

AR-1918

REPORT

OF THE

Territorial Mine Inspector

TO THE

Governor of Alaska

FOR THE

YEAR 1917

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the mineral production of Alaska can not be collected within less than three or four months after the close of the year, but meanwhile it is desirable to publish the preliminary estimates here given, which are believed to vary not over 5 per cent from the actual figures.

The value of the mineral production of Alaska in 1917 is estimated at \$41,760,000, exceeding that of any previous year except 1916, which was \$48,632,000. The decrease in 1917 was, therefore, about \$6,870,000. During 33 years of mining Alaska has produced over \$391,000,000 worth of gold, silver, copper and other minerals.

Alaska mines are believed to have produced gold to the value of about \$15,450,000 in 1917, compared with \$17,240,000 in 1916. The total value of the gold mined in the Territory is now about \$293,500,000, of which \$207,000,000 has been won from placers. In 1917 about 88,200,000 pounds of copper were produced in Alaska, valued at about \$24,000,000. The production in 1916 was 119,600,000 pounds, valued at \$29,480,000. The total copper produced to date is 427,700,000 pounds, valued at \$88,400,000.

The value of Alaska's lesser mineral products in 1917 was about as follows: Silver, \$1,050,000; coal, \$300,000; tin, \$160,000; lead \$160,000; antimony, \$40,000; tungsten, chromium, petroleum, marble, gypsum, graphite, platinum, etc., \$600,000. The year 1917 marks the first production of chromium in Alaska and about 81 ounces of platinum was saved in placer gold mining at several widely separated localities.

GOLD PLACER MINING.

The data in hand indicates that the value of the placer gold output in 1917 was \$9,850,000; in 1916 it was \$11,140,000. The decrease was due chiefly to restriction of operations because of the high cost of supplies and the scarcity of labor. The placer output was increased only in the Tolovana, Marshall, and Ruby districts and at the new Tolstoi camp.

GOLD LODE MINING.

About 33 gold lode mines were operated in 1917, compared with 29 in 1916. The value of this lode gold mined decreased from \$5,912,000 in 1916 to about \$5,250,000 in 1917. The decrease was due chiefly to the disaster at the Treadwell mine. Southeastern Alaska, especially the Juneau district, is still the only center of large quartz mining development in the Territory. Next in importance is the Willow Creek lode district. Gold-lode mining on Prince William Sound, Kenai Peninsula and in the Fairbanks district is at a standstill.

COPPER MINING.

The copper production of Alaska in 1917 was about 88,200,000 pounds, valued at about \$24,000,000. This is less than the production in 1916, which was 119,600,000 pounds, valued at \$29,484,000, but is greater than the production of any other year. The reduction in output was due largely to labor troubles at the Kennecott-Bonanza mine. During the year 17 copper mines were operated, compared with 18 in 1916—8 in the Ketchikan district, 6 in the Prince William Sound district, and 3 in the Chitina district. The enormous output of the Kennecott-Bonanza mine, in the Chitina district in 1917, as in previous years, overshadowed that from all others.

TIN MINING.

About 232 tons of stream tin was produced in Alaska in 1917. Most of this came from the York district, where two tin dredges were operated. Developments were also continued on the Lost River lode-tin mine. The rest of the concentrates were recovered incidentally to placer-gold mining, chiefly in the Hot Springs district.

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ANTIMONY MINING.

The mining of antimony ore (stibnite) began in Alaska in 1915, and continued on about the same scale throughout the first half of 1916, when a fall in the price of antimony put an end to most of these operations. Mining continued at two localities in the Fairbanks district in 1917.

TUNGSTEN MINING.

The Fairbanks district and Seward Peninsula were the principal producers of tungsten in Alaska in 1917. In the Fairbanks district two tungsten mines are in course of development. At one of these mines one unit of a 75-ton mill is in operation and late in the summer was turning out several hundred pounds of scheelite concentrates daily. At the other mine a similar mill was in course of construction. Underground work was in progress at both mines. The present indications give promise of a large increase in the production of tungsten in the Fairbanks district. In Seward Peninsula tungsten was produced principally by sluicing the residual scheelite-bearing lode material in Sophie Gulch. Smaller quantities were recovered as the result of placer mining at other localities.

MINERAL FUELS.

The production of petroleum from the only oil claim patented in Alaska in the Katalla District, was increased somewhat in 1917. Drilling continued on a small scale, but no new productive wells were obtained.

About 61,000 tons of coal, valued at \$300,000, were mined in Alaska during 1917. The largest production was derived from the Eska Creek mines in the Matanuska field, which were taken over by the Alaskan Engineering Commission. Coal was mined also at the Doherty mine in the Matanuska field, at the Bluff Point mine on Cook Inlet, on Cache Creek, and near Candle. The most important event of the year in connection with coal mining was the completion of the Matanuska branch of the government railroad. The high-grade coal on Chicaloon River is now being opened by the Alaskan Engineering Commission, and small shipments to Anchorage have been reported. Work preparatory to mining is being undertaken by private lessees on Moose Creek.

The coal lands in the Nenana coal field have been subdivided and will be offered for leasing at an early date. The Government railroad is now being built southward to this field from Nenana, on the Tanana River, and will probably reach the field and make the coal available for shipment in the summer of 1918. A private railroad from Controller Bay to a patented coal claim in the eastern end of the Bering River field is now under construction and is reported to be nearing completion.

DREDGING.

Thirty-nine dredges were operated in Alaska during the mining season of 1917, of which 32 were situated on the Seward Peninsula, three in the Iditarod District, and one each in the Ruby, Circle, Fairbanks and Cache Creek districts. Two of the large dredges near Nome, which had been under construction for several years, were completed and one of them was operated during a part of the season. One of the dredges of the American Gold Dredging Co., formerly operated on the Amcovik River, was moved to Swanson Creek in the American River district, near Teller.

The Alaska Mines Corporation (successors to the Nome Consolidated Dredging & Power Co.) optioned considerably more ground and completed, in the Nome district, a dredge that has been under construction by the Nome Consolidated Dredging Co., since 1912 on Flat Creek. Last season

this company dismantled the dredge that was operated on Wonder Creek by the Nome Consolidated Co.

SOUTHEASTERN ALASKA.

About 9 lode-gold mines, 8 copper mines and 2 placer mines were operated in Southeastern Alaska during 1917. Preliminary estimates indicate that the value of the gold produced in this field was about \$4,900,000. The estimated copper production from this region (all of it from the Ketchikan district) was 3,650,000 pounds, valued at about \$1,000,000.

In the Ketchikan district no gold mines were operated. The principal copper producers were the Rush and Brown, It, Jumbo, and Mount Andrew mines. The Mammie mine was closed down in the spring, and an increased output was made at the It. The Rich Hill Copper property on Kasaan Peninsula, is being developed by the Granby Company. A 60-ton flotation mill was constructed on the Salt Chuck mine (formerly the Goodro mine) where milling was begun late in the summer. A molybdenite-bearing lode in the vicinity of Shakan on the west coast of Prince of Wales Island, is being developed. Marble quarrying at Tokeen was continued about as usual.

Development of the copper lodes of the Ketchikan district, particularly on the Kasaan Peninsula, has led to the uncovering of large bodies of magnetic iron ore at a number of places. This magnetite, which contains usually about 0.5 per cent of copper has hitherto been regarded only as a low-grade copper ore. Attention has recently been redirected to these ores as a source of iron. Magnetic separation should yield a high-grade iron ore and a valuable by-product of chalcopyrite to pay for the cost of separation. Plans for utilizing these iron ores are now being considered.

MINING AND METALLURGICAL EXPERIMENT STATIONS UNITED STATES BUREAU OF MINES.

A mine experiment station was established at Fairbanks during the present year, one of the eight authorized by an act of Congress in 1915, under the supervision of the United States Bureau of Mines.

This station will make qualitative analyses for the prospector as well as conduct tests on ores for the purpose of determining the character of the ore and the milling process best adapted for the most economical treatment of it. The station is equipped with small testing or sample mills of different types, stamps, ball-mills, roll-mill, flotation process, cyanide process and the tables, amalgamation, Pachuca and settling tanks necessary for the operation of the same. The station will be of great benefit and assistance to the mining industry of the interior of Alaska.

Another of the United States experiment stations was established on the grounds of the University of Washington at Seattle, Washington, for the benefit of the Pacific Northwest States and Southeastern Alaska. This station, in addition to having the metallurgists and chemists of the United States Bureau of Mines, will have the cooperation of the Faculty of the College of Mines and the assistance of the students in conducting investigations. At present the principal investigations being conducted by the station are in electric metallurgy and in the mining, treatment and use of coal. The Fairbanks station was visited during July and August and was under construction at that time. The Seattle station was visited in October, when investigations were being made into the treatment and separation of copper and nickel ore of southeastern Alaska, as well as preparations to test and determine the character of washing plant required for the washing and cleaning of the Matanuska coal.

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SCHOOL OF MINES

The Territorial Legislature, third session, passed an act providing for the establishment of the Alaska Agricultural College and School of Mines, in accordance with the provisions of the Act of Congress approved March 4, 1915, and for the granting of a charter to the above institution. Owing to the vastness of the Territory, its sparsely populated condition and the small number of students that would congregate at any one place, it would be very hard to enroll enough students to insure the maintenance of this college in the manner desired. A better plan for the present needs of the Territory would be to establish classes, in the several principal centers of mining or agriculture, in those industries. For instance, a class in mining could be established in the school of Juneau, where excellent opportunities for the study of mining and metallurgical operations are offered to the students, as some of the largest mines in the United States are situated almost within the city. These mines are equipped with the most modern mills known to the mining industry and mining and milling costs have been reduced to the lowest known to the mining world. I am sure that the managements of those properties would be pleased to cooperate with a class of that kind to the extent of letting the students have free access to the mines and mills for the purpose of studying mining and milling methods. An abundance of minerals and ores for laboratory and experimental work could be procured nearby.

The large school house recently built in Juneau could easily furnish the class room or rooms necessary for such a course. The necessary laboratory for the conduct of assays, analysis and general metallurgical studies, could be erected near the school building at a nominal cost. Class rooms for the study of the different branches of agriculture could be added to the high schools of Fairbanks, Anchorage and other centers where agriculture is engaged in extensively enough to warrant the establishment of such a school, and where studies of the soil could be conducted by the students. Fairbanks also could establish a class in mining, having the use of the United States Bureau of Mines mining and metallurgical experiment station.

The establishment by the United States Bureau of Mines of a mining and metallurgical experiment station at Juneau is a possibility, and the United States Bureau of Mines might be induced to contribute that much toward the establishment of a school of mines at Juneau. This is not a new method of conducting schools of this kind. Australia and New Zealand have used this method for years and have even conducted them as night schools. Some of the most efficient mining engineers of those countries gained their knowledge in that way while working in the mines, thereby acquiring a practical and technical education at the same time.

LABOR CONDITIONS.

During the year there was a shortage of labor in some districts or localities, but, taken as a whole, there was an ample supply of labor within the Territory and wherever there was a shortage it was due to its distribution, some localities having an excess while others suffered from a shortage. The large, low-grade mines of the Juneau district were severely handicapped in the operation of their mines and mills by reason of the lack of sufficient labor. The shortage of labor in this district could be traced to the small wage paid by those mines as compared with the mines in other sections, and the copper mines of the States.

A shortage of labor was noted in the Fairbanks district, although the placer operations had decreased fully fifty per cent below that of 1916, in the number of men employed, and \$5 a day and board, for eight hours'

work, was the going wage. This can be partly traced to the large number of men employed by the Alaska Road Commission on the interior wagon roads and the construction of the Government railroad, where the pay was more certain, although lower, large numbers of laboring men being attracted to the railroad construction towns of Nenana and Anchorage, where the number of idle men was noticeable.

There were three strikes by those employed in the mining industry during the year. Early in June the miners in the Willow Creek District demanded an increase in wages from \$3.50 per day and board to \$4 per day and board. The Willow Creek Mines Company, operating the Gold Bullion Mine, was the only company in the district to grant the request of the miners; the other mines continued operations without experiencing any difficulty in getting all the labor needed.

On June 16 the miners working at the mines of the Kennecott Copper Corporation at Kennecott, demanded that they be paid a flat rate of \$4.50 a day and board, instead of the sliding scale then in force at that mine, the miners agreeing to accept the old scale of \$3.75 and \$4.25 per day and pay \$1.25 per day for board upon the price of copper dropping below 18 cents per pound; upon the company refusing this offer the men quit in a body and established a camp near McCarthy, which contained about 220 men. Better living conditions were also demanded by the men.

The schedule of wages used as a base rate by the Kennecott Copper Corporation, which became effective January 1, 1917, in the mining department was as follows:

Shift Bosses	\$5.25
Compressormen	4.75
Hoistmen	4.50
Miners	4.25
Trammers (main level)	4.25
Powdermen	4.25
Skip Tenders	4.25
Timber Boss	4.75
Timbermen	4.25
Timbermen Helpers	3.75
Pipe and Trackmen	4.50
Pipe, Track and General Repairmen	4.25
Pipe and Track Helpers	3.75
Tramway Operator Shift Boss	4.25
Tramway Men	3.75

Shaft miners and muckers and miners working in a raise at a distance of over 25 feet, measured vertically from its starting point on the level below, will receive 50 cents per shift above base rates here given during the period of such employment only.

All men to work 8-hour shifts, except those working on a monthly basis.

Board \$1.25 a day; hospital, 10 days or under, 10 cents per day hospital fee; over ten days \$2 per month for single men, calendar month; men with families \$3 per month.

The system of payment before the strike was a base rate as above stated, with an added bonus. The bonus rate adopted January 1, 1917, was as follows:

The standard rate of wages as a base rate will prevail when the average price of copper during the previous month was under 18 cents per pound.

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When the average price of copper is 18 cents and under 23 cents per pound, each employee engaged upon daily wage basis will receive a bonus of 25 cents a day.

The raise in the bonus continuing on this rate for every 5 cents per pound raise in copper, the employee receiving a bonus of 25 cents a day additional.

All employees employed by the month shall receive a bonus of not to exceed \$15 per month.

After the men had struck, the company offered a new schedule of rates for bonus, which was as follows:

Effective June 16, 1917, the standard wage scale will continue as the base rate and will prevail when the average price of copper for the previous month is under 15 cents per pound.

When the average price of copper is 15 cents and under 18 cents per pound, each employee engaged upon a daily wage basis will receive a bonus of 25 cents per day.

The raise in the bonus continuing on this rate for every 3 cents per pound raise in the price of copper. the employee receiving 25 cents a day added bonus.

Mess employees on a monthly basis will receive a bonus of \$4 per month for each 25 cent change in the bonus for employees on a daily basis.

Bonuses to all other employees on a monthly basis will be fixed by special agreement.

In each and every case the bonus for the current month will be determined by the average selling price of electrolytic copper as given in the Engineering & Mining Journal quotations for the preceding month.

After almost a month of bickering and trying to agree upon a basis of settlement, without coming to any agreement, the company sent men to Cordova and Anchorage, who secured enough men to take the places of those that went out on the strike, thus proving that labor could be procured in the Territory, even under those conditions, which is usually difficult of accomplishment.

At the Ellamor mine the men did not demand any advance in wages, but demanded of the management that they discharge the foreman within twenty-four hours or they would all walk out. The demand was signed by 28 of the hundred men employed at the mine. The manager that evening (June 25), before the 24 hours had elapsed, posted a notice to the effect that the mine would be closed until July 7 for repairs to the machinery. The 28 men that signed the agreement drew the money coming to them and left the camp the evening of the 25th. The mine resumed work as soon as the repairs were completed, the foreman having left in the meantime.

The eight-hour law, as amended, covering all underground mining, was generally observed throughout the Territory. The ten-hour scale of wages. (\$5 per day and board for eight hours' work) was maintained in the underground placer mines.

A general eight-hour law, applicable to all wage and salary earners in the Territory, was passed by the Alaska Legislature, session of 1917, in response to a referendum submitted to the people at the general election of 1916, the referendum having been adopted by an overwhelming majority. The law became effective January 1, 1918. This law will not effect the mining industry to any great extent, as the quartz mines and underground placer mines are already operated under an eight-hour law. It will, however,

affect the surface placer and dredges to a certain extent, but the number of men employed in those is small as compared with the other mining industries.

USE OF EXPLOSIVES.

Under the new explosive act, in force since November 15, 1917, all users of explosives must first procure licenses and

Any person in the United States, its Territories, Alaska, the District of Columbia and other dependencies of the United States, found with explosives in his possession and who does not have a license issued by the Federal Government, showing the purpose for what the explosives are to be used, will be at once arrested and fined up to \$5,000 or sent to prison for one year. If the circumstances warrant, the person may be fined \$5,000 and in addition given the one year in prison."

This is the principal clause in a war measure passed by the last Congress, and it is now being put into effect by the Bureau of Mines, which has been charged with its enforcement. Mr. Francis S. Peabody, of Chicago, a well known coal operator, familiar with the use of explosives, has been appointed by Secretary of the Interior Lane to act as assistant to the Director of the Bureau of Mines, Van H. Manning, in the enforcement of the law. D. C. Sargent, with headquarters at Cordova, has been appointed Inspector of Explosives for Alaska, and will represent the Bureau of Mines in the administration of the law within this Territory. Under the law, the Director of the Bureau is empowered to utilize the services of all United States officers and all police officers of states, including city police forces, county sheriffs, deputies, constables and all officers in any way charged with police duty. The police are not only to look after enforcement of the law, but are also to make thorough investigations of all dynamite outrages and fires in factories and warehouses and to make their reports to the Director of the Bureau of Mines. Persons apprehended in plots to blow up factories or bridges will be turned over to the authorities for prosecution under Federal laws.

The law provides that everyone who handles explosives must have a license. The manufacturer, the importer and the exporter must have licenses issued by the Bureau of Mines in Washington, as well as the purchaser and seller of explosives. In Alaska these licenses will be issued by the United States commissioners. Only citizens of the United States or of the countries friendly to the United States and the Allies, may obtain licenses. Contractors, mining companies, quarrymen and others using large quantities of explosives which are handled by employees, may issue explosives to their employees only through those employees holding a license called a "foreman's license."

The purchaser of dynamite, in obtaining a license, must state definitely what the explosive is to be used for, and will be held accountable for its use as stated and the return of any explosive that may be left.

With the strict enforcement of this law, the Federal authorities hope to prevent explosives from falling into the hands of disloyal persons and to withhold explosives from persons who will not guard them carefully enough to prevent their being stolen.

Every applicant for a license must appear in person before the licenser, who is directed to refuse to issue a license to any person not known to him to be responsible and loyal, or, if not known to him, unless he is recommended by reputable citizens of the community.

A corporation official applying for a license for a corporation and a foreman applying for a foreman's license should present proper credentials

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SIVES.

since November 15, 1917, all users

its Territories, Alaska, the agencies of the United States, and who does not have a permit, showing the purpose used, will be at once arrested and imprisoned for one year. If the offender may be fined \$5,000 and in

measure passed by the last Congress by the Bureau of Mines, which Mr. Francis S. Peabody, of Chicago, with the use of explosives, has been named to act as assistant to the mining, in the enforcement of the law at Cordova, has been appointed to represent the Bureau of Mines in this Territory. Under the law, he is authorized to utilize the services of all officers of states, including city police and all officers in any case are not only to look after and make thorough investigations of all mines and warehouses and to make their reports to the Bureau of Mines. Persons apprehended in violation of the law may be turned over to the authorities

who handles explosives must have a license and the exporter must have a license in Washington, as well as in Alaska these licenses will be issued only to citizens of the United States and the Allies, may obtain licenses, quarrymen and others using explosives handled by employees, may issue licenses to those employees holding a li-

cence, must state definitely the purpose and will be held accountable for the use of explosive that may be left.

Under the law, the Federal authorities hope to get the hands of disloyal persons and to guard them carefully enough

to appear in person before the licensor, and to advise any person not known to him, unless he is rec-ommunity.

When a license for a corporation and a license should present proper credentials

to show their official capacities. The word "foreman" as used in the regulations, designates the person actually issuing explosives from the explosives magazines and any other person who may be designated by his company to see that explosives are taken by workmen only to points necessary to the carrying on of his duties and that unused explosives are returned to a safe place, whether or not this man is known at the mine or plant or carried on the pay roll under the title of foreman.

Under an interpretation of section 9 of the law, every person authorized to sell or issue or otherwise dispose of explosives, shall keep a complete, itemized and accurate record, showing each person to whom explosives are sold, given, bartered or to whom or how otherwise disposed of; the quantity and kind of explosives; the purpose for which they are to be used; and the date of each sale, gift, barter or other disposition; and this shall be sworn to and furnished to the director of the Bureau of Mines, or his authorized representatives, whenever requested.

JUNEAU DISTRICT.

Alaska Treadwell Gold Mining Co.—Mine Accident.

The most serious disaster that has ever happened to the mining industry in Alaska, so far as the effect on the mineral output is concerned, is the caving of the Alaska Treadwell, 700 and the Alaska-Mexican mines, all properties owned by the Alaska-Treadwell Gold Mining Company and subsidiary companies.

The cave-in occurred on April 22, at 1:30 a. m., letting in the waters of Gastineau Channel, which filled the underground workings of the Treadwell, the 700 and the Mexican mines. The subsidence followed a well-defined fault line crossing the ore body north and south and following closely the east end line of the 700-ft. claim. The hanging wall had been settling for over two years, but with increasing speed since July, 1916, when the work of drawing ore from the upper stopes was discontinued on account of the settling of the hanging wall.

One of the principal contributing causes of the cave-in was the drawing of broken and caved pillar ore from the upper levels, thereby removing the support from the hanging wall. This was done in an effort to make the mine pay for the development of the lower levels. The ore from the 1750-ft. level to the 2300-ft. level was of too low a grade to pay the cost of operation. Consequently the stopes below the 1750-ft. level to the 2300-ft. level were abandoned, leaving a solid block of approximately 500 feet of rock between. Practically a new mine was developed below the 2300-ft. level and on that level and the 2500-ft. level development work was well advanced—stopes had been cut and ore was being hoisted in continually increasing tonnage. The central shaft had been sunk below the 2800-ft. level and a cross-cut was being driven on the 2700-ft. level, to the ore body. Diamond drill holes had been driven on those levels and ore yielding an average of over \$2 a ton was found. New equipment consisting of storage electric motors, Granby self-dumping cars, electric hoists, pumps, etc., had just been lowered into the mine a short time before the accident and all of it was lost.

For several days prior to the cave-in, surface subsidence was noticed and special watchmen were detailed to watch for any indication of a cave-in. At 11:30 p. m., April 21, a further subsidence was noted and the management was notified that water was running into the mine. When warning was given of the danger, 130 men were underground and all reached the surface and have been accounted for except one. Several men have stated

that he came up on the cage, but this statement is doubted, as he had a family and his family have not seen him since.

There were 773 men employed in the flooded mines at the time of the disaster, distributed as follows: Alaska Treadwell mine, 462; 700 mine, 250 and the Mexican mine, 61. Because of the shortage of labor at the time all of the men who wanted work were employed in the Alaska-Juneau, Perseverance, and the other mines on the mainland.

The power plants, warehouses, cyanide plant, foundry and the machine shops were used and operated with about 50 per cent of the force previously employed. This was possible because these foundry and machine shops do most of the foundry and machine repair work for the Alaska Juneau Gold Mining Co.

The annual output of the mines flooded was approximately three million dollars. Therefore, the annual gold output of the Territory will be reduced by that amount.

The Ready Bullion mine, which is situated about 2000 feet to the eastward of the flooded mines and which was connected with them by one tunnel only, driven on the 1350-ft level, was saved. A concrete bulkhead, 36 feet thick, imbedded into the sides, floor and roof of the tunnel prevented the flooding of this mine. An additional concrete bulkhead, 50 feet thick, was put in after the flood to reinforce the first bulkhead. Mining operations are carried on continuously in this mine and though a small amount of water seeps through the crevices in the rock and around the bulkhead, it is not enough to cause any great inconvenience and it can be handled by a small pump.

History of the Alaska Treadwell Mines.

The Treadwell group of mines is situated on the northeast side of Douglas Island, about two and one-half miles southeast of the city of Juneau, which is located on the mainland across Gastineau Channel. The group consists of four mines, beginning with the Treadwell mine at the northwest end and embracing the following in the order named: The 700-ft. mine, the Mexican mine, and with a 2,000-ft. space intervening, the Ready Bullion Mine. These four mines are operated by three separate mining companies, as follows: The Alaska-Treadwell Gold Mining Co., which operates the Treadwell mine; the Alaska-Mexican Gold Mining Co., which operates the Mexican Mine; the Alaska-United Gold Mining Company, which operates the 700-ft. mine and the Ready Bullion mine. From an operating standpoint, these mines have always been referred to as the Treadwell mines, all of them being under the same management.

The Treadwell mines were first discovered in the fall of 1880 by Pierre Erussard (French Pete), who located the Paris and Bear's Nest claims. Two years later the interests of Erussard were transferred to John Treadwell, who, with associates, formed the Alaska Mill & Mining Co. A controlling interest was purchased in 1890 by English capital and the Alaska-Treadwell Gold Mining Co. succeeded in the management of the properties.

These mines, through the magnitude of their operations and low mining and milling costs, attracted the attention of the mining world. At the time of the cave-in there were five stamp mills operating a total of 960 stamps and treating approximately 5,000 tons of ore a day.

At the time of the disaster to the properties, they were in process of consolidation, involving the Alaska-Treadwell, the Alaska-United and the Alaska-Mexican companies. These were to be merged into one operating company and a mill similar to the one built for and now operated by the Alaska-Juneau Gold Mining Company on the mainland, was to be

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constructed to take the place of the stamp mills, in order to lower the
milling costs. New underground and electric haulage equipment was be-
ing installed and Granby self-dumping cars and many other labor-saving de-
vices were added to further decrease the cost of production.

The total output of the three mines that were flooded, as given by
the report of the committee on consolidation, up to June 1, 1916, was valued
at \$54,886,968 and the dividends declared were \$21,337,651.

The grand total summary of accomplishments of all the mines for the
period of their whole history, up to June, 1916, was given as follows:

Tons crushed	\$26,464,047
Yield	\$82,797,459.91
Yield per ton	2.37
Operating profit	25,938,579.07
Operating cost per ton	1.42
Operating profit per ton	0.95
Dividends	21,337,651.00
Dividends per ton	0.805

To facilitate the handling of the increased tonnage anticipated under
the consolidation, the Mexican mine shaft was being widened from a two-
compartment shaft to a five-compartment shaft (two skip-ways, two man-
ways and pipe compartment), the dimensions of the shaft being 8x32 feet
in the clear. This shaft was nearing completion down to the 2100-ft. level
and was used in hoisting men and material at the time of the accident.

The mines flooded were situated mostly below and extending under
the Gastineau Channel to a depth of approximately 2200 feet below water
level. The ore body being worked had a length of about 2500 feet and a
width varying from 100 to 300 feet and between 45 and 50 miles of tunnels
had been driven. The cave-in took place to the 1200-ft. level, caving to the
surface on the western side of the fault line for a distance of about 250
feet, the eastern side standing almost vertically, very little subsidence
being noted.

It is very doubtful if the mines will ever be unwatered and operated
again.

Alaska-Gastineau Mining Company.

The Alaska-Gastineau Mining Company which operates the Perse-
verance mine in Silver Bow Basin, about four miles from Juneau, is the
operating company for the Alaska Gold Mines Co.

This mine, considered from the standpoint of tonnage, is one of the
largest mines on the American continent, and its output was 2,240,346 gross
tons, or an average of 186,696 a month. The mine is in a large fissured
zone of slate and metagabbro, cemented together by a network of quartz
lenses and veinlets.

Development work for 1917 consisted of 4,731 feet of drifts or levels;
1,702 feet of cross-cuts; 1,678 ft. of raises—a total of 7,244 feet of de-
velopment, in addition to which 12,754 feet of diamond drill holes were
driven. An average of 687.25 men were employed during the year, 525.23 in
the mine and 162.02 in the mill.

The stopes are worked on a caving system, overhead stoping just
enough ore being drawn to give headroom for the machines. The ore
is blasted out along the foot wall and the ore drops from the hanging
wall with a little additional blasting. From the stopes the ore passes
over grizzlies into chutes, the over size being bulldozed in bulldozing
chambers. From the chutes it is drawn into 4-ton cars of the Granby
self-dumping type and hauled by storage battery motor to the main ore-

