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# PLACER MINING IN ALASKA IN 1924

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Written for publication in the Annual Report of the Mine Inspector (B.D.Stewart) to the Governor of Alaska.

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## Introduction

This report is written to give early publication to a review of placer mining in Alaska in 1924. It is the third of a series of annual reports by the writer to be published in the Annual Report of the Territorial Mine Inspector.

A study of placer mining in Alaska was begun by the writer in 1922 for the U.S. Bureau of Mines. Since then practically all of the more important placer districts and operations have been visited and studied. A report on "Placer Mining Methods and Costs in Alaska" has just been written, and will be published as a U.S.Bureau of Mines bulletin. It should be available for distribution about the latter part of 1925.

As there are more than fifty distinct placer mining centers in Alaska which are widely separated and scattered over the vast territory, it is only possible to visit a small number of them each season. Information concerning the operations in districts that could not be visited during the season has in most instances been obtained through conference or correspondence with operators or

others interested in those districts and is so given in this report. Information so obtained on some of these districts may be incomplete or meager, while no data may be available on others, so that the report cannot, under these conditions, be made as complete as desired.

In accordance with the laws of Alaska, the Territorial Mine Inspector annually distributes blank forms requiring statistics on accidents, production, labor, etc. These forms for placer mines include questions concerning the mining operations, and as the annual report on placer mining is a Territorial report, information received through these forms will in the future be considered as available for preparing such a report. Any information so received would, however, be discreetly used. Any confidential data, such as concern the production, costs, etc., will be so held and used for compilation purposes only, unless permission to make public such data has been specifically granted by the operator making the report by so designating it on the form, or special permission has been otherwise obtained. It is therefore hoped that the operators will give all possible aid by making as complete a report and as soon after the close of the season as possible, appending any other interesting information concerning their operations, and developments under way or planned. The usual field work will be continued, but it is only through a cooperation of this kind that it becomes possible to keep in touch with the many operations and obtain

statistics and general information pertaining to the industry for the year under consideration. With this cooperation by the operators and under the arrangement stated, these annual reports can, in the future, be made more complete, and with further descriptions and discussions of mining methods and costs, and the conditions affecting them, will be of increasing interest and benefit.

The writer was unable to return to Alaska in 1924 until early in August. On August 17 he traveled by aeroplane from Fairbanks to Eagle, a distance of 220 miles as flown. Three hours and twenty minutes were required to make the trip, which by the regular means of travel via the Yukon River would have taken ten days at the best. Had it not been for this aeroplane trip the districts beyond Circle could not have been included in the seasons field work. Conditions permitted visiting only a small part of the Forty Mile district, after which the Eagle, Seventy Mile and Circle districts were visited. Returning by trail from Circle to Fairbanks, the latter district was covered. The operations in the Hope and Sunrise districts had closed for the season before those districts could be reached; however, a trip was made to the Girdwood section.

John A. Davis of the U. S. Bureau of Mines conducted placer mining investigations on the Seward Peninsula during the season, visiting, in the order named, the Koyuk, Candle, Inmachuck, Nome, Solomon, and Council districts.

Returning via the Yukon River, he visited the Marshall district and, at Ruby, obtained information on the operations conducted in that locality. The writer is indebted to Mr. Davis ~~for making this investigation, and~~ for the information on the Marshall and Ruby operations, and for most of the data concerning the operations conducted on the Seward Peninsula during 1924.

The writer wishes to again thank the many Alaskans who have so kindly assisted him, and for the wonderful hospitality and courtesies shown him in the field, regretting that individual acknowledgment cannot be made here. Special acknowledgment is made to the U. S. Geological Survey for statistics on the placer gold production and other data; to the late Dr. Alfred H. Brooks and to S.R.Capps of the U.S.Geological Survey; to B.D.Stewart and John A. Davis of the U.S. Bureau of Mines; to the officials of Alaskan dredging companies maintaining offices in the United States, particularly in San Francisco, Calif.; and to the following Alaskans for information concerning the operations in districts not visited during the season: J.E.Fullerton of Flat; Sidney Ridge, of Hot Springs; T.J.McKinnon, of Tolovana and Tacotna; Chas. Harper and O. Hillman, of Talkeetna; Arthur Lingo, of Chickaloon; Fred Dunbar, of Chena; L.Levensaler and S.H.Palmer of Nizina; J.F.Keller, of Moore Creek.

Production

Within a period of 44 years, or from 1880 to 1923, inclusive, Alaska has produced gold and silver valued at $350,457,008.[1] Of this amount, $233,122,944 in gold and

[1] Brooks, A.H., Alaska's Mineral Resources and Production, 1923: U.S.Geol. Survey, Bulletin No. 773. Revised statistics.

more than $1,100,000 in silver is credited to the placer mines. More than $200,000,000 of this placer gold has been mined since 1900. In 1923, the placers of Alaska produced $3,608,500 in gold and $18,345 in silver; 6,015,595 cubic yards of gravel being mined, from which an average recovery of 60 cents in gold per cubic yard was made. The 25 dredges operated during 1923, dug 4,645,053 cubic yards of material, yielding an average gold recovery of 40 cents per cubic yard, or producing $1,848,596, which was 51 per cent of the placer gold output for the year. The gravels sluiced at the other placer operations yielded an average gold recovery of $1.28 per cubic yard.

Detailed or final statistics on the placer gold production for 1924 are as yet not available. The early estimate of the Alaska placer gold output for 1924, according to the advanced statement just issued by the U.S. Geological Survey, shows it to have been about $3,599,400, or about $9000 less than in 1923. The output from dredges

showed a decrease of about $285,000, while that from all other placer methods showed an increase of about $276,000. These early estimates are, however, subject to correction after the final figures are received. In this advance statement, the Survey reports that 25 dredges were operated during 1924, which produced about $1,565,000 in gold. However, this does not include 3 Seward Peninsula dredges that operated for about one month or less, and which made but a small production.

A small amount of platinum was recovered as a by-product of gold placer mining, mainly at Dime Creek on the Seward Peninsula, and some stream tin was also recovered at some of the gold placer operations in the Hot Springs district. About seven tons of stream tin were mined in the Port Clarence district near York.

Placer Mining in 1924

Climatic conditions bear a direct influence upon the available water supply at most of the Alaskan operations. The season of 1924 was, in general, a normal one in this respect, so that most of the operations were favored with larger water supplies over a longer period than was the case during the unusually dry season of 1923. The snow fall in most of the districts was unusually light during the winter of 1923-1924, and with but little rain during the spring, a general shortage of water was experienced during the latter part of June and a part of July. This condition was generally relieved about the latter part of July, after heavy

rains had set in, from which time most of the operations had a fair supply of water for the balance of the season. This did not apply to the upper Yukon River districts, however, as the operations in the Forty Mile, Eagle, Seventy Mile and Circle districts were greatly handicapped because of lack of water, a condition that was not bettered until late in August, by which time a number of the mines had been obliged to suspend operation for the season, or continue with the small amount of labor then available. The dredge in the Circle district was obliged to shut down for 20 days during July, because of a lack of water for its flotation.

In general, the season of 1924 has been a favorable one from an operating standpoint for the open-cut, hydraulic, and drift mines, and mainly accounts for the increased placer gold production by those methods. The smaller production by the dredges can be attributed mainly to the lower grade ground handled by many of them and because a number of the dredges operated a shorter season than the average, with five or six of the dredges experiencing serious delays through accidents or other causes. This decreased production by the dredges does not indicate that dredging is declining, for although the average tenor of the gravels dredged has decreased, many new dredge developments are underway and others are being planned. The future for dredging is most promising and within a few years the production of gold by dredges should be greatly increased.

In 1924, there were 28 dredges operated in Alaska; 18 on the Seward Peninsula and 10 in the interior and other districts. Those operated are as follows:

Gold Dredges Operated in Alaska in 1924

Seward Peninsula:

Nome district:

Alaska Investment & Development Co., Osborne Creek
Alaska Mines Corporation, Snake River
Bangor Dredging Co., Anvil Creek
Dexter Creek Dredging Co., Dexter Creek
Hammon Consolidated Goldfields Co. No. 1
" " " " " 2
" " " " " 3

Solomon district:

Lomen Reindeer & Trading Co., Solomon River
Shovel Creek Dredging Co., Shovel Creek
Iverson & Johnson, Big Hurrah Creek

Council district:

Crooked Creek Dredging Co., Crooked Creek
Northern Light Mining Co., Ophir Creek
Wild Goose Mining & Trading Co., No. 1, Ophir Creek

Casadepaga district:

Casadepaga Mining Syndicate, Canyon Creek

Koyuk district:

Dime Creek Dredging Co., Dime Creek

Kougarok district:

Alaska Kougarok Co., Taylor Creek
Bering Dredging Corporation, Kougarok River

Port Clarence district:

Luther Gold Dredging Co., Budd Creek

Yukon Basin

Circle district:
Berry Dredging Co., Mammouth Creek

Fairbanks district:
Chatham Gold Dredging Co., Cleary Creek
Fairbanks Gold Dredging Co., No. 1, Fairbanks Creek
" " " " No. 2, " "

Iditarod district:
Northern Alaska Dredging Co., Otter Creek
Riley Investment Co., Otter Creek

Innoko district:
Flume Dredge Co., Yankee Creek
Guinan & Ames Dredging Corporation, Upper Ganes Creek

Kuskokwim Region:

Mt. McKinley district:
Kuskokwim Dredging Co., Candle Creek

Susitna Region:

Yentna district:
Cache Creek Dredging Co., Cache Creek

Four of the above dredges were operated only for a period of about one month or less. Four or five of the dredges operated during 1924 will be idle in 1925, three of them having dredged the last of their ground. Four dredges, which were idle in 1923, resumed operations in 1924, two of them having been moved to new locations. Two new dredges were erected and operated in 1924.

The investigation of possible dredging areas was unusually active during 1924, particularly in the Interior districts. Drilling was actively conducted on Fish, Cleary, Goldstream, Engineer and Ester Creeks in the Fairbanks district; on the Nome tundra, Seward Peninsula; on Moore

Creek and the Tuluksak River in the Kuskokwim region; and elsewhere; and preliminary examinations resulting in encouraging reports were made on other creeks in the interior districts. Three new dredges are to be erected in 1925, one in the Fairbanks district, one in the lower Kuskokwim region, and one in the Innoko district. While several other new dredges are being considered for 1925, the plans are still too indefinite to be announced. Two of the dredges on Seward Peninsula that were idle in 1924 and two that have been idle for a number of years, are expected to resume operations in 1925. Two large dredging interests, the Fairbanks Exploration Co. and the Goldfields American Development Co., are most active in the investigation of the dredging possibilities in the Fairbanks district and while no announcement has as yet been made regarding the future, all indications point to an early development of large scale dredging operations.

The most important dredging operation in Alaska is that of the Hammon Consolidated Goldfields Co. at Nome. This company erected and placed in operation another 9 cubic foot electrically driven dredge and increased its Diesel power plant to 3150 H.P. Its No. 2 dredge operated from May 1 to December 7, or 220 days, establishing a new record for the working season of an Alaskan dredge.

The successful application of the method of thawing frozen gravels with water at natural temperatures has made

available for dredging many of the large areas of so-called low grade ground that were previously considered to be of little or no economic importance as dredging ground. As the natural thawed ground is being rapidly depleted, more of the dredging operations are adopting this method of thawing. In 1924, about two million cubic yards of ground were thawed by this method. Most of the operations have water under pressure available for thawing, from ditches, while several of the companies are pumping the entire supply required for thawing purposes, or are so supplementing the ditch supply during low water periods.

The usual method is to drive the thawing points to bedrock, spacing them according to the depth and character of the ground and the water supply available. The water under pressure issues from the opening at the lower end of the point and in working its way back to the surface, thaws the frozen ground around the point, enlarging this cylinder until the ground between the points is all thawed. The time required to complete a thaw normally ranges from 4 to 15 days, depending mainly on the character of the ground, the spacing of the points and the temperature of water. The points are usually set in triangular relation to each other and spaced from 8 to 16 feet apart. Water at the freezing point, or 32° F., contains no available heat for thawing and as most of the water available for thawing during the spring and

fall months is seldom more than a few degrees warmer than this, there are practically only 3 to 3-1/2 months, June, July, August, and sometimes a part of September, when the average temperature will be around 50° F. During adverse cold seasons, the temperature of the water may not average over 40 or 45 degrees, while during more favorable ones, temperatures of 65 to 70 degrees have been recorded for relatively short periods. The temperature also varies according to the source of the water. Under average conditions, it is generally considered that when the temperature of the water drops to 36° to 38° F. that its use is no longer efficient practice. The water pressures used range from 10 to 80 pounds, depending mainly on the source and the pressure available. While driving the points, high pressures up to 40 to 60 pounds are generally considered as most favorable, after which the pressure is reduced to where it is considered most efficient for that operation. Each placer deposit may have its own peculiarities. Boulders or tightly packed heavy gravel may make the driving of the points to bedrock most difficult or practically impossible, and for successful thawing the points or the water must go to bedrock. Thawed underground channels or horizons may be present, if so their occurrence and their limits must first be determined so that the thawing points can be placed to avoid them as much as possible, thereby confining the water to the frozen faces, otherwise water will escape by these easier

avenues of flow, causing the waste of much water, and may leave patches or "horses" of frozen ground between them or the points. Thawing with water at natural temperatures accomplishes a most thorough and satisfactory thaw when the points are properly placed and the method is otherwise correctly applied. The normal cost of thawing by this method ranges from 7 to about 18 cents per cubic yard thawed, and while the cost at some of the operations may be considerably higher than anticipated, this is often due to costly or inadequate water supplies, difficult conditions for driving the points to bedrock, an unbalanced operation, etc. Even so the costs were considerably reduced at several of the operations during the past season.

Hydraulic mining in most of the districts experienced a more successful season in 1924 than it did in 1923, because of the generally bettered water supply. While hydraulic mining in some form is conducted in practically all of the districts, the larger operations are located on the Seward Peninsula and in Southwestern Alaska, where conditions are generally more favorable for obtaining large water supplies under pressure, than they are in the Interior districts. The peculiar topographic and climatic conditions in the Interior are, in general, unfavorable for procuring steady and ample water supplies under pressure, so that most of the hydraulic operations there are obliged to

impound the water and use it intermittently during the greater part of an average season. Hydraulic elevators are operated mainly on the Seward Peninsula, although a small elevator is operated in the Hot Springs district and there are several smaller ones in the Iditarod. A ruble elevator is operated on Candle Creek in the Fairhaven district.

Of the mechanical operations, the steam scraper plants predominate. The largest of these operations are conducted on Goldstream Creek in the Fairbanks district, being located alongside of the Chatanika branch of the Alaska Railroad. These scraper plants had a successful season, but as practically all of the properties on this creek have been acquired by dredging interests, they will probably not resume work in 1925. A few steam scraper plants are also operated in the Hot Springs, Forty Mile, Iditarod, Innoko and Tolovana districts, and sometimes in conjunction with hydraulic operations for cleaning bedrock or stacking the tailings. The number of steam scraper plants operated is gradually growing less each season, either giving way to dredges or as in most instances, the ground that has been favorable for their profitable operation has been pretty well depleted. No dragline excavator operations were conducted during the year, except the small combination dragline - steam shovel on Caribou Creek, a tributary of the Salchaket River. Preparations were, however, made to operate two dragline excavators in 1925. The dragline excavator will soon receive greater

adoption for the mining of the smaller or isolated areas of shallow gravels lying upon an easily dug bedrock and under conditions whereby the pit can be drained, but which would not justify the installation of a dredge. They require less power, labor and maintenance in their operation than a steam scraper plant. They can be readily moved and placed in operation, and with a long boom, the excavator has a large digging radius, and can deliver its load directly to the sluices without the use of any intermediate conveying device. When operated under suitable conditions, it will handle a larger yardage and naturally at a lower cost than the steam scraper.

Drift mining was conducted mainly in the Fairbanks, Tolovana, Hot Springs, and Ruby districts and to a lesser extent in the Circle, Forty Mile, Chandalar, Koyukuk and other interior districts. But little of this mining was done on the Seward Peninsula where the principal operations were restricted to the Koyuk district. Most of the drift mines are now conducted on a very small scale, and consist mostly of "sniping" out the pay left by the earlier operations. There are but few large blocks of virgin ground remaining that will support profitable dirfting. A large block of ground has been opened up at the mouth of Little Eldorado Creek in the Fairbanks district and some of the modern methods of underground mining have been adopted. The frozen gravel and bedrock face is drilled with air drills,

and without the usual procedure of steam thawing, is blasted down, scraped into a car by a slush scraper operated by an air hoist, and conveyed to the surface and sluiced in the customary way. The success of the method is proven and will probably be adopted elsewhere where similar conditions exist that are necessary for its success. Drift mining, like some of the other methods of placer mining, is passing with the depletion of the richer and more favorable gravels, and on many of the creeks has given way to dredging. The gold production by the drift mines during 1924 was probably somewhat greater than during the previous year, partly due to the more favorable conditions for sluicing the dumps and some high grade gravels mined at a number of the properties.

The usual number of small ground-sluicing and booming operations followed by the shoveling-in of the remaining gravel and the bedrock, were conducted, although the average gold production by such operations is small. Several operations after removing the overburden shoveled the gravel and bedrock into wheelbarrows, wheeling it to a self-dumping bucket and carrier operated by a small steam hoist, which conveyed it to elevated sluices, thereby providing the necessary grade for the sluices and dump room. The unusually low water in the Forty Mile River and its tributaries afforded an opportunity to work the richer gravel bars which was profitably done by a few of the prospectors.

Since 1915, when gold was first discovered in the

Tolovana district, no new gold discoveries of any real consequence have been made in Alaska. In 1919, gold was discovered on the Stuyahok River and some of its tributaries, in the Marshall district, and while a small number of miners have been shoveling-in in that vicinity since then, the reports from there have not been very encouraging. Each year numerous "discoveries" are reported, but most of these are on well-known creeks that had formerly been well prospected and mined, so that these discoveries were usually only of importance to the discoverer. Further prospecting on the Sisskala Creek, a tributary of the Dolbatna River about 5 miles north of Melozi on the Yukon River and that vicinity has not met with any success. During the winter of 1923-1924 a discovery was made on the benches on Tenderfoot Creek in the Richardson district and good pay was reported to have been found on No Grub and French Creeks, tributaries of the Salchaket River. These created a small rush from Fairbanks and other nearby interior places, but nothing of consequence has developed. Some gold was found on the North Fork of Big Mud Creek in the Cosna-Nowitna district, where "Ruby" Johnson is reported to have sunk a 130 foot shaft, striking 5 feet of gravel carrying 1 cent in gold to the pan. Fifteen or more men are reported to be prospecting in that section this winter. Gold was discovered late in the season of 1924 on Gold Pan, Grady, Dome and several other creeks near Deese

Lake in the Cassiar country, British Columbia, causing quite a stampede and much staking. Coarse gold and shallow ground is reported. While this district is outside of Alaska, it is best reached via Wrangel, Alaska, and has attracted many Alaskans.

Transportation

Transportation facilities between the States and Alaskan ports, and to the various points in Alaska remain practically the same as in 1923. Ocean, rail, river and overland freight rates remain the same and were given in the 1923 report. Some of the benefits that are being derived from the completion of the Alaska Railroad are reflected in the new mining development and a continuation of many of the operations in the interior districts and those affected by it. The two river steamers operated by the Railroad between Nenana and Holy Cross maintained regular weekly service during the season. Privately owned launches carrying mail, passengers and some freight operated between Holy Cross and St. Michael, with others running from Nenana to points up the Tolovana and Kantishna Rivers, and from Yukon River points touched by the steamers of the Alaska Railroad to points on the Koyukuk, Innoko and Iditarod Rivers. The boat service between St. Michael and Nome was about the same. Transportation conditions on the Upper Yukon River were exceptionally poor in 1924, particularly for passengers. The service from Seattle to Bethel and the river service between Bethel and

Kuskokwim River points up to McGrath and Tacotna has been improved. The Alaska Road Commission did much commendable work on the many road projects under way, especially when it is realized that one highway project from the Coast to the interior receives practically half of the only too inadequate annual appropriation for road and trail maintenance and construction. The balance being allotted for the maintenance of all the others and for the numerous important projects under construction, provides only a same sum for each. This has greatly increased the cost of the work and permits only a few miles of road to be constructed each year. The road being constructed between Chatanika and Circle, a distance of about 130 miles, should be given special consideration and be pushed to an early completion. Connecting, as it will, the Fairbanks district with the Upper Yukon River, a vast territory containing numerous placer deposits now too isolated to afford exploitation, will be made accessible, and trade and travel now going via Canada will be diverted to the Alaska communities and the Alaska Railroad. Other important roads under construction, as from Talkeetna to Cache Creek, Tacotna to Ophir, Ruby to Ophir, Eagle to Forty Mile district, and others, that are of immediate need to those mining districts should be completed before further projects of lesser importance are considered, for it is mainly the mining industry that supports most of

the interior and Seward Peninsula communities.

The practical use of aeroplanes to facilitate travel and the delivery of the mail in Alaska, was most successfully demonstrated in 1924. Planes were used at Ketchikan and Nome in connection with mining activities, but most of the flights were made from Fairbanks to points within a radius of about 250 miles. About twenty-five trips were made from Fairbanks to Tolovana, carrying mining men and provisions, and several trips were made with light mining machinery. Less than an hour was required to cover this distance, which would otherwise require 5 or 6 days of hard trail hiking. Flights were also made with passengers from Fairbanks to the Salchaket, Circle, Eagle, Kantishna, Kuskokwim and other districts. Trips that required only a few hours by aeroplane would in most instances have taken as many weeks by the usual means and route of travel. A government plane made ten trips during the winter with the mail from Fairbanks to McGrath. The aeroplane company at Fairbanks plans to extend its service during 1925 and other communities plan to establish plane service. A small subsidy by the government would hasten this development and so help in remedying many of the delays and difficulties now encountered in traveling to and from the remote districts, and which would be the quickest means of developing the country. Aeroplane service must be given serious consideration in the interests of humanity, for there are many

localities far distant from the nearest doctor where the aeroplane is the only practical means of providing urgent medical care to the seriously stricken.

The placer mining conducted during the year in the various districts with brief descriptions of the placers mined, the equipment, methods of mining employed, etc., at the more representative operations, particularly those in districts visited during the season under consideration, are given in the following "Review by Districts."

## Review of Placer Mining by Districts

### Southeastern Alaska

The placer gold output for the year from the southeastern Alaskan districts was very small, placer mining being restricted to a few small operations conducted mainly in the Juneau and Porcupine districts, and to a little beach mining at Lituya Bay, Yakataga and Yakutat. A hydraulic plant was operated by a crew of four in the Silver Bow Basin back of Juneau and several small open-cut operations were conducted elsewhere in that region. Placer prospecting was done on Montana Creek and several of the other Creeks flowing into the Lynn Canal. Several operations were working over the mill tailings at the Treadwell property, employing placer mining methods for their excavation. Preparations are being made in the Porcupine district, reached via Haines, to resume the extensive hydraulic operations on Glacier Creek. Several shovel-in operations were also conducted in that district.

### Copper River Region

#### Nizina District

The principal operations in this district are the large hydraulic plants on Dan and Chititu Creeks. The accessibility, general economic conditions, the character of the deposits mined and the hydraulic mining methods

employed at these operations were discussed in the 1923 report. The Nizina district produced about $110,000 in placer gold in 1924.

Dan Creek

KH 81-16 The Dan Creek Hydraulic Mining Company ~~has~~ acquired the property of the Dan Creek Mines Company and conducted the large hydraulic operations on that property along similar lines as the former company. A method of piping over the side of the boxes is employed at the creek operations. The sluice boxes are set below bedrock and working downstream from the head of the block of ground being mined, the material is piped over the sides of the boxes, the operation alternating from one side of the pit to the other. In 1924, the company employed an average of 18 men, the maximum number being 24. Twenty-two days were spent on deadwork. The active mining season extended over a period of 93 days during which hydraulicking was conducted for 48 twenty-four-hour days. The average depth of the deposit mined was about 12 feet, 180,200 square feet of area or 83,948 cubic yards being mined during the season. The operating costs were 40.6 cents per cubic yard. The creek deposit mined contains an unusually large number of large boulders. These are "bulldozed" with powder and put through the sluices. The cost of the explosives used at this operation during the season was $4785, or 5.7 cents per

cubic yard mined. This method of bulldozing will be dispensed with next season when the boulders and such bedrock as may require blasting will be drilled with an air drill and then blasted, an operation which it is considered will materially reduce this item of cost. A Pelton wheel and a one-drill air compressor will be installed for the purpose. Included in the above operating data are the results of a small operation conducted on the right limit bench, where 2 to 3 men were employed and where an area of about 20,000 square feet averaging about 8 feet deep was mined with very satisfactory returns.

Chititu Creek

K-87-11 The principal operations conducted on Chititu Creek were the two hydraulic operations of the John Andrus Company. These operations use a similar method of hydraulicking as at Dan Creek, although both of them started hydraulicking at the lower end of the purposed pit and the advance made upstream. A total of 99,180 cubic yards of material was mined, or 297,540 square feet averaging 9 feet deep, at an operating cost of 51 cents per cubic yard. The season was started on May 1 and closed October 8. The clean-up started September 2 and was completed September 18. An average of 35 men were employed. It was the most successful season this company has experienced. A. Powell with one K-87-10 man hydraulicked on the left limit bench of Rex Creek, a tributary of Chititu Creek. C.Cayouette did a little drift

mining on the Dan Creek benches, and Martin Harris continued his prospecting on lower Young Creek.

## Chistochina District

The principal placer mining in this district was conducted at the large hydraulic operation on Slate Creek, and the hydraulic plant on the Middle Fork of the Chistochina River. Several small open-cut operations were also conducted in other parts of the district.

## Nelchina District

The Nelchina district, while within the Chitna recording precinct, is best reached from Chickaloon at the end of the Matanuska Branch of the Alaska Railroad. It lies 40 miles northeast of Chickaloon, from where it is reached only by trail. Placer mining was conducted on Alfred and Albert Creeks by ground-sluicing and shovel-in methods. The finding of some rich pay on the benches of both Creeks was reported.

Andrew Christophersen, with one man, shoveled-in for 8 days and recovered 57 ounces in gold. Ballinger and Cameron shoveled-in on both Albert and Alfred Creeks, reporting favorable clean-ups. A.W.Hall shoveled-in on Alfred Creek. The development work started in 1923 on Alfred Creek by the Alaska Placer Mines Association was not continued in 1924.

Kenai Peninsula Region

Including the Hope, Sunrise and Girdwood districts, there were five hydraulic and several ground-sluicing and shovel-in operations conducted during the season. The principal operation was that of Erickson, Totland and Johnson on Crow Creek. The total gold output from these districts for the season is estimated to have been about $32,000.

Girdwood district

K185-67 Erickson, Totland and Johnson, with a crew varying from 10 to 17 men, hydraulicked on Crow Creek, taking out four pits. A total of 150,000 square feet of bedrock was mined, or about 50,000 cubic yards. The depth of the deposit varied from 7 to 14 feet, the average depth being 9 feet. The season's work started June 1 and closed October 1. Sixty-nine 20-hour days were spent in hydraulicking, the balance of the season being spent in preparatory work, setting up and cleaning up. The operating cost was 37 cents per cubic yard. The system of hydraulicking generally used here is to work two paralleling pits at a time, so that one pit can be used as a by-pass for the excess creek water, while hydraulicking is conducted in the other. The hydraulicking alternates from one to the other, the boulders in the idle pit in the meantime being drilled with air drills and blasted. The method of piping into the head of the boxes is used. Each pit has its separate line of sluice boxes. The tailings from both

pits are stacked by the one stacker giant. The area mined in 1924 was in a narrow part of the creek valley, so could only be mined one pit wide.

Axel Lindbloom conducted his usual ground-sluicing operations on Lower Crow Creek, where he works alone.

Sunrise district

K95-141 The principal operation conducted in this district was the hydraulicking on the benches of Canyon Creek just below Mills Creek, where Joe Wilson with a crew of 3 men had a very successful season. The ground mined averaged 20 feet in depth. K95-139 Bob Michaelson, working alone, hydraulicked on Mills Creek. The Canyon Creek Dev. Co., on Canyon Creek, was inactive.

Hope District

K95-111 Matheson Bros., with 4 or 5 men, took out three pits by hydraulicking on Resurrection Creek and also did some work on a new ditch line. Ed Belmont K95-118 hydraulicked on Bear Creek, where, however, a large slide suspended operation for a considerable part of the season.

Knik District

K B5-34 B5-39 B5-40 B5-48 A small outfit was taken into the Metal Creek property on Metal Creek, a tributary of the Knik River, east of Anchorage, and a small pit was mined mainly to determine the merits of the ground. Four men were employed. The owners state that this ground averages about 12 feet deep, the stream grade is 3 per cent, the gold is coarse and it

is expected that the deposit will yield about 50 cents in gold per cubic yard, and an abundant supply of water from the glacier fed creek can be made available at high head. It is planned to install a large hydraulic plant in 1925.

## Talkeetna Region

### Yentna District

The operations in the Yentna district experienced a good average season, for while there was some water shortage up to the latter part of July, a steady supply was generally available after that. The wagon road from Talkeetna, on the Alaska Railroad, has been completed to Peters Creek at Mile 23. It has not been announced if this road would be continued via the summit and Cache Creek, or up Peters Creek. About 95 men were engaged in placer mining, which includes the ore dredge, 14 hydraulic plants, four of which are operated on a small scale with canvas hose outfits, and six ground-sluicing or shovel-in operations.

Cache Creek and tributaries

W+75'05 The largest operation and main producer in the district was that of the Cache Creek Dredging Company, on Cache Creek, which operated its 6-1/2 cubic foot electrically driven dredge, handling 224,897 cubic yards of material at an operating cost of 32.46 cents per cubic yard. A royalty was also paid of 5.55 cents per cubic yard, and is not included in the above cost. The average depth dredged was

8.7 feet. In 1923, the operating cost was 19.24 cents, the dredge digging 307,044 cubic yards. The hydroelectric power cost in 1924 was $44.91 per day, or 3.02 cents per cubic yard dredged. Dredging started on May 13 and closed October 11, or a period of 151 days, the dredge realizing an operating time of 83 per cent. The breaking of a spud caused the dredge to be shut down for 12 days in June. This dredge and its operation was described in the 1923 report as were some of the more representative hydraulic operations in the district.

K175-40 Dick O'Rork, with four men employed, hydraulicked the shallow creek gravels on Upper Cache Creek.

K175-37 Joe Anderson, with nine men, conducted very successful hydraulic operations on Falls Creek, the creek gravels mined averaging about 9 feet in depth. The gravels average from 25 to 35 cents per square foot, with some spots over $1.00 per square foot, and are generally considered to be the richest being mined in the district.

K175-56 O. Hillman, with seven men, hydraulicked near the mouth of Dollar Creek. The operation was more of a prospecting nature for a narrow cut about 10 feet wide was hydraulicked up the creek for about one mile. The gravel averages about 10 feet deep, lying on a clay bedrock. No mining was done on Upper Dollar Creek.

K175-47 J. Murray conducted hydraulic operations on Nugget creek from June 6 to September 25; taking out 14 small

pits, or a total of about 100,000 square feet, or about 22,000 cubic yards. The average depth of ground mined was 6 feet, which includes about 1 foot of soft coal formation bedrock. The operating cost was about 5 cents per square foot or about 23 cents per cubic yard. Small pits are mined, ranging from 70 to 80 feet in width to 90 or 100 feet in length. Three to four lengths of sluice boxes, 28 inches wide, are set on a 7-inch grade paved with longitudinal steel-shod riffles. One giant with 3-inch nozzle set on top of the bank pipes the material into the head of the boxes. Boulders are removed and piled by hand on cleaned bedrock. Tailings are stacked by a giant with a 3-inch nozzle. A loss of fine gold is reported. Six men were employed, three 8-hour shifts being worked. From 5 to 9 days are required to make the set up, hydraulic, and clean-up a pit. The boxes are taken up, moved, and reset for another pit in 24 hours.

K+15-31 Hugh Price, with 2 men employed, hydraulicked on Short Creek; Al Wolf, K+15-58 with 4 men employed, hydraulicked shallow creek gravels on upper Thunder Creek; N.Balabanoff and partner shoveled-in on Nugget Creek; and Geo. Tomac shoveled-in on Falls Creek.

Peters Creek and tributaries

K+15-31 On Peters Creek, the Yentna Placer Mining Assn., with five men, hydraulicked creek placer by piping into the head of the boxes; Elmer Carlson, with one man, conducted hydraulic operations; and R. Smith with two men and a hose

outfit did similar mining. Frank Jenkins, working alone on Gopher Creek, hydraulicked in the Creek and on the bench; Chris Hammerschmidt with one man ground-sluiced and hydraulicked the deep bench on Bird Creek; Rice, Cooper and Dwyer conducted hose hydraulic operations on the Willow Creek benches, and Cast and Mack with two men did similar mining in the creek placers on Poorman Creek.

Gray, Bedar and Vest shoveled-in on Clear Creek and Dick Francis with one man operated a hose hydraulic plant on Long Creek.

Camp Creek and tributaries

The section known as the Fairview district lies about twenty miles west of Cache Creek. It is reached from Cache Creek by rough pack trail or via the Yentna River and Clearwater Creek from Susitna. A small number of prospectors have been prospecting and shoveling-in on Lake, Camp, Mills, Twin, Pass, Cottonwood, and other Creeks, and their short tributaries, for many years, making a small production. A few others were attracted to this locality during 1924, and while the district has not been visited by the writer, a number of these prospectors report favorable conditions for dredging and hydraulicking. In general, it is reported that the gravels are shallow, ranging up to 12 or 14 feet in depth, much of the gold is coarse, and the gravels are of an average size. Apparently the development of this district has been handicapped because of the present difficult accessi-

bility.

Matt Hugar and Ben Grier shoveled-in and prospected on Mills Creek; as did P.J.Collins on Twin Creek; Frank Irvin on Pass Creek; H.Bahrenberg on Camp Creek; F. Zorn on Lake Creek; and there were probably several others prospecting in the districts that have not been reported.

## Valdez Creek District

The McKinley Placer Mining Company, on Valdez Creek, suspended its large hydraulic operations early in the fall of 1923, and, during the following winter, drift mined the deposit. While the reports from this district are very meager, it is reported that this company conducted no work during the 1924 season. L.S.Wickersham on Valdez Creek and Pete Monohan on White Creek are reported to have done a little mining.

## Kantishna District

Placer mining in the Kantishna was conducted mainly by Fink and Hamilton with several men employed, who operated the hydraulic plant of the former Kantishna Hydraulic Mining Company on Moose Creek. It is reported that the Mt.McKinley Gold Placers, Inc., on Caribou Creek have retired as an operating company and have leased their holdings and was so operated during the season. Several automatic dam and shovel-in operations were conducted elsewhere in the district.

## Bonnifield District

Very little placer mining was done in the Bonnifield district during 1924. The Gold King Mining Company on Gold King Creek employed from 6 to 8 men putting in a bedrock drain and working on the Mystic Creek ditch. There was very little water available for hydraulicking until late in August. This company did no mining this season. Elmer Gustafson conducted an automatic dam and shovel-in operation on Grubstake Creek, and Mike Trip hydraulicked on the bench on the Totalanika.

## Yukon Basin

### Forty Mile District

The Forty Mile district lies just west of the Canadian boundary, receiving all of its supplies via Canada. While a portion of this district lies within 40 miles of the Yukon River, it is a most inaccessible one and consequently freighting rates are high. The freight rates from Puget Sound ports via Skagway and Dawson to Forty Mile, Eagle and Circle were reported in the 1922 report and range from about $60 to $90 per ton. During last year, about 250 tons of supplies were freighted into the Forty Mile district. About 100 tons of this freight went in via Eagle, of which about 80 tons were hauled during the winter. About 150 tons, including some mining equipment, was freighted in during the winter via the town of Forty Mile. The wagon road from

Eagle has been completed to about Mile 13 and several miles beyond have been graded. From Gravel Gulch, or Mile 12, the summer freight is taken on to the various creeks by pack horses over a poor trail.

Freighting Rates from Eagle to Forty Mile Camps

| Eagle to | Distance from Eagle- Summer Route. Miles | Summer Rates per Pound in Cents | Winter Rates per Pound in Cents |
|---|---|---|---|
| Gravel Gulch | 12 | 3-1/2 | - |
| Liberty Creek | 29 | 7 | - |
| Dome Creek | 38 | 10 | - |
| Steel Creek P.O. | 52 | 14 | 4 |
| Jack Wade P.O. | 67 | 19 | 6 |
| Franklin P.O. | 81 | 25 | 6-1/4 |
| Chicken P.O. | 91 | 25 | 6 |

A different route is traveled during the winter, making the distance much longer to most of the camps. The above winter rates are for staples, the rates on perishables averaging about 1 cent more per pound. During the summer, the trip from Eagle to Chicken P.O. takes four days.

Winter Freighting Rates to Forty Mile Camps via Forty Mile

| Forty Mile to | Distance from Forty Mile Miles | Rate on Staples Cents per Pound |
|---|---|---|
| Steel Creek | 40 | 2-1/2 |
| Jack Wade | 55 | 4-3/4 |
| Franklin | 78 | 4 |
| Walkers Fork | - | 4 |
| Chicken | 110 | 5 |

The average scale of wages paid in the Forty Mile is $5.50 for 9 hours with board. The cost of boarding men ranges from about $2.50 to $3.50 per day per man. There is plenty of fair timber on most of the creeks. Rough lumber sawn at McKinley Creek sells for $100 per thousand board feet at the mill.

Nearly sixty different placer operations are conducted in the district on over 20 different creeks and at numerous places on the Forty Mile River. Typical of the Forty Mile district are the large number of one-man operations, most of which are conducted by old prospectors who have been shoveling-in or drifting a small area each season. Many of these men are still working the same claims located by them in the early days of the camp. The annual production of gold by each one, in most cases, amounts to only a few hundred dollars.

A list of the operations conducted during 1924 follows:

| Operator | Creek | Type of Operation | No.Men Working |
|---|---|---|---|
| Jno. Ostergard | Napoleon | Shovel-in,winter drift | 1 |
| Eric Jones | " | Winter & summer drift | 1 |
| L.G.Michaels | #45 Pup | Ground-sluicing & shovel-in | 1 |
| Chas. Anderson | Forty Mile R. | Winter drift | 1 |
| F.W.Tomlinson | Franklin Gulch | Ground sluice & shovel-in | 1 |
| Geo. Mock | " " | " " " " | 1 |
| John Roberts | " " | " " " " | 1 |
| T.N.Spaulding | " " | Shovel-in | 1 |
| Jno.Fitzpatrick | Forty Mile R. | Winter drift | 1 |
| Geo. St.Florino | Ingle Creek | Gr.Sluice & Shovel-in,winter drift | 1 |
| Wm.Kirkpatrick | Forty Mile Cr. | Ground Sluice & Shovel-in | 1 |
| E. Johansen | Ingle Creek | " " " " winter drift | 1 |
| Fred. Gruber | " " | " " " " " " | 1 |
| Lee Steele | " " | Ditch construction | 2 |
| Jno. Clark | " " | Ground sluice & shovel-in | 1 |
| G.E.Traub | Chicken | Shovel-in & winter drift | 2 |
| E.W.Starbird | " | Shovel-in | 1 |
| Frank Barrett | " | " | 1 |
| Chris. Larsen | " | Ground sluice & Shovel-in | 1 |
| Frank House | " | Summer and winter drift | 1 |
| James Milo | " | " " " " | 1 |
| McMahon & Van Hook | Lost Chicken | Ground sluice & shovel-in drift | 2 |
| Purdy & Lysell | Myers Fork | Open cut | 2 |
| Ole Tweeden | " " | Ground sluice & shovel-in,wint. dr. | 1 |
| James Meese | Forty Mile R. | Ground sluice & shovel-in | 1 |
| Chas. Westphal | " " | " " " " | 1 |
| Fred Hostetter | " " | " " " " | 1 |
| Emil Kruger | " " | " " " " | 1 |
| Frank Watson | " " | " " " " | 1 |
| Henry Seymour | " " | " " " " | 1 |
| Geo. Brost | " " | " " " " | 1 |
| Geo.Gaidus | Steel Creek | Not mining now | |
| Larsen & Nelson | Moose Cr. | Ground sluice & shovel-in | 2 |
| Jno. Burke | Flat Cr. | Hydraulic (hose) | 1 |
| Chas. Torsell | O'Brion Cr. | Hydraulic & winter drift | 1 |
| Sam Samuelson | Walker Fork | Open cut | 1 |
| Alex Gustavesen | Canyon Cr. | Ground sluice and shovel-in | 1 |
| P.W.Wagner | Wood Creek | " " " " | 1 |
| Frank Montgomery | Squaw Creek | " " " " | 1 |
| Madigan & Berg | " " | Gr.sluice & shovel-in,winter drift | 2 |
| A.A.McCandless | Jack Wade Cr. | Hydraulic & scraper | 13 |
| T.E.Phillips | " " " | Winter drift | 1 |
| Pat Carroll | " " " | Winter drift & shovel-in | 1 |

| Operator | Creek | Type of Operation | No.Men Working |
|---|---|---|---|
| James Morris | Jack Wade Cr. | Summer & winter drift | 1 |
| Walter Hunt | " " " | Shovel-in & winter drift | 1 |
| Tom Lynch | " " " | Shovel-in | 1 |
| Jno. Melandt | " " " | Ground sluice & shovel-in | 1 |
| Jno. Lambert | " " " | Ground sluice & winter drift | 2 |
| Andrew Lassen | " " " | " " " " " | 1 |
| Paul Saupe | " " " | Winter drift | 1 |
| C.L.Johnson | " " " | Summer & winter drift | 1 |
| Geo. Pilz | " " " | Ground sluice & winter drift | 1 |
| Patterson & Arnold | " " " | Shovel-in and winter drift | 2 |
| Ed. Eckstein | Butte Cr. | Winter drift & shovel-in | 1 |
| J. B. Powers | Twin Cr. | Hydraulic | 2 |
| Dome Gold Corp. | Dome Cr. | " | 7-20 |
| H.D.Cowden | Walkers Fork | (Ditch construction, etc. (Plans scraper operation 1925 | 10-15 |

The Forty Mile district experienced an unusually dry season, particularly so on Dome, Jack Wade and several other of the creeks. While rain often fell on the divide on all sides of these creeks, very little was received by them. The low stage of water brought out a number of miners who did very well mining the shallow bars at different places along the Forty Mile River. The principal mining operations were those of the Dome Gold Corporation on Dome Creek, a tributary of O'Brien Creek, and A.A. McCandless on Jack Wade Creek. H.D.Cowden employed from 10 to 15 men during the season on ditch construction and preparatory work on Walkers Fork and plans to hydraulic and operate a steam scraper in 1925.

Ex 60-126 The Dome Gold Corporation operated its hydraulic plant on the upper bench on the right limit of Dome Creek. While there are three tiers of benches at this point, the

upper bench has been found to carry the richest gravel. This upper bench is elevated about 150 feet above the creek level and ranges from a few feet in depth along the rim to a depth of 67 feet at the innermost working face about 350 feet back from the rim. The deposit is frozen and consists mostly of light flat gravel with much sand, covered by moss and a few feet of soil with practically no muck. Bedrock is a soft schist, interbedded with quartzite, and this formation contains many small short veins and blobs of quartz. While some nugget gold is present, one nugget being found worth $87, most of the gold is flattened and fine and some of it is coated with iron oxide. Most of the gold occurs near bedrock.

Water for hydraulicking is brought to the operations from the head of Dome Creek through an 8-mile ditch. This ditch was constructed 4 feet wide at the bottom and about 9 feet at the top on a grade about 5.2 feet per mile, and will handle about 1200 miners inches. Due to the small watershed and the peculiar dry area which this creek drains, the hydraulic operations are seriously handicapped during most of the average season through lack of water. During an average season there is generally enough water to operate two giants with four-inch nozzles for a month or two, after which it must be impounded in the ditch and used intermittently. The 1924 season has been an exceptionally dry one on this creek, for during most of the season, the use of water for

hydraulicking was restricted to 2 or 3 splashes during the 24 hours for periods of from 1 to 1-3/4 hours each. A 1200 foot pipe line reducing from 24 inches to 18 inches in diameter, carries the water from the ditch to the top of the pit. Twelve-inch pipe is used in the pit where the average head of the water is about 150 feet. Water for ground-sluicing off the upper barren gravels is mostly obtained from short local ditches and is only available for a short period.

The present pit was opened up in 1923. The system of opening a pit is to drive adits well in bedrock from the rim of the bench to a point about half way back into the bench. A connection is then made to the surface and the gravel hydraulicked in until a small pit is opened. Deep rock cuts may also be used where adits are not required. Formerly the giants were set up in front of the gravel face for piping it down. While this still holds to some extent, the mining is now mostly done by setting up about six giants at different places on top of the gravel and driving it to the boxes. Usually only two giants with 3-inch nozzles can be operated at a time, although during periods of more favorable water supply three giants with 4-inch nozzles may be used.

From 18 to 20 lengths of sluice boxes are installed in the tunnel or rock cut. These boxes are 3 feet wide, set on a 10-inch grade and paved with block riffles. The gold recovery is poor for the large amount of fine material present, along with considerable black sand, overloads the

boxes and riffles especially during a period of low water supply. The flat gravel, no doubt, also "rafts" gold through the boxes. The use of rail riffles, an undercurrent, and mercury would improve the gold saving, provided the flow to the boxes was carefully regulated. Tailings are run into the creek below, but as the small amount of water in the creek during 1924 was insufficient to carry them off, they built up a high dam across the narrow valley.

The pit being mined was about 220,000 square feet in area when seen in August, 1924. About 130,000 square feet of this was mined in 1923 to an average depth of about 22 feet. While handicapped by a serious water shortage, the company expected to mine about 100,000 square feet, averaging about 30 feet in depth, during 1924. The working face being 67 feet at the deepest place, had become too deep for profitable operation under the existing conditions. During periods of good average water supply, the operating costs are stated to be about 20 to 25 cents per cubic yard. The company usually employs a crew of 15 to 20 men, which was reduced to 7 during the dry period.

K+BC-125 A. A. McCandless operated his combined hydraulic-steam scraper operation on Jack Wade Creek, employing from 12 to 13 men. The water shortage necessitated doing most of the mining with the steam scraper. Lee Steele had several men at work on Ingle Creek, mainly on ditch construction. It is generally reported that Mr. Steele is planning

a dredge operation on Mosquito Fork above Chicken Creek and the lower part of Ingle Creek, the ditch being constructed for the development of hydro-electric power.

## Eagle and Seventy Mile Districts

The Eagle and Seventy Mile areas are both within the Eagle recording precinct, as are Fourth of July Creek, Washington Creek, Charley River, and most of the North Fork of the Forty Mile River and its tributaries. Eagle P.O. is the supply point. The general water shortage was experienced until August, after which time most of the hydraulic operations had a steady head. The prevailing wage scale ranges from $5 to $6 for 10 to 11 hours work plus board. The cost of boarding is from $2.50 to $3.50 per man day. About 45 men were engaged in mining in the Eagle, Seventy Mile and Fourth of July Creek areas. No mining was done on Washington Creek. Several prospectors were in the Charley River area. Most of the mining is conducted on the tributaries of the Seventy Mile River.

### Eagle Area

The only mining done in the Eagle area was conducted at the five automatic dam and shovel-in operations on American Creek and its tributary, Discovery Fork. Seven men were engaged in this work. These operations are within 8 to 11 miles south of Eagle P.O. and are reached from there by a good wagon road which follows these creeks. J.J.Samis and

one man, Ed Olson and one man, and F. Omo, mined on Discovery Fork, and H . Ross and Gus Fritch mined on American Creek.

Dams are constructed across the narrow creek and the water is impounded back of them. These dams are equipped with a gate of the swinging type and when the water back of the dam reaches a certain level, it automatically trips the gate, releasing the water which rushes and booms down the narfow cut, usually 12 to 16 feet wide, carrying the overburden and gravel with it. After the water back of the dam has all run out the gate swings back to its original position and the cycle is repeated. After repeated "booms", the sluice boxes are installed in the cut and the remaining gravels and a foot or so of bedrock are shoveled-in. At the Samis operation, the deposit averages 6 to 8 feet in depth. A cut 12 to 16 feet wide, varying from 200 to 600 feet in length, is "boomed" practically to the schist bedrock, after which 1 to 2 feet of the bedrock is picked up and shoveled into the boxes. The average length of each "splash" of water is about two minutes, the frequency being most variable, ranging from 1 every 3 or 4 minutes to 1 or 2 a day. In a good average day of 10 hours one man will shovel-in a "box length" or a 12 foot length for the width of the cut. Barite pebbles are found on this creek.

At the Ross operation, the deposit is from 6 to 8

feet deep, the grade of the creek at this point being 5 to 6 inches to 12 feet. An 8-foot automatic swing gate is used in a dam about 80 feet long. A dam and gate of this size costs from $250 to $300 and at this operation is good for about six cuts. The deposit is boomed down to a foot or two of gravel and this and up to 6 inches of bedrock is shoveled-in. One man shovels-in, scrapes, and cleans with a brush, about 100 square feet per day. The cost of mining the entire depth of the deposit is $75 per box length or about $2 per cubic yard. One cut about 12 feet wide and 500 to 600 feet long is the average season's work for this man.

The cost of this kind of mining on Discovery Fork is generally less for the stream grade there is steeper, permitting booming practically to bedrock.

Seventy Mile Area

Five hydraulic operations, employing 20 men, and six ground-sluicing and shovel-in operations by lone miners, were conducted in this area. The district is reached by trail from Eagle, the operations being located between Fox Creek, which is 15 miles from Eagle, and Flume Creek at 63 miles. No regular freighting is conducted, as most of the miners do their own. Winter freighting from Eagle to Crooked Creek, or 23 miles, has been done for 3 cents per pound and to Alder Creek, 58 miles, for 8 cents during the winter and 12-1/2 to 15 cents during the summer. Practically all freighting is done during the winter. The Seventy Mile

River and many of its tributaries are bordered with bench placers. These benches are known to be gold bearing and at places have supported profitable operation. There are from 2 to 3 tiers of benches along both limits of the Seventy Mile River, all of which are well elevated above the River. These bench deposits range from 6 to 30 feet and more in depth, and while they have been more or less prospected in the past, their possibilities for hydraulicking are still to be determined.

M160-91 The hydraulic operation of Froelich, Kummer, Ott & Scheele on Crooked Creek, where 6 men are employed, is one of the largest in the district. The creek deposit mined is from 6 to 12 feet in depth, containing on an average of 15 to 20 cents in gold per square foot. The gravel is of medium size, with but few boulders. Bedrock formation is composed of alternating beds of sandstone, shale, and conglomerate, some beds being harder and more resistant, forming occasional higher ridges. A sticky clay sediment generally overlies most of the bedrock. The average grade of the stream is 100 feet to the mile. The deposit is stripped by ground-sluicing and hydraulicking well ahead of mining, leaving from 5 to 6 feet of gravel and from 1 to 2 feet of bedrock to be mined. The average pit mined is generally 125 feet long and from 80 to 150 feet wide, depending on water pressure and width of the pay.

In starting a pit 3 to 4 boxes are set and a trench is piped down the center of the purposed pit, and sluice boxes are installed therein for the full length. Generally from 10 to 14 boxes are used. These are set on a grade of 8 inches to 12 feet, so that the end of the lower box is usually below bedrock, while the head box is 1 to 3 feet above bedrock, although in one set-up this was 12 feet above, which was found to be much too high for good work. The boxes are 30 inches wide and 24 inches high, constructed according to regular design of 1 inch sides and bottom. These are paved with block riffles, made up in sets and held in place by special lining boards, which are bolted to the sides of the boxes.

These liners are made up in sets 12 feet long, 2-inch boards being bolted together, making them high enough to come flush with the tops of the boxes. Old boards or slabs are nailed lengthwise to the side braces of the boxes and a 1-1/2-inch board strip is nailed lengthwise along the top edge, so that the boxes are fully protected from the force of the piping. Board aprons or backstrops are hung centrally along the boxes from standards made of 2-inch pipe.

Four field giants are set (a) two on the bank near each upper corner of the pit, and (b) two at the lower edge of the pit on bedrock. The field giants are provided with 2-1/2 or 3-inch nozzles, depending on the water supply.

These now operate under 60 foot of head, although a 150 foot head was available at the former work further down the Creek. This low head is handicapping the operation and a higher ditch is being constructed. The stacker giant (c) with 3-inch nozzle, operates under 70 foot head. During low water periods, the water is stored in the ditch reservoir and used intermittently for short periods at a time. The average water supply permits the use of but one field giant and the stacker giant at a time, when the practice is to complete one side of the pit before the other side is piped. When a full head of water is available, piping is sometimes done from both sides at one time. The lower giant b pipes the material diagonally upstream, and as far to the head of the boxes as practical before it is put over the side by this giant and giant a, and the pit is piped well into bedrock. The material alongside of the boxes at the lower end, is then piped to the upper end by giant b, and the stacker giant c, and piped over the side. Bedrock is then given final cleaning with a fire hose and nozzle outfit. From 6 inches to 3 or 4 feet of bedrock is taken up. Boxes are then cleaned up and removed and material remaining alongside and underneath is piped ahead on virgin ground for the next pit. Boulders are removed and piled by hand on cleaned bedrock, the larger ones being broken with a sledge. Six men are employed, shifts of 12 hours being worked.

One pit of 18,750 sq. ft., or about 4170 cubic yards,

was piped over the side in 8 days with a full head of water available. About 220 inches of ground-sluice water was used or about twice as much as one field giant with 3-inch nozzle under 60-foot head delivers. The total water used, including that used by the stacker giant, was 455 inches, giving an approximate water duty of 1.2 cubic yards.

Twelve boxes are installed, the giants set, the bedrock drain fixed up, and everything is made ready for a new pit, 125 feet long, by 3 men in 8 shifts. The average clean-up of the boxes is done by 4 men in 1 shift. In 1922, with a good steady water supply under a head of 120 feet, 34,000 square feet of ground 6 feet deep, or 7555 cubic yards, were piped over the side in 10-1/2 days of steady piping. Including the setting up, clean-up, and all, 15 days were required. This is the best work that has been done here. Where the water is used intermittently, it generally requires from 25 to 27 days to pipe over a pit 125 by 150 feet and 6 feet deep, or 4180 cubic yards. During an average season, May 10 to Sept. 15, about 5 pits, or from 75,000 to 80,000 square feet are mined, when the operating cost ranges from 5 to 7 cents per square foot or 23 to 32 cents per cubic yard. About $5000 is invested in the equipment and $5000 in the ditch line.

12460-19 C. A. Bryant with a crew of five men hydraulicked the creek deposit on Alder Creek. The deposit averages

about 8 feet in depth and is stated to contain about 20 to 25 cents in gold per square foot. Water is obtained from Alder Creek and brought to the operation through a 1-1/4-mile ditch, with a carrying capacity of about 300 miners inches. The main pipe line is about 400 feet long, reducing from 18 to 12 inches in diameter, with 8-inch pipe in the pit. Two No. 1 giants are used in the pit under ~~100~~ 140 foot head and a third is used for stacking the tailing. The method of piping over the side of the boxes similar to the one at Crooked Creek, is used. About 25,000 square feet of bedrock are mined per season. The operation was short of water during most of the season.

KA60-100 Dudney and Steele installed a small hydraulic plant and completed their ditch, on Fox Creek. The bench deposit here is from 7 to 12 feet deep. The mining done consisted of stripping several feet of overburden from an area which is to be hydraulicked next season. Ed Webster ground-sluiced and shoveled-in on Fox Creek.

KA60-94 Carlson & Nelson, with one man, hydraulicked with a small outfit on Broken Neck Creek. C.F.Yost, KA60-75 working alone, hydraulicked on the right limit bench of Nugget Creek. This bench averages about 20 feet in depth, and with the method of piping into the head of the boxes, from 7000 to 8000 square feet of bedrock is mined in a season.

KA60-90 Wm. Russell, Axel Johnson, and Frank Swanson, each

working alone, ground-sluiced and shoveled-in on the Seventy Mile River benches, and similar mining was done by A.Turnbull on Barney Creek; and by E. Robertson on Flume Creek.

Fourth of July Creek

451-19 The only summer mining on this creek is the hydraulic operation of the July Creek Placers Co. The operation is 10 miles up the creek, by trail from Nation on the Yukon River. The Creek deposit mined averages from 12 to 15 feet in depth and consists mostly of medium sized gravel with an average number of medium sized boulders, overlain by 2 to 3 feet of moss and overburden. Bedrock at the present workings on No. 11 above, is a soft but tough fine grained conglomerate. Conglomerate, sandstone, and shale are the bedrock elsewhere. The gold is fine and flattened and its distribution is rather spotty. Natural drainage along bedrock has thawed much of the deposit. Springs near the present workings form much "glacier" ice during the winter which delays the starting of operations in the spring. Water for hydraulicking is obtained through 10-3/4 miles of ditch. The upper ditch of 8-1/4 miles built with a 4-foot bottom, takes the water from the headwaters of Washington Creek and brings it over the divide running it into Ruby Creek, from where it and the Ruby Creek water is picked up by the lower ditch and conducted 2-1/2 miles to the upper penstock. The water from the upper ditch was permitted to run down over the side hill

into Ruby Creek, causing a great deal of sand to be carried into the Ruby ditch and reservoir and which has been a source of considerable expense and loss of time. From the upper penstock, the water runs through a chute into a small reservoir 40 feet below, thence to another penstock, from where about 800 feet of 17 to 14 inch pipe carries the water to the pit, where 9 and 7 inch diameter pipe is used. No. 1 giants with 3-inch nozzles operated under a 160 foot head are set up in the pit with a similar sized giant for stacking the tailing. The average water supply is such that it must be impounded in the reservoir during most of the season and used intermittently. Three boxes are first set up at the lower end of the pit, well down in bedrock, and from 3 to 5 feet of overburden and gravel is stripped off. From 8 to 9 more boxes are then installed, so that the head box rests on top of bedrock. The sluice boxes are 30 inches wide inside of the liners, are set on an 8-inch grade, and paved with block riffles. The gravel and from 1 to 3 feet of bedrock is then piped over the side in a manner similar to the method used at Crooked Creek, although some of the pit is often piped into the head of the boxes. The average pit mined is about 100 feet long and 200 feet wide. A block of about 50,000 square feet, averaging 12 feet in depth and about 35 cents in gold per square foot, was mined in 1924, nine men being employed, two of which were on the ditch. Excepting the water supply, the conditions for hydraulicking are in

general quite favorable, although this creek could have been mined to a better advantage with a small dredge. The present scale of hydraulicking started here in 1923. The company expects to mine from 70,000 to 80,000 square feet of bedrock per season in the future.

Bower and Newlan prospected on No. 8 above and John Starr working alone took out a small winter dump.

Al. Brown prospected on Bonanza Creek, and S. McCarthy took out a small winter dump, prospected and shoveled-in on a small creek opposite the mouth of Flat Creek, both being tributaries of Charley River.

## Circle District

Most of the placer mining in this district is done in the Circle section, although a number of small operations are conducted in the Woodchopper section on Woodchopper, Sam, and Coal Creeks. About 75 men are engaged in mining in the district. The Circle district experienced an unusually dry season, conditions not being much improved until in the fall after it was too late to be of much help. Freezing weather was also experienced considerably earlier than usual. As a result, the operations suffered and the gold production from the district for 1924 will be less than the previous year. The prevailing wage scale for placer mining labor is $6 for 10 hours, plus board, which costs from $2.50 to $3.50 per man day. Rough native sawn lumber sells for $80 per

thousand at the Miller House.

Freight for the Circle section is received at Circle, coming via Canada. A wagon road, most of which is in fair condition, leads from Circle as far as the Miller House, a distance of 50 miles. From the Central House, on this road, 34 miles from Circle, a road goes up Deadwood Creek for 8 miles, from where the operations on this Creek are reached by trail. From the Miller House, trails lead to the various creeks. The following are the freighting rates from Circle to the various points.

| Circle to | Distance from Circle Miles | Freight rates in cents per pound | |
|---|---|---|---|
| | | Summer | Winter |
| Central House | 34 | 5¢ | 2¢ |
| Deadwood P.O. | 42 | 8 | 3 |
| Miller House | 50 | 10 | 3 |
| Eagle Creek | 59 | 11-1/2 | 4-1/2 |

Miller House is about 80 miles northeast of Chatanika, the terminus of the narrow gauge branch of the Alaska Railroad. Between the Miller House and Chatanika lies a vast country known to contain many placer deposits still too inaccessible to permit their exploitation. Nineteen miles of road has been completed on the Chatanika end of the road project now under way between that place and Circle. About 65 miles more of road remains to be constructed and the Circle end of the road put in shape. The

continuance of mining and the development of this part of the country depends on the completion of this wagon road which should be hastened to completion. This road will make this district very accessible from the Fairbanks district, permitting supplies to be brought from there and will divert the freight and travel now going to the Upper Yukon River via Canada to Fairbanks and the Alaska Railroad. It is the most important road project in interior Alaska.

Circle Section

Most of the placer mining in the Circle section is now confined to Deadwood and Mammouth Creeks, and their tributaries draining into Crooked Creek, and on Eagle Creek, a tributary of Birch Creek. A number of small shovel-in operations, some of which are of a prospecting nature, were also conducted on several of the other tributaries of Crooked and Birch Creeks. Samples taken of the concentrates recovered on the Berry dredge on Mammouth Creek and at the hydraulic operation on Miller Creek showed the presence of considerable cassiterite or stream tin.

Deadwood Creek

K4 50-65 The largest operation on Deadwood Creek was that of Iverson, Knutsen & Fursath, who with two men employed, hydraulicked on No. 2 above. This property had been idle for a number of years, 1924 being the first season for the present operation. The 4000 foot ditch was cleaned out and repaired and much of the season was spent in putting things in shape

to resume mining. Like all of the small creeks in the district, the water supply is very small during most of the season, when it must be used intermittently. The ditch water is available under 135 foot head in the present pit. The creek deposit mined averages 8 feet in depth, the upper 3 feet being stripped prior to the regular hydraulicking. The 5 feet of remaining gravel, which is of medium size, and from 1 to 2 feet of schist bedrock is piped over the side of the boxes. The tailings are stacked with a giant. One pit, 170 feet long and 140 feet wide was mined during the season and another pit was started. The average width of the pay streak is from 170 to 200 feet, but the gold distribution is spotty. The average gold content is considered to be about 40 cents per cubic yard. The better portions of the deposit were formerly mined by shovel-in methods.

450-65 Peter Bloom, on No. 43 below; Gus Chisholm on No. 40 below; Rookness & Lovig on No. 23 below; Henry Reupke on No. 21 below; M. Peters on No. 16 below; Alfred Johnson on No. 11 below, A. Clatworthy on No. 4 below; and John Stack on No. 15 above; conducted winter drifting operations. Some of these one-man drift mines are on the benches where a 50 to 60 foot adit is driven into the bench and 15 to 25 foot raise made to the surface. Drifts 15 to 25 feet long are then driven up and down stream from the face, and by working toward the portal of the adit a strip of ground is

mined out on each side, usually carrying a face just high enough to work, or 2-1/2 to 3 feet. The gravel is thawed with wood fires. The drifting in the 15 to 20 foot creek deposit is done from a small shaft. The gravel is thawed by wood fires and hoisted to the surface with a windlass. With these methods, one man will mine from a few hundred to several thousand square feet of bedrock during the winter, usually producing not more than $200 to $400 in gold.

Rockness & Lovik, H. Reupke, M. Peters, Alfred Johnson, A Clatworthy, Jno. Stack, and Wm. Woodman also shoveled-in during the summer.

K450-20 Langlow and Larsen, on Switch Creek, a tributary of Deadwood, conducted small hydraulic operations on No. 6 claim, first stripping off 4 feet of overburden and piping 4 to 6 feet of gravel into the head of the boxes, using intermittent water most of the time under a 120 foot head. There is much slide rock in the narrow V shaped valley. The average pit mined is 100 feet long and from 50 to 75 feet wide. Working only one shift, one to two pits are mined in a season.

The lower part of Deadwood Creek has been more or less prospected from time to time and some mining has been done at various places. Considerable prospecting by shafts was recently done there to determine its dredging possibilities. The result of this prospecting is reported to have been unfavorable.

Mammouth Creek and tributaries

K450-6 The C.J.Berry Dredging Co., on Mammouth Creek operated

its 3-1/2 cubic foot, steam driven, combination type of dredge, which dug 142,841 cubic yards during the season. The dredge started the season's digging on July 1, but was obliged to shut down on July 12, lacking water for flotation. Digging was again resumed on August 1 and continued until Oct. 7. The season was considerably shorter than the average one, and the digging capacity of the dredge was materially reduced by the numerous large granite boulders encountered at this part of the creek. From 3 to 4 feet of muck and top gravel is hydraulicked off a season in advance of dredging to aid the thawing of the gravels which are otherwise partly permanently frozen. About 86,000 cubic yards of such overburden was so removed during the season. One interesting feature of this dredge is its steam equipment, which consists of two 75 H.P. Wolf locomobile boilers and engines. The steam is superheated before it enters the engines, which are mounted on top of the boilers. These locomobiles consume on an average of 4 cords of wood per operating day. The cost of wood on the dredge is $15 per cord; its cost at the woodchopper's camp about 8 miles away is $5. At a cost of $60 per day for wood and $23 for the wages and board of the two engineers (one on each shift) and who also do the firing, the daily power cost is $83 or $0.554 per H.P. day. In the early spring and late fall when the dredge is heated, an additional half cord of wood is burned.

The company employed 16 men during the season, 4 to 6 men being engaged on the stripping operations. One of the longest pipe lines in Alaska is used for this work. It runs from No. 7 above Mastodon Creek to the mouth of Granite Gulch on Mammouth Creek. This pipe line is 2 miles long, being 32 inches in diameter at the intake and 15 inches at Granite Gulch, the difference in elevation between these two points being 240 feet. The average water supply being very small, usually only one 3 to 3-1/2 inch nozzle can be operated, and then for only a few months of the season.

#50-58 J. Anderson conducted hydraulic operations on No. 34 above on Mastodon. A crew of six men were employed during the spring, being reduced to two during the dry period. Only a comparatively small area was mined this season, mostly by piping into the head of the boxes. The usual method of hydraulicking at this operation and at the one formerly conducted by the same operator further down the creek, which operation will be resumed again in 1925, is known as the "Circle" system, whereby the lower part of the pit is piped over the side of the boxes and the upper part is piped into the head, affording some of the advantages of both of these methods. It is particularly well adapted to the hydraulicking of average creek gravels, for in combining the two methods, a longer pit can generally be mined than would otherwise be permitted by the conditions limiting each method. A description of the method as used on Mastodon

Creek follows.

The frozen creek deposit, some of which had formerly been drift mined, ranges from 15 to 20 feet in depth. The overburden is stripped with the giants well ahead of actual mining to aid in thawing and to reduce the depth to an average of 10 to 12 feet of gravel. The gravel is of medium size and contains an average number of medium sized boulders. Bedrock is a schist, much of it being slabby but most of which can be piped up and cleaned with a giant, the more crevviced requiring some hand cleaning. The average stream grade at the lower ground is 5 inches to 12 feet, increasing to 6 inches at the present operation on No. 34 above.

The water supply is erratic, and even with a full head is usually only sufficient to operate one field giant and the stacker at a time. During low water periods, the water must be used in splashes, averaging about 8 to 12 ten-minute splashes in 12 hours, when the field giant and the stacker giant are generally operated alternately. The pressure water for the No. 34 operation is obtained from two ditch lines, at different elevations, the average head being about 100 feet. The crew employed varies with the water conditions, during a favorable season being 10 to 12, working two 12-hour shifts, and during an unfavorable season only one shift may be worked with from 2 to 4 men.

The pits mined at the lower operation were usually about 200 feet long and 150 to 200 feet wide. On the upper

ground they are generally 80 to 100 feet in width, mainly bedause of the narrower channel. From 3 to 4 boxes are first installed on grade below the purposed pit, as deep in bedrock as conditions will permit and small wings are erected at the head. A trench is then piped to bedrock down the center of the area to be mined, the material going through these boxes. While dependent on bedrock conditions, usually from 8 to 10 more boxes are installed in this trench and heavier wings erected at the head. The boxes are 32 inches wide and 24 inches deep, set on a grade of 7 or 8 inches. Block riffles are used. The head of the boxes in the average pit is usually about the center of the pit and setting on bedrock. A board back stop about 6 feet high is erected along the side of the boxes opposite to the side being piped, although it is generally not erected until after the gravel has been piped down to the level of the tops of the boxes.

In the larger pits six field giants are generally set, three on each side of the central trench or sluice. The a giant is set at the upper end of the area to be mined, about half way between the trench and the outer edge, the b giant is set on the outer edge about half way up the pit, and the c giant is set on bedrock at the lower end of the pit. The arrangement is the same for the other side of the pit. A seventh giant, d, is set in position for stacking the tailings. In the shorter pits the b giants

are generally omitted when only four field giants are set. When the water supply permits, 3-1/4-inch nozzles are used on all of the giants and the amount of ground sluice water turned in is about twice that provided by one field giant. The c giants pipe the material upstream, which with the aid of the b giants is driven over the side of the boxes. The a giants drive some material into the field of b, also driving a little over the side, but they are used mainly for piping the material within their field into the head of the boxes. The a and b giants may later be moved down into the pit, especially if the bank is too high for efficient operation from the initial set-up. The material lying alongside of the boxes at the last is driven ahead by c and d and put over the side, or is driven into the field of a and the upper part of the pit completed. The boxes are removed, and any material which has remained alongside the boxes or in the bedrock trench is piped ahead to be put in from the next cut. Where this method is used on some of the other creeks, especially during a period of low water supply, the greater part of the pit is usually piped into the head of the boxes, With a full head of water, operating one field giant and the stacker steadily, one pit on the upper ground, 100 feet wide, 200 feet long, and averaging 10 feet deep, was piped to the boxes in 21 days, working 4 men to the 12-hour shift, at a cost of 10 cents per square foot or about 27 cents per cubic

yard. This area was stripped of 6 to 8 feet of overburden for 5 cents per square foot. With average splash water conditions, it would have required about 50 days to pipe in the 10 feet of gravel and bedrock in this pit. The average time required for installing 12 to 14 boxes, setting up the giants, etc., is 3 shifts with 8 men. The average clean-up requires one shift. With an exceptionally good water supply, the operating cost for hydraulicking, exclusive of the stripping, has been as low as 15 cents per cubic yard. This operating cost, however, usually ranges from 25 to 50 cents per cubic yard.

'50-51 Boyer Leine shoveled-in on No. 9, Mastodon Creek, and Gus Erickson took out a small winter dump on Upper Mastodon and was making preparations to install a hydraulic plant.

C. H. Wheeler, Geo. Woods, and C. Belenberg, each working separately, shoveled-in on Independence Creek and Finlon and Grignon took out a small winter dump on No. 4 below.

McPherson & Crossman hydraulicked on Miller Creek in creek placer averaging about ten feet deep, using the method of piping over the side of the boxes. The average pits mined are 80 feet wide by 100 feet long.

Westenvik Bros. were installing a hydraulic plant on Bonanza Creek; Adolph Urban prospected and shoveled-in

on Boulder Creek; and N. Schneider shoveled-in on Portage Creek.

Eagle and Birch Creeks

K45-73 The C. J. Berry hydraulic operations on No. 14 Eagle Creek, experienced a poor season due to an exceptionally low water supply. One pit of 22,000 square feet was mined, mostly with a small intermittent supply of water, and the balance of the season was spent in stripping ahead for the next pit. From 4 to 6 men were employed. The method of piping over the side of the boxes, which are elevated above bedrock, is used and involves some interesting features. A description of the operation follows.

The frozen creek deposit averages 18 feet in depth and 150 feet in width, the central 60 feet up to No. 15 having been drifted out by former operations. To aid in thawing the ground and also to get rid of troublesome sandy material, from 6 to 8 feet of this overburden and barren gravel is stripped with the giants, usually a season in advance of the actual mining operation. About 6 feet of medium sized pay gravel, 4 feet of sandy clay, which wedges out at the edges of the channel, and 1 foot of schist bedrock is piped over the side of the boxes. The gold is coarse and the average gold content is from 40 cents to $1 per cubic yard, depending on the amount of former drifting done. The average grade of the creek is 125 feet per mile.

Water is obtained from Miller Fork and Mastodon Fork, through a ditch system two miles long, with another 1 mile ditch from Cripple Creek, all tributaries of Eagle Creek. Three pipe lines, each from 600 to 800 feet long, conduct the water to the working pit. These pipe lines are of 21 to 18 inch diameters to the Y's; 11-inch pipe being used in the pits.

A trench is first piped into bedrock and into the bank ahead and 3 to 4 boxes are set on 9-inch grade and light wings erected at the head. A head giant then pipes a trench on grade down the center of the purposed pit, connecting with these boxes. From 10 to 12 more boxes are then installed on a 7-inch grade. Steel standards fastened to each side of the boxes and meeting 4 feet above over the center of the boxes, support steel plates 1/4-inch thick, 5 feet high and 8 feet long and which hang from a 3/4-inch pipe running from one standard to the other. While it is the aim to pipe the gravel so it will just roll over the top of the boxes and into them, these plates are necessary to stop flying material and water from going beyond. When piping, the bottoms of these plates are fastened to the opposite side of the boxes, as the piping is generally done from only one side at a time. The boxes are 36 inches wide, excluding the 1-1/2-inch liners and are 24 inches deep. The bottom and sides are made of 1-1/4-inch material. A heavy timber with a quarter section cut out, so as to fit over the top and upper outer side of

the boxes, is nailed along each edge as a protection from the piping. The upper 10 boxes or those on 7-inch grade are paved with high carbon steel plates 1/2 inch thick and cut square so they can be turned. These plates are laid on 2 x 4's running crosswise of the boxes, with a special spacing block so as to leave a 2-inch space between plates which acts as a riffle. These plates are used to save grade. The lower boxes are paved with 12 pound rail riffles, set lengthwise, spaced at 2-3/4 -inch centers with cast iron spacers, and bolted together in sets 4 feet long. Depending on conditions, the lower end of the boxes may be resting on bedrock, or a foot or so below, while the head of the boxes may be from 6 to 10 feet above bedrock, so that their tops at this point are generally only a few feet below the surface of the gravel. Small wings are erected at the head to guide the ground-sluice water.

The average pit mined is about 150 feet square. Eight field giants are set, four on each side of the boxes. Two a giants are set on top of the bank along each outer edge of the area to be mined, the upper ones being near the upper corners, the lower ones about a third of the way up from the lower end of the pit. Four b giants are set at the lower end of the pit on bedrock, two on each side of the boxes.

All of these field giants are equipped with 3-1/4-

inch nozzles and operate under 120 foot head. The stacker giant c has a 3-1/2-inch nozzle operating under 135 foot head. Normal water conditions permit the use of only one field giant and the stacker at a time, so the field giants not in use are "plugged". During low water periods, water is impounded in a ditch reservoir and used intermittently or in splashes, for periods of about 1 hour in duration, averaging 8 to 10 of these splashes in 24 hours.

The b giants pipe the material up stream into the field of giants a, and also drive some of it over the sides. The a giants do most of the piping over the side. The upper a giants drive the material over the side at a point usually below the first or second upper boxes, and also drive into the field of the others. The b giants are, however, used mainly to take up the lower gravel, clay and bedrock, and for final cleaning, being advanced upstream in stages. Giant c does the stacking, and along with the inner b giants drive the material lying alongside the boxes to points upstream for piping over. Finally, the boxes are cleaned up and removed, after which giants b and c drive ahead the material which was left alongside and under the boxes to be recovered in the next pit. One of the inner b giants or the stacker giant, finally pipes the short trench for the lower 3 or 4 boxes for starting the next pit.

When water is available the average crew consists

of 6 men, two 12-hour shifts being worked. A complete set-up for a pit, exclusive of moving the pipe lines, can be made in 24 hours. One set-up of the main pipe lines serves for two pits. During an average season, from 2 to 3 pits are mined. In 1921, 20,740 cubic yards were mined at an operating cost of 36.1 cents per cubic yard, and in 1922 49,860 cubic yards, at a cost of 19.96 cents per cubic yard.

KK50-35 J. R. Parkin installed a hydraulic plant on Birch Creek, several miles below Twelve Mile Creek. While no mining was done during the season, everything is in readiness to start in 1925. KK50-51 H. Bartlett prospected on Gold Dust Creek, a tributary of Eagle Creek. KK50-26 T. McLain prospected his creek ground on the North Fork of Harrison Creek, a tributary of Birch Creek, and plans to install a hydraulic plant in the near future. KK50-26 John Clayworth prospected his claims just below McLain's. KK50-10 Wm. Reynolds ground-sluiced and shoveled-in on Squaw Creek, a tributary of Birch Creek.

Woodchopper Section

KK 48-44 Eight small outfits numbering 15 men, mined on Sam, Coal and Woodchopper Creeks with several miners doing prospecting work. The creek placers on Woodchopper Creek average from 10 to 15 feet in depth and the bench deposits from 10 to 20 feet with some 60 foot depths at places along the upper bench. Some of the creek placer contains thawed channels and wet irregularly-shaped areas. Bedrock is a conglomerate, slate and limestone. The gold is coarse and

its distribution is generally spotty. The placers on Coal Creek are of a very similar character and depth, much of the gold, however, being coated with a black iron oxide. The gold production from this section in 1924 was very small.

S. Johnson and partner ground-sluiced on Sam Creek and also took out a winter dump. On Coal Creek, Beaton & Nelson drift mined both winter and summer; Martin Adamick ground-sluiced and shoveled-in; and Frank Slaven was doing prospecting work. Coal Creek is being considered as a dredging proposition. On Woodchopper Creek, Halstrom & Rossbach took out a winter dump and ground-sluiced and shoveled-in, as did Gus Abramson; Lee & McGregor drift mined both winter and summer; Frank Bennett and C.F.Moon both took out small winter dumps. Jno. Cornell prospected on both Woodchopper and Webber Creeks.

## Fairbanks District

The Fairbanks district experienced a good season, early reports indicating that the placer gold production from this district for 1924 was a considerable increase over that of 1923, when it was $603,000. Three dredges were successfully operated in the district, a new dredge having been erected and operated on upper Cleary Creek. One or possibly two new dredges will be erected in 1925. The Bagley scraper operations on Goldstream and Gilmore Creeks did very well. In general, more drift mining was done, particularly on

Ester, Little Eldorado and Cleary Creeks, where several operations were conducted on a considerably larger scale. A number of small hydraulic plants were operated and numerous small open-cut operations were conducted on the many creeks.

Modern underground mining practice was applied to a drift mining operation on Little Eldorado Creek and a method has been developed which dispenses with steam thawing.

About 55 summer operations were conducted in the district during 1924, employing about 300 men, which includes 44 men employed on the three dredges. This, however, does not include more than 125 men employed by the two large dredging interests investigating the field. Eighteen drift mines with 98 men are reported to have operated during the winter season, and there were probably others. About half of these drift mines also operated during the summer and as such are included in the summer mines reported.

The activities of the two large dredging interests investigating the possibilities of the larger and more important creeks in the district, are of unusual interest and importance. These interests have acquired options on extensive areas which they have been prospecting, and have made a careful study of the possible water supplies and other conditions affecting dredging. While no announcement has been made concerning any future development, it is generally construed that the prospecting results have, in general, been most encouraging, which is reflected by the

fact that one of these companies has made large payments on the options held. There are, however, many problems to be solved, of which one of the most important and deciding ones, is the problem of providing at a reasonable cost the large supplies of water under pressure, that will be required for the stripping and thawing of these deeper frozen deposits. This will either require the construction of an exceptional long ditch system or large pumping plants. Possibly both means will be used.

14 49-83 58-94 The Fairbanks Exploration Company was most actively engaged in drilling on Goldstream, Engineer, Cleary, Ester and lower Fish Creeks, which are under investigation for dredging. This company also conducted extensive investigations for a water supply, making surveys for a ditch system which if adopted in its entirety would make one of the longest, if not the longest, ditch system ever attempted for placer mining. The survey would involve the construction of a main ditch 100 miles long with a lateral or feeder ditch 40 miles long. The general details of this survey and the conditions involved are as follows. The main ditch intake would be about 3/4 miles below the junction of Faith and McManus Creeks on the Chatanika River. From here, the ditch would follow the north side of the Chatanika Valley to a point just above and opposite to the mouth of Cleary Creek, where the water would be conducted across the Chatanika Valley

under 550 foot head through a 7930 foot wood stave syphon, 4 feet in diameter, to the ditch on Cleary Creek. It would then continue around the head of Cleary Creek, then past the head of Little Eldorado and Dome Creeks to Vault Creek, where a 4000 foot tunnel through the hill would bring it to Fox on the north side of Goldstream Creek, where the head would be 350 feet. To this point would be about 60 miles. From here, one branch would follow up the north side of Goldstream Creek to Golden, the other branch continuing down past Big Eldorado Creek, etc., crossing Goldstream Creek and continuing on to Ester Creek. This ditch line would be 100 miles long. The ditch would be dug mostly with steam shovels, for a carrying capacity of about 5000 miners inches. It would be dug about 15 feet wide at the bottom, and on a grade of 2.64 feet to the mile. To avoid as much frozen ground as possible, the southern exposures of the hills were followed as much as possible, and to avoid the deep draws and gulches, the water would be syphoned across them through wood stave syphon, 4 feet in diameter. To do this, approximately 44,000 feet of this wood stave syphon would be required. The syphons would be placed with a fall of 4 feet to the 1000 feet and the grade in the 5 by 6 foot tunnels would be 2-1/2 feet per 1000 feet. The minimum average flow of water expected at the intake is about 1600 miners inches. To supplement this supply, a lateral ditch is considered which would practically double the quantity

for the main ditch. This lateral would bring the water from Beaver Creek to the main ditch, near Bell Creek, a distance of about 40 miles, which would include about 2 miles of syphon and about 1-1/2 miles of tunnel.

The Goldfields American Development Company, a subsidiary of the Consolidated Goldfields Company of South Africa, had two drills busy all summer, and also did shaft prospecting, on upper Fish Creek, for which 30 to 35 men were employed. This company did not, however, exercise its options on this Creek, but later started similar prospecting on Ester Creek and the Chena River, which according to late reports is still in progress.

Goldstream Creek and tributaries

K+58-266 The principal operations on Goldstream Creek and at the mouth of Gilmore Creek, were the five large Bagley scraper operations conducted by James McPike with 15 men on No. 3 below Gilmore Creek; K+58-229 A. Hanot with 10 to 15 men on Discovery, Goldstream; Henry Wagner with 16 to 21 men on No. 6 and 7 below Goldstream; F. Bleecker with 7 men on No. 10 below; and H. Atwood on No. 11 below with 5 men. James McPike K+58-229 mined an area of about 120,000 square feet, averaging 18 feet in depth, of which 5 feet of the lower gravels and from 2 to 4 feet of bedrock were scraped to the car and hoisted to the sluices. A. Hanot mined a pit of about 60,000 square feet.

Henry Wagner mined two pits during the season, for

after completing one of 80,000 square feet on No. 6 below, another pit of 70,000 square feet was started and completed on No. 7 below. This is an unusually fine record for one season. The deposit mined averaged about 25 feet in depth, the average depth of 12 feet of gravel being overlain by muck and overburden. The moss is first stripped with the scraper, the muck and overburden being removed by hydraulicking. About 6 feet of the upper barren or very low grade gravels are then scraped to waste. The lower 6 feet of gravel and several feet of the schist bedrock are then scraped to the car in the underground loading station and pulled up an inclined track and dumped into the sluices.

A 5-foot, or 2-1/2 cubic yard Bagley was used for most of the scraping and was operated by 9 by 10 double cylinder hoist. An 8-1/2 by 10 hoist was used for hauling the car up the track incline to the sluices. Four boilers, in total 180 H.P., provided the power for the operation. Ten tons of coal are burned during the two 10-hour shifts worked, with an additional ton when sluicing. On the basis of 11 tons of coal, costing $6.25 per ton at boilers, and the wages and board of a fireman, one for each shift, this power cost amounts to $85.75 per 20 hours, or $0.477 per H.P. or $0.235 per H.P. hour. The burning of coal has proved most satisfactory and has reduced the power cost at this operation about 40 per cent.

Casalegno Bros. with 8 men drifted during both

summer and winter on No. 15 and No. 16 below, Goldstream, and Petrok & Mogstad with 8 men operated a winter drift mine on lower No. 16 below. Pete Hanson ground-sluiced and shoveled-in on First Chance Creek. Chas. Peterson and Chas. Norlin each stripped and hydraulicked a small area on Gilmore Creek.

144-145 On Pedro Creek, Guis & Co. with 9 men hydraulicked 3 pits on No. 7 below, or about 75,000 square feet, averaging 12 to 15 feet in depth, and A. Nelson with one man on No. 2 below, hydraulicked a small area. A. Zimmerman with a crew of 8 men hydraulicked on Twin Creek, stacking the tailings with a cableway excavator. Sansome, Gove: and Hughes did some drifting on Engineer Creek.

Ester Creek

Peterson & Company with 22 men employed, operated a summer drift operation on No. 9 below. Crooks, McLeod & Hammer did some drift development during the winter on No. 11 below, but did not take out a dump. Kolkman & Company, with 10 men sunk a shaft and ran a short drift on No. 4 below Discovery bench during the winter, but struck more water than they could handle. Another attempt is to be made this winter. A. Martin & Co. with 10 men took out a winter dump of about 15,000 square feet on No. 3 below, and Ed Hess & Company with 9 men took out a winter dump of about 10,000 square feet on No. 3 above, and during the summer drifted about 12,000 square feet on No. 2 above. H. Crook & Co., with 5 men,

drifted on Discovery. Both dredging interests drilled on Ester Creek.

No placer mining was done on Gold Hill, nor was any reported on Happy Creek.

Dome Creek

KA49-46 Kinney & Gillis and 8 men conducted drift operations on No. 2 above, during both summer and winter. C. Johnson with 9 men drifted on No. 15 below, for a short period. KA49-35 KA49-63 Magnussen & Anderson drifted on the Niggerhead Association.

According to reports, no mining was done on Vault Creek during the summer, although several were planning to drift there during this winter. Hill and Cosgrove drifted on Big Eldorado Creek.

Little Eldorado Creek

KA49-191 Drift mining was conducted by the Idaho Mining & Leasing Co. on the Oregon Assn., with 15 men; I. Hansen & Co. on Discovery with 16 men; H. Andreson & Co. on No. 3 below with 6 men; Larson, Berg & Co. on Goldstake with 4 men; Nelson & Killis on No. 2 above; and Fraecher, Nelson & Co. on No. 7 above.

The operations of the Idaho Mining & Leasing Company are of special interest for a new method was tried and successfully developed during the season. The former method used at this operation, which involved the drilling of holes in the frozen face for inserting the sweaters for steam thawing, was described in the annual report for 1923. The main details

of the present operation are as follows.

The deposit is from 165 to 170 feet deep and while solidly frozen, the average gravel mined seldom contains more than about 5 per cent ice. The gravel is tightly packed and of medium size, but contains some large hard quartz and schist boulders, which lie mainly on top of bedrock. Bedrock is a schist, soft beds alternating with harder slabby ones. The ice in the gravel occurs in small crystals or as small masses or seams. Larger masses of ice as generally encountered in average gravels elsewhere do not occur here. It is because of this character of the ice and the much less than average amount of ice present in this gravel, that this method of mining has proved successful.

The 7 by 7 full crib timbered shaft with square set station at the bottom is 175 feet deep, being 6 feet in bedrock. This shaft was sunk, 238 feet of drifts and 30 feet of station were driven by the old method. A change was then made. The present equipment consists of three 50 H.P. boilers, a 7 x 10 double cylinder hoist, a six wheelbarrow size self-dumping bucket and carrier, a No. 5 Sturtevant blower for ventilation, a 650 cubic foot Leyner air compressor, an 8-inch centrifugal pump for pumping water for sluicing, three "B.B.R.W. #13" Jackhammer drills, one 6-1/2 H.P. "Turbinair" double drum air hoist, a 12 cubic foot box type bottomless Quincy slush scraper, etc. The air drills are of

the wet type, using 7/8 inch hollow hexagonal steel with a cross bit of 1-3/8-inch gage. The steels are 5 feet long, starters seldom being used.

The main drifts were then advanced, making the total distance of 275 feet upstream and 240 feet downstream, using the new method of drilling the face and blasting it down without thawing. Cross cuts were then driven in both directions from the ends of these drifts to the side limits of the pay, the total length of cross cut at the upstream end being 280 feet and at the downstream end 185 feet. Thus a block of ground containing about 120,000 square feet of pay was opened up. The 6-1/2 by 6 foot drifts were driven by one driller and two muckers, working at both faces during the shift at the rate of 7 feet per 8-hour shift, and at a cost of $4.50 per foot. These drifts required no timbering, while those driven by the former method of thawing, usually required 3 piece sets and top lagging. The cross cuts at the end of the block were driven 18 feet wide and 5 feet high by two drillers and four muckers working at two faces during a shift, advancing each face an average of about 4 feet per shift.

The mining was started in the cross cuts along the wall nearest the shaft and was advanced toward the shafts, i.e. the retreating method was used. Two drills were used at the upstream end and the average height of the face

mined was 4-1/2 feet, or 2 feet of gravel and 2-1/2 feet of bedrock. The back holes were drilled in the gravel and spaced 3 feet apart; the cut or breast holes were drilled in bedrock, 2-1/2 feet apart; and the lifters 3 feet apart. All holes were drilled the length of the steel or 5 feet. With two drills, a 130-foot face was drilled, and blasted in two 8-hour shifts. One man could drill on an average of 150 feet of hole, load, and shoot them in 8 hours. This is an average of 100 square feet of bedrock or approximately 17 cubic yards per man shift. One steel drilled an average of three 5-foot holes. There was never any trouble with stuck steel and practically no trouble from the freezing of the drills. Shortly after drilling, the holes were blown out with air to remove any water which would otherwise freeze and tend to close up the hole. The holes were loaded with 40 per cent straight nitroglycerine dynamite, usually 4-1/2 sticks to the hole. No stemming was used. This powder was found to be too fast for the gravel and too gassy under the present ventilating system. The holes, however, broke clean to the bottom. The average powder consumption was 0.4 pound per bedrock square foot. The cost of this powder was 7-1/2 cents, for fuse and caps 2-1/2 cents, or a total explosives cost of 10 cents per square foot or about 60 cents per cubic yard.

From 12 to 24 hours after blasting, the material

was scraped from along the face to the main drift, up a short incline and dumped into a car. The scraper was dragged back and forth by cables operated from the two drum air hoist.

Considerable trouble was experienced and much time was lost through the freezing of the air in the rotary gears of the air hoist. The incline necessary to permit the scraper to dump into the car also caused some delay, for with about each 1300 feet of bedrock scraped, it had to be taken down and set up at a new place. This required from 2 to 3 hours each time. It is planned to deepen the main drifts by 6 feet, so that this incline will not be required. Some delays were also occasioned by the tramming, for the two trammers could not keep pace with the scraper when operating steadily. Under the present arrangement, and due to trouble from freezing, the scraper could be operated but about 5 out of the 8 hours, but even so an average of about 250 square feet of bedrock was scraped during the shift. With the above mentioned difficulties corrected and with 3 drills busy at the face, the scraper operation can be conducted almost continuously, when it is expected to increase this performance to about 350 square feet per shift. Lacking the necessary equipment, at present, only one drill was operated at the downstream face, where, after the material was blasted down, it was shoveled into wheelbarrows and wheeled to the cars.

The workings were kept safe by putting in bulkheads

about every 25 feet along the face. There are 4 by 8 foot timber cribs filled with waste gravel. With each advance of about 40 feet, another row of these bulkheads was placed. At intervening places where the roof might slab, as at the lower points, a post with a cap was set. As the work advanced these were removed and the ground was allowed to settle.

After the material was scraped to the car, it was trammed to the shaft, dumped into the bucket, hoisted to the surface, conveyed over the incline cable and automatically dumped into the sluices. The regulation type of dump box and sluice is used at this operation. After the material struck the water and passed through the sluices, it readily disintegrated and was satisfactorily sluiced. The shattering effect of the detonation is mainly responsible for preparing this material for sluicing without the necessity of the former method of thawing with steam. The heat liberated by the explosion plays but a comparatively small part.

The success of this method has been proven, although the operation must still be considered to be in the experimental stage. When once properly equipped and developed so that two drills and a scraper can be kept busy at each end, the management, Mr. J. F. Foran, expects to mine from 1000 to 1400 bedrock square feet per day of two shifts, by working a crew of about 40 men, at a cost of 50 cents per square foot, exclusive of royalty or capital charges. This operation employed 15 men during the past summer, operating but one

shift of 8 hours each day. No mining is done during the winter.

Cleary Creek and tributaries

pp 49-50 The Chatham Gold Dredging Company erected a small dredge on No. 5 above, Cleary Creek, and started dredging on June 29, operating very successfully until the close of the season. This dredge will work down to No. 3 above, Cleary Creek, and then dredge Chatham Creek, for which it was originally designed.

The dredge is of the flume type and is driven by gasoline engine power. The close connected bucket line contains sixty 1-1/2 cubic foot buckets, the average dumping rate being 33 per minute. The buckets dump directly into the head of the flume which is 60 feet long and 30 inches wide, inside the liners. This flume is set on a grade of 1 inch per foot and is equipped with rail riffles set both transverse and lengthwise, and a sluice type undercurrent. The dredge is designed for a digging depth of 14 feet below water level, but has dug to 18 feet. The anchorage is by head lines. The hull is 22-1/2 feet wide, 46 feet long and 4 feet deep. The total weight of the dredge is about 75 tons and draws 2-1/2 feet of water. One 8-inch Morris pump delivers about 1500 gallons of water per minute to the flume. Power is produced by two 32 H.P. Doman gasoline engines. These engines operate an average of 22 hours per day, consum-

ing during that time an average of 110 gals. of gasoline and 6 gals. of lubricating oil. The gasoline costs 35 cents per gallon at the dredge and the oil 60 cents per gallon and with the full time of the two engineers included at $10 each, which includes wages and board, this power cost amounts to $62.10 per day or $0.97 per H.P. This dredge dug about 1000 cubic yards per day during the season, the actual digging time being about 80 per cent. On this basis this power cost is 6.21 cents per cubic yard dredged. The ground dredged on Cleary Creek is from 12 to 23 feet deep, averaging about 15 feet. Most of it was formerly drift mined and is now all thawed. The gravel is of medium size. Bedrock is a schist, some of which is slabby, when up to 4 feet of it is dug. The gold is both coarse and fine. A clay sediment which overlies bedrock gives some difficulty in washing on this type of dredge and causes some loss of gold. It is planned to add a screen and conveyor. Seven men, including the dredgemaster are employed for the dredge operations.

AK49-194 Frank Manley employed an average of about 12 men in drilling and hydraulic stripping operations on Discovery claim, Cleary Creek. About two-thirds of an area of 300,000 square feet was stripped of about 6 feet of muck and overburden in 40 days with a crew of 5 men. One 3-inch nozzle operating under a 70-feet head was used along with a small quantity of ground sluice water. Mr. Manley purchased a

dragline excavator from the Alaska Railroad, which he planned to operate on this ground in 1925, but this ground, like most of the claims from here down on Cleary Creek, has now been either purchased or is held under option by dredging interests, and will not be mined next season.

R. Cunningham, with 2 men on No. 10 above, and C. Carlson, with 2 men on No. 9 above, ground sluiced, shoveled-in and wheeled to a self-dumper. Pearson & Johnson with 3 men hired, drifted on No. 6 below and Joe Ragner was "sniping" on No. 12 below.

Peterson & Hilty, with a crew of 8 men, conducted summer drifting operations on the Hope and Totem claims; as did Sam Weiss with 8 men on the Hazzard claim, and Ward & Co. with 3 men on Discovery, Chatanika Flats. Connolly & McPherson with 3 men hired conducted both summer and winter drift operations, and Odegard & Co. with 4 men, Freeman & Co. with 3 men, and Haggbloom & Co. with 3 men took out small winter dumps.

On Wolf Creek, Erickson & Woodring drifted on No. 2 above; Chas. Danielson and partner on No. 4 above, and Johnson & Anderson on No. 5 above, groundsluiced and shoveled-in.

On Chatham Creek, Nels Giske and partner were drifting in the lower right limit bench on No. 4, and report encouraging results from prospecting the right limit bench well towards the top of the hill. Colbert and Dahl with

4 men hired, mined on No. 1 Chatham. With a small reservoir and hand operated gate about 8 to 10 feet of muck and upper gravel was boomed off, leaving 3 feet of gravel and 1 foot of soft bedrock, which was shoveled into wheelbarrows, wheeled to a self-dumping bucket, hoisted to an inclined cable by small steam hoist, and conveyed to the sluices. About 12,000 square feet were so mined from May 15 to Sept. 20. The cost of removing the overburden was about 6 cents per square foot or 20 cents per cubic yard; for shoveling-in, etc., 19 cents per square foot or $1.30 per cubic yard. The cost for mining the entire depth, averaging about 13 feet in depth, was 25 cents per square foot or about 53 cents per cubic yard. They also drifted about 5000 square feet during the winter.

Fairbanks Creek

K-4915 The Fairbanks Gold Dredging Co. operated both of its dredges, each one, however, losing considerable time because of bad accidents. While changing spuds on the No. 1 or 4 cubic feet dredge, the tackle slipped and the rear gantry collapsed, causing a shut-down of two weeks in June, while repairs were made. A new bucket line of 79 buckets was installed during the spring, and the dredge has generally reinforced and strengthened. By relieving the bucket line drive of its former additional duty of operating a pump, and increasing the bucket speed so as to dump one more

bucket per minute, the digging capacity has been increased to about 2500 cubic yards per day. The No. 2 dredge sank in June, causing a loss of 11 days. This dredge shut down the latter part of September, when it was beached to undergo repairs. About half of the ground dug by these dredges is thawed with water at natural temperature. About 35 men were employed by the company.

Martin Sather & Co., with 8 men, conducted drifting operations during the winter and summer on the bench at No. 12 below on Fairbanks Creek, and Tool & Eagan with 2 men hired drifted on the bench at No. 8 below. This latter operation is to be resumed this winter, thawing the frozen gravel by the customary steam methods, after which a small Bagley scraper equipped with a pointed hook on one side for undercutting, will be tried for breaking down the thawed face and scraping the material to the car.

Fish Creek

The Goldfields American Dev. Co. conducted extensive prospecting on upper Fish Creek, from the Black Hills Assn., up to No. 11 above, to determine its dredging possibilities. Two churn drills were operated and numerous prospect shafts were sunk. From 30 to 35 men were engaged in this work. The cost of this drilling for both cased and uncased holes averaged $3.25 per foot, the holes ranging from 20 to 60 feet in depth. Prospect shafts were sunk in the

frozen ground to depths of 18 to 40 feet, at an average cost of $5.50 per foot. This company gave up its option in September. The original holders of the option have now organized the Tanana Valley Dredging Co., Ltd., and it is reported that a 6 cubic foot electrically driven dredge with a 40 foot digging depth has been purchased and is to be erected on this property in 1925. The Fairbanks Exploration Co. had one drill at work on lower Fish Creek. Jackson & Wickander hydraulicked on Last Chance Creek, a tributary of upper Fish Creek, and Eagan & Wild prospected on Fourth of July Hill.

Other Creeks

Miller & Co., with 4 men, hydraulicked creek ground on Homestake Creek, a tributary of Faith Creek. L. Schmidt ground-sluiced on the Nome Creek bench. Preliminary investigations of the dredging possibilities of Nome Creek, a tributary of Beaver Creek, were made, and the area is to be given a thorough prospecting.

On Kokomo Creek, a tributary of the Chatanika River, James Bros., Eagan Bros., Victor Graham, H. Steese, F.Stander, Chris. Sather, and several others were prospecting their ground. Most of this work is done during the winter.

Chena River

The gold production during 1924 from the Chena was very small. The area is at present difficult of access,

being best reached by winter trail from Fairbanks traveling cross country, the distance to Shamrock Creek being about 82 miles.

It has long been contended that the upper Chena River and the lower portions of Palmer, Shamrock, Ohio, Quartz, Salmonfoot, and other of its tributaries, were favorable for dredging. These possibilities are now being investigated.

K+50-55 Joe Chesna & Company, with 6 men, hydraulicked creek ground 14 to 16 feet deep on upper Shamrock Creek. A. McIntosh K+50-15 & Co. employed 4 men on Palmer Creek, where a hydraulic plant has been installed. This company, however, did practically no mining during the season, the work done consisting mainly in deepening and extending the bedrock drain. A. Van Curler K+50-55 conducted a small drift operation on lower Shamrock Creek. Jno. Cruzner and partner drifted on Hell for Sure Creek in frozen ground about 36 feet deep, reported to contain about $1.00 in gold per square foot. Several men were prospecting on Teuchet, Blackshell, Munson, Demar, Ottertail and other tributaries of the Chena and several prospectors were on tributaries of the little Chena River.

## Tolovana District

The gold production from the Tolovana for 1924 will show a considerable increase over that of 1923, for the

district was favored with a better water supply and many of the operations had very successful clean-ups. Drift mining there is, however, on a decline and even though the district affords generally unfavorable conditions for bringing in ample water supplies at a reasonable cost for hydraulicking, the number of small hydraulic operations is increasing. In 1924, nine drift mines, eight hydraulic and several ground-sluicing and shovel-in operations were conducted, employing in all about 110 men. While the usual amount of labor was available, practically all of the operations wanted more men, mainly because of the more favorable operating conditions. Transportation up the Tolovana River to Brooks was improved and the tram around the Log Jam is being rebuilt. The aeroplane service from Fairbanks to Brooks was of most valuable aid to many of the operators, who traveling to and from the district by that means. Fresh meats and provisions and a sectionalized scraper, were also transported by aeroplane.

Livengood Creek

14 W 9-18 McIntosh Bros. conducted drifting operations on the bench with 5 men; Drakula, Jurich and Radak with a crew of 6 men drifted on the Jewel bench; O'Connor, Kelley & Co., with a crew of 12 to 14 men, drifted on the Letrum bench; Bostrom & Co., with 8 to 10 men, drifted on the Ready Bullion; and Simons and Fisko prospected and drifted on the right limit bench. The largest drifting operation was

that of Arvjick & Seeburg's on the Letrum bench. From 16 to 18 men were employed and the ground is reported to have averaged $1.25 per square foot. J. McClelland, with 4 men, conducted hydraulic operations in the creek deposit, using a small elevator.

Amy Creek

K+49-45 Bachner & Co. drifted on the right limit bench with a crew of 12 men, and Jack Nielsen with 3 men employed, ground-sluiced and shoveled-in creek placer.

Ruth Creek

K+49-43 Bentley Falls with 4 men conducted hydraulic operations and J. Hudson with 2 men, ground-sluiced.

Lillian Creek

K+49-47 M. Beegler with 3 men hydraulicked rich gravels on the bench, as did Barker and Godfrey with 5 men. C.W.Hudson hydraulicked the creek placer which averaged about 18 feet in depth. He also conducted drifting operations during the winter. About 12 men were employed.

Olive Creek

K+49-70 N.P. Hudson, with a crew of ten, conducted a combined hydraulic and scraper operation in ground 12 to 18 feet deep on upper Olive Creek. C.W.Hudson with 4 men hydraulicked on lower Olive. The ground around the mouth of Olive Creek and on Livengood Creek is being considered as possible dredging ground.

Wilbur Creek

K-49-141 Tom Verdes with 1 man ground-sluiced and shoveled-in on the left limit bench and 2 or 3 other parties were doing similar mining at the mouth of Wilbur. Johnson and Healy conducted small drifting operations.

Hot Springs District

Reports received on the operations in the Hot Springs district indicate that their gold production for 1924 will probably be greater than that of 1923, and show that 10 hydraulic, 4 ground-sluicing and shovel-in, 1 slip scraper, 1 open cut with a self-dumper, and about 6 drift operations were conducted with about 60 men.

Eureka Section

K-48-94 Farmer & Jones hydraulicked on "High Bar" between Alameda and Eureka Creek. M.S.Gill and 2 men hydraulicked two pits on Last Chance Bar on Pioneer Creek, the deposit being 12 to 14 feet deep and all frozen. Operating costs were 12 cents per square foot or about 25 cents per cubic yard. K-48-95 Frank & Co. with a crew of six hydraulicked on the bench of Pioneer Creek, where three pits were completed, and one pit was mined on Seattle Jr. Creek. ___ Lund hydraulicked on the bench of Rhode Island Creek. K-48-92 Johnson, Sundstedt and Ainsley conducted hydraulic operations on the bench between Glenn Gulch and Rhode Island Creek in ground 5 to 10 feet deep. About 100,000 square feet of bedrock

were mined and some work was done on the construction of a new ditch to the Alice bench. K+48-87 V. Erickson and one man hydraulicked 12 foot ground at the mouth of Chicago Creek, a tributary of Omega Creek. Stevens, Buckley & Anderson mined on Shirley Bar between Glenn and Gold Run Creek. K+48-16 Olsen and Evenson ground-sluiced and shoveled-in on Omega Creek; Bob Hieght, and J. Green did similar mining on Eureka Creek.

Tofty Section

K+48-76 Cleveland and Howell conducted hydraulic operations on the Tofty bench with a crew of 8 men. The deposit consists of an average of 5 feet of gravel, containing the gold and tin (cassiterite) overlain by 30 to 45 feet of muck and other overburden, all of which is frozen. The gravels after being stripped of overburden by ground-sluicing and hydraulic methods, are hydraulicked to a small elevator operated under a low lift. Several tons of stream tin are usually recovered each season as a by product. K+48-71 Hanson and Lindberg with a crew of nine; Mellon, Strand and Hardwick, and Albrecht, Demmic & Co., on Woodchopper; K+48-13 Radovich & Co., on Miller Creek; K+48-3 Otto Hovely on Cache Creek; and several dthers, conducted drifting operations. K+48-21 M. Murray, on American Creek, with 5 men, after stripping off the muck and overburden by ground-sluicing with an automatic dam, shoveled the gravel and bedrock into wheel barrows, wheeling it to a self-dumping bucket, which was then hoisted up an incline cable and dumped

into the elevated sluices. Ed Ness with 8 men operated a slip tooth scraper, and H. Besonen and 2 men ground-sluiced and shoveled-in on American Creek. Anderson & Anderson did hydraulicking on Boulder Creek.

## Rampart District

The Rampart district was very quiet, there being two hydraulic plants, four automatic dam and shovel-in operations and two winter drifting operations conducted in 1924, engaging about 20 men. M 49-148 Chas. Swanson with 4 men hydraulicked bench placer on Hunter Creek at the mouth of Dawson Creek, while further down on Hunter Creek, A. Ott with 2 men hydraulicked on the bench. On Little Minook Creek, M 48-29 Climie, LaPorte & Nelson operated their automatic dam and shoveled-in, and S. Markoff with 2 men conducted similar mining about a mile further down the creek. Automatic dam and shovel-in mining was done by T. Antonsen on Hoosier Creek; and by Frank Hawley on Slate Creek. Several prospectors were "sniping" on Big Minook Creek. Miller and Elsted, and James Climie did some drift mining on Idaho Bar during the winter.

## Ruby District

The operations in the Ruby district are now rapidly diminishing in both size and number and consequently the gold production is delcining. About 65 men were engaged in mining and prospecting.

M 36-19 L. Sturtevant with two men on No. 4 above, Al Burke

on No. 3 above, and R. Deacon and one man on Discovery, ground-sluiced and shoveled-in on Bear Pup. B.J.Bowers with a crew of four men ground-sluiced and shoveled-in on Greenstone Creek. Farrell & Warren with two hired men hydraulicked, and Hansen & Rasmussen were drift mining, on McKetchum Creek. Willike, Cannon and Ferry with 2 men, and Manuel & Shropshire with 2 men, drift mined on Poorman Creek. Ed. Morton, Chas. Johnson, Wm. Midgley, Ed. McKelvie, and Jensen & Wicklund drifted on Flat Creek. From 2 to 3 men were engaged at each of these operations. R. Fulkerson with 2 men conducted drifting operations on Solomon Creek. While at work timbering a shaft, Mr. Fulkerson fell a distance of 40 feet and was instantly killed on July 24, 1924. Stevenson and Quinn, Fay and Cannon, and Geo. Bittels did drift prospecting on Timber Creek. M. McCarty prospected, and Rush & Collins worked over some tailings on Spruce Creek. Fred Carlson, Pilbach Bros., Frank Widegar, Jno. Dunn, Carl Vaughn, and Tommy, the Jap, were among those prospecting Big Creek. A. Sharpee and partner shoveled-in, and Tom Dean prospected on Birch Creek. Augusta, Galligher, & Forno drifted on Little Pup; Wm. Sandow drifted on Glacier Creek, and Max Rigler with a crew of six drifted on Trail Creek.

## Koyukuk and Chandalar Districts

The reports received from these districts are meager and general. These districts, lying about 150 miles

in a straight line north of the Yukon River, are two of the most remotely located in Alaska.

The Koyukuk district was one of the first to be discovered (1900), and has since produced about five million dollars in gold. In recently years the production has averaged about $100,000, coming from a comparatively small number of small operations. Most of these operations are conducted by groundsluicing and shoveling-in methods. A few small drift mines were operated. There are a great many creeks in the district known to be gold bearing and further discoveries are being made, mainly on the benches of many of the creeks. The gold content of the gravels mined is unusually high, and most of the gold is coarse. More miners are now being attracted to the district, prospecting is more active, and it is reported that several hydraulic plants are to be installed during the next season. The development of the district has been very slow, apparently due mainly to its isolated position.

About 60 men were engaged in mining and prospecting in the Nolan-Coldfoot section, mainly on the Hammon River, Nolan, Porcupine, Smith, Emma, Slate, Jim, John, Wild and other creeks. Good pay is reported to have been found in prospecting during the season at the mouth of Porcupine Creek and on Smith Creek, a tributary of the Nolan, and some high grade gravels were mined on the benches of the Hammon River, Nolan and other Creeks. Some drilling was done on Slate

Creek. About 15 miners were in the Hughes section. A general shortage of water is reported.

Meager reports on the Chandalar district, which lies over the divide to the east of the Koyukuk district, state that a little shoveling-in and prospecting was done on Little Squaw, Big Squaw, Tobin and Big Creeks. While encouraging results are reported from the prospecting, the general reports indicate that the gold production was less than in 1923, when $42,000 was produced. The main operation was on Big Creek where O. Nicholson with 6 to 7 men drifted ground about 20 feet in depth on No. 4 below. It is reported that the ground was averaging about $1.50 per square foot. A. Newton and one man ground-sluiced and shoveled-in on No. 1 below Big Creek. Visuda and several others planned to conduct drifting operations during this winter on the Smith ground on Little Squaw Creek.

## Iditarod District

Including the few operations on George River, Julian, Donlin and Moore Creeks, which properly lie in the Kuskokwim Region, 30 placer operations were conducted in the Iditarod during 1924, employing 135 men. Two dredges were operated on Otter Creek, employing 39 men. Most of the other operations used hydraulic methods of mining. A good supply of water was available at most of the operations

after about the middle of July, when a shortage of labor was experienced. The gold output from the district for 1924 is estimated to have been about $175,000.

Otter Creek

K+ 13-23 The Riley Investment Company operated its dredge until September, when a mechanical break-down brought the season to a close. A large area of ground averaging about 15 feet deep was most successfully thawed in advance of dredging operations at an operating cost of about 7-1/2 cents per cubic yard. The company employed 26 men. The Northern Alaska Dredging Company operated its dredge, employing 13 men. Richardson Bros. with 2 men hydraulicked; Peter Miscovich with 5 men operated a hydraulic elevator; J. Warren with one man, and J. Johnson, shoveled-in. K+ 73-21 Frank Salen with 6 men employed, hydraulicked on Granite Creek, and H. Galneck and partner ground-sluiced on Malamute Pup, tributaries of Otter.

Flat Creek

K+ 73-31 Capt. Becker with one man operated an automatic dam on Bonanza Claim; K+ 73-9 P. Laparrier and partner mined on the Glenn; H. Agoff and partner were on the Fox claim; P. Claustrop, and Frank Andersen and partner, mined on the Wild Cat. The Alpha Mining Company hydraulicked on the Alpha, in good pay which was discovered to come in from the gulch on the right limit. W. Sakoff and two men, and

B. Maroni and partner mined on ~~on~~ the Upgrade; O. Olson and 3 men hydraulicked on the Hill Top; Paul Wabnig mined on the Idaho claim.

Chicken Creek

The Chicken Creek Mining Company had a very successful season hydraulicking at both the upper and lower pits. Fourteen men were employed.

Happy Creek

Pete Steger and two men ground-sluiced and shoveled-in at the very head of Happy Creek on the Summit Association, while Dan Olson and partner mined on the Ray farther down the creek near Willow.

Willow Creek

Bolanger & Co., with 3 men, operated a small hydraulic elevator and J. Loranger with 5 men operated a Bagley scraper a short ways below them. The dragline excavator of Frank Manley's was not operated during the season, but some work was done on the ditch and preparations were made to resume operation next season.

Moore Creek

The principal operation on Moore Creek was that of Dawson and Keller on No. 6 Pup, where they hydraulicked ground averaging 10 feet deep. Prospecting conducted the previous season showed the pay to continue well above the old ditch line so a new ditch about 3 miles long was

completed and successful operation has resulted, although this new ditch gave considerable trouble during the season. They also conducted some drilling operations on Moore Creek, which is being investigated for its dredging possibilities. Nine men were employed. Felix Boushau ground-sluiced.

Georgetown area

K13-22 Barney Walsh with 5 men and Harry Stevens with 4 men hydraulicked on Donlin Creek, a tributary of Crooked Creek. Anderson and Remus mined on Julian Creek and Riley and Kirk hydraulicked on George River. These operations, as well as those on Moore Creek, while being in the Kuskokwim region, outfit in Flat and are generally considered in the reports of the Iditarod district.

## Innoko District

Two dredges, three steam scraper plants, one hydraulic plant and about eight ground-sluicing and shovel-in operations were conducted in the Innoko district. In general, the district was not very active and it is estimated that the gold output was less than that of the previous year. The wagon road from Tacotna has been completed to the mouth of Yankee Creek.

Ganes Creek

K13-51 Gainan & Ames Dredging Corporation operated its 2 cubic foot semi-diesel driven dredge on No. 13 above.

This dredge, formerly on Glacier Creek on Seward Peninsula, was moved to Ganes Creek in 1923, starting its first season on this creek in 1924. The Innoko Dredging Company's dredge was idle, the season being spent in drilling. As a result, this dredge will not resume operation.

Yankee Creek

K+73-35 The Flume Dredge Company operated its 2-1/2 cubic foot distillate driven flume dredge. This company has had the machinery and hull material for a similar dredge on Little Creek for several years. While the erection of this dredge has been delayed until the hydroelectric installation which the company has underway, and which is to provide power for these two dredges, could be completed, the company announces that this dredge will be erected and operated, and the hydroelectric installation will be completed, in 1925.

Little Creek

K+73-10 Schneirla Bros. resumed their hydraulic operations on Little Creek; Vibe & Cameron operated a slip scraper; Dan Nicholson ground-sluiced and operated a scraper; and F. Speljack ground-sluiced.

Spruce Creek

K+4-26 Edwards & Nicholson and Riech & Daniels ground-sluiced and shoveled-in.

Ophir Creek

K+64-31 Collins & Hard, and Johnson & Johnson operated steam

scrapers; John Staton ground-sluiced, shoveled-in and wheeled to a self-dumper. Berg and Meier ground-sluiced and shoveled on No. 4 below, bench, with 4 men. The average depth of deposit mined was 35 feet, of which 8 feet was gravel, the balance muck. An area of 13,000 square feet of bedrock was mined, 25 days being spent in shoveling and wheeling to a self-dumper. Victor Hill mined on Victor Gulch. K-84-16

Marshall (Wade Hampton) District

The principal placer operations are conducted on Willow Creek, located about 14 miles from Marshall (Fortuna Ledge P.O.) on the lower Yukon River. They are reached by small boats traveling 10 miles up a narrow slough to Willow Creek Landing, from where a 3 mile corduroy road leads over low rolling hills to the operations. The cost of transporting supplies from Marshall to the Willow Creek operations is 4 cents per pound in the summer and 2 to 2-1/2 cents in the winter. The average base rate on freight from Seattle to Marshall is about $35 per ton.

Willow Creek

K-81-6 J.W.Hill and J. G. Johnston groundsluiced to within 4 feet of bedrock, the remaining gravel and bedrock being shoveled-in. There are numerous boulders and most of the bedrock has to be carefully cleaned, owing to crevices. Side pay is being mined, the main pay streak

having formerly been worked out. Jos. Plein and one man "sniped" a small area of virgin ground about 20 feet deep on Discovery, which had been covered by an old dump. Leo Moore and wife ground-sluiced and shoveled-in on No. 1 above. Wm. Jamison was "sniping" on No. 2 above; P. Oliver mined on the Spider Fraction; Tony Jurack "sniped" on No. 3 above and N.F.Patten was "sniping" on side pay on No. 4 above.

Wilson Creek

K+81-19 This creek lies over the range from Willow Creek and empties into the slough several miles below Willow. No mining is done on Wilson Creek proper, but is confined to its tributaries, Disappointment and Elephant Creeks. Blanker and Edgar with a crew of 5 men hydraulicked on Disappointment Creek, using a small scraper for stacking the tailing. K+81-7 Geo. Pilcher, working alone, hydraulicked on Elephant Creek.

K+81-17 81-15 Dougherty and Gertler ground-sluiced and shoveled-in on Buster Creek, a tributary of the Kako, in the Russian Mission district. K+81-25 J.H.Wick shoveled-in on Montezuma Creek, a tributary of Buster.

K+12-1 The little mining done in the Stuyahok district was mostly of a prospecting nature. Fred Kruger and 3 others were prospecting on Fat Creek, a tributary of the Stuyahok. Moore, Richardson, Humphreys and Edwards had a lease on some of Kruger's ground but their operations

were confined chiefly to prospecting.

## Kuskokwim Region

The principal operation in the Kuskokwim Region is the dredge of the Kuskokwim Dredging Company on Candle Creek, near McGrath, in the Mt. McKinley district. Placer mining was conducted on a small scale north of McGrath on Hidden Creek, a tributary of the Nixon River and elsewhere in that vicinity. A placer deposit on the North Fork of the Nixon River is being drilled to determine its dredging possibilities.

K-1411 The dredge of the Kuskokwim Dredging Company on Candle Creek operated from May 24 to October 17, a working season of 147 days, of which only 9 per cent was lost time. This is an unusually fine record. An area of 164,225 square feet was dredged, which averaged 22-1/2 feet in depth after being stripped of from 20 to 35 feet of overburden by ground-sluicing and hydraulicking in advance of dredging. The dredge dug 134,206 cubic yards of gravel averaging $1.23 in gold per cubic yard. Difficult digging and sluicing conditions occasioned by much heavy clay greatly reduced the digging capacity of the dredge, which only dug an average of 1000 cubic yards per 24 hours. A large amount of drilling was also done on the lower ground.

K-1811-16 The New York-Alaska Gold Dredging Co. has, for several seasons past conducted drilling operations on Bear

Creek, a tributary of the Tuluksak, in the Tuluksak-Aniak district on the lower Kuskokwim. This company operated two gasoline driven churn drills during 1924 and also prospected with open cuts and shafts. An average of about ten men were employed. As a result of the prospecting, this company will erect a dredge on this creek in 1925. It is a diesel driven dredge of the combination type with revolving screen, flume and conveyor, with a 4 cubic foot close connected bucket line, capable of digging 18 feet below the water line. The contract price of this dredge erected at the property ready to operate is $175,000.

Several small open cut operations were conducted on Spruce, Canyon and other creeks in the Tulusak-Aniak district and a small amount of similar mining was done in the Goodnews Bay district.

## Seward Peninsula

Final or detailed statistics on the placer gold production for the 1924 season from the Seward Peninsula are not yet available, but early estimates would indicate a small increase over that of the previous year. For 1923, the U.S. Geological Survey reports a gold production of $1,270,000 from 3,091,610 cubic yards of gravel sluiced. This was a slight increase over the 1922 production and an increase of practically one million cubic yards of gravel sluiced. This was due mainly to the two large dredges at Nome, which

started their first season that year. The Survey reports that, in 1923, 16 dredges were operated on the Seward Peninsula, digging 2,921,629 cubic yards, producing $1,017,620 in gold, or an average of 35 cents per cubic yard. This was 80 per cent of the 1923 placer gold output, while the hydraulic mining operations, including all operations where any water was used to move gravel to the sluice boxes, produced 14 per cent, drift mining, 4 per cent, and all other placer methods 2 per cent.

In 1924, 18 dredges were operated on the Seward Peninsula, as mentioned on page 8, which, according to early estimates made by the writer, but from incomplete returns, indicate that the gold output by these dredges was practically equal to that produced by dredges on Seward Peninsula in 1923, while the yardage dug was about 200,000 cubic yards less. Four of these were small dredges, and were operated for only about one month or less, while a number of the other dredges had accidents resulting in considerable loss of time, reducing their seasonal yardage and production. Over half of the ground dredged during 1924 on the Seward Peninsula was handled by the large dredges of the Hammon Consolidated Goldfields Co. Two dredges operated during the past season completed the dredging of their ground, but a number of dredges that were idle will resume operations in 1925. A large increase in both the gold output and the

yardage dug, by the dredges, is expected for 1925. The main dredging activity was on the Nome tundra and much drilling was done there during the season. The largest interest there has recently changed hands and a consolidation with large adjoining dredge holdings may result in the near future.

1452-47 The largest dredging operations in Alaska are those of the Hammon Consolidated Goldfields Company at Nome. This Company operated three 9 cubic feet electrically driven dredges, the third dredge, No. 3, having been erected during the summer. This new dredge is of the same size and construction in practically all respects as the No. 1 dredge, with a digging depth of 60 feet below the water level. These dredges are of the "composite type" of construction, having wooden hulls, longitudinal steel trusses, entire steel superstructure, and a special housing of pressed board, lined on the inside and outside with sheet steel and in all ways constructed to give most practical and efficient operation under Alaskan conditions, especially as encountered at Nome.

The No. 1 dredge operated from June 25 to Nov. 8, or 136 days, handling 426,943 cubic yards. No. 2 dredge operated from May 1 to Dec. 7, or 220 days, digging 1,020,229 cubic yards. This operating season of 220 days establishes a new record for Alaska dredging. No. 3 dredge started its first dredging on Oct. 7, running until Nov. 26, or 50 days, digging 115,750 cubic yards. The three dredges handled

1,562,922 cubic yards. The average depth of ground dredged was 46 feet. Three more 525 H.P. Werkspoor diesel units were added to the power plant which now has a total horsepower of 3150. These engines operate on 14 - 16 gravity fuel oil, which is delivered to the Nome anchorage by tank steamers from where it is pumped to the storage tanks about 1-1/2 miles distant. The fuel consumption under average load is approximately 25 gallons per hour per engine and 30 gallons under full load. The engines are directly connected to 2300 volt, 538 KVA, General Electric alternating current generators. This current is stepped up to 11,000 volts and transmitted 3-1/2 miles to the dredges.

The company thawed a large volume of ground during the season with water at natural temperature.m The ground thawed ranged from 35 to 65 feet in depth. The water used for thawing was obtained mainly from the Miocene ditch, although during the period of minimum flow the supply was supplemented by pumping. Water was used under pressures from 30 to 80 pounds per square inch. In some of the deeper ground and particularly in certain areas along the Third Beach line, where bedrock is overlain by limestone boulders or a cemented bed of gravel, difficulty was encountered in driving the thawing points to bedrock. In these areas, churn drill holes are put down to bedrock, in which the thawing point is placed. These churn drill holes are gener-

ally spaced at 32 foot centers in equilateral triangular relation to each other, and intermediate points are driven about half way between, and as deep as it is possible to drive them. From 3 to 4 weeks is normally required to complete a thaw. In areas where the points can be driven to bedrock, the usual spacing is at 16-foot centers, when less time is required for thawing. A complete and thorough thaw is usually obtained when the points can be put to bedrock, although large amounts of water may be lost and patches or "horses" of frozen ground may remain where thawed underground drainage channels are encountered.

From 80 to 350 men were employed by the company on dredge erection, dredge operation, thawing, drilling, hydraulic operations, etc.

K-52-149 The Alaska Mines Corporation operated its 3-1/2 cubic foot dredge (former Center Creek dredge) on Snake River. Engine trouble caused a considerable loss of time. About 100,000 cubic yards of ground averaging about 24 feet in depth were thawed with water at natural temperature. The water for one unit of 100 points was pumped from the Snake River by an electrically driven 6-inch centrifugal pump delivering 1000 gallons per minute at 17-1/2 pound pressure. These points were spaced at 10-foot centers and required an average time of 12 days to complete a thaw. Another unit of 150 points obtained the water from the Center Creek

ditch at an 11-pound pressure. These points were spaced at 8-foot centers and an average thaw required 4 days. The much less time required to thaw with this unit, is apparently due, at least in part, to more favorable and shallower ground and possibly warmer water. All points were easily driven to bedrock. Fifteen men were employed by the company, five being engaged on the thawing.

K-52-127 The Bangor Dredging Company on Anvil Creek, operated its dredge for 86 days, digging 140,000 cubic yards. The dredge was shut down for 5 days in August, due to a mechanical accident and also experienced trouble with seasonal frost. But for seasonal frost the deposit is unfrozen. The operating cost for the season was 19.3 cents per cubic yard. Nine men were employed.

K-52-167 The Dexter Creek Dredge on Dexter Creek was operated from July 17 to October 5, 8 days of this period was, however, lost due to a broken spud. The dredge dug 57,000 cubic yards at an operating cost of about 30 cents per cubic yard. Eight men were employed.

K-53-120 The Lomen Reindeer & Trading Company, successors to the Eskimo Dredging Company on Solomon River, started the season's dredging on July 15. The dredge was later shut down for 17 days due to the breaking of the crank shaft of the 200 H.P. Diesel engine. Resuming operation, it continued until October 19. The dredge dug 230,000 cubic

yards during the season, which was much less than its usual yardage. Fifteen men were employed.

K453-175 The Northern Light Mining Company's dredge operated from July 9 to October 12, digging 108,000 cubic yards at an operating cost of 23 cents per cubic yard. Only one shift was operated for the first ten days in July. About 30,000 cubic yards were thawed with water. Nine men were employed.

K453-176 The Wild Goose Mining & Trading Company operated its No. 1 dredge on Ophir Creek from July 23 to October 5, or 77 days. The actual operating time was 1667 hours , or 90.15 per cent. The dredge dug 158,759 cubic yards, recovering 47.01 cents per cubic yard. The operating cost was 18.51 cents per cubic yard. This dredge started operations on Ophir Creek in 1910 and operated each season since then. It has now completed the dredging of its ground, bringing to a close one of the most consistent and profitable dredging operations in Alaska. Fifteen men were employed.

K444-168 The Bering Dredging Corporation dredge on the Kougarok River started digging on July 19 and until August 2 dug back through last season's tailings. From August 2 to September 2 it floated its way across claim No. 3, not owned by the company. It resumed digging on September 6, continuing until October 8. About 50,000 cubic yards were dredged. Eight men were employed.

K445-31 The Dime Creek Dredging Company operated its dredge

on Dime Creek and thawed a small area with water. Considerable difficulty was experienced with frozen ground. The Shovel Creek dredge, the Big Hurrah Creek dredge, and the Crooked Creek dredge, all operated for the greater part of the season. The dredge of the Casadepaga Mining Syndicate K+53-96 on Canyon Creek, after being moved downstream for several miles was reconstructed and launched on September 7, operating until September 27. The dredge of the Alaska Investment K+52-208 & Development Company on Osborne Creek operated for about 20 days. The Alaska Kougarok Dredging Company's dredge on K+44-166 Taylor Creek operated for about 36 days. The Luther Gold K+43-81 Dredging Company's dredge on Budd Creek operated for a short period during the fall.

The dredges and holdings of the Alaska Dredging K+45-42 Company and the Candle Creek Dredging Company, on Candle Creek, are reported to have been acquired by E. J. Matthews of the Keewalik Mining Company, and would resume operations in 1925. The old Flower dredge that has been lying idle on lower Solomon River for a number of years is to be overhauled and will be operated there by the Neilsen Mining K+53-120 Company in 1925. It is also reported that J. Bellevue plans to resume dredging on Dry Creek, near Nome. Dredging on this creek was brought to a sudden close in 1921, when the dredge caught fire.

Hydraulic mining was conducted in many of the districts, particularly in the Nome, and Fairhaven distri cts,

where the larger operations employ hydraulic elevators. In the Nome district, the Hammon Consolidated Goldfields Company at Little Creek conducted hydraulic elevator operations in three pits, completing two pits started in 1923. This work was, however, restricted as most of the water formerly available for these operations is now used for thawing purposes. Lee & Swanberg, with a crew of 7 men, hydraulicked on the right limit benches of Osborne Creek. The Golden Ore Mining Company on Boulder Creek, and other tributaries of the Snake River, did not mine during the season, but conducted prospecting work on its properties, in preparation for the extensive operation planned for the future. The Canada Alaska Mines, Ltd., employed 7 men in cleaning out and repairing the ditches on Oregon Creek, a tributary of Cripple Creek, and other work was done in prospecting the property to determine its possibilities for future hydraulic operation. E.W.Quigley with 7 men hydraulicked the shallow gravels on lower Big Hurrah Creek, a tributary of the Solomon River, by piping into the head of the boxes and stacking the tailings. The Wild Goose Mining & Trading Co. conducted a hydraulic elevator operation on Ophir Creek, mining 19,791 cubic yards.

K745.15 In the Koyuk district, Porter, Leonard & Co., with 4 men, hydraulicked by piping into the head of the boxes on Dime Creek. Some platinum is recovered as a by-product of

gold placer mining on this creek, and while only a relatively small quantity of platinum is recovered, it is the main source in Alaska. W.L.Sutton on Dime Creek, and F.J.McCoy on Sweepstakes Creek, conducted small open cut operations.

In the Fairhaven district the principal operations were those of the Keewalik Mining Company and A. Cordovada. Rylander, Nass & Company, #45-64 with 5 men, hydraulicked on Bear Creek, a tributary of the Buckland River; Swanson and #44-29 Nordlind with 2 men hired, hydraulicked on Patterson Creek, a tributary of Candle Creek, and O. Lundberg conducted a small hydraulic operation on Candle Creek. A.L.Lundquist with 4 men operated a hydraulic elevator plant on Patterson Creek.

The Keewalik Mining Co. employed 12 men, operating a hydraulic elevator plant on Candle Creek, and a Ruble elevator operation was conducted on the Johnny Bull Channel. Two severe floods were experienced, one of which filled up the Candle Creek pit.

#44-37 A.V.Cordovado with ten men conducted hydraulic elevator operations on Inmachuck River, mining one pit 150,000 square feet in area. The ground averages from 20 to 25 feet deep, from which 10 to 12 feet of muck and overburden is stripped, after which the 10 to 12 feet of gravel and a foot or two of bedrock is piped to the elevator. The combined cost of the stripping and the elevator work in 1924 was about 17 cents per square foot. #44-41 D. Hoogendorn with 4 men, and #44-32 R. Eschold with one man, hydraulicked

on the Inmachuck River benches.

Numerous small open-cut operations employing ground-sluicing and shoveling-in methods were conducted in many localities.

Very little drift mining was done on Seward Peninsula. Several small winter dumps were taken out in the Nome district, but most of the drift mining was conducted on Dime Creek, where Hegberg K45-32 and Holmes drifted on No. 7 above with 4 hired men, taking out about 10,000 square feet during the summer; Valentine K45-30 and Porter with 7 men took out a winter dump on No. 1 below left limit bench, from a 140 foot shaft; and Olson K45-32 Bros. with a crew of 6 men drifted about 20,000 square feet during the summer on No. 1 above, left limit bench. McDonald K45-42 and McIntosh drifted on No. 12 left limit bench, Candle Creek, in the Fairhaven District.