TERRITORY OF ALASKA

REPORT

OF THE

COMMISSIONER OF MINES

TO THE GOVERNOR

FOR THE

BIENNIUM ENDED DECEMBER 31, 1940

Juneau, Alaska
February 25, 1941.

To the Honorable Ernest Gruening,
Governor of Alaska.

Sir:

I have the honor to submit, in accordance wtih Sec. 3, Chapter 80, Session Laws of 1935, the Report of the Commissioner of Mines for the biennium ended December 31, 1940.

Respectfully yours,

B. D. STEWART,

Commissioner of Mines.

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Assayers-in-charge

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Clerical Staff

Ronald L. Stewart, Chief Clerk .....Juneau
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THE DEPARTMENT OF MINES

Administrative Work and General Information:

The activities of the Territorial Department of Mines, including the operation of three public assay offices, situated at Ketchikan, College and Nome, respectively, are administered under the direction of the Commissioner of Mines, at the headquarters office in Juneau. At this office information on matters relating to mining and the mineral resources of the Territory is disseminated by means of personal interviews with visiting inquirers, and by correspondence. Extensive files of reports on individual mining properties and prospects, which are based largely on field investigations that are continuously carried on by the associate mining engineers of the Department during the open season of each year, together with a complete library of the publications of the U. S. Geological Survey and U. S. Bureau of Mines, furnish the basis for the authentic information that is disseminated. Consulting service is also available to the various local departments and agencies of the Federal Government and of the Territory.

During the past biennium the Juneau office was visited by 3,700 persons, all of whom were seeking information or assistance in matters relating to the mineral industry of Alaska. Many of these visitors were prospectors seeking unpublished information or publications and maps covering districts in which they were interested, or who desired suggestions as to areas favorable for carrying on prospecting activities. Other visitors included many mining engineers and prospective investors who wished information on particular properties or suggestions as to those that might warrant financing and development. A number of new mining enterprises have been launched as a result of these office consultations.

Inquiries received by mail concerning opportunities for prospecting and mining in Alaska and seeking advice as to favorable mineralized areas, methods of operation, etc., continue to increase. Incoming and outgoing first class mail handled by the Juneau office during the past biennium numbered 8,800 pieces, as compared with 6,000 handled during the preceding biennium.

Government reports on the Alaskan mineral industry are no longer distributed free as formerly, but must be purchased from the Superintendent of Documents, Washington, D. C. Many of the most important ones are now out of print and are no longer obtainable. They may, however, be consulted at the Department of Mines library in Juneau. For the convenience of the local public, and to obviate the delay involved in sending to Washington, D. C. for them, a small stock of such reports as are still available, including all new publications dealing with the mineral resources and industries of Alaska, has been secured and is kept on hand at the Juneau office for resale to the public at cost. The number of publications that were distributed during the past biennium, including the biennial report of the Commissioner of Mines, was 1,730, which is approximately 1,000 more than were distributed during the preceding biennium.

Large numbers of geologic and topographic maps were also distributed. These included many sketches prepared by the engineers of the Department of Mines that display the detailed geologic features of individual mining properties examined by them, together with development workings and the positions, widths and assay results of samples taken by them on each property. Prints of such sketches are furnished free to prospectors and owners of the properties examined for distribution by them to interested parties.

The office at Juneau is also equipped to make preliminary tests of rocks and minerals, including petrographic analyses by microscopic methods. During the past biennium a total of 221 thin sections have been made of rocks and ores the true identity of which could not be determined otherwise. These determinations have been of great assistance in solving the relationships that exist between the occurrence of many types of ores and the rocks and geologic structures with which they are associated.

A complete set of specimens of all the common rocks and minerals, as well as some of the more important rare ones, has been secured and is available at Juneau for study by pros-

pectors and others. These specimens supplement the extensive collection of ores that are typical of the various mining districts of Alaska that has been kept at the office for many years. Similar though less extensive collections have been placed at the public assay offices at Ketchikan, College and Nome.

Field Work, including Mine Inspection:

The organic act of the Department of Mines requires that a continuing survey of the mineral resources and mining operations of the Territory be conducted and that information relating thereto be disseminated for the purpose of promoting the best interests of the mining industry and of those engaged therein, including prospectors and investors. This work is conducted by three associate mining engineers, and also by the Commissioner of Mines to such extent as freedom from his administrative duties permits. It embraces field investigation of properties, including examination and sampling of prospects; large-scale geologic mapping of individual prospects, as well as districts of limited area; consultation on the ground with prospectors and operators, especially those engaged in preliminary development of mining properties who cannot afford to engage private engineers and geologists; and giving them technical assistance and advice when requested. It also includes mine inspection and advising on matters relating to safety in mining operations.

During the past biennium improvised branch offices of associate mining engineer were established at Anchorage and at College. Owing to lack of funds for paying rental for office space the associate engineer at Anchorage occupied quarters that temporarily were furnished gratuitously by the Alaska Railroad in the building that is used as a coal testing laboratory by the U. S. Bureau of Mines. This building is situated in the railroad yards at some distance from the business center of the city and is ill-suited to the convenience of the public, which impairs the effectiveness of the services sought to be rendered.

In the absence of other available quarters at Fairbanks or College, the associate engineer who is stationed there maintained headquarters at his own home near College where he improvisd office space and crude facilities in his unheated garage.

The office at Anchorage was in operation only from opening in May, 1940, to October 1, when the engineer in charge resigned. A successor was appointed in November, but it was impossible to secure for him at Anchorage prior to the close of the year either living quarters or office space. For this reason his temporary headquarters have been at Juneau. The office at Anchorage will be reopened as soon as suitable space can be procured.

The third associate engineer is permanently stationed at the headquarters office in Juneau, from which base he conducts field investigations and mine inspection in all regions of the Territory not covered by the other engineers.

Within the past biennium approximately 300 mining properties and prospects were visited and examined by the associate mining engineers of the Department. In the course of this work conferences were held in the field with more than 500 prospectors and mine operators, with whom their problems were discussed and to whom various types of assistance was rendered when requested. In connection with the field examinations approximately 300 samples of ore from veins and ore zones were cut, the assay results from which were furnished free to prospectors and other owners, and were used in preparing sketch maps and reports on the properties from which the samples were obtained.

The field work also included geologic reconnaissance investigation by Mr. Roehm of considerable areas; notably that portion of the Kuskokwim River region that lies between Goodnews Bay and the Tuluksak River, and extensive portions of Seward Peninsula that included the valley of the Kougarok River and adjacent ranges, the Bendeleben Mountains, and a portion of the Arctic slope south of Deering. In the Kougarok region Mr. Roehm was assisted by Mr. Shallit, who conducts the field office at Nome and who continued field investigations and topographic mapping in that area after Mr. Roehm's departure. Manuscript reports on these investigations are on file in the office at Juneau.

Limited field investigations were also conducted by the Commissioner of Mines in the Broad Pass, Kantishna, Bonnifield, Circle and Fairbanks regions during 1939, within which season also many weeks were devoted to supervising the sealing of the extensive mine-fire area in the Suntrana mine at Healy and in investigating and regulating coal mining operations in the Matanuska field. The season of 1940 was devoted largely to establishing the Anchorage field office and in directing investigations to be conducted from it, and in reexamining mining operations in both coal fields and in the Fairbanks region. The Livengood district and the field office at Nome were also visited.

As a result of the field investigations that have been conducted by the Department of Mines during the past biennium, several new mineral discoveries have been made, notably gold placer deposits; improved mining practices and equipment have been adopted; development and mining programs have been modified and improved; and many prospectors and prospective investors have been directed to localities and enterprises believed favorable for them to examine or undertake.

During the biennium approximately 125 mines of various types, including dredges, were inspected, with special reference to safety, by the associate engineers and the Commissioner of Mines. Wherever unsafe conditions were observed suitable steps were taken to insure their correction, in which ready compliance by mine operators and their employees was secured in most instances. Disciplinary measures were found necessary, however, in the case of the Evan Jones Coal Company at whose Jonesville mine in the Matanuska field noncompliance with legal requirements as to underground conditions and practices was found to exist.

Although two cases of violation of the law against dry-drilling in mines were observed and corrected, there was gratifying compliance with the law at nearly all other mines.

Valuable assistance in promoting safe practices in mines continued to be rendered during the biennium by the U. S. Bureau of Mines through their resident instructor, with whom the Department of Mines has cooperated closely.

Geophysical Investigations:

In order to determine the applicability in Alaska of the use of geophysical methods in the solving of problems relating to the discovery and outlining of ore deposits that are covered by overburden an experimental program was outlined by the Commissioner of Mines early in 1939 and field work was commenced in July of that year by Henry R. Joesting, associate mining engineer of the Territorial Department of Mines, who is a well qualified geophysicist. Several mining students who were attending the University of Alaska were engaged as field assistants to Mr. Joesting. During the season of 1939 investigations were carried on in the Livengood and Circle placer mining districts and in several sections of the Fairbanks placer area where field work was continued during the winter months. Preliminary work on the investigation of gold lodes in the Cleary Creek area was also started.

During the year 1940 a special investigation was conducted in the Kako Creek valley near the eastern border of the Marshall district on the lower Yukon River. This area was chosen for experimental work because little was known as to the nature of the occurrence and the extent of its gold placer deposits, or as to the geologic conditions that obtained in the area, which had never been mapped. Simultaneously with the geophysical field work, geologic mapping of the areas chosen for investigation was carried on by Ernest Fox, professor of geology at the University of Alaska, who was temporarily engaged for that purpose. The Kako Creek Mining Company cooperated in the investigation by furnishing drill logs that were used in checking the geophysical and geologic observations and by supplying living quarters for the field party. On completion of this work in the early fall the party returned to Fairbanks and resumed investigations that were commenced early in the spring on gold-quartz lode deposits of the Ester Dome area, particularly in the vicinity of the Ryan lode. Cordial cooperation in this work was received from the Bartholomae Oil Corporation which is prosecuting large-scale development work on the Ryan property.

Geophysical investigation of lode deposits of base ores in Southeastern Alaska and possibly other regions during the

coming biennium is planned if governing conditions prove favorable. Such deposits should be particularly amenable to this type of investigation. It is also hoped that geophysical examination of the lodge-gold deposits that are known to occur in close association with major zones of faulting and fracturing in Southeastern Alaska may be similarly investigated.

A detailed technical paper entitled, "Magnetometer and Direct-current Resistivity Studies in Alaska," that was prepared by Mr. Joesting has been printed and issued by the American Institute of Mining and Metallurgical Engineers as their Technical Publication No. 1284. This paper will be read by Mr. Joesting at the annual meeting of the Institute in New York City in February, 1941.

The following statement prepared by Mr. Joesting gives a non-technical explanation of the methods employed in his work and a preliminary report on the results thus far achieved:

Some Results of the Experimental Geophysical Program of the Territorial Department of Mines

By HENRY R. JOESTING,
Associate Mining Engineer and Geophyscist

About a year and a half ago the Territorial Department of Mines inaugurated a modest experimental geophysical program. The purpose of this program was to determine to what extent geophysical methods could be used as aids to mining and prospecting in Alaska. The following discussion outlines briefly some of the gold mining and prospecting problems to which geophysical methods have been applied, and also some of the results of the experimental work done by the Department of Mines.

First, it is well to define the terms geophysics and geophysical prospecting. Geophysics means, literally, earth physics. It is an extremely broad science, since it has to do with measurement and interpretation of all physical phenomena encountered in or on the earth, in the sea and in the atmosphere surrounding the earth. For convenience, geophysics is divided into several branches, some of which are important enough to be considered as separate sciences. Some of the important branches are meteorology, oceanography, geodesy and geophysical prospecting.

Geophysical prospecting is concerned with measuring and interpreting differences in physical properties that exist between mineral deposits and their enclosing rocks, particularly when their presence is not indicated by surface outcrops. There are four general geophysical methods in common use; namely, magnetic, electrical, gravimetric and seismic. Each method depends on the existence of measurable differences between the mineral deposits and the adjacent rocks in magnetic permeability, electrical conductivity, density or elasticity. The choice of geophysical method depends on the particular prospecting problem and also on such factors as the cost and the

time required to get results. If the supposed deposit is relatively shallow and easy to prospect by ordinary methods, then the geophysical method must be simple and inexpensive to be of any practical use. On the other hand, if the deposit is deep and prospecting is expensive, it is possible to use more elaborate geophysical methods and still save time and money.

The magnetic and the electrical methods were chosen by the Department of Mines for its initial experimental work because these methods are applicable to the study of most of the important prospecting and mining problems encountered in interior Alaska; also the cost of instruments and of field work is comparatively low. They offer the additional advantages of speed and simplicity of operation. Therefore, these two methods stand the best chance of being of eventual general use to the small, as well as to the large operator and prospector.

Now, having briefly reviewed the various geophysical prospecting methods available, let us look into some of the problems connected with gold prospecting and mining to which geophyiscal methods might be applied. In interior Alaska, most of these problems are connected with the muck, silt, and residual deposits that cover a large part of the country, particularly in the mature regions. Many of the deposits are permanently frozen; others are thawed. They range in thickness from a few feet to several hundred feet and constitute the principal handicap to prospecting for both lodes and placers.

The most important of the problems on which geophysical work has been done are: First, the location of buried placers; second, the location of buried lodes, and of faults, contacts and intrusions that may have a bearing on mineralization; and third, the determination of depth of thawed and permanently frozen overburden and the distribution of permanently frozen ground.

In undertaking this work two alternative methods of procedure were considered: We either could have concentrated on one single problem, or we could have made a broad study of all of the important problems. In view of the fact that very little previous geophysical work had been done, compared to the immense amount done in the States and in other countries,

the second method was chosen; that is, a general study was made of all of the more important problems.

PLACER DEPOSITS

For locating and outlining buried placers the magnetic method appears to be best adapted. The instrument used for this work is known as the magnetic field balance, or vertical magnetometer. It is not only extremely sensitive, but surveys made with this type of instrument are rapid and inexpensive. The magnetometer can be used for prospecting for placer gold because magnetic minerals, or black sands, are commonly associated with the gold. Thus, in many cases, placers may be outlined simply by finding the maximum concentration of black sands.

Now, it is well known to everyone who has done any placer prospecting or mining that the amount of magnetic black sand varies in different placers. Some rich placers contain very little black sand, while the reverse is true with respect to some low grade ones. And, since magnetic minerals are much more widespread than gold, black sand occurs in many gravel deposits that are entirely barren of gold. The presence of both gold and magnetic minerals in placers depends primarily on an adequate bedrock source of both materials. For this reason, prospecting for placers with a magnetometer should be confined to mineralized regions.

In order to determine in a reasonably short time the applicability of the magnetic method to placer prospecting in interior Alaska as a whole, about 110 samples of concentrates from 54 creeks were examined. Magnetic minerals, the most important of which was magnetite, were found in all the samples, in amounts ranging from 1 to over 50 per cent. Magnetometer surveys were then run over several placers to determine the relations between magnetic mineral content and its effect on the magnetometer. Considerable panning was also done to ascertain whether magnetic minerals and gold were generally concentrated in the same parts of placers.

It was found that the presence of relatively small amounts of black sand can be detected by the magnetometer, although of course more black sand is necessary in deep, than in shallow

placers. Considered on the basis of black sand content alone, about 75 per cent of the placers in the interior can be located by magnetometer surveys. However, other factors, chief of which is occasional irregularities in the magnetic properties of bedrock, reduce this figure to an estimated 50 per cent.

Where the paystreak is well defined and more or less uniform, the amount of black sand has been found to be proportionate to the gold content, and these placers can be outlined with considerable accuracy. On the other hand, where the gravel is not well sorted and there is no true paystreak, the placer can at best be only approximately outlined. From data gathered in this experimental work and from a knowledge of the geology, it is now possible to predict whether or not magnetic methods can be used successfully in any region in the interior. I should mention, however, that the method does not eliminate regular prospecting, but it does in some cases eliminate much prospecting in barren ground. The low cost and rapidity of magnetometer surveys make them worth trying whenever drilling or shaft sinking is difficult or expensive.

GOLD LODES

The geophysicist is up against a difficult problem in devising a method for detecting or tracing buried gold-quartz veins. Most gold-quartz veins are small and their physical properties are often not materially different from those of the country rock. Even in a vein assaying two or three ounces to the ton, the amount of gold is too small to be detected directly by any known geophysical method. However, worthwhile results may often be obtained by utilizing a combination of geology and geophysics.

The position of a vein may be controlled by faulting, or by the contact of two dissimilar rocks, or it may bear a definite relation to intrusions of igneous rocks. In many cases it is possible to trace these structural features by one or more geophysical methods. For example, there is often sufficient difference in the magnetic properties of rocks on opposite sides of a fault so that it can be traced by a magetometer survey. Similarly, igneous rocks can be located, and in general any contact of dissimilar rocks can be traced through differences in

magnetic properties, and in this manner the presence of quartz veins can often be indicated.

An electrical method that measures the conductivity of buried formations has been used successfully for tracing fault zones and veins occurring in faults. Fault zones usually contain breccia and gouge and this material will conduct an electric current more readily than the undisturbed rock on both sides of the fault.

Both magnetic and electrical methods have been used by the Department of Mines for the purpose of tracing bedrock features with which quartz veins are associated. As a rule, it has been found necessary to start the geophysical surveys where conditions are already known, after which the survey is extended to unknown areas. Geophysical prospecting for lodes can be used most advantageously to supplement geological work and in connection with direct prospecting. As with placer investigations, the primary aim is not to eliminate direct prospecting entirely, but merely to reduce the amount of this slower and more expensive type of work that is so often done in unfavorable areas.

A case in point is the work done on Ester Dome in the Fairbanks district during which as much information as possible was gotten from a few natural bedrock exposures and from what prospect trenches and pits were already there, and during which magnetometer and resistivity surveys furnished supplementary information where no bedrock exposures could be found. Although this work has not been completed, enough was learned to show that the general procedure is well suited to interior Alaska regions.

BASE METAL ORE DEPOSITS

Of the various geophysical exploration methods available, the magnetic and electrical methods are of greatest value in prospecting for base metal ore deposits. The method used depends on conditions as determined by preliminary geological studies. Often it is necessary to use more than one method to obtain conclusive results.

Magnetic methods can be used to locate deposits, the magnetic properties of which are measurably different from the

surrounding rocks. They are of special value in finding highly magnetic deposits, such as magnetite, ilmenite, chromite and pyrrhotite, but are also useful where the positions of ore deposits are determined by geologic structures. Rapid traverses over highly magnetic deposits can be made with a dip needle, or with one of the less sensitive magnetic field balances. Where detailed and precise measurements are necessary, a Schmidt-type field balance, similar to the one used by the Department of Mines for magnetic surveys in interior Alaska, should be used.

Most electrical methods depend for their operation upon the creation of an electric field of force in the subsurface. This field may be produced either by passing a direct, or alternating, current through the ground by means of conductors in contact with the surface; or by sending in electromagnetic (radio) waves without making contact with the surface. These methods utilize the differences that exist between the electrical properties of relatively good conductors, as base metal ore deposits; and poor conductors, as siliceous rocks surrounding ore deposits.

The direct current resistivity method used by the Department of Mines is capable of obtaining information at comparatively great depths, but is slower than some of the less powerful methods. For rapid reconnaissance surveys, any one of the several low-powered radio methods should be useful in prospecting for large deposits in Southeastern Alaska.

FROZEN GROUND AND DEPTH OF OVERBURDEN

Besides the work on buried placers and lodes, the Department of Mines has carried on experimental work for the purpose of developing geophysical methods to determine the location and extent of permanently frozen ground and also to determine depths of muck and gravel overburden.

It was found that frozen muck and gravel are extremely poor conductors of electricity compared to their thawed counterparts. Advantage is taken of these differences in conductivity to develop a rapid and inexpensive method of finding the extent and depth of frozen deposits. Considerable attention has also been paid to the problem of finding the thickness of muck and gravel in both thawed and permanently frozen areas. It is possible at present to determine depths when conditions are fairly simple, but where depths are over about 50 feet, and where both frozen and thawed ground are encountered, results have not been uniformly satisfactory.

UNDERGROUND WATER

It was found possible to determine the location and approximate depth of water-bearing gravel under permanently frozen ground wherever tried, therefore it is probably safe to say that it is possible in the majority of cases. The greatest depth at which water was indicated by resistivity methods was about 100 feet, but under conditions encountered so far it should be possible to obtain reliable indications to depths of several hundred feet. In determining the presence of water under frozen, unconsolidated deposits, advantage was taken of the great difference in resistivity between frozen and thawed material. The resistivity method in this case indicates the presence of thawed ground, rather than the actual presence of water, therefore a knowledge of local stratigraphy was found to be helpful in interpreting the resistivity measurements. As a rule, however, thawed spots, or layers, in unconsolidated ground are likely to be water-bearing gravel.

Where the overburden is thawed, the problem of determining the location and approximate depth of water-bearing gravel is more difficult, except where the gravel is very thick, or close to the surface. Under favorable conditions water has been located under thawed ground at depths of 80 to 100 feet. The resistivity of water-bearing gravel is higher than that of merely moist gravel or silt, but is much lower than that of frozen deposits.

The geophysical work being done by the Department of Mines is still in an experimental stage; nevertheless, enough has been accomplished to prove that geophysics has a definite and an important place in gold prospecting and mining, both placer and lode, and in the detection and estimation of the extent of base-metal ore deposits.

Assay Offices:

The usefulness and importance of the three public assay offices that were established in 1937 at Ketchikan, College and Nome, respectively, have been amply demonstrated during the past biennium. They have been liberally patronized by the public and have served as a definite stimulus to prospecting and development work in the regions served by them. Through the medium of these offices the Department of Mines has been kept constantly advised as to any discoveries of new mineral deposits in the Territory, and by interviews or correspondence with the discoverers has been enabled to assist in appraising the potential importance of such deposits. Whenever the results of these preliminary inquiries have appeared to justify it and the discoverer has desired it a field examination of the deposit has been made by an engineer of the Department of Mines.

At the present time special importance attaches to the discovery and development of deposits of the strategic minerals: Tin, tungsten, antimony, chromium, platinum, mercury, molybdenum, manganese and nickel, all of which occur in Alaska. The public assay offices have been particularly useful during the past year in testing samples of such minerals. It will be noted in the subjoined tabular statement of the mineral determinations made at the assay offices during the past biennium that the number of samples of strategic minerals that have been submitted for assaying has increased substantially during the past year.

Mineral Determinations Made at Territorial Assay Offices

Year 1939

Substances Determined	College	Ketchikan	Nome	Total
Gold-Silver	2,279	1,446	451	4,176
Copper	38	32		70
Lead	38	25	9	72
Zinc	34	25		59
Platinum	16			16
Molybdenum	6	5		11
Antimony	12		18	30
Tungsten	21			21
Tin	7	2	3	12
Chromium	6	3		9
Miscellaneous*	15	30		45
Water analyses	52			52
Identifications	174	59	27	260
	2,698	1,627	508	4,833
Year 1940				
Gold-Silver	1,918	1,185	309	3,412
Copper	30	13		43
Lead	14	6		20
Zinc	8	4		12
Platinum	6			6
Molybdenum	17			17
Antimony	23	3	2	28
Tungsten	8		2	10
Tin	43	3		46
Chromium	86			86
Miscellaneous*	226	4	67	297
Water analyses	61			61
Identifications	261	78	47	386
	2,701	1,296	427	4,424
Total for the biennium	5,399	2,923	935	9,257

*—Includes alumina, arsenic, barium, beryllium, bismuth, bullion, cadmium, calcium, cobalt, fluorine, iron, lime, magnesium, manganese, mercury, nickel, phosphorus, potassium, strontium and tellurium.

Mining Extension Courses (In Cooperation with University of Alaska):

During the past three years the Department of Mines has cooperated with the University of Alaska by undertaking on its behalf the giving of an extension course in mineral identification and mining to prospectors and other interested persons at Nome. This course is given by Aben Shallit, assayer-in-charge and field engineer of the Department of Mines at Nome, who is temporarily transferred to the University staff for the necessary period during the winter months. The response to this offer of training has been gratifying. The course affords a valuable source of education to the participants during a period of the year when winter conditions enforce comparative idleness on many who are associated with and interested in mining and prospecting on Seward Peninsula.

NEEDS AND RECOMMENDATIONS

Prospecting:

More extensive, better directed and better financed exploratory, prospecting and development activity is the primary need of the mining industry in Alaska. This is essential to the maintenance of its present productive prosperity and its future normal growth. Too great a percentage of the efforts and resources of mining operators of the Territory is being devoted to the sole task of extracting mineral wealth from developed reserves and far too little to the search for and testing of new deposits that will be needed to replace those currently being depleted with ever increasing rapidity.

This problem is being met in certain portions of Canada by syndicates organized for the purpose and by some of the larger mining companies. One large mining company regularly maintains a corps of experienced prospectors in the field at widely scattered and often remote localities where geologic conditions are thought to be favorable for the occurrence of mineral deposits. These prospectors are paid a monthly salary and are assured of a liberal cash purchase price plus a substantial share in any productive mining enterprise that results from their discoveries. The company maintains at its own expense a fleet of airplanes that are used for transporting and keeping in touch with the prospecting parties and for supplying them with provisions and equipment. Serious consideration of the feasibility of adopting some such plan is recommended to the mining operators of Alaska and especially to those who are now reaping the greatest benefits from productive operations in the Territory.

A well directed prospecting program having for its principal aim the discovery and development of additional deposits of the strategic minerals, nearly all of which are known to occur in Alaska, if undertaken promptly and with liberal support might reveal important supplies of at least some of these minerals and thus contribute substantially in meeting the nation's present needs.

Geologic Maps and Reports:

Geologic maps and reports are indispensable to the prospector and field engineer in their search for mineral deposits. Splendid service has been rendered to Alaska by the U. S. Geological Survey in furnishing for general distribution such maps and reports over a period of many years. However, during recent years funds available to the Survey for continuing this service on the needed scale have been inadequate. Many of the excellent maps and reports that have been issued in the past covering the Territory's most important mineralized regions have for several years been out of print and are no longer available for the use of the public except by consultation at libraries in the larger cities. Among the important maps and reports of which the supply has become exhausted are those relating to the Juneau Gold Belt, the geology and mineral resources of Southeastern Alaska, the Sitka district and the west coast of Chichagof Island, the Porcupine district, Prince William Sound, Kenai Peninsula, Fairbanks district, Fortymile region, and several sections of Seward Peninsula, including the Nome district. To serve their purpose these publications should be readily and continuously available to the individual so that he may take them with him on his exploratory and prospecting expeditions. It is recommended that the Legislature memorialize the Congress to appropriate funds adequate in amount and specifically for the purpose of enabling the Geological Survey to reprint and reissue for distribution to the public at cost those maps and reports at least that relate to the districts and areas listed above and also to conduct such field work as may be necessary in the judgment of the Survey to bring such maps and reports up to date.

Safety Measures:

In the sections of this report that deal with mine accidents and mine safety, attention has been directed to the results of a recent study that has been conducted by the Territorial Department of Mines on the trend of accident occurrence during the past decade. This study has revealed that during this period accidents at mines have tended to increase both in frequency and in severity much more rapidly than has the

total number of shifts worked at mines. The study reveals also that a high percentage of mine accidents, including fatalities, have occurred as a result of carelessness and the neglect of simple precaution against hazardous practice or failure to recognize the existence of hazards in his practice on the part of the injured person and often also on the part of the mine officials under whose direction his work was being performed. The number of accidents that have happened from such causes far outnumber those that have resulted from any unsafe physical condition in the mine plant or mine workings. Periodic mine inspection by a law-enforcing agency will not suffice in curing this condition. In order to be effectively solved the problem must be met by the mine officials and their employees jointly, through the adoption of more rigid disciplinary measures where responsibility for unsafe practices and the existence of unnecessary hazards that result in accidents can be fixed either upon an official or upon an employee; by improved supervision over and more careful instruction of the worker in safe methods of performing his individual tasks; through a thorough and immediate investigation of the cause of each accident by a safety committee and also by a safety engineer if one is employed, and by applying the findings in the prevention of similar conditions, and by cordially supporting and participating in the safety training program offered by the U. S. Bureau of Mines to the end that every mine official and employee shall be properly equipped to administer first aid to the injured and to be aware of the hazards and practices that result in accidents. In order to be successful such safety programs must be inaugurated by and be actively participated in by the mine officials in charge of the operation.

The effectiveness of such measures has been amply demonstrated. At the mines of the Phelps Dodge Corporation, whose safety record is enviable, every employee is required to receive safety and first aid training before entering upon his duties for which a skilled trainer is constantly employed. A code has been adopted by this company under which every employee, including officials of all capacities, are disciplined when found responsible for the existence of conditions or for acts and practices that result in an accident. The discipline usually consists in laying off the offender for periods that

vary in length in accordance with the seriousness of the neglect and degree of responsibility. The severity of the penalty is increased for repeated offenses, with complete dismissal as the maximum. Within the first year after these safety measures were put in effect the number of lost-time accidents that occurred at their principal mine was reduced from over 400, —the number that had occurred during the previous year,— to four, a reduction of 99 per cent. The adoption of similar methods by mining operators in Alaska and cordial cooperation by their employees in all efforts to promote safe practices, including willing acceptance of just disciplinary measures, will go far toward minimizing accidents in our mines.

Transportation:

Facilities for transporting the supplies, equipment and products of mines in the Territory have continued to improve during the past two years, particularly through expansion of airplane service made possible by the construction of new air fields and improvement of existing fields.

By lowering operating costs adequate transportation facilities make it possible to mine lower grade material, which in turn increases minable reserves and results in true conservation by maximum utilization of resources.

As transportation systems are expanded new mineralized areas become accessible for exploration, prospecting and development and continued progress of the mining industry is thus more definitely assured.

The local representatives of the Federal road and trail-building agencies have continued in their efforts to improve their valuable services to the mining industry in such degree as limited funds and restrictive regulations by which they are controlled have permitted.

Larger appropriations have enabled the Territorial Highway Engineer to give increased assistance to scores of mining operators in providing and improving transportation facilities needed for the success of their operations.

A particularly valuable contribution that has been made by the Territorial Highway Engineer during the past year is

the proposal of a well coordinated system of new roads that would link together the existing internal highways of the Territory and provide a new tidewater terminus for the whole system at Haines in Southeastern Alaska. If this plan were adopted and the proposed highways constructed, extensive known mineralized regions now relatively inaccessible would be opened for exploration and development. The plan is heartily indorsed and its execution as speedily as funds for the purpose can be made available is recommended.

THE MINING INDUSTRY

GENERAL STATEMENT

The most productive years in the annals of mining in Alaska were the three years from 1915 to 1917, inclusive, which marked the period of maximum production from the mines of the Kennecott Copper Corporation. Annual production reached its highest peak in the year 1916 when the total value of all minerals produced was $48,387,000. Of this total $29,484,000, or 61 per cent, represents the value of the copper ores that were mined and shipped during that year. The remaining 29 per cent represents the combined value of gold and all other minerals produced during the same period. Over one-fourth of all mineral wealth that Alaska has produced came from the Kennecott group of copper mines, the total value of whose output was in excess of $220,000,000. These mines, together with the railway line approximately 200 miles in length that served them, were dismantled and permanently abandoned at the beginning of the past biennium. The value of copper produced in Alaska fell from $7,717,000 for the biennium ended December, 1938, to $38,000 for the past biennium, and the output for the year 1940 fell to an estimated value of only $7,900.

This great loss that was sustained through the cessation of copper mining was compensated to a surprising degree, however, by the augmented output of other minerals during the past two years; notably gold, platinum metals and coal.

New record values for the annual ouput of gold have been set during each of the past three years, and the output for the year 1940 exceeded that of the previous high year by $3,600,000, according to the preliminary estimate of the U. S. Bureau of Mines.

Alaska contributes 13 per cent of all gold mined in the United States and its output is exceeded in value by that of California and the Philippine Islands only.

Among lode-gold mines of the United States, exclusive of

the Philippines, the Alaska Juneau property ranks first in tonnage output of ore and also in low per-ton cost of production; and second in the value of its output, in which respect it is surpassed by the Homestake mine in South Dakota.

For the past three years the Independence mine in the Willow Creek district has taken the rank of 11th greatest produced of lode-gold in the United States.

Alaska also holds first rank in the United States in the production of the strategic minerals antimony, platinum and tin. In the field of strategic minerals it is now also producing mercury in significant amount and is a potential producer of chromium, molybdenum, nickel and possibly tungsten.

An unfavorable feature of the present situation in the industry is the extent to which maintenance of the present high level of production depends upon placer mining operations. Although no serious diminution of output from this source in the immediate future is anticipated, installation of additional dredges and other mechanical mining equipment and increased efficiency in the operation of plants now in use will be responsible for the sustained output rather than any increase in reserves of minable material. As has been emphasized in previous reports on the condition of the mining industry, discovery and development of new mineral reserves in the Territory during recent years have not been keeping pace with the increasingly rapid extraction of minerals from those already known and developed. This is a very unhealthy condition in an industry that is based upon an exhaustible and unreplenishable resource and the inevitable disastrous result of its continuance is obvious.

Lode Mining:

Although the number of active lode mining properties in the Territory has increased by 35 during the past biennium the number of producing mines has decreased by twelve, and the number of men employed at productive mines was 210 less in 1940 than in 1938. During the same period lode properties under development have increased in number from 31 to 78 and the number of men employed from 161 to 289.

The value of the gold output from lode mines was $360,000 less in 1940 than that produced in 1938. The decrease in productive lode-gold operations took place principally among the small mines of Southeastern Alaska, Prince William Sound and to a lesser extent in the Fairbanks district. The most notable advance in gold-lode mining activity occurred in the Willow Creek mining district of the Third Division, where production, development activity and employment at mining properties all increased substantially. Particularly noteworthy was the growth in importance of the Independence Mine of the Alaska Pacific Consolidated Mining Co., which during the biennium took rank as the eleventh largest gold producing mine in the United States.

As heretofore has been the case for many years, however, the major portion of the lode-gold production of the Territory has been derived during the biennium from the operations of the Alaska Juneau Gold Mining Co., at Juneau, from which 62 per cent of the total yield came in 1939. Although final figures on the production of gold from the Alaska Juneau mine are not yet available for the year 1940, a preliminary estimate indicates that its value will probably fall below that for the year 1939 by about $230,000; and that the output for the biennium will have a value of approximately $1,691,000 less than that for the biennium 1937-1938. The Alaska Juneau mine continued to maintain its rank of second in value of output among the lode-gold mines of the United States,* outside of the Philippines, as well as first in point of tonnage of ore mined and in low cost per-ton of ore production.

Among other noteworthy occurrences in the field of gold-lode mining during the year were the expanded development operations at deeper levels of several mines in the Willow Creek and Fairbanks districts particularly and the success in increasing ore reserves that attended these developments. Two new gold-lode properties that give promise of becoming important mines reached the productive stage during the biennium. These were the Ryan lode of the Bartholomae Oil Co. on Ester Dome in the Fairbanks district, and the Golden Zone mine near Colorado station in the Broad Pass district.

*—U. S. Bureau of Mines, Mineral Year Book, 1940.

During the biennium ended December 31, 1938, there was produced in Alaska copper ore whose total value was $7,717,000, and in the mining of which about 200 men were employed. As a result of the permanent closing of the mines of the Kennecott group in the fall of 1938, the production of copper in the Territory practically ceased and there appears to be no likelihood of a resumption of copper mining on a substantial scale within the near future.

No ores chiefly valuable for their content of lead and silver are mined in Alaska except intermittently in small lots. However, substantial amounts of these metals have been produced as by-products in the treatment of ores whose greatest value has been in the gold or copper contained in them. There was a pronounced decrease in the value of the output for the past biennium of both lead and silver, especially the latter. In the case of lead the decrease reflects largely the lowered production of the Alaska Juneau mine, from which nearly the entire output comes. The value of the silver produced during the past two years is only slightly over one-third of that produced during the preceding biennium. This heavy reduction is due mostly to the cessation of operations by the Kennecott Company whose copper ores carried a very substantial amount of silver. A part of the reduction was also due to the lowered output of the Alaska Juneau mine.

Alaska occupied the rank of first in the United States in order of value of antimony ore produced during the year 1938, and second in quantity of output, in which it was surpassed only by Idaho.* The output during the past two years has been substantially less, however, and this rank may not have been maintained. At the present time the Alaska ores are nearly all mined at the Stampede Creek property of Morris P. Kirk & Sons in the Mt. McKinley section of the Nenana precinct, where a concentrating mill was installed during the year 1939. There are many properties in various sections of Alaska that are capable of producing limited quantities of antimony and the listing of that commodity as one of the strategic metals in the national defense program has stimulated interest in them. It is probable that new production in

*—U. S. Bureau of Mines, Mineral Year Book, 1940.

small lots will be made from at least some of these properties in the near future.

During the year 1940 production of mercury in significant quantity was commenced after many years during which the known cinnabar deposits of Alaska were unproductive. This resumption of productivity was due to the high prevailing market price of quicksilver which justified the installation of two new retorts which were placed in operation rather late in the year at the Red Devil property on Barometer Mountain near Parks in the central Kuskokwim River region. The grade of the ore found on this property which was discovered rather recently is substantially higher than that on properties from which production came when cinnabar was mined and retorted in nearby regions many years ago. The relative importance of the Red Devil property as compared with the older properties from which former production has come is indicated by the fact that during the few months of 1940 that followed the installation of the retorts above mentioned more quicksilver was produced than the entire recorded past output of all other properties in Alaska combined.

During the past year new retorts were also shipped to a lode cinnabar deposit situated on the shore of Bering Sea near Bluff and to the Hudson cinnabar lode near Livengood. At the latter property old workings that had caved were cleared out and samples were taken of the cinnabar-bearing vein in place. No additional new development work has been done at the Bluff property and at neither locality has production of quicksilver been made, according to last reports received.

During the year 1940 an intensive and detailed examination of the deposits of nickeliferous ores that for many years have been known to exist on Yakobi Island and at a nearby locality on the West coast of Chichagof Island in Southeastern Alaska was carried on by a field party of the U. S. Geological Survey. The entire field season was devoted to this work, which formed a part of the Government's program of investigating possible sources of supply of strategic minerals. Detailed topographic and geologic mapping of the mineralized areas was conducted but a report on the results of the investigation has not been made public. Necessarily the exam-

ination was confined to surface observations, which are often rendered difficult and inconclusive in this region by the presence of overburden, dense vegetation and forest growth. Subsurface exploration of some type will be required to obtain full knowledge of the extent and value of the deposits. In spite of the fact that these deposits have been privately held for many years through the repeated location of large groups of claims, the amount of underground work done upon them is negligible.

Within the biennium a contract was let by the U. S. Treasury Department, Procurement Division, for delivery under the Strategic Minerals Act of 25,000 tons of high grade chromite ore that was to have been mined at the Red Mountain deposits on Kenai Peninsula, southeast of Seldovia. Unfortunately the existence of deep snow over the deposits, the outcrops of which lie at altitudes of 3,000 feet or more above sea level, together with lack of transportation facilities prevented the sampling necessary before surface mining could properly be undertaken. For these reasons the time limit fixed by the contract within which delivery of the ore was to have been made expired before even sampling operations had been commenced and the contract was accordingly cancelled and the project collapsed. The Kenai Peninsula chromite deposits are known to be of commercial grade and extent and they form a valuable reserve of this strategically important commodity which can be made available with relative ease if and when the demand is sufficient to justify the development and mining expense involved. Other deposits of chromite ores are known to exist on Mt. Burnett on Cleveland Peninsula in the Ketchikan precinct and at Red Bluff Bay on the East coast of Baranof Island in Southeastern Alaska. However, their suitability for commercial development under existing conditions has not yet been demonstrated.

Placer Mining:

Expansion of operations in placer mining was very pronounced during the past two years, and in keeping with the trend that has been in evidence for several years this expansion was particularly marked in the field of mechanized operations. At the close of this biennium there were 70 more

placer plants that were using some form of mechanical equipment, including dredges, draglines, bulldozers, scrapers, elevated washing plants, pumps, etc., and 1093 more men were employed at such plants, than there were at the close of the preceding biennium.

There were seven more dredges in operation in 1940 than there were in 1938 and the number of men employed at dredging plants had increased by 622 during the biennium.

The most important new installation completed during the biennium was that of the Cripple Creek dredge that was placed in operation during the latter part of the year 1940 by the U. S. Smelting, Refining & Mining Co. in the Ester Dome area. This dredge operates in very deep ground from which the overlying barren gravels have been removed previously by a 12-cu. ft. Moneghan dragline and the upper layers of frozen silt and muck by hydraulic giants. Another new dredge that was assembled on the ground in 1938 was put in active operation by the same company on Pedro Creek, a tributary of Goldstream in the Fairbanks area. Two other new connected-bucket line dredges were built and became productive in 1940; one by Livengood Placers, Inc., at Livengood in the Yukon-Tanana region and one by the American Creek Dredging Co., on American Creek, an upper tributary of the Niukluk River in the Cape Nome precinct, Seward Peninsula. On Seward Peninsula also, Lee Brothers, whose operations are on upper Solomon River, placed a second dredge in operation during the season of 1940. This dredge was rebuilt from equipment that was salvaged from an abandoned dredge formerly operated by another company lower down on Solomon River but which had been idle for many years.

A distinct innovation in the field of dredging in Alaska was the placing in operation of an entirely new type of plant known as the Becker-Hopkins single-dipper dredge. The original machine which was the first of its kind to be manufactured, was built and placed in operation during the season of 1939 by the Triple X Mining Company on its property in Moose Creek in the western Bonnifield region. The performance of this dredge is reported to have been very gratifying and a second machine of improved type was built and placed in

operation in 1940 on Eva Creek in the same region by the Standard Mines, Inc., whose operations are under the same management. The distribution of dredging operations is shown in Table VII.

Mechanized placer plants other than dredges increased in number during the biennium from 99 to 162 and the number of men employed increased from 909 to 1380. At the close of the year 1938 there were 50 draglines in use in the Territory and during 1940 there were 54. The distribution of these mechanized operations is set forth in Tables VIII and IX.

The value of gold produced from placers during the biennium was about $6,500,000 more than that produced during the preceding biennium.

Although Alaska produces nearly all of the tin mined in the United States the quantity and value of the output are very small. Furthermore, production, which has been confined to one small property near Cape Prince of Wales at the westerly tip of Seward Peninsula, has declined rapidly during the past two years. The estimated output for the biennium is only slightly more than one-fourth that for the preceding two years and its value is estimated to be only $83,300.

Minerals Year Book 1940, issued by the U. S. Bureau of Mines, states:

> "Early in 1940 it was reported that prospect drilling at the properties of the American Tin Fields, Inc., failed to disclose substantial new deposits and at the present rate of production commercial gravels would be exhausted within 4 or 5 years."

Tin ranks very high among the strategic materials in which the United States is deficient and great efforts are being made to increase our domestic supply. In line with this policy field parties of the U. S. Geological Survey devoted the open seasons of the past two years on an intensive surface geologic examination of the potential tin bearing areas of the western part of Seward Peninsula. The results of these examinations have not been announced, nor is it yet known whether the Federal Government will follow them up by undertaking the task of determining potential quantities of minable

tin-bearing materials by sub-surface development, as has been done recently by the U. S. Bureau of Mines in the search for supplies of strategic minerals in the States.

It is reported that plans are being made to launch a private enterprise in the development of the tin deposits in the vicinity of Ear Mountain on Seward Peninsula and that preliminary testing of the ground has already been carried on in an effort to secure financial assistance in the form of an R. F. C. loan.

Small quantities of high-grade tin concentrate have for many years been recovered as a by-product from the mining of placer gold in the Hot Springs and Ruby districts of the Yukon Basin. The occurrence is known of tin in placer form at several other widely separated localities in Alaska and it is possible that under the stimulus of the present demand additional deposits of minable material will be revealed as a result of the intensified search for them that is anticipated.

Alaska possesses the only important deposits of metals of the platinum group that are found in the United States. Large scale production of platinum metals commenced in the Goodnews Bay region near the mouth of the Kuskokwim River when dragline plants were placed in operation there in the year 1935. A further spectacular increase in production occurred in the year 1938 that resulted from the operation of a large dredge that had been built on Salmon River the year before. During the past two years production from this district has totaled $2,089,000, an increase of nearly a half million dollars over that of the preceding biennium. As a result of this large Alaska output the United States holds the rank of fourth largest producer of platinum metals in the world.* Dime Creek in the Koyuk district on Seward Peninsula continued to yield a small output of placer platinum. This stream has been a minor source of the metal for many years.

Coal Mining:

The two mines that for many years have furnished most of the coal mined in Alaska continued to produce steadily dur-

*—U. S. Bureau of Mines, Mineral Year Book, 1940.

ing the biennium, and during the year 1940 operated on a larger scale than heretofore. These are the Jonesville mine of the Evan Jones Coal Company in the Matanuska field and the Suntrana mine of the Healy River Coal Company in the Nenana field.

The Jonesville mine supplies the bituminous coal that is used as locomotive fuel on The Alaska Railroad, and also supplies the commercial market at towns along the railway line south of Broad Pass as well as those along the coast, including Cordova, Valdez and Kodiak. The Suntrana mine furnishes the subbituminous coal that supplies the needs of all communities and mining camps north of Broad Pass and along the Tanana and Yukon Rivers, as well as the large power plant that generates the electric power used in the extensive dredging operations of the U. S. Smelting, Refining & Mining Co. in the Fairbanks region.

Notable improvements were made during the past year in the surface plant at the Suntrana mine, which is a model camp in every way. These improvements included a mine fan of large capacity that will provide adequate ventilation for the extensive new underground workings that are contemplated; and a commodious new steam-heated bunk house that has just been completed, which augments the already excellent housing facilities available for the mine crew.

Both of the coal mines worked continuously at full capacity during the past year, within which production surpassed all previous records. The visible market for coal expanded greatly during the year as a result of the increased population and activities that attended the construction of the military and naval bases at Fairbanks, Anchorage, Kodiak and Dutch Harbor, and it is evident a still further material increase in the tonnage of coal mined in Alaska will be necessary during the coming year in order to meet the market requirements. Two new coal mining projects are at present being contemplated, one of which is in the Matanuska field and the other in the Broad Pass field.

Quarries:

Lime rock was the only non-metallic mineral product produced from quarries during the past biennium. Although the output of this material made during the year 1940 at the quarry of the Superior Portland Cement Co. at View Cove, on Dall Island was somewhat less than that for 1939, the total output during the biennium exceeded that of the preceding one by about 75,000 tons. The product of this quarry is shipped to the company's important plant in Seattle where it forms raw material for the manufacture of cement that is widely used on the Pacific Coast and in Alaska.

The quarry of the Vermont Marble Company, situated at Tokeen on the northwest coast of Prince of Wales Island, was dismantled early in the biennium and no further production of marble is to be anticipated from the Tokeen deposits within the near future. For many years this quarry has supplied marble of fine quality that has been used in ornamenting many of the finest buildings on the Pacific Coast, including the Federal and Territorial building in Juneau.

Drilling for Oil:

Both oil-drilling operations that had been active with 98 men employed during the preceding biennium were idle during the past two years.

The plant of the Iniskin Drilling Co. at their well-site on Fitz Creek in the Chinitna Bay district remains intact and it is reported that resumption of drilling there is being considered.

The extensive and very valuable camp that had been erected by the Standard Oil Company of California at the head of Salmon Creek, a tributary of Becharof Lake on the north slope of the Alaska Peninsula, was dismantled in the spring of 1939 and the well, which had been carried to a great depth, was plugged and capped. A regrettable feature of the abandonment operations was the wrecking and burning of the well constructed camp buildings, which might have served many useful purposes had they been left intact in the remote regions in which they were situated.

R. F. C. Mining Loans:

Some of the most important mining enterprises to be launched in Alaska during the past few years have been financed through mining loans that have been advanced by the Reconstruction Finance Corporation. These enterprises include the dredging operations of the Goodnews Bay Mining Company in the platinum field of Salmon River and its tributaries and the gold-dredging operations of the Alluvial Golds, Inc., on Woodchopper Creek in the Circle district. During the past biennium another major mining enterprise that was financed by the R. F. C. became productive. This was the gold-dredging operation of Livengood Placers, Inc., a subsidiary of the Callahan Zinc Lead Company of Wallace, Idaho. The loan granted to this company was approved in the sum of $1,350,000.

A loan in the sum of $40,000 is reported to have been made during 1940 to A. S. Crane and Irving McK. Reed of Fairbanks, whose gold placer mining property is in the Rampart district.

No authentic information has been received of any mining loan having yet been granted by the R. F. C. for operations on deposits of strategic minerals in Alaska. However, it is understood that preliminary investigations have been made of tin deposits in the Ear Mountain section of Seward Peninsula by private persons in anticipation of the granting of an R. F. C. loan for launching a productive enterprise if the preliminary tests prove favorable.

PRODUCTION

In the following two tables is displayed the trend of production of mineral commodities both within the biennium ended December 31, 1940, and in comparison with the preceding biennium. Subsequent to the preparation of these tables a press release issued by the Department of the Interior, Bureau of Mines, under date of January 21, 1941, has been received which announces their preliminary estimate of the amount and value of the gold produced in Alaska during the year 1940 "in terms of recoverable metal" to be 765,200 fine

ounces, valued at $26,782,000. The production figures for the year 1940 that were used in preparing the following tables are based on the preliminary estimate released by the Department of the Interior Geological Survey, under date of January 1, 1941. It will be noted that the Bureau of Mines estimate above given exceeds that of the Geological Survey by 40,200 fine ounces in quantity and by $1,407,000 in value. Corrections in those amounts to all of the figures used in the subjoined tables Numbers I and II that involve the estimate of gold produced in the year 1940 will therefore be required if the Bureau of Mines estimate proves to be more accurate than that of the Geological Survey.

TABLE I*

Summary of increases and decreases in the value of the various minerals produced in Alaska during the biennium ended December 31, 1940, as compared with the preceding biennium:

Commodity	Increase	Decrease
Gold	$5,111,000	
Silver		$ 412,000
Copper		7,679,100
Lead		23,800
Tin		208,100
Antimony		38,000
Platinum	462,100	
Coal	128,100	
Lime Rock	12,400	
Mercury	29,300	
Totals	$5,742,900	$8,361,000
Net decrease in production		$2,618,100

The recorded production of each individual mineral commodity for each year of the past two biennia is shown in Table II.

*—Statistics on production used in this report are derived from published reports issued by the U. S. Geological Survey, except those relating to antimony, coal, lime rock and mercury, which were secured from the U. S. Customs Service or from data obtained from original sources by the Territorial Department of Mines.

TABLE II

Value of minerals produced in Alaska during the biennia ending December 31, 1938, and December 31, 1940, respectively:

Values of All Minerals Produced

Year		
1937	$26,888,100	
1938	28,611,400	
Total for Biennium		$55,499,500
1939	$25,283,600	
1940	27,597,800	
Total for Biennium		52,881,400
Decrease in value		$ 2,618,100

Amount and Value of Gold Produced

Year	Fine Ounces	Value	
1937	582,085	$20,373,000	
1938	662,000	23,170,000	
Total for Biennium			$43,543,000
1939	665,115	$23,279,000	
1940	725,000	25,375,000	
Total for Biennium			48,654,000
Increase in value			$ 5,111,000

Amount and Value of Silver Produced

Year	Fine Ounces	Value	
1937	495,000	$ 384,000	
1938	474,940	307,000	
Total for Biennium			$ 691,000
1939	203,500	$ 138,000	
1940	198,300	141,000	
Total for Biennium			$ 279,000
Decrease in value			$ 412,000

Amount and Value of Copper Produced

Year	Pounds	Value	
1937	36,007,000	$ 4,741,000	
1938	29,760,000	2,976,000	
Total for Biennium			$ 7,717,000

1939	256,000	$ 30,000	
1940	70,000	7,900	
Total for Biennium			$ 37,900
Decrease in value			$ 7,679,100

Amount and Value of Lead Produced

Year	Pounds	Value	
1937	2,004,000	$ 120,400	
1938	2,224,000	105,400	
Total for Biennium			$ 225,800
1939	2,120,000	$ 106,000	
1940	1,920,000	96,000	
Total for Biennium			202,000
Decrease in value			$ 23,800

Amount and Value of Tin Produced

Year	Pounds	Value	
1937	372,000	$ 202,300	
1938	210,640	89,100	
Total for Biennium			$ 291,400
1939	74,000	$ 37,300	
1940	92,200	46,000	
Total for Biennium			83,300
Decrease in value			$ 208,100

Amount and Value of Antimony Produced

Year	Pounds	Value	
1937	1,060,532	$ 44,700	
1938	830,000	26,400	
Total for Biennium			$ 71,100
1939	304,000*	$ 12,500	
1940	560,000*	20,600	
Total for Biennium			33,100
Decrease in value			$ 38,000

Amount and Value of Platinum Metals Produced

Year	Fine Ounces	Value	
1937	8,131	$ 397,600	
1938	34,420	1,229,300	
Total for Biennium			$ 1,626,900

1939	27,230	$ 997,000	
1940	28,860	1,092,000	
Total for Biennium			2,089,000
Increase in value			$ 462,100

*—U. S. Customs

Amount and Value of Coal Produced

Year	Short Tons	Value	
1937	131,600	$ 552,700	
1938	159,230	620,900	
Total for Biennium			$ 1,173,600
1939	146,250	$ 585,000	
1940	179,180	716,700	
Total for Biennium			1,301,700
Increase in value			$ 128,100

Amount and Value of Lime Rock Produced

Year	Tons	Value	
1937	129,544	$ 72,400	
1938	102,707	86,600	
Total for Biennium			$ 159,000
1939	176,910	$ 98,800	
1940	129,776	72,600	
Total for Biennium			171,400
Increase in value			$ 12,400

Amount and Value of Mercury Produced

Year	Flasks	Value	
1937		$	
1938	10	700	
Total for Biennium			$ 700
1939			
1940	151	$ 30,000*	
Total for Biennium			$ 30,000
Increase in value			$ 29,300

*—Estimated value.

MINING OPERATIONS

All Mines:

The distribution by judicial divisions of mining operations of various types, both active and inactive, during the biennium ended December 31, 1940, and the average number of men employed at active mines, are exhibited in the following Table No. III.

A comparison of conditions with respect to the number of active properties of all types and crews employed at the close of the past biennium with similar conditions at the close of the preceding biennium is set forth in Table No. IV.

Lode Mining:

The extent of lode mining as indicated by the number of producing mines and the number of properties under development, together with the number of men employed during the year 1940, in each judicial division is shown in Table No. V, and shipping mines are listed in Table No. VI.

Placer Mining:

The extent and distribution of dredging and other types of placer mining operations throughout the Territory at the close of the past biennium are summarized in Tables Nos. VII, VIII and IX.

TABLE III

List of Mining Operations by Divisions

Type of Operation	Year 1939 Total Number	Active	Inactive	Men Employed at active Mines	Year 1940 Total Number	Active	Inactive	Men Employed at active Mines
First Division:								
Lode	55	28	27	1,203	59	36	23	1,213
Placer	3	3	.	22	4	4	....	34
Non-metallic	2	2	....	30	1	1	....	20
Second Division:								
Lode	4	3	1	6	10	8	2	15
Placer	113	102	11	537	119	108	11	538
Dredges	27	24	3	632	28	24	4	490
Non-metallic	2	2	....	2	....	....	....	.....
Third Division:								
Lode	54	40	14	502	48	37	11	552
Placer	59	51	8	285	61	52	9	280
Coal mines	4	3	1	46	5	3	2	60
Oil	3	2	1	97	....	....	....	.....
Fourth Division:								
Lode	46	40	6	176	52	42	10	177
Placer	369	341	28	1,555	353	332	21	1,449
Dredges	28	28	....	1,045	29	28	1	1,415
Coal mines	2	2	....	51	1	1	....	59
	771	671	100	6,189	770	676	94	6,302

TABLE IV

Comparison of Mining Operations for Two Biennia
Listed by Types

Type of Operation	Biennium Ended 1938 Number of active Mines	Men Employed	Biennium Ended 1940 Number of active Mines	Men Employed	Increase Mines	Increase Men	Decrease Mines	Decrease Men
Lode mines	88	2,039	123	1,957	35	....	....	82
Placer mines (other than dredges)	464	2,018	496	2,301	32	283	....	....
Dredges	45	1,283	52	1,905	7	622	....	....
Coal mines	4	123	4	119	....	...	....	....
Non-metallic	....	....	1	20	1	20	....	....
Oil drilling	2	98	....	....	....	....	2	98
Miscellaneous	....	198	....	63	....	...	....	135
Totals	603	5,759	676	6,365	73	606	....	.....

TABLE V

Distribution of Active Lode Operations by Judicial Divisions

Year 1940

Judicial Division	Productive (with mills) Number	Men	Under Development Number	Men
First Division	10	1,129	26	84
Second Division	3	7	5	8
Third Division	19	421	18	131
Fourth Division	13	111	29	66
Totals	45	1,668	78	289

Total number of active operations 123
Total number of men employed 1,957

TABLE VI

List of Mining Companies That Shipped Ores or Concentrates to Outside Smelters During Biennium 1939-40

Division	Company	Nature of Ore or Concentrate
First		
	Alaska Empire Gold Mining Co.	Sulphide—concentrate: Gold, Silver, Lead, Zinc
	Alaska Gold & Metals Co.	Sulphide — concentrate: Palladium, Copper, Gold
	Alaska Juneau Gold Mining Co.	Sulphide—concentrate: Gold, Silver, Lead, Zinc, Copper
	Apex El Nido Mining Co.	Sulphide—concentrate: Gold, Silver
	Cantu Mining Co.	Ore: Gold, Silver, Lead
	Chichagoff Mining Co.	Sulphide—concentrate: Gold, Silver
	Flagstaff Mining Co.	Sulphide—concentrate: Gold, Silver, Lead, Copper
	Gold Standard Mine (Folswarzny & Associates)	Sulphide—concentrate: Gold, Silver
	Hirst Chichagof Mining Co.	Sulphide—concentrate: Gold, Silver
	Kasaan Gold Mine (Wendell Dawson)	Sulphide—concentrate: Gold, Silver
	Nelson & Tift	Sulphide ore: Gold, Silver, Pyrite

Second		
	American Tin Fields, Inc.	Tin oxide concentrate
	U. S. Smelting, Refining & Mining Co. (Nome operations)	Black sands: Gold, Silver
Third		
	Alaska Pacific Consolidated Mining Co.	Sulphide—concentrate: Gold, Silver, Lead, Copper
	Cliff Gold Mines, Inc.	Sulphide—concentrate: Gold, Silver
	Crow Creek Gold Corp.	Sulphide—concentrate: Gold, Silver
	Gold Cord Development Co.	Sulphide—concentrate: Gold, Silver, Lead, Copper
	Fern Mine (Fern Gold Leasing Co.)	Sulphide—concentrate: Gold, Silver, Lead, Copper
	Gold Mint Mine (Johnson & Associates)	Sulphide—concentrate: Gold, Silver
	Golden Zone Mine, Inc.	Sulphide—concentrate: Gold, Silver, Lead, Copper
	Lindsley, Geo.	Sulphide—concentrate: Gold, Silver
	Mabelle Mines, Inc.	Sulphide—concentrate: Gold, Silver
	Nabesna Mining Corp.	Sulphide—concentrate: Gold, Silver, Lead, Copper, Zinc
	New Hope, Inc.	Ore: Gold, Silver
	Oracle Mine	Sulphide—concentrate: Gold, Silver
	Portage Gold Mines, Ltd.	Sulphide—concentrate: Gold, Silver, Lead
	Superior Mines, Inc.	Sulphide—concentrate: Gold, Silver
	United Mining & Development Co.	Sulphide—concentrate: Gold, Silver
	Willow Creek Mines	Sulphide—concentrate: Gold, Silver
Fourth		
	Bartholomae Oil Corp.	Sulphide—concentrate: Gold, Silver
	Cleary Hill Mines, Inc.	Sulphide—concentrate: Gold, Silver
	Hi Yu Mining Co.	Sulphide—concentrate: Gold, Silver
	Morris P. Kirk & Sons, Inc.	Sulphide—antimony ore
	Nickaloff Mines, Inc.	Sulphide—concentrate: Gold, Silver
	Red Top Mining Co.	Sulphide—concentrate: Gold, Silver
	U. S. Smelting, Refining & Mining Co. (Fairbanks operations)	Black sands: Gold, Silver

TABLE VII

Distribution of Dredges by Divisions and Precincts

Year 1940

Second Division:

Precinct	Number of dredges	Number of men
Cape Nome	11	406
Council	6	44
Fairhaven	4	202
Koyuk	1	6
Port Clarence	1	15
St. Michael	1	9
Sub-total	24	682

Fourth Division:

Precinct	Number of dredges	Number of men
Bethel	2	37
Circle	3	117
Fairbanks	8	681
Fortymile	2	47
Goodnews Bay	2	59
Hot Springs	1	23
Innoko	4	43
Nenana	2—Dipper	12
Otter	2	36
Tolovana	2	168
Sub-total	28	1,223

Total Number of Dredges ... 52

Total Number of Men Employed ... 1,905

TABLE VIII

Distribution of Placer Mining by Judicial Divisions and Types
Year 1940 (Dredges not included)

Division	Mechanical Dragline, Bulldozer, etc. Number	Men	Straight Hydraulic Number	Men	Drift Number	Men	Ground sluice, Shovel-in, Booming Number	Men	Prospecting & Development Number	Men
First	2	17							1	5
Second	45	346	38	119	12	51	6	8	9	14
Third	7	39	34	194	1	23	10	14	3	10
Fourth	108	978	42	103	38	117	70	93	75	158
Totals	162	1,380	114	416	51	191	86	115	88	187

Total number of placer operations ... 501

Total number of men employed ... 2,289

TABLE IX

Active Placer Operations by Types
Biennium 1939-1940 (Dredges not included)

Mechanical plants

	1939		1940	
	Number	Men	Number	Men
Draglines	51	761	54	727
Hydraulic with bulldozers	43	228	51	263
Others	64	428	57	390
	158	1,417	162	1,380
Straight hydraulic	110	428	114	416
Drift mining	69	266	51	191
Ground sluicing, shoveling-in, etc.	81	112	86	115
Prospecting, drilling, etc.	78	176	88	187
Totals	496	2,399	501	2,289

EMPLOYMENT AT MINES

Within the 25-year period just ended employment in the mining industry reached its lowest ebb during the year 1933, when the number of men in the crews engaged at mines of all types aggregated 3,377. The corresponding figure for the year 1940 was 6,363, or nearly double.

A healthy feature of the growth of the mining industry since 1933 is reflected in the uniformity with which the increase in employment within it has taken place, which feature is exhibited in the following table. (Table XI. p. 52)

Of the total number of men engaged during the year 1940, the placer industry employed 67 per cent; the lode mining industry, including two non-metal operations, employed 31 per cent, and coal mines employed 2 per cent. The corresponding percentages for 1938, the closing year of the preceding biennium, were: 60 per cent; 36 per cent; and 2 per cent, respectively. These figures exhibit the more rapid recent growth of the placer mining branch as compared with the lode mining branch of the industry that is also evidenced by other data included in this report.

There was a total net gain during the biennium of 604 in the number of men employed at mines of all types as compared with employment at the close of the preceding biennium.

The number of men employed in the placer industry increased by 770 during this biennium, while employment in the lode mining industry decreased by 97 men and that at coal and other mines decreased by 69 men.

The following tabulation exhibits the trend and continuity of employment at all mines during the past two biennia, and those in the placer, lode and coal mining industries separately.

TABLE X

Summary of Trend and Continuity of Employment During Past Two Biennia.

	Biennium Ended Dec. 31, 1938	Biennium Ended Dec. 31, 1940	Increase	Decrease
At All Mines:				
Average number of men	5,472	6,253	781	
Total shifts worked	2,371,832	2,584,630	212,798	
Average shifts worked per man per year	217	226		9
At Placer Mines only:				
Average number of men	3,303	4,084	781	
Total shifts worked	1,182,372	1,401,777	219,405	
Average shifts worked per man per year	179	171		8
At Lode Mines & Mills only:				7
Average number of men	2,014	2,007		43,749
Total shifts worked	1,144,449	1,100,700		
Average shifts worked per man per year	284	272		12
At Coal Mines only:				
Average number of men	108	113	5	
Total shifts worked	53,001	61,093	8,092	
Average shifts worked per man per year	246	271	25	

The importance of the two major operating companies in the matter of employment is evident from the fact that of the total number of men employed at 99 lode mining properties the crew of the Alaska Juneau Gold Mining Company represents over one-half, and of the total number engaged at 549 placer properties the crews of the U. S. Smelting, Refining and Mining Company at Fairbanks and Nome represent approximately one-fourth.

The trend of employment in the mining industry during the past 25 years is exhibited fully in Table XI below. This table shows a greater number of men employed in mining for the year 1940 than for any year since 1917.

More complete details regarding the distribution of employment at mines will be found in the sections of this report that deal with the progress of mining operations and with accidents at mines, respectively; and in the lists of mining operators and properties that are appended to the body of the report.

TABLE XI.

Employment at Mines, 1914 to 1940, Inclusive

Year	Number of Men Employed at: Placers	Lode Mines & Milling Plants	Coal and Other Mines	Totals
1914	4,400	3,500	140	8,040
1915	4,400	3,850	160	8,410
1916	4,050	4,200	340	8,590
1917	3,550	3,220	270	7,040
1918	3,000	1,897	400	5,297
1919	2,180	1,757	310	4,247
1920	1,990	1,880	360	4,230
1921	2,150	1,681	400	4,231
1922	2,198	1,623	280	4,101
1923	2,080	1,500	270	3,851
1924	2,500	1,978	175	4,653
1925	2,700	1,745	116	4,561
1926	2,332	1,663	108	4,103
1927	2,325	1,930	114	4,141
1928	2,234	1,668	109	4,011
1929	2,354	1,605	89	4,048
1930	2,220	1,502	98	3,820
1931	2,163	1,323	78	3,564
1932	2,180	1,496	78	3,754
1933	2,063	1,246	68	3,377
1934	2,195	1,451	79	3,725
1935	2,323	1,665	89	4,077
1936	2,605	1,867	105	4,577
1937	3,136	1,957	92	5,185
1938	3,470	2,071	218	5,759
1939	3,928	1,986	229	6,143
1940	4,240	1,974	149	6,363

LABOR CONDITIONS

Labor conditions in the mining industry have continued during the biennium generally satisfactory throughout the Territory.

Employment during the past two years was at the highest level that has been reached since 1917, and the total number of miners employed increased by 220 during the biennium.

The Territorial Employment Service continued to perform very valuable services in securing when needed satisfactory employees for mining operators and in placing unemployed applicants in jobs. A shortage of experienced miners was reported by some of the larger mine operators throughout the biennium.

Wage scales for miners appear to have remained substantially the same as during the preceding biennium, although some increases in rates of pay have been reported in sections where competition in the labor market has arisen as the result of the unusual demands created by construction of military and naval bases.

A somewhat greater spread of employment, which evidently has resulted from the application to the gold mining industry of the overtime provisions of the federal Wage and Hour law, has also become evident since that law took effect in October, 1938; and particularly during the past year.

Living conditions at mining camps in Alaska are, with few exceptions, unusually good. Quarters furnished by mine operators generally are comfortable and sanitary and food at most camps is notoriously excellent. One or two complaints were received during the biennium with regard to food and other living conditions at small mines in remote localities, but such complaints have been rare indeed.

Continuous and orderly progress of operations at all mines has continued through the biennium with no interruptions on account of strikes or other labor disturbances. The industry was also free from the disturbing and costly effects of interrupted shipping that hampered mining operations and

development during the preceding two years as a result of maritime strikes.

Labor union representatives were successful during the biennium in organizing the employees of the U. S. Smelting, Refining and Mining Company at Fairbanks with the result that the local union affiliated with the C. I. O. received recognition by the National Labor Relations Board as the accredited bargaining agency for the employees of that company. This local is the first labor union to be organized in the placer mining industry of Alaska.

Office of Labor Commissioner:

By an Act which for many years has been regarded as a "dead letter," the Territorial mine inspector was designated "Ex-officio Labor Commissioner."

No funds have been appropriated by the Legislature for carrying on the functions of that office since the year 1924.

The authority granted by this act is restricted to the preparation of certain statistical data and the enforcement of limited sanitary regulations at canneries and the like that are now promulgated and administered by the Department of Health.

During the past two years the Commissioner of Mines, who has legally fallen heir to the moribund office of labor commissioner, has received a number of appeals for assistance in collecting wages claimed to be due and unpaid in amounts too small to justify court action, and has also been asked to adjust similar disputed or unpaid compensation claims for injuries sustained by mining and other employees. Two cases were presented where checks were received in payment of wages that were found to be worthless when presented at a bank for payment.

In all of these cases the Commissioner of Mines has endeavored to give such assistance as was possible, but this was usually limited to giving the advice that it would be necessary for the aggrieved person to bring suit in court in order to secure settlement of his claim. In many of the cases presented the claimant had left the jurisdiction of the court in which action

would have to be brought and was financially unable to incur the expense of filing suit.

Obviously, some remedy for this situation should be provided, as has been recommended by the Attorney General in his report to the Legislature.

SAFETY TRAINING AT MINES

Within the past two years all operators of mines in Alaska have been communicated with either by mail or in person by a resident representative of the Safety and Health branch of the United States Bureau of Mines, in an effort to acquaint the operators and their employees with the safety training service that is available to them. This service includes not only practical training in administering first aid to the injured, but also instruction in recognizing hazards that may lead to injuries and fatalities and the best methods to employ in minimizing and avoiding such hazards. The effectiveness of such training in accomplishing the ends sought has been amply demonstrated in Alaska, as well as throughout the United States. In one Alaska mine alone the saving of seven lives in a single year was attributed by the manager of the mine to the safety training received by his employees from the U. S. Bureau of Mines instructor during the preceding year. Unquestionably an enormous amount of suffering also has been abated through the application of proper first aid methods that have been taught to a limited percentage of the miners of the Territory.

In this work the Territorial Department of Mines has cooperated with the U. S. Bureau of Mines in every possible way and has assisted in making arrangement for the conduct of safety training at as many mines as possible.

Instruction in mine rescue training has not been attempted during the past two years, owing to a lack of sufficient available funds to properly carry on that work. If another coal mine explosion, serious underground fire or similar disaster should occur in the Territory, there would not be available at the present time the equipment and trained crews

that would be required in order to rescue promptly any victims that might be alive in the mine. Another effort is now being made to secure for the Bureau of Mines sufficient additional funds to enable their local safety representatives to remedy this situation.

Valuable assistance was rendered by the Bureau's safety instructor in sealing the mine workings that were affected by the extensive underground fire that occurred at the Suntrana mine of the Healy River Coal Corporation in 1939.

There follows a resume of the first-aid training program carried out by the U. S. Bureau of Mines safety instructor during the past two years.

During 1939 training was conducted for the following organizations and a total of 216 men completed the prescribed course in first-aid training:

Adler Mine	Happy Creek, Alaska
Cleary Hill Mines, Inc.	Cleary, Alaska
Healy River Coal Corp.	Suntrana, Alaska
New York-Alaska Gold Dredging Corp.	Nyac, Alaska
U. S. Smelting, Refining & Mining Co.	Fairbanks District
U. S. Smelting, Refining & Mining Co.	Nome District
University of Alaska	College, Alaska

In addition to the number who completed the training, 296 men were partially trained; that is, they failed to attend one or more class periods and were not recommended for certificates. At the University of Alaska 13 men were trained in mine rescue.

In 1940 training was conducted for the following organizations and the prescribed course in first-aid training was completed by 923 men:

Alaska Juneau Gold Mining Co.	Juneau, Alaska
Alaska Pacific Consolidated Mining Co.	Independence, Alaska
Civilian Conservation Corps and U. S. Forest Service	Juneau, Petersburg, Ketchikan, Cordova, Seward, Anchorage, Eklutna, and Fairbanks, Alaska
Cleary Hill Mines, Inc.	Cleary, Alaska
Goodnews Bay Mining Co.	Platinum and Snow Gulch, Alaska
Hirst-Chichagof Mining Co.	Kimshan Cove, Alaska
Lee Brothers Dredging Co.	Solomon, Alaska
New York-Alaska Gold Dredging Co.	Nyac, Alaska
U. S. Smelting, Refining & Mining Co.	Fairbanks District
U. S. Smelting, Refining & Mining Co.	Nome District
Willow Creek Mines, Inc.	Luckyshot, Alaska

In addition to those who completed the prescribed course, 839 men were partially trained. Safety inspections were made at six of the properties visited, and 200 persons interested in the operation of mines in the Territory were contacted relative to promoting safety programs at their operations. Four fatalities in the operations of the placer mines of Alaska were investigated, and a gas survey of the equipment of the Alaska Railroad was conducted.

ACCIDENTS AT MINES

Both human suffering and financial loss result from the occurrence of lost-time and fatal accidents. The amount of this suffering and loss is proportionate to the frequency with which accidents occur as well as to their severity when they do occur.

Responsibility for reducing the frequency and severity of accidents in mining, as well as in other industries, rests both upon the operator and upon the employee. It is the duty of the operator not only to provide safe working conditions for his employees, but also to provide competent, strict and continuous supervision over the manner in which the work is done. It is the duty of the employee to perform his tasks carefully and to avoid constantly such acts and practices as involve accident hazards to himself and his fellow employees.

A careful study of our accident records emphatically reveals that these responsibilities of the employer and of the employee in the mining industry of Alaska are not being satisfactorily met.

An analysis of the accident statistics of the past ten years shows that whereas the total number of shifts worked annually at mines of all types have increased within the decade by only 36 per cent, the number of non-fatal accidents has increased by 90 per cent and their average severity has increased by 58 per cent.

A further analysis, in which the several branches of the industry are considered separately, shows that during this decade the total number of shifts worked per annum in placer mining increased by only 41 per cent, while within the same period the number of accidents increased by 76 per cent and their severity increased by 60 per cent; that in lode mining the total number of shifts per annum increased only 30 per cent, whereas the increase in the number of accidents was 87 per cent and in severity 60 per cent; and that in coal mining the total shifts worked annually have increased by 55 per cent, while the number of accidents reported have increased five-fold and their severity seven-fold. The above statement refers to non-fatal accidents only.

The record also shows that during the decade under consideration a total of 69 fatalities occurred at all mines, of which number 12 took place at placer mines and 57 at lode mines.

During the year 1940 there were eight fatalities, which is twice the number that occurred in 1939, and one more than the annual average for the decade.

These records clearly reveal that there has been no substantial improvement during the past ten years in conditions and practices that result in fatalities at mines in Alaska and that the frequency of occurrence and the severity of non-fatal accidents have both increased to a serious degree.

In an effort to assist mining operators and their employees to reduce mine accidents to a minimum the Commissioner of Mines in 1935 succeeded in arranging with the U. S. Bureau of Mines to resume in Alaska the safety training program which had been abandoned two years previously. Since that arrangement was made the full-time services of a skilled safety instructor have been made available by the Bureau of Mines to the mining industry in the Territory at Federal expense. Scores of mining camps have been visited by this instructor each year and an earnest effort has been made to secure the cooperation of mining operators and their employees in making the safety training program a success. The response to these efforts that has been given by the mining

operators generally, with very few exceptions, thus far has been disappointing.

The disturbing upward trend in the occurrence of serious mine accidents that is revealed by the analysis of the records above given and by the tabulated statistics that follow is a distinct challenge to the mining operators of Alaska to take vigorous steps immediately to reduce the toll of dead and injured that is being taken by the industry.

With few exceptions physical conditions in and about the mines of Alaska, viewed from the standpoint of safety, are not deserving of serious criticism. The causes that underly the growing frequency of the occurrence of serious accidents without question are to be found in: Insufficiency and laxity of supervision; inadequacy of disciplinary measures, which should be applied to responsible officials as well as to workmen when avoidable accidents occur; lack in the effectiveness of existing safety organizations at individual mines, especially at the larger mines both lode and placer, where a disproportionate percentage of serious accidents are found to occur; and inadequate support of the safety training program that is offered by the U. S. Bureau of Mines, which program experience throughout the United States has demonstrated to be highly effective in reducing fatality and accident rates wherever it has been consistently adopted with sincerity and enthusiasm by operators and employees.

Mine Fire at Suntrana:

On May 5, 1939, fire was discovered in the underground workings of the Suntrana Mine of the Healy River Coal Corporation in the Nenana coal field. It consisted of a small blaze that had developed by spontaneous combustion in fine loose coal within a timber crib whose dimensions were probably less than 10 feet on a side. Efforts were first made by the mine crew to extinguish the fire by application of water. These efforts were unsuccessful owing to the difficulty of reaching the spot effectively. Caving of the roof above the crib occurred and gases drove the workmen from the immediate vicinity. Efforts were then made by the mine officials to prevent the spread of the fire by erecting stoppings on the

gangway level and by caving down the back of the gangway, but these efforts were unavailing. On May 29 the office of the Commissioner of Mines at Juneau was notified of the existence of the fire, which by then had reached a stage that precluded the possibility of extinguishing it by direct fire-fighting methods, and assistance in fighting it was requested. The Commissioner of Mines and the Safety Instructor of the U. S. Bureau of Mines immediately responded to the summons for assistance and reached the mine on June 2 and May 29, respectively. On advice of these officials steps were immediately taken to completely seal off, under their supervision, the entire area affected by the fire. This task required the efforts of a large crew working mostly in two shifts over a period of two and one-half months. The seal was completed on August 23, 1939. Periodical tests of the air in the fire zone made since that date have demonstrated that the fire was completely extinguished by this method.

In the early stages of this fire several workmen were overcome by gas, but by good fortune only no fatalities resulted. The hazards were extremely great on account of the presence of large quantities of carbon monoxide and methane gases that were generated by the fire. Mistaken procedure on the part of the mine official in charge in handling the ventilating current during the initial stages of the fire and his failure to promptly notify the office of the Commissioner of Mines of the existence of the fire contributed greatly to the casualty hazards that existed. By immediate organization of a properly trained mine rescue crew provided with oxygen-breathing apparatus and other necessary equipment the fire undoubtedly could have been quenched in its early stages, or at least could have been brought under control with a fraction of the losses that eventually resulted from the fire.

The area affected by the fire was very large. It embraced all workings above the gangway level for a distance of more than 2,000 feet outby the gangway face. Much of this area had been mined out and was caved down, but there was a very large loss of coal in place that had been fully developed and was ready for extraction. The direct expense of effectually sealing this large area was also very great.

In February, 1940, a small underground fire developed at a point near the mine entrance where a new fan tunnel passes over and partly intersects old workings on No. 1 Seam, formerly known as the Negri bed. This point is approximately 150 feet in from the portal of the fan tunnel. The fire was controlled by loading out the smouldering material and was finally quenched by sluicing in sand filling. Fire in the old Negri workings had developed from spontaneous combustion in 1924 and had probably remained latent until fresh air reached the caved workings when the fan tunnel was driven immediately over them. No further difficulty is anticipated from this fire.

The accident frequency rates, which are given in Tables XII, XIII and XIV, represent the number of fatalities and other accidents that have occurred per million "man-hours" of employment. The use of these rates in exhibiting accident frequencies has been adopted by the U. S. Bureau of Mines as the best means of properly comparing the records of various mines or groups of mines in various regions.

TABLE XII.

Summary of Mine Accidents Occurring in Alaska During 1939

Number of Mines	Group	Number of Men Employed	Number Shifts Worked	Results of Accidents: Fatal	Serious	Slight	Total Time Lost (Days)
	Placer Mines:						
48	Dredges	1,613	359,471	0	43	107	2,124
52	Draglines	703	125,280	0	0	1	5
186	Hydraulic	866	86,973	1	2	4	74
254	Others	746	111,900	0	1	0	60
540		3,928	683,624	1	46	112	2,263
6	**Coal Mines:**						
	Underground	74	19,072	0	8	3	420
	Surface	26	7,571	0	2	2	68
6		100	26,643	0	10	5	488
2	**Oil Drilling:**	97	21,060				
	Lode Mines:						
45	Metal	1,599	438,279	3	76	205	3,829

2	Non-Metal	32	5,160	0	0	0	0
47		1,631	443,439	3	76	205	3,829
	Mills:						
40	Metal	387	104,682	0	9	12	418
635		6,143	1,279,448	4	141	334	6,998

TABLE XIII

Summary of Mine Accidents Occurring in Alaska During 1940

Number of Mines	Group	Number of Men Employed	Number Shifts Worked	Results of Accidents: Fatal	Serious	Slight	Total Time Lost (Days)
	Placer Mines:						
52	Dredges	1,905	413,753	1	41	117	1,826
58	Draglines	759	115,400	0	1	0	60
208	Hydraulic	948	94,800	1	1	2	113
232	Others	628	94,200	2	0	0	0
550		4,240	718,153	4	43	119	1,999
4	**Coal Mines:**						
	Underground	94	24,915	0	10	15	610
	Surface	32	9,535	0	2	2	111
4		126	34,450	0	12	17	721
	Lode Mines:						
99*	Metal	1,560	436,247	4	81	216	4,130
2	Non-Metal	23	4,830	0	0	0	0
101		1,583	441,077	4	81	216	4,130
	Mills:						
62*	Metal	414	111,502	0	3	13	130
717		6,363	1,305,182	8	139	365	6,980

*—Includes small intermittent operations.

Fatalities at Mines

Year 1939:

During the year 1939 there were four fatalities that resulted from accidents at mines in Alaska, three of which occurred at gold lode mines, and one at a placer operation.

The causes of these fatalities and the properties at which they occurred are as follows:

1. Fall down raise when ladder gave way—Alaska Juneau Mine 1
2. Fall into stope caused by cave of dump—Alaska Juneau Mine 1
3. Overcome by powder gas while removing hang-up in manway—Hirst-Chichagof Mine 1
4. Crushed by piece of muck that split and rolled from larger mass—Fairbanks Department, U. S. S. R. & M. Company 1

4

Year 1940:

During the year 1940 there were eight fatalities that resulted from accidents at mines in Alaska, four of which occurred at a gold lode mine and four at placer operations.

The causes of these fatalities and the properties at which they occurred are as follows:

1. Fell to ground with power pole which broke after it had been climbed for purpose of placing safety line—Nome Department, U. S. S. R. & M. Company 1
2. Fall down raise when ladder that was being repaired gave way—Alaska Juneau Mine 1
3. Crushed by piece of frozen muck that fell from conveyor feeder to top of caterpillar—Fairbanks Department, U. S. S. R. & M. Company 1
4. Fell with scaffold used to paint fuel oil tank which suddenly dropped to ground—Alaska Juneau Mine..... 1
5. Overcome by unidentified noxious gas at bottom of 177-foot placer shaft—partnership operation of William Taroff and Alex Hudoff (the deceased) near Olnes..... 2
6. Crushed between mine car and drift wall due to insufficient clearance between wall of drift and mine track—Alaska Juneau Mine 1
7. Blown to bits by accidental discharge of loaded hole—Alaska Juneau Mine 1

8

TABLE XIV

Summary of Accidents at all Metal Mines (Mills not included)
During the Period January 1, 1937, to December 31, 1940

ALASKA—(Includes Placers)

Year	Type of Operation	Men Employed	Man-Shifts Worked	Man-Hours Worked	Accidents Fatal	Accidents Non-Fatal	Accident Frequency Rates Fatal	Accident Frequency Rates Non-Fatal	Time Lost (Days)
1937	Placers	3,136	547,748	4,929,732	2	129	0.41	26.17	1,733
	Lodes	1,476	414,361	3,314,888	2	258	0.60	77.83	4,706
	Non-Metal	25	4,175	33,400	0	3	0	89.82	9
		4,637	966,284	8,278,020	4	390	0.48	47.11	6,448
1938	Placers	3,470	607,624	5,468,616	2	112	0.37	20.48	1,365
	Lodes	1,575	458,436	3,667,488	5	318	1.36	86.71	4,761
	Non-Metals	32	4,560	36,480	0	1	0	27.41	14
		5,077	1,070,620	9,172,584	7	431	0.76	46.99	6,140
1939	Placers	3,928	683,624	5,468,992	1	158	0.18	28.89	2,263
	Lodes	1,599	438,279	3,506,232	3	281	0.86	80.14	3,829
	Non-Metal	32	5,160	41,280	0	0	0	0	0
		5,559	1,127,063	9,016,504	4	439	0.44	48.69	6,092
1940	Placers	4,240	718,153	5,745,224	4	162	0.70	28.20	1,999
	Lodes	1,560	436,247	3,489,976	4	297	1.15	85.10	4,130
	Non-Metal	23	4,830	38,640	0	0	0	0	0
		5,823	1,159,230	9,273,840	8	459	0.86	49.49	6,129

UNITED STATES—(Includes Non-Metal Mines)

1937	118,429	29,856,610	239,544,432	219	18,055	0.91	75.37	
1938	103,027	23,505,864	188,170,166	156	12,722	0.83	67.61	

TABLE XV

Comparison of Accidents and Employment at Mines During the Biennium ended December 31, 1940, with those of the Preceding Biennium

	Mean No. Men Employed	Man-Shifts Worked	Accidents Fatal	Accidents Non-Fatal	Accident Frequency Rates Fatal	Accident Frequency Rates Non-Fatal	Time Lost (Days)
Biennium ended December 31, 1940	6,253	2,584,630	12	979	0.58	47.3	13,978
Preceding Biennium	5,472	2,371,832	27	924	1.30	44.0	14,026
Increase	781	212,798		55		3.3	
Decrease			15		0.72		48

TABLE XVI

Summary of Accidents at Lode-Gold Mines
During the Period January 1, 1933, to December 31, 1940

Year	Men Employed	Man-Shifts Worked	Accidents Fatal	Accidents Non-Fatal	Accident Frequency Rates Fatal	Accident Frequency Rates Non-Fatal	Time Lost (Days)
1933	1,011	323,594	7	156	2.70	60.23	2,170
1934	1,203	363,478	6	207	2.06	71.13	3,621
1935	1,222	348,723	6	233	2.15	83.51	3,870
1936	1,362	367,411	8	232	2.72	78.93	3,192
1937	1,391	383,476	1	230	0.33	74.97	4,198
1938	1,482	430,536	5	296	1.45	85.94	4,282
1939	1,599	438,279	3	281	0.86	80.14	3,829
1940	1,560	436,247	4	297	1.15	85.10	4,130

TABLE XVII

Summary of Man-Shifts Worked, Fatal and Non-Fatal Accidents, and Time Lost in All Mines in Alaska

Year	Man-Shifts Worked at			Fatalities			Non-Fatal Accidents			Time Lost (Days)		
	Placer Mines	Lode Mines and Mills	Coal Mines	Placer Mines	Lode Mines and Mills	Coal Mines	Placer Mines	Lode Mines and Mills	Coal Mines	Placer Mines	Lode Mines and Mills	Coal Mines
1912				6	6							
1913				10	15							
1914				5	14							
1915				4	19							
1916				7	22		27	736				
1917				9	24		11	705				
1918				1	12		0	199				
1919				0	13		5	350	5			
1920				0	9		0	302			2,831	
1921		568,615	103,389	0	12		0	249			3,519	471
1922		537,180	55,309	0	5	0	0	252			4,344	250
1923	84,948	618,359	66,927	2	9	0	7	230	42	394	3,991	673
1924	117,545	468,890	51,398	0	16	0	30	327	6	560	4,882	75
1925	405,000	592,326	34,353	0	6	0	0	303	5	No report	5,639	109
1926	418,744	563,992	51,398	1	6	1	90	365	10	1,042	5,308	75
1927	418,235	555,155	34,915	2	7	1	178	259	13	3,267	4,819	445
1928	445,707	559,081	32,766	3	6	0	152	302	2	2,048	5,981	19
1929	420,249	524,836	25,525	5	9	0	142	255	6	1,657	4,301	197
1930	484,301	486,515	30,101	0	7	0	123	271	7	1,096	3,979	221
1931	437,573	425,201	22,129	0	6	0	92	167	5	1,251	2,668	101
1932	441,335	445,876	22,267	0	5	0	67	163	14	765	2,630	250
1933	437,267	403,021	19,805	1	7	0	90	177	2	1,077	2,381	9
1934	478,908	443,265	20,514	0	6	0	95	220	7	1,313	3,784	201
1935	499,765	458,440	23,571	2	6	0	116	266	12	1,250	4,372	291
1936	496,370	515,105	27,285	2	8	0	89	284	8	1,014	3,780	149
1937	547,748	548,929	25,267	2	2	16	129	298	14	1,733	5,007	407
1938	607,624	595,520	27,744	2	5	0	112	351	20	1,365	5,091	423
1939	683,624	548,121	26,643	1	3	0	158	302	15	2,263	4,247	488
1940	718,153	552,579	34,450	4	4	0	162	313	29	1,999	4,260	721

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Alaska Chichagof Mining Co., Chichagof	Bez; Klag Bay, Chichagof Island	Sitka	Gold lode	Idle
Alaska Consolidated Mining & Smelting Co., 1502 Alworth Bldg., Duluth, Minn.	Jumbo Mine; Sulzer, Prince of Wales Island	Ketchikan	Copper lode	Idle
Alaska Empire Gold Mining Co., Juneau	Chas. Williams; Hawk Inlet, Admiralty Island	Juneau	Gold lode with mill	17
Alaska Exploration & Mining Co., Box 136, Pullman, Wash.	Bird Creek	Talkeetna	Hydraulic	6
Alaska Goldfields Corp., Juneau	Jualin Mine; Berners Bay	Juneau	Gold lode development with mill	5
Alaska Gold Mountain Mines, 820 Garfield Bldg., Los Angeles, Calif.	Smuggler Cove property; Cleveland Peninsula	Ketchikan	Gold lode development	Idle
Alaska Gold & Metals Co., Ketchikan.	Salt Chuck or Goodro Mine; Kasaan Bay, Salt Chuck	Ketchikan	Palladium and copper lode with mill	5
Alaska Juneau Gold Mining Co., Juneau	Alaska Juneau; Juneau	Juneau	Gold lode with mill	1,003
Alaska Mayfield Mines, Inc., Cordova	Mayfield Mine; Columbia Glacier, Shoup Bay	Valdez	Gold lode with mill	Idle
Alaska Mining & Development Co., Fairbanks	Wyoming Mine; Cleary Creek	Fairbanks	Gold lode with mill	5
Alaska Placers, Council	Niukluk River	Council	Dredge	9

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Alaska Pacific Consolidated Mining Co., Anchorage	Independence, Free Gold, Jap and Eldorado properties; Fishhook Creek, Willow Creek	Knik	Gold lode with mills	166
Alaska Railroad, The, Anchorage	Eska Mine; Matanuska Field	Knik	Coal mine	19
Alaska Sunset Mines, Inc., 611 Insurance Bldg., Seattle, Wash.	Sunset Creek	Cape Nome	Dredge	Idle
Alaska Taylor Mining Corp., 91 Columbia Street, Seattle, Wash.	Kougarok River	Cape Nome	2 washing plants, bulldozers and dragline	14
Alaska Willow Creek Gold Mines, Inc., 609 Lowman Bldg., Seattle, Wash.	Lucky Strike, Yellowstone, Homestake and Opal Groups; Reed and Archangel Creeks	Knik	Development of gold lode	9
Alaskan Placer Lakes, Inc., Washington Bldg., Tacoma, Wash.	Trib. to Silva Creek, Windham Bay	Juneau	Development of placer property	14
Alder Creek Mining Co., Meehan	Alder Creek trib. to Fairbanks Creek	Fairbanks	Dragline	12-14
Alluvial Golds, Inc., Fairbanks	Woodchopper Creek	Circle	Dredge	43
Alpha Mining Co., Flat	Alpha Creek	Otter	Hydraulic and bulldozer	11
American Creek Dredging Co., San Francisco, Calif.	American Creek	Cape Nome	Dredge	15

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
American Creek Operating Co., Fairbanks	American Creek, Tofty	Hot Springs	Dredge	23
American Tin Fields, 914 Vance Bldg., Seattle, Wash.	Tin City	Port Clarence	Mechanical placer and mill	25
Anderson, Andrew, Olnes	Dome Creek	Fairbanks	Drift mining	8
Apex-El Nido, Juneau	Lisianski Inlet, Lisianski	Sitka	Gold lode with mill	Idle
Arctic Circle Exploration Co., First Natl. Bank Bldg., Chicago, Ill.	Candle Creek	Fairhaven	Hydraulic	6
Arctic Circle Exploration Co., First Natl. Bank Bldg., Chicago, Ill.	Candle Creek	Fairhaven	Dredge	170
Aurora Nickel Co., Juneau	Sea Level and Snipe Bay; Chichagof and Baranof Islands	Sitka	Intermittent development of nickel lodes	Idle
Austin, B. C. & Co., Valdez	Chisna River	Chitina	Check drilling	5
Awe Mining Co., Flat	Chicken Creek	Otter	Two draglines, washing plant, bulldozers, highline scraper and hydraulic	20
Baranof Mining Co., Ketchikan	Halleck Island, 12 Miles North of Sitka	Sitka	Development of gold lode	Idle
Bartholomae Oil Corp., 1033 Brea Road, Fullerton, Calif.	Gold Run Creek	Port Clarence	Dredge	15

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Bartholomae Oil Corp., 1033 Brea Road, Fullerton, Calif.	Ryan Lode; Ester Dome	Fairbanks	Gold lode development	6
Basham, Wm., & Schrieber, E. F., Fairbanks	Lower Nome Creek	Fairbanks	Hydraulic and bulldozer	8-9
Bear Creek Mining Co., Anchorage	Bear Creek	Ft. Gibbon	Hydraulic and bulldozer	6
Beaton & MacDougall, Ophir	Yankee Creek, 2 miles below Vibe dredge	Innoko	Bulldozing into boxes; dragline for tailings	13
Berry Dredging Co., C. J., 111 Sutter Street, San Francisco, Calif.	Mammoth Creek	Circle	Dredge	28
Berry Dredging Co., C. J., 111 Sutter Street, San Francisco, Calif.	Mastodon Creek	Circle	Hydraulic, dragline and bulldozer	9
Berry Holding Co., 111 Sutter Street, San Francisco, Calif.	Eagle (Mastodon Fork)	Circle	Hydraulic, bulldozer and slackline scraper	12
Big Minook Mining Co., Fairbanks	Big Minook Creek	Rampart	Hydraulic, bulldozer, drag scraper for tailings	10
Blake & Larson, Chatanika	Lower Chatanika	Fairbanks	Drift mining	8
Bleeker, F. C., Fairbanks	First Chance Creek, trib. to Goldstream	Fairbanks	Hydraulic and bulldozer	6
Blue Jay Mine, Ketchikan	Libe property; Helm Bay	Ketchikan	Gold lode with mill	5
Bock, Adolf, Tofty	Deep Creek, trib. to Sullivan	Hot Springs	Drifting from shaft	11

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Bodis, George, Nome	Dick Creek	Port Clarence	Hydraulic	5
Bonita Creek Mining Co., Nome	Bonita Creek	Cape Nome	Hydraulic	Idle
Boundary Dredging Co., 351 California Street, San Francisco, Calif.	Canyon Creek	Fortymile	Dredge	15-20
Boundary Dredging Co., 351 California Street, San Francisco, Calif.	Walkers Fork	Fortymile	Drill and shaft prospecting	7-8
Bouquier, Hatten & Turner, Flat	Black Creek, 2½ mi. E. of Flat	Otter	Bulldozing into boxes	5
Bristol Bay Mining Co., 405 Montgomery Street, San Francisco, Calif.	Wattamus Creek, Goodnews Bay	Goodnews Bay	Dredge	25
Bristol Bay Mining Co., 405 Montgomery Street, San Francisco, Calif.	Upper Wattamus Creek	Goodnews Bay	Dragline, bulldozer and washing plant	8
Brock, Ben, & Johnson, Peter, Hot Springs	Eureka Creek	Hot Springs	Hydraulic and bulldozer	5-6
Buck & Sjoberg, Cantwell	Valdez Creek	Chitina	Hydraulic	7
Burk, Al, Ruby	Long Creek	Nulato	Drift mining	4-5
Butte Creek Mining Co., Miller House	Butte Creek, Circle district	Fairbanks	Hydraulic, bulldozer and dragline	5
Cache Creek Mining Co., Anchorage	Nugget Creek, Yentna district	Talkeetna	Hydraulic and bulldozer	10

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Camel-Gypsum Co., Gypsum	Iyoukeen Cove, Chichagof Island	Sitka	Non-metallic mine	Idle
Cameron-Johnson Mine, Valdez	Shoup Glacier, Shoup Bay	Valdez	Gold lode with mill	Idle
Camp Creek Dredging Co., 715 1331 3rd Ave., Seattle, Wash.	Camp Creek	Council	Dredge	9
Cantu Mining Co., Hyder	Cantu Mine; Salmon Glacier	Hyder	Gold lode development	Idle
Caribou Gold Dredging Co., Fairbanks	Caribou Creek, Salcha River	Fairbanks	Check drilling	13
Caribou Mines, Colorado	Caribou Creek	Fairbanks	Dragline, washing plant and stacker on crawlers	12-14
Carlson & Co., 1117 3rd Ave., Seattle, Wash.	Iron Creek	Cape Nome	Pumping plant	5
Carlson, J. E., Gulkana	Valdez Creek	Chitina	Hydraulic and drift mining	23
Casa de Paga Gold. Co., 1106 Hoge Bldg., Seattle, Wash.	Beaver Creek	Cape Nome	Dredge	7
Castleton & Keenan, 616 Insurance Bldg., Seattle, Wash.	Kougarok River	Cape Nome	Bulldozer, pumping plant, dragline and washing plant	6
Castleton & Keenan, 616 Insurance Bldg., Seattle, Wash.	Kougarok River	Cape Nome	Dredge	35
Central Development Co., Jack Wade	Wade Creek	Fortymile	Hydraulic and bulldozer	10-12

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Central Mining Co., Central	Upper Deadwood Creek	Circle	Dragline, bulldozers and washing plant	24
Century Mines, Inc., Juneau	Daly Alaska property; Salmon Creek	Hyder	Gold lode development	Idle
Chandalar Gold Mines, Inc., Toronto, Ont.	Sulzer, Carlson & Shields properties	Chandalar	Development of gold lodes	Idle
Chatham Mining Co., Fairbanks	Burns property; Chatham Creek	Fairbanks	Gold lode development	Idle
Chichagof Mining Co., Chichagof	Klag Bay, Chichagof Island	Sitka	Gold lode with mill	15
Chititu Mines, McCarthy	Rex and Chititu Creeks	McCarthy	Hydraulic	18
Clara Creek Mining Co., Anchorage	Clara Creek, Goodnews Bay	Goodnews Bay	Platinum placer, with dragline, washing plant and bulldozer	22
Cleary Hill Mines, Inc., Fairbanks	Rhoads-Hall or Free Gold; Cleary Creek	Fairbanks	Gold lode with mill	25
Cleary Hill Mines, Inc., Fairbanks	Sullivan Creek and Tofty Gulch	Hot Springs	Dragline, bulldozers and washing plant	20
Cleary Hill Mines, Inc., Fairbanks	Eureka Creek	Hot Springs	Drill prospecting	5
Cliff Gold Mines, Inc., Valdez	Cliff; Valdez Arm	Valdez	Gold lode with mill	25
Conwest Exploration Co., The, Toronto, Ont.	Willow Creek Mines; Craigie Creek	Knik	Holding company of Willow Creek Mines	
Council Dredging Co., 715 1331 3rd Ave., Seattle, Wash.	Niukluk River	Council	Dredge	9

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Crabtree & Sullivan Co., Bluff	Daniels Creek, over ½ mile from mouth	Cape Nome	Bulldozer and pump	10
Craigie Creek Mining Co., Anchorage	Willow Creek	Knik	Power shovel	7
Cravey Mining Co., Ophir	R. limit Yankee Creek, 1½ mile below Beaton and MacDougall	Innoko	Bulldozing into boxes; dragline stacks tailings	8
Cripple Creek Mining Co., Anchorage	Cripple Creek, Folger	Innoko	Dragline with washing plant and bulldozer	24
Crow Creek Gold Corp., Anchorage	Monarch and Jewel Mines; Crow Creek	Knik	Gold lode with mill	5
Crown Point Mining Co., Seward	Kenai Lake	Kenai	Gold lode with mill	5
Dahl Creek Mining Co., 730 38th Ave., San Francisco, Calif.	Dahl Creek	Cape Nome	Pumping plant	6
Degnan & Rosander, Takotna	Bonanza Group; Right limit of Little Creek at mouth	Innoko	Bulldozer with dragline for tailing and washing plant	15
De Vault & Hamberg Assn., Talkeetna	Pass Creek, Fairview	Talkeetna	Hydraulic	10
Dieringer, Roy, & Cook, Jack, Valdez	Gold Greek, Valdez Bay	Valdez	Drag scraper and bulldozer	6
Dime Creek Dredging Co., Haycock	Dime Creek	Koyuk	Dredge	6

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Donan Mines, Inc., 650 So. Spring St., Los Angeles, Calif.	Marion Twin and Gold Mint properties	Knik	Gold lode with mills	6
Dry Creek Dredging Co., 141 Milk Street, Boston, Mass.	Inmachuck River	Cape Nome	Dredge	14
Dunton & Roessel, Ketchikan	Valparaiso; Dolomi, Prince of Wales Island	Ketchikan	Gold lode development with mill	5
Dutch Creek Mining Co., Talkeetna	First and Dutch Creeks	Talkeetna	Hydraulic	8
Ebner Gold Mining Co., Juneau	Ebner, Gold Creek	Juneau	Intermittent development of gold lodes	Idle
Echo Cove Gold Mining Co., Juneau	Winter & Pond; Echo Cove, Berners Bay	Juneau	Gold lode development	Idle
Eek River Mining Co., Anchorage	Rainy Creek, trib. to Eek River	Bethel	Bulldozing into steel boxes	5
Elmer, J. M., Valdez	Slate Creek	Chitina	Hydraulic	20
Enstrom, Oscar, Fairbanks	Fourth of July Creek	Eagle	Hydraulic and bulldozer	6
Erickson & Palmatier, Talkeetna	Falls Creek	Talkeetna	Hydraulic	5
Eva Creek Mining Co., Nenana	Liberty Bell Mine; Eva Creek near Ferry	Fairbanks	Gold lode with mill	Idle
Evan Jones Coal Co., Anchorage	Evan Jones; Jonesville	Knik	Bituminous coal with washery	39
Faith Creek Mining Co., Fairbanks	Faith Creek	Fairbanks	Hydraulic	5-10

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Falls Creek Mining Co., Moose Pass	States property; Falls Creek	Kenai	Gold lode development	6
Fern Gold Leasing Co., 925 Market Street, Wilmington, Del.	Fern Mine; Archangel Creek	Knik	Gold lode with milling plant	34
Fern Gold Mining Co., Spokane, Wash.	Fern Mine and Talkeetna properties; Archangel Creek	Knik	Mine leased to Fern Gold Leasing Co.	
Fish Creek Mining Co., Fairbanks	Upper Fish Creek	Fairbanks	Hydraulic, bulldozer	7-8
Fisher & Fisher, Fairbanks	Grant Creek	Ft. Gibbon	Hydraulic, dragline and bulldozer	6
Flagstaff Mining Co., Ketchikan	Treasure Group; Karta Bay, Prince of Wales Island	Ketchikan	Development of gold lode with milling plant	5
Forno, Theobaldo, Poorman	Poorman Creek, Poorman	Nulato	Drift mining	7
Forsgren Dredging Co., Alderwood Manor, Wash.	Inmachuck River	Fairhaven	Dragline, bulldozer and pumping plant	10
Forsgren Dredging Co., Alderwood Manor, Wash.	Inmachuck River	Fairhaven	Dredge	18
Fox Bar Dredging Co., 2505 Garfield Road, Spokane, Wash.	Kougarok River	Cape Nome	Dredge	9
Frasca & Co., John, 111 Sutter Street, San Francisco, Calif.	Independence Creek, Circle District	Circle	Hydraulic and bulldozer	6
Freeburn Development Co., 377 Colman Bldg., Seattle, Wash.	Maiden Bay property; Maiden Bay	Ketchikan	Zinc lode	Idle

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Galvin & Associates, J. G., Seattle, Wash.	Sam Tucker property; Bluff	Cape Nome	Mercury lode development and mill	Idle
Ganes Creek Dredging Co., Anchorage	Ganes Creek	Innoko	Dredge	15
Garrison Co., Nyac	Granite Creek	Bethel	Washing plant, dragline and bulldozer	6
Gilmore Mining Co., Inc., Fairbanks	Gilmore Creek	Fairbanks	Dragline	13
Glass Dredging Co., Council	Melsing Creek	Council	Dredge	Idle
Gliska & Bokhoven, Talkeetna	Camp Creek, Fairview	Talkeetna	Hydraulic	5
Gold Beach Placers, Inc., 327 Colman Bldg., Seattle, Wash.	Beach at Nome	Cape Nome	Dragline, pumping plant, bulldozer	10
Gold Bullion, Inc., Nome	Dreamy Gulch	Cape Nome	Dragline, pumping plant, bulldozers and washing plant	11
Gold Center Mining Corp., Anchorage	Milo Kelly; Willow Creek	Knik	Development of gold lode with small mill	5
Gold Cord Development Co., Wasilla	Gold Cord Mine; Fishhook Creek	Knik	Gold lode with mills	18
Gold Cord Mining, Milling & Power Co., Wasilla	Fishhook	Knik	Under Lease to Gold Cord Dev. Co.	
Gold King Mining Co., Nenana	Gold King Creek	Nenana	Hydraulic	8

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Gold Mint Mining Co., Hope	Nearhouse property; Palmer Creek	Kenai	Gold lode development	5
Gold Placers, Inc., Fairbanks	Coal Creek	Circle	Dredge	46
Golden Zone Mine, Inc., Anchorage	Golden Zone; Broad Pass	Talkeetna	Development of gold lode with mill	40
Goodnews Bay Mining Co., Goodnews Bay	Salmon River, Patinum, Fox and Squirrel Creek properties	Goodnews Bay	Dragline, washing plant and bulldozer	11
Goodnews Bay Mining Co., Platinum	Snow Gulch	Goodnews Bay	Dragline, washing plant and bulldozer	22
Goodnews Bay Mining Co., Goodnews Bay	Goodnews Bay	Goodnews Bay	Dredge	46
Goodpaster Exploration, Fairbanks	Gray Quartz lode; head of Tibbs Creek, Goodpaster	Fairbanks	Gold lode development	5
Granite Creek Mining Co., Flat	Granite Creek, trib. to Otter Creek	Otter	Bulldozer, hydraulic	5
Grant Lake Co, Moose Pass	Grant Lake, Moose Pass	Kenai	Gold lode development with small mill	5
Grant Mining Co., Nome	Coffee Creek	Cape Nome	Bulldozer, pumping plant	10
Greenstone Mining Co., Long	Greenstone Creek	Nulato	Hydraulic and bulldozer	4-5
Grubstake Mine, Inc., Wasilla	Grubstake Creek	Knik	Development of gold lode with small mill	5

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Gustaffson & Sweedman, Nome	Oregon Creek	Cape Nome	Hydraulic	5
Haines Construction Co., Haines	Kleheni River and tributaries	Skagway	Development of placer property	10
Hard, Eric, Ophir	Ophir Creek	Innoko	Highline slip scraper and bulldozer	8
Hard, Uotilla, Hanson, Folger	Bear Creek, Cripple area	Innoko	Dragline, washing plant and bulldozer	23
Harrison Creek Mining Co., Miller House	North Fork, Harrison Creek	Circle	Hydraulic	5
Healy River Coal Corp., Fairbanks	Suntrana Mine; Healy River, Nenana	Nenana	Sub-bituminous coal with screening plant	59
Heath, Robert, Fairbanks	Pearl Creek	Fairbanks	Dragline and bulldozer	7
High Grade Gold Mining Corp., Anchorage	High Grade; Fishhook Creek	Knik	Gold lode development with small mill	5
Hirst Chichagof Mining Co., 415 7th Ave. So., Seattle, Wash.	Hirst Mine; Kimshan Cove, Chichagof Island	Sitka	Gold lode with milling plant	70
Hitt, Vance, Poorman	Poorman Creek	Nulato	Dragline, pumping plant and bulldozer	15
Hi Yu Mining Co., Fairbanks	Hi Yu Mine; Fairbanks Creek	Fairbanks	Gold lode with mill	16
Hogendorn, R., Deering	Inmachuk River	Fairhaven	Hydraulic	5
Hope Mining Co., Seward	Resurrection Creek	Kenai	Hydraulic	Idle
Houston Coal Co., Anchorage	Houston	Knik	Bituminous coal	Idle

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Independence Mining Co., 701 Union Street, Seattle, Wash.	Independence Creek	Circle	Hydraulic, and slackline scraper	9
Inland Dredging Co., 715 1331 3rd Ave., Seattle, Wash.	Fish River	Council	Dredge	9
Jackson, Nels, Fairbanks	Fourth of July Creek	Nenana	Hydraulic	5
Jenkins Estate, F., Talkeetna	Willow Creek	Talkeetna	Hydraulic	6
Johnson, Gabe & Co., Nome	Wonder Creek	Cape Nome	Drift Mining	10
Johnson, Gustus & Associates, Flat	Golden Horn Mine; Otter Creek	Otter	Gold lode development	Idle
Johnston & Blondo, Miller House	North Fork Harrison	Circle	Dragline, bulldozer and washing plant	11
Kaiyuh Mining Co., Nulato	Camp Creek	Nulato	Dragline with washing plant	Idle
Kasaan Gold Co., Railway Exchange Bldg., Spokane, Wash.	Julia, Dunton or Harris Creek Mine; Harris Creek, Hollis	Ketchikan	Gold lode with mill	5
Kensington Mines, Inc., Juneau	Kensington and Comet Mines; Berners Bay	Juneau	Gold lode development	Idle
Kirk, Morris P. & Sons, Inc., 2717 So. Indiana Street, Los Angeles, Calif.	Stampede antimony mine; Stampede Creek	Fairbanks	Antimony lode with mill	14
Klery Placers, Inc., Kiana	Klery Creek	Noatak-Kobuk	Dragline, washing plant	Idle
Kokomo Mining Co., Fairbanks	Kokomo Creek	Fairbanks	Hydraulic and slackline scraper	7

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Kow Kow Mining Co., Platinum	Kow Kow Creek, Arolic	Goodnews Bay	Dragline, washing plant and bulldozer	20
Kugruk Mines, Inc., Deering	Kugruk River	Fairhaven	Hydraulic, elevator and bulldozers	25
LaCrosse, Jack, Miller House	Bonanza Creek	Circle	Hydraulic and bulldozer	6
Lammers & Fitzpatrick Mining & Exp. Co., 2505 Garfield Road, Spokane, Wash.	California Creek, trib. to Kobuk River	Noatak-Kobuk	Hydraulic and bulldozer	12
Lane Investment Co., San Francisco, Calif.	Big Hurrah Mine; Solomon River	Cape Nome	Gold lode with mill	Idle
Laurin Brothers, Taylor	Macklin Creek	Cape Nome	Drag scraper and hydraulic	10
Lee Brothers Dredging Co., Nome	Solomon River	Cape Nome	2 Dredges	20
LeRoi Extension Gold Mining Co., Valdez	Granite Mine; Port Wells	Valdez	Gold lode with mill	11
Lindbald Mining Co., Girdwood	Crow Creek	Knik	Hydraulic	6
Lindsay, Geo., Moose Pass	Mile 16, Moose Pass-Hope highway	Kenai	Development of gold lode with mill	5
Linn, Eli, Long	Trail Creek	Nulato	Dragline and bulldozer	7
Little Don Mining Co., Central	Deadwood Creek below Switch Creek	Circle	Hydraulic and bulldozer	5
Livengood Placers, Inc., 1 Montgomery Street, San Francisco, Calif.	Livengood Creek	Tolovana	Dredge	140-160

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Long Creek Mining Co., Fairbanks	Long Creek, Ruby	Nulato	Dragline and bulldozer	18
Mabelle Mine, Inc., Anchorage	Mabel Mine; Reed Creek	Knik	Gold lode with milling plant	24
Mabel Mining, Milling & Power Co., Anchorage	Reed Creek	Knik	Under option to Mabelle Mine, Inc.	
Marvel Creek Mining Co., Flat	Marvel Creek; Tuluksak area	Bethel	Dragline with washing plant	19
Mastodon Mining Co., Miller House	Lower Deadwood Creek	Circle	Dragline, bulldozers and washing plant	15
McKinley Gold, Inc., Cordova	McKinley Lake; McKinley Lake, 20 miles east of Cordova	Cordova	Gold lode development with mill	16
Mellick & Halverson, Sleitmut	Red Devil; Kuskokwim River, 8 miles below Sleitmut	Kuskokwim	Development of quicksilver lode	6
Mespelt & Co., Medfra	Pearson & Strand; Nixon Fork, Kuskokwim River	Mt. McKinley	Gold lode with mill	7
Minook Mining Co., Rampart	Little Minook, Rampart Dist.	Hot Springs	Shovel, bulldozer and washing plant	14
Miscovich, P. & Sons, Flat	Otter Creek	Otter	Trencheau, hydraulic, bulldozer and hydraulic lift	12
Mohawk Mining Co., Fairbanks	Henderson and Bondholder Mines; Ester Dome	Fairbanks	Gold lode with mill	4-5

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Moira Copper Co., 639 Wells Bldg., Milwaukee, Wisc.	Moira Sound, Prince of Wales Island	Ketchikan	Copper lode	Idle
Monarch Mining Co., Jack Wade	Baby Creek and Squaw Gulch	Fortymile	Hydraulic and bulldozer	6
Montana Mining Co., 407 Madison Ave., Helena, Mont.	Omega and Alpha Creek, Eureka District	Hot Springs	Dragline, hydraulic and bulldozer	11
Moore Creek Mining Co., Flat	Moore Creek	Otter	Dragline, washing plant and bulldozer	12
Moose Creek Coal Co., Anchorage	Rawson or Wishbone Hill property; Moose Creek	Knik	Bituminous coal with washery	Idle
Moose Pass Placers, Inc., Juneau	Moose Pass, Mills Creek	Kenai	Hydraulic with bulldozer	Idle
Moss & Larson Mining Co., Takotna	Upper Ganes Creek	Innoko	Dredge	12
Mount Andrew Mining Co., 72 Wall Street, New York	Mount Andrew Mine; Kasaan Peninsula	Ketchikan	Copper lode	Idle
Nabesna Mining Corp., Chitina	Whitham and Golden Eagle Groups; Nabesna River	Chitina	Gold lode with mill	14
Nass, Kass & Olsen, Haycock	Dime Creek	Koyuk	Drift mining	10
National Nickel Corp., Juneau	Bohemia and Tasmania Groups, Yakobi Island	Sitka	Nickeliferous lode (development)	Idle
Nelson Mining Co., Chisana	Bonanza Creek	White River	Hydraulic and bulldozer	5
Nelson & Tift, Ketchikan	Nelson & Tift; McLean Arm, Prince of Wales Island	Ketchikan	Gold lode development with small mill	7

LIST OF MINING OPERATORS AND PROPERTIES

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New Bullion Mining Co., Anchorage	Herning property; Upper Craigie Creek	Knik	Gold lode with mill	5
New Chichagof Mining Syndicate, Juneau	New Chichagof; Pinta Bay, Chichagof Island	Sitka	Gold lode development	Idle
New Hope, Inc., Seward	Hirshey & Hatcher properties; Palmer group, Hope	Kenai	Development of gold lode with mill	5
New York Alaska Gold Dredging Corp., 120 Broadway, New York	Tuluksak River, Nyac	Bethel	2 Dredges	37
New York Alaska Gold Dredging Corp., 120 Broadway, New York	Bear Creek, Tuluksak area	Bethel	Dragline with washing plant and bulldozer	12
Newsboy Development Corp., Fairbanks	Newsboy lode; Cleary Creek	Fairbanks	Gold lode with mill	Idle
Nickel Corporation of America, Juneau	Bohemia Basin, Yakobi Island	Sitka	Nickeliferous lode	Idle
Nicolai Placer Mines, 1414 Fourth Ave., Seattle, Wash.	Dan Creek, McCarthy	McCarthy	Hydraulic	18
Nome Creek Dredging Co., Fairbanks	Nome Creek	Tolovana	Dredge	20
Nordale, Adler, Fairbanks	Homestake; Wolf Creek	Fairbanks	Gold lode development	6
North American Gold Dredging Co., Flat	Otter Creek	Otter	Dredge	20
Northland Development Co., North Bend, Wash.	Willow Creek, Flat	Otter	Dragline, washing plant and bulldozer	14

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Nukalaska Mining Co., 814 Fidelity Bldg., Los Angeles, Calif.	Beauty Bay, Nuka Bay	Kenai	Gold lode development	6
Oliver & Dodson, Jack Wade	Upper Jack Wade Creek	Fortymile	Hydraulic, pump and bulldozer	10
Ophir Gold Dredging Co., Council	Ophir Creek	Council	Dredge	8
Oracle Mine, Moose Pass	Moose Pass	Kenai	Gold lode with mill	Idle
Osborn Creek Dredging Co., Nome	Osborn Creek	Cape Nome	Dredge	6
Palmer Creek Mining Co., Hope	Palmer and Resurrection Creeks	Kenai	2 hydraulic camps	12
Parker & Son, Fairbanks	N. R. Hudson property; Olive Creek	Tolovana	Hydraulic, pump and bulldozer	11
Paulson, S. R., Ophir	Colorado Creek, Cripple area	Innoko	Hydraulic, dragline and bulldozers	14
Peandori Placer Mines, Bethel	Cripple Creek, trib. of Salmon River, lower Kuskokwim District	Kuskokwim	Bulldozing into boxes; scraper for tailings	10
Peninsula Placers, Nome	Irene Creek	Cape Nome	Pumping plant and bulldozer	5
Peterson & Mayfield, Girdwood	Crow Creek	Knik	Hydraulic	12
Point Astley Mining Corp., Juneau	Ahrensted property; Snettisham	Juneau	Copper, silver, gold lodes development	
Polson, A., Nome	Center Creek	Cape Nome	Drift mining	11

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Porcupine Mining Co., Miller House	Porcupine Creek	Circle	Dragline, hydraulic	6
Portage Gold Mines, Ltd., 206 Times Bldg., Victoria, B. C.	Dominick Vietti property; Poe Bay	Valdez	Gold lode with mill	10
Porter, Wallace, Haycock	Bear Creek	Koyuk	Hydraulic	8
Powers, John, Eagle	Dome Creek	Eagle	Hydraulic	5
Prospect Mining Co., Nenana	California Creek, Bonnifield District	Nenana	Silver, gold, copper lode development	Idle
Puntilla, Waino, Takotna	Little Creek	Innoko	Dredge	7
Pyne Creek Mining Co., Fairbanks	Palmer Creek	Fairbanks	Hydraulic and bulldozer	7
Quigley, E. W.,Solomon	Solomon River	Cape Nome	Hydraulic and bulldozer	8
Rae Wallace Mining Co., 7th Street, Wallace, Idaho	Rae Wallace or Rosenthal property, Fishhook Creek	Knik	Under lease to Alaska Enterprise, Inc.	
Rainbow Mining Co., Nome	Black Gulch	Cape Nome	Hydraulic	5
Randall, N. B., Windham	Spruce Creek	Juneau	Drag scraper	5
Rapp & Till, Luckyshot	Gold Bullion; Craigie Creek	Knik	Cyanide plant	10
Ready Bullion Mining Corp., Fairbanks	Stay property; Eva, Quartz, Hudson or Borovich and Stevens Mine; Ester Dome	Fairbanks	Gold lode with mill	5
Red Top Mining Co., Fairbanks	Jos. Quigley property; Friday Creek, Kantishna	Fairbanks	Gold lode with mill	13

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Reeve & Reeve, Talkeetna	Upper Cache Creek	Talkeetna	Hydraulic	5
Remington, A., & Turner, Geo., Flat	Matt Johnson property; R. limit of Otter Creek	Otter	Hydraulic lift, pump and bulldozer	5
Repo, John, & Schwaesdal, Andrew, Wiseman	Myrtle Creek	Koyukuk	Hydraulic and bulldozer	9
Rice, C. F. & Co., Teller	Sunset Creek	Port Clarence	Pumping plant and scraper	5
Riley Investment Co., 116 Carson St., Carson, Nev.	Otter Creek	Otter	Dredge	16
Roberts, C. O., Nome	Hurrah Creek	Cape Nome	Pumping plant and bulldozer	7
Rolando, B. & Sons, 769 So. 64th St., Tacoma, Wash.	Game Creek	Council	Bulldozer and pumping plant	8
Ross, Otis & Partners, Talkeetna	Peters Creek	Talkeetna	Gas shovel	5
Ruff & Tuff Gold Mining Co., 329 Republic Bldg., Seattle, Wash.	Ruff & Tuff; Columbia Glacier	Valdez	Gold lode with mill	10
Sakow, Walter, & Tomoff, Geo., Flat	Manley Estate property; Willow Creek	Otter	Bulldozer, hydraulic and dragline for tailings	9
Savage & Bergstrom, Circle Springs	Portage Creek	Circle	Dragline, bulldozer and washing plant	12
Savage & Matheson, Takotna	Evan Jones — Nickelson ground; Spruce Creek, Ophir	Innoko	Dragline, washing plant and bulldozer	14

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Schlitz Creek Mining Co., Nome	Schlitz Creek	Port Clarence	Hydraulic elevator	7
Scott, Tolbert, Nome	Iron Creek	Cape Nome	Dredge	6
Scott Company, J. H., Hyder	Riverside Mine; Salmon River	Hyder	Gold, silver, tungsten, lead lode with mill	20
Shaw, T. J., Edmons, Wash.	Ophir Creek	Council	Hydraulic	8
Shaw & Cook, Bonanza	Ungalik River	St. Michael	Dredge	Idle
Shield, C. F. & Co., Fairbanks	No Grub Creek, Salcha Dist.	Fairbanks	Hydraulic, slackline and bulldozer	10
Slack & Mahan, Nome	California Creek	Cape Nome	Dredge	5
Solo Mining Co., Ketchikan	Electrum Group; Hyder	Hyder	Gold lode development	Idle
Sorenson & Associate, Hope	Resurrection Creek	Kenai	Hydraulic	6
Sparks, Howard G., & Miller, Max, Livengood	Luckman; Amy Creek	Tolovana	Hydraulic and bulldozer	4-6
Speljack, Frank, Takotna	Coffy Bench; Ganes and Little Creeks	Innoko	Hydraulic and bulldozer	7
Spokane Peters Creek, Inc., 522 Old Natl. Bank Bldg., Spokane, Wash.	Peters and Cache Creeks	Talkeetna	Dragline with washing plant and bulldozer	Idle
Standard Mines, Inc., Ferry	Eva Creek	Nenana	Dredge	6
Steavens, Lea, 3272 McClintock Ave., Seattle, Wash.	Quartz Creek	Cape Nome	Dragline, bulldozer and hydraulic	5

LIST OF MINING OPERATORS AND PROPERTIES

Name and Address of Operator	Name and Location of Mine or Plant	Precinct	Type of Operation	Approx. Crew
Stepovich, Mike, Fairbanks	Lower Fish Creek	Fairbanks	Dragline and bulldozer	15
Strandberg & Sons, Anchorage	Candle Creek, Takotna	Innoko	Dragline, washing plant and bulldozer	23
Stuyahok Mining Co., Anchorage	Flat Creek ,trib. to Stuyahok River	Wade-Hampton	Draglines, bulldozers and washing plants	25
Sullivan, J. T. Mining Co., 109 So. Main Street, Stillwater, Minn.	Daniels Creek	Cape Nome	Slackline cable	25
Superior Mine, Inc., The, 717 Sacramento Street, San Francisco, Calif.	Little Giant, Rose, Star, Big Four and Blue Fox Groups; Mineral Creek and Picot Bay	Valdez	Gold lode with mill	10
Superior Portland Cement, Inc., 1003 Seaboard Bldg., Seattle, Wash.	View Cove; Dall Island	Ketchikan	Limestone quarry	20
Tatlanika Mining Co., Fairbanks	Grubstake Creek, Bonnifield district	Nenana	Hydraulic, bulldozer	7
Texas Creek Gold Mining Co., Hyder	Texas Creek	Hyder	Silver, lead lode	Idle
Three Miners, Inc., Ophir	Esperanto Creek, Tolstoi area	Innoko	Dragline, washing plant and bulldozer	12
Togiak Mining Co., Anchorage	Trail Creek, Togiak River	Bristol Bay	Hydraulic with bulldozer	6
Trinity Mining Co., Nome	Kougarok River	Cape Nome	Hydraulic	6
Triple X Placers, Inc., Ferry	Moose Creek	Nenana	Dredge	6

LIST OF MINING OPERATORS AND PROPERTIES

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Triple X Mining Co., Ferry	Moose Creek	Nenana	Dragline, bulldozers and washing plant	9
Tweet Brothers, Teller	Coyote Creek	Port Clarence	Pumping plant and bulldozer	6
Tweet & Sons, Teller	Deese Creek	Port Clarence	Dredge	Idle
Ungalik Syndicate, 100 E. 42nd Street, Seattle, Wash.	Ungalik River	St. Michael	Dredge	9
United Mining & Development Co., Seward	Slate Creek, Moose Pass	Kenai	Development of gold lode with mill	12
U. S. S. R. & M. Co., 1 State Street, Boston, Mass.	Pedro Creek	Fairbanks	Hydraulic and bulldozer	10
U. S. S. R. & M. Co., 1 State Street, Boston, Mass.	Mosquito Fork and Chicken Creek	Fortymile	Drill prospecting	6
U. S. S. R. & M. Co., 1 State Street, Boston, Mass.	Cleary, Pedro, Goldstream, Ester-Cripple, Fish, Little Eldorado and Fairbanks-Fish Creeks	Fairbanks	8 Dredges	681
U. S. S. R. & M. Co., 1 State Street, Boston, Mass.	Nome	Cape Nome	3 Dredges	289
U. S. S. R. & M. Co., 1 State Street, Boston, Mass.	Henry Ford Mine; Fairbanks	Fairbanks	Gold lode with mill	16
United Western Mines, Inc., Juneau	Clark property; Carlson Creek	Juneau	Gold lode development	Idle

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Uotilla & Hard, Ophir	Ophir Creek	Innoko	Dragline, washing plant, hydraulic and 2 bulldozers	25
Uotilla & Ogriz, Flat	Slate Creek	Otter	Dragline, washing plant, hydraulic and bulldozer	12
Utopia Mining Co., Anchorage	Utopia Creek	Ft. Gibbon	Dragline, bulldozer and washing plant	14
Vibe, N. J., Ophir	Yankee Creek	Innoko	Dredge	9
Vibe & Schwaesdall, Takotna	Spaulding Creek, Upper Ganes	Innoko	Dragline with washing plant	9
Wade Creek Dredging Co., Fairbanks	Wade Creek	Fortymile	Dredge	28-30
Wagner, Frank, Talkeetna	Lower Bird Creek	Talkeetna	Hydraulic	5
Walkers Fork Gold. Corp., 726 Jos. Vance Bldg., Seattle, Wash.	Walkers Fork	Fortymile	Dredge	Idle
Warwick, A., Livengood	Wilbur Creek	Tolovana	Hydraulic and bulldozer	6
Whitehead & Co., White Bluff, Wash.	Pioneer Creek, Eureka District	Hot Springs	Bulldozer, pump and hydraulic lift	5
Wickersham Bros., Cantwell	Valdez Creek	Chitina	Hydraulic	8-10
Willow Creek Mines, Luckyshot	Lucky Shot, War Baby and Gold Bullion properties; Craigie Creek	Knik	Gold lodes with milling plant	55

LIST OF MINING OPERATORS AND PROPERTIES

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Willow Creek Mining Co., Marshall	Willow Creek	Wade-Hampton	Dragline, bulldozer and pump	14
Wilson Creek Mining Co., Anchorage	Elephant Gulch, trib. to Wilson Creek	Wade-Hampton	Dragline, bulldozer and washing plant	16
Wolf Creek Mining Co., Fairbanks	Wolf Creek, trib. to Cleary Creek	Fairbanks	Dragline and washing plant	5
Wycoda Mining Co., Ketchikan	Goo Goo and Sea Level properties; Thorne Arm	Ketchikan	Development of gold lode	Idle
Yakataga Mining Co., Yakutat	White River	Kayak	Placer drilling	5
Yellow Band Gold Mines, Inc., Chitina	Yellow Band, Chick Nelson and Bremner; Golconda Creek	Chitina	Gold lode with mill	10
Yukon Mining Co., Anchorage	Bobtail Creek, trib. to Kako Creek	Wade-Hampton	Dragline, bulldozer and washing plant	15
Zimmerman, A. A., Circle Springs	Ketchum Creek	Circle	Dragline, hydraulic	8
Zimmerman, A. A., Fairbanks	Sourdough Creek, vicinity of Fairbanks	Fairbanks	Hydraulic, slackline, excavator	5