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PLACER MINING IN ALASKA IN 1926,

By

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Mining Engineer, U. S. Geological Survey.

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Introduction:

This is the fifth of a series of annual reports that have been written by the writer for publication in the Annual Report of the Mine Inspector of Alaska in accordance with the cooperative arrangement between the Territory of Alaska and the Alaska Branch of the Federal department. These annual reports are written to give an early review of the placer mining industry in general, with a review by districts wherein the placer mining operations and developments conducted during the year in the various districts are recorded. It is only possible to visit a small number of the many placer mining districts in the Territory each season and investigate the operations conducted there and the conditions affecting them. Through the kind cooperation of many placer mine operators and other interested Alaskans, reliable information is obtained each year of the operations and developments conducted in most of the districts that could not be visited that season. In this way, it is possible to keep in close touch with the entire industry, although, questionaires are not sent to the operators,

and information on some of the districts not visited during the year may be incomplete or at times entirely lacking. Until this year, this information was obtained by the U. S. Bureau of Mines. Practically all of the districts have now been visited, and have been reported upon in this series of annual reports, wherein main attention is given to the operations in the districts visited during the year. As some of the districts have been revisited and the principal operations there were described in the former reports, only the new and more interesting operations and developments will be given detailed discussion herein.

It is the aim to make these reports as complete as possible within practical limits, although at the time they must be written only some advance estimates of the placer gold production for the year can be given as it is not the duty of the Alaska office to procure and compile complete production statistics, this being the duty, according to law, of the Mineral Resources division of the U. S. Geological Survey (Alaska Branch) at Washington, D. C. Most of the estimates given are those of the writer and are based upon information obtained in the field and from well informed Alaskan sources, special acknowledgement being made for others. They are subject to such revision as may be necessary when the final official statistics become available. The geology of the placers in the many districts have been studied by the geologists of the U. S. Geological Survey and reported upon in the

many bulletins and technical papers published by that body since the industry first began in Alaska, and to which publications the reader is referred. A study of placer mining in Alaska was made by the writer for the U. S. Bureau of Mines during 1922, 1923, and 1924, the report "Placer Mining Methods and Costs in Alaska", U. S. Bureau of Mines Bulletin No. 259, will soon be available for distribution.

The writer's field work during the season of 1926 was done principally on the Seward Peninsula and in the Fairbanks district where the principal operations and developments are being conducted. The Sunrise district was also visited. Frank Holzheimer, associate engineer with the Survey investigated the mineral resources of the lower Kuskokwim River Basin and the Goodnews Bay district, obtaining detailed information on the placers and the placer operations in those areas as well as general information for this report on operations conducted during 1926 in the Ruby, Iditarod and Innoko districts, and the upper Kuskokwim River Basin.

It is regretted that it is not practical to record here the names of the many mine operators and other Alaskans who have given valuable aid in making these annual investigations and reports possible. Acknowledgment is here made all of them, especially to those in the districts visited and whose operations are as mentioned in the "Review by Districts". Special acknowledgment is made to B. D. Stewart, Territorial Mine Inspector and Supervising Engineer in Alaska for the

Bureau of Mines and the Geological Survey; to Frank Holzheimer of the Alaska office of the U. S. Geological Survey; to S. Guthrie and H. K. Carlisle of the General Land Office; J. E. Fitzgerald of the Post Office Department; officials of the Alaska Railroad, and of the U. S. Customs; officials of Alaskan mining companies with offices in Seattle and San Francisco; to Ed Belmont and Chas. Matheson of Hope; B. A. Grier, Fred Obermiller, Chas. Harper of Anchorage; Chas. Kramer of Nizina; W. E. James of Chisana; J. E. Carlson of Cantwell; Red Zickwolf of Tanana; James Climie of Rampart; E. Cronin and J. Howell of Hot Springs; Geo. Metcalf, Geo. Hutchinson, Geo. Wesch, Tom McKinnon, A. Conrad, G. E. Jennings of Fairbanks; M. E. Kelly of Livengood; James Hamil, Jno. Clayworth of Circle; Casper Ellingen of Nation; Geo. Marsh, Chris Betsch of Marshall; Harry Donnelly of Flat; Grant Jackson, J. J. Keenan, J. H. Harlan, R. B. Earling, D. F. Lisson, Almer Rydeen, R. W. J. Reed of Nome; Geo. Waldhelm, and Mrs. H. J. Christensen of Teller.

Production:

The total value of the mineral output of Alaska within a period of 46 years, 1880 to 1925, inclusive, is $653,304,968, of which $364,034,167 is the value of the gold and silver. Of this amount, the placers have produced about $240,185,000 in gold and $1,160,000 in silver. More than 85 per cent of this placer output has been produced since 1900.

In 1924, the placers produced $3,564,000 in gold. (1) The total value

(1) Statistics from Mineral Resources of Alaska: U.S.Geological Survey.

of all minerals produced in 1925 was $18,220,692, the placers being credited with about 19 per cent of it, or about $3,500,000, (2) the lowest output since 1900. This was due to a smaller dredge output, and to the acquisition by dredging interests of extensive holdings of placer, mainly in the Fairbanks district, which are being developed for large scale operation.

(2) Final figures not available.

Complete statistics on the total placer gold production for 1926 are not yet available but early estimates indicate it to have been about $3,750,000, an increase over that of 1925. The production of the dredges shows a large increase due mainly to the three large dredges operated at Nome. Other methods of placer mining were generally greatly handicapped because of severe water shortage during the prolonged dry season experienced in most of the districts. The Circle, Seventy Mile, and Forty Mile districts experienced favorable seasons making an increased production. Most of the Interior districts, including Fairbanks, Tolovana, Hot Springs, Koyukuk, etc., the Yentna and the coastal districts show a decrease, while the production from the Iditarod and the Innoko districts was maintained or increased mainly because of the dredges

operated there. A number of the smaller districts show very little fluctuation in the annual production. Seward Peninsula made a very large increase in its gold output, most of it being produced by dredging in the Nome district. The placer gold production for 1927 should show a substantial increase, especially if a favorable season for water prevails, although no appreciable change can be expected from the Fairbanks district until the dredges of the company, now doing extensive development and construction work there, begin operation, which will be about 1928.

Eleven tons of tin concentrates were shipped from Seward Peninsula, being the product of a small hydraulic mine which started operations in August on Goodwin Gulch in the Port Clarence district. Ten tons of tin concentrates, a product of a former shovel-in operation on this property, were shipped to Singapore in 1925, the smelter returns reporting a metallic tin content of 74.8 per cent, the highest grade of tin concentrate received by this smelter in many years. Four tons of stream tin were also shipped during the year and two more tons are ready for shipment from the Hot Springs district, where it is recovered as a by-product of gold mining.

Placer Mining in 1926:

The placer mining season of 1926 was, in general, not favorable for most of the operations, as climatic conditions were unusually

adverse for providing normal water supplies. The unusually light snow fall of last winter, melted quickly so that the spring water supply permitted but a short period for sluicing. This was followed by a prolonged warm dry spell with only occasional light rains so from the early part of July until the later part of August, when the general rains set in, there was a serious lack of water for sluicing in most of the districts. Some of the dredging operations were also affected, several having insufficient water for the operation of their hydro-electric power plants and several lacked water for a while for proper flotation of the dredge, while at some of the others, the greatly reduced water supply was a serious curtailment of the water thawing ahead of dredging. The upper Yukon districts were favored with an exceptionally good season for water, while in the Fairbanks district this condition was about normal. Tolovana, Iditarod and some of the other interior districts, which always have to contend with a water shortage, were especially hard hit in this respect. All of the Seward Peninsula experienced one of the driest seasons in its history. The alpine snows or ice caps which formerly existed on the higher mountains in the central part of the Peninsula, and which were the source of much of the water available for mining during the drier part of the season, have almost entirely disappeared during the past few years of minimum snow fall. It is a question whether they will ever be replenished to a size where they may again play their important part in the water supply of that region. In the Nizina, Girdwood, and other coastal

districts, where the streams supplying water to the mines are fed by glaciers, most favorable supplies were available, although the larger operations there spent much of the season in preparing for future operations.

Gold Dredging:

During 1926, 33 gold dredges were operated in Alaska; 19 on the Seward Peninsula and 14 in the Interior and other districts. There were 600 men employed in connection with this dredging, and the thawing, stripping and other work connected with it. The Seward Peninsular dredges employed 380 of these men, an average of about 225 being employed by the large company operating four dredges at Nome.

The gold output by these dredges is estimated at about $2,300,000 or about 60 per cent of the total placer gold output for the year. This is a large increase over the previous year, and is due mainly to the successful operation of the large dredges at Nome. During 1925, 27 dredges were operated in Alaska; 16 on the Seward Peninsula and 11 in the Interior and other districts, their output being about $1,600,000.

The companies operating dredges during 1926 are listed below, each with one dredge except as noted:

Gold Dredges Operated in Alaska in 1926.

Seward Peninsula.

Nome district:	
Bangor Dredging Corpn.	Anvil Creek.
Dexter Creek Dredging Co.	Dexter Creek.
Dry Creek Dredging Co.	Dry Creek.

Nome district, Continued:

Hammon Consolidated Goldfields Co. No. 1,	Copper Gulch.
" " " " No. 2,	Little Creek.
" " " " No. 3,	Saturday Creek.
" " " " No. 4,	Snake River.

Solomon district:

Goldsmith Dredging Co.,	Solomon River-Coal Cr.
Scott, Newberg & McCarthy,	Solomon River.
Shovel Creek Dredging Co.,	Shovel Creek.
Solomon Valley Dredging Co.,	Solomon River.

Casadepaga district:

Casadepaga Mining Co., Inc.,	Casadepaga River.

Council district:

Crooked Creek Dredge (Mebes & Hansen),	Albion Creek.
Northern Light Mining Co.,	Ophir Creek.
Ophir Gold Dredging Co.,	Ophir Creek.

Koyuk district:

Dime Creek Dredging Co.,	Dime Creek.

Fairhaven district:

Keewalik Mining Co., No. 1,	Candle Creek.
" " " No. 2,	Candle Creek.

Kougarok district:

Behring Dredging Corpn.,	Kougarok River.

Yukon Basin Interior.

Circle district:

C. J. Berry Dredging Co.,	Mammouth-Independence Cr.

Fairbanks district:

Chatham Gold Dredging Co.,	Chatham Creek.
Fairbanks Gold Dredging Co. No. 1,	Fairbanks Creek.
Nome Creek Dredging Co.,	Nome Creek.
Tanana Valley Gold Dredging Co., Ltd.,	Fish Creek.

Iditarod district:

Northern Alaska Dredging Co.,	Otter Creek.
Riley Investment Co.,	Otter Creek.

Innoko District:

Flume Dredge Co.,	Yankee Creek.
" " "	Little Creek.

Innoko district, Continued:

Frank Joaquin (Innoko Dredging Co.)	Ganes Creek.
Guinan & Ames Dredging Corpn.,	Ganes Creek.

Kuskokwim Region.

Mt. McKinley district:

Kuskokwim Dredging Co.,	Candle Creek.

Tuluksak-Aniak district:

New York Alaska Gold Dredging Co.,	Bear Creek.

Coastal Region.

Yentna district:

Englehorn & Co., (Cache Creek dredge),	Cache Creek.

Five new dredges were placed in operation during the year, they are the dredges of the Goldsmith Dredging Co., the Solomon Valley Dredging Co., the New York Alaska Gold Dredging Co., the Tanana Valley Gold Dredging Co., Ltd., and the Nome Creek Dredging Co. All but two of the dredges operated in 1925 resumed in 1926, they are the Fairbanks Gold Dredging Co. No. 8, which was permanently taken out of commission, and the small Iversen & Johnson dredge. The following dredges were idle in 1925 but resumed in 1926 - the No. 1 Hammon dredge, the Ophir Gold Dredging Co. dredge, formerly the No. 1 dredge of the Wild Goose Mining and Trading Co., and the Innoko Dredging Co. dredge, now operated under lease by Frank Joaquin and associates. The C. J. Berry Dredging Co., the Kuskokwim Dredging Co., the Behring Dredging Corpn., and the Crooked Creek dredge, completed the dredging of their ground, and while not yet definitely reported, two other dredges may not resume next season.

Prospecting by drilling or other means and other investigative work to determine the dredging possibilities was done principally on Ingle Creek and vicinity in the Forty Mile district, on American Creek in the Hot Springs district, on Livengood and Olive Creeks in the Tolovana, the Arctic River Basin in the Goodnews Bay region, the Kougarok River, Swanson Creek and several other creeks on Seward Peninsula, the Ungalik River in the Norton Bay-Nulato region. To date, the only definite announcement for new dredge construction in 1927, is a two and one-half cubic foot flume dredge for American Creek, although several others are under consideration.

The Fairbanks Exploration Co., a subsidiary of the U. S. Smelting, Refining and Mining Co., was especially active in carrying on its extensive dredging development in the Fairbanks district. A maximum number of 850 men were employed by this company in the construction of, the 79 mile or Davidson ditch, power plants, camps, etc., preparing the ground by stripping the overburden, doing experimental work with water thawing, etc. Exceptionally good progress was made this season. The construction of this ditch for bringing water from the upper Chatanika River to the creeks, mainly for stripping and thawing purposes, was started during the spring and at the close of the year had been about 60 per cent completed. The construction of the first dredges will probably be begun late in 1927 and everything should be ready for operation in 1928. This is the largest placer mining project ever undertaken in Alaska. A more detailed account of this work is given under the heading, "Fairbanks district".

Thawing with water.

The placers on the Seward Peninsula and in the Interior are usually solidly frozen when covered with a deep sod and muck overburden, or when 10 to 12 feet or more feet in depth. Exceptions are, however, often found, for through the development of bedrock drainage by natural or artifical means, thawed channels or areas may have developed. The exposed shallow gravels in creek or river beds generally thaw to bedrock each season. At some of the dredging operations, where the shallow gravels are overlain by sod and muck and are in part permanently, or seasonally frozen, this covering is first removed by stripping to expose frozen gravels which then naturally thaw, although a bedrock drainage must be established to insure complete thawing. The deeper placers, however, necessitate the thawing of most of the ground before dredging is possible. Such frozen placer is now being thawed with water at natural temperatures which is delivered to the ground under pressure through thawing points, under conditions best adapted to that particular ground and the available water supply. A large volume of ground is thawed annually in this way by seven of the dredging companies operating eleven of the Alaskan dredges, as well as by its extensive use in the Yukon Territory. Were it not for the successful development and application of this method of thawing, most of the perpetually frozen ground would be beyond economic consideration for dredging.

The practice of thawing frozen ground ahead of dredging varies according to the character and depth of the ground, the water supply,

and other conditions. Each field or even local area may have peculiarities requiring special procedure. For low thawing costs, the ground should be favorable to permit the easy driving of the points, the efficient use of the water, etc., an ample supply of water under suitable pressure must be available at a low cost; and the operation must be systematically and efficiently handled to obtain good results. One interior operation reports a thawing cost of 5 cents per cubic yard thawed, at others this cost generally ranges from 7 to 10 cents and in some instances up to 15 cents. Water is pumped at some of the operations, principally, to supplement the ditch supply during periods of low water.

The largest thawing operations are conducted at Nome by the Hammon Consolidated Goldfields Co,, 90 to 100 man having been employed at this work. This company has, by much experimental work and actual practice, developed an efficient and successful method of thawing the deep frozen, generally difficult, ground. The main features of the practice as developed here are the spacing, driving or setting the points, the use of temperature points and the application of the water. The depth of ground in the major areas ranges from 30 to 85 feet. Ground 85 feet deep has been successfully thawed as demonstrated by its dredging this season. The sod and muck overburden is, as a rule, not deep so no stripping is done. All water is supplied from ditches, excepting low water periods when the water is returned to the points by pumping. In ground not deeper than 45 feet, the 3/4 inch thawing

points are usually driven and are spaced at 16 foot centers in equilateral triangular relation to each other. Special means and devices for driving the points have been designed and developed by the company's engineers, and are a great improvement over those formerly used. In the deeper ground, holes, spaced at 32 foot centers, are usually drilled into which 1 1/2 inch open end pipe points are placed. Holes are also drilled at a spacing so that one will act for every twelve thawing points, into which sealed 3/4 inch pipes are placed. These are the temperature points into which the thermo couple attached to the cable leading to a resistance thermometer is lowered to obtain the temperature of the ground at certain levels for determing the degree and the extent to which the thawing has advanced. All points reach bedrock. The average time required to complete a thaw when the points are spaced at 16 foot centers is 30 to 35 days, and at 32 foot centers, about 100 days. At Snake River, where the ground is 10 to 23 feet deep, the points are spaced at 7 foot centers, an average thaw requiring 20 to 25 days. The average amount of water used by a 3/4 inch point is 1 to 1.25 Miners Inches, and 3 Miners Inches by the 1-1/2 inch point. Experimental work on methods of driving the points, conserving water, increasing its efficiency, and other features, is being done to further improve the practice and reduce the cost.

Cost of dredging.

Placer mining is a real and serious business and must be considered, and like any other business under consideration, must receive

the systematic and careful investigation of experienced men before it is undertaken. The bonanza placer days are past, the former rich, well defined pay streaks have been mined leaving the lower grade ground to be mined by more modern methods. As strange as it may seem, systematic prospecting and the proper interpretation of the results are so often disregarded. Sufficient proper prospecting must be done not only to ascertain the value of the ground per cubic yard and the available yardage and its gross gold content, but to also obtain information as to its physical characteristics. All conditions having a bearing on the operation of the property and the cost of winning its precious content must be investigated before its merits can be established, and the proper method for mining it, determined. All of these conditions then govern the expenditure that can be made for the property and the equipment, whereby the gross returns will pay all expense, retire the investment plus interest, and leave a net profit commensurable with the undertaking or satisfactory to those interested.

Placers free of perpetual frost are being dredged in Alaska in most instances at an operating cost of 15 to 25 cents per cubic yard. At a few properties where conditions are more generally favorable, operating costs as low as 10 cents have been reported, while in isolated localities or under adverse conditions it often exceeds the higher figure. Where the ground is frozen, the cost of thawing is an added expense plus the cost of such irregularities in operation as may be contendent with such conditions. Not all of the placer may be frozen in which case the

cost of thawing per cubic yard dredged may become nominal.

One of the largest items of the total cost, if not the largest, often not given sufficient consideration at the time the property is equipped, is the amortization or the return of the capital invested in the dredge and equipment. The short operating season of three to six months, and other conditions affecting operation in Alaska especially limit the volume of placer that can be mined during a season. The amortization of this invested capital may range from as low as a few cents per cubic yard in special cases, to as much or more than the operating cost. There are few dredging or other placer properties available in Alaska that are of sufficient richness or size, or possess other necessary features, to support a large capital charge. Some of the dredging companies and other placer operations are in a good position in this respect. Some have very nominal amortization charges, having been able to purchase and install on the property a good used dredge or other equipment at a very reasonable cost, with ditches and other improvements provided on the property by some former operation. Such equipment may not be as economical to operate as a new or better adapted dredge or plant probably would be, but this may be justified when the limitations of the property are considered. In the not too distant past, the prices and terms for property, or the royalties asked, were often far too large. Fortunately, this condition has been much bettered. There

There are several instances on the Seward Peninsula where the low temp of the unfrozen placer would not permit profitable dredging

if continued by the company. At one of these, the small dredge was subsequently purchased at a small figure by a partnership of experienced dredgemen, who by being familiar with the ground and making some changes in the dredge, and putting in their full effort, have been able to pay all costs and net a small profit. At another, a 5 cubic foot electrically operated dredge and the ground was acquired by another partnership on a reasonable royalty basis. This operation has been able to keep going in ground averaging only 10 to 12 cents per cubic yard, although it is admitted that should any extensive repairs or replacements become necessary, it would mean the end. Quite a number of hydraulic, drift and other kinds of placer properties are being worked in various parts of Alaska under somewhat similar arrangements.

Hydraulic Mining.

Hydraulic mining was, as usual, done in most of the districts although this form of mining was the most seriously affected by the prolonged drought. Hydraulic mining in the interior districts is generally limited to small scale operation as the topographic and climatic conditions are generally adverse to obtaining large reliable water supplies under high pressure. Many of the mines, especially those located above the main general drainage level, must rely mainly upon the water provided by the melting snows and the rain fall, so, in consequence, must either impound water and use it intermittently, or else close down during low

water supply periods. The low stream gradients encountered in mining in creek and river beds usually necessitate the stacking of the tailing. This is most generally done with a giant using water under pressure. The available water supply may at times require the alternate use of the water by the field and stacker giants. A few of the mines stack the tailing with cableway excavators, scrapers, or some other mechanical means, in order that all of the pressure water available can be used in the pit. One operation hydraulicks the gravel to a sump from where it is elevated by mechanical means to the sluice boxes which are set at an elevation sufficient to provide the required grade and dump room.

The largest hydraulic operations are conducted on the Seward Peninsula, and in the Nizina, the Cooks Inlet region and other coastal districts in Southwestern Alaska, where the conditions are generally more favorable for obtaining better water supplies. A large number of small hydraulic mines are operated on the Seward Peninsula. The two largest hydraulic elevator operations in Alaska, the Cordovada operation on the Immachuck River and the Lee & Swanberg operation on Osborne Creek, are also located there. Both of these have an unusual water supply, the former having a natural lake storage, the latter, a spring fed supply which, however, became very low during a part of this season. The Dan and Chititu Creek hydraulic operations in the Nizina district are the largest of their kind in Alaska. They experienced a satisfactory season although much of the work done this year was in preparation for future operation and a large increase in production next year

is anticipated by them. Extensive development preparatory to hydraulic mining on a large scale was done on Porcupine Creek in the Porcupine district. Several new small plants were installed during the season in other districts. Surveys were made in the Koyukuk district to ascertain the feasibility of obtaining a water supply for hydraulicking the bench placers of the Nolan and Hammon Rivers. A long ditch will be required.

Drift Mining.

Drift mining has ceased to be much of a factor in the placer gold production as most of the profitable ground adaptable to this method has been worked out or acquired by dredging interests. It is, however, being done on a greatly reduced scale, principally in the Fairbanks, Hot Springs, Ruby, and Koyukuk districts. A few small operations were conducted in some of the Seward Peninsular districts and in some of the other interior districts although most of these are winter operations with but one to two men engaged at each. Several of the plants in the Fairbanks district experimented with underground scrapers and other labor saving methods. Drift mining in most parts of Seward Peninsula is greatly handicapped by lack of fuel and timber. Fuel oil is available in the Nome area, and as certain areas on the Nome tundra and vicinity may not be suitable for dredging, a small increase in drift mining there is predicted.

Mechanical methods other than dredging.

A relatively small number of Bagley scrapers, slip toothed scrapers and cableway excavators were operated. Some of these were used for stacking tailing or delivering the gravel from the pit to the sluices in connection with hydraulic mining. The former large Bagley scraper operations in the Fairbanks district passed with the acquisition of their ground by dredging interests. While some small scraper plants are still being operated in some of the interior districts, they have, in general, passed the period of their economic usefulness.

The most notable cableway excavator operation was conducted at the mouth of Daniels Creek at Bluff, on the Seward Peninsula, where placer beneath the level of the sea was mined. A cableway excavator plant was also installed in the Marshall district where it was used during the season for developing the ground for its next season operation. No dragline excavators are reported to have been operated this season although the plant on Willow Creek in the Iditarod is to resume next year and several other operations of this kind are being considered.

The cableway, and the dragline excavator are better adapted for placer mining under Alaskan conditions than any other mechanical means other than dredging, the dragline excavator possessing many advantages over the cableway. To insure their economical and efficient operation under Alaskan conditions, the depth of gravel to be dug by the excavator should generally not exceed 8 or 10 feet after stripping, the

material to be excavated should be practically free of large boulders, and sticky clay, which is difficult to wash, the gravel must be unfrozen and the bedrock should be relatively soft and uniform. It is very essential that conditions permit keeping the working pit drained of water, preferably by natural drainage.

The excavator bucket is controlled by cables and therefore can not be held rigid and its path governed, as in the case of the rigid bucket line of a dredge with its following buckets held in position by positive anchorage. Unless the pit is kept drained so that the path or position of the excavator bucket can be seen, a considerable portion of the richest of the material, especially when the main gold concentration is at or near bedrock, is most likely to be left behind, and the bedrock cannot be properly cleaned. The use of an excavator in digging loose running material under water as in the case of sea beach placers, has additional difficulties for not only is it impossible to deliver fully loaded buckets but the auriferous material is greatly diluted and reduced in tenor by much barren material washed into the pit by the action of the surf.

These excavators can dig their load and deliver it to the sluice boxes without requiring additional conveying machinery, they can be operated by a small crew, require comparatively little power, and the cost for repairs and maintenance is low. The cableway excavator has the disadvantage of requiring a quite extensive set up for each pit, and lacks the mobility and digging ability of the dragline excavator.

The dragline excavator, being a self contained machine, can be readily moved from place to place, quickly resume operation, and deliver the material directly to the sluices. Those with booms 60 feet or more in length afford a suitable digging radius and in general this size of machine is better adapted to placer mining than the smaller ones. The sluices are set on timber frames equipped with flange wheels so they can be pulled ahead along a track paralleling the pit with each step up of the machine. Caterpillar traction greatly improves the handling of the machine in moving although the skid and roller arrangement may be more desirable in view of the difference in first cost. The cost of an excavator complete with a 60 foot boom and a 1-1/2 cubic yard bucket landed at the property ready to operate is much less than that of a light 2-1/2 cubic foot flume dredge. It also has a greater digging capacity and will mine the ground at an operating cost closely approaching that of a dredge of this size. It is, however, not contended that the dragline excavator should supplant the dredge for each has its merits and its limitations.

Under the conditions mentioned, these excavators adapt themselves very well to the mining of the small isolated areas of pay gravel left by former operations in many of the districts, and to areas lacking sufficient size to justify the installation of a dredge. There are numerous creeks in Alaska where small gold dredges have dug only the naturally thawed and more favorable gravels of the creek bed, usually

being incapable of digging the rest. Some of the deeper or, at times, partly frozen ground and the points across the bends of the main pay channel have often been passed by. While the economic possibilities of such remaining ground is still to be determined in most cases, the excavator has a prospective field there.

Manual Methods.

A few small operations are still being conducted in the Interior where after the auriferous gravel has been stripped of overburden and reduced in volume, it is shoveled into wheelbarrows, wheeled to a centrally located loading station, dumped into a self dumping carrier bucket and with the aid of a small steam hoist is hoisted to, and pulled along, an overhead cable to the sluices into which it is automatically dumped. Compared to the method of shoveling directly into the sluices, this method permits the working of a larger pit, it speeds up the work, and permits the sluices to be placed where suitable grade and dump room can be provided.

Automatic dams for impounding the water and periodically releasing it, a method termed "booming" or "splashing", is used at many of the small interior mines where only small water supplies are available. As a method of mining, it is used for groundsluicing or booming away the overburden, and reducing the volume of gravel to be subsequently shoveled into the sluice boxes.

Tin Mining.

The occurrence of tin minerals is reported from many localities in Alaska but its commercial recovery has been confined to the placers in the Cape Prince of Wales and Cape York areas in the Port Clarence district on Seward Peninsula, and to the Hot Springs district in the Interior. Tin lodes have been found in the vicinity of Lost River, Cape Mt., Potatoe Mt., Ear Mt. and elsewhere in the Port Clarence district. Some extensive development of lode has been done in the past in the first two named localities. Stream tin, cassorite, is found in many of the streams heading in or near the granitic areas of Cape Prince of Wales, the York, Ear, and Hot Springs Mts. and elsewhere on the Peninsula. Two tin dredges were formerly successfully operated on Buck Creek also recovering some gold, and tin was also recovered by two gold dredges formerly operated on the Anikovik River. Stream tin is an important by-product of gold placer mining in the Tofty and Woodchopper areas of the Hot Springs district and while much prospecting has been done there for tin bearing lode none has so far been found. Stream tin has recently been found in encouraging quantities in the gold placer near the head of Moran Creek in the Ft. Gibbon district. Further details of some of these tin placer occurrences will be given in the "Review by Districts". The present prevailing high price of tin metal has renewed the interest in the search for tin lode and placer. Conditions indicate the long continuance of a high price for the metal and should have a favorable effect toward the development and mining of the tin deposits of Alaska. Being,

however, a comparatively low priced metal, the cost of producing, shipping, and marketing the tin concentrates from Alaskan deposits, especially those in isolated localities, or where tin would be the only valuable product recovered, restrict profitable operation to high grade deposits. The concentrates should also permit dressing to a high degree of purity. As a word of caution to those not familiar with the tin minerals and those associated with them, early analysis of the concentrate is advised.

New discoveries.

Not as many new discoveries of placer were reported in 1926 as in previous years. Most of those reported were, as usual, made in fields extensively mined or well prospected in the past and are of local importance only. Gold was discovered last winter in a narrow elevated beach line about 3 miles east of Bluff on Seward Peninsula and caused considerable excitement gaining much publicity. Prospecting has limited the possible pay area at this place to within one claim. This discovery caused the prospecting of the shore line at numerous places in this vicinity, principally about 8 miles to the east at Long Beach, and while but little encouragement was met there, further prospecting will be done this winter. During the summer a small excitement was started on Aggie Creek in the Fish River Basin and while some high grade gold, reported to be valued at $19.99 per ounce, was found, little else has materialized. A small rush of prospectors was made to the Kaiyuh Hills, south of Nulato on the

report that an important discovery had been made. Muddy Creek, a tributary of the Innoko River, and Bonanza Creek, flowing into the Kaiyuh slough and the Yukon River, were the main centers of interest. Desultory prospecting was done in this area years ago and was renewed several years ago. A small amount of gold has been recovered but the value of the discovery is still to be determined. The geology of the area is reported by the prospectors to be favorable, the ground is mostly unfrozen, wet and deep, making prospecting by customary methods most difficult and unsatisfactory. It is reported that a power drill is now on Bonanza Creek and would be operated this winter. This should give some definite information. The opening up of high bench ground in the Sunrise district with encouraging results can be construed as a fore runner of similar bench possibilities in many of the districts. Most of the remaining unworked placer is to be found in the benches, and where conditions will permit the bringing of suitable water supplies to them, an increase in the hydraulic mining of such bench deposits is anticipated. No development of any consequence has been reported from any of the discoveries made in 1925.

Transportation.

No important changes in the transportation facilities between the States and the Alaskan ports, or on the Alaska Railroad and the Yukon River, are noted excepting the service on the lower Yukon between Holy

Cross and St. Michael. Due to the burning of the regular mail and passenger launch on this service, this business was handled by small launches not adapted to the carrying of passengers. A new boat of special design is planned for this run. Weekly service was maintained between St. Michael and Nome. The trip from Nenana to Nome could be made this summer in 9 to 12 days depending upon the connections made at Holy Cross and St. Michael. This trip from Nome to Nenana requires from 12 to 20 days. The prolonged period of low water conditions prohibited the transportation of freight up the Innoko, Iditarod and Koyukuk Rivers until late in August, seriously affecting the mining operations there. Freight rates to all points remain practically the same, excepting small reductions on a few commodities in carload lots. Reductions were made in the lighterage rates at Nome on general merchandise and oils. Special mention of the freight rates to Fairbanks and to Nome are made under those districts.

The Alaska Road Commission did excellent work on road extension and trail building. The season was very favorable for this work and additional modern road building equipment and a larger appropriation was available. Great progress was made on the Chatanika to Circle road project and should be completed at the present rate of progress in about 1929. This is the most important road project benefiting the development of mining now under construction in Alaska. The work done on other major projects of importance to mining include the roads completed or being constructed between Talkeetna and Cache Creek; Tacotna and Ophir;

McKinley Park to the Kantishna; Chulkana to the Chistochina; Bettles to Wiseman, etc. The Commission also improved the Seward Peninsula railroad tram which is open to the use of the public for conveying light loads between Nome and Shelton, a district otherwise of difficult accessibility. A bill has been under the consideration of Congress the last few years to extend this tram to Dhul, thence a wagon road from there to the Immachuck River, with a tram from there to Candle Creek. This would provide a needed cross country route between Nome and the Kotzebue Sound region, and make more accessible the large intervening country.

The Bureau of Public Roads did fine work in constructing roads in the forest reserves. Its road connecting Moose Pass Station on the Alaska Railroad with Sunrise and Hope was completed this year and will be of great benefit in developing the mining resources of those districts.

The first commercial aeroplane flights to be made in Alaska actually date back no farther than 1923. The flying distances were quickly extended and the service greatly improved. Good landing fields have been provided at practically all of the main Alaskan Towns. Trips from Fairbanks, to Nome, to the Koyukuk, to the Kuskokwim and to practically all of the distant and more isolated districts were repeatedly made during this year, being more proof of the practicability and great value of this means of transportation. The wonderful work done by the flyers of the U. S. Navy in doing aerial mapping and exploration in Southwestern Alaska in cooperation with the U. S. Forestry Department is especially noteworthy and is a great lesson in showing what can be

done in this way in exploring and thereby aiding in the development of the various resources of a large, still very difficultly accessible region of Alaska.

The review of the placer mining operations and development conducted in the various districts follows.

REVIEW BY DISTRICTS.

Southeastern Alaska.

Placer mining in Southeastern Alaska was restricted to a few small operations in the Juneau, Wyndham Bay, and Porcupine districts, and the usual small intermittent beach mining operations at Lituya Bay, Yakataga Bay and Yakutat. The placer gold production was small. The principal operation in the Juneau district was the hydraulic mining done by a crew of three men at the head of Silver Bow Basin back of Juneau. Extensive development for hydraulic mining is underway in the Porcupine district.

Porcupine District.

The Porcupine district in Southeastern Alaska was at one time the scene of considerable placer mining and an important producer. Several large hydraulic plants were operated there. In recent years its production has been very small and while only one "booming" operation with 6 men engaged is reported this year, extensive development for hydraulic mining is being done on McKinley and Porcupine Creeks. In former days Porcupine Creek was readily accessible from Haines by a route following the right limit of the Klehini River, a distance of about 40 miles. An auto road was recently completed between Haines and Pleasant Camp and is now the means of access. To reach Porcupine Creek from

this road it is necessary to ford the Klehini River, a dangerous stream, and crossing it during the summer is a very hazardous undertaking. One man and his team of horses were drowned in making this crossing this summer and a total of fourteen men are reported to have lost their lives at this place under similar conditions. It is contended that this crossing is an outstanding obstacle to the development of the district.

The Porcupine Mining Co. has acquired control of extensive placer holdings on McKinley and Cahoon Creeks and below McKinley on Porcupine Creek. While placer mining was formerly conducted on Porcupine Creek, it is reported that recent prospecting has proven a large area of virgin creek placer containing good pay gravel still available, ranging from 20 to 40 feet and more in depth. The company employed 30 men this season on development and construction work preparatory to hydraulic mining on lower Porcupine Creek. Several camps were maintained. A high line flume, 8000 feet long, and 4 feet by 3 feet in cross section, on an 0.8 per cent grade is being constructed to carry water from McKinley Creek to a point above the proposed operations, affording a head of 360 to 375 feet in the pit. This involved the erection of a cantilever type of bridge with an "A" truss timber construction across the gorge of McKinley Creek. The bridge span is 240 feet long and the height of the bridge floor above the creek is 165 feet. In addition to carrying the flume this bridge also served as a viaduct capable of supporting traffic incident to the transportation of supplies, for which a tractor will be used. The company operates its own sawmill, the district

affording excellent timber. Owing to the low creek gradient and the depth of the gravel on lower Porcupine Creek, hydraulic elevators will be used in mining. It is now proposed to first mine out an ancient channel that roughly parallels the present one and then use that for diverting the stream and so permit the hydraulicking of the present channel, including areas under and bordering an old diversion flume left by former operations. It is contended that this old flume was erected on good pay ground.

In addition to the coarse gold, it is said that much fine gold is present on lower Porcupine Creek, as former operations lost much of this fine gold because of the large amount of "metallics" which filled and clogged the riffles in the sluice boxes. It is believed that these "metallics", which occur in the gravels in quantities as great as 40 pounds to the cubic yard, are mainly pyrites. It is proposed to make special efforts to recover this fine gold and experiments will be made in this connection with a 4-coil Faust jig, one of which is now on the ground. The company has acquired the hydraulic plant of the Glacier Creek Mining Co., formerly operated on Glacier Creek. No mining is now being done on Glacier Creek.

Placer operations have been conducted on a small scale over a period of ten years on the property of the Gold Nugget Mining Co. on Porcupine Creek above the mouth of McKinley. Snow Bros. now hold the property under lease and this year had a crew of 6 men engaged on "booming" operations on the 4th Claim located about one mile above McKinley

Creek. The depth of the placer here is stated to vary between 8 and 12 feet. A 4 mile ditch brings water from Big Grizzly Creek to a dam equipped with twelve gates. Here it is impounded until a large volume has accumulated and then released at intervals under a head of 6 feet. The water booms or groundsluices off most of the gravel, that which remains contains most of the gold and is put through the sluice boxes.

The Copper River Region.

Nizina District.

The placer gold production of the Nizina district for 1926 amounted to $101,500, a decrease from that of the previous year. Practically this entire production was made by the three large hydraulic plants on Dan and Chititu Creeks. A large part of the ground handled by these operations had to be moved in opening up cuts on the benches and was not the regular payground. Other work was also done towards preparing for future operation. A large increase in production is expected next year.

Two hydraulic plants, with a crew of 41 men employed, were operated by the J. E. Andrus Co. on Chititu Creek, a total of 129,340 cubic yards being mined. At the upper plant, a small pit was mined in the creek bed on No. 11 Chititu, and a cut 116 feet wide by 385 feet long was mined on the Kiernan Bench, No. 1, Rex Creek. The bench placer mined ranged from 8 to 60 feet in depth, averaging 34 feet. A portion of this was a large slide and had to be mined off to open these bench

workings. At the lower camp, on No. 2 and 3 Chititu, a pit 205 feet wide and 966 feet long, in gravel averaging 9 feet deep, was mined in the creek bed with good results. New diversion dams were constructed and other work was done as a measure for future flood control.

The Dan Creek Hydraulic Mining Co. hydraulicked on the right limit benches of Dan Creek and were obliged to move a large amount of low grade material in opening up the pit. The bedrock of the pay channel was found to dip into the hill and below the general level of the bench rim necessitating a change in set-up. A crew of 8 to 10 men were employed. A small cut was also mined in the creek bed by four of the company's regular employees working on a lease arrangement with the company. C. Cayouette mined along on the Dan Creek benches, and Warren Wilson with two men prospected with a small hydraulic plant on Cooper Gulch. No mining is reported to have been done this year on any of the other creeks.

Chisana District.

Six placer operations with 15 men engaged were operated in the Chisana, or Shushana district making a production estimated at about $60,000. All of the operations used automatic dams for impounding the water for its intermittent use. The main operations were conducted by James Johnson on No. 1, Little Eldorado Creek, where they had three additional men groundsluicing in the creek and operating a small hydraulic plant on the benches. These benches are stated to be frozen, the 5 to

6 feet of pay gravel being overlain by small barren gravel ranging up to more than 50 feet in depth. It is planned to mine on No. 6 Bonanza next year. Pete Eklund on No. 3 and McCottigan and Green on No. 5, Bonanza Creek, mined with a small crew employed. Jno. Carroll on Gold Run and A. Nelson on Bonanza, mined alone. Miles Atkinson on Bonanza, W. E. Kinney on Gold Run, and C. F. Whitham are reported as not having mined this season. The district is seriously handicapped by lack of water, fuel and its inaccessibility. It is now better reached via Gulkana as this route avoids the crossing of the many glacier streams encountered on the McCarthy trail. A road from Gulkana to the Chisto-Shina is now under construction.

Kenai Peninsula Region.

Placer mining in the Kenai Peninsula or Cooks Inlet region is restricted mainly to the Hope, Sunrise, and Girdwood districts, although some prospecting is reported to have been done on Cooper Creek and several creeks emptying into Cooks Inlet. In the above mentioned districts, 8 hydraulic plants with 22 men and 5 groundsluicing and shovel-in operations with 5 men, were conducted. Their production for the year is estimated at $27,000, which is less than in 1925. The road from Moose Pass Station on the Railroad to Sunrise, a distance of 31 miles, and from Sunrise to Hope, a distance of 9 miles, was completed this year and most of the travel is now going this way.

Hope District.

Matheson Bros. operated their hydraulic plant on Resurrection Creek with a crew of 9 men, mining ten pits, each averaging 75 feet long and 150 feet wide in gravel 6 feet deep, or 23,000 cubic yards which gave an average gold recovery of 40 cents per cubic yard. An appreciable gold loss is reported as due to the conditions under which the ground is mined. The water supply was also much improved this year by the completion of an additional 1-1/2 miles of ditch. The Babe Mining Co., Ed Belmont, hydraulicked with 3 men engaged on the high channel on Bear Creek, mining about 20,000 cubic yards. Most of the gold recovered here is coarse and worn, one nugget worth $25 being found this season, although a considerable amount of finer gold, much of it being crystalline and which is derived from the local bedrock, is also present.

Sunrise District.

The principal operation conducted in the Sunrise district was that of Joe Wilson and two sons, who hydraulicked on the left limit benches of Canyon Creek at the mouth of Fresno. Bob Michaelson did a little groundsluicing on Mills Creek and has plans to open up and mine the high channel he has found there. Fred Matz shoveled-in on Mills above the canyon. Tom Allison hydraulicked for a short while on the Canyon Creek benches; Jno. H. Brown did his annual successful sniping on the bars of Six Mile Creek; and M. Connolly mined on his bench ground on lower Six Mile Creek; The Canyon Creek Dev. Co. on Canyon Creek was

idle, the extensive development and construction work that had gotten well underway in preparation for the mining of the creek placers and the old channel on the left limit benches, has been abandoned.

Jacobs & Arnodt installed a hydraulic plant and opened up an interesting high channel deposit located on the left limit of Lynx Creek, about 60 feet above the creek level. Water was obtained from the old Lynx Creek ditch at a point 286 feet above the creek, syphoned across the creek through 11 to 9 inch pipe and delivered to the bench workings under a head of 210 feet. A No. 2 giant with a 4 inch nozzle was used for breaking down the bank and piping into the sluice boxes. The 28 inch sluice boxes were set on 14 inch grade. A pit about 250 feet long and 25 to 40 feet wide was piped off along the outer edge of this channel showing the ground to be 20 to 30 feet in depth. The wash here is heavy, with some boulders up to 4 feet in diameter, and much stiff clay is present. The wash in the face shows differing characteristics, there being little if any pronounced bedding. The gold is coarse and well worn, most of it being distributed in the lower gravel, on, or near the slate and graywacke bedrock. The mine and possibilities of this bench are still to be determined but a satisfactory clean-up was made from the comparatively small amount of ground moved. While only the outer edge of the channel is exposed, it is probably 150 to 175 feet in width, occupying a defined rock rimmed channel, and continuing upstream for a distance of more than 750 feet. It is cut off at both ends by turns in the creek, but is exposed again below the present workings on

the opposite limit of the creek. It is below this crossing where the main creek placers of Lynx Creek were found and mined. Chas. Harper has acquired the Amodt interest and with Roy Jacobs will cross-cut and further open up the deposit with a working pit next season.

Girdwood District.

Holmgren & Erickson with two men employed operated the hydraulic plant on the right limit benches of Crow Creek with good results. The pay became very light as mining was carried on up the creek bed the previous season. By going back to where this was first noted it was found the pay channel had swung into the right limit. Axel Lindblad groundsluiced and prospected on Winner Creek.

Nelchina District.

The Nelchina district has been the scene of very little placer mining in recent years, but this season has been a fairly successful one for the few miners that have stayed with it. The district has the reputation of having a spotty gold distribution probably because of the deep and extensive glacial gravels there which have been eroded and reconcentrated by the creek forming at places some good pay. Some good pay was found on Albert Creek during the summer by Ballinger & Cameron who are reported to have groundsluiced and shoveled-in for 45 days recovering $4,000 in gold. A. O. Christopher groundsluiced farther up the creek. Al. Dresse groundsluiced and did some drift prospecting on Alfred Creek, and Shorty Wehnke prospected by drifting on Sleigh Creek.

Yentna District.

Cache Creek Area.

The gold production from the Cache Creek area was very much less than in 1925, which, while in a small part due to the dryness of the season, was due mainly to the small production made by the dredge. One dredge with 13 men, 13 hydraulic plants with 51 men and 4 ground-sluicing operations with 4 men constituted the season's placer activity.

The Cache Creek dredge on Cache Creek was operated under a lease by Englehorn & Co. The dredge started the season's digging on May 5 and closed on September 5 when a spud was broken. The dredge dug up stream to within a few claims below Nugget Creek. About 250,000 cubic yards were dug, although the gold content was very much less than the average for previous years. The dredge was idle for about 4 days during midsummer because of lack of sufficient water to operate the hydro-electric plant. It is reported the dredge will be operated again next season as more favorable ground has been acquired just below the mouth of Nugget Creek.

The principal hydraulic operations were those of Joe Anderson on Falls Creek who employed 9 men, and James Murray who operated a plant on Nugget Creek with 8 men and another on the benches of Cache Creek about a mile below Rambler Gulch with about 6 men. Both of these operations report good returns. James Murray plans to install another plant on Cache Creek and operate it next season. Al Wolf hydraulicked on Thunder Creek, and Cooper & Baker, after installing some of the

hydraulic plant which was formerly on Ramsdyke Creek, mined on Willow Creek, 4 men being engaged at each of these operations. Hydraulic mining was also done by Hugh Price on Short Creek; Joe Krummenaker on Windy; Smith & Hewitt on Dollar Creek, who did mostly prospecting; H. L. Smith on upper Cache; Wm. Pinee on Peters; Cast & Peters on Poorman, who also enlarged their plant; Frank Jenkins on Willow; and Weatherell &Anderson on lower Peters Creek. Jno Kimball mined with a hose outfit on Chechako Creek. Dick Francis on Long; Chris. Hammerschmidt on Bird; and N. Balanbanoff on Nugget, mined by groundsluicing methods. The Carlson & Weatherell holdings on Peters Creek are to be drilled and investigated next year for dredging.

Fairview Area.

The Fairview area in the Yentna district produced about $2,000 in gold this season, only 4 small groundsluicing and shovel-in operations being conducted with 5 men, although several other men were prospecting in the vicinity. The Alaska Road Commission built a new summer trail this season from the mouth of the Clearwater at the Yentna River to Mills Creek. The trail leading from the district to Cache Creek was blazed and cableways were installed across the more dangerous glacial stream crossings, notably at Granite Creek. Pat Collins mined on Notobac Creek, a tributary of Twin and was the main producer. Matt Hugar mined on upper Mills and Frank Ervin on Pass Creek. C. J. Lincke mined and prospected on Chicago Gulch, Cottonwood Creek and elsewhere.

Sam Wagner, one of the discoverers of the district, returned after a long absence and prospected on Mills, Wagner and Chicago Gulch in search of an old channel. Axel Nelson prospected on Wolverine and Camp Creeks.

Valdez Creek district.

The Valdez district produced about $5,000 in gold in 1926, about 20 men being engaged in mining, prospecting and development. While the district was the scene of a small rush last year, no new discoveries have been made or has any increased production developed thereby. Augustine & Co., however, took a lease on the Carlson bench at the mouth of Lucky Gulch and had 5 men engaged this summer in the construction of a 3 mile ditch line and other development work in preparation for hydraulicking next year. Johnson, Beline & Co. composed of 5 men including or representing those interested in the judgment obtained against the McKinley Gold Placers, Inc., drifted on the Tammany Channel. Most of the season was spent in preliminary work and in opening up. This deep V-shaped old channel was drift mined in the early days with good results. It was later acquired by eastern capital and equipped with one of the largest hydraulic plants in Alaska. This operation was not successful as a large amount of low grade or barren gravel and many large boulders had to be handled before the main pay gravel confined to the narrow floor of the channel was reached. Monoham & Olsen continued their search for a possible old channel on Timberline

Creek, although the heavy overburden encountered handicapped the work and the results so far have not been very encouraging. Wickersham & Rumohr mined on No. 2 above on Lucky Gulch with reasonable success. Lorne Campbell prospected on Roosevelt Creek doing some drilling near the mouth, and several others prospected elsewhere. Several natives mined at the lower end of Valdez Creek. No mining was done on White Creek.

Kantishna District.

Twenty or more small groundsluicing and shovel-in operations with one or two men engaged at each were conducted in the Kantishna district, mainly on Glenn, Eureka and Glacier Creeks. Most of these operations use automatic dams, the small water supplies available usually requiring intermittent use. It is stated that Wm. Taylor & Co. did some hydraulicking on the bench of the former Mt. McKinley Gold Placers, Inc. property on Caribou Creek although this has not been confirmed.

Bonnifield District.

The Bonnifield district is reported as having had very little placer activity this season, only one small hydraulic operation and several groundsluicing outfits being operated. According to reports, the Gold King Mining Co., on Gold King Creek was idle, although an option has been taken on this company's holdings with a view to enlarging the hydraulic plant for future operation.

Yukon Basin.

Forty Mile District.

More than 50 placer mines were operated on the many creeks of the Forty Mile district. Three of these were major hydraulic operations, the rest being principally small groundsluicing and drift mines with but one to three men engaged at each. Most of the placer mining was done on the Forty Mile River, Franklin Gulch, Ingle, Chicken, Jack Wade, Dome Creek, Myers Fork and Walkers Fork. The season was a favorable one for water and an increase in production was made. While details of the production are lacking it is conservatively estimated at not less than $60,000.

The Walkers Fork Gold Co. operated its plant on Walkers Fork and had a good clean-up. According to indirect reports, the gradient of the creek is very low here so a method is used whereby the gravels are hydraulicked to a sump and there picked up and transported to the sluice boxes by a steam operated scraper. A dragline excavator is being considered for next year. A. A. McCandless on Jack Wade Creek used a similar method but this operation had to close down for the season during August because of the breaking of the engine shaft. The Ingle Gold Co. operated the hydraulic plant of the Dome Gold Co. on Dome Creek, from 6 to 12 men being employed and a good season is reported. The Ingle Gold Co. also had about 20 men engaged on Ingle Creek and the vicinity where they operated two power drills and did other work toward determining the merits of the property particularly for dredging.

Eagle - Seventy Mile District.

Six booming and shovel-in operations using automatic dams with 7 men engaged were conducted in the Eagle district. J. J. Hanis operated one plant on American Creek and one on Discovery Fork. Ed Olson, and F. E. Cmo, mined on Discovery Fork; Wm. Fritch, and Harry Ross on American Creek.

Four hydraulic plants with 17 men and six groundsluicing and shovel-in outfits with 6 men are reported as having been operated in the Seventy Mile District. Favorable water conditions prevailed. Froehlich, Kummer & Ott had 6 men engaged at their hydraulic operation on Crooked Creek, a new ditch line also being completed. C. A. Bryant hydraulicked on Alder Creek, and C. F. Yost on Nugget. Dalsens & Ellingen operated the hydraulic plant on the property of the July Creek Placers Co. on Fourth of July Creek in the Nation area on a lease. Seven men were engaged. One of the best seasons experienced on the creek was had, 70,000 square feet of ground averaging 10 to 12 feet in depth was mined and an area of 60,000 square feet was stripped of overburden, averaging 3 to 5 feet deep, for next season. Detailed accounts of the operations in the Forty Mile, Eagle, Seventy Mile, and the Circle districts were given in the Annual Report for 1924.

Circle District.

While details concerning some of the operations conducted in the Circle district in 1926 are lacking, it is estimated that the district produced close to $175,000, a marked increase over the previous

year. Not only was it a favorable season for good water supplies but the dredge had one of its best seasons. Thirty operations with 70 men are reported to have been conducted in the Circle district besides 8 to 10 men who prospected or did a little mining alone on as many creeks remote from the main areas. The road under construction from Chatanika to Circle has been practically completed to the Twelve Mile summit. With the completion of this road to the Miller House and the improvement of the present road from Circle to the Miller House, the main areas of the Circle district will be easily accessible from Fairbanks and be a valuable feeder to the Fairbanks district and the Alaska Railroad.

In the Woodchopper area, 9 operations with 14 men are reported. Among these are included the mining done by S. Johnson on Sam Creek; Lee & McGregor, Halstrom & Rosenbach, Gus Abrahamzon, Frank Bennett, Jno. Cornell, and O. F. Moon, on Woodchopper Creek and tributaries; and Fred Bretlinger on Coal Creek. Most of these groundsluices during the summer and drift during the winter. A large area of ground on Coal Creek was optioned to the Treadgold interests of the Yukon Territory a year ago. While no development work was done during this year, it is stated the first payments have been made.

In the Deadwood area, 9 operations with 11 men are reported and include the mining of Peter Bloom, Gus Chisholm, Rockness, Henry Reupke, M. Peters, A. Clatworthy, Jno. Stack, and Wm. Woodman, all of whom mine on Deadwood Creek, most of them shoveling-in in the summer

and doing lone drift mining in the winter. Langlow & Larsen hydraulicked on Switch Creek and during the winter took out a small dump. It is not definitely known if the hydraulic plant on Deadwood Creek was operated this season, as the previous operators, Iversen & Fursath, are now mining in the Tolovana district.

The principal mining operations of the district are conducted in the vicinity of the Miller House and the Eagle and Birch Creek area. Twelve operations with 45 men were conducted in this area. The main operation and producer was the dredge of the C. J. Berry Dredging Co. It completed the dredging of Mammouth Creek and dug up Independence for 1,800 feet, very good pay being dug. Twelve men were employed. Out of a total of 87 dredging days the dredge was digging for 86.1 per cent of the time, handling 180,681 cubic yards. Some difficulty was experienced in dredging Independence Creek as the ground is shallow and not enough fine material is present to permit good dredge flotation. The dredging operation of the company has now been completed, the remaining ground on Independence Creek will be hydraulicked, starting next season. Jno. Anderson with a crew of 5 men, and Gus Erickson with 1 man, operated hydraulic plants on Mastodon Creek; Boyer Leine and shoveled-in. On Independence Creek; shoveling-in was done by Geo. Woods, Chas. Eelenberg and C. W. Woods, the latter also taking out a small winter dump. Walter Crossman hydraulicked on Miller Creek with a small crew.

The O. J. Berry hydraulic operation on Eagle Creek had a very good season, having good water and good pay. Two cuts, or about 40,000 cubic yards were mined and a large area was stripped ahead of overburden averaging 8 feet in depth. Interests holding an option to purchase the J. R. Parkin property on Birch Creek below Twelve Mile operated the hydraulic plant and conducted investigative work under the direction of E. Lohnas. Seven men were employed. Jno. Clayworth mined and prospected on Harrison Creek. Geo. Blondeau with several men was engaged in ditch construction and other preparatory work for hydraulic mining on the North Fork of Harrison Creek.

Fairbanks District.

Early estimates of the placer gold production of the Fairbanks district for 1926 indicate a relatively small decrease from that of the previous year. There was a further decline in the number of productive operations conducted and the number of men engaged at them. The year was, however, an exceptionally active one for the district in that a great amount of development and construction work was done. Two new dredges were also put in operation. During 1926, 46 productive operations were conducted with 245 men engaged. In addition there were 9 winter prospecting operations not classed as productive. During the summer season, 4 dredges with 88 men, 7 hydraulic mines with 34 men, 9 drift mines with 69 men, and 18 groundsluicing and other forms of open cut mining with 20 men were operated, a total of 30 mines with

191 men engaged. There were 16 winter drift mines operated with 54 men, 3 of these continuing as summer operations with 10 men.

The extensive development and construction work being done by the Fairbanks Exploration Co., preparatory to large scale placer mining will place the Fairbanks district as the foremost placer camp in the North. While ~~the dredging of~~ Goldstream and Cleary Creeks are the first to be dredged following this development, other creeks in the district will subsequently be mined as the outcome. The construction of the 79 mile or Davidson ditch system, now well under way, adds greatly to the placer wealth of the district as the water provided by this ditch will at some future time be available for hydraulic mining of a large quantity of placer ground occurring on the various creeks which is not adapted to dredging and whose possibilities and the contendent conditions would when considered alone never justify the expense of bringing in the water supply necessary for their extensive and profitable mining. A long placer life is assured for the district and a large increase in the district's placer gold production will be made as soon as this company's dredging operations start, which will be in 1928. This development has been made possible by the construction and completion of the Alaska Railroad, capable engineering and construction, and modern equipment, and by the development of the method of thawing frozen gravels with water at natural temperatures.

Before the completion of the Alaska Railroad, Fairbanks received its supplies, and was reached, via St. Michael and the Yukon

River and was therefore dependent upon its summer transportation. Without the Railroad it would now be isolated and freight rates would be exceptionally high. Transportation between the States and Fairbanks is now available throughout the entire year. The following table, compiled and summarized from the joint rate tariff of the Alaska Railroad, gives the freight rates on the principal commodities between Puget Sounds ports and Fairbanks.

1926-JOINT FREIGHT RATES ON COMMODITIES,

BETWEEN SEATTLE OR TACOMA, WASH. & FAIRBANKS, ALASKA,

VIA SEWARD, ALASKA & THE ALASKA RAILROAD.

Article.	Rate per ton of 2000 lbs.
Agricultural implements & parts - Any quantity, -	$ 15.00
Explosives - dynamite, powder,	
Less than carload lots -	130.60
Carload lots - min. weight 20,000 lbs.	75.80
Flour, grains, etc. in sacks, -	
Carload lots - min. weight 36,000 lbs.	28.00
Fruits & vegetables, fresh (1) - Any quantity, -	99.80
Groceries, - 5th class rate, only, -	
Carload lots - min. weight 24,000 lbs.	41.00
Lumber, piling, poles, common, sqft, -	
Carload lots,- min. weight, 40,000 lbs.	21.60
In lots of 20000 B. ft., or more	19.00
Mining Machinery, all kinds - Any quantity, -(2)	30.00
Ore & Ore concentrates, in sacks (3)	
Value not exceeding $50 per ton (4)	
Less than carload lots -	18.00
Carload lots - min. weight 20,000 lbs.	15.00
Carload lots - min. weight 40,000 lbs.	12.00

Rates include usual handling and wharfage charges. Ten general class rates on some of the above articles and others not given in table range from Class 1, at $3.94 per 100 lbs. to Class E, at $1.06 per 100 lbs.

(1) An additional charge of $1.00 per 100 lbs. is made if carried in refrigerator or cool room on steamers between Seattle and Seward.

(2) Additional charge made for all single heavy pieces weighing over 4,000 lbs.

(3) From Fairbanks to Seattle, or Tacoma, Wash.

(4) If declared valuation is greater, a charge of 25 per cent additional is made for each 100 per cent or fraction thereof of excess valuation.

One of the large oil companies established a distributing station at Fairbanks this year. Oil and gasoline is now brought to Fairbanks over the Railroad in tank cars. This has greatly reduced the cost of delivery and the price at Fairbanks. The prices at Fairbanks this fall were as follows:- Gasoline in 55 gal. drums, 29 cents per gal., in cases, 44 cents per gal.; diesel oil, 24 gravity, in 110 gal. drums, 11 cents per gal., or 7.1 cents per gal. at Seward. Cost of drums is additional. Healy coal now sells, f.o.b. Fairbanks, in carload lots, per ton of 2240 lbs., as follows:- Mine run - $6.00, Lump - $7.00, Screenings - $3.00. Matanuska coal averages about $2.00 per ton higher. Common labor is paid $6.00 and board for 8 hours, or $6.00 and board for 10 hours on some of the creeks. Skilled labor is paid proportionately higher. Plenty of labor was available.

Four dredges were operated in the district, two of these starting initial operation this year. The Nome Creek dredge while now located in the Tolovana recording district, is considered as being in the Fairbanks district because of its accessiblity, and the Courts will soon be asked to make this official.

The Fairbanks Gold Dredging Co. operated its No. 1 dredge, on Fairbanks Creek throughout the season with good results. This 4 cu. ft. diesel driven dredge started the seasons operation on May 27. The No. 2, or the old reconstructed Risdon dredge formerly operated by the company on upper Fairbanks Creek was permanently beached and dismantled at the close of the 1925 season. The ground dug this season on No. 4 below claim, was 30 to 40 feet in depth in many places, 2 to 14 feet being muck overburden. Much of the ground on Fairbanks Creek having been formerly mined by other methods, has developed thawed channels and spots. About 50 per cent of it remains frozen, this is thawed with water at natural temperatures. The water for thawing is provided by a ditch under a 30 to 40 foot head, and at low water periods is supplemented by water supplied by a 6 inch pump driven by a small diesel engine. The company employed 17 men this year.

The Chatham Gold Dredging Co. operated its small steam driven dredge on Chatham Creek and report a good season. This is a flume dredge with 60, 1-1/2 cu. ft. buckets in the close connected bucket line, and digs an average of 1,000 cu. yds. per day. The ground is 14 to 15 feet in depth and is practically free of permanent frost except in occasional spots. Eleven men were employed.

The erection of the 5 cu. ft. steam turbine driven Yuba dredge of the Tanana Valley Gold Dredging Co., Ltd., on Fish Creek which was started in 1925, was completed early in 1926 and digging started on July 14. It was operated for about one month after which it was

hemmed in on all sides by solidly frozen ground and had to shut down. As no provision had been made to thaw the ground, work was then started on the construction of a small ditch to bring water from Pearl and upper Fish Creeks. This ditch will be 8,200 feet long and will have a maximum carrying capacity of 500 miners inches, delivering the water under a head of 85 feet at the present dredge location. Fish Creek affords but a small water supply which during the greater part of a normal season will be entirely inadequate for efficient stripping and thawing purposes. It is the plan to thaw the ground next season and it is unlikely that sufficient ground will be ready for several years to justify further operation of the dredge.

The placer on Fish Creek above its junction with Fairbanks Creek varies from 18 to 60 feet in depth. Beyond the banks of the creek bed proper, the gravel is overlain by frozen muck covered with sod and moss. Some naturally thawed channels and spots have developed although most of the ground is solidly frozen.

The main details of this screen stacker dredge are as follows:- Hull 44' by 110' by 9'; draught - 5'; anchorage - 2 steel spuds; bucket ladder 90' long; 82 - 5 cu. ft. buckets in a close connected line; 22 buckets dump per minute; maximum digging depth below water level - 40 feet; revolving screen 6' by 27' overall with 19 feet of perforated plates with 5/16, 7/16 and 1 inch holes; stacker - 110'6" center to center, with 30 inch belt; gold saving or riffled sluice

area - 915 sq. ft., safe-all area - 46 sq. ft.; pumps - 1-8 inch at 45 ft. head for the sluices, 1-8 inch at 65 ft., for the screen and tables; 1-4 inch for save-all and clean-up purposes; and 1 - 2-1/2 inch for feed water. Electrical equipment 7 - 440 volt direct current motors of 270 total motor H. P. besides 1 - 5 H. P. motor for lighting and a 2 H. P. tool motor. The power plant is installed on the dredge and consists of 2 - 135 H. P. at 150 lbs. pressure dry back type boilers; 1 - 300 H. P. feed water heater; 1 - 300 K. W. at 80 per cent P. F. steam turbine, direct connected to a turbo-generator, 430 volts at 3,600 R. P. M. The total weight of the dredge is about 800 tons. Its daily digging capacity is rated at 3,000 cu. yds.

The boiler consumed, during the run made, 12 tons of Healy coal per 24 hours. This coal is freighted by tractors from Gilmore, the nearest railroad point 14 miles away, and costs $15 per ton landed at the dredge. Three men per shift were engaged in putting coal aboard the dredge. The company employed 22 men, 6 men per 12 hour shift being engaged on the dredge.

The Nome Creek Dredging Co. accomplished remarkable results as the first hauling to Nome Creek started in March and by September 2 the dredge had been erected and started operating. All hauling was done by caterpillar tractor over the new road from Chatanika to U. S. Creek, a distance of 31 miles. From there it was hauled 8 miles beyond over a high summit and down into Nome Creek. While the dredge first started digging on September 2, it did not get down to

regular operation until September 12, and continued until November 8. In 67 days of operation 84,000 cu. yds. were dug. The Company controls 10 miles of upper Nome Creek. The average width of the creek bed is about 600 feet, the average width as it will be dredged is 350 to 450 feet. The gravel, which in places is covered with a thin layer of soil, is unfrozen, contains medium sized material with the largest pieces about 2 feet in diameter, and averages 8 to 9 feet in depth. The bedrock is Birch Creek schist with intrusive granite in places and is easily dug.

The dredge is a screen stacker type, electrically operated, and was designed by R. E. Guderian. The hull is 38' by 80' by 6'; the draught is 4 feet; anchorage is by lines; the bucket line is close connected and contains 60-5 cu. ft. buckets which dump at the rate of 24 per minute; the maximum digging depth below water level is 18 feet; the revolving screen is 4-1/2' by 28' overall with 20 feet of perforated plates containing 3/8", 5/8", and 1/4" by 7/8" holes; the stacker is 60 feet from center to center and has a 30 inch belt. One 10 inch pump at 60 lbs. provides water for the screen nozzles and the sluices, with a 4 inch pump for the safe-all, clean-up and other purposes. There are 5-440 volt. alternating current induction motors aboard, a total motor H. P. of 195. The gold saving area is 890 sq. ft. consisting of a 30" by 20' riffled trough distributor under the screen from which sluices from each side, each 30" by 12 feet lead to the side sluices. These are 3 feet wide and 60 feet long, the lower 8

feet being a sluice undercurrent consisting of a perforated plate with 1/2 inch holes set 2 inches above expanded metal screen covering a cocoa matting surface. Cocoa matting covered with expanded metal screen is used on the main tables. Hungarian steel shod riffles are used in the upper 25 feet of the side sluices, with rails, set lengthwise, for the rest of the distance to the undercurrent. The gold is bright, usually fine but shotty and heavy and analgamates madily. Practically no black or other heavy sand is present. About 50 per cent of the gold is recovered in the distributing trough. The save-all has 36 sq. ft. of riffled surface. The total weight of the dredge is about 400 tons. While the dredge has not yet dug to capacity it should attain a daily digging average of about 2500 cu. yds.

The steam electric plant is located on shore and consists of a 360 H. P. Wolf locomobile boiler and engine operated at 225 lbs. pressure, direct connected to a 275 K. W. at 225 R.P.M., 480 volt alternating current generator. Power is transmitted to the dredge at 440 volts. The average power consumption is about 100 K. W. From 5-1/2 to 6 cords of wood, costing $5.00 per cord in 16 foot lengths delivered at the power house, was burned in 24 hours. Contracts have been made for providing better wood for the future which will improve the efficiency of the plant. The company employed 18 men, 2 men per shift being engaged at the power house, 8 men including the dredg-master operate the dredge, and 4 men do all of the hauling with 2-30 h. p. caterpillar tractors.

Hydraulic mining was done by A. Zimmerman & Co. who operated one plant on Twin Creek, and one on Pedro Creek a short ways below, 14 men being employed. The gravel is piped into the head of the boxes, the tailings being stacked by cableway excavator operated by steam power. This permits all of the available water to be used by the field giants. These operations experienced one of their best seasons for handling ground. Jackson & Wickander hydraulicked on Last Chance Creek using a scraper to stack tailings. The hydraulic plant of Miller & Co., on Homestake Creek was operated this season by A. Nichols & Co., with a crew of 5 men. Steger & Wirden operated a small hydraulic plant on Fox Creek. A. McIntosh & Co. on Palmer Creek and Chena, Miller & Co. on Shamrock Creek, tributaries of Chena River did hydraulic mining, each with a crew of about 5 men. They had one of their best seasons.

Mining on a small scale by groundsluicing and other methods involving mainly hand labor was done by R. Cunningham, and Carlson & Rasmusson on upper Cleary Creek; J. Ragner on the Cleary benches; Chas. Danielson on Wolf; Tom Gilmore on Gilmore; Pete Hansen on First Chance; Kilty & Co. on Sourdough; A. van Curler on Shamrock; besides a small number of individual miners whose activities are not known.

Drift mining is on a decline as most of the available ground has been acquired by dredging interests. The operations conducted were mainly on Ester, Vault, Dome, Little Eldorado, Chatanika Bench, and Fairbanks Creeks, and in a smaller way on Big Eldorado, Gilmore, upper

Cleary, Chatham and several other creeks. The largest operations were those of Peterson &Co., who drifted on No. 9 A below on Ester Creek during the summer season with a crew of 22 men; M. Stepovich who developed a block of ground during the winter on No. 16 below Fairbanks Creek and mined during the summer with a maximum crew of 21 men; and I. Hansen & Co. on Little Eldorado who mined with a large crew during the winter and continued as a summer mine with a smaller crew. A Andreson & Co. mined during the summer, and Nelson, Keller & Co. during the winter on Little Eldorado. Jack Prest, Grosse & Conta, M. Sproni, and Tino Callatenni, each employed crews and mined on Vait Creek during the winter, the latter operation continuing during the summer. At the mouth of Dome Creek, Kleinschmidt, Dempsey & Durand drifted during the winter and H. Magnussen did some drift prospecting. Matson & Co. mined during the winter on Dome Creek. Chas. Peterson, Geo. Koonts, and Steve Liddy are each reported to have taken out alone a small winter dump on upper Gilmore Creek. Geo. Robertson prospected during the winter on upper Engineer; Hill & Cosgrove winter mined on Big Eldorado; M. Baganoff drifted during the summer on Ester. During the winter a number of shafts were sunk on Ace Creek near Ester by Sagan & Campbell, Mc. Daniels Co., Alvin Martin and others. Gold was found in one of the first shafts and caused some excitement although subsequent development disclosed it to be a small local spot and no pay of extent or consequence has been found. Carlson & Rasmussen took out a winter dump on No. 9 above, Cleary, and Nels Giske drifted on Chatham.

Hilty & Co. with 6 men drifted during the winter and Fred Schaup developed during the winter and mined during the summer with a crew of 6 men, on the Chatanika Bench. McDowell, Stevens & Co. dug a ditch and sunk a shaft on lower Fairbanks Creek in preparation for this winter's mining. Joe Cruzner conducted small drifting operations on Hell for Sure Creek. A little shaft sinking was again done on Kokomo Creek during the winter but without encouraging results. There were no doubt a number of other small operations of which no record has been obtained.

The outstanding development work being done in Alaska is that of the Fairbanks Exploration Col, who had from 650 to 850 men employed during the summer in preparation for large scale dredging operations. Exceptionally good progress was made in all of the various branches and everything should be in readiness to start dredging on Goldstream and Cleary Creeks in 1928. This is the largest placer development ever undertaken in Alaska and it is being most systematically and carefully conducted. It is an example of what can be done in Alaska by large capital and capable engineers when the mineral resources are available to justify it. The company is engaged in constructing the 79 mile or Davidson ditch, power plant, camps, stripping and thawing operations, drilling, etc., and on experimental and investigative work.

Remarkable progress has been made in the construction of the ditch which at the close of the year had been about 60 per cent completed.

A maximum of 500 men were at one time employed on this ditch work, which is organized into five districts. Excepting on the steep side hills where considerable preliminary hand work had to be done and where rock was encountered, the five "Mogul" graders drawn by 10 ton caterpillars did wonderful work in removing most of the ground to the top of the ditch cut. The graders were followed by shovels equipped with 3/4 cu. yd. buckets, there being 3 steam and 8 diesel operated shovels, which dig the ditch to grade. A total of 1,400,000 cu. yds. of material has to be dug for this ditch. In one month the five shovels dug 8-1/2 miles of ditch. One diesel shovel in favorable ground dug 600 feet of ditch in one day. Less trouble was had with breakdowns by the diesel shovels than with the steam powered ones, it being stated that the diesel engine would stall when the digging became too heavy while the steam shovel was forced until something broke.

The details of the ditch have been changed from time to time and as new surveys were made were mentioned in former reports. The final figures are now given. Water will be taken from the Chatanika River just below the junction of Faith and McManus Creeks and by ditch and syphon brought down the right limit of the valley to a point two miles above Cleary Creek. There it will be syphoned across the Chatanika through a 46 inch diameter steel syphon 8019 feet long, then carried up Cleary and across it at Discovery, then on the Little Eldorado, Dome, and to the head of Vault Creek, where it will go through a 7 by 7 tunnel

3716 feet long to the head of Fox Gulch on the Goldstream side. Most of the ground is favorable for ditching and while some frozen areas exist mainly on the north slope of the hills and at the head of the creeks and gulches, and considerable rock work is necessary in places, the ditch is designed to avoid as much of the bad ground as possible and with the aim for low maintenance cost. The heads of the creeks and bad gulches are therefore avoided by syphoning across them. This requires fifteen syphons having a total length of 31,913 feet. "Lockbar" steel pipe in diameters of 46 rtd 56 inches and 1/4, 5/16, and 7/16 inches in thickness will be used.

The ditch as far as the tunnel has a grade of 2.11 feet to the mile (.004%) dug 12 to 15 feet wide at the bottom, and 4 feet deep, dug 2 feet into solid ground on the lower side. It is designed for a 1 : 1 upper side slope and a 1 1/2 : 1 lower side slope and a carrying capacity of 5,000 miners inches. The head of the water at the intake of the Chatanika syphon will be 660 feet and at the Fox Gulch end of the tunnel 375 feet. The length of the ditch system from the intake to Cleary Creek is about 50 miles, and 74.4 miles to the end of the tunnel. From the tunnel at the head of Fox Gulch, one lateral, 4 1/2 miles long, with a carrying capacity of 1,500 miners inches will carry the water up Goldstream as far as Gilmore, the other lateral, 7 1/2 miles long, with a carrying capacity of 3,500 miners inches will carry it down Goldstream to Silver Creek. The estimated cost of this ditch system is between

1 1/4 and 1 1/2 million dollars. Most of the bents and syphon foundations were placed before the freeze up this fall. Because of the soft marshy ground across the Chatanika valley the foundations there will be placed during the winter. All of the syphon pipe will be hauled to its destination and the rock tunnel will be driven during this winter. It is estimated that the entire ditch construction will be completed by the end of 1927. This water will be used for stripping and thawing purposes ahead of the dredges and will subsequently be available for hydraulic mining the higher lying placer occurring on the various creeks of the district.

The company conducted hydraulic stripping operations on lower Goldstream, on upper Goldstream and Gilmore Creeks, and on lower Cleary. While only the small local water supplies under low head were available for this work on Goldstream and Gilmore Creeks, surprisingly good results were realized, about a 75 acre area on lower Goldstream and about 40 acres around Gilmore being stripped of muck. On Cleary, the 12 mile or Kokomo ditch water under 35 to 40 foot head was used and an area of about 50 acres or more was stripped here. While most of the stripping work so far has been confined to the more favorable areas and higher pressure water in large quantities will be required to efficiently strip these areas overlain by heavy gravel tailing, a water duty in stripping the muck on lower Goldstream of 16 cu. yds. to the inch is reported. The average grade here being about 1 per cent and the muck contains a high

percentage of ice with no overlying tailings. On Gilmore Creek where the grade is about 2 1/2 per cent but the ice content is much less a duty of 10 cu. yds. is reported.

Drills were operated during the year on Ester, Eva, Dome and Goldstream Creeks and on the Chatanika Flats, in prospecting and in further defining the limits of the dredgeable area. Some holes were drilled in the deeper ground on Cleary Creek for thawing purposes. Some thawing with water was done on Gilmore Creek although much of this ground here is shallow and naturally thawed or will so thaw after it is stripped of the muck. The deeper ground will be thawed with water but so far most of the thawing done has been mainly of an experimental nature. Systematic thawing will be started next season. While no particular method of thawing has been decided upon as yet the general practice will no doubt be similar to that used at Nome, where the points are driven to bedrock in average ground while in the deep ground holes are drilled into which the thawing point is inserted. Holes for this purpose will be drilled during this winter.

The foundation was placed and the building erected for the central power plant located at Fairbanks. The machinery will be installed next season and while the details have not been definitely announced there will be two 3,000 K.V.A. steam turbines directed connected to alternating current generators which will provide a high voltage current for transmission to the creeks. A 500 K.V.A. steam turbine will also be installed

for general use. The battery of boilers will be provided with chain grates for burning coal. Healy coal will no doubt be used of which it is estimated about 20,000 tons will be required for a six months period of operation. The estimated cost of this power plant is one million dollars with an additional $250,000 for transmission.

A thorough study of dredging conditions has been made by the company's engineers and while the design and size of the dredges to be installed has not yet been announced it is thought that 3 - 6 cu. ft. and 4 - 10 cu. ft. dredges will be built for Goldstream and Cleary Creeks. The largest of these are to be able to dig 60 feet below water level. The deepest ground to be dredged after being stripped of overburden is 80 feet deep and is located at the lower end of Cleary Creek. Three of these dredges are to be shipped to Fairbanks in 1927.

Tanana Precinct.

Included in the Tanana Precinct, are the Salchaket, Delta, and Richardson or Tenderfoot districts, these areas all draining into the upper Tanana River. The Richardson or Tenderfoot district has been the largest producer in the past, although the combined production from the entire precinct is now very small, only a few small operations being conducted. Six or eight prospectors are in the Salchaket district and while most of the mining done is of a prospecting nature a little mining by groundsluicing and shoveling-in was done, mainly, on George, Bullfrog

and No Grub Creeks. The excavator-shovel operation on Caribou Creek ceased work two seasons ago. Only two men are reported as mining in the Delta district. The principal operations in the Richardson district were conducted by two groundsluicing outfits on Democrat Creek, and several small drift and open cut mines on Tenderfoot Creek and its upper tributary, Bush Creek.

Tolovana district.

The placer gold production of the Tolovana district for 1926 was less than the previous year, although the winter drift mines are reported to have had favorable clean-ups. All of the sluicing operations, particularly the hydraulic operations, were hard hit by the exceptionally dry season. While quite a number of prospect shafts were sunk last winter, very little new development resulted. Little suitable drifting ground remains and a decided decrease in this form of mining is predicted. Good pay was reported to have been found last winter in shafts sunk on several claims on the Livengood Bench but proved disappointing when opened up.

During the summer season, 7 hydraulic mines with 25 men, 6 drift and drift prospecting operations with 25 men, and 3 groundsluicing operations with 3 men, were conducted. During the winter there were 11 drift and drift prospecting operations with 51 men. As five of these winter operations were also conducted as summer mines with 25 men, the total number of men actually engaged in placer mining in the district was about

eighty. In addition, a power drill was operated in connection with investigations for dredging, at which 3 men were employed. The various activities are best given in a table as follows:

Name of operation.	Creek or claim.	Type of Operation.
Iverson, Forsath & Co.	Livengood Bench-Fisko Ass'n.	W & S drift.
Soderland & Radak	" " Deep Channel Ass'n	W drift.
Angelo Todotti	" " Jewel Bench	W prospect, S drift.
Barker & McDougall	" " Gold Dollar	S drift prospect.
Julius Larsen	" " Eldorado	W drift.
O'Connor & Kelly	" " Leitrum Bench	W drift.
Simons & O'Sullivan	" " Duncan Ass'n.	W drift.
Drakula, Silva & Escorde	" " George Ass'n.	W & S drift.
McIntosh Bros.	" " Eureka Ass'n.	W & S drift.
Bostrom & Co.	" " Ready Bullion	W & S drift.
Pat Carroll	" " Last Chance	Drift prospect.
J. H. Nielson	Amy Creek	No mining.
B. Douglas	Gertrude Creek	Groundsluicing.
Barker & Godfrey	Lillian Creek No. 2	No mining.
M. Beegler	" " " 1	Hydraulic.
C. W. Hudson	" " District	Hydraulic.
N. R. Hudson	Olive Creek	Hydraulic.
J. Hudson	" " lower	Hydraulic.
J. McClelland	Livengood Bench	Hydraulic.
Bentley Falls	Ruth Creek	Hydraulic.
Tom Verdie	Wilbur Creek	Groundsluicing.
Johnson & Healy	" "	Drift & prospect.
C. J. LeMont	Tolovana	Prospect.
Olson & Browman	Quail Creek	Hydraulic.

O'Connor & Kelly completed the mining of their ground last spring and left the district. The Soderland & Radak operation is also reported to have been brought to a close last spring. The Drakula, Silva & Escorde operation continued until early in June and then closed. The Bostrom & Co. operation was the largest producer of the drift mines employing an average of 11 men during the winter. With a smaller crew most of the summer was spent in shaft prospecting and opening up a new

block of ground. The largest hydraulic operation was that of C. W. Hudson with a maximum crew of 8 men.

A Keystone drill was operated for 4 or 5 months during the early part of the year on Olive Creek, where California interests investigated the dredging possibilities of the alluvial fan deposit at the lower end of the creek. While the results have not been made known, the option has been relinquished. Other interests made a general preliminary investigation of the possibilities of the Livengood Bench and made preliminary surveys to determine the feasibility of bringing in a larger water supply. Surveys made some years ago showed the largest supply that could be brought into the district was that of the Beaver River. A very long ditch and a long tunnel would be required for this. The cost of this project no doubt placed it beyond further consideration.

Hot Springs District.

The Hot Springs district produced $57,500 in placer gold during 1936, which is a considerable decrease from the previous year. Stream tin concentrates were also produced as a by-product of the gold mining in the Tofty-Woodchopper area, 4 tons of concentrates being shipped during the year and about 2 tons are awaiting shipment. This tin occurs as cassorite in a siliceous matrix, as rounded grains, pebbles and boulders ranging from fine sand to pieces more than 50 pounds in weight. The concentrates as shipped contain from 51 to 54 per cent tin.

Twentythree placer operations with a maximum of 65 men engaged

were conducted during 1926, there being 9 hydraulic plants with 29 men, 4 drift mines with 21 men, and 10 groundsluicing and other open-cut operations with 16 men. In addition 3 to 5 men were employed in stripping overburden, prospecting, etc., on American Creek where dredging operations are to be started next year. According to reports, options have been taken by British interests on Sullivan, Woodchopper and intervening creeks with a view to investigating the tin possibilites next year.

In the Eureka area, the principal operations were those of J. R. Frank who hydraulicked on What Cheer Bar and operated an automatic dam on Doric Creek; and the hydraulic mining done by Farmer & Jones on McCaskey Bar; Johnson, Sundstedt and Hensley on Alice Bench; and M. S. Gill on Last Bench. Groundsluicing and shoveling-in was done by Bob Highet, and James Green on Eureka Creek; Jno. Malin, and Chas. Allen, on Pioneer; Tom Loveland on Rhode Island; and Olson & Svensson on Omega Creek. Small hydraulic plants were operated by Stevens & Gill on Shirley Bar; Red Anderson on Rhode Island; and Victor Erickson on Chicago Gulch.

The greater part of the production was made by the operations inthe Tofty-Woodchopper area, where Hansen Tillison & Lind drifted on Woodchopper with a crew of 9 men; Dimnick, Albrecht & Millianic drifted on Miller; and Miljevich Bros. & Fredlund drifted on Deep Creek. The hydraulic plant of Cleveland & Howell on the Sullivan Bench was operated for only a short period. Otto Hovley drifted on Cache; Chas. Grill groundsluiced on Tofty Gulch and Louis Anderson hydraulicked on Boulder Creek. J. Sissford, and Chas. Schneider, and several others prospected.

M. Murray, and Ed Moss, conducted small open-cut operations on American Creek; and Beeonen & Nurstes mined on New York Creek.

The American Creek Dredging Co., Fairbanks interests under the management of Chas. Lewis, have acquired control of 4 1/2 miles of American Creek and its tributaries and during the year prospected, stripped overburden, and did other preparatoy work. A diesel driven flume dredge with a 2 1/2 cu. ft. close connected bucket line is to be erected on this creek and start operations next season. According to the company's report, the dredgeable area is estimated to contain 2,000,000 cu. yds. having an average gold content of 90 to 95 cents per cu. yd. The ground is 12 to 18 feet deep of which 2 to 5 feet is muck overburden, all being frozen. The maximum width of the pay is 300 feet. The creek is noted for some of the large nuggets it has yielded. After stripping off the overburden, most of the shallow gravels will naturally thaw, the deeper gravels will be thawed with water.

Rampart District.

The Rampart district experienced a better season than usual and the production is estimated at about $20,000. Nine operations with 18 men engaged were conducted, two of these being hydraulic operations with 7 men, the rest being groundsluicing and shovel-in mining, in most cases by the aid of automatic dams. Three drift operations with 4 men were carried on during the winter.

Chas. Swanson with four men hydraulicked on Hunter Creek. This

is the largest operation in the district. The property and plant has been acquired by Eugene Swanson who will operate it in the future. A. Ott with one man hydraulicked on lower Hunter Creek, and O. O. Clemens groundsluiced. Climie, La Porte & Crockett on Little Minook Creek carried on their usual mining, taking out a good sized cut. With an automatic dam the overburden and upper gravels are boomed off leaving about two feet of gravel and bedrock which is shoveled into the sluice boxes. Jno. Duncan used a similar method mining further down the creek. Others mining in the district were, Frank Hawley, and McGenty, on Slate Creek; Tom Antonsen on Little Minook Jr.; Geo. Pride on Big Minook. The Olson & Browman hydraulic operation on Quail Creek is located in the Tolovana district and is reported there. Crockett & La Porte took out a small winter dump on Hoosier; and H. Miller, and James Climie, each working alone, winter drifted on the Idaho Bar.

Ft. Gibbon-Gold Hill District.

Seven men were engaged in placer mining and prospecting in the district, the production made being small. The principal operation was that of Warren & Ferrell who operated their hydraulic plant on Mason Creek, although most of the work done was of a preliminary nature. They report having found pay on the benches. Jno. Minook shoveled-in and prospected on the same creek. Al Rhodes on Tozie and Bear, and Wm. Bowers on Grant Lynx Creeks prospected and did a little mining. Fred Zickwolf prospected near the head of Moran Creek, a tributary of the Tozie and reports having found

good values in both gold and stream tin in the creek and left limit benches, the principal tin content being in the creek placers. According to his statements, the creek gravels average 3 to 4 feet thick and are overlain by from 3 to 20 feet of muck, the deeper muck being along the valley rim. All of the deposit excepting the shallow exposed gravels are frozen. Mining done here by him two years ago, is stated to have yielded 1500 pounds of tin concentrate, besides the gold, from 1200 sq. ft. of bedrock mined. From 3 to 4 feet of muck was groundsluiced off leaving 3 feet ofgravel that was shoveled-in. This placer tin occurrence attracted attention during the summer and the holdings have been optioned with a view to prospecting next season. Placer tin is also found elsewhere in the district, as on Welch Creek, a tributary of Moran, and in smaller amounts on Grant and Lynx Creeks.

Ruby District.

The Ruby district produced about $40,000 in placer gold in 1925, and according to early estimates the 1926 production would exceed this a little. Eighteen drift operations with 45 men, and 10 groundsluicing and shovel-in operations with 15 men are reportedas having been conducted in 1926. The main production came from the drift mines on Poorman and Flat Creeks. There have been no new developments in the district in recent years and it has declined rapidly. The road from Ruby into the mining area has been completed to Greenstone Creek and good progress was made this season in extending it towards Poorman. This road is to ultimately connect with Ophir in the Innoko district.

Dennis Coyle, and Wm. Perry, on Poorman Creek conducted the largest drift operations in the district, each had a crew of about 5 men employed. Scanlon & Kelly had from 2 to 5 men engaged in drifting, and Walker & Rayder drifted and prospected with a drill on Long Creek. Drifting operations were also conducted in a small way by Agusta & Mattson on Duncan; Hansen & Rasmussen, and Ahrens & Kennett, on McKetchum; Willike & Vick, Morton & Bailey, Wm. Midgley, Wm. Vuilch, and Jensen & Wicklund, on Flat Creek. Martin DeBoris, and Tony Cannon, each drifted and prospected on Solomon Creek, as did W. D. McCarty on Spruce, and Pilbach Bros. on Big Creek. Groundsluicing and shoveling-in was done by L. E. Sturtevant, Al Burks, and Deacon & Johnson, on Bear Pup; Gibson & Douglas on Greenstone; Grogan & McGettigan on Timber; J. Robinson on Ruby. A little mining, mostly prospecting, was done by Geo. Bittles on Midnight; Collins on Tamarack; Jack Wolf and Joe St. Germain, on Granite; Max Rigler, and Hansen on Trail Creek.

Koyukuk District.

A large number of small drift and open-cut operations were conducted on the many creeks in the Koyukuk district. Fairly complete reports include 30 summer operations with 60 men engaged and 16 winter operations with 40 men. As many of the miners are engaged in both summer and winter mining and in some instances carry on operations at several different places during the season, the actual number of men in the district engaged in placer mining is estimated at about 75. The

main activity is in the Nolan-Coldfoot area, where the principal mining is done on the Nolan and Hammon Rivers, Porcupine, Emma, Twelve Mile, Archibald, Swift, Smith, Slate, Myrtle, and other creeks, all draining into the Middle Fork of the Koyukuk River. Mining in the Bettles area is done principally on the tributaries of Wild Creek and on John River, Indian River, and the South Fork of the Koyukuk. The Koyukuk district is one of the most difficultly accessible camps in Alaska, this being particularly emphasized this summer when the low stage of water in the Koyukuk made the usual river boat transportation impossible except for a short period early and late in the season. Rich extensive placers are found in the district although mining costs are high and development has been greatly retarded by the high cost of delivering supplies. The average cost of bringing a ton of freight from Seattle to Wisemanis about $300.00, of which $160.00 per ton is the charge from Bettles to Wiseman, a distance of about 65 miles. During the summer, work was started on a trail between Bettles and Wiseman which upon completion will afford tractor haulage and should make a material reduction in the freighting cost.

In spite of the adverse season for water, a production was made closely approaching that of the previous year. Most of the operations mentioned in the report of last year were active in 1926, Several small hydraulic plants were installed and operated this season, namely that of Chas. Franks on Indian River, and Newton Gilberts on Myrtle Creek. The Detroit Mining Co. backed by Detroit, Mich., capital had a large outfit

freighted up to Bettles early in the season but the low stage of water which developed soon after would not permit its delivery to the mouth of the Hammon River. Included in this outfit were three large boilers and pumps which were to be used in drift mining at the mouth of the Hammon. The company had 40 to 45 men engaged during the greater part of the season. A survey was made to determine the possibility of bringing the water from the North Fork of the Koyukuk for use in hydraulic mining on the benches of the Nolan and Hammon Rivers and their tributaries. While found possible, a very long ditch would be necessary. Being unable to get the steam plant to its destination, it is stated, the company has suspended work for the winter and its plans for future development have not been made known.

Chandalar District.

Reports concering most of the placer operations conducted in the Chandalar district are lacking. A steam plant was taken into the district a year ago to be used by Carlson, Buckley & Amero for drifting on Little Squaw Creek, where they reported having found a narrow width of good pay. Meager reports obtained concerning the district indicate no new development and a relatively small production

Iditarod District.

The Iditarod district made a most creditable production in 1926, amounting to $261,000, in spite of the exceptional long period of dry

weather. Most of this production came from creeks in the near vicinity of Flat and the greater portion is credited to the two dredges. Lack of water during the greater part of the season closed down most of the operations, other than dredging, while a few continued on a greatly reduced scale. No clean-ups are reported to have been made, except by the dredges, until early in September when relief came with the starting of the rains. One of the dredges was obliged to close down nearly a month earlier than usual due to the lack of water for thawing. The district was further handicapped by lack of supplies as the low stage of water existing in the Iditarod River until early in September prohibited the operation of the river launches even as far as Dykeman.

Twenty three operations with a maximum of 120 men are reported to have been conducted in the district. These include 2 dredges with 37 men; 12 hydraulic plants with 60 men, 3 of which used hydraulic elevators; 9 groundsluicing or other open-cut operations with 13 men; and one operation with 10 men engaged principally in ditch construction and other preparatory work.

The Riley Investment Co. operated its 3 1/2 cu. ft. combination type dredge on Otter Creek for a period of 146 days, starting June 1, and dug 260,290 cu. yds. Twenty five men were employed, 9 on the dredge with the balance engaged in stripping, thawing and other work. The 110 H. P. diesel engine has recently been replaced by a 128 H. P. Enterprise solid injection diesel engine which is giving very good satisfaction.

Its diesel oil consumption averages 4 1/2 gals. per hour. The cost of this oil at Seattle was 4.7 cents per gal., and 61 cents per gal. delivered at the dredge. A small size, Model 150, De Laval cream separator is now being used for purifying the used lubricating oil, removing carbon, water and foreign oil. Previous to doing this thirty barrels of lubricating oil were used in an average season. Due to this method of purification, this consumption was reduced to eight barrels last year. Dredging this season was mainly in the deeper ground that had been left along the edge of old dredge cuts and in virgin ground left by former operators who at that time considered the ground too low grade to be profitably mined by the methods used. Before most of this ground has been stripped of overburden, it is too deep for the dredge which has a digging depth of 15 feet below the water level. An average of 8 feet of overburden, mainly muck, is therefore first removed by groundsluicing and hydraulic methods, after which it is thawed with water. The spacing of the thawing points has been increased, from 10 feet, to 15 feet between centers, an average of 20 days now being required to complete a thaw. This change has reduced the thawing cost to 5 cents per cu. yd. For the first time in the Company's experience, there was a lack of water for thawing this season, necessitating the closing down of the dredge nearly a month earlier than usual.

The Northern Alaska Dredging Co. operated its 3 cu. ft., combination type, diesel driven dredge on Otter Creek for a period of 175 days,

digging 208,220 cu. yds. The ground required no thawing. Twelve men were employed. The mechanical details of these dredges and the methods of operation were reported in 1923.

Hydraulic plants using elevators were operated by Peter Miscovich, with a crew of 4 men, on Otter Creek; Martin Roslund & Co., with 6 men, on Black Creek, and Harry Stevens with 5 men on Donlin Creek. Hydraulic mining by piping into the head of the boxes was done by the Chicken Mining Co., on Chicken Creek where they employed a maximum crew of 15 men during the best water periods; Salen & Co. on Granite Creek; Boulanger & Co., and Loranger & Co. on Willow; Dave Strandberg on the Upgrade Assn., the Alpha Mining Co., on the Alpha Assn., Ben Morosi on the Hilltop, and Sakoff & Co., on Flat Creek; Barney Walsh on Donlin; and Jno. F. Keller on Moore Creek. No operations are reported on George River. Barney Walsh on Donlin Creek, normally employs 4 men at his hydraulic operations which are conducted on the benches, where the pay is about 200 feet in width with a quite even gold distribution. The ground is all frozen. A 120 foot head is available at the two giants in the pit for piping down the bank and into the boxes. A natural dump is available for the tailings. During the greater part of the season, the water is impounded and used intermittently, as it also is at the Stevens hydraulic elevator operations on the same creek, permitting the use of water for only about two or three out of the 24 hours. A similar and even more serious water situation is experienced by most of the operations around Flat during an average season. Frank Manley had a maximum crew

of 10 men employed on the construction of a ten mile ditch to bring water from Bonanza Creek to Willow. Some groundsluicing was also done and a small area was mined. Upon completion of this development, dragline excavator operations are to be resumed. Small groundsluicing and shovel-in operations were conducted by Paul Wobnig on the Hilltop Assn., on Flat Creek; Justis Johnson on Malamut Pup; Jerome Warren on Otter; Dehouse & Cassidy and Pete Steger, on the Summit Assn., and Wm. Burns on Happy Creek; and Cecil Barlow on Moore Creek.

Innoko District.

The Innoko district made a considerable increase in production in 1926, and while full reports are lacking it is estimated to have been close to $238,000. The main portion of this was made by the dredges, one dredge that has been idle for the past two years, resuming this year and making a very creditable output. Twenty two operations with 86 men engaged were active, there being 4 dredges with 36 men, 3 slip toothed steam scraper plants with 16 men, 2 groundsluicing and self dumper outfits with 11 men, 8 groundsluicing and shovel-in operations with 13 men, and 5 drift operations with 10 men. The road between Tacotna and Ophir was completed this year. The district is isolated and mining costs are high.

Frank Joaquin and associates leased the dredge of the Innoko Dredging Co. on Ganes Creek and operated it from May 19 to September 14, on 117 days on the Joaquin holdings with good success. This dredge is a steam driven combination type with a revolving screen, two flumes and a

conveyer, and has a close connected 3 1/2 cu. ft. bucket line. The ground dredged was 10 to 13 feet deep and not frozen. Thirteen men were employed. The resumption of operation by this dredge which has been idle since August 1923, means much to the district. The Quinan & Ames Dredging Corpn. operated its dredge on upper Ganes Creek a crew of 8 men being employed. This small 60 H. P. semi-diesel driven combination type of dredge with 2 cu. ft. buckets in an open connected bucket line was formerly operated on Glacier Creek on Seward Peninsula. It was moved to Ganes Creek and started dredging there in 1924. It is stated it may be moved to another field next year.

The Flume Dredge Co. operated one dredge on Yankee Creek and one on Little Creek, a total of 14 men being employed. The placer dredged on both creeks is shallow and excepting occasional frozen spots, is generally free of perpetual frost. Where frozen and muck covered, the 2 feet or so of overburden is first removed by stripping, exposing the gravels which then thaw by natural means. A stiff clay overlying bedrock causes a large loss of gold, much of it going through the flume without disintegrating. After the tailings have been exposed to the air and frozen during the winter, this clay crumbles and can then be redredged with a good recovery. Both dredges are identical in size and design and are of the straight flume type with an open connected line of 2 1/2 cu. ft. buckets. Each dredge has a daily digging capacity of 900 to 1000 cu. yds. They were formerly driven by distillate engines, these

were removed this year and a 60 H. P. Fairbanks Morse Style V. A., diesel engine installed on each dredge. Each engine consumes about 50 gals. of 24 gravity diesel oil in 24 hours, this oil costing 68.7 cents per gal. delivered at the dredge. They have made a large reduction in the power cost. The dredge on Little Creek was to be dismantled this winter and moved down the creek in order to resume operation next spring below ground owned by other interests now mining it.

On Ophir Creek, Hard & Collins, and Johnson & Johnson operated steam scraper plants; Berg & Maier, and Jno. Staton, each had crews employed in groundsluicing off the deep overburden and shoveling and wheeling the remaining gravels into a self dumper; Jno. Caskey took out a small dump by drifting. Victor Hill engaged a crew in drifting on Victory Gulch. Edwards & Nicholson, James Weir, and Geo. Boore, each groundsluiced and shoveled-in on Spruce Creek. Vibe & Co. with 7 men operated a slip toothed scraper plant, and F. Speljack groundsluiced, on Little Creek. Hans Erickson, and Chas. Baker, mined on Ganes; Ed Mollette on Yankee; Gus Lampey, and H. S. Hansen on Ester; Frank McCaffery on Beaver, Mrs. R. A. Anderson employed several men at drift and open cut mining on Anvil Creek.

Tolstoi District.

Four operations with 11 men engaged are reported as having been conducted in the Cripple area of the Tolstoi district during 1926, and four operations with 6 men in the Tolstoi area. There were no doubt several other small operations. In the Cripple area, Sid Paulson employed 3 men at his hydraulic operation on Colorado Creek. In a normal season

8 men are usually employed. The ground mined here is 6 to 11 feet deep, about 2 feet being muck overburden. Water is supplied by a 1 1/2 mile ditch giving a 150 foot head at the giants. Wm. Cridgley did a little mining on Colorado but was mainly engaged in installing a pipe line for future hydraulicking. Jim Wilson with 8 men mined on Cripple Creek where according to reports the muck is first stripped off, and the gravel then loaded into a 10 cu. ft. self dumping bucket and hoisted out of the cut to the sluices. Wm. Sennatkos mined and prospected on Eldorado Creek. In the Tolstoi area, Harry Madison, and Jno. Kruger, each working alone, took out small dumps. Ed Enholn and one man hydraulicked, and Jones groundsluiced on Madison Creek.

Kuskokwim Region.

Mt. McKinley Precinct.

Ten small open cut operations with 14 men, practically all in the Nixon Fork area and involving mainly groundsluicing, shoveling-in and prospecting, and one dredge with from 11 to 22 men on Candle Creek, are reported to have been operated in the Mt. McKinley precinct. The production was comparatively small and very much less than in 1925. The dredge of the Kuskokwim Dredging Co. on Candle Creek was operated from May 27 to August 12, most of the time on only one shift. The limiting conditions for stripping the deep overburden, the difficult digging conditions, and the clay encountered which is difficult to wash, greatly reducing the capacity of the dredge, are stated to make its further

profitable dredging by the company impossible, so the company has permanently closed its operation. On Hidden Creek, Dick Mathis operated a small hydraulic plant stacking the tailings with a scraper, and Goebel did some shoveling-in. Walter Stevens & Jack Nixon took out a small winter dump on Crooked Creek and this summer shoveled-in on Nixon Fork. Ed. Edwards, Red Richardson, Frank Vaugh, and Lee Page, each did a little mining and prospecting on Nixon Fork. Joe Sherwood was on Anicoe Gulch; Strand & Pearson were on Ruby; and Carl Schuttler mined on Carl Creek.

Sleitmute Area - Middle Kuskokwim. (a)

(a) From unpublished report of F. Holzheimer, U. S. Geological Survey.

No placer mining operations are reported to have been conducted in this area although a number of men were engaged in prospecting and no doubt some of them did a little shoveling-in. Prospecting was done by Ed. Cacuett, Ed Lind, Ed McGowan, Alex Ekberg on Swift River, and by Gus Reinos on the Chulitmuck, a tributary. Frits Tuttle, and Tom Killea & Chas. Wood, were on the Holcholitna; Ernie Grier & Chas. Wood on the Tatlawiksuk; and Nick Mallick, and Sam Voich, on the Holitna River. No prospecting is reported to have been done on the Stony River this season. The placer operations in the Georgetown area are, as usual, reported under the Iditarod district.

Tuluksak - Aniak District. (a)

(a) From unpublished report of F. Holzheimer, U. S. Geological Survey.

The main operation in the district is that of the New York Alaska Gold Dredging Co. on Bear Creek, a tributary of the Tuluksak River. During the summer of 1926, the dredge machinery and other material was landed at Bethel, the harbor for the sea going steamers, and taken by river boat to the landing at the Forks of the Tuluksak. From this point it was freighted cross country during the winter by tractor haulage to the present dredge camp, at Nyac. A large well appointed camp has been erected here. Nyac is located about 95 miles by river from the Indian camp at the mouth of the Tuluksak, the airline distance being 45 miles. While winter affords the better conditions for freighting in from the main river landing, some summer transportation is carried on by poling boats up the Tuluksak to the second landing from where a wet tundra trail leads 18 miles to the foothills camp. From there a fair tractor road leads to Nyac, 15 miles distant. The dredge was designed by the Union Construction Co. and was erected this spring by them under contract. It started digging on No. 7 below claim on July 1. An average dredging season of about 6 months is expected to be realized in the future. Several years were spent in drilling this area, but because of the erratic gold distribution two 4 inch drills are kept at work ahead of the dredge and close sampling and panning of the material brought up by the buckets

is done. The company formerly drilled the bench deposits on Bear Creek and is now further prospecting them on the right limit at Discovery by mining out cuts by groundsluicing methods with a view to subsequent hydraulic operation. The company employed 40 men this season. The prevailing wage scale in the district for common labor is $6.00 per day and board. Native labor is available at $75 to $100 per month but when used it is mainly on contract work on clearing brush, etc., and for some of the general work.

The dredge is a diesel driven combination type with a revolving screen, two flumes and a conveyor. The main details are as follows: Hull 38' by 73' by 5.6 ft.; draught 4.3 feet.; two spuds; bucket line is close connected containing 61 - 4 cu. ft. buckets dumping at rate of 27 per minute; maximum digging depth below water is 20 feet; revolving screen is 16 feet long, 5 feet in diameter, and has 2 1/2 inch holes; conveyor 80 feet center to center with 30 inch belt. The distributor under the screen is 84 by 120 inches and fitted with angle iron riffles; each flume is 80 feet long, 30 inches wide, and has cast iron riffles; the save-all area is 27 sq. ft. One 12 inch pump supplies water to the flumes, one 8 inch pump to the nozzles in the screen, 3 inch pump to the bucket nozzles, and there is another 3 inch pump for general use. Two 75 H. P. two cylinder Pacific Diesel engines provide the power. They consume 160 gals. of diesel oil per day, this oil costing 41 3/4 cents per gal. at the dredge. The dredge is operated on 3 - 8 hour shifts. Its

daily digging capacity is rated at 2600 cu. yds. although this average has not yet been realized.

The placer being dredged averages 10 to 12 feet in depth, the moss and soil covering may be missing or be up to 4 feet thick. Drilling has shown the presence of deeper channels. Bedrock is usually a fine grained greenish rock which is shattered and readily dug, from 1 1/2 to 2 feet being dug. At other points it is a granitic rock cut by fine grained basic dikes. The gravel is loose washed material and small in size, about 90 per cent passing a 2 1/2 inch ring, there being only a few boulders the largest of which weigh about 600 pounds. All of the ground is free of perpetual frost. The gold is fine to medium in size and while large nuggets are uncommon, one valued at $50 has been recovered. The presence of platinum is suspected. The bench gravels are up to 18 feet and more in depth with a foot or two of moss and overburden, otherwise being similar in character to the creek gravels. The bedrock is shattered granitic rock. The fine well worn gold occurs mainly in the lower foot of gravel and on and in the bedrock.

Two placer operations are conducted on Canyon Creek, a tributary of the Kwithluk River which enters the Kuskokwim about 18 miles below Akiak. Anderson Bros. with 2 natives employed, and Herman Oman with 2 natives, groundsluice and shovel-in, the former operation using an automatic dam. Canyon Creek is described as draining a narrow valley about two miles long and having a grade of 8 per cent. It is located in mountains

which reach an altitude of 5000 feet. The placer averages about 6 feet in depth and the pay is about 100 feet wide. The gold occurs mainly as small flat nuggets but is not exceptionally coarse. Bedrock is mainly a black slate although quartz porphyry dikes, chert, conglomerate and other rocks are exposed elsewhere in the valley. All of the ground is unfrozen. Sluice box concentrates from the Cwan operation analyzed by Paul Hopkins of the U. S. Bureau of Mines at Fairbanks, showed much gold, with the dark minerals being mainly magnetite with a small amount of ilmenite, rutile, and garnet. A little cinnabar and gray lead carbonate, cerrusite, also being present. The presence of a very small amount of platinum was also indicated but no assays were made due to the smallness of the sample.

Dahl & Wilson on Marvel Creek, a tributary of the Aniak River, and Brink Bros., on New York Creek near Napamute, groundsluiced and shoveled-in. R. M. Wooden, and Phil Power prospected in the vicinity of Napamute.

Goodnews Bay - Quinhagak District. (a)

(a) From unpublished report of F. Holzheimer, U. S. Geological Survey.

Three groundsluicing and shovel-in operations comprise all of the placer mining reported in the Goodnews Bay area. Thorsen & Smith mined on Wattanna Creek; Peter Roeser on Olympic; and Jim Ryan on Bear Creek.

A low divide separates the Goodnews Bay mining area from the Arolic River, or Quinhagak area, to the north. Tupper Thompson with one man groundsluiced on Kow Kow Creek; and Jack Harelson did similar mining on Butte Creek. Geo. Wetrick prospected on Butte, Fox, Faro, and other creeks all tributaries of the Arolic River. John Hansen, Albert Bell and August Wicklund prospected on the Arolic River and on Kow Kow, Butte, Trail, Fox, Faro, and other tributaries. They have gotten together extensive holdings here and during the season did preliminary prospecting to ascertain the possibilities for dredging. A number of holes were put down with a hand drill, mainly, ten holes on the Arolic River between the Gap and Snow Gulch. A hole drilled below the Gap went 32 feet into gravel, 22 feet of which is reported to be pay, with bedrock not reached. The drill was found to be too light for most of the work. One section of the deposit on Kow Kow Creek showed 6 feet of sand and gravel overlying 1 1/2 feet of angular material, mud and grit, below which was exposed 15 feet of so-called "gumbo" clay, with the rock bedrock not uncovered. Platinum is reported to have been found in the gravels of this creek. Holzheimer states he believes prospecting in the Arolic Basin to be fully justified, the area presenting good possibilities, the results of the drilling and prospecting having thus far been encouraging but only indicative, and much more drilling and other investigative work will have to be done to determine the dredging possibilities. It is planned to operate a heavy power drill here next summer.

Marshall-Wade Hampton District.

Twenty five men were engaged in placer mining and development in the Marshall district and while preparations were made for increased mining operation, there was little change in the production which for several years has been averaging around $12,000 per year. Most of the mining is done on Willow Creek.

Marsh, Wirem & Co. installed a cableway excavator plant on the Bon Rosa claim on Willow Creek during the season and with it opened up the ground for future operation by digging a long bedrock drain. This ground was prospected by drilling during several previous seasons and it is stated to average 25 to 30 feet in depth with very little muck overburden. The gravel is not frozen, it is coarse and contains quite a number of large boulders. Bedrock is a porphyry which it is contended can be readily dug and cleaned. A 3 drum, 8 1/4 by 10, double cylinder hoist operates the cableway excavator which is of local construction. From 6 to 8 men were employed this season. Mining will be started next spring. It is the plan to first strip off the upper 15 feet of barren or low grade gravel, using the excavator for this and then mine the remaining gravel according to usual cableway excavator methods.

Tom Plunkett, Joe Plein, Leo Moore, James Johnson, W. H. Parks, Tony Jurack, and Patton & Hill, all conducted small open cut operations on Willow Creek. Edgar & Duggan hydraulicked on Disappointment Creek using a scraper to stack tailings. Geo. Pilcher hydraulicked on Elephant

Creek. Jack Mort on Buster, and J. W. Wick on Montezuma, mined by groundsluicing.

The Stukahok district was very quiet, only four men being reported as doing any mining in the district, most of it being of a prospecting nature. These men were Fred Kruger with one man on Fat Creek, Wm. Moran and J. J. Jenkins on other tributaries of the Stuyahok River.

Seward Peninsula.

The occurrence of placer gold on the Seward Peninsula was known in 1865, although it was not until 1897 that the first recorded production was made. The great rush to Nome took place in 1900 and the development and mining of its extensive rich placer resources began. From the beginning until 1925, inclusive, the Seward Peninsula has made a recorded production of placer gold valued at $87,000,000 and no doubt a considerable additional amount was produced that was not reported. The main portion of this production was made by the mines operated in the Nome, Council, Solomon and Fairhaven districts with the balance from the Port Clarence, Kougarok, Koyuk, and minor districts. During the four years prior to 1926, the annual production reached a low mark, although notable development for large scale dredging operation in the Nome district was underway. While as a result of this development, dredging was started in 1923, full operation was, however, not actually attained until this year. Mainly as a result of this, the gold production of the Peninsula for 1926 was

$1,765,000, an increase of about $700,000 over the previous year. Nearly 90 per cent of this production was made by the 19 dredges. Placer tin concentrates to the weight of 22,700 pounds were also produced by one small operation in the Port Clarence district. In 1926, there were 120 summer productive operations conducted on the Peninsula with a maximum of 613 men engaged, and 16 winter operations with 31 men. Besides these, there were 20 non-productive operations engaged in drilling, prospecting, etc., with 47 men employed. The summer operations include 19 dredges with 379 men; 2 scraper plants with 10 men; 1 cableway excavator plant with 12 men; 7 hydraulic elevator plants with 51 men; 24 hydraulic plants with 71 men; and 67 small groundsluicing and shovel-in operations with 90 men. Most of the mines, including some of the dredges, particularly those relying upon a ditch water supply for thawing purposes, were seriously handicapped for lack of water, as an usually light snow had fallen during the previous winter and the prolonged dry season was not broken until the coming of the rains late in August. It was one of the driest seasons ever experienced in the history of placer mining on Seward Peninsula.

Nome and other Seward Peninsular ports are closed to navigation from about the latter part of October until about the middle of June. This has some bearing on the length of the mining season for many of the larger operations, and on the cost of supplies, yet the cost of supplies delivered at the Ocean ports is nominal. The mining season, outside of

winter work, normally varies from 75 to 150 days, depending, however, upon seasonal conditions and the method of mining. The dredging season ranges from 75 to 125 days in most of the districts, yet at Nome, longer seasons are generally realized, one dredge at Nome being operated for 220 days in 1924. Frozen conditions encountered in the early spring cannot economically be combated by most methods of mining, nor is it practical to continue after the hard freezing weather of the late fall sets in.

Sea going vessels cannot dock at Seward Peninsular ports, but as at Nome, must anchor off shore and the cargoes must be lightered to the beach. Storms, which rise suddenly, are characteristic of Norton Sound and Bering Sea, and then the unloading of ships may be delayed for periods up to a week and more. During 1925 five trips were made by the regular steamer between Seattle and Nome, 3 trips by the regular freighter, and a number of small independent steamers made several trips. The Lighterage at Nome and other ports is done by local interests. Regular weekly service was maintained between Nome and St. Michael via Bluff, Golovin, etc., by a 65 foot diesel sea going boat, and other small boats of similar or smaller size were operated on the run between Nome, Teller, Candle and other points, for which the season was very favorable. Freight rates on the main commodities from Puget Sound ports to some of the Seward Peninsula ports and the lighterage rates there, are given in the following table.

1926 COMMODITY FREIGHT RATES.

SEATTLE OR TACOMA, WASH., TO SEWARD PENINSULA POINTS.

Article	Rates-ship anchorage; Nome-Bonanza-Bluff L.C.L.	Rates-ship anchorage; Nome-Bonanza-Bluff C.L.	Lighterage rates: Nome	Lighterage rates: Bonanza	Rates - ships anchorage Golvin (4) L.C.L.	Golvin (4) C.L.	Teller (4) L.C.L.	Teller (4) C.L.
Coal in sacks, per ton 2000 lbs.	$15.65	$ 7.14	$ 5.00	$ 6.50	$17.00	$9.00	$17.00	$ 9.00
Cold Storage (perishable), per ton, wt., or meas.	45.00	38.00	10.00	10.00	52.00	44.00	52.00	44.00
Dynamite, High explosives (1), per ton, wt. or meas.	35.50	35.00	10.00	10.00	44.50	40.00	52.00	47.50
Freight, ordinary, N.O.I.B.N., per ton, wt. or meas.	19.00	16.00	6.00	10.00	21.00	17.00	23.50	18.50
Hay, baled, double compressed, per ton 2000 lbs.	21.00	15.00	7.00	9.00	23.50	20.00	25.50	21.00
Oats, feed, etc., N.O.I.B.N., per ton, 2000 lbs.	18.00	15.00	7.00	9.00	21.00	17.00	23.00	18.00
Lumber, common, rough, soft, lengths not over 32', per 1000 B. ft.	23.00	21.00	8.00	10.00	24.50	22.50	26.50	24.50
Lumber, dressed, soft, loose or in bundles, lengths not over 32', per 1000 gross B. ft.	24.00	22.00			25.50	23.50	27.50	25.50
Machinery, including mining & dredging & parts, no single pieces over 5000 lbs. (2) per ton, wt., or meas.	16.00	15.50	7.00	9.00	17.00	15.50	20.50	16.50
Oils -explosives, distillate, gas etc., per ton, wt. or meas.	20.00	16.00	10.00	10.00	23.50	18.00	25.50	18.50
Oils-fuel oil, coaloil, engine oil, per ton, wt. or meas.	18.00	15.00	7.00	9.00	22.50	16.50	24.50	18.50
Return Freight;								
Empty carriers, drums, etc. per ton, wt. or meas.	2.50	2.50	(5)1.00	(5)1.50	3.50	3.50	3.50	3.50
Ore, Graphite, etc., value not over $100 per ton(3) per ton of 2000 lbs.	7.50	7.50	8.00	10.00	7.50	7.50	7.50	7.50

Above rates are to or from ship's side only. Lighterage to shore is extra charge as given. 50 ¢ per ton is charged in addition for wharfage at both Seattle and Nome.

L.C.L. - Less car load rate. C.L. - Carload rate. (1) Wharfage charge at Nome $1.00 per ton. (2) Additional charge for each single heavy piece weighing over 4000 lbs. Graduated scale. (3) Higher rate if value over $100 per ton. (4) Lighterage to shore additional. Charge about like those given from Nome and Bonanza. (5) For each 110 gal. empty drum, or half rate for 55 gal. barrels.

Further improvement to the entrance of jetty and to the harbor for small boats at Nome at the mouth of Snake River, were made by the U. S. War Department. The Alaska Road Commission made many road improvements and improved the track and bridges on the Seward Peninsula Railroad tram running from Nome to within a mile of Shelton, a distance of 86 miles. This tram has been turned over to the public's use and provides the only summer access to that area. Small gasoline driven cars often with trailers, and small light flat cars drawn by dogs are the means of conveyance over this light narrow gauge track. It ends about a mile south of Shelton necessitating the crossing of a deep slough and the swift Kuzitrin River in skiffs controlled by cables. From Shelton, a rough trail leads to the Kougarok district to the west, and to the Kotzebue Sound side to the north. Freight is being hauled from Nome to the end of the tram for $30 per ton for lots more than one ton, and $40 per ton in smaller lots. Plans are under advisement for extending this tram to Dahl, from where a road is to lead to the Immachuck and the Candle districts, with additional tram at the Candle Creek end. This tram should at least be extended across the river to Shelton and 12 miles beyond to Dahl.

Fuel and lumber is shipped in from the outside. The Peninsula is bare of timber, excepting in the eastern portion in parts of the Council and Koyuk districts where a fair spruce growth is available. The only native fuel available for mine operation in the other districts is a small willow and alder growth. Coal is shipped in in sacks, mainly from

British Columbia and Utah and sells at the yard in Nome for $30 per short ton during the summer and $32 during the winter. Shipments totaling 5700 tons of coal were received during 1925; also only 2000 tons of American Coal and 600 tons of foreign coal were shipped in this year. A very small tonnage of poor quality coal is mined for local use in the Candle district and a little coal is sometimes brought to Nome from the Cape Lisbourne field. In the larger lots, at Nome, gasoline sells for $4.65, and distillate for $4.40 per 10 gal. case, with gasoline in 55 gal. barrels at 32.32 cents per gal. A large mining company at Nome provides operators of the district with 24 gravity oil for $6.00 and crude oil for $5.40, per barrel. Labor around Nome is paid on the basic rate of 70 cents per hour without board, at some of the more remote operations on the Peninsula the rate is $6.00 to $7.00 per 10 hour day with board. Skilled labor is paid higher, the scale varying according to the kind and location.

Nome District.

Forty-one placer operations with 338 men engaged were conducted in the Nome district in 1926 and include 4 dredging companies operating 7 dredges with an average number of 251 men engaged; 2 hydraulic elevator plants with 26 men; 5 hydraulic plants with 10 men; 19 groundsluicings, shovel-in and open cut prospecting operations with 25 men; 7 winter drift and drift prospecting operations with 14 men; 2 summer shaft prospects with 4 men; and 2 drilling operations with 8 men.

1453-42

The principal and largest placer operation in the Nome district as well as in Alaska, was that of the Hammon Consolidated Goldfields Co., a subsidiary of the U. S. Smelting, Refining & Mining Co. This company employed an average of about 225 men in operating its four dredges near Nome, and on thawing and other work connected with this operation. The hydraulic elevator plant at the mouth of Anvil Creek was also operated for a short period during the fall when the water was available. The first of the dredges started the seasons digging on June 20. Two of these dredges operated until early in October, while two continued into late November. All of the dredges are electrically operated, the power being generated at a central power plant at Nome by 6 - 525 H. P. Pacific Diesel Workspoor engines direct connected to 6-525 H. P., 2300 volt, alternating current generators. The plant consumes an average of about 500 barrels of 24 gravity diesel oil per day. This current is stepped up to 11,000 volts and transmitted 3 miles to the dredges where it is used at 440 volts. The Nos. 1, 2 and 3 dredges are of the modern California type and were designed and erected by the Yuba Mfg. Co. Nos. 1 & 3 have a digging depth of 60 feet below water level and No. 2,40 feet. These three dredges have 9 cu. ft. buckets in a close connected line, which dump at an average rate of 23 to 24 buckets per minute and now dig an average of about 6000 cu. yds. per day. The No. 3 dredge dug ground 80 feet deep this season. They have double deck gold saving tables. The No. 1 and 2 dredges have 880 motor H. P. installed and the No. 3,

590 motor H. P., the average power consumption for each being about 440 K. W. Dredge operation is carried on in 3 - 8 hour shifts. The No. 4 dredge on Snake River, formerly the Center Creek dredge, is a 3 1/2 cu. ft. stacker boat, with 175 motor H. P. installed. It digs an average of about 1800 cu. yds. per day.

Practically all of the ground in the major areas is frozen and is thawed with water, a large crew being employed at this work. Water for thawing is provided by the Miocene and Pioneer ditches, and the Seward ditch has recently been put in order. Mention of the thawing practice has already been made under "thawing" in the early part of the report. Three 450 H. P. pumping plants each containing two 12 inch centrifugal pumps are operated, when conditions demand, for returning the water to the dredge ponds and the thawing points. A 50 H. P. pumping plant is also provided for supplementing the ditch supply of water on Snake River. During a period of about six weeks this mid-summer, all of the water available from Home River was easily handled by the Pioneer ditch, the Miocene ditch being dry.

The 3 1/2 cu. ft. semi-diesel driven stacker dredge of the Bangor Dredging Corpn. on Anvil Creek continued digging upstream until October 12, closing the season on No. 7 above claim. The 2 1/2 cu. ft. open link connected, gasoline driven stacker dredge of the Dexter Creek Dredging Co. on Dexter Creek was operated until the end of the season but lost much time by losing the pond water. In digging upstream in the

vicinity of the limestone-schist contact, open fissures or caverns were repeatedly struck, the water in the pond running out leaving the dredge high and dry. The bad ground was eventually passed early in September. The steep grade of Dexter Creek has required the building of many dams behind the dredge, and the narrowness of the creek bed has made it necessary to dig much rim rock in order to provide room for the dredge to operate. It is now well to the head of the creek and no doubt will complete its dredging next season.

1457-166 The Dry Creek Dredging Co. dredged on Dry Creek, in ground averaging 10 to 14 feet deep to a false clay bedrock. Beyond the immediate creek bed where moss and muck covers the gravel, it is generally frozen and is thawed by water with a thawing plant of about 200 points. The points are driven at 6 foot centers, a thaw in 14 foot ground requiring about 3 to 5 days. The water is pumped at a 20 to 25 lb. pressure. The dredge is a reconstructed one being a straight flume type with 32 - 2 3/4 cu. ft. buckets in an open, link connected, line, operated at a speed to dump 17 buckets per minute. The flume is 74 feet long, 3 feet wide, set on a 10 inch grade, and fitted with transverse rail and cast manganese riffles. Power is provided by an 80 H. P. Venn Severin, hot point, solid injection, 2 cylinder, semi-diesel engine which consumes 100 gals. of 24 gravity oil in 24 hours. This oil costs about 18 cents per gal. at the dredge. Seven men are employed. It is stated that a 3 cu. ft. close connected bucket line for this dredge is planned for next season.

Lee & Swanberg on Osborne Creek conducted hydraulic elevator operations in the creek bed, a crew of 10 men being engaged. A 10 inch elevator is operated under a head of 165 feet with a lift of about 16 feet. The ground after preliminary stripping averages 9 feet in depth. A large reliable spring fed water supply is available by an 8 mile ditch, this supply failing for the first time during the driest part of this season. Small hydraulic operations were carried on by R. Stewart on Monument Creek, Rheinish Bros. on Rock; Calkins & Nashenwong on No. 4, A, Anvil, and on Nokula Gulch; Swedman & Wagner on Oregon Creek; and Fred Barnofski on the bench near Hastings Creek.

Many small groundsluicing and shovel-in operations were carried on with from one to three men engaged at each. These include the operations of Johnson & Warner on Snow Gulch; Geo. Cahill and Dick Lambert on Glacier Creek; Tom Olson on Beaver; Johnson & Nelson on Anvil bench; Hohn & Widsted, and Henry Bird, on Specimen Gulch; Joe Henhauser on Grass Gulch; Schmedling on Dry; Jack Topolsky on the Dexter-Dry Creek divide; Tom Ochman, and Jack Smith on Cripple Creek; S. Sansouci, Lorens Waddell, Chas. Miller, Hyggren & Holm, and Tom Jensen, several of these mining on the present beach, the others on the second beach line in the vicinity of Jess Creek. Ben Gillette with one man mined on the low bench several hundred feet back from the sea shore about 1/2 mile east of Nome. This area from here to Hastings Creek is now being proposed by some Nome interests as a dredging field.

Small dumps were taken out by drifting and some drift prospecting was done last winter, with one or two men engaged at each. These operations included those of Connolly Bros. and Jack Topolsky, on the Dexter-Dry Creek divide; Wehhauser & Ulrich on Grass Gulch; Brunner & Roth on Dry Creek Hill; Rohn & Otterson on the Anvil-Dexter divide; Neibuhr & White on Dexter Hill; and Panos & Hannah on the Big Bend of Snake River. Several of these started sinking new shafts this fall in preparation for this winters mining. The production last winter was very small. David Borei had two men sinking prospect shafts at the head of Dry Creek; and Brill & Caffney sunk a shaft on Sunset Creek. A small increase in drifting mining is looked for around Nome this winter.

Otto Malla carried on drilling operations on lower Little Creek, meeting with encouraging results. The ground ranges from 30 to 44 feet in depth where the holes were drilled, the gold distribution being in the bed of lower gravels 5 to 7 feet thick. The bedrock here is 5 to 7 feet above sea level. The wash contains marine shells and some characteristic beach material. The pay encountered by the drill up to the time the operation was visited, was limited, mainly to one hole, although good prospects were obtained in most of them. It is stated that a shaft will be sunk on the best hole this winter and drifting will be done to determine the extent of the pay and the character of the deposit. The find is very interesting and appears to be a beach line, but this and its relationship to other beach lines can not be definitely determined until further development and prospecting has been done. Chas. Brown drilled numerous holes

between Sunset Creek and Penny River to locate a western extension of the Third Beach line. Beach material was in evidence in drillings examined at some of the holes, and it is stated that the results of this prospecting has been very encouraging.

Solomon District.

The Solomon area, while in the Nome Recording Precinct, is reported separately. Nine operations with 47 men engaged, were conducted and include 4 dredges with 37 men; 2 hydraulic plants with 6 men; 1 drift mine with 2 men; 2 groundsluicing and shoveling-in operations with 2 men; and 2 prospecting operations with 3 men.

14453-120 The dredge of the Goldsmith Dredging Co. at Coal Creek and Solomon River was erected during the summer under contract to the Yuba Mfg. Co. It started digging on August 15 on Coal Creek, later digging on Solomon River. Twenty-five men were engaged during the construction period after which the crew was reduced to about twelve. This company owns twenty-one claims, eighteen of which are on the Solomon River above Butte Creek and sixteen miles up the River from tidewater. This placer on Solomon River is shallow, ranging up to 10 feet in depth, high reefs of bedrock being exposed in the creek bed at several localities. The gravel is mostly a loose light washed material, and beyond the creek bed is covered with a shallow depth of muck and moss. The ground is not frozen, excepting occasionally in the deeper moss covered flats and points, which will thaw after stripping. The bedrock is a schist and fractured limestone. Both coarse and fine

gold is present, the better pay being somewhat spotty in its distribution. The Solomon River Valley in this locality ranges from 250 to 600 feet in width, and a maximum width of 400 feet of pay is claimed.

The dredge is a flume type, the main details being as follows: Hull 36 ft. by 83 ft. by 4 ft.; constructed of light material; draught 30 inches. The close connected line containing 48-2 1/2 cu. ft. buckets, can dig 12 feet below water level, and is operated at a speed to dump 28 buckets per minute. It delivers the material directly to the head of the flume. This steel flume is 108 feet long, 3 feet wide, set on a 12 inch grade, and fitted with rail riffles set both crosswise and lengthwise, also some 2 inch angle-iron sets. The save-all area is 33 sq. ft. There are two wooden spuds. A 12 inch pump provides the water for the flume, and a 4 inch pump is available for general uses. A 120 H. P. Fairbanks-Morse "Y" type diesel engine provides the dredge power, and a 3 H.P. distillate engine is provided for driving the compressor. A 10 H. P. semi-diesel engine is available for an auxiliary, and a 6 H. P. distillate engine for the light generator. The average daily digging capacity of the dredge is rated at about 1500 cu. yds.

KA53-120 The Solomon Valley Dredging Co. on lower Solomon River acquired the Flower dredge formerly operated here, reconstructed it, and started digging on August 4 on the Mamie claim. Eight men were employed. The placer being dredged is 10 to 15 feet deep and contains unfrozen light to medium sized material. The dredge is a flume type with line anchorage.

The bucket line is open link connected and contains 32-2 1/2 cu. ft. buckets dumping at the rate of 17 per minute. The flume was 58 feet long, 30 inches wide, set on a 12 inch grade, and fitted with rail riffles set lengthwise. The flume has recently been extended. A 9 inch pump provides the water for sluicing. A 50 H. P. Atlas semi-diesel engine drives the winches and the pump; a 35 H. P. engine of the same make drives the bucket line. The dredge can dig about 800 cubic yards per day.

K453·12C Scott, Newberg & McCarthy operated the 5 cu. ft. electrically driven dredge of the Lomen Reindeer & Trading Co. on Solomon River, under a lease arrangement. Nine men were engaged. This is the former Three Friends dredge which has been operated on this river each season since 1905. It is a stacker dredge with shaking screens, and while at one time steam driven, was later electrified, power now being provided from a shore plant containing a 200 H. P. Dow-Willans diesel engine. This engine consumes an average of 210 gals. of 24 gravity diesel oil per day, this oil costing 27 cents per gal. at the power plant. The dredge digs an average of 3000 cubic yards per day. The ground dredged this season was some that had been passed by when formerly dredged because of its low gold content. It averages 10 feet in depth and is not frozen. As now dredged it averages but 10 to 12 cents per cubic yard but due to a liberal royalty arrangement for the ground and the use of the dredge, and the hard work of these partners, the operation is able to make a small profit. The lowest cost dredging now being done in Alaska, is probably being realized at this

operation, although the present operators frankly admit that should any serious break down occur or extensive repairs become necessary, it would no doubt mean the end.

#4 53-15 The Shovel Creek Dredging Co. operates its semi-diesel driven flume dredge, with a 2 1/2 cu. ft. close connected bucket line, as usual, on Shovel Creek. Seven men were engaged. The dredge digs an average of 1500 cubic yards per day. The placer dredged is 6 to 9 feet in depth and consists of light washed easy digging and sluicing material. The ground is low grade but this efficient little dredge is economically and well operated by the four partners who own it. One of the bad features of dredging on Shovel Creek is the great depth of "glacier" ice which usually accumulates each winter. This generally delays the start of the season's dredging until early in August, although, this year there was very little of this ice, the dredge starting on July 16.

#5 53-11 E. W. Quigley operated a hydraulic elevator plant at the mouth of Big Hurrah Creek, employing 6 men. The deposit here averages 9 feet in depth and is not frozen. A 10 inch elevator is used, water being provided from a 7 1/2 mile ditch giving 210 foot head in the pit. Necessary preparatory work, and the shortage of water delayed the start of mining until late in August. Future hydraulic operations will be conducted on the low bench on the left limit of the Solomon River, just below the mouth of Big Hurrah Creek. The small Iverson & Johnson on upper Big Hurrah Creek was idle.

Andrew Conrad with one man drifted in ground 40 feet deep on the Cracker Jack Bench on the right limit of Solomon River; and Jack Melin operated a small hydraulic plant on the left limit benches opposite the mouth of Shovel Creek. Jno. Rothler on Lyon Creek, and Jas. Nelson on upper Big Hurrah, shoveled-in. Ed Cadney prospected on the Solomon benches opposite No. 18 and 19; and Weaver & Povlick prospected on the right limit opposite No. 16, where they obtained some good prospects.

Cassadepaga District.

While the Cassadepaga district is part of the Council Recording Precinct, it is here reported as a separate district. The principal mining in the Cassadepaga, which lies just over the divide at the head of the Solomon River, was done by the Cassadepaga Mining Co. Inc., who operated their small 2 1/2 cu. ft. distillate flume dredge on the Cassadepaga River, about one mile above Canyon Creek. The placer in the river bed is not frozen and ranges from a foot or two to 9 feet in depth, averaging about 5 1/2 feet. The gravel is small to medium in size. Bedrock is a schist and slabby limestone. The dredge is digging up the present river bed over a width of from 100 to 175 feet. Seven men are employed. This dredge is driven by a 60 H. P. distillate engine and digs about 800 cubic yards per day. It was first operated on the Solomon River, then on Canyon Creek, and was again moved to the present ground where it started operation in 1924. The dredge camp is 25 miles by road from the mouth of the Solomon River, freight being hauled in from there for $50 per ton in the summer.

Bench deposits occur on both limits of the Casadepaga River and have been mined at numerous places, particularly at the mouth of Ruby Creek, and along the left limit below Willow Creek. The run of auriferous gravel along the Casadepaga River, like that on the Kougarok and many other streams, does not follow the many meanderings of the present stream, and outside of the bench deposits, will in many cases be found crossing the points at the bends and beyond the present stream bed in the wider flats, all of which are moss and muck covered. Unfortunately, these light dredges that dig such shallow ground have by force of circumstances, had to hold closely to the shallower and thawed ground of the immediate stream bed.

Oscar Wick hydraulicked on the Old Channel claim where a narrow frozen pay channel crossing a high point on the right limit of the Casadepaga had been discovered by Sam Gaylord. A small dredge formerly digging up the river in this vicinity lost the pay after passing above this point. This channel is about 18 feet wide and has an average of 8 feet of gravel overlain by 8 to 10 feet of muck and moss. When visited the overburden had been stripped for a distance of about 300 feet, a shaft put down here disclosing the bedrock to be about 10 feet higher than the creek level. It is about 500 feet at right angles from where this work is being done to the river and it is very possible that another one or more similar channels will be found. Sam Gaylord prospected on the Casadepaga; Wm. Allison prospected on the Casadepaga and on Penelope Creek. Nels Nelson groundsluiced and shoveled-in on the low bench on No. 18 right limit of Ruby Creek.

Bluff District.

The Bluff area lies within the Nome Recording Precinct, but is here reported as a separate district. The placer operations conducted in the Bluff district include 1 cableway excavator plant with an average of 12 men engaged; 2 hydraulic plants with 4 men; 2 groundsluicing and shovel-in operations with 4 men, and 2 drift operations with 5 men; besides a number of drift prospecting operations that were conducted during the winter along the beach.

The principal placer mining is done at and in the near vicinity of Bluff, particularly at the mouth of Daniels Creek. Daniels Creek is noted for the rich placer formerly mined there. There is still considerable rich ground at its lower end that has not been mined because of adverse physical conditions. The present beach placers at the mouth of this creek gained the reputation of having been the richest known of their kind. Former mining was done here, some of it by freezing down during the winter, so that most of the present beach placer along the beach and off shore under the sea has been pretty well worked over, mining being carried to the false clay bedrock 15 to 20 feet below sea level. The true bedrock beneath has not been reached here, although, shafts from which small rich dumps have been mined, were at one time put down 45 to 60 feet to the pinnacled limestone on the lower end of No. 1 claim at the mouth of Daniels Creek. A study of the conditions here indicate that a high ridge of bedrock probably crosses the mouth of Daniels Creek just below where these

shafts were sunk. The present beach placer contains small beach worn material with large limestone boulders usually present in the lower horizon overlying the clay bedrock. Much hematite and limonite is recovered in the concentrates in sizes from fine rounded grains to large pebbles. Much ruby sand, and black sand in lesser amounts, is also present as well as considerable cinnabar. The gold is fine, some of it already amalgamated, some of it coated and rusty, and its present distribution is irregular.

The Allen Mining Co., operated a cableway excavator plant at the mouth of Daniels Creek in the mining of the beach placer under the sea and along the present beach. The plant is set up on the beach just to the east of of Daniels Creek. A 1 1/4 inch traction cable, operated through tension blocks on a gin pole 93 feet high, is fastened to a four-pile dolphin, which has been driven about 1200 feet distant, and about 500 feet off shore. An average depth of 6 feet of water covers the sea bottom at the dolphin at mean high tide, the difference in tides being only a few feet. About 700 feet from the gin pole end, a one inch cable is fastened to the traction cable and is connected to a donkey hoist set some ways down the beach. With this the position of the traction cable is shifted as required. The excavator bucket is suspended from a wheeled carriage operating along the traction cable. It is a heavy regulation, toothed, cableway excavator bucket and has an inside measurement of 1 1/2 cubic yards. It is controlled by a 7/8 inch haulage cable, and is

operated over a span of 400 to 500 feet. A 125 H. P. six cylinder, Twin City gasoline engine drives a two speed, two drum, hoist for operating the traction, and the haulage cables. The sluice is set on a high scaffold base alongside of the gin pole. The sluice is 112 feet long, 3 feet wide, set on a 12 inch grade, and is fitted with special cast iron, bevelled, transverse riffle sets. This sluice was formerly equipped with a grizzly through which the fines passed and went to a 3 foot by 15 foot trough which is a drag classifier combined with a shaking motion and air pulsation. Concentrates from this went to a 3 1/2 foot Rose Ore Mill Amalgamator for final grinding and amalgamation. It is claimed some high grade concentrates were produced by this classifier. At present the gold saving is made entirely by the riffled sluice and while fine rusty gold is being lost, the quantity could not be definitely determined. Greater refinement in the gold saving practice is, however, advised. A 75 H. P. Atlas, three cylinder, diesel engine drives a 10 inch sand pump for providing water for the sluices. The head of this sluice is 45 feet above the ground.

Releasing the haulage cable, the excavator bucket travels down the traction cable by gravity, at the same time the traction cable is being gradually lowered in landing the bucket. Pulling on the haulage cable drags the bucket forward and fills it, the traction cable being then tightened and raised as the bucket is hauled along it to the hopper at the head of the sluice where it is automatically dumped. At steady

operation from 30 to 40 buckets can be dug and delivered per hour. The average load, however, is generally not more than one cubic yard as the sloshing of the water into the bucket washes out some of the material and there is often considerable spill from the bucket while it is enroute, to the hopper. Much trouble has been had with the pump, with excessive cable breakage, the loosening of deadmen, etc., so that regular operation could not be realized. It is estimated, however, that with average steady operation, the plant will handle about 800 cubic yards per 24 hour day. One clean-up of 2800 buckets yielded $1456 in gold. This and other clean-ups indicate an average gold content of 45 to 50 cents per cubic yard. One areaoff shore was mined during the summer to a maximum depth of 20 feet below the 5 feet of sea covering it. Here several thin bands of clay occurred between the beds of gravel. In a pit later opened up along the shore, the clay bedrock overlain by boulders at a depth of 18 feet was dug to. Evidence was found where of previous mining. Some of the difficulties attending an operation of this kind have been mentioned in the fore part of this report under the discussion of excavator methods. In addition, cable breakage, etc., is to be expected when the cable span is great, especially so in this case where an additional severe cross strain is created by the shifting cable. The sudden release of load when the bucket dumps also causes the flopping and severe jerking of the traction cable and its anchorage. The entire set up is to be changed. It is stated that the company is negotiating for No. 1 Daniels Creek, and

if successful in this, will mine there next season.

Meegan & Olson on No. 5 Daniels Creek, and Sam Tucker on Swede Creek, operated small hydraulic plants, the latter also doing a little drifting during the winter in some of the gravel filled caverns in the limestone on that creek. Groundsluicing was done by Mike Powers on Silver Bow, and by Brady Hansen on Koyana Creek. Powers & Marion took out a small winter dump by drifting on Eldorado.

An elevated beach deposit containing gold was found, just east of Koyana Creek, last winter by Merritt & Chittick. This caused considerable excitement and a small stampede of prospectors in this section, and resulted in the staking of miles of beach and its prospecting by adits and shafts. The original and main discovery was made just above the present beach between Koyana and Twin Creeks, where alluvial and slide material is exposed for a distance of about 1200 feet between the east rim of limestone and the west rim of schist. Three cross cut adits and some drifts were subsequently driven here, all within a distance of about 350 feet of eachother and about midway between the two rock rims mentioned. The most easterly adit, 120 feet long, cross cut the beach deposit but was practically barren of gold. The central adit, 115 feet long, showed indications at the face of solid rock being close ahead. Occasionally, fair prospects could be taken off bedrock in this adit. The Discovery, or most westerly adit, was driven in 75 feet and later the connecting drift to the east and a short drift to the west were driven. Fair scattered prospects were obtained in the connecting drift but the

best prospects, some pans taken off bedrock at selected spots showing as much as $1.00 in gold, with several that went better, one about $3.00, were obtained along the Discovery adit and the western drift. The largest piece of gold was worth 7 cents.

This beach deposit is elevated 5 to 7 feet above high tide and consists of a 10 to 25 foot thickness of typical beach gravel and gray sand with thin interbedded bands of ruby sand. The beach material is covered by stream gravel, mixed with angular rock and soil, making the total maximum thickness from surface to bedrock, 50 to 60 feet. Bedrock is mainly a schist. Some large quartz and limestone boulders are occasionally encountered which rest generally on this bedrock. The deposit is not frozen. Surface investigation indicated the existence of a high channel coming down the left limit of Koyana Creek and which entered the sea in the vicinity of this beach line. Proof of the existence of such a channel has been shown by a 68 foot shaft formerly sunk on this bench some 2000 feet back from the beach. It is stated that colors of gold were found in the panning of the gravel taken from this shaft from the surface down, and the bedrock dipped sharply away from the beach or to the north. While only a short general investigation of the economic possibilities of this discovery was made, it is quite apparent, that this beach deposit is a reconcentration of the material from this high channel which the sea cut and eroded at a long quartering angle. The available evidence shows some gold to be present in this channel and it may have been enriched along its western rim by the erosion of small gold bearing quartz veins

occurring in the schist formation there. This local gold bearing quartz may also be the source of the greater part of the gold occurring in the western portion of the beach deposit, some of the gold being still fairly sharp and rough. This evidence and the result of the development indicate the main gold occurrence in this beach deposit to be between the Discovery adit and the schist rim about 400 feet to the west, and confined mainly within a width of 20 to 35 feet of this beach line.

The concentrates from pannings taken from the adits include a fine heavy white sand, which analysis has proved to be cerrusite, or lead carbonate. No mining other than by panning has been done at this property. When visited, the owners, Merritt and Chittick, were constructing a small ditch and planned to groundsluice some cuts across the deposit. Further drifting to the west of the Discovery adit is advised and pending results the deposit should be mined by drifting methods.

Among those prospecting last winter for similar bench placer, mainly, at Long Beach about 3 miles to the east, and between there and Koyana Creek, were Swedman, Wagner & Bernstad; Pete McGraw; Meegan & Olson; Ed Cross; Ed Kohn; Hans Samuelson; and a number of others. Some fair prospects were found and further prospecting is planned by them for this winter. It is advised, that before driving adits or sinking shafts in prospecting for a beach line such as these, that the possibility

for a source of gold behind it should first be investigated. Steffenson, Barnette & McIvor, who also prospected in this vicinity last winter, are reported as planning to drill this winter in the lower Fish River Basin.

Council District.

Placer mining in the Council district, formerly very active and one of the largest producers, is very much on the decline. During 1926, there were operated, 3 dredges with 25 men; one hydraulic plant with 3 men; and 12 groundsluicing and shoveling-in outfits with 13 men. While three dredges were operated but one of these approached the usual scale of operation. A season or two more will complete the dredging of their ground although other dredging in the district may develop by that time.

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The main operation in the district was that of the Northern Light Mining Co. which employed 9 men in the operation of its 2 1/2 cu. ft. distillate driven flume dredge on Ophir Creek near its mouth. This dredge was operated from July 9 to October 17, or 101 days, digging 141,410 cubic yards, an average of 1400 cubic yards per day. The ground dredged was not frozen and averaged 11 feet in depth, 3 1/2 to 4 feet of which was soil overburden. This character of ground was easily dug and accounts for the large increase in the daily digging average, and also the lower gold tenor. Formerly digging mainly in shallow gravel free of overburden, this dredge dug an average of 900 cubic yards per day.

The Ophir Gold Mining Co. (Oliver, Trolson, Mebes, Hansen, et al) purchased the dredges and property of the Wild Goose Mining & Trading Co. on Ophir Creek, and this year operated the No. 1, a 3 1/2 cu. ft. electrically driven stacker dredge, in some of the former dredge tailing and in some virgin ground left at the camp site. Lack of water for operating the hydro-electric plant delayed the start of dredging until late in August. While this dredge also has a 160 H. P. distillate engine aboard for an auxiliary, no distillate was available for its operation, as transportation up the Fish and Niukluk River, the means of access, was prohibited by the prevailing low water.

The Crooked Creek dredge (Mebes & Hansen) was operated for a short period on Albion Creek and it is reported that the dredge operation on this creek has been completed. Nels Trolson had a small crew engaged in hydraulicking on Ophir Creek. Chas. Matson, H. P. Howard, Eno. Gross, Nat Dimon, W. L. Johnson, Fred Durocker, and Ben Shaw, all mined single handed on Ophir Creek; Anton Haakonsen mined on Medicine Gulch, T. J. Shaughnessey on Dutch Creek; and Wm. Brookins on Foster Creek. Al Sundquist prospected and mined on Aggie Creek; and Myers & Pederson were on Rock Creek. A small excitement was started this fall on Aggie Creek, a tributary of Fish River, by the finding of some very high grade gold. According to reports, the occurrence was a very local extent and no further development has been done.

Koyuk District.

Placer operations conducted in the Koyuk, or Dime Creek, district include 1 dredge with 6 men; 3 hydraulic plants with 11 men; 3 groundsluicing and shoveling-in outfits with 5 men; and 1 winter drift mine with 4 men.

1914 5/31 The dredge of the Dime Creek Dredging Co. on Dime Creek was operated for about a month. The gravel here averages 6 feet in depth, and in the banks is covered with muck overburden to a depth of 10 to 12 feet. Bedrock is a hard blocky to slabby igneous rock of which 2 to 4 feet is dug. Some of the placer is frozen, particularly the deeper, and is thawed with water. The 3/4 inch points are driven to bedrock and spaced at 6 foot centers. The average time for a thaw is about seven days. This dredge is the smallest one operated in Alaska. It is a flume dredge driven by a 25 H. P. distillate engine. The bucket line is open link connected and contains 33-1 1/2 cu. ft. buckets, which dump at any average speed of 19 per minute. It has a digging depth of 12 feet below water level. The flume is 82 feet long, 20 inches wide and is fitted with rail riffles. It is a good digger for its size, digging about 450 cubic yards per day. It was formerly on Warm Creek and elsewhere in the Council District. A small amount of platinum is recovered on Dime Creek, usually about 2 ounces of platinum with each 100 ounces of gold. On Dome Creek, Porter & Leonard hydraulicked on No. 6 bench; Olson Bros. hydraulicked, groundsluiced and drifted; Hegberg & Holmes drifted during the winter; and Al Hegberg, and W. L. Sutton groundsluiced

and shoveled-in. Frank McCoy installed a hydraulic plant on Sweepstake Creek during the summer and operated it for a short while this fall. Sam Smith shoveled-in on Sweepstake Creek.

Fairhaven District.

Placer mining in the Fairhaven district was done by 2 dredges with 40 men engaged; 4 hydraulic plants with 16 men; 1 scraper plant with 7 men; 6 groundsluicing and shoveling-in outfits with 6 men; 2 winter drift mines with 4 men; and 2 outfits with 7 men prospected under the lava capping on the Inmachuck River. The district is divided into the Candle and Inmachuck areas.

Candle area.

K445-15

The two dredges and property of the Keewalik Mining Co. on Candle Creek, were this year held and operated under a lease and option by the Golden Center Mines, Inc., This company operated both dredges and made an investigation of the property. The dredges dug 80,338 cubic yards of high grade placer. The No. 1, is a flume dredge driven by 2 - 50 H. P. distillate engines. It has a 3 1/2 cu. ft. close connected bucket line and can dig 16 feet below the water level. It was formerly on the Kugruk River. Most of this seasons digging was done by this dredge, the No. 2 dredge being operated intermittently in the shallow ground. The No. 2 is a distillate driven flume dredge and has 1 3/4 cu. ft. buckets in an open link connected line. The average ground on Candle Creek consists of about 12 feet of gravel, which beyond the immediate

creek bed, is covered by 6 to 9 feet of muck and moss. An average of about 4 feet of bedrock is dug. Most of the placer is frozen. The muck is first removed by stripping methods and the gravel is thawed with water. The thawing points are driven at 10 foot centers and an average thaw completed in about ten days. It is reported that tentative plans include the addition of a larger dredge, and the development of steam electric power at the coal mines on the Kugruk River for transmission to Candle Creek.

Hydraulic elevator plants were operated by L. A. Sundquist on Candle Creek; W. H. French on Jump Creek; and Nordling & Swanson on Patterson Creek. Valentine & Porter with a crew of 7 men hydraulicked on Bear Creek. Valentine & Abraham conducted development work for hydraulic mining on Bear Creek. O. A. Lundberg operated a steam scraper plant on Candle Creek with a maximum crew of 7 men. Groundsluicing and shoveling-in was done by Jno. Murphy, and Jno. Reddin, on Candle Creek; Wm. Leavitt on Gold Run; Ben Mace on First Chance; Ed Hanson, and Chas. Evern, on Quarts Creek. Winter dumps were taken out by drifting by McDonald & McIntosh on Candle Creek, and b y Henry Coffin on Kugruk River.

Inmachuck area.

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The principal mining in the Inmachuck area was done by A. V. Cordovado who operated a large hydraulic elevator plant on the Inmachuck River. About 12 men were employed. A large area of ground is mined each season, a favorable water supply being available throughout the season because of the large natural lake storage. R. Hoogendorn,

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and Escholtz Bros., each conducted hydraulic mining operations on the Immachuck River. H. Stull and Hank Fries, both continued with their placer prospecting under the deep lava capping on the Immachuck River. Encouraging reports are heard about this prospecting but so far as known no mining, other than the sluicing of the small project dumps, has been done.

Kougarok District.

Placer mining in the Kougarok district centers around its only settlement, and postoffice, Taylor, which is located on the upper Kougarok River at Taylor Creek. The district is one of the most remote of the Peninsular districts, being located in the central part and accessible only by land routes. Freight is taken into the district via Teller, where it is loaded directly onto scows from the steamers and towed up Grantley Harbor, Imruk Basin, and beyond to Davidsons Landing, at a cost of $15 per ton. From there it is hauled by team over a rough road to Taylor, a distance of 45 miles, or to near by camps, for $80 per ton during the winter and $200 per ton during the summer. Present conditions and facilities account for this high hauling charge, this freighting from Davidsons Landing to the district formerly being done for about half the present price. Should the demand justify, this road could be readily put in shape for tractor haulage and the freighting so done at a greatly reduced cost. The district is also reached by rough road and trail from Shelton, at the end of the Seward Peninsula Railroad tram, from where it is 45 miles to Taylor. Supplies are occasionally taken in this way in

small lots, mainly to camps on the lower Kougarok River, at a cost about the same as by the other route.

The main production of the district has been derived from the creek placers in the Kougarok River, above Arizona Creek, and from its tributaries, Trinity, Macklin, Taylor, Homestake, Henry, North Fork and Windy Creeks, the Dahl Creek area being considered separately. While some rich spots of placer have been mined in the district, its placers, when compared to those in some of the other districts, can not be classed as high grade. The Kougarok River contains gold bearing gravel for a length of more than 50 miles. From about Coarse Gold Creek down to Windy Creek, the river bed is bouldery, and numerous high reefs of bedrock are exposed. This portion also includes 8 miles of canyon which extends from about North Fork to within about three miles above Windy Creek. The river has cut a deep winding course into the rock formation, making many large wide bends. Some of these bends are practically a circle, only a narrow neck remaining to hold the river from cutting through. The river floor varies from 150 to 600 feet and more in width, distinct widenings occurring at and below the junctions of its main tributaries. The river has meandered over this floor so that the width of uncovered gravel generally ranges from 100 to 250 feet. Beyond this are the wide moss and muck covered flats, and points at the bends, while generally at the narrowest places, the banks rise as precipitous rock cliffs. The river gravels vary in depth up to 12 feet with high reefs cutting across at a number of places. Large slabs of rock lay mostly on top of the

exposed gravel and are found, mainly downstream from the rock cliffs from which they have fallen and have apparently been rafted and dropped there by ice. There are also channels in the river floor which at places are 4 to 8 feet lower in bedrock than the present stream. The shallow exposed gravels in the river bed are free of perpetual frost, while in the deeper ground, where the gravels are covered with 2 to 6 feet of muck and moss it is generally frozen.

The pay gravel of the creek placer does not hold within the boundaries of the present river bed but may cut across the wide flats and points beyond its banks. The best pay is therefore generally found below places where the bench placers have been eroded and reconcentrated by the present stream or in the original channel. This development of richer spots has, in part at least, given the placer a reputation of a spotty gold distribution. About seven miles of the river have been dredged above Arizona Creek, dredging being held mainly to the thawed and exposed gravels. The bedrock of the vicinity is a limestone, slate and schist, and in most instances is overlain by 1 to 4 feet of clayey sediment derived from its decomposition. Bench placers usually occur on both limits of the Kougarok and the tributaries mentioned. These bench placers are usually quite low in gold content but have been mined at various localities mainly on the Kougarok, below Taylor and Homestake Creeks near the settlement of Taylor, above Macklin to Trinity Creek, and to a less extent below the mouth of Arizona and Coarse Gold Creeks.

Many ditch lines have been dug by former operators and include such ditches as the 15 mile North Star ditch from Taylor Creek to Gold Run, the 10 mile Lane ditch on Henry Creek, the 9 mile Kougarok Mining & Ditch Co. ditch from the upper Kougarok to Taylor Creek, the 8 mile French ditch on North Fork, and many others of shorter length. These main ditches have 8 to 10 foot bottoms and can deliver water at a maximum head of from 100 to 150 feet. Most of these are now out of use but could be rehabilitated, as portions of some of them have. While the Kougarok River and some of the main tributaries carry a fair flow of water during the driest part of the season, most of the water during such periods is not available above the ditch intakes so that most of the placer operations are then unable to carry on.

The Behring Dredging Corpn. on the Kougarok River conducted the main operation in the district. During this season the company's dredge dug down to the lower limits of its dredging ground just above the mouth of Arizona Creek and there completed its dredging operation. Eleven men were employed. This combination, screen, flume, and conveyor, dredge with 54 - 3 cu. ft. buckets in a close connected line which dumps at the rate of 24 buckets per minute, is driven by two 50 H. P. distillate engines. The distillate consumption is about 200 gals. per 24 hours, the distillate costing 76 2/3 cents per gal. at the dredge. This dredge started on this river in 1915 and has since dug 6 miles of river bed from Taylor Creek down to its present location. Its dredging was confined mainly to the present river bed to a width ranging from 85 to 250 feet.

The depth of ground dug varied up to 12 feet, averaging 6 to 7 feet including the 1 to 4 feet of sediment and bedrock dug. The future of this dredge has not been decided but will probably be operated by other interests owning ground on the Kougarok. The 2 1/2 cu. ft. distillate driven Risdon dredge of the Alaska Kougarok Co. has not been operated since 1924, and is sunk and in bad condition below the mouth of Macklin Creek on the upper Kougarok. It dug about one mile of the river. There is a long strethh of river held by this company that would, no doubt, justify the installation and operation of a suitable dredge.

The Dick Creek Mining Co. (Grant & Nixon) conducted the principal hydraulic operations in the district although this property on Dick Creek lies just over the divide from the upper Kougarok River and is really located in the Port Clarence Recording Precinct. The placer here is 8 to 10 feet deep of which 5 to 6 feet is muck overburden. This is stripped and the gravel is piped into the head of a short length of sluice boxes. The tailings are stacked by a small bucket elevator, similar to a gravel loader, and is operated by a small gasoline engine. A maximum number of 7 men are engaged at this operation. Wells Bros. & Nelson installed a small hydraulic plant on Merritt Gulch near the mouth of Henry Creek where they have started mining a pay channel about 100 feet wide that follows down the steep gulch for about 3000 feet. About 8 feet of muck overburden covers the gravel which varies from a few inches to 4 feet in depth. This placer contains some good sized well rounded quartz boulders, indicating a possible high channel source. Small hydraulic operations were

conducted by Laurin Bros. on Macklin Creek; and by Jerry Sullivan near Trinity Creek.

Groundsluicing and shoveling-in was done by Isadore Fix on North Fork; Harry Gavin, and H. R. Ahrens, on Harris Creek; Mike Kennedy on Homestake; Jno. Donovan on Mascot Gulch; and Jud Chidister on Humboldt Creek. Jerry Sullivan also took out a small winter dump on the Kougarok just below Macklin Creek; small willows being the only available fuel for thawing purposes. If otherfuel was available more prospecting and drifting would be done in the district. A gasoline powered 4 inch drill was operated this summer on the Kougarok River between Arizona and Coarse Gold Creeks in prospecting that area for dredging possibilities.

According to Jerry Sullivan, he found considerable stream tin while mining for gold some 6 years ago on Humboldt Creek above Ballarat. He reports having recovered about 60 to 75 pounds of tin concentrate, besides the gold, from a cut 5 feet deep, and estimated to have contained about 100 cubic yards of gravel. An assay of these concentrates reported a 65 per cent tin content.

Iron Creek-Dahl Creek districts.

The Iron and Dahl Creek areas are within the Kougarok Recording Precinct, but being remote from the main placer areas of the district, are mentioned under their own heading. Two hydraulic plants with 5 men, and one groundsluicing operation with one man, were conducted in the Iron

Creek area. This area is reached via the Seward Peninsula Railroad tram, being 60 miles distant from Nome. Patterson, Alexander & Co., hydraulicked on upper Discovery claim on Iron Creek. The average depth of the gravel mined is 6 feet. Much of this ground was formerly mined with a scraper, the gravel is free of overburden and some large boulders up to 3 and 4 feet in maximum size are present. Bedrock is a slate and limestone. A 6 to 7 inch grade is available. The gravel now mined averages about 30 cents per cubic yard and is being mined only because of the necessity of opening up for future operations. The best pay is found on the limestone bedrock. It is claimed the ground above the present workings will average about $1.00 per cubic yard. A 3 mile ditch delivers the water, affording a 250 foot head in the pit, although this head has been reduced to 160 feet for better convenience. One field giant, usually with a 2 1/4 inch nozzle, is used for piping into the head of the 36 foot length of sluice boxes. Tailings are stacked with a giant. Two men are engaged on each shift. Mining was delayed until late in August this season due to lack of water. During a season of good water supply, 5 to 6 cuts, each 100 feet wide by 100 to 120 feet long are generally mined. B. Benson operated a small hydraulic plant on Iron Creek. S. Horton groundsluiced and shoveled-in on Slate Creek.

Five men mined in the Dahl Creek area. K. L. Craven groundsluiced on Wonder Gulch, a steep gulch tributary to Coffee Creek, about 4000 feet long. The pay averages about 70 feet in width. The deposit

averages 20 feet in depth and is all frozen. Small flat gravel, from a mere streak to 8 feet in thickness is overlain by deep muck and sod. Bedrock is a soft schist containing numerous small quartz stringers. The gold is coarse and rough. The gravel alone is stated to contain about $5.00 in gold per cubic yard, the average for the entire deposit from surface down has been a little over a dollar. The operation is dependent upon the direct run-off of the rain and melting snow for its water supply. Geo. Thompson groundsluiced on Coffee Creek. Carey & Kanari hydraulicked and groundsluiced on Dahl Creek when water was available, and Paul Rasums groundsluiced further down the Creek. Jno A. White prospected in the district.

Dahl Creek lies 12 miles beyond the end of the Seward Peninsula Railroad tram from where it can be reached over a rough road. Quartz Creek, for about 3 miles below No. 11 above claim, and the lower end of Dahl Creek, down from No. 6 above claim, formerly yielded a large gold production, some rich spots of placer being found. The geology of these placers is most unusual as the benches, and in places the creek bottoms, consist mainly of small subangular quartz fragments and finely crushed clayey quartzose material. It is believed that this was laid down over an extensive area under marine conditions, this area at one time no doubt being an inland sea connected with the Imruk Basin. A prospect shaft was sunk to a depth of 187 feet, some years ago, on the left limit bench of Dahl Creek near its mouth. It was sunk entirely in this material,

which here contained many shalls. The bottom of this shaft is below sea level. Bedrock was not reached.

Upstream from No. 6 above claim on Dahl Creek, the bedrock is a slate and schist and no pay of any consequence has been found. Below this point the creek has cut down into this quartzose material. The creek pay on Dahl Creek was from 125 to 175 feet wide and 3 to 7 feet deep and lay on a false bedrock of sticky clayey finely ground quartzose material. Most of this pay has been mined. Deep bench deposits line Dahl, Quartz, and other creeks in the near vicinity, and while having been mined to a small extent, are practically untouched as the gold content is not sufficient for profitable mining under the conditions available for a water supply. The mining of these extensive benches and the placers on Coffee Creek await development and mining but unfortunately the topography of this area is adverse to providing a suitable water supply and the area is a peculiarly dry one. The hills around Dahl and Coffee Creek are dissected and separated from the main range, and in maximum height reach to about 1000 feet above sea level. The available drainage areas are small.

Port Clarence District.

Thirteen placer operations with 34 men engaged were conducted in the Port Clarence district in 1926, and include 2 hydraulic plants with 11 men; 1 scraper plant with 3 men; 9 groundsluicing and shoveling-in outfits with 16 men; and 1 drilling operation with 4 men.

One of the principal and most interesting operations was that of Geo. Waldhelm who installed a small hydraulic plant during the season on Goodwin Gulch and started mining early in September. By the close of the season 22,500 pounds of stream tin concentrates had been produced. Eight men were engaged. According to Mr. Waldhelm, Goodwin Gulch is a short narrow gulch at the head of Goodwin Creek which empties into Lopp Lagoon and has a grade of about 200 feet to the mile. The placer in this gulch is bouldery and averages about 3 feet in depth, bedrock being a granite and schist. Prospects of nl to 4 pounds of cassorite to the pan are common and they seldom show less than two ounces. No gold is present. The cassorite occurs in the gravel in sizes ranging from a fine sand up to pieces 5 to 6 inches in maximum dimension. It varies in color, being white, buff, gray and black. Some iron pyrite is present in the placer but the concentrates can be cleaned to a high degree of purity. Tin has also been found in commercial quantities for more than two miles below on Goodwin Creek but this area has not yet been thoroughly prospected. The placer prospected on this creek ranges from practically bare bedrock to 10 feet or so in the banks, the average depth being about 5 feet, over a maximum width of 150 feet. The grade of Goodwin Creek is 50 feet per mile. Water for hydraulicking on the Gulch has been provided by a 3 mile ditch from which a half mile of pipe carries it to the one No. 1 giant under a head of 100 feet. The gravel is piped into the head of the boxes. The tin concentrates were sacked and hauled to the beach at Tin City about

2 1/2 mile distant, and from there shipped to Seattle enroute to Singapore.

This Gulch was mined for several years prior to this year, by H. J. Christensen who had about 10 men engaged in groundsluicing and shoveling-in. In 1924, 17 1/2 tons of concentrates were produced and shipped to Singapore, the returns showing a tin content of 73.8 per cent. In 1925, 389 bags of concentrates were produced and shipped, the smelter returns showing a net weight of 18,345 pounds with a tin content of 74.8 percent, reported by the smelter at Singapore to be the highest grade of tin ore received by them in many years. This tin was purchased by this smelter on December 9, 1925, for $7,775.27, on the basis of the London price of tin metal per ton of 2240 lbs., less the smelting charge. Handling and wharfage charges at Seattle, freight and marine insurance from Seattle to Singapore, interest, and 5 per cent commission charges, amounted on this shipment to $716.94. The cost of mining, preparation and shipment to Seattle, is not known. H. J. Christensen planned to do similar mining on Buck Creek this season where both tin and gold are found in the same placer, but according to recent reports these plans were not carried out.

Rice, Postlethwaite & Miller installed and operated a scraper plant on Swanson Creek. F. B. Tweet & Sons installed and operated a small hydraulic plant on Coyote Creek. Groundsluicing and shoveling-in was done by Baldridge, Thompson & McLean, on Windy Creek; Wm. McAdams on the Bluestone River; Gordon Strange, Ole Mertensen, Hans Thorsen, and Carey, Ingli & Kanari, on Cold Run Creek; and H. Johnson on Igloo Creek. Martensen,

Johnson, are also reported to have each taken out a small winter dump by drifting. J. J. O'Leary with 2 men, prospected and mined on the Bluestone River. The Bluestone River is being considered for future investigation for dredging. Duncan McLean prospected for tin in the Cape Prince of Wales area. L. J. Bryant had a small crew engaged in prospecting and drilling on Swanson Creek to determine its possibility for dredging.

Norton Bay-Hulato Region.

While no placer mining is reported to have been done in this region, Frank Shaw has for a number of years been busily engaged with the help of several other men in sinking shafts and drilling on the Ungalik River and its tributary Bonanza Creek, located near Bonanza about 160 miles east of Nome. According to reports obtained from various sources, a large yardage of high grade dredging ground has been proved on Bonanza Creek and the upper unit on the Ungalik River, with an almost equal yardage of partly proven ground indicating a slightly lower gold content. On Bonanza Creek for a length of 5000 feet and a width ranging from 150 to 400 feet, the pay gravel is 6 feet in average depth and is mostly thawed. On the upper unit of the Ungalik, pay has been found over a width of 800 to 1000 feet, the placer being partly frozen and 8 to 14 feet deep. Below on the lower unit of the Ungalik River, a very large yardage of commercial placer has been proven and an equally or greater yardage has been partly proven. Prospecting here has shown pay for a maximum width of 2200 feet,

the deposit being 12 to 20 feet deep and partly frozen. It is stated that conditions for dredging here are very favorable. The holdings reach to tide water where conditions are favorable for the lightering of supplies from ocean vessels. Judging by these reports, it appears that this area ranks as one of Alaska's greatest potential dredging fields and should become the scene of large scale dredging operations in the near future.

Kobuk District.

The Kobuk district lies northeast of the Seward Peninsula, within the Arctic Circle, and is about the most remote of the producing placer camps. There are two main fields, the Squirrel River or Kiana area, and the Shungnak area, all the streams of which drain into the Kobuk River. F. R. Ferguson & Sons with a crew of about 5 men on California Creek, and Fred Johnson with about the same number of men on Dahl Creek, carried on hydraulic mining and are the principal operations in the district. Shovel-in operations were conducted by Herman Dahl on Lynx Creek, and by James Cross on Ambler River. Louis Lloyd, Mike Touhy, and Chas. Coffin, are each reported as groundsluicing and shoveling-in on Dahl Creek. In the Kiana area, Ged Westlake, Paul Xavier, Manual Laberdero, Herman Bernhart, and Jack Gasseroff, mined on Klery Creek; and Albert Wise was on Timber Creek. Clarence Hawkins has a tractor and drill and is prospecting on Klery Creek.