were completed or in process during the year in Southeastern Alaska by the following companies:

Admiralty Alaska Gold Mining Co. at Funter Bay on Admiralty Island extended their 200-level a distance of 2,800 feet and diamond drilled slightly more than 1,000 feet. Objective of the exploration is to intercept and further explore the copper-nickel Mertie Lode at the 200-level elevation, which is about 1,250 feet below where the DMEA tunnel-and-drilling program, completed in 1958, explored this ore body. Several strong water flows encountered in driving the the tunnel and in core drilling impeded progress. A crew ranging from 4 to 10 men were employed throughout the year in the work.

Columbia Iron Mining Co. continued diamond drill exploration of their Union Bay magnetite-iron deposits north of Ketchikan. Pack-sack type drills were used, obtaining a very satisfactory core recovery of 96 percent to depths of 100 feet.

Mineral Basin Mining Co. completed several miles of access road on their claims near Hyder to further explore deposits of gold, silver, copper, lead, zinc, and iron. Exploration was by trenching and a crew of 3 to 5 men were employed during the season. The work will be resumed next year.

Mt. Andrew Mining Co., subsidiary of Utah Construction and Mining Co., established a camp by helicopter at Vixen Inlet northwest of Ketchikan and diamond drilled magnetite-iron deposits optioned from Don Ross. In addition, Mt. Andrew Mining Co. continued their extensive program of drilling on iron and copper properties of Kasaan Peninsula of Prince of Wales Island.

Newmont Mining Co. did extensive diamond drilling on their nickel deposits, optioned from Fremont, on Brady Glacier in Glacier Bay National Monument. Exploration of these deposits may be continued next year.

Alaska State Mines completed 350 feet of tunnel through the ice of Texas Creek Glacier near Hyder, Alaska during the summer. Object of the work was to find a deposit of electrum (a naturally occurring alloy of gold and silver in varying proportions) under the ice of the glacier. Electrum was discovered in 1925 as float at the foot of the glacier and the lode in place mined on a small scale in 1937. Specimens from the deposit have assayed up to 3406.76 ounces of gold per ton, a value of $119,236.60.

In the industrial minerals, Ideal Cement Co. conducted diamond dril exploration of limestone deposits on Dall Island.

In Central Alaska, major exploration projects in metals by private interests during the year were completed by Alaska Mines and Minerals, Inc., and Newmont Mining Co; Alaska Mines and Minerals, operator of the Red Devil mercury mine, continued a surface program of taking bedrock samples through as much as 40 feet of overburden by a tractor mounted auger equipped with an 8-inch bit, having tungsten carbide cutting tips, in search for new deposits of cinnabar.

Newmont Mining Co. completed an exploration and sampling program on a molybdenum deposit at Hayes Glacier, 60 to 80 miles northwest of Anchorage. The owner of the deposit, Glacier Mining Co., announced that a sizeable deposit of molybdenum exists, but that development of the deposit is hindered by lack of power, and further exploration of the deposit will be suspended for an indefinite period.

The Federal Bureau of Mines completed additional exploration on the White Mountain mercury showing in the Kuskokwim River Region with results indicating promise of a significant deposit. The Bureau of Mines also continued their exploration of the Beluga Coal Field by diamond drilling.

In Northwestern Alaska during 1960, major exploration of the Ruby copper prospect north of Kobuk was intensified by Bear Creek Mining Co., a subsidiary of Kennecott. Two diamond drills started the program for the year which was increased by the addition of a third drill early in the summer and the arrival of two additional drills in late August, the earliest date permitting shipment of the drills by barge on the Kobuk River because of prolonged low water. A Canadian-manufactured Nodwell tracked-truck made daily freighting trips between Kobuk and the camp, a distance of 14 miles. A crew of 40 to 50 men was employed until late October, completing the fourth season of drilling and exploration. This work will continue in 1961.

The Little Squaw Mining Co. of Spokane under direction of Eskil Anderson did underground exploration of the Mikado Lode gold deposit in the Chandalar with very promising results. More extensive development of the Mikado Lode will be resumed next year as well as further exploration of the Mikado and other promising gold lodes in the area.

Throughout Alaska, there were no exploration programs of consequence in the field of radioactives.

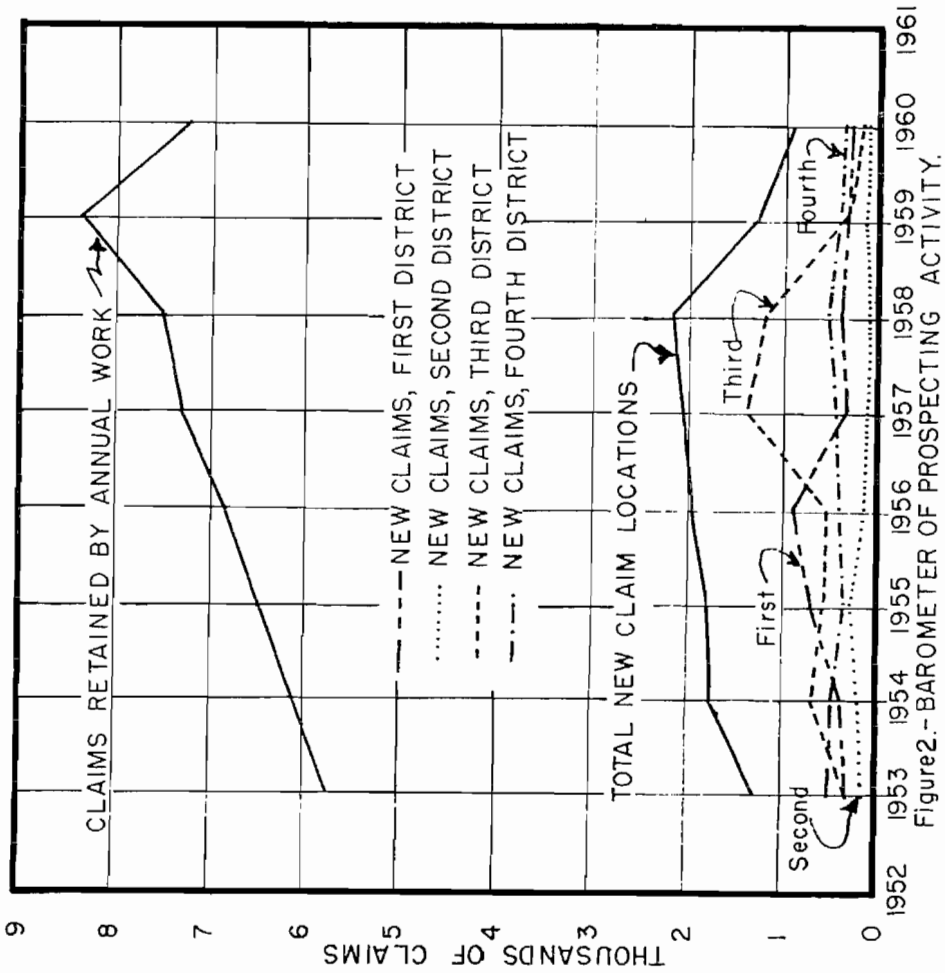

Figure2.-BAROMETER OF PROSPECTING ACTIVITY.

Precious Metals

Gold - There was a decline in the number of gold miners and prospectors, no significant production from the lode gold mines, and a reduction in manpower and number of dredges even before Executive Order L-208 closed the gold mines, with an overall decline continuing until the present from 1942. The Gold Reserve Act of 1934, which established the price at $35 per ounce (less 8 3/4 cents), and the continuing increase in real costs as well as decreased purchasing power of the dollar, have almost destroyed a basic, fundamental industry in Alaska and the nation--mining gold.

Both gold and silver are produced in substantial quantities by the United States, however, consumption in the arts and industry has exceeded mine output in recent years. The monetary stock of gold in the United States which gradually increased until 1957, resulted in part from settlements in foreign trade in which exports exceeded imports in value, and in part from liquid capital moving to the relatively stable United States monetary system from less stable foreign systems. This trend is now completely reversed.

Monetary gold stocks held by the United States no longer total $22 billion as they did in 1957, having been depleted gradually during the intervening years, and at an accelerated rate during 1960 when nearly $1.7 billion of U.S. Monetary gold stocks was purchased by foreign central banks. Further sales of $97 million in the first two business days of 1961 cut the nation's gold stocks to $17.6 billion, the lowest since January, 1940.

Since the United States has only $17.6 billion in gold reserves (some $11 billion of which is pledged to assure a minimum of 25 cents in gold backing for every dollar) foreign demand could clean out the vaults. The accumulation of gold in foreign monetary stocks and private hoards shows no tendency to slacken during the year - all told, foreign nations have slightly more than $21 billion in short term claims against our

nation's $17.6 billion of reserve. Management by governments in control of their monetary systems may resist the stern discipline that gold and silver impose on them through currencies made up of coins of intrinsic worth equal to their face values or paper money redeemable in such coin. Nevertheless, those governments that can afford to hoard gold seem to take every opportunity to increase their holdings.

At the end of the year, the dollar price of gold continued to inch upward on the London bullion market, advancing to $35.72. This compared with a high of $44 an ounce set in mid-November. Analysts have said the slowly rising price on the world market means "substantial and widespread demand" for the metal is pressing against supply, even though the Bank of England has been feeding into the market gold which it is purchasing from the U.S. Treasury.

It is now obvious that increasing the nation's production of gold is an economic necessity and numerous incentives for increasing the price of gold through subsidy by government, favorable depletion, taxation, and other remedies are proposed nationally and in the State.

In the urgent search for remedies for the problem of sinking U.S. gold reserves, the obvious solution of increasing them by increased production of the precious metal has been considered by many, but advocated by few.

The price of gold may again be allowed to seek its own price level to conform to the increase in real costs, as shown by the consumer's wholesale price index (which excludes food and farm products) and the decreased purchasing power of the dollar. In 1950 the wholesale price index was 100 compared to 131 in 1960 (1947-1949 = 100) and the purchasing power of the dollar is 80 cents (1947-1949 = $1.00).

The total annual production of gold by Alaska since 1880 in fine ounces and marketed dollar value is shown on Figure 3.

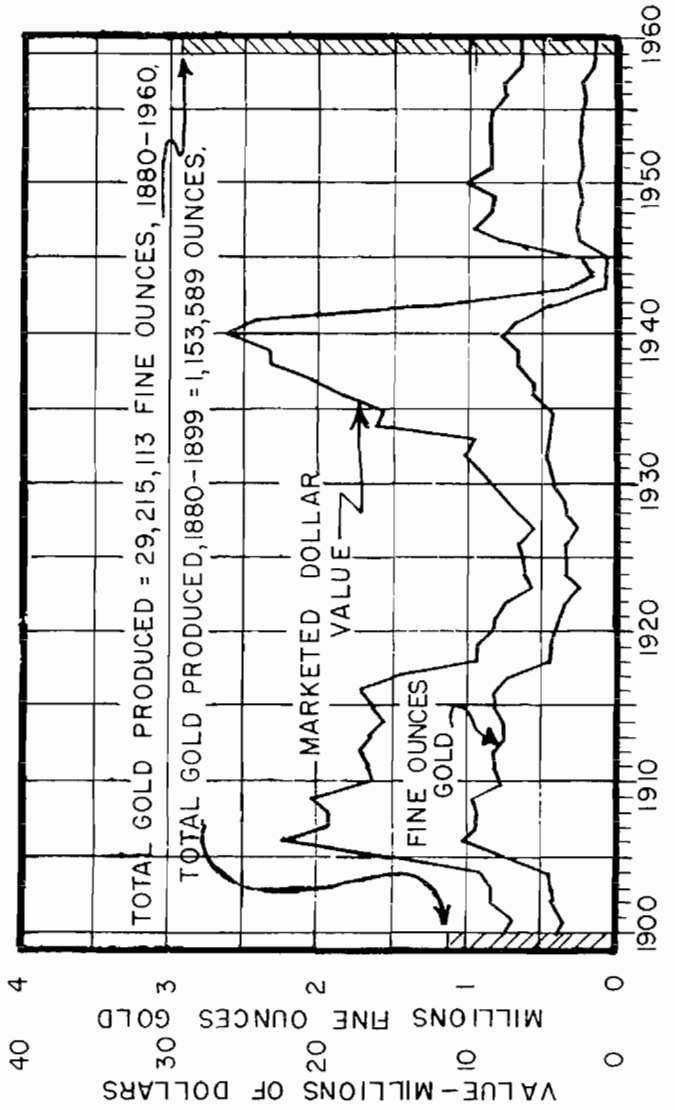

Figure 3.- TOTAL ANNUAL GOLD PRODUCTION, 1880-1960.

1880-1932—Price of gold, $20.67 per fine ounce.
1917—Treadwell Mine flooded.
1914-1918—World War I.
1942—Gold Mines closed by Executive Order L 208.
1941-1945—World War II.

Placer Gold - In the overall total for the Fourth District, there were about 210 fewer men employed in gold placer mining in 1960 than in 1959. Most of the reduction in number of men employed was by the United States Smelting Refining and Mining Co. There were ten mining or development outfits that were active in 1959 and not active in 1960. Of the ten placer operators which did not operate in 1960, there are a few that undoubtedly will be in operation, at least sporadically, in the future. Among these are Alder Creek Mining Co., Gold Stream Mining Co., Quail Creek Mining Co. The Stanich Brothers are reported to have sold or optioned their holdings in the Koyukuk to the Miscovich Brothers.

The United States Smelting Refining and Mining Co. operated four dredges in the Fairbanks District in 1960; Dredge 2 at Fairbanks Creek, Dredge 3 at Chatanika, Dredge 6 at Sheep Creek, and Dredge 10 at Cripple Creek. All of these dredges should complete their operations within the next three or four years.

Chatham Creek Mining Co. moved from Last Chance Creek to the upper part of Ready Bullion Creek near Ester and mined on ground leased from Harold Hassel. Early in August they were working on a second cut of the season just below the fork in the upper part of the creek.

The Chena Mining Co., operated by J. W. Pinto and Carl Poorman, mined during the year on upper Dome Creek on ground leased from the USSR&M Co.

Hassel Mining Co. curtailed operations considerably this year. After leasing the upper part of Ready Bullion Creek to the Chatham Creek Mining Co., Harold Hassel moved his equipment to the lower part of the creek, where he did some preparatory work.

Nick Kupoff and Charles Lazeration mined during the summer on Pedro Creek at its junction with Twin Creek valley. The present operators think that there may be some side pay left underneath tailing piles for about one claim length above their workings.

Olive Creek Mines, under the management of Carl Parker, continued mining on Eva Creek on ground owned by the USSR&M Co.

During the year there was some prospecting and claim staking on Nugget Creek, tributary to Smallwood Creek. The Wolf Creek Mining Co. continued mining as in 1959 on ground leased from the USSR&M Co. on Fish Creek. Ernest Maurer continued mining on First Chance Creek as in previous years.

In the Nome District, the USSR&M Co. operated dredges 5 and 6. They will continue to operate the two dredges next season.

Grant Nelson (Inmachuk Mining Co.) put his second dredge in operating condition.

During the season, Herb Engstrom moved and rebuilt the dredge which had been on Eldorado Creek, to Basin Creek.

Doctor Davis and Associates worked placer ground at Bluff.

Otto Weinard sold his mining claims to a group of men who plan to work Mud Creek next season. Fred Weinard will continue to mine on Mud Creek as he has in the past.

The Far North Mining Co. plans to shut down its operation at Candle next season because the present price of gold and the cost of fuel of $1.00 per gallon unloaded at Candle makes it uneconomic to mine the ground. A news item reports that the operators, Parker and Raymond, are investigating mining properties in South America.

Bon Davis mined on Gold Run Creek where he recovered specimen gold and sold it for jewelry and pocket pieces. The gold brought between $40 and $60 and ounce, depending on size.

Meritt Pedersen operated the old Lammers dredge

on Klery Creek, but will not operate next season.

Ben Falls, although limited by a water shortage, mined during 1960 on Wilbur Creek using hydraulic monitors for stripping muck and for piping into sluice boxes and a bulldozer for pushing gravel to the head of the boxes and stacking tailings.

The Redstone Mining Co., operated by Carl Heflinger, mined near Livengood Creek. A bulldozer is used for mining and stacking tailing; a sluiceplate is used at the head of the boxes.

Henry Havrilack mined on Ruby Creek on ground that had not previously been mined by mechanical methods, but had been mined by drift mining and hand opencuts.

The T and T Mining Co., owned and operated by Bill Thomas mined on the left limit of Hunter Creek a few hundred feet upstream from the 1957 site of operations. The summer was spent in stripping with hydraulic monitors preparatory to mining a cut in August and September.

The Weisner Trading Co., owned by Ira Weisner of Rampart, mined until mid-July on Little Minook Creek when stopped by a shortage of water. Two monitors and a bulldozer were used for mining and a dragline for stacking tailings.

Strandberg and Sons moved the site of their mining to the right limits of Eureka Creek. A dragline is used to feed a crawler-mounted washing plant, towed by a D-8 tractor. Electricity for operation of the stacker belt, trommel, and pumps is furnished by a skid-mounted, diesel-electric generator.

Pete Johnson mined alone by hydraulicking on the right limit of Eureka Creek. He mined in "splashes", allowing the water to back up in the ditch until the ditch is nearly full, getting one 15-minute splash every two or three hours. One monitor is used for mining and one feeds by-water to the sluice box through a pipe.

Archie Pringle employed one man on the upper part of Rhode Island Creek during part of the summer. A bulldozer and monitor are used in stripping and mining.

Tony Lanning mined alone on the left limit of Thanksgiving Creek recovering side pay left beside old drift mine workings. He used a bulldozer to mine and to stack tailings and a monitor to wash gravel into the boxes.

Lode Gold - Lode gold mining in Alaska which produced at a rate of one-third of the annual total in Alaska and employed 4,200 men in 1914, the zenith of the gold standard, has been for all practical purposes nonexistent in Alaska since the closing of gold mines by Executive Order L-208 in 1942 and subsequent economic developments. Only a very few mines in the Willow Creek and Fairbanks Districts are now sporadically operated by crews of 2 or 3 men.

During 1960, lode gold mining activity in Alaska was confined to the following: (1) Tury Anderson and Associates worked on the Silvertone prospect preparatory to installing a mill in 1961. (2) Arctic Alaska Fisheries and Enterprises, Inc., under the management of John Sheldon, Rudolph and Adolph Vetter, continued exploration and mining on gold lodes near the Fairbanks-Wolf Creek divide. The company plans to do underground work on the Nordale group in the winter of 1960-61. The company now has leases on the Cleary Hill property, the Nordale Group and the McCarty Group in addition to owning several claims in the area. Five hundred tons of ore was mined and milled during the year from mining on the Nordale Group. (3) The Lookout Mine on Emma Creek near Ester operated intermittently during the summer by "Bumps" Turnbarge, the owner, and Bill Hewitt his partner. The under-hand stoping methods used preclude mining of anything other than exceptionally high grade ore. The two-stamp mill has a capacity of one-half ton per hour. (4) There was some preliminary activity and sniping in the Willow Creek District, with very minor production.

Silver - Althought there are many deposits in Alaska

which contain appreciable amounts of silver associated with galena, sphalerite, pyrite, pyrrhotite, arsenopyrite and other minerals particularly in Southeaster Prince William Sound and Central Alaska, Alaska's production of silver during 1960 and for many preceeding years has been recovered mainly as a by-product of gold mining. The average ratio of silver to gold produced is one ounce silver to every 7.2 ounces of gold. Silver, which has lost most of its international monetary significance and has a shrinking place in foreign coinage, probably will depend for its future demand largely on United States monetary legislation and on a rapidly rising application in industry and arts.

During the century preceding 1914, silver engaged in a long test of strength with the gold standard and as an equal in a bimetallic system. The Silver Purchase Act of 1934 did not remonetize silver; however, it did provide for virtually unlimited silver purchases at prices set by the government. Moreover, the Act permitted coinage of silver dollars and issuance of silver certificates against the purchases with the result that the purchase program could proceed indefinitely without need of Congressional approval of funds. The Act provided that purchases should continue until the Treasury's silver stocks, valued at $1.2929+ an ounce, should be equal to one-third of its gold stock valued at $35 an ounce. Silver dollars, silver certificates, and subsidiary silver coin amount to 11 or 12 percent of the U.S. Currency in circulation. Roughly, $2 billion of silver certificates are in circulation. The bimetallic standard of the U.S. as such has been allowed to lapse and has been overwhelmed by the size of the gold reserves and gold purchases.

Silver figures recently released by the U.S. Treasury are the basis for enumerating four developments, important to both the financial and mining industry:

1. Purchases by the Treasury of newly-mined, domestically produced silver have declined very materially. Only 711,000 ounces were acquired by the Treasury in the fiscal year ending June 30, 1960.

2. A very heavy demand for the coinage of subsidiary silver coins continues. Dimes, quarters and half dollars took 41,000,000 ounces in the past fiscal year (more than current U.S. annual production) as contrasted with 36,500,000 ounces in the previous 12-month period.

3. Treasury sales of silver to industry more than doubled in the last year, to 28,000,000 ounces from 11,250,000 ounces previously.

4. "Free" silver owned by the Treasury will last only 2 years at the present rate of erosion. The balance in the general fund has dropped to less than 140,000,000 ounces and the Treasury is selling at a rate of at least 65,000,000 ounces annually. A possible source of additional silver to the Treasury is the monetary reserve behind $5 silver certificates. This denomination can be replaced by Federal Reserve Notes, without Congressional action. However, such a switch in $1 silver certificates would require authorization by the Congress.

Platinum Group - The metals of the platinum group include platinum, palladium, iridium, osmium, rhodium and ruthenium. Platinum is the most abundant and important member of the group but each of these metals has important industrial uses. All the platinum-group metals except palladium command prices much higher than gold.

In recent years world production of all six metals of the platinum group has been about 36 short tons a year valued at $65 million. U.S. output is only a small part of the total. Domestic consumption of platinum group metals exceeds domestic production and continuance of imports from South Africa and Canada are essential.

Alaska continued production of platinum. Goodnews Bay Mining Co. dredged south of Platinum, Kuskokwim River Region. Total yardage washed during the year increased from 1959 largely because less clay in the ground dredged permitted handling more yards through the washing plant. Values were somewhat better than anticipated.

Base Metals

Mercury - Of the base metals produced in Alaska during 1960, the most important in quantity and value was mercury. Minor amounts of copper, 17 tons, are estimated as Alaska's total production of copper as recoverable content of ores during 1960. Some lead-zinc-silver ores were mined at the Riverside Mine near Hyder but not shipped during the year. A few test lots of lead-silver ores were shipped to smelters, however, these are not included in production of base metals for 1960.

Total production of mercury during the year is estimated to be 4,450 76-pound flasks, 707 more than produced in 1959, and valued at $938,000, a 10 percent increase from the previous year. The Red Devil Mine, operated by Alaska Mines & Minerals, near Sleetmute (Kuskokwim River Region) yielded the bulk of the output, Russell R. Schaeffer being the only other producer of record. Discovery of new ore above the 450 level of the Red Devil Mine substantially increased ore reserves. At the close of the year, a shaft was being sunk from the 450-level to the 600-level.

Considerable activity in exploration and acquisition of cinnabar deposits in the Kuskokwim River Basin and elsewhere was evidenced by large companies and the U.S. Bureau of Mines. A Japanese firm, Nomura Co., announced negotiations, pending final approval, for acquisition of mercury and by-product antimony soot production from the Red Devil, as well as purchase and tentative operations of other cinnabar deposits controlled by Alaska Mines & Minerals. The Japanese announced their intention to ship concentrates from these deposits to Japan for ultimate refinery and recovery of the mercury and antimony content of the ores.

Copper - Copper which occurs in deposits found in the Prince William Sound, Nizina, Ketchikan, as well as in the Ruby District of the Kobuk River, was produced only by Ray Trotochau from the long dormant Kennecott Mine at McCarthy. Developments in the exploration of

potential producers of copper are described under "Exploration."

Iron - Several large companies continued extensive exploration of Alaska's numerous and promising iron deposits. Although no production was obtained, there are positive indications of production within two or three years from at least one property. Among the favorable deposits of magnetite are those at Klukwan, Port Snettisham, Union Bay, Duke Island, Bradfield Canal and several on Prince of Wales Island. Humble Oil and Refining did assessment work on their iron discovery of 1958.

Tin - Placer tin deposits are numerous in Alaska, but the Seward Peninsula is the area of most importance from a standpoint of tin placers. Lode tin deposits are common, and considerable tin placer mining has been done there in the past. The only significant production of tin under the U.S. flag was forced to close in 1955, when the Lost River Mine of U.S. Tin Corporation was closed by economic factors and the withdrawal of government support. Lenhart J. Grothe of Red Devil, Alaska, purchased the property of Lost River Tin Mines for $21,777 in a public auction held by General Services Administration in September. It is noted that the U.S. Government recently announced a loan of $10,000,000 to stabilize and improve the tin industry of Bolivia. Other sources of tin for the nation are the Malay States and the Far East where political unrest is common. The forecast is that tin consumption is exceeding present rates of production, even with reserve stocks of the International tin group included.

Other - Production in the future of antimony, bismuth, chromium, cobalt, iron, lead, molybdenum, nickel, silver, tin, tungsten, zinc and other metals from ores of Alaskan deposits is a certainty. Many deposits of these metals are known to exist in Alaska, and the utilization of Alaska's practically untouched mineral wealth is certain in view of present and future rates of consumption, depletion of ore reserves elsewhere, and the risk uncertainty inherent in many of the present foreign sources for these metals.

Nonmetallics

Although there was no appreciable production of clay, stone, or other nonmetals, the value of sand and gravel produced in the State was virtually unchanged from 1959. The Corps of Engineers, U.S. Army, Bureau of Public Roads and the State Division of Highways were the principal producers of 5,892,000 tons of sand and gravel valued at $5,345,000.

Of major note was the announced intention of Permanente Cement Co. to construct a plant near Sutton, production capacity 500,000 barrels of cement per year from their newly discovered limestone deposits on the East Fork of Kings River. Another group, Alaska Portland Cement, Ltd. purchased claims encompassing limestone deposits in the Cantwell Windy area, about 165 miles north of Anchorage, which had previously been investigated by the U. S. Geological Survey and Bureau of Mines.

Interest has been shown by large firms in Alaska's deposits of gypsum on Iyoukeen Cove, Chichagof Island.

Several inquiries have been received by the Division for samples from and information about the paligorskite deposits of Lemesurier Island, Southeastern Alaska. Paligorskite is a mineral of similar properties and possible use as a substitute in certain applications of asbestos.

Deposits of asbestos are known to occur in the Kobuk River Region and on Admiralty Island.

Sulfur, pumice, shales and clays useful in light weight aggregate, serpentine, jade, graphite, mica, garnet, marble, fluorite, calcite, bentonite, kyanite, azurite, malachite and other minerals useful in industry or the arts occur in Alaska.

A large deposit of jade of good quality is on the Kobuk River in Northwestern Alaska, mica deposits exist on Sitklan Island and Seward Peninsula, and graphite on Seward Peninsula.

Radioactives

There was no production of uranium ores during the year in Alaska. A barge shipment of ore from Bokan Mountain mined during the previous year was shipped by Jott Mining Co. Plans are to produce uranium ores from Bokan Mountain by a reorganized Jott Company in 1961. Prospecting for uranium ores was conducted by a very few.

Coal

Seven strip mines and one underground mine were active during the year. Employment in underground coal mines averaged 40 men during the year compared to 190 men employed in strip mining of coal. Production of coal in 1960 totaled an estimated 669,000 tons, almost 10,000 tons more than mined in 1959. A list of active coal operations is appended to this report. Of interest in the industry was the purchasing of Suntrana's underground mine by Usibelli in October.

Matanuska Field. The Evan Jones Coal Co. continued subcontracting a stripping operation to Minor Roop. Mrak Coal Co. continued its strip mining on a steady basis. The Castle Mountain Coal Co. was mined intermittently by lessees on a small scale.

Nenana Field. Suntrana produced from its underground mine until October when this mine was purchased by Usibelli. Usibelli mined only strip coal. Arctic Coal Co. and Cripple Creek Coal Co. mined strip coal. Arctic mined only during the first half of the year.

Kenai, Point Barrow Fields. These fields were not mined during the year although the Point Barrow Field contributed some production for local use.

Bering River Field. The exploration program of 1958 and 1959 which exposed coal beds and tested samples from this field did not continue on the scale

anticipated. A several hundred thousand dollar program is necessary to determine if large scale coal mining from this field is feasible for export to Japan or for other markets.

Beluga Field. This field would provide an excellent site for a mine-mouth power plant for transmission of power to Anchorage. Preliminary investigations of this field by the former Territorial Department of Mines and two seasons exploration by core drilling of this field by the U.S. Bureau of Mines has been completed. Further investigation of this field by the Federal Bureau of Mines is planned for the 1961 season.

The economics of a mine-mouth power plant in the Beluga Field cannot be accurately evaluated until results of the present and planned future exploration of this field is completed.

It is interesting to note that a thorough engineering study and sound analyses of the cost of generating power at a coal-fired mine-mouth power plant in the Matanuska Field for transmission through the existing grid to Anchorage was considered among other proposals. Although the coal offer was competitive in price with proposals of the petroleum and natural gas industry, it was not accepted because anticipated delivery of blocks of power from a coal-fired mine-mouth power plant did not meet imminent needs of Anchorage for power.

Coal was stockpiled for contractor use at the Clear project. A power plant under construction at the site is to be 60 percent completed by January, 1961, with final completion scheduled for the following July. When in full operation the plant will use 60,000 tons of coal a year. The nearest source of coal is the Healy River Coal Field, 40 railroad miles distant.

New Legislation

During 1960, the following legislation affecting the mineral, solid fuel, petroleum and natural gas

industries, and the functions of the Division of Mines and Minerals, was enacted.

1. Alaska's bonus of $10,000 offered for the discovery of uranium was canceled.

2. Authorization and appropriation of $1,000,000 for the construction or repair of pioneering access roads by the Department of Public Works "into areas rich in natural resources or to mining prospects of commercial promise inaccessible to truck haulage." No pioneering access roads may be constructed, relocated or repaired under provisions of this act except to those areas approved by the Commissioner of Natural Resources. (Chapter 154, amending Sections 1, 2, 3, and 4, Ch. 47, SLA 1959).

3. Authority of the Commissioner of Natural Resources to promulgate safety and conservation regulations pertaining to mining, amending Sec. 47-3-141, ACLA 1949; amending Sec. 47-3-190 ACLA 1949; amending Sec. 47-3-206, ACLA 1949 as amended by Ch. 7, SLA 1953; amending Sec. 47-3-207, ACLA 1949; amending Sec. 47-3-228 ACLA 1949.

This act defines mining to "include any and all parts of any mine or mineral exploration project within Alaska, and any mining or treatment plant or equipment connected therewith underground or on the surface, which contributes, or may contribute to the mining or treatment of ore, coal, or other metalliferous or nonmetalliferous mineral product; the term shall also include any site of tunneling, shaft-sinking, quarrying or excavation of rock for other purposes, as for example, but not limited to, the construction of water or highway tunnels or drains, or of underground sites for the housing of industrial plants or other facilities."

Penalty for violation of noncompliance with any provisions of the act shall be a misdemeanor and upon conviction, a guilty person or corporation shall be fined not to exceed $1,000 or imprisonment for not more than one year or both, at the discretion of the Court. The provisions of the act apply to all operations in the State employing one or more men, or on which one or more lessees are working. (Ch. 70, SLA 1960)

4. The deadline date for completing annual assessment work required to hold mining claims was changed to noon on September 1 of each year. (Chapter 26, SLA 1960)

5. Geophysical, geochemical, and geological work conducted on claims by qualified experts and verified by detailed reports filed in the office of the recording district in which the claim is located may be applied as the annual labor or assessment work required to hold mining claims. Such surveys, however, may not be applied as labor for more than two consecutive years or for more than a total of five years on any mining claim, and each such survey shall be nonrepetitive of any previous survey on the same claim. (Chapter 67, SLA 1960)

6. Responsibility for examination and certification of explosive handlers was transferred from the Division of Mines and Minerals to the Department of Labor. (Chapter 32, SLA 1960)

7. The Fish and Game Code dealing with use of streams, rivers, and lakes, Sec. 31, Art. 1, Ch. 94, SLA 1959, was amended by Chapter 180, SLA 1960 to read as follows:

"In the event that any person or governmental agency desires to construct any form of hydraulic project or to use any equipment that will use, divert, obstruct, pollute or change the natural flow or bed of any river, lake or stream or to use, except for the purpose of crossing a river or stream at an established crossing, any wheeled, tracked or excavating equipment or log dragging equipment in the bed of any river, lake or stream containing anadromous fish or that will utilize any of the waters of the State or materials from any river, lake or stream beds, such person or governmental agency shall notify the Commissioner of such intention prior to the commencement of construction, and the Commissioner shall acknowledge receipt of such notice by return mail.

"If the Commissioner so determines, he shall, in said letter of acknowledgement, require such person or

governmental agency to submit to him full plans and specifications of the proposed construction or work, complete plans and specifications for the proper protection of fish and game in connection therewith, and the approximate date when such construction or work is to commence, and shall require such person or governmental agency to obtain the written approval of the Commissioner as to the sufficiency of such plans or specifications before construction is commenced."

While not new legislation, Chapter 117 of SLA 1957, relating to prospector assistance by the Division of Mines and Minerals is still law, but no monies were appropriated in 1960 to administer and offer the assistance described in this Act. Many inquiries regarding prospector assistance have been received by the Division of Mines and Minerals.

Needs of the Industry

Multiple Use. Of deep concern to the State and National mining industry is interpretation of the Multiple Use Act (Public Law 167) and execution of its provisions by the U. S. Forest Service and Bureau of Land Management. The minerals industry approves the intent and purpose of this legislation within limits consistent with the difficulties already faced by the industry to find, explore, develop and produce minerals and metals--the most vital and necessary of commodities to our individual and national well-being and security. However, recent experiences concerning Public Law 167 and the Multiple Use Act in Alaska and elsewhere in the nation are viewed with justifiable alarm and disapproval by the mining industry.

Some of the practices and contentions of the Federal agencies involved in "multiple use" border on absurdity to the mining industry and are dangerous, especially since they are presented as evidence before a "hearings examiner" appointed by one of the agencies. Not even the most fertile imagination can be stretched to believe that "discovery of valuable mineral in such quantity as to cause an ordinarily prudent men to expend money and work in the hopes of developing a paying mine" means proving the existence of prof-

itable ore bodies or minerals under all economic conditions or climes, especially the prevailing economic clime and mineral markets compared to that in existence when many of the claims were originally located. For example, uranium or uranium minerals had no economic value until recent discovery and release of nuclear energy! Even gold, which has evolved from prehistoric times from shells, etc., as a universally accepted metal of intrinsic basic worth as money, and is currently in strong demand and increasing in price on world markets, was declared to be of "no value" --------.

Although appeal from a decision of the hearings examiner is possible, the trouble, expense and difficulty involved prohibits many from justified appeal to probable reversal of the examiner's decision by courts established specifically by the Constitution of the Land for the interpretation of laws and protection of the individual's liberties or rights.

Specific examples of this situation are many. In the public interest, a review of the entire "multiple-use-theory" and present legislation and procedures required for its execution is necessary for impartial, valid, useful interpretation of the intent of "multiple-use" to the mining industry. The review should consider basic concepts and definitions long established in the minerals industry and accepted for an equal period of time by our government in granting patents to mineral lands.

Federal Land Withdrawals from Alaska

Another policy detrimental to the minerals and fuels industry as well as the public good is that of continued enormous land withdrawals by the Federal Government for various agencies and purposes. These withdrawals have been and are being made, without due regard for the State's desires or sovereignty, or for the general good of all present or future citizens of Alaska or the other States. All of the Federal withdrawals either restrict or prohibit mining, many under the guise of "For the purpose of preserving unique wildlife, wilderness and recreational areas....."

Net Federal land withdrawals and reservations, restricting or prohibiting mining, total roughly 80 million acres as of the end of 1960, or an area of 125,000 square miles, which is equal to the combined land areas of New York, Maine, Massachusetts, New Jersey, Connecticut, Rhode Island, Delaware, Maryland, New Hampshire, Vermont and almost one-tenth of the area of Pennsylvania. Compared to important mining states in the western United States, the net Federal withdrawals of Alaska land areas restricting or prohibiting mining, is equal to the combined land areas of all of Idaho and almost one-third of Montana --- two great major producers of metals, minerals, and fuels.

PETROLEUM AND NATURAL GAS INDUSTRY

Summary

The birth of commercial crude oil production and the founding of a petroleum industry in Alaska was announced to the world in November when Standard Oil Company of California's first tanker, loaded with approximately 100,000 barrels of crude oil produced from the Swanson River Field, departed from the Nikiski terminal destined for the Richmond Refinery in California. In September, Standard Oil posted crude prices for the Swanson River Field which range from $1.88 per barrel of 25 to 25.9 degree gravity oil to $2.76 per barrel of 40 to 40.9 degree gravity oil. Developments in the Swanson River Field up to and including 1960 have proven this to be a major field.

Total production of crude oil from Alaska in 1960 is estimated to be 600,000 barrels, valued at $1,470,000 compared to the 1959 production of 133,000 barrels valued at $295,000. Systematic development of the Swanson River and Soldotna Creek Units on the Kenai Peninsula and the completion of the Kenai-Nikiski pipeline and terminal port facilities on Cook Inlet resulted in a five-fold increase in value of crude petroleum from the previous year.

Developments in the natural gas industry were highlighted by Halbouty Alaska Oil Company's discovery of a new gas field 6 miles south of the Soldotna Creek Unit (oil) of Standard-Richfield and 16 miles northeast of Union-Ohio's Kalifonsky Beach gas field. Open flow of the discovery well in the new field was reported to be 80 million cubic feet per day from a depth of 5,000 feet. This discovery is the first made by an independent operator in Alaska in almost 60 years of intermittent exploration drilling. Three wells drilled in the Kalifonsky Beach gas field by Union-Ohio in 1959 have sufficient capacity to fulfill the combined 20-year contract with Anchorage

Natural Gas Corporation. Union-Ohio has reported preliminary studies of the feasibility of liquefying Kenai gas for foreign export.

The Anchorage Natural Gas Corporation was granted a franchise to distribute natural gas within the city of Anchorage, and the proposed consumer rates approved, by the Anchorage City Council. According to the terms of the franchise, Anchorage Natural Gas Corporation has until December 31, 1961, to deliver the gas. Delivery from the Kenai Unit Gas Field has been delayed by the complex problems encountered in the construction of the pipeline in the submarine crossing of Turnagain Arm. Construction was originally scheduled for completion on October 15, 1960, but will now resume in the spring of 1961 with additional equipment working under revised engineering and construction methods. The distribution system in Anchorage was partially emplaced during the year.

Some natural gas for consumption by Federal Agencies was produced near Barrow by wells on Naval Petroleum Reserve No. 4.

Production of natural gas in Alaska in 1960 is estimated at 225 million cubic feet valued at $26,000. This represents an increase of 69 percent in production and 62.5 percent in value from the previous year.

Monthly average employment in the crude petroleum and natural gas industry of Alaska increased from 97 men in 1957 to 430 in 1959. An estimated peak of 600 men was reached in 1960, and it is conservatively estimated that 1.5 million man-hours were worked in the exploration, development, and production phases of the industry.

Expenditures of the petroleum and natural gas industries for exploration, development and production are estimated to be $35,000,000 in 1960 compared to $30,654,000 in 1959.

Swanson River Field

Location of Field - T7&8N, R9W, Kenai Peninsula

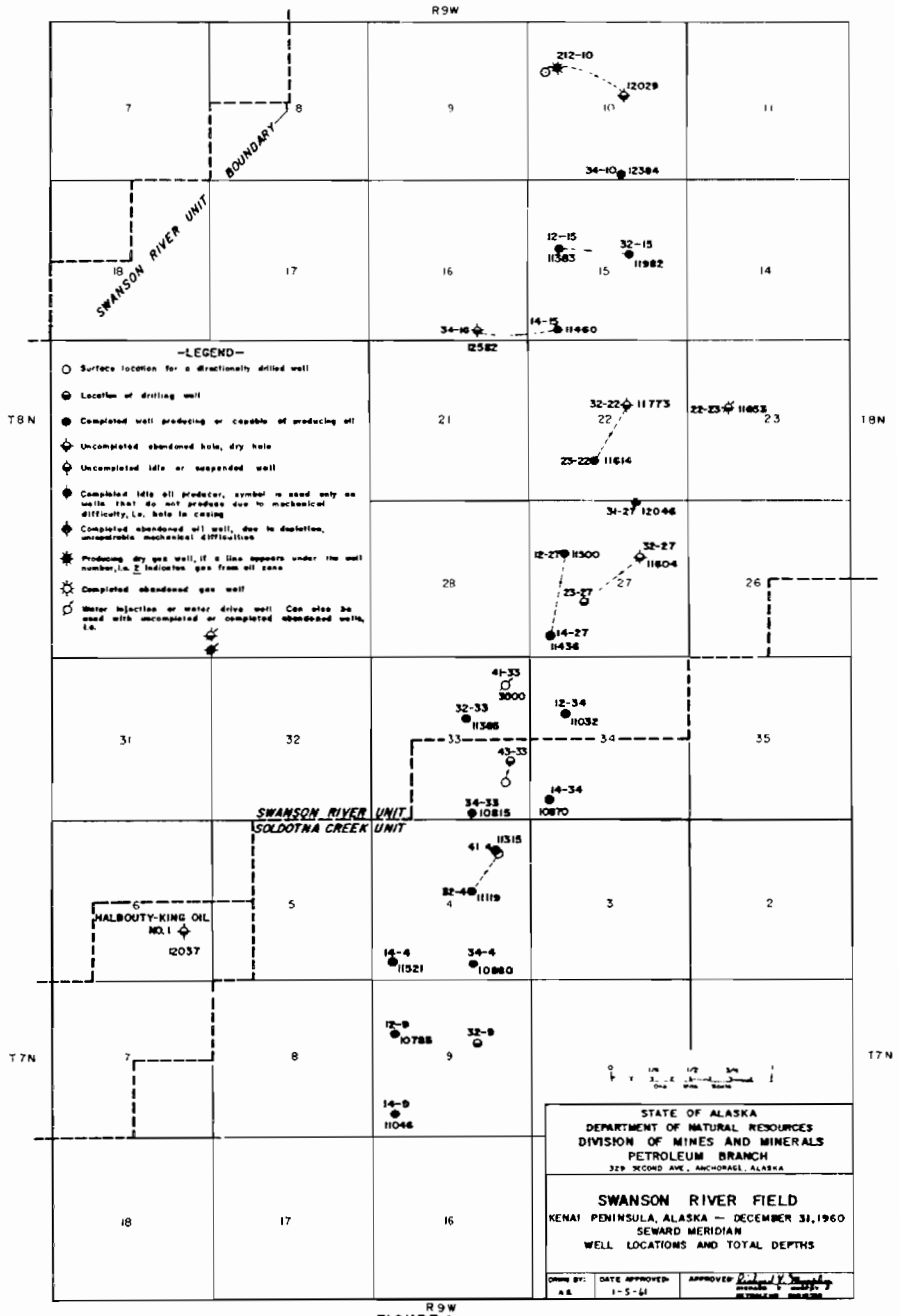

FIGURE 4.

Seward Meridian; Type of Structure - narrow anticline cut by numerous transverse faults; Discovery Well and Completion Date - Swanson River Unit 34-10, 10-1-57; Elevation Range - 133 Feet - 373 Feet KB; Range of Producing Depths - 10150 Feet - 11700 Feet; Range of Producing Sections - 8 Feet - 300 Feet; Permeability Range - 0 - 3275 mds; Oil Gravity Range - 30° - 38° API; Original and Current GOR - 116 - 400 SCF/STB; Current Spacing Pattern - 80 acres; Approximate Developed Area: 3920 acres; Reservoir Pressure - 5500 - 5800 psig. The following table shows the cumulative production:

Date	Producing Wells	Water Barrels	Oil Barrels	Gas MCF
1- 1-60	5	33,705	222,344	32,113
12-31-60	17	45,213	780,343	148,563

The Swanson River Field lies within the Swanson River Unit and the Soldotna Creek Unit. At the end of 1959 there were five producing wells, two dry holes, and three wells being drilled in the Field. An increase in drilling was precipitated during 1960 by the completion in March of the Soldotna Creek Unit Well 41-4, which produces from a much thicker pay section of the Hemlock Zone than the wells in the fault block areas to the north. Of sixteen wells spudded during 1960, thirteen wells were completed as oil producers, two wells were plugged and abandoned, and one well, SRU 212-10, was completed in an upper gas sand. One salt water disposal well was put down in August. At the end of 1960, there were three development wells being drilled. The operator's plans call for the employment of two additional rotary rigs for field development.

Swanson River well production flows to gathering stations through 3 inch tape-wrapped flow lines buried 3 and 1/2 feet at which depth production can be handled without pipeline heating. Flow lines and gathering lines are equipped with scraper traps for wax control. Well heads are equipped with high-low pressure shutdown controls so that lease operators can shut in any

group of wells from the trap inlet header. Special hot oil circulating connections are being used to provide for wax removal in gathering headers and separators. Gas metering facilities are housed to prevent freezeups.

Construction of a common carrier pipeline system from the Swanson River Field to Nikiski on Cook Inlet some 18 and 1/2 miles to the west began in July, 1960. The system consists of a 4 inch feeder pipeline 1 and 1/2 miles long serving the Swanson River Unit wells which runs to a pump station at the Soldotna Creek Unit, and an 8 inch trunk pipeline 19 miles long from the pump station to a marine tanker loading terminal at Nikiski.

The trunk line station consists of two 13,000-barrel cone-roof tanks equipped with propeller-type mixers and two engine-driven reciprocating pumps designed to develop 825 psig maximum discharge pressure. Normal winter pumping pressure is 480 psig and summer pressure is 170 psig. Remote supervisory control equipment via radio and instrumentation permits remote operation of the station from Nikiski. The trunk pipeline from the field to Nikiski is buried three feet with protective coating and cathodic protection. It is designed for an ultimate discharge pressure of 1620 psig. Initial capacity is 10,000 barrels per day with ultimate capacity designed for 35,000 bpd. The pipeline will occasionally operate at temperatures below the pour point of the oil.

The marine terminal construction at Nikiski was begun in April, 1960. It consists of tankage, loading lines, ballast handling facilities, and an utility building to provide space for an office, laboratory, and miscellaneous pumping and heating facilities. Presently, there are two 132,000-barrel cone-roof tanks in use (48 feet high and 140 feet diameter), and plans call for at least one other tank with approximately 200,000 barrel storage capacity. The tanks are equipped with propeller mixers to keep wax in solution, have heaters to maintain 40° F. minimum oil temperature, and have remote-reading tank gauges with receivers located in the office and on the wharf.

Crude oil is loaded aboard tankers by force of gravity at an average rate of 15,000 bph through a 24 inch loading line from the tanks to the end of the wharf and three 8 inch hoses connecting to the tanker. Tanker loading rates are controlled from the wharf office. A 20,000-barrel cone-roof tank is provided for receiving ballast water from the ship through a 10 inch ballast pipe line extending from the end of the wharf to the tank. Heating facilities are provided for maintaining ballast water temperature at 40° F.

Building of the wharf began in June, 1960. It is situated 1000 feet from the shoreline where tidewater velocities reach 7 knots and tide levels vary 25 feet. A 12 feet wide causeway connects the terminal and the wharf. The wharf sits in 40 feet of water at low tide and is designed to accomodate 28,000 DWT tankers. The breasting platform is 47 feet wide by 250 feet long, consists of a reinforced concrete deck supported by 6 feet and 8 feet diameter caissons, and has a flexible fender system. The main mooring dolphins are designed for a rope load of 228,000 pounds and the secondary mooring dolphins for a rope load of 114,000 pounds.

The pipeline and trunk line station were completed in October when transfer of oil from the field to the Nikiski terminal began. During the second week in November, Standard's first tanker was loaded with approximately 100,000 barrels destined for the Richmond Refinery in California. This volume of oil leaving Alaska was over one-half as large as the total amount produced from the Swanson River Field during 1959. Production up to the date of the pipeline was trucked from the Field to the port of Seward.

Drilling

During 1960, a total of thirty-one wells were completed or spudded in the State. Total footage drilled was over 240,000, compared to over 137,000 in 1959. Twenty-six wells were spudded in 1960 (16 in 1959) of which eight were exploratory wells, two were step-outs (Kenai Unit Gas Field), and the remaining sixteen were

Swanson River Field development wells. Of the 25 wells completed in 1960, thirteen were Swanson River Field oil producers, one was completed in an upper gas sand overlying the Hemlock Zone of the Swanson River Field (SRU 212-10), one was a step-out (Kenai Unit 14-4), one was a gas discovery (Alaska Oil and Mineral-King Oil 1-B), and nine were plugged and abandoned. Two of the plugged and abandoned holes were in the Swanson River Field and the other seven were exploratory holes elsewhere.

One of the most important exploratory wells during 1960 was Soldotna Creek Unit, Well No. 41-4. It was drilled by Standard Oil Company of California, operator of the Swanson River and Soldotna Creek Units. SCU 41-4 was drilled as a southern extension to the Swanson River Oil Field, and was the first well completed on the Soldotna Creek Unit. On March 21, the well was tested flowing 3,400 barrels per day of 38.6-degree gravity oil through a 32/64-inch bean from selected perforations ranging from 10,565 to 10,234 feet. Production is from the Hemlock zone of Eocene age.

On September 26, 1960, a new gas field discovery was made when Halbouty-Alaska Oil Company Well No. "Alaska Oil and Minerals-King Oil Inc. 1-B" 24-21, Sec. 21, T7N, R9W was completed. It flowed gas at an estimated rate of 2.67 million cubic feet per day through a 16/64-inch bean from a perforated interval 5,020 to 4,992 feet. The well was originally drilled to 14,019 feet and the Hemlock zone tested wet.

An extension to the Kenai Gas Field was made when Kenai Unit Well No. 14-4, Sec. 4, T4N, R11W was completed. Union Oil Company of California is the operator. The well flowed gas at a rate of 4.1 million cubic feet per day through a 3/8-inch bean from a perforated interval 4,320 to 4,311 feet. Production is from sands in the Upper Kenai formation of Eocene age, and the new well extends the Kenai Gas Field approximately two miles east of the earlier production. The operator also drilled two shallow wells on the Knik Arm Development Contract, approximately twenty-five miles northeast of Anchorage. Wells No. "Knik

Arm" 1 and "Knik Arm" 2 were abandoned after reaching total depths of 3,013 and 3,215 feet, respectively. It is anticipated that a deeper test will be drilled in this area during 1961.

On December 7, 1960, Standard Oil Company of California, Operator, spudded Well No. "Falls Creek" 1, Sec. 6, T1N, R12W, and at the close of the year the well was drilling at 6,474 feet. This well is located approximately 50 miles southwest of the Swanson River Oil Field, and is regarded as an important test in determining the extent of oil reserves in the Cook Inlet Basin.

During 1960, Paul Benedum and Associates abandoned the first well to be drilled in the Yukon-Koyukuk Basin. Well No. "Nulato Unit" 1, Sec. 12, T10S, R1E, Kateel River B&M was abandoned on June 1, 1960 after reaching a total depth of 12,015 feet. The well apparently was spudded and abandoned in rocks of lower Cretaceous age.

In the Yakataga area, Richfield Oil Corporation drilled and abandoned two wells during 1960, and at the close of the year was drilling a third. Wells No. "Kaliakh Unit" 1 and 2 were abandoned after reaching total depths of 14,699 and 9,575 feet respectively, and Well No. "Kaliakh Unit" 2RD (redrill) was drilling at 10,532 feet at the writing of this report.

Colorado Oil and Gas Corporation, Operator, abandoned the company's fourth well drilled in the Yakutat area. On November 19, 1960, Well No. "Dangerous River Unit" 1, Sec. 17, T29S, R37E Copper River Meridian was abandoned at a total depth of 8,634 feet. The operator has indicated that operations in that area will be resumed in 1961.

NEW LEGISLATION

The first amendment of the Alaska Oil and Gas Conservation Act (Chapter 40, SLA 1955), became effective April 1, 1960. The purpose of this amendment (Chapter 75, SLA 1960) is to provide for the earlier and more complete filing of oil and gas drilling and exploration records, and to provide a longer period during which the State must hold certain of these records confidential.

Subsection 4(a) (2) of Section 4 of the Alaska Oil and Gas Conservation Act now reads:

"(2) The making and filing of reports, well logs, drilling logs, electric logs, lithologic logs, directional surveys, and all other subsurface information on any well drilled for oil or gas, or for the discovery of oil or gas, or for geologic information; provided, however, that the required reports and information shall be filed within thirty (30) days after the completion, abandonment, or suspension of the well; provided further, that required reports and information marked "confidential" shall be kept confidential for twenty-four (24) months after the 30-day filing period, unless the owner gives written permission to release such reports, logs, or other information at an earlier date."

Chapter 180, SLA 1960 amending Sec 31, Art 1, Ch 94, SLA 1959, dealing with the use of streams, rivers, and lakes is also applicable to the petroleum and natural gas industry. Information on this law is contained in the section on mining legislation of this report.

Table 5

OIL AND GAS WELL ACTIVITY

ALASKA - 1960

Operator	Well Name & No.	¼	Sec.	Twp	Range	B & M	Spud Date	Completion Date	TD (ft)	Status 12-31-60
Standard Oil Co. of Cal.	Swanson River Unit 32-22	NE	22	8N	9W	S	11- 3-59	1- 3-60	11773	P&A
Benedum & Associates	Nulato Unit No. 1	SE	12	10S	1E	KR	11-29-59	6- 1-60	12015	P&A
Richfield Oil Corp.	Kaliakh River Unit No. 1	SW	34	20S	14E	CR	12- 3-59	6- 7-60	14699	TA (a)
Standard Oil Co. of Cal.	Swanson River Unit 14-27	SW	27	8N	9W	S	12-26-59	6-14-60	11436	POW (b)
Standard Oil Co. of Cal.	Soldotna Creek Unit 41-4	NE	4	7N	9W	S	12-31-59	3-21-60	11315	POW
Standard Oil Co. of Cal.	Swanson River Unit 23-22	SW	22	8N	9W	S	1- 4-60	3- 9-60	11614	POW (c)
Pan American Petr. Corp.	Napatuk Creek CH No. 2	NW	27	8N	77W	S	3- 8-60	4- 7-60	1423	Core hole
Standard Oil Co. of Cal.	Swanson River Unit 212-10	NW	12	8N	9W	S	3-17-60	5-28-60	12029	GSI (d)
Standard Oil Co. of Cal.	Soldotna Creek Unit 32-4	NE	4	7N	9W	S	3-30-60	6- 5-60	11119	POW (e)
Pan American Petr. Corp.	Napatuk Creek CH No. 2A	SE	27	8N	77W	S	5-14-60	5-26-60	2140	Core hole
Standard Oil Co. of Cal.	Soldotna Creek Unit 14-4	SW	4	7N	9W	S	6- 3-60	8-13-60	11520	POW
Richfield Oil Corp.	Kaliakh River Unit No. 2	NE	28	20S	14E	CR	6-14-60	8-31-60	9575	P&A
Halbouty Alaska Oil Co.	Alaska O&M-King Oil 1-B	SW	21	6N	9W	S	6-15-60	9-26-60	14019	GSI
Standard Oil Co. of Cal.	Swanson River Unit 32-33	NE	33	8N	9W	S	6-21-60	8-25-60	11385	POW
Colorado Oil & Gas Corp.	Dangerous River Unit No. 1	NE	17	29S	37E	CR	6-28-60	11-19-60	8634	P&A
Standard Oil Co. of Cal.	Swanson River Unit 12-15	NW	15	8N	9W	S	7-23-60	10- 5-60	11383	POW
Standard Oil Co. of Cal.	Swanson River Unit WI 41-33	NE	33	8N	9W	S	8- 8-60	8-17-60	3000	SWI
Standard Oil Co. of Cal.	Soldotna Creek Unit 12-9	NW	9	7N	9W	S	8-16-60	10- 9-60	10785	POW
Halbouty Alaska Oil Co.	Bishop Creek Unit 11-11	NW	11	7N	11W	S	8-20-60	9-10-60	9034	P&A
Standard Oil Co. of Cal.	Swanson River Unit 12-34	NW	34	8N	9W	S	9- 4-60	10-21-60	11032	POW
Richfield Oil Corp.	Kaliakh River Unit No. 2 RD	NE	28	20S	14E	CR	9- 3-60		10532	Drlg
Union Oil Co. of Cal.	Knik Arm No. 1	NE	2	16N	4W	S	9-23-60	10- 8-60	3013	P&A
Standard Oil Co. of Cal.	Soldotna Creek Unit 34-33	SE	33	8N	9W	S	9-30-60	11-12-60	10815	POW
Standard Oil Co. of Cal.	Swanson River Unit 32-27	NE	27	8N	9W	S	10-10-60	11-24-60	11604	P&A
Union Oil Co. of Cal.	Knik Arm No. 2	NE	5	16N	3W	S	10-10-60	10-22-60	3215	P&A
Standard Oil Co. of Cal.	Soldotna Creek Unit 34-4	SE	4	7N	9W	S	10-14-60	11-27-60	10880	POW
Union Oil Co. of Cal.	Kenai Unit 14-4	SW	4	4N	11W	S	10-18-60	11-21-60	5125	GSI
Standard Oil Co. of Cal.	Soldotna Creek Unit 14-9	SW	9	7N	9W	S	10-28-60	12-26-60	11046	POW

OIL AND GAS WEL L ACTIVITY
ALASKA - 1960

Operator	Well Name & No.	¼	Sec.	Twp	Range	B & M	Spud Date	Completion Date	TD (ft)	Status 12-31-60
Standard Oil Co. of Cal.	Soldotna Creek Unit 14-34	SW	34	8N	9W	S	10-30-60	12-23-60	10870	POW
Standard Oil Co. of Cal.	Swanson River Unit 23-27	SW	27	8N	9W	S	11-25-60		8512	Drlg (f)
Standard Oil Co. of Cal.	Soldotna Creek Unit 32-9	NE	9	8N	9W	S	12- 3-60		9286	Drlg
Standard Oil Co. of Cal.	Falls Creek No. 1	SW	6	1N	12W	S	12- 7-60		6474	Drlg (g)
Union Oil Co. of Cal.	Kenai Unit 41-19	NE	19	4N	11W	S	12-23-60		3613	Drlg
Standard Oil Co. of Cal.	Soldotna Creek Unit 43-33	SE	33	8N	9W	S	12-30-60		1961	Drlg (h)

(a) Temporarily abandoned pending outcome of Kaliakh River Unit No. 2 RD, (b) Sfc loc 12-27, (c) Sfc loc 32-22, (d) BHL in 32-10. Completed in 12-10, (e) Sfc loc 41-4, (f) Sfc loc 32-27, (g) location given is sfc loc - proposed BHL is to be under Cook Inlet approximately 3000 feet west of sfc loc, (h) Sfc loc 44-33.

Abbreviations: POW - producing oil well, PGW - producing gas well, GSI - gas well shut in, TA - temporarily abandoned, SWI - salt water injection well, P&A - plugged and abandoned, S - Seward Baseline and Meridian, CR - Copper River Baseline and Meridian, KR - Kateel River Baseline and Meridian, Sfc loc - surface location, BHL - bottom hole location, RD - redrill, Drlg - Drilling.

Exploration Activities

The following tabulations indicate the areas in which surface mapping and seismic operations were conducted, the number of companies participating, and party work-weeks or geophysical crew work-weeks expended.

Surface Mapping:

Area	Companies	Party Weeks
Cook Inlet	6	25
Cooper River	6	23
Gulf of Alaska	1	1 1/2
Alaska Peninsula	4	21
Bethel Basin	1	1 1/2
Yukon-Koyukuk	2	4
Nushagak	2	6
Porcupine-Kandik	10	71
Brooks Range-Arctic Slope	6	92
Other	1	1 1/2

Geophysical Operations:

	Seismic		Gravity		Aero Magnetic	
Area	Co's.	Crew Weeks	Co's.	Crew Weeks	Co's.	Crew Weeks
Cook Inlet	14	119	1	7	-	-
Copper River	-	-	-	-	-	-
Gulf of Alaska	2	30	-	-	-	-
Alaska Peninsula	1	2	1	10	-	-
Bethel Basin	2	15	-	-	-	-
Yukon-Koyukuk	-	-	-	-	-	-
Nushagak	-	-	1	4	-	-
Porcupine-Kandik	1	6	-	-	9	4
Brooks Range-Arctic Slope	-	-	-	-	-	-

SAFETY AND EMPLOYMENT

Safety

To better serve both employer and employee in the minerals and fuel industry as well as fulfill the lawful functions of safety inspections and enforcement of regulations in all industries for which the primary responsibility lies with the Division of Mines and Minerals all safety and accident statistics starting with this year will be analyzed to contain "injury-frequency" and "injury-severity" rates.

The analyses of accident statistics is useful as criteria to safety inspectors or engineers, and to an operator, to prevent occurrence of accidents, thereby improving safety and reducing cost of accident insurance. Individual operators' injury-frequency and injury-severity rates will remain confidential for the operator to compare the safety of his operation statewide and nationally. The injury-severity rate is a factor used by insurance companies in establishing premium rates for compensation insurance of an occupation or industry, or of an individual operation.

The following are explanations of injury-frequency and injury-severity rates.

1. Injury-frequency rate is defined as the number of fatal and nonfatal disabling injuries per million man-hours of exposure.

$$\text{Injury-frequency rate} = \frac{\text{Number of disabling injuries}}{\text{Total Man Hours Worked}} \times 1{,}000{,}000$$

2. Injury-severity rate is based on the total scheduled charges in the following table for all deaths and permanent total and permanent partial disabilities and total days of disability from all tem-

porary total injuries that occur during the period covered by the rate. The rate relates these days charged to the man hours worked during the period and expresses the loss in terms of a million-hour unit.

Table 1. Scheduled charges for weighing deaths, permanent total disabilities, and permanent partial disabilities for computing severity of injury: (Dismemberment means severance of any part of the bone)

Injury	Time Charged Days
Death	6,000
Permanent total disability	6,000
Dismemberment or total loss of use:	
Arm above elbow	4,500
Arm at or below elbow and above wrist	3,600
Hand at wrist	3,000
Thumb (all)	1,800
Fingers	*
Leg above knee	4,500
Leg at or below knee and above ankle	3,000
Foot at ankle	2,400
Great toe	1,050
Other toes	*
Tarsus (arch of foot)	2,400
Loss of Sight:	
One eye (whether or not there is sight in other eye)	1,800
Both eyes, in one accident	6,000
Both ears, in one accident	3,000
Unrepaired hernia	50

*For each finger or toe only the schedule charge for the highest bone involved will be used. The hand and foot has a total schedule of 3,000 and 2,400 days respectively, ranging from 35 to 900 days for individual bones involved.

The charge for loss of use shall be a percentage of the scheduled charge, corresponding to the percentage

loss of use of the member or part involved, as determined by the physician engaged or authorized to treat the case.

The above table was adopted by the Safety Division, Federal Bureau of Mines in 1956 from American Standards Association, Inc., American Standard Method of Recording Work Injury Experience, Bulletin Z16.1-1954.

The accident statistics of Alaska for the period 1921 to 1959 inclusive have been analyzed to show injury-frequency rates and fatality rates as well as trends of these rates as shown in figures 1 to 6 of the coal, lode and placer operations. The injury-severity rate for this period, although computed to include the scheduled time charge for deaths, did not include the scheduled time charges for permanent total disabilities and permanent partial disabilities because of a lack of complete information; therefore, this record is not shown on graphs for the various types of mining.

The following table is a summary of employment and accident statistics for the year 1960:

Table 6

SUMMARY OF EMPLOYMENT AND ACCIDENTS IN MINERAL AND FUEL INDUSTRIES OF ALASKA, 1960

TYPE	NUMBER			ACCIDENTS		TIME LOST	INJURY	
PLACER MINING	MINES	MEN	MAN HRS	FATAL	NONFATAL	DAYS**	FREQUENCY	SEVERITY
Dredges	20	314	962,674	0	30	831	31.2	863.22
Nonfloat	74	218	348,800	0	0	0	0	0
Hydraulic	9	16	25,600	0	0	0	0	0
Hand	6	1	12,000	0	0	0	0	0
Total & Average	109	549	1,349,074	0	30	831	31.2	863.22
COAL MINING								
Strip	7	170	321,176	0	42	410	130.8	1279.7
Underground	2	41	68,264	0	21	103	307.6	1509.0
Total & Average	9	211	389,440	0	63	513	169.9	1317.0
LODE MINING*	102	346	291,200	0	20	276	68.6	947.8
MILLS, METAL	1	10	16,800	0	0	0	0	0
CRUDE PETROLEUM	25	600	1,376,896	1	16	6,087	11.6	4420.5
Total & Average	246	1,716	3,085,410	1	129	7,413	-	-

* Includes lode, prospector and intermittent operations and exploration projects, excluding sand, gravel, and stone operations.

** Based on scheduled charges for injuries by American Standards Association, 1956.

Note: Figures for 1960 are preliminary and subject to revision. Number of men employed is the average for the year.

Coal Mining

Frequency of occurrence of all injuries (fatal and nonfatal combined) in coal mining was at a rate of 167.9 per million man-hours of exposure in 1960 compared with a rate of 141.5 per million man-hours of exposure in 1959, an increase of 14.4 percent. The frequency of occurrence of all injuries has been rapidly rising annually in coal mining and the record for 1960 shows no change in this trend. Increase in the frequency of occurrence of all injuries in coal mining from 1921 to 1959 inclusive has been at an average annual rate of 16 percent for each year of the period. (See figure 1). There were no fatalities in coal mining during 1960.

The average number of men working daily at strip and underground coal mines in 1960 decreased by 77 from the previous year, or 25 percent. However, total man-hours worked only showed a decrease of 16.5 percent and estimated total production of coal an increase of 1.4 percent. The increased production of coal for 1960 is attributable to the greater proportion of the production being obtained by open pit strip methods.

Lode Mining

The frequency of occurrence of all injuries in lode mining during 1960 was at a rate of 68.6 per million man-hours exposure compared to 21.9 in 1959, an increase of 68 percent. The overall frequency of occurrence of all injuries has decreased 38.8 percent in lode mining for the period 1921 to 1959 inclusive; however, for the past decade, 1950 to 1960 inclusive, the trend has again been one of increasing occurrence of injuries in lode mining at an average rate of 30 percent per year for each year of the period. This increase in frequency of occurrence is more marked considering that man-hours worked by prospectors and intermittent operations and exploration projects, excluding sand, gravel, and stone op-

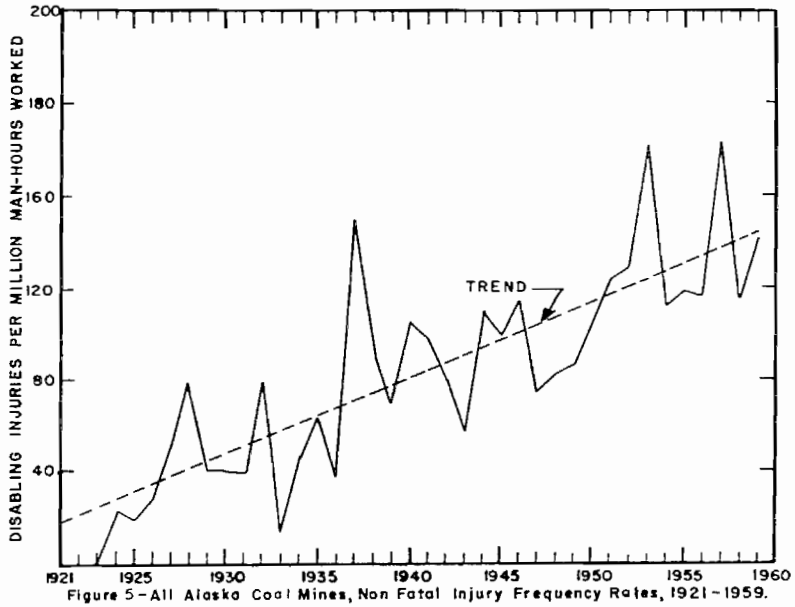

Figure 5 – All Alaska Coal Mines, Non Fatal Injury Frequency Rates, 1921 – 1959.

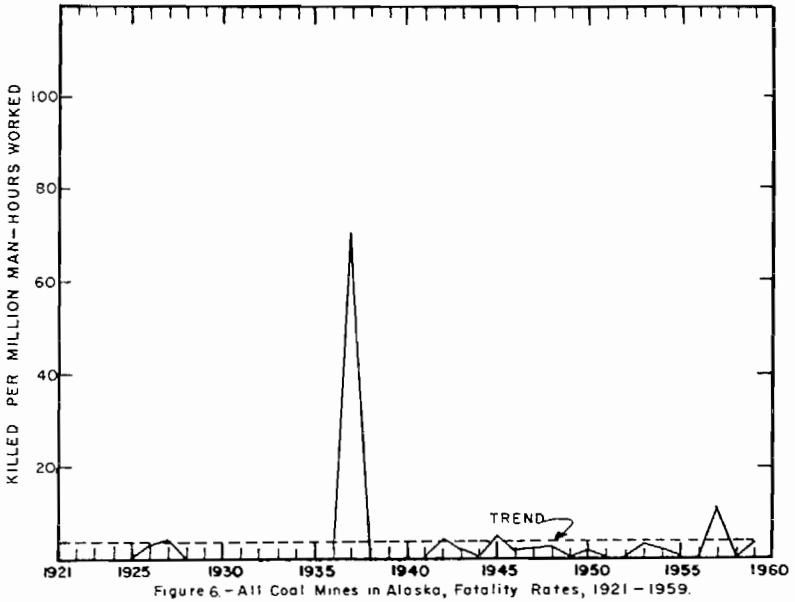

Figure 6. – All Coal Mines in Alaska, Fatality Rates, 1921 – 1959.

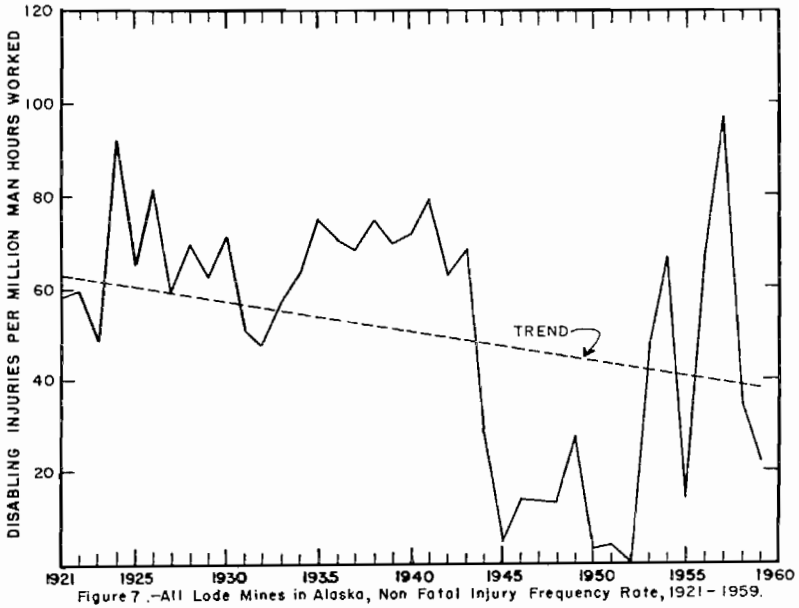

Figure 7 .–All Lode Mines in Alaska, Non Fatal Injury Frequency Rate, 1921 – 1959.

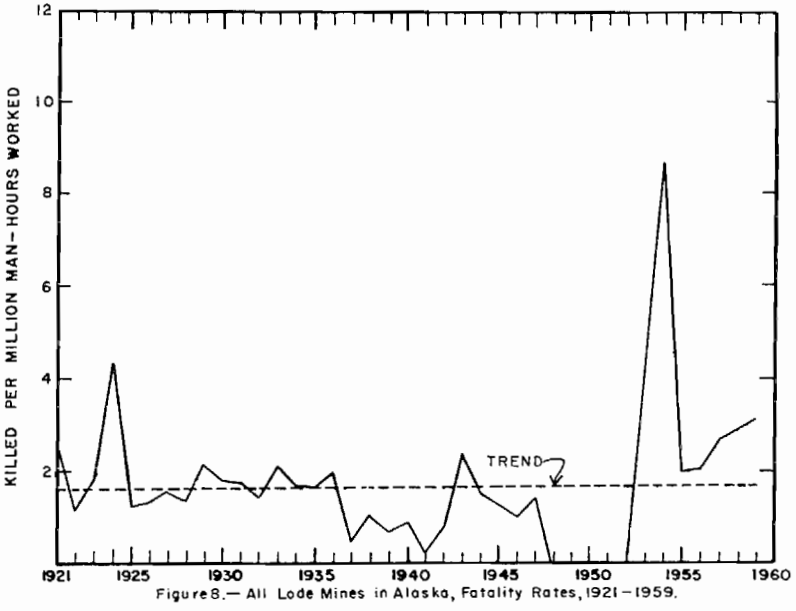

Figure 8.— All Lode Mines in Alaska, Fatality Rates, 1921 – 1959.

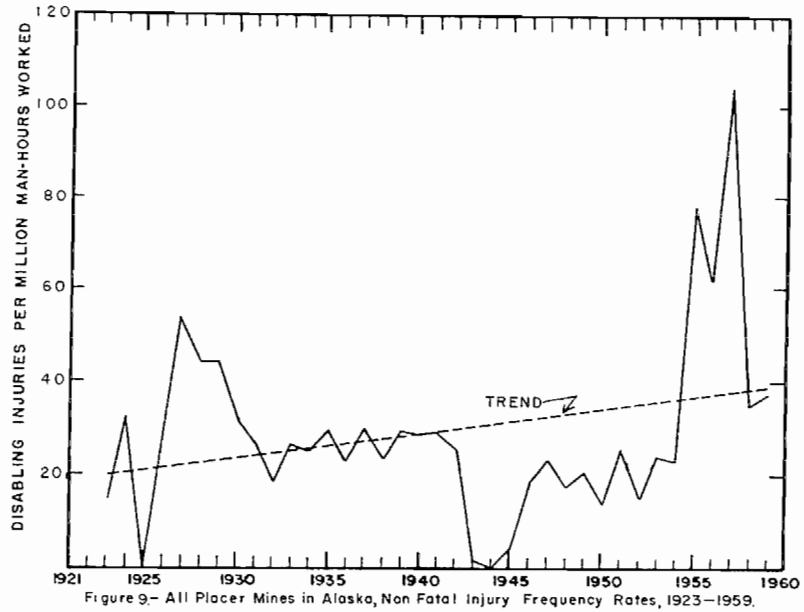

Figure 9.- All Placer Mines in Alaska, Non Fatal Injury Frequency Rates, 1923–1959.

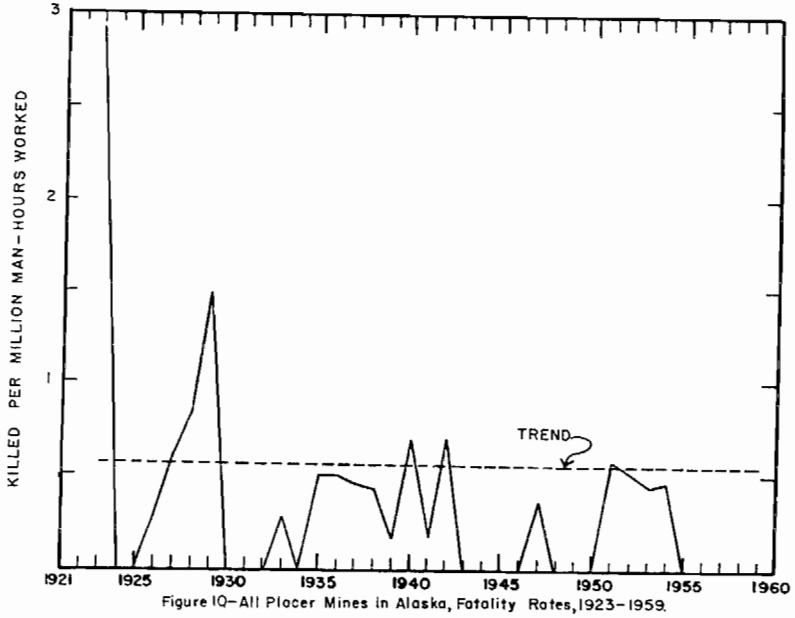

Figure 10–All Placer Mines in Alaska, Fatality Rates, 1923–1959.

erations is estimated and included in the total man-hours worked in lode mining.

The average number of men working daily in lode mining is estimated to be 346 in 1960, compared to an estimated 360 in 1959, a decrease of 4 percent. Total man-hours worked are estimated to be 291,200 compared to 319,200 in 1959, a decrease of 8.8 percent. The only producing lode mine in Alaska employing more than 2 men is the Red Devil Mine at Sleetmute.

There were no fatalities in lode mining in Alaska during the year.

Placer Mining

The frequency of occurrence of all injuries in placer mining in 1960 was at a rate of 31.2 per million man-hours of exposure compared to 36.9 in 1959, a decrease of 15.5 percent. The frequency of occurrence of all injuries has been rising annually in placer mining at an average rate of 2.6 percent per year for the period 1923 to 1959 inclusive; 1960 shows a favorable decrease of 18.1 percent from the trend of injury rates as shown on figure 5.

The average number of men working daily at all types of placer mining is estimated to be 539, a decrease of 504 men or 48.5 percent from 1959. However, it is estimated that total man-hours worked during the year in placer mining decreased by only 0.5 percent from 1959. Accurate employment statistics for the entire placer mining operations in Alaska are not available as numerous operations of 2 men or less do not report data to the Division. Total production of gold and silver, however, remained unchanged in value from the previous year and again was the leading mineral commodity in terms of value produced, in the State.

Petroleum and Natural Gas

As the petroleum and natural gas industry of

Alaska until this year was only in stages of creation, employment and accident data are considered not representative of this industry during this time. However, with the development of a major oil field at Swanson River and installation of permanent industrial facilities for marketing crude petroleum and natural gas in Alaska, starting with 1960, accident and employment data will be collected and analyzed.

Available data indicates that an average of 600 men worked 1,376,896 man-hours per year with a frequency of occurrence of disabling injuries of 11.6 per million man-hours of exposure. This is an increase of 1050 percent in number of men employed in 1957 when the first commercial well was brought in the Swanson River Field.

A fatality is chargeable to the industry when a helicopter crashed into the sea with Mr. Gilbert R. Frick.

Employment

The average annual employment of the mineral and fuel industries of Alaska from 1914 to 1959 is shown in the following figure. The importance of gold mining is apparent and emphasized by study of the graph. Executive Order L-208 closing lode gold mines is partially responsible for the sharp drop of total employment of men from 1914 to 1959, a decrease of 427 percent; from 1940 a decrease of 375 percent. During 1960, the petroleum and natural gas industry with an estimated 600 men employed, included in totals for the minerals and fuels industry, did not change the declining trend of employment.

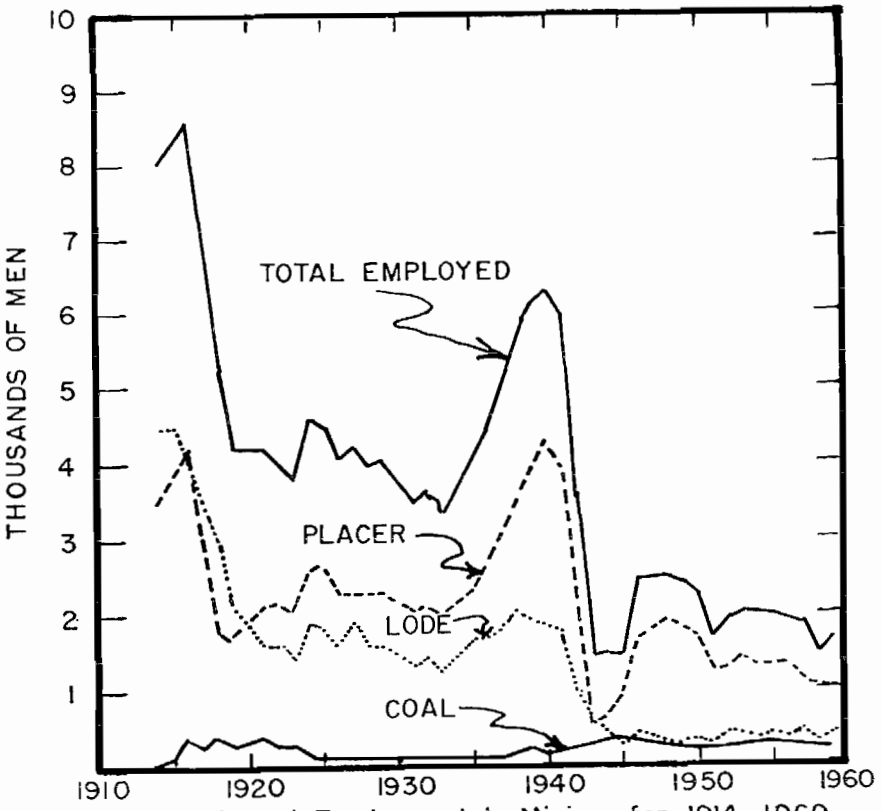

Figure II.-Average Annual Employment in Mining for 1914-1960.

LIST OF ALASKA MINING OPERATIONS ACTIVE DURING 1960

Name and Address of Operator	Location of Mine & Recording District	Approx. Crew	Type of Operation*
Admiralty Alaska Gold Mining Co. Box 2642, Juneau	Funter Bay Juneau	4	Nickel-copper lode development
Alaska Exploration & Mining Co. Talkeetna	Bird Cr. Talkeetna	1	Hydraulic
Alaska Horizons Co. Vic Fondy & Ray Jones	Treasure Cr. Talkeetna	2	Testing ground with caisson
Alaska Juneau Gold Mining Co. Box 2419, Juneau	A. J. Mine Juneau	23	Gold lode & mill (selling equipment and scrap)
Alaska Mines & Minerals Box 422, Anchorage	Red Devil Mine Kuskokwim	40	Mercury production
Alaska Nickel Co. Fred Jenkins Box 913, Fairbanks	Flume Cr. Fairbanks	5	Gold lode development
Alaska Portland Cement Co.	Foggy Pass Nenana	3	Limestone exploration
Alaska Resources, Inc. Fairbanks	Goldstream Cr. Fairbanks	2	Limestone & peat
Alaska State Mines 10330 Serrano Ave., San Jose 27, California	Hyder Hyder	3	Prospecting
Alder Creek Mining Co. Box 1999, Fairbanks	Fairbanks Cr. Fairbanks	8	Nonfloat
Alluvial Golds, Inc. 4732 46th N.E. Seattle 5, or Coal Creek	Woodchopper Cr. Fairbanks	19	Gold dredge
American Metal Climax, Inc. 718 Granville St., Suite 908 Vancouver, B. C.	Alaska general Several	3	Mineral investigations
American Smelting & Refining Co. 718 Granville St. Vancouver, B. C.	Alaska general Several	1	Mineral investigations
Amero, A. W. Chandalar	East Fork Chandalar River Fairbanks	1	Prospecting

*Types of operations are explained at end of list

Anderson, Einart & Farrell, Ed 314 Front St. Graehl Fairbanks	Goose Cr. Fairbanks	3	Nonfloat
Anderson, Ellis Chandalar	Tobin Cr. Fairbanks	1	Small scale hand
Anderson, Tury & Associates Fairbanks	Fairbanks Dist. Fairbanks	2	Lode prospecting
Arctic Alaska Fisheries & Enterprises, Inc., Sheldon, John & Vetters, Adolph and Roudolph 1314 Sixth Ave., Fairbanks	Head of Wolf Cr. Fairbanks	3	Lode prospecting & mining
Atlas Brick & Tile Co. Anchorage	Anchorage Anchorage	8	Mfg. brick & tile
Atlas Mines George J. Waldhelm Box 755, Nome	Dahl Cr. Cape Nome	1	Nonfloat
Bailey, Jerry Ketchikan	Ketchikan Ketchikan	2	Prospecting
Barrett, Frank Chicken	Mosquito Fork Fairbanks	1	Prospecting
Basin Creek Mining Co. Herbert Engstrom Box 554, Nome	Basin Cr. Cape Nome	3	Dredge
Bear Creek Mining Co. W. 508 Cataldo Spokane, Washington	Ruby Cr. Noatak-Kobuk	40	Copper lode development
Beckwith, Rea Box 119, Anchorage	Alaska general Several	2	Mineral investigations
Bierman, William Yakima, Washington	Slate Cr. area Copper Center	2	Nonfloat
Belanger, George Box 1771, Palmer	Nelchina Dist. Chitina	1	Prospecting
Berg, L. C. Box 58, Sitka	Chichagof Dist. Sitka	1	Prospecting
Berg, Rhinehart (Bear Creek Mining Co.) Chitina	Ruby Cr. Noatak-Kobuk	1	Copper lode development
Beshores, Paul & Assoc. Box 1161, Mollala, Oregon	Kugruk River Fairhaven	1	Nonfloat

Bittner, Paul Central	Deadwood Cr. Fairbanks	1	Hydraulic
Bittner, Paul Central	Hot Springs Dist. Hot Springs	1	Prospecting
Bliss, Patrick J. Ungalik	Ungalik Cr. Cape Nome	3	Nonfloat
Boedecker, Bill Hollis	Hollis Ketchikan	2	Prospecting
Bodis, George Nome	Macklin Cr. Cape Nome	1	Hydraulic
Brandl, P. & R. Box 4042, Star Route Spenard	Nugget Cr. Talkeetna	4	Nonfloat
Breseman, John W. Box 796, Pelican	Chichagof Dist. Sitka	1	Prospecting
Brockway, John T. & Ellis, Sid 2500 E. Street Bellingham, Washington	Chichagof Dist. Sitka	2	Gold lode development
Brown, Erwin General Delivery Petersburg	Southeast Alaska Several	1	Prospecting
Burnette, Dewey & Hunter, Martha Box 1995, Fairbanks	Crooked Cr. Fairbanks	2	Nonfloat
Carr, G. W. Miller House	Miller Cr. Fairbanks	2	Nonfloat
Carr, Paul Big Lake	Bore Cr. Fairbanks	1	Prospecting
Carstens, Heine C. Central	Portage Cr. Fairbanks	2	Nonfloat
Casanoff, Jack Kiana	Klery Cr. Noatak-Kobuk	1	Small scale hand
Cassell, J. B. Hollis	Hollis Ketchikan	2	Prospecting
Casto, Steve 33 Mile, Haines	Porcupine Cr. Haines	1	Small scale hand
Chandalar Mining Co. Hugh Matheson, Jr. 1075 Riverview Dr., Fairbanks	Big Cr. Fairbanks	4	Nonfloat

Chatham Creek Mining Co. Berg, Tweiten, & Wickstrom Box 64, Fairbanks	Ready Bullion Cr. Fairbanks	3	Nonfloat
Chena Mining Co. Pinto, Bill 216 Third Ave., Fairbanks	Dome Cr. Fairbanks	2	Nonfloat
Cline, Harvey Cordova	Yakataga Beach Cordova	1	Small scale hand
Coffield, Lawrence Fairbanks	Black Cr. Talkeetna	1	Gold lode prospecting
Coffield, Lawrence Fairbanks	Black Cr. Talkeetna	1	Nonfloat
Columbia Iron Mining Co. 525 William Penn Place Pittsburgh 30, Penna.	Southeast Alaska Several	8	Mineral investigations, aerial recon., drilling
Connell, Paul A. Central	Circle & Black Dists. Fairbanks	1	Prospecting
Cordero Mining Co. 131 University Ave., Palo Alto, California	White Mtn. McGrath	4	Mercury lode explorations
Crane, Fred & Associates Kotzebue	Northwestern & Northern Alaska Regions	2	Prospecting
Canyon Creek Mining Co. Jens Kvamme & Sons Akiak	Marvel Cr. Kuskokwim	4	Nonfloat
Dahl Creek Mine Charles E. "El" Stout 709 Fifth Ave., Fairbanks or Kobuk	Dahl Cr. Noatak-Kobuk	2	Nonfloat & jade
Davidson, Wes Davidson Log, Ketchikan	Thorne River Ketchikan	1	Prospecting
Davis, Bon Box 45, Nome	Gold Run Cape Nome	1	Nonfloat
Davis, Dr. & Associates Utah	Bluff Cape Nome	4	Small scale hand
Davis Mines, Inc. Talbert E. Davis 1511 Mary Ann, Fairbanks	Shovel Cr. Noatak-Kobuk	2	Nonfloat

Davis Mining Corp. C. E. Davis Box 881, Juneau	Windham Bay Juneau	1	Suction dredge
Degnan, Joseph A. Ophir	Mastodon Cr. Innoko	2	Nonfloat
Dickman, O. J. Teller	Kigluaik Mtns. Cape Nome	1	Prospecting
Dotson, R. L. "Red" Mile 8 1/2 N. Tongass Ketchikan	Ketchikan Dist. Several	1	Prospecting
Eckers, Theron Kasaan	Kasaan Peninsula Ketchikan	2	Prospecting
Edgecumbe Exploration Co. C. T. & G. H. Morgan Box 758, Sitka	Silver Bay Sitka	2	Gold lode maintenance
Eisenmenger, William 410 11th St., Fairbanks	Tibbs Cr. Fairbanks	1	Lode prospect
Emerick, Rollie Delta Junction	Several Several	1	Prospecting
Empire Jade Co. Gene Joiner Kotzebue	Jade Cr. Noatak-Kobuk	1	Jade recovery & cutting
Falls, Bentley Box 33, Livengood	Wilbur Cr. Fairbanks	1	Nonfloat
Far North Mining & Development Co. Candle or Kotzebue	Candle Cr. Fairhaven	8	Nonfloat
Flat Creek Placers Fullerton Brothers, Flat	Flat Cr. Mt. McKinley	3	Nonfloat
Foster, Neal W. Box 279, Nome	Seward Peninsula Fairhaven & Cape Nome	1	Lode prospecting
Foster, Neal Box 279, Nome	Hannum Cr. Fairhaven	2	Nonfloat
Fremont Mining Co. Box 125, Forest Grove, Oregon	First Division Several	16	Mineral explorations & drilling
Gagnon Placers Talkeetna	Cottonwood & Willow Creeks Talkeetna	2	Placer testing
Ghezzi, Alfred Sr. Box 1857, Fairbanks	Third & Fourth Divisions Several	1	Prospecting

Gilbertson, Geo., & Associates Fairbanks	Mosquito Fork Fairbanks	4	Nonfloat
Gilkey, Walter Yakutat	Lituya Bay Juneau	4	Beach sands
Glacier Mining Co. Anchorage	Hayes River area Anchorage	10	Molybdenite exploration
Gold Stream Mining Co. Denny G. Breaid Box 2116, Fairbanks	Goldstream Cr. Fairbanks	2	Stripping only
Goodnews Bay Mining Co. 422 White Bldg., Seattle 1, or Platinum	Salmon River and tribs. Bethel	40	Platinum dredge & nonfloat
Gordon, Tom Anchorage	Twin Cr. Talkeetna	2	Nonfloat
Gosho Trading Co. 50 Broad St., New York 4, N. Y.	Ketchikan Dist. Ketchikan	5	Prospecting
Grant Lake Mining & Development Corp. John Dyer & Associates Anchorage	Grant Lake area Seward	3	Prospecting
Grant Mining Co. Frank C. Edgington Box 53, Tanana	Grant Cr. Ft. Gibbon	2	Nonfloat
H & T Mining Co. Jack Haynes & Carl Thomas Box 1138, Seward	Last Chance Mine Seward	2	Gold lode preparation
Hancock, K. S. Haines	Porcupine Cr. Haines	1	Small scale hand
Hansen, Burnett F. Eagle	Ben Cr. Fairbanks	2	Nonfloat
Hansen, Burnett F. Eagle	Crooked Cr. Fairbanks	3	Nonfloat
Hassel Mining Co. Harold Hassel Box 1070, Fairbanks	Ready Bullion Cr. Fairbanks	4	Nonfloat
Havrilack, Harry Rampart	Ruby Cr. Rampart	1	Nonfloat
Henton, Fred Mile 42, Seward Highway	Slate Cr. Seward	2	Gold lode development

Hibbard, Bill 1723 Tongass, Ketchikan	Ketchikan Dist. Several	1	Prospecting
Hickok, Clara Talkeetna	Thunder Cr. Talkeetna	2	Hydraulic
Hofstad, Richard Petersburg	Petersburg Dist. Several	1	Prospecting
Hogendorn, Jack Deering	Inmachuck River Fairhaven	1	Hydraulic
Hope Mine R. V. Watkins Box 521, Fairbanks	Faith Cr. Fairbanks	1	Nonfloat
Huff, J. W. Route 1, Box 567B Ketchikan	Gravina Island Ketchikan	2	Prospecting
Humble Oil & Refining Co. 1829 E. Fifth Ave., Anchorage	Bristol Bay Dist. Bristol Bay	10	Iron lode exploration
Hyder Mines, Inc. 904 Fourth Ave., Seattle or Hyder	Riverside Mine Hyder	2	Silver-lead-tungsten
Ideal Cement Co. Dave Coalbaugh Ft. Collins, Colorado	Ketchikan Dist. Ketchikan	20	Exploration
I-L & M Co. Box 2015, Ketchikan	Kendrick Bay & others Ketchikan	1	Air & ground prospecting
Inmachuck Mining Co. Grant H. Nelson Nome	Inmachuck River Fairhaven	6	Gold dredge
Jak Mining Co. Fairbanks	Crooked Cr. Fairbanks	4	Dredge
Johansen, Engbret Chicken	Ingle Cr. Fairbanks	1	Small scale hand
Johnson, Iver M. Fairbanks	Chisana Dist. Fairbanks	2	Nonfloat
Johnson, Pete Manley Hot Springs	Eureka Cr. Hot Springs	1	Small scale hand
Kalmbach, G. F. Box 3686, Anchorage	Fern Mine Wasilla	2	Gold lode
Kettendorf, James Box 657, Hagamon Road Fairbanks	Rose Cr. Fairbanks	1	Small scale hand

Kloss, Herman & Davis, Jack (K & D Mining Claims) Sunset Cove	Sunset Cove Juneau	2	Gold-antimony lode development & prospecting
Knaack, William & Associates Seward	Beauty Bay Seward	2	Gold lode
Koby, Jack Box 952, Juneau	Juneau Dist. Juneau	1	Prospecting
Kodiak Exploration Co. Box 448, Kodiak	Kodiak Island Kodiak	3	Tungsten & copper prospecting
Kopanski, Max Skagway	Juneau Dist. Skagway	1	Prospecting
Koshalk, Louis & Associates 833 Fourth Ave., Fairbanks	Crevice Cr., trib. John River Fairbanks	3	Nonfloat
Kubley & Lange Ketchikan	Ketchikan Ketchikan	1	Prospecting
Kupoff, Nick & Lazeration, Charles	Pedro Cr. Fairbanks	2	Nonfloat
Ladybird Mining Co. Anchorage	Valdez Cr. Talkeetna	3	Placer preparations
Lake Creek Placers Pitts, E. H. Big Lake, via Fairbanks	Lake Cr. Koyukuk	1	Hydraulic
Langlow, Jens Central	Switch Cr. Fairbanks	1	Hydraulic
Lanning, Tony Manley Hot Springs	Thanksgiving Cr. Hot Springs	1	Nonfloat
Lee Brothers Dredging Co. Box 208, Nome	Solomon River Cape Nome	12	Gold dredge
Lemke, W. E. Box 628, Petersburg	Petersburg Dist. Petersburg	1	Iron prospect
Leonard, Harry B. Wiseman	Smith Cr. Fairbanks	1	Small scale hand
Lindquist, Hjalmer 133 N. Marion, Bremerton, Wash. or Ophir	Bedrock & Ester Creeks Innoko	1	Nonfloat
Lindsay, George c/o R. E. Baumgartner Seward	Oracle property Seward	1	Development work

Little Creek Mine Ivor C. Carlson Ophir	Little Cr. Innoko	2	Nonfloat
Little Squaw Mining Co.	Mikado Lode Fairbanks	2	Lode prospecting & development
Locke, Barney Anchorage	Third Division Several	2	Prospecting
Long Creek Mining Co. "Ash" Richardson Ruby	Long Cr. Nulato	4	Nonfloat
Lucky Seven Mining Co. Walter E. Roman Miller House	Mammoth Cr. & Portage Cr. Fairbanks	3	Nonfloat
Lucky Syndicate A. L. Schneider Box 615, Nome	Kougarok River Cape Nome	8	Gold dredge
McReynolds, Warren; Eichner, Ken; Williams, B. C.; Hawkins, W. A.; Peterson, K. C. Box 292, Ketchikan	Kasaan Peninsula Ketchikan	2	Prospecting
McWilliams, Howard F. Box 1317, Anchorage	Third Division Several	1	Prospecting
Maclaren River Copper Corp. Copper Center or Box 981, Anchorage	Maclaren River Talkeetna	2	Copper lode development
Magill, Fred Box 444, Petersburg	Southeast Alaska Several	1	Lode prospecting
Magnuson, Warren Ophir	Ganes Cr. Mt. McKinley	3	Placer prospecting
Magnuson, Warren Ophir	Fourth Division Several	1	Prospecting
Manske, Dan Fairbanks	Ingle Cr. Fairbanks	2	Nonfloat
Martin, Jim Ketchikan	Ketchikan Ketchikan	1	Prospecting
Marvel Creek Mining Co. Aniak	Marvel Cr. Kuskokwim	2	Nonfloat
Maurer, Ernest L. 513B Fourth Ave., Fairbanks	First Chance Cr. Fairbanks	1	Nonfloat

Meldrum, William Chicken	Stonehouse & Chicken Creeks Fairbanks	1	Stripping only
Mendenhal, Roy Deering	Milroy Cr. Fairhaven	1	Nonfloat
Miowest Ore Co. Iron Mtn., Missouri	Several Several	1	Iron ore investigations
Miller, James; Lindgrin, Earl & Atwood, M. J.	Sheep Cr. Fairbanks	3	Nonfloat
Minalaska, Inc. Magnuson Brothers Ophir	Gaines Cr. Innoko	3	Gold dredge
Mineral Basin Mining Corp. Arthur Moa Box 126, Hyder	Mountain View property Hyder	8	Lode exploration
Minerals, Inc. Box 1211, Juneau	Yakutat Dist. Juneau	4	Beach placer investigations
Miscovich Brothers Flat	Otter Cr. Mt. McKinley	6	Dredge
Moneta Porcupine Mines, Ltd. 408-402 W. Pender St. Vancouver 2, B. C.	Southeastern Alaska Several	8	Mineral investigations & reconnaissance
Monte Cristo Mining Co. R. W. Beck Gakona	Slate Cr. Chitina	8	Nonfloat
Mrak, William Sutton	Grubstake Gulch Palmer	3	Nonfloat
Mt. Andrew Mining Co. Box 358, Ketchikan or 1011-1030 W. Georgia St. Vancouver 5, B. C.	Kasaan Peninsula Ketchikan	8	Iron & copper exploration drilling & geophysical
Mt. Parker Mining Co. A. F. Parker Box 2127, Juneau	Mt. Parker Mine Juneau	1	Gold lode maintenance
Munoz, Juan Box 553, Ketchikan	Kasaan Peninsula Ketchikan	3	Diamond drilling
Newlun, O. H.	Prince of Wales Island Ketchikan	1	Prospecting
Newmont Mining Corp. of Canada Ltd. Room 604, 749 W. Hastings Vancouver, B. C.	Alaska general Several	8	Mineral investigations & exploration

New York-Alaska Gold Dredging Corp. 2503 Smith Tower, Seattle or Nyac	Tuluksak River, California & Rock Creeks Bethel	50	3 gold dredges
Nielsen, Elwood Moose Pass	Crown Point Mine Seward	2	Gold lode development
North American Mining Co. Meritt Pederson	Klery Cr. Noatak-Kobuk	5	Dredge operations
Novatney, Robert 104 Ninth St., Juneau	Helm Bay Ketchikan	1	Gold lode development
Nugget Mining Co. Steven Petersen Nome	Niukluk River Cape Nome	2	Gold dredge
O'Brien, Jim & Dunsmire, Jim Cooper Landing	Surprise Cr. Seward	2	Placer drift
O'Carrol, Michael Fairbanks	Spruce Cr. Innoko	2	Nonfloat
Olive Creek Mines Carl Parker Box 552, Fairbanks	Little Eva Cr. Fairbanks	5	Nonfloat
Olson, Henry T. "Tiger" Taku Harbor	Juneau & Admiralty Dists. Juneau	1	Prospecting
O'Neill Ventures William O'Neill 505 Eighth Ave., Anchorage	Dan Cr.	2	Placer prospecting
O'Neill Ventures 505 Eighth Ave., Anchorage	Upper Falls Cr. Talkeetna	4	Placer exploration
Operators Unknown (2) Anchorage	Friday Cr. Fairbanks	2	Nonfloat
Otter Dredging Co. Ogriz & Kobler Flat	Otter Cr. Mt. McKinley	7	Gold dredge
Pade, Otto	Skagway Skagway	1	Prospecting
Palmer, R. B. Fairbanks	Sourdough Cr. Fairbanks	1	Prospecting
Pekovich, W. S. Box 2642, Juneau	Port Snettisham Juneau	1	Iron lode development

Permanente Cement Co. Oakland, California	Kings River Palmer	4	Limestone exploration
Pettyjohn, Fred S. 4 Eleanor St., Fairbanks	S. Slope Alaska Range Talkeetna	1	Lode prospecting
Phelps Dodge Corp. Box 991, Douglas, Arizona	Alaska general Several	14	Prospecting
Pratt, Jack & Dube, Tony Suntrana	No Grub Cr. Fairbanks	2	Nonfloat
Price, Stanton c/o Dean Goodwin Box 1262, Juneau	Windfall Harbor Juneau	1	Prospecting
Prince Creek Mining Co. S. E. Agoff Flat	Prince Cr. Mt. McKinley	4	Nonfloat
Prince of Wales Mining Co. Box 898, Ketchikan or Room 3, 1807 Fir St. Vancouver, B. C.	Southeastern Alaska Several	4	Mineral reconnaissance & prospecting
Purdy Brothers Chicken	Myers Fork Fairbanks	2	Nonfloat
Purkeypile, I. W. & Associates Fairbanks	Tonzona Dist. Mt. McKinley	3	Lode prospecting
Queen, Wes	Southeastern Alaska Several	2	Prospecting
Quitsch, William Valdez	Mineral Cr. Valdez	1	Gold lode
Radovan, Martin McCarthy	Glacier Cr. McCarthy	1	Copper lode prospecting
Rambaud and Hanks Chicken	Napoleon Cr. Fairbanks	3	Hydraulic
Redstone Mining Co. Heflinger, Carl Fairbanks	Livengood Cr. Fairbanks	2	Nonfloat
Rhode Island Creek Mines A. W. Pringle Manley Hot Springs	Rhode Island Cr. Hot Springs	3	Nonfloat
Rice, Harry Palmer	Independence Mine Wasilla	2	Gold lode sniping
Ricks, Dean Fairbanks	Fairbanks Dist. Fairbanks	1	Prospecting

Robinson, George F. Boundary	Wade Cr. Fairbanks	1	Nonfloat
Rosander & Gates Ophir	Bear Cr. Innoko	3	Nonfloat
Rosander & Reed Ophir	Yankee Cr. Innoko	4	Nonfloat
Schaefer, Russel Crooked Creek	Cinnabar Cr. Kuskokwim	2	Mercury lode
Sheldon, Charlie Shungnak	Shungnak River Noatak-Kobuk	1	Jade placer
Sirilo, Julius Box 625, Bethel	Aniak Dist. Kuskokwim	1	Prospecting
Spirit Mountain Mining Co. Ray Trotachau Sultan, Washington	Canyon Cr. Chitina	3	Nickel-copper prospecting
Squaw Creek Mining Co. Jack Wilke Boundary	Canyon Cr. Fairbanks	1	Nonfloat
Standard Slag Gabbs, Nevada	Southeastern Alaska Several	5	Prospecting
Steears, Al	Southeastern Alaska Several	2	Prospecting
Stensland, Anton Ketchikan	Helm Bay & McLean Arm Ketchikan	1	Prospecting
Strandberg Mines, Inc. 926 Fourth Ave., or Box 2099 Anchorage	Alaska general Several	2	Mineral investigations
Strandberg Mines, Inc. Box 2099, Anchorage	Mespelt Mine Medfra	3	Gold-copper lode
Strandberg Mines, Inc. Box 2099, Anchorage	Eureka Cr. Hot Springs	14	Nonfloat
Strandberg Mines, Inc. Box 2099, Anchorage	Indian River Fort Gibbon	10	Nonfloat
Strandberg Mines, Inc. Box 2099, Anchorage	Colorado Cr. Innoko	9	Nonfloat
Strandberg Mines, Inc. Box 2099, Anchorage	Iron Cr. Talkeetna	2	Prospecting
Stover Brothers	Flat Dist. Mt. McKinley	2	Nonfloat
Stuver, Jules Flat	Moore Cr. Mt. McKinley	2	Hydraulic

Sultan Sawmill & Mining Co. Ray Trotachau Sultan, Washington	Kennecott Mine McCarthy	9	
Sunshine Mining Co. 738 Peyton Bldg., Spokane 1, Washington	Kagati Lake Bethel	3	Mercury lode exploration
Sweepstakes Mine Charles Moon & Baldwin Box 371, Nome	Sweepstakes Cr. Cape Nome	2	Nonfloat
T and T Mining Co. William Thomas 503 Seventh Ave., Fairbanks or Rampart	Hunter Cr. Rampart	1	Nonfloat
Taylor, Arley & Associates	Eureka Cr. Fairbanks	1	Nonfloat
Tetinek, Eugene Fortuna Ledge	Willow Cr. Wade Hampton	1	Nonfloat
Timroth Exploration Co. Grand Junction, Colorado	Alaska general Several	5	Mineral explorations
Titus, Jack & Cook, Fred Solomon	Shovel Cr. Cape Nome	2	Small scale hand
Totem Exploration Co. Joe Blazek 317 Dock St., Ketchikan	Southeastern Alaska Several	2	Prospecting-exploration & diamond drilling
Toussaint, Ed Fort Yukon	Big Cr. Fairbanks	1	Gold lode development
Towle & Ross Ketchikan	Southeastern Alaska Several	2	Aerial magnetometer
Transworld Resources Hesperia, California	Yakataga Beach Several	4	Placer exploration
Turnbarge & Associates	Lookout Mine Fairbanks	3	Gold lode development
Tweet, N. B. & Sons Teller	Kougarok River Cape Nome	5	Nonfloat, hydraulic, & dredge
Ulrich, Henry Nome	Rock Cr. Cape Nome	1	Small scale hand
Uranium & Strategic Ore Development Co. Mr. Hammond, Anchorage	Craigie Cr. Wasilla	3	Gold lode prospecting

U.S.S.R.& M. Co. Box 1170, Fairbanks	Fairbanks Dist. Fairbanks	200	4 gold dredges
U.S.S.R.& M. Co. Box 1170, Fairbanks	Hogatza River Ft. Gibbon	35	Gold dredge
U.S.S.R.& M. Co. Box 1170, Fairbanks	Mosquito Fork Fairbanks	20	Dredge
U.S.S.R.& M. Co. Box 438, Nome	Nome Dist. Cape Nome	150	Gold dredges
Uotila, Gus Ophir	Ophir Cr. Innoko	4	Nonfloat
Uotila, Gus & Yrjana, Albert Ophir	Birch Cr. Nulato	2	Stripping
Wackwitz, Charles & Fred Box 1595, Fairbanks	Bedrock Cr. Fairbanks	2	Prospect development
Wall, Melvin c/o Robert Hoedel Homer	Valdez Cr. Talkeetna	3	Placer & lode prospecting
Walper, J. A.	Chicken Dome Mt. McKinley	4	Placer exploration
Watson, Mrs. Ben Cape Yakataga	Yakataga Beach Cordova	2	Small scale hand
Wattamuse Mining Corp. Nat Browne Route 1, Burton Washington, or Goodnews Bay Village	Slate Cr. Bethel	2	Nonfloat
Weinard, Otto F. & Fred Candle	Mud Cr. Fairhaven	5	Nonfloat
Weisner Trading Co. Ira Weisner & Jim Pierce Rampart	Little Minook & Hoosier Cr. Rampart	4	Nonfloat
Western Alaska Mining Co. R. J. Anderson Box 121, Spenard	Kolmakof property Kuskokwim	1	Mercury lode development
Williams, Burton A. May Creek via Cordova	Rex Gulch McCarthy	1	Small scale hand
Willis, George	Parks property Aniak	1	Building retort
Withrow, Alfred W. Bettles Field	Koyukuk River Fairbanks	1	Small scale hand

Wiurm, Andrew Box 491, Nome	Dome Cr. Cape Nome	1	Hydraulic
Wolf Creek Mining Co., Inc. Box 141, Fairbanks	Fish Cr. Fairbanks	8	Nonfloat
Woodman, I. N. Box 573, Valdez	Nelchina Dist. Several	1	Prospecting
Yelinore, Inc. Paul Fretz 947 Orcas St., Anchorage	Yellow Band property McCarthy	4	Gold lode prospecting
Young, Frank R. Haines	Haines Dist. Haines	1	Prospecting
Zaiser, Clarence Ruby	Greenstone Cr. Nulato	2	Nonfloat
Zaiser, Leonard McGrath	Cache Cr. Talkeetna	1	Nonfloat
Zimin, Nick S. Neknek	Alaska Peninsula & Bristol Bay Dist. Several	1	Prospecting
Zukoev, James	Bonnifield Dist. Nenana	1	Nonfloat

"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, 1960

Name and Address of Operator	Location of Mines & Coal Field	Type of Operation	Approx. Crew
Arctic Coal, Inc. 130 Lacey Street or Box 1386, Fairbanks	Lignite Creek Nenana Field	Strip	11
Castle Mountain Coal Co. Box 1292, Palmer	Near Chickaloon Matanuska Field	Strip	3
Cripple Creek Coal Co. Box 529, Fairbanks	Cripple Creek Nenana Field	Strip	26
Delta Coal Co. Box 818 Delta Junction	Donnelly Jarvis Creek Field	Strip	3
Evan Jones Coal Co. Box 619, Anchorage or Jonesville	Jonesville Matanuska Field	Underground	68
Meade River Coal Co. Ed Burnell, Barrow	Meade River Pt. Barrow Field	Underground	12
Minor Roop Strip Subcontracting under Evan Jones	Jonesville Matanuska Field	Strip	61
Mrak Coal Co. Box 16, Sutton	Near Eska Matanuska Field	Strip	33
Pioneer Mining Co. 2405 Glenwood Ave., Anchorage	Moose Creek Matanuska Field	Strip	4
*Suntrana Mining Co., Inc. 525-3rd Ave., Anchorage or Suntrana	Healy Creek Nenana Field	Underground	39
Usibelli Coal Mines, Inc. Usibelli, Alaska	Healy Creek Nenana Field	Strip	30

*Suntrana Mining Co. sold mine and equipment to Usibelli in October, 1960.

OIL AND GAS COMPANIES ACTIVE DURING 1960

Name and Alaskan Address of Company	Home or Regional Office	Type of Activity
Bass Drilling Co.	905 San Jacinto Bldg., Houston	Seismic
Benedum, Paul G.	Benedum-Trees Bldg., Pittsburgh 22	Drilling
British American Oil Producing Co. 1827 East Fifth Ave., Anchorage	Mercantile-Dallas Bldg., Box 749, Dallas 21	Geologic field party, seismic
British Petroleum Exploration Co. (Alaska), Inc. Mt. McKinley Bldg., Anchorage	620 5th Ave., New York City 20	Seismic, geologic field party
Canadian Husky Oil Co., Ltd.	815 6th St. W., Calgary, Alberta, Canada	Gravity
Cities Service Oil Co.	Bartlesville, Okla.	Geologic field party
Colorado Oil and Gas Corp. Yakutat	Box 749, Denver	Drilling, seismic
Continental Oil Co. 946 East Fifth Ave., Anchorage	1137 Wilshire Blvd., Los Angeles 17	Geologic field party
Gulf Oil Co. of California 326 H St., Anchorage	Box 1392, Bakersfield, California	Seismic, geologic field party
Halbouty Alaska Oil Co. 746 F St., Anchorage	5111 Westheimer Road, Houston 27	Drilling
Honolulu Oil Corp.	215 Market St., San Francisco 5	Seismic, geologic field party
Humble Oil & Refining Co. Box 7-248, Anchorage	Box 2188, Houston	Seismic, geologic field party, aeromag survey
Hunt Oil Co.	700 Mercantile Bank Bldg., Dallas	Seismic, gravity meter
Ohio Oil Co. 520 K St., Anchorage	550 South Flower St., Los Angeles 17	Seismic, geologic field party
Pan American Petroleum Corp. 333 B St., Anchorage	Box 591, Tulsa 2	Seismic, aeromag survey, geologic field party
Phillips Petroleum Corp. 211 Loussac-Sogn Bldg., Anchorage	Bartlesville, Okla.	Seismic, geologic field party

Pure Oil Co. Box 1651, Anchorage	35 East Wacker Drive, Chicago	Gravity
Richfield Oil Corp. Box 2241, Anchorage	555 South Flower St., Los Angeles 17	Drilling, seismic, geologic field party, aeromag survey
Shell Oil Co.	Suite 1055, Dexter Horton Bldg., Seattle 4	Geologic field party, seismic, aeromag survey
Sinclair Oil and Gas Co. Box 584, Anchorage	Box 521, Tulsa	Geologic field party, seismic, aeromag survey
Standard Oil Co. of California Box 7-839, Anchorage	225 Bush St., Standard Oil Bldg., San Francisco 20	Production, drilling, seismic, geologic field party
Sunray Mid-Continent Oil Co. Box 854, Anchorage	714 West Olympic Blvd., Los Angeles 15	Geologic field party
Superior Oil Co. 321 C St., Anchorage	550 South Flower St., or Box 3015 Terminal Annex, Los Angeles	Geologic field party
Texaco, Inc. Loussac-Sogn Bldg., Anchorage	3350 Wilshire Blvd., Los Angeles 5	Seismic, geologic field party
Union Oil Co. of California 2805 Denali, Anchorage	Union Oil Center, Los Angeles	Drilling, seismic, geologic field party, aeromag survey

LIST OF REPORTS ISSUED BY THE DIVISION OF MINES

AND MINERALS AND CORRESPONDING 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.

*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.

*Joesting, Henry R., Strategic mineral occurrences in interior Alaska; Pamphlet No. 1, May 1942.

*Joesting, Henry R., Supplemental to Pamphlet No. 1 -- Strategic mineral occurrences in interior Alaska: Pamphlet No. 2, March 1943.

*Anderson, Eskil, Mineral occurrences other than gold deposits in Northwestern Alaska: Pamphlet No. 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 1045. (Revised to May 1946).

*Anderson, Eskil, Asbestos and jade occurrences in the Kobuk River region, Alaska; Pamphlet No. 3-R, May 1945.

*Roehm, J. C., Some high calcium limestone deposits in Southeastern Alaska; Pamphlet No. 6, March 1946.

Proper Claim Staking in Alaska; Information Circular No. 1, May 6, 1960.

Rights of Canadians in Alaska under the Mining Laws; Information Circular No. 2, September 15, 1953.

Hints for Prospectors on the Mainland of Southeastern Alaska; Information Circular No. 3, March 15, 1954.

*Alaska Uranium Information; Information Circular No. 4, March 15, 1955.

General Alaskan Mineral Information; Information Circular No. 5, May 2, 1960.

Alaskan Prospecting Information; Information Circular No. 6, November 5, 1959.

Compulsory Assessment Work Affidavits; Information Circular No. 7, July 15, 1957.

Mineral Industry Consultants Available for Work in Alaska; Information Circular No. 8, July 6, 1959.

Dealers in Alaskan Rocks and Minerals; Information Circular No. 9, August 18, 1959.

* Out of print. On file in certain public and university libraries.