

PLACER MINING in ALASKA in 1924 and 1925,
by Norman L. WimplerINDEX

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PLACER MINING IN ALASKA IN 1924 AND 1925.

From (Data gathered and reports written by Norman L. Wimpler, Placer Mining Engineer, U. S. Bureau of Mines, ~~and~~ Reports for two years combined in the office of Mine Inspector)

Introduction

~~These reports are written for publication in the Annual Report of the Mine Inspector for the Territory of Alaska in accordance with a cooperative agreement between the U. S. Bureau of Mines and the Territory of Alaska.~~

A study of placer mining in Alaska was begun by the writer in 1922 for the U. S. Bureau of Mines, and since that time practically all of the more important placer districts and operations in Alaska have been visited and studied.

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 *familiar with* ~~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.~~

~~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. ^{It had}
~~it not been for this aeroplane~~ trip the districts beyond Circle could
not have been included in the season's field work. Conditions per-
mitted visiting only a small part of the Forty Mile district, after
which the Eagle, Seventy Mile and Circle districts were visited. Re-
turning 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.~~

During the season of 1924 John A. Davis of the U. S. Bureau of Mines conducted placer mining investigations on ~~the~~ Seward Peninsula, 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.

During 1925 the field work of the writer was conducted in the Fairview, Cache Creek, Hope, Sunrise, Girdwood, Hot Springs, Tolovana, Fairbanks, Richardson, Tenderfoot, and Valdez Creek districts, which were visited in the order named. In each annual report under "Review by districts" attention has been given mainly to those districts and

operations visited during the current season, with accounts of the conditions existing, and the mining methods employed at the more representative operations are given. During the past four years most all of the more important placer mining districts have been visited and reported upon, so that this series of four annual reports includes first hand information on practically all of the principal placer mining operations in Alaska. The report for 1925 was written during October before ~~the~~ production statistics which are annually obtained and published according to law by the Mineral Resources Division of the U. S. Geological Survey were available for this year.

Acknowledgments

The writer is greatly indebted to the many Alaskans for their helpful cooperation, especially to those he met during his field studies and to those who supplied him with the information concerning the operations conducted in those districts not visited during the season. Special acknowledgment is also made to the U. S. Geological Survey for statistics on placer gold production and other data.

Production

The total value of the gold and silver produced by all Alaskan mines from 1880 to 1924, inclusive, a period of 45 years, is \$357,257,000. Of this amount, its placers have produced \$236,722,326 in gold and \$1,150,000 in silver. More than \$200,000,000 of this

placer gold has been produced since 1900. The placer mining was at its height in 1906 when the production was \$18,600,000 in gold and 8,000 men were employed in mining it. In 1923 the placers of Alaska produced \$3,608,500 in gold from its 446 summer mines and 75 winter mines, with 2,368 men employed. \$18,345 in silver was also produced by the placers in 1923. 6,015,595 cubic yards of gravel were mined from which an average recovery of 60 cents in gold per cubic yard was made. The 25 dredges operated during 1923 dug 4,645,063 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. The placer gold production in 1924 was \$3,599,382, the lowest up to that time since 1900.¹ During 1924 there were 25 dredges operating which produced about \$1,565,000 in gold. This does not include, however, 3 Seward Peninsula dredges that operated for about one month or less, and which made but a small production.

¹Statistics from Mineral Resources of Alaska; U. S. Geological Survey

Statistics on the total placer gold production for 1925 were not available when this report was written, but indications are that it was a little less than that of 1924. Early reports indicated a decreased production in the Fairbanks district, as most of the properties there on the more important creeks where many of the former operations were conducted have been acquired by dredging interests.

The production from Seward Peninsula will also show a decrease as one of the three largest dredges there did not operate, while the other two did not start until early in September. A number of the other dredges there were also late in starting. Some of the large hydraulic elevator plants on the Seward Peninsula were also curtailed in their operation through lack of water. While a number of the interior districts made a smaller production, others made material increases. The Yentna, and some of the coastal districts made larger productions.

It is estimated that about 2,700 men were engaged in placer mining, prospecting and development work during 1925, with from 500 to 800 of these men employed by dredging interests mainly on work preparatory to future operation, principally in the Nome and Fairbanks districts. The low stage in placer gold production was no doubt reached in 1925 and ~~pending~~^{with} the completion of extensive dredging developments now under way, a large increase by dredging should result in 1926.

During 1924 and 1925 a small amount of platinum was recovered as a by-product at the gold placer mines on 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~~^{was} mined in the Port Clarence district near York in 1924, and 17 tons of stream tin was shipped out of the Tofty area in the Hot Springs district during 1925. A shipment of $9\frac{3}{4}$ tons of placer tin is also reported from Tin City on Seward Peninsula in 1925.

The following table giving the value of gold produced by Alaskan placer mines according to districts from the first year of production to 1923, inclusive, has been compiled to show the relative importance of the various districts in respect to past production. Grouped as "All others" are included the Yentna, Nizina, and the Kenai Peninsula region, as a segregation was not available. Due to some adjustment of the production statistics prior to 1922, which was made in 1923 by the U. S. Geological Survey, the total given in the table is \$992,548 more than now reported by the Survey.

Value of Gold and Silver Produced by Alaskan
Placer Mines by Districts
(Compiled mainly from statistics published by
U. S. Geological Survey.)

<u>District</u>	<u>First year of production</u>	<u>Value of gold pro- duced to 1923, incl.</u>
Forty Mile	1886	\$6,524,000
Circle	1894	6,850,000
Rampart	1896	1,619,000
Seward Peninsula	1897	84,650,185
Kobuk	1898	338,000
Koyukuk	1900	4,921,100
Hot Springs	1902	6,330,400
Fairbanks	1903	72,576,000
Bonnifield	1903	298,000
Kantishna	1903	522,000
Valdez Creek (a)	1903	490,000
Richardson	1905	1,744,000
Chandalar	1906	295,500
Ruby	1907	5,496,000
Irmoko-Tolstoi	1907	3,165,000
Kuskokwim Region	1908	2,622,000
Eagle and Seventy Mile	1908	370,000
Iditarod	1910	19,230,000
Chisana	1913	667,000
Marshall	1914	1,139,000
Tolovana	1915	4,200,000
All others (b)	Since 1880	10,068,307
		<u>\$234,115,492</u>

Silver produced from placer mining to 1923, incl. 1,131,845

235,247,337

(a) Personal estimate

(b) Mainly the Yentna, Nizina & Cook Inlet districts and Southeastern Alaska.

Summary of Placer Mining in 1924

Climatic conditions bear a direct influence upon the available water supply at most ~~of the~~ Alaskan ^{placer} 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 was 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 under way 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, ^{twenty eight} ~~there were 28~~ dredges ^{were} 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
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Koyuk district:

Dime Creek Dredging Co.	Dime Creek
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Kougarok district:

Alaska Kougarok Co.	Taylor Creek
Bering Dredging Corporation	Kougarok River

Port Clarence district:

Luther Gold Dredging Co.	Budd Creek
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Yukon Basin:

Circle district:

Berry Dredging Co.	Mammoth Creek
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Fairbanks district:

Chatham Gold Dredging Co.	Clary Creek
Fairbanks Gold Dredging Co., No. 1	Fairbanks Creek
" " " " No. 2	" "

Iditarod district:

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

Innoko district:

Flume Dredge Co.	Yankee Creek
Guinan & Ames Dredging Corp.	Upper Ganes Cr.

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 Company and the Goldfields American Development Company, 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 Company at Nome. This company erected and placed in operation another 9 cubic foot electrically driven dredge and increased its diesel power plant to 3,150 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.

and Foster Shumway
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 from ditches under pressure available for thawing, 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 3½ 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
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 rubble elevator is operated on Candle Creek in the Fairhaven district.

Showing Mechanical Methods

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
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 drifting. 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.

Ground sluicing, etc

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.

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 Kuskokwin 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

The
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 Wrangell, Alaska, and has attracted many Alaskans.

numerous important projects under construction, provides only a small 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. Aeroplans 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 "Review by Districts."

Summary of Placer Mining in 1925

The season of 1925, in general, was a normal one for placer mining from an operative viewpoint, and one of exceptional activity in dredge development. The acquisition of properties by

dredging interests caused the suspension of a number of mining operations, while in other cases, operations were not conducted on the usual scale while investigations were under way. Many of the operations in most of the interior districts and some in the northern part of the Seward Peninsula were handicapped for several months through lack of water occasioned by a long spell of hot dry weather. A water shortage, especially for hydraulic mining is, however, the usual condition in most of the interior districts. Southwestern Alaska districts had a good season with no pronounced water shortage. High flood conditions developed by exceptionally heavy rains during September were quite general throughout Alaska, although very little damage to the placer operations has been reported.

During 1925, there were 27 dredges operated in Alaska; 16 on the Seward Peninsula and 11 in the interior and other districts. The companies operating dredges in 1925 are listed below, each company operating one dredge, except as noted.

Gold Dredges Operated in Alaska in 1925

Seward Peninsula:

Nome district:

Bangor Dredging Corporation	Anvil Creek
Dexter Creek Dredging Co.	Dexter Creek
Dry Creek Dredging Co.	Dry Creek
U. S. Smelting, Refining & Min. Co. No. 2	Nome Tundra
U. S. Smelting, Refining & Min. Co. No. 3	Nome Tundra
U. S. Smelting, Refining & Min. Co. No. 4	Snake River

Solomon district:

Lomen Reindeer & Trading Co.
Shovel Creek Dredging Co.
Iverson & Johnson

Solomon River
Shovel Creek
Big Hurrah Creek

Council district:

Crooked Creek Dredging Co.
Northern Light Mining Co.

Crooked Creek
Ophir Creek

Casadepaga district:

Casadepaga Mining Syndicate

Canyon Creek

Koyuk district:

Dime Creek Dredging Co.

Dime Creek

Kougarok district:

Bering Dredging Corporation

Kougarok River

Fairhaven district:

Keewalik Mining Co. No. 1
Keewalik Mining Co. No. 2

Candle Creek
Candle Creek

Yukon Basin:

Circle district:

Berry Dredging Co.

Mammoth Creek

Fairbanks district:

Chatham Gold Dredging Co.
Fairbanks Gold Dredging Co. No. 1
Fairbanks Gold Dredging Co. No. 2

Cleary Creek
Fairbanks Creek
Fairbanks Creek

Iditarod district:

Northern Alaska Dredging Co.
Riley Investment Co.

Otter Creek
Otter Creek

Innoko district:

Flume Dredge Co.	Yankee Creek
Flume Dredge Co.	Little Creek
Guinan & Ames Dredging Corporation	Ganes Creek

Kuskokwim Region:

Mt. McKinley district: (McGrath)

Kuskokwim Dredging Co.	Candle Creek
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Susitna Region:

Yentna district:

Thos. D. Harris & Co.	Cache Creek
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The Dry Creek, and the two Keewalik dredges on the Seward Peninsula, which were idle in 1924, resumed operations in 1925; while 5 dredges operated on the Peninsula in 1924 were idle in 1925. All of the dredges in the interior and other districts continued operations in 1925 and a new dredge was operated on Little Creek in the Innoko district. The dredge on Fish Creek was erected during the season but was not completed in time to operate. The dredge for the Tuluksak River in the Kuskokwim region was landed at Aniak during the summer, but will not be erected and operated until next season. At least two new dredges will start operations, and three dredges idle in 1925 will resume in 1926. About 50 per cent of the placer output in recent years has been produced by dredging. The production by dredges in 1925 will closely approximate that of 1924, when they produced \$1,563,633 in gold.

The year 1925 was an unusually active one in dredging developments and the investigation of possible dredging areas. Drilling was

done on Ester, St. Patrick, Goldstream, Dome, Little Eldorado, and Cleary Creeks, and on the upper Chena River and its tributaries, in the Fairbanks district; on the Salchaket River and its tributaries Caribou and Butte Creeks; on Ingle Creek in the Forty Mile district; on Moore Creek and the Tuluksak River in the Kuskokwim Region; on the Nome tundra, on American Creek, a tributary of the Niukluk River; on Coal Creek, a tributary of Solomon River, and elsewhere on the Seward Peninsula, and in the interior. The placers on Coal Creek in the Circle district; Nome Creek in the Fairbanks district; Moose Creek in the Bonifield district; the Tofty and Eureka areas in the Hot Springs district; the Katzehin and Shuck Rivers near Juneau; were among those prospected and investigated for dredging possibilities. A large dredging field is reported to have been developed on Bonanza Creek, a stream emptying into Norton Sound about 125 miles east of Nome.

⁴⁵⁰⁻⁹⁹ The most important dredge development under way is that of the Fairbanks Exploration Company in the Fairbanks district. This company has had from 250 to 425 men engaged during the year in drilling, surveying, ditch construction, building construction, experimental work in stripping overburden and other investigative and construction work. Goldstream and Cleary Creeks are to be the first to be dredged, although it will probably be three years before dredges will be ready to start operations there. A 12 mile ditch and some small local ditches were constructed. A resurvey was made of the 79 mile ditch under consideration for bringing water from the Chatanika River as far as Goldstream

Creek, but its construction has as yet not been decided upon.

The Goldfields American Development Company, large British interests, was very active in drilling and investigating dredging ground in the Fairbanks district up until the middle of June, when the company withdrew.

K152-42 A transaction of great importance to the future of dredging was consummated during 1925 when the U. S. Smelting, Refining and Mining Company acquired the dredges, equipment and all holdings of the Hammon Consolidated Goldfields Company at Nome and those of the Nome Mining Corporation (formerly known as the Alaska Mines Corporation). This company operated a $3\frac{1}{2}$ cubic foot dredge on Snake River, and two of the 9 cubic foot dredges were operated for a short period in the fall. The main work conducted was in thawing a large volume of ground with water at natural temperatures, for which a 1,700 point outfit was used. Systematic experiments and studies were conducted in thawing, which, according to reports, have greatly improved the efficiency of the thawing and reduced its cost. Thawing with water at natural temperatures has its problems which must be solved for different conditions. These problems are now generally well understood and this method of thawing is being used with great success at many of Seward Peninsula and interior dredging operations where frozen ground is encountered and has been the chief factor in extending the dredging fields of Alaska. *Hydraulic Mining - 1925*
Hydraulic mining was conducted as usual in most of the districts. Water shortage in some of the interior and Seward Peninsula districts handicapped those operations during mid-season, but in general

hydraulic mining experienced a good normal season. This was particularly so in the Yentna, and Nizina districts, and on Kenai Peninsula. Hydraulic operations in the interior are conducted mostly on a small scale, being limited by the adverse conditions for obtaining ample water supplies. The larger operations are conducted mainly on Seward Peninsula and in the districts of Southwestern Alaska. On the Seward Peninsula it has been necessary in most instances to construct long ditch lines to obtain a water supply under pressure, but even so, periods of drought are common. In Southwestern and Southeastern Alaska, large water supplies are obtainable under high pressure by comparatively short ditches or other conduits, and as many of the streams are glacial fed, an exceptionally good water supply is then available during the hottest and driest of weather. The use of scrapers and cableway excavators operated by steam for stacking tailings has been adopted by a number of the interior hydraulic operations where the water supply is small. No new hydraulic plants of importance were reported to have been installed during 1925.

Method of open cut mining in 1925
Steam scraper plants still predominate among the mechanical methods of open cut mining, although their use is rapidly on the decrease. Several scraper plants were operated on Goldstream Creek during 1925, but with the acquisition of most of the ground on this creek by dredging interests most of the operations formerly conducted here have suspended. A few scraper operations were conducted in the Innoko district,

Iditarod, Forty Mile and Seward Peninsula districts, but scrapers are now more generally used in conjunction with hydraulic or other open cut operations for scraping bedrock or stacking tailings. The day of the steam scraper as a mechanical method of placer mining in Alaska is doomed, as the dredge, cableway excavator or dragline excavator can mine most of the ground where scrapers are applied, more efficiently and economically. No cableway excavators or dragline excavators were reported to have been operated during 1925, although cableway excavators were used successfully in the Fairbanks district for stacking tailings at two hydraulic operations. Dragline excavator operations are to be resumed on Willow Creek in the Iditarod district next season.

Drift mining
Drift mining was conducted mainly in the Fairbanks, Tolovana, Hot Springs, Ruby and Koyukuk and to a lesser extent in the Circle, Forty Mile, Chandalar and several other interior districts, and in the Nome, Koyuk, Inmachuck and Fairhaven districts on the Seward Peninsula. Some 4 or 5 of the larger operations employed as many as 20 men while most of the others were conducted on a very small scale in comparison. Placer favorable for profitable drift mining has practically been depleted in most of the districts and in others drift mining is giving way to dredging.

A large number of small groundsluicing and booming operations followed by the shoveling-in, or some other means usually involving much manual effort, were conducted. Operations of this kind are conducted in all of the districts and in some this method of mining is the only one employed. Individually, most of them produce a very small

amount of gold each season but in the aggregate, the amount is considerable. These methods involve very small investments in equipment, and being generally conducted by one or two prospectors who live in the vicinity, can better meet conditions of a small water supply and are often the most practical for mining small areas or isolated patches of placer and hence will always be popular in certain districts and with a certain class of miners.

A number of placer discoveries were reported during 1925, but as has been the case with most of the discoveries within the past ten years, they have been made mostly in old districts and on creeks that were formerly well prospected and mined and are so restricted to very limited possibilities. Prospecting is increasing and many of the prospectors are in the more isolated places in search of virgin fields. Discoveries made in recent years on "new" creeks have unfortunately not turned out well. No new district of importance has been discovered since Tolovana in 1915, although with a vast area still to be prospected or reprospected, discoveries of importance can be expected. A stampede of some 40 men was made into the Valdez Creek district during the summer when news leaked out that several miners, who had been in the district since its discovery in 1903, had found and mined a little coarse gold on a high rim on Timberline Creek. Some years ago this would have attracted very little attention. However, such rushes stimulate new interest and usually result in reprospecting.

Transportation facilities between the States and Alaskan ports, and to the various points in Alaska, remained practically the same as in 1924. Freight rates remained practically unchanged, although passenger rates on ocean and Yukon River steamers were in most instances increased 10 to 15 per cent. The operations of the Alaska Railroad and its weekly steamer service on the Tanana River and below, on the Yukon River as far as Holy Cross, is proving of benefit to the mining industry of the interior. The Alaska Road Commission did most valuable work in extending its roads and trails in the various districts as did the Bureau of Public Roads with its road construction in the forest reserves of southeastern and southwestern Alaska where mining is conducted.

Many aeroplane trips were made from Fairbanks to various points, including Nome, and such isolated places as Wiseman, McGrath, Kantishna and numerous others. A large six passenger plane was added to this fleet last spring. Other interests operated a plane out of Seward to Cook Inlet and westward points, during the latter part of the summer, and it is reported that this service from Seward will be improved and extended next year. A company was being financed in Alaska to operate a small dirigible. A number of the communities prepared landing fields at their own expense and last spring the Territory of Alaska appropriated a small sum of money out of the territorial road fund with which these fields were improved and others

prepared at other towns. Air transportation has proved its reliability and benefit in Alaska, bringing as it does the isolated places to within a few hours travel which would require weeks to reach by the regular means of transportation. The development of air transportation should be given all possible assistance.

A review of placer mining and conditions in the various districts in Alaska during 1924 and 1925 is given in the following pages.

REVIEW OF PLACER MINING BY DISTRICTS

Southeastern Alaska

The placer gold output for 1924 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.

No new operations were reported from southeastern districts in 1925 and the placer gold production was very small for that year. The hydraulic plant continued to operate in Silver Bow Basin and several small open-cut and prospecting operations were conducted elsewhere in the Juneau district. The usual beach mining at Lituya Bay, Yakataga and Yakutat was carried on by a small number of individual miners. The gold placers of Porcupine, McKinley and Cahoon Creeks in the Porcupine district were consolidated a year or so ago, and the hydraulic outfit formerly on Glacier Creek was purchased and moved to Porcupine Creek.

Los Angeles interests had an option on these holdings, but it is understood that they were not active this season. The original holders, however, had about six men at work this season on construction and development. Hydraulicking will possibly start next season. It is claimed a large area of creek placer ranging from 20 to 40 feet and more in depth has been prospected with favorable results. A large water supply is available at heads up to 375 feet. The creek gradients are low, so that it is planned to operate with hydraulic elevators. This property lies 40 miles northwest of Haines, the government road between these two places being reported as having been completed this fall. Juneau interests investigated the dredging possibilities of the Katzehin River during the season, and it is reported that other interests were investigating the placers on the Shuck River in the Windham Bay district with a view to dredging.

Copper River Region

Nizina District:

The principal operations in this district in 1924 were 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.

kt 87.76 The Dan Creek Hydraulic Mining Company 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 dead work. 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 \$4,785, 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.

^{KL 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 proposed pit and the advance made upstream. A total of 99,180 cubic yards of material was mined, or 397,540 square feet averaging 9 feet deep, at an operating cost of 41 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. ^{KL 87-10} A. Powell with one man hydraulicked on the left limit bench of Rex Creek, a tributary of Chititu Creek. ^{KL 87-15} C. Cayouette did a little drift mining on the Dan Creek benches, and ^{KL 87-13} Martin Harris continued his prospecting on lower Young Creek.

^{KL 87-16} Favorable reports from the three large hydraulic operations in the Nizina district in 1925 indicate a satisfactory normal production. The principal operations were those of the Dan Creek Hydraulic Mining Company, which employed about the same number of men as in 1924 in hydraulicking both the bench and creek placer on Dan Creek, and the two hydraulic operations of John E. Andrus on Chititu Creek where the same number of men were also employed as in 1924. In handling the many large boulders at Dan Creek, which were formerly "bulldozed" to break them to a size whereby they could be piped into the sluices, a small air compressor operated by water power was installed this season for delivering

air to one drill. The boulders are now drilled and then blasted and a very appreciable saving in the explosives cost is reported. A little hydraulicking was done on Rex Creek. A little drift mining was conducted on the Dan Creek benches and the small amount of work done on Young Creek was principally in prospecting.

Chistochina District:

The principal placer mining in this district during 1924 and 1925 was conducted at the hydraulic operation of J. M. Elmer on the Slate Creek Mining Company's property on Slate Creek where about 15 men were employed in 1925. The hydraulic plant of the Alaska Middle Fork Mining Company is also reported to have been operated on the Middle Fork of the Chistochina River, and several small open-cut operations were conducted elsewhere in this district.

Nelchina District:

The Nelchina district, while within the Chitina recording precinct, is best reached from Chickaloon at the end of the Matamska branch of the Alaska Railroad. It lies 40 miles northeast of Chickaloon, from where it is reached only by trail. Placer mining was conducted in 1924 on Alfred and Albert Creeks by ground-sluicing and shovel-in methods, and the finding of some rich pay on the benches of both creeks was reported.

Kx 76-44 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.

In 1925 several small open-cut operations were conducted on Albert and Alfred Creeks and some very favorable cleanups are reported. About eight men were mining in the district.

Kenai Peninsula Region

In 1924, including the Hope, Sunrise and Girdwood districts, there were five hydraulic and several ground-sluicing and shovel-in operations conducted. 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.

In 1925 placer mining in this region was restricted mainly to the Sunrise, Hope and Girdwood districts, of relative importance in the order named. A few small operations of a prospecting nature were also conducted at other localities on Kenai Peninsula and adjacent to Cook Inlet. In the above mentioned districts, 7 major hydraulic operations employing 24 to 36 men; 6 small hydraulic operations with 7 men; 4 groundsluicing operations with 4 men; and 2 "bar" sniping operations with 2 men; were active during 1925. Besides these, several men were busy doing their annual assessment work. In general, the operations in the Hope and Sunrise districts experienced a favorable season. The large-scale development under way on Canyon Creek and the numerous places elsewhere on Six Mile Creek and its tributaries where old channel

deposits are showing promise, indicate that this region still has a long active placer life. This is especially interesting for the first placer gold in Alaska was discovered on Kenai River on the Kenai Peninsula in 1848 by Russians. Starting in 1884 and following up to about 1895, American prospectors discovered gold on many of the creeks and the richer areas were mined by the earlier known methods. Since 1895, placer mining has been restricted chiefly to those streams tributary to Turnagain Arm, the most important ones being Resurrection, Six Mile, Crow Creek, and their tributaries, although there were other streams, such as the Kenai River and its tributary, Cooper Creek, where active placer mining was conducted up to recent years. The placer gold production from the Kenai Region to date is not definitely known, but the placer production from Kenai Peninsula and Crow Creek (Girdwood district) is estimated to have been close to two million dollars. Placer mining in this region is now done mainly by hydraulicking, using the method of piping into the head of the boxes, with the stacking of the tailings by giants where natural dump room is lacking as in the case of the creek deposits.

Failures have been common in the region, in part, due to inadequate prospecting or to conditions particularly adverse to the methods that were employed. In 1905, a dredge failed on Resurrection Creek for reasons stated to have been the numerous large boulders present and further to an improperly designed dredge. A small dredge was erected on upper Kenai River in 1911 and also failed partly for similar reasons. Hydraulic elevator operations were not successful

when used on Resurrection and Six Mile Creeks. In general, the placers in this region are low grade, the gradients of the creeks are low, and the gravels are heavy, often with many large boulders. While these conditions are adverse to low cost operation, the streams, particularly those tributary to Turnagain Arm, are mostly glacier fed so that large steady water supplies are generally available. The topography also permits the bringing of this water to the operation under high pressure by comparatively short ditches and pipe lines. With such water supplies, hydraulicking has and can be accomplished at considerably lower costs than in other districts not so well favored. The mining season is also considerably longer than in most of the other Alaskan districts; operations can get under way by May 15 and continue to October 1 and in some instances until November 1.

The origin of the placer gold of the Kenai region is mostly from the erosion of the gold veins existing in the slates and graywackes occurring there, but the region has been glaciated so that some of the gold-bearing material may have been transported by the glaciers from sources far distant from its present location. The channel deposits occurring at elevations well above the present streams as along Six Mile, Canyon and Mills Creek are, at least in part, the remaining portions of preglacial placers. Excepting such placers, the present placers are mostly the reconcentration by the present streams of the material eroded and transported by the glaciers, which may include some preglacial placer, although some of the gold has been provided by the post-glacial erosion of the local lode formation.

Hope District:

The Hope district is best reached from Rainbow, a station on the Alaska Railroad, 20 miles from Anchorage. A small launch operates from Rainbow to Hope, which lies 8 miles distant across Turnagain Arm. A wagon road follows up Resurrection River from Hope to the placer operations there. A trail leads from Hope to Sunrise, a distance of 9 miles.

K+ 95-106 In 1924 Mathison Brothers, with 4 or 5 men, took out three pits by hydraulicking on Resurrection Creek and also did some work on a new ditch line. *K+ 95-118* Ed Belmont hydraulicked on Bear Creek, where, however, a large slide suspended operation for a considerable part of the season.

K+ 45-108 In 1925 the principal operation in the Hope district was the hydraulic operation of the Mathison Mining Company located $3\frac{1}{2}$ miles south of Hope on the Resurrection Creek. A $3\frac{1}{2}$ -mile ditch delivers from 700 to 800 miners' inches of water to the giants under a head of 350 feet at the present pit. From 1,000 to 1,500 miners' inches of water is also available for ground-slucce purposes. A new ditch from Wolf Creek, which will be $2\frac{1}{2}$ miles long with one mile still to be completed, will practically double the present water supply. A 4,000-foot pipe line, 16 inches in diameter reducing to 11 inches, carries the water from the penstock to the present workings. Three giants are set up in the pit and one giant is set at the end of the boxes for stacking the tailings. From 3 to 4 inch nozzles are used, depending on the water supply. The creek placers mined average 6 to 8 feet in depth

to the bedrock of glacial clay and gravel. Most of the ground is covered with timber and 1 to ²₁ feet of soil. The gravel is heavy and contains some large boulders. About 10 per cent of the material is too heavy to put through the boxes, so is stacked on cleaned bedrock or removed from the pit. The gold is fine, but small nuggets are common. The largest piece recovered was worth \$23. It is stated that the deposit averages 40 to 50 cents per cubic yard. The grade of the creek is 100 feet per mile. Small pits 75 feet long by 150 feet wide are usually mined. The material is piped into the head of the boxes. From 36 to 40 feet of 4-foot sluice boxes, set on a grade of 7 inches to 12 feet, and equipped with rail riffles set transverse, are used. Mercury is used only in cleaning up. Usually about 8 boulders weighing from 5 to 7 tons each are encountered in each pit. These are "bulldozed" to facilitate their handling. An old steam shovel, now operated by water power and converted into a derrick with a 46-foot boom, was tried out this season for handling boulders. A home-made device similar to a mechanical hay fork with heavy steel arms is dropped by cable from the end of the revolving boom. In tightening the cable the arms close, grabbing the boulder, which is then lifted out of the pit. It is reported that its operation has not been successful. Under average conditions about 3 pits or about 6,000 cubic yards of gravel are mined per month for a hydraulicking season of 3 to 4 months. A full crew of 3 shifts consists of 12 men. During August, the usual low water period, the field and stacker giant can only be operated

alternately. Average costs are now about 25 cents per cubic yard, although in 1913 the same work, including all cost of dead work, is stated to have been 14 cents per cubic yard.

kt 95-116 During 1925 the Babe Mining Company hydraulicked an old channel on the right limit of Bear Creek, 3 miles up from Hope. This channel was discovered in 1924 and prospecting shows it to be confined between two defined rims located 40 feet above the present creek level, for a distance of about 1,500 feet. Its maximum depth is 35 to 40 feet, the upper 25 feet being a clayey wash—possibly glacial—with the underlying wash gravel averaging 15 feet in depth. The channel has steeply pitching rims and averages about 35 feet in width at the bottom. The gold is all coarse, being mostly on the slate-graywacke bedrock and in the lower gravel. The gravel is heavy, containing many boulders. The upper gravels are first stripped with the giants and dumped into the creek, after which the boxes are set and the pay gravel is piped in. No stacking of tailings is required. To remove boulders, a chain is fastened around them and with a cable operating through a block on a small gin pole, are dragged to one side. The motive power is supplied by a 36 inch Pelton wheel which operates a small hoist. Boulders up to 6 and 7 tons in weight are easily handled in this way. Chas. Wehe mined with a small hose outfit on Bear Creek about one-half mile above the Babe Mining Company and Tolson and Taylor conducted a small hydraulic operation 2 miles above, at the same time stripping a small quartz vein which crosses the creek at this point.

Sunrise District:

KT 95-141
A wagon road from Sunrise follows up Six Mile Creek to the Canyon Creek Development Company camp, a distance of 9 miles. The Bureau of Public Roads is constructing a splendid road from Mile 29, on the Alaska Railroad, to Sunrise, a distance of 37 miles. This road was completed for 20 miles during 1924 and was to be completed by the fall of 1925 to the Canyon Creek Development Company camp, 8 miles beyond. This road makes the district very accessible and is doing a great deal toward its development. Most of the supplies for the Sunrise district will in the future be brought in this way, motor trucks to be used for transport.

During 1924 the principal operation conducted in the Sunrise 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. Bob Michaelson, working alone, hydraulicked on Mills Creek. The Canyon Creek Development Company, on Canyon Creek, was inactive. KT 95-139

During 1925 the Sunrise district was the most active of any in the region. M. Connolly conducted small hydraulic operations on the promising old channel on the left limit bench of Six Mile Creek about one mile above Sunrise. Oscar Plowman was sniping the bar placer on Six Mile Creek at the mouth of Alder Creek and John M. Brown was doing similar mining a short way above. Herman Lutsch did a little hydraulicking on the benches of Gulch Creek. KT 95-142 KT 95-150

45.141
The largest and most interesting operation is that of the Canyon Creek Development Company on Canyon Creek, 9 miles upstream from Sunrise. This company started its extensive development program six years ago, and while inactive last year, resumed again this season. Four miles of ditch and two pipe lines 2,000 and 3,000 feet long, supply from 2,000 to 3,000 miners' inches of water under high pressure. One of these lines is 24 to 14 inches in diameter, the other 17 to 14 inches. The plan of development consists of the construction of a high timber crib and hydraulic filled dam in the narrow rock rim canyon of Canyon Creek, for diverting the water thru an old channel deposit on the left limit of the creek which will permit the mining of the creek placers below and at the same time the diverted water will groundslice another old channel further down the creek which will be later hydraulicked.

No work was done on the dam this season or last, but it will be completed next year. It is of timber crib construction and hydraulic filled with a clayey glacial wash which sets like cement. White hemlock timbers spaced 10 feet apart, notched and spiked together and all well braced and keyed are used for the crib work. The dam is now 60 feet high, and when completed the height will be 110 feet or 90 feet to the spillways. It is 45 feet long and 125 feet thick at the bottom and will be 125 feet long and 40 feet thick at the top. A spillway will be blasted out of the solid rock walls of the right limit of the canyon. The water diverted by the dam will be taken off on the left limit through an old gravel filled channel 1700 feet long,

which is now being hydraulicked, then passed through 2,000 feet of 16-foot flume and used to ground sluice away the deep overburden of the lower old channel to prepare it for subsequent hydraulicking while the creek placer is being mined.

The present operations are restricted to piping out the upper old channel mentioned. This old channel contains a stream sorted tightly packed heavy gravel confined within its narrow slate graywacke rimmed walls. It contains a small amount of gold. It averages about 30 feet across at the bottom and is covered with a deep overburden of glacial material 5 to 25 feet of which is a cemented blue clay and fine gravel. In places the glacier action was gouged deeply into the underlying stream gravel. This cemented material on caving comes down in enormous blocks which the giant cannot cut, and must be blasted to bits before it can be piped into the boxes. The cut is being piped out for a width of 150 to 200 feet across the top to keep the sides from sloughing. The depth of the deposit from the surface to the bedrock floor ranges from 100 to 140 feet. A No. 7 giant with 6-inch nozzle operating under heads from 325 to 375 feet is used for hydraulicking. The cemented material encountered has greatly handicapped the work so that several more seasons may be required to complete the hydraulicking of this diversion channel. Six men were employed earlier in the season on this work, the crew being increased later on to twelve. Labor is paid \$5, and pipemen \$6, for 8 hours, with board furnished.

channel

The lower channel is one mile long, being 91 feet in maximum depth. It is 50 to 70 feet wide at the bottom and about 150 feet wide at the top. At the lower end the bedrock floor has only a few feet of elevation about the creek level. Several drill holes have been put down and a satisfactory gold content is claimed. The creek placer from the dam down to the junction of Canyon Creek with Six Mile Creek, a distance of $1\frac{1}{2}$ miles, ranges from 7 to 12 feet in depth and contains a medium sized gravel reported to carry high gold values.

This is probably the most interesting and extensive hydraulic mining development now under way in Alaska. It will probably be 1928 before active mining will be started.

Tom Allison hydraulicked on the right limit benches of Canyon Creek on the Weible ground and Joe Wilson and two sons hydraulicked the benches on the left limit below Mills Creek, formerly the Renner ground. Bob Michaelson was ground sluicing on Mills Creek below the junction with Juneau Creek where he is opening up a presumably old channel on the right limit bench. Fred Matz shoveled-in on Mills Creek just above the canyon.

Girdwood District:

1295-115 In 1924 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.

In 1925 Erickson, Totland and Johnson hydraulicked on Crow Creek, only the three being engaged in the work. Jno. Holmgren and Erickson will mine on this property next season. Axel Lindblad ground-sluiced on Winner Creek and at the mouth of Crow Creek. The Girdwood property, located seven miles from Girdwood at the head of Crow Creek, is still idle, having been shut down after a few seasons of hydraulicking prior to 1907, because of other operations being conducted lower on the Creek. This lake bed deposit occupies a basin of about 200 acres. The deposit is deep, one drill hole near the center going 95 feet to bed-rock. There are an unusually large number of big boulders present. These have handicapped drilling, although a very satisfactory gold

content is claimed to have been encountered in the few holes drilled and from the comparatively small yardage mined years ago.

Knik District:

Kt 85-34 In 1924 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 was planned to install a large hydraulic plant in 1925.

Talkeetna Region

Fairview District:

The Fairview district lies about 25 miles to the west and south of the Cache Creek district and is best reached by small boat from Anchorage going to Susitna Station, a distance of about 50 miles, thence up the Susitna and Yentna Rivers, a distance of 85 miles, to the mouth of the Clearwater Creek. From here a rough foot trail follows along the Clearwater and crosses the divide into the Mills Creek watershed. This distance to the head of Twin Creek is about 16 miles and to the junction of Twin and Mills Creek, about 4 miles farther. The district can be reached via Cache Creek, but this route is advisable only in an emergency during the open season because of difficult traveling and dangerous river crossings. The small amount of supplies taken

into the district are, however, freighted during the winter from Talkeetna on the Alaska Railroad via Cache Creek, a distance by winter trail of about 50 to 60 miles.

The Alaska Road Commission plans to construct a suitable pack trail in 1926 from the mouth of the Clearwater into the district and with this route established, supplies could be taken in this way at a reasonable cost. No difficulty would be encountered during the greater part of the open season in transporting heavy machinery up the river to this point, using small shallow draught boats and scows, freight-
ing it from there to the district during the winter.

Gold was first discovered in the district in 1906, a year after the discovery at Cache Creek, and while gold was found to be of widespread occurrence, mining has been restricted principally to the Mills Creek area. Wagner and Chicago Gulch, small tributaries at the head of Mills Creek, and Boulder and John Creeks, tributaries of Twin Creek, were the only places where gold in payable quantities was found prior to 1911. These are all short, narrow gulches with steep gradients and were soon mined out by ground sluicing and shovel-in methods. The many other gulches nearby were all well prospected prior to 1911, but no pay gravels of consequence were found. With the depletion of these gulches, gold was later found lower down on Twin and Mills Creek and two years ago pay gravel was discovered on Pass Creek. It is on these creeks that most of the present mining is being conducted. The streams between Mills Creek and the Kahiltna River, such as Camp, Sunflower and

the Lake Creek basins have been prospected, and while gold has been found in small quantities on all of them, its distribution has been too widespread over their broad valleys to make commercial placer. Considerable fine gold has been recovered from the bars of Lake Creek and the Kahiltna River, but such occurrences have been proved to be erratic and of very small extent. The Kahiltna River is a glacial stream.

All of the mining operations are conducted above timber line and at elevations where the water supply is small and limited to a few months use during the season, being supplied mainly by melting snows and rainfall. This precludes any opportunity for hydraulic mining in the district except possibly on a very small scale. Splendid spruce timber in large quantities is obtainable below timber line, particularly on lower Mills, Camp and other main creeks. The occurrence of lignite coal is common. On Camp Creek about one-half mile above the mouth of Cottonwood Creek, a firm, woody lignite outcrops along the right limit in a bluff about 40 feet high, for a distance of about 500 feet. A 20-foot thickness is exposed above the creek level, the foot wall being well below the water. The bed dips S. E. about 15 degrees. A sample of this outcropping lignite analyzed at the Bureau of Mines at Anchorage shows it to compare very favorably with the Healy River lignite.

The geological report made in 1913 by S. R. Capps¹ of the

¹Capps, S. R., The Yentna district, U. S. Geol. Survey Bull. 534, 1913.

U. S. Geological Survey describes the geology and early mining of the district in detail.

Glaciers at one time eroded the formation, consisting of the Tertiary gravels, the Eocene coal bearing formation underlying them in the geological series, with the slate-graywacke series beneath. In the Mills Creek basin the slate-graywacke series is exposed only at a few places and while this formation may have contributed some gold to the present placers, the main source can be attributed chiefly to the Tertiary gravels, and possibly some glacial material, which the present streams have eroded and concentrated. As only a few of the tributaries in the Mills Creek basin contained gold in any appreciable quantity, it is indicated that the original gold content of the Tertiary gravels does not have a general or regular distribution but is more or less confined to definite areas cut by these streams and not reached by others. It is also possible that some of this gold has been derived by direct erosion of the slate-graywacke formation containing certain defined mineralized strata, the existence of which, however, has so far not been proven. The slate-graywacke series is exposed between Cottonwood and Pass Creeks and a large area occurs in the northern part of the district, but the gold in Pass and Cottonwood Creeks as well as Wolverine and Clearwater Creeks, has been derived from a similar source ~~as~~ ^{to} that in the Mills Creek basin. The gold found in the upper reaches or gulches is coarse and well worn, becoming fine and flattened further down stream. Except for seasonal frost, all the ground in the district is unfrozen.

The district has produced about \$35,000 to 1925, according to a rough estimate, and the production for 1925 did not exceed \$2500. From 1911 until recently but ten or twelve prospectors remained in the

entire district. A little new interest was aroused in 1924 and 1925 so that in 1925 about twenty miners and prospectors were there.

In 1924 ^{K+75-53} Matt Hugar and Ben Grier shoveled-in and prospected on Mills Creek; as did P. J. ^{K+75-47} Collins on Twin Creek; ^{K+75-54} Frank Ervin on Pass Creek; H. Bahrenberg on Camp Creek; F. Zorn on Lake Creek; and there were probably several others prospecting in the district that were not reported.

In 1925 four ground sluicing and shovel-in operations were conducted with six men engaged, while the others were engaged in prospecting.

^{K+75-47} Pat Collins on Notobac Creek, an upper tributary of Twin Creek, ground sluiced and shoveled-in. The ground averages 9 feet in depth with a pay streak 30 to 60 feet wide. Up to 5 feet of upper gravel is ground sluiced off during the spring, boxes are then set on a 6-inch grade which is all the creek will afford, and the gravel ground sluiced down as far as conditions permit. Usually 2 to 3 feet of gravel and 6 inches of soft clayey conglomerate bedrock is then shoveled-in. The gravel is of medium size with but few large boulders. The gold is fine but pieces from 50 cents to ~~\$2.00~~ have been recovered. From 4,000 to 5,000 square feet of bedrock are mined during an average season, the average gold content of the ground being 12 to 16 cents per square foot.

^{K+75-52} Matt Hugar mined by similar methods on Mills Creek between Wagner and Chicago Gulch in ground averaging 12 feet in depth.

Pomeroy and Kortke used similar methods in sniping some small remaining areas on the lower end of Chicago Gulch.

Kt 75-53 B. A. Grier and one man prospected at the junction of Twin and Mills Creek to ascertain the dredging possibilities of this area. The Mills Creek valley at this point ranges from 600 to 800 feet in width and continues so for a mile or two below. Above the junction the valley of Mills Creek ranges from 400 to 600 feet in width for about $2\frac{1}{2}$ miles, and Twin Creek valley for a similar distance has about the same width with some local flats widening to 800 to 1,000 feet. As far as could be judged at the time the property was visited early in the spring, there appeared to be no physical conditions that would handicap dredging. The stream gradient ranges from $1\frac{1}{2}$ to about $2\frac{1}{2}$ per cent, and there were no indications that the creeks have ever experienced high flood conditions. Some boulders are present, but were not noticeable in quantities or size that would be of serious consideration. Mr. Grier reports that during the summer a 400-foot bedrock drain was run from Mills to Twin Creek and from each end of this drain three shafts were sunk to prospect the intervening ground to the respective sides of the valley. Encouraging quantities of fine and flattened but quite heavy gold were recovered from this drain and these shafts, showing an evenly distributed gold content. The depth of the ground prospected showed an average of 10 to 12 feet.

Kt 75-54 Frank Ervin and son ground sluiced and shoveled-in on Pass Creek. Gold was discovered on this creek several years ago. The creek occupies a narrow valley about 3 miles long. This creek was not visited

but the placer is stated to average about 5 feet in depth and gold values considerably higher than the ground now mined elsewhere in the district are claimed for it. It is reported that a small water supply can be made available for hydraulicking and a small plant is under consideration. Lincke and Griffiths were prospecting on Cottonwood Creek and later were on one of the gulches at the upper end of Mills Creek. Other prospectors were on Little Skookum, Wolverine, Clearwater, Home, Camp, Lake and other creeks.

Cache Creek District:

12-75-60 In 1924 the largest operation and main producer in this district was that of the Cache Creek Dredging Company, on Cache Creek, which operated its $6\frac{1}{2}$ 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.

Dick O'Rork, with four men employed, hydraulicked the shallow creek gravels on upper Cache Creek.

K+ 75-27
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.

K+ 75-56
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 a mile. The gravel averages about 10 feet deep, lying on a clay bedrock. No mining was done on upper Dollar Creek.

K+ 75-64
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.

Kt 75-27
Hugh Price, with 2 men employed, hydraulicked on Short
Creek; Al Wolf, with 4 men employed, hydraulicked shallow creek gravels
Kt 75-58
on upper Thunder Creek; N. Balabanoff and partner shoveled-in on
Kt 75-3
Nugget Creek; and Geo. Tomac shoveled-in on Falls Creek.
Kt 75-27

In 1925 the Cache Creek district experienced a very favorable season and the placer gold output for the year should be considerably larger than in 1924. Not only were the water conditions favorable, but in general the ground mined yielded larger returns. Nine hydraulic operations with 33 men engaged, one dredge operation with 21 men, 5 ground-aulling operations with 10 men and several sniping operations were conducted. With the double ender and pack horse trails from Mile 23 on the Talkeetna to Peters Creek road, completed this fall by the Alaska Road Commission, one going up Peters Creek to upper Peters Creek, the other to Cache Creek, the accessibility and transportation facilities are greatly improved.

Kt 75-60 The Cache Creek dredge continued to be the main producer of the district this season and was operated under lease by the Thos. D. Harris Company. A very successful season was experienced. The dredge started the season on May 22 and dug an exceptionally large yardage at a lower cost. But two men were employed per 8-hour shift on the dredge.

Kt 75-27 Joe Anderson with 9 men hydraulicked on Falls Creek under similar conditions as in the past, until towards fall when the new ditch bringing water from the Forks on upper Falls Creek was completed and hydraulicking was resumed with this new supply which affords a

head of 225 feet. The old supply had been reduced to a 90-foot head. The change has greatly speeded up the operation and favorable clean-ups were made. A hoist operated by water pressure has also been installed for handling boulders with a stone boat. Hugh Price hydraulicked on the benches of Short Creek. Joe Krummenaker prospected on the benches of Windy Creek in search of a high channel. ^{K 75-56} The Dollar Creek property was idle, having been sold to creditors during the summer. ^{K 75-58} Al Wolf, with 3 men, hydraulicked on the right limit bench of Thunder Creek two miles up from its mouth. This ground averages 5 feet deep. When visited a successful season was indicated.

^{K 75-64} J. Murray with six men had one of his best seasons, hydraulicking the left limit benches on Nugget Creek, the ground averaging 5 feet deep. The average pit mined is about 60 feet wide and 100 feet long. Using a 3-inch nozzle in the field, and a similar one for stacking, under a head of 180 feet, the material is piped into the head of a short string of sluice boxes. A pit is mined in 5 to 7 days when a full supply of water is available. Most of the ground mined this season required little if any stacking of tailings, some natural dump room being available. As a result, a much larger area of ground was mined than last year, when fourteen average sized pits were mined in the creek. The season's hydraulicking this year started May 25. ^{K 75-3} Balabanoff and Chernoff ground sluiced on upper Nugget Creek, J. McAllister was sniping with a rocker on Cache Creek and Dick O'Rork and one man hydraulicked on upper Cache Creek.

Peters Creek District:

^{K+15-67} During 1924 the Yentna Placer Mining Association, with five men, hydraulicked creek placer on Peters Creek 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; ^{K+15-66} Chris Hammerschmidt with one man ground-slued and hydraulicked the deep bench on Bird Creek; ^{K+15-71} Rice, Cooper and Dwyer conducted hose hydraulic operations on the Willow Creek benches, and ^{K+15-73} Cast and Mack with two men did similar mining in the creek placers on Poorman Creek.

^{K+15-75} Gray, Bedar and Vest shoveled-in on Clear Creek and Dick Francis with one man operated a hose hydraulic plant on Long Creek.

^{K+15-67} In 1925 William Pineo and two men hydraulicked on the old Harper ground just below the upper Canyon, Chris Hammersmith conducted his usual ground-sludging operations on the benches of Bird Creek, Cast and Mack had a good season hydraulicking on Poorman Creek, as did Frank Jenkins on Willow Creek just above the canyon, where he mined light gravel averaging 5 feet in depth. Cooper and Holbin on the left limit bench of Willow Creek below the canyon did well with a small hose outfit. They have purchased the hydraulic outfit on Ramsdyke Creek and will move it to their property this winter. They also plan to construct a ditch to bring water from Ramsdyke Creek and expect to be ready to hydraulic next season. The operations on Poorman and Willow Creeks have used only the local water, which is

usually a very small supply necessitating impounding and using it in short, intermittent splashes. Dick Smith ground^{ed} sluiced for a while on the benches of Peters Creek above the lower canyon, and Carlson and Weatherell hydraulicked the right limit bench of this creek at the lower end of this canyon, but ceased operation about mid-season.

12-7⁵⁰ An attempt to sink prospect shafts on Peters Creek early this spring about 5 miles below the lower canyon or about 3 miles above the bridge at Mile 23 failed because of an excessive flow of water encountered in the loose washed gravel. Similar difficulty had been experienced the previous year, when but one shaft out of many reached bedrock at a depth of 7 feet, near the right limit of the creek about one mile below the canyon. This ground is under option to a dredging company. The owners of the ground were, however, successful in reaching bedrock near this locality, with one shaft near the right limit which reached bedrock at $6\frac{1}{2}$ feet and one near the left limit at 7 feet, and report a gold content of 68 cents and 44 cents per cubic yard respectively. Very good prospects are also reported from those shafts not reaching bedrock. The gold is fine, ranging up to pieces worth about 5 cents, and has been derived mainly from the reconcentration of glacial material and the Tertiary gravels, and probably to some extent through the stream erosion of the slate-graywacke series, through which Peters Creek has cut its channel. For a distance of about one-quarter of a mile below the canyon, boulders are encountered, but for a distance of 5 miles down-stream the gravels are of medium

size, and while some heavy rocks are present, prospecting so far has not shown any that would be a handicap in dredging. Large boulders do, however, show up in the creek bed about 5 or 6 miles below the canyon. The valley ranges from 800 to 1,000 feet in width, the creek gradient is low. Systematic drilling will be necessary to determine the dredging possibilities of this creek.

Valdez Creek District:

^{K+67-24} 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 ^{K+67-114} on White Creek are reported to have done a little mining.

Kantishna District:

^{K+68-13} In 1924 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 ^{K+66-14} 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 1924 season. Several automatic dam and shovel-in operations were conducted elsewhere in the district.

During 1925 placer mining in this district was characterized by the large number (twenty-five) of ground-slucing and

shovel-in operations with but one or two men engaged at each. Sixteen of these operations engaging 19 men used automatic gates, while nine employed the usual ground-sluicing methods engaging 11 men. One hydraulic plant was operated for part of the season by Wm. Taylor & Company on the benches of Caribou Creek on the property of the Mt. McKinley Gold Placers, Inc., four men being engaged. The greater number of these operations were conducted on Glenn, Eureka and Glacier Creeks, with one operation on each of the following: Eldorado, Yellow, Rainy, Caribou and Crevice creeks. On the Toklat side, 2 operations were conducted on Little Moose Creek and 3 on Crooked Creek. Crooked Creek, a tributary of the Toklat, was the scene of a small stampede last year when gold was discovered on the benches there.

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.

In 1925 two hydraulic operations engaging 11 men and 6 ground-sluicing and shovel-in operations with 12 men were conducted in the district.

12458-206

The Gold King Hydraulic Mining Company with 8 men hydraulicked on Gold King Creek during the early part of the season in creek ground averaging 6 to 7 feet in depth. Pat Britt with one man groundsluiced on Bonnifield Creek and Elmer Gustaveson with 3 men mined with an automatic dam on Grubstake Creek. Fred Rowe with 2 men hydraulicked on Platte Creek on the property mined by Val Diebold two years ago. Otto Lienfelder^{K+58-169} mined on Daniels Creek using an automatic gate and E. H. Keys mined by the same method on Moose Creek, a tributary of the Nenana River. Zeilke also did similar mining on the creek and one man groundsluiced on Rex Creek. Dredging interests acquired an option on Moose Creek about mid-season and prospected the ground.

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 1923 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

<u>Eagle to</u>	<u>Distance from Eagle, Summer Route, in Miles</u>	<u>Summer Rates per Pound in Cents</u>	<u>Winter Rates per Pound in Cents</u>
Gravel Gulch	12	3½	-
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	6½
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 in Miles	Rate on Staples, Cents per Pound
Steel Creek	40	$2\frac{1}{2}$
Jack Wade	55	$4\frac{3}{4}$
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 sawed 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.

List of the Operations Conducted in the Forty
Mile District During 1924.

<u>Operator</u>	<u>Creek</u>	<u>Type of Operation</u>	<u>No. Men Working</u>
60-31 (Jno. Ostergard	Napoleon	Shovel-in, winter drift	1
Eric Jones	"	Winter & summer drift	1
L. G. Michaels 60-77	#45 Pup	Ground-sluicing & shovel-in	1
60-91 Chas. Anderson	Forty Mile R.	Winter drift	1
F. W. Tomlinson	Franklin Gulch	Ground-sluice and 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, w. drift	1
Wm. Kirkpatrick	Forty Mile Cr.	Ground-sluicing & shovel-in	1
E. Johansen	Ingle Creek	" " " " " w. 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 w. drift	1
James Meese	Forty Mile R.	Ground-sluice & shovel-in	1
60-91 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 Creek	Ground-sluice & shovel-in	2
Jno. Burke	Fiat Creek	Hydraulic (hose)	1
Chas. Torsell	O'Brien Creek	Hydraulic & winter drift	1
Sam Sammelson	Walker Fork	Open-cut	1
Alex Gustavesen	Canyon Creek	Ground-sluice and shovel-in	1
P. W. Wagner	Wood Creek	" " " " "	1
Frank Montgomery	Squaw Creek	" " " "	1
Madigan & Berg	" "	Gr. sluice & shovel-in, w. drift	2
A. A. McGandless	Jack Wade Creek	Hydraulic & scraper	13
T. E. Philips	" " "	Winter drift	1
Pat Carroll	" " "	Winter drift and shovel-in	1



<u>Operator</u>	<u>Creek</u>	<u>Type of Operation</u>	<u>No. men Working</u>
James Morris	Jack Wade Creek	Summer & winter drift	1
Walter Hunt	" " "	Shovel-in & winter drift	1
Tom Lynch	" " "	Shovel-in	1
Jno. Melandt	" " "	Ground-sluiice & shovel-in	1
Jno. Lambert	" " "	Ground-sluiice & winter drift	2
Andrew Lassen	" " "	" " " " " "	1
Paul Saupe	" " "	Winter drift	1
C. L. Johnson	" " "	Summer & winter drift	1
Geo. Pilz	" " "	Ground-sluiice & winter drift	1
Patterson & Arnold	" " "	Shovel-in and winter drift	2
Ed. Eckstein	Butte Creek	Winter drift & shovel-in	1
J. B. Powers	Twin Creek	Hydraulic	2
Dome Gold Corp.	Dome Creek	"	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 1924 on ditch construction and preparatory work on Walkers Fork and plans to hydraulic and operate a steam scraper in 1925.

Kx 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 4-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 $1\frac{3}{4}$ hours each. A 1,200 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 groundsluicing 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.

K760-125 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 hydroelectric power.

In 1925 placer mining in the Forty Mile district remained about the same as in 1924, although new development under way indicates improvement for the future. A large number of one and two men operations were conducted as usual on the various creeks of the district, using ground-sluicing and shovel-in methods with several using hose

outfits for hydraulicking, while others conducted drift mining. The largest mining operation was conducted on the Dome Creek benches where Lee Steele operated the hydraulic plant which last season was operated by the Dome Gold Corporation. Ditch construction and other development is reported as still under way on Walker's Fork where H. D. Cowden has a crew of about 10 men employed. The A. A. McCandless plant on Jack Wade Creek is reported to have been idle. Ingle Creek and Mosquito Fork are to be prospected by Lee Steele, who has recently organized the Ingle Creek Gold Mining Company. A Keystone drill is reported to have been shipped to this property last spring and the dredging and hydraulicking possibilities of this area are to be investigated.

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 in 1924 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.

In 1924 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.

^{Kt 60-54} During 1925 the same number of men were engaged in placer mining in this district. J. J. Samis conducted two operations using an automatic gate and shoveling in, and Ed Olson, F. E. Omo and Gus Fritch each did similar mining.

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 narrow 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.

In the Seventy Mile area during 1924 there were five hydraulic operations, employing 20 men, and six ground-sluicing and shovel-in operations by lone miners. There were about the same number of operations employing the same number of men in 1925.

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 $12\frac{1}{2}$ 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.

Kt 60-97 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 groundsluicing 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 proposed 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 $1\frac{1}{2}$ -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 $2\frac{1}{2}$ or 3-inch nozzles, depending on the water supply. These now operate under a 60 foot 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 square feet, or about 4,170 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 7,565 cubic yards, were piped over the side in $10\frac{1}{2}$ 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 4,180 cubic yards. During an average season, May 10 to September 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 \$5,000 is invested in the equipment and \$5,000 in the ditch line.

Kt 60-70 C. A. Bryant with a crew of five men hydraulicked the creek deposit on Alder Creek during 1924. 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 $1\frac{1}{4}$ -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 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.

Kx60-100 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 groundsluiced and shoveled-in on Fox Creek.

Kx60-94 Carlson & Nelson, with one man, hydraulicked with a small outfit on Broken Neck Creek. C. F. Yost, ^{Kx60-75} 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 7,000 to 8,000 square feet of bedrock is mined in a season.

Kx60-90 Wm. Russell, Axel Johnson, and Frank Swanson, each working alone, groundsluiced and shoveled-in on the Seventy Mile River benches, and similar mining was done by ^{Kx60-80} A. Turnbull on Barney Creek; and by E. Robertson on Flume Creek.

Kx51-19 During 1924 the only summer mining on Fourth of July Creek was the hydraulic operation of the July Creek Placers Company. 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 $10\frac{3}{4}$ miles of ditch. The upper ditch of $8\frac{1}{2}$ 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 $2\frac{1}{2}$ miles to the upper penstock. The water from the upper ditch was permitted to run down over the sidehill 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.

In 1925 the principal operations in the Seventy Mile area were the hydraulic operations of Froelich, Kummer and Ott on Crooked Creek; C. A. Bryant on Alder Creek; and Carlson and Nelson on Broken Neck. Small operations were conducted on Fox, Barney, Nugget and Flume Creeks, and on the Seventy Mile River. The July Creek Placer Company operated its hydraulic plant on Fourth of July Creek with a crew of about 9 men and two small drifting operations were conducted lower down on this creek.

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. During 1924 about 75 men were engaged in mining in this district. An unusually dry season was experienced, 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 sawed 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:

<u>Circle to</u>	<u>Distance from Circle in Miles</u>	<u>Freight rates in cents per pound</u>	
		<u>Summer</u>	<u>Winter</u>
Central House	34	5	2
Deadwood P. O.	42	8	3
Miller House	50	10	3
Eagle Creek	59	11½	4½

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.

Most of the placer mining in the Circle section is now confined to Deadwood and Mammoth 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 Mammoth Creek and at the hydraulic operation on Miller Creek showed the presence of considerable cassiterite or stream tin.

4-50-65 The largest operation on Deadwood Creek was that of Iverson, Kmatsen & 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 4,000 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.

Kt 50-65 Peter Bloom, on No. 43 below; Gus Chisholm on No. 40 below; Rockness & 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 $2\frac{1}{2}$ 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.

Kt 50-20 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.

^{K150-74} The C. J. Berry Dredging Company, on Mammoth Creek operated its $3\frac{1}{2}$ 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 October 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 Mammoth 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 3½ inch nozzle can be operated, and then for only a few months of the season.

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 hydraulic mining 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 Eastodon 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 creviced 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 because of the narrower channel. From 3 to 4 boxes are first installed on grade below the proposed 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, $3\frac{1}{4}$ -inch nozzles are used on all of the giants and the amount of ground-sludge 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.

kt 50-57 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.

kt 50-72 The C. J. Berry hydraulic operations on No. 14 Eagle Creek experienced a poor season during 1924 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 16 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 $1\frac{1}{2}$ -inch liners and are 24 inches deep. The bottom and sides are made of $1\frac{1}{4}$ -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 $2\frac{3}{4}$ -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-slucice 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 $3\frac{1}{4}$ -inch nozzles and operate under 120 feet of head. The stacker giant (c) has a $3\frac{1}{2}$ -inch nozzle operating under a 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.

Kx 50-35 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. H. Bartlett *Kx 50-51* prospected on Gold Dust Creek, a tributary of Eagle Creek. T. McLain *Kx 50-62* 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. John Clayworth prospected his claims just below McLain's. Wm. Reynolds *Kx 50-10* groundsluiced and shoveled-in on Squaw Creek, a tributary of Birch Creek.

In the Woodchopper section during 1924 there ^{were} eight small outfits numbering 15 men, mining 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.

^{K451-11} S. Johnson and partner groundsluiced on Sam Creek and also took out a winter dump. On Coal Creek, ^{K451-3} Beaton & Nelson drift mined both winter and summer; Martin Adamick groundsluiced 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 groundsluiced 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.

In 1925 the Circle district experienced a better season than in 1924 because of a generally increased water supply. About 100 men were engaged in placer mining and prospecting in the Circle district. The usual small drift, open cut and prospecting operations were conducted in the Woodchopper area on Sam, Coal, Woodchopper Creeks and Charley River. Coal Creek is being prospected by C. Ellinger, a dredging operation being considered for this creek. The principal operation on Deadwood Creek was that of Iverson, Knutsen and Fursath, who hydraulicked the creek placer, 5 men being engaged.

Langlow and Larsen hydraulicked on Switch Creek. The principal operations around Miller House were conducted by the Berry dredge on Marmouth Creek, the C. J. Berry hydraulic operation on Eagle Creek and Jack Anderson who hydraulicked on Mastodon. The dredge and the Eagle Creek operations report very successful seasons. Smaller hydraulic operations were conducted on Miller, Bonanza and Birch Creeks.

Fairbanks District:

In 1924 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. *There was an increase in drift-mining* 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} *where* a method has been developed ~~which~~ ^{that} dispenses with steam thawing.

About 55 summer operations were conducted in the district during 1924, employing about 300 men, ~~which~~ ^{that} 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^{ly} long ditch system or large pumping plants. Possibly both means will be used.

kt 58 49
44.63 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 $\frac{3}{4}$ of a mile 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 a 550 foot head through a 7,930 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 4,000 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 5,000 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 1,000 feet and the grade in the 5 by 6 foot tunnels would be $2\frac{1}{2}$ feet per 1,000 feet. The minimum average flow of water expected at the intake is about 1,600 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 $1\frac{1}{2}$ 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.

During 1924 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; 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 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 $2\frac{1}{2}$ cubic yard Bagley was used for most of the scraping and was operated by 9 by 10 double cylinder hoist. An $8\frac{1}{2}$ 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 & Hogstad with 8 men operated a winter drift mine on lower No. 16 below. Pete Hanson groundsluiced and shoveled-in on First Chance Creek. Chas. Peterson and Chas. Norlin each stripped and hydraulicked a small area on Gilmore Creek.

On Pedro Creek, Guis & Company 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.

On 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 & Company 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 & Company with 5 men drifted on Discovery. Both dredging interests drilled on Ester Creek.

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

On Dome Creek, 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. 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.

On Little Eldorado Creek, drift mining was conducted by the Idaho Mining & Leasing Company on the Oregon Assn., with 15 men; I. Hansen & Company on Discovery with 16 men; H. Andreson & Company on No. 3 below with 6 men; Larson, Berg & Company on Goldstake with 4 men; Nelson & Killis on No. 2 above; and Fraecher, Nelson & Company on No. 7 above.

Kt 44-191 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 by 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 $6\frac{1}{2}$ 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 $\frac{7}{8}$ inch hollow hexagonal steel with a cross bit of $1\text{-}\frac{3}{8}$ -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. Crosscuts were then driven in both directions from the ends of these drifts to the side limits of the pay, the total length of crosscut 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 $6\frac{1}{2}$ 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 crosscuts 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 crosscuts along the wall nearest the shaft and was advanced toward the shafts; i.e., the re-treating method was used. Two drills were used at the upstream end and the average height of the face mined was $4\frac{1}{2}$ feet, or 2 feet of gravel and $2\frac{1}{2}$ 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, $2\frac{1}{2}$ 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 nitroglycerine dynamite, usually $4\frac{1}{2}$ 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 $7\frac{1}{2}$ cents, for fuse and caps $2\frac{1}{2}$ 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 1,300 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 tramping, 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~~

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 1,000 to 1,400 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.

2/11/15 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 $1\frac{1}{2}$ 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 $22\frac{1}{2}$ feet wide, 46 feet long and 4 feet deep. The total weight of the dredge is about 75 tons and draws $2\frac{1}{2}$ 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. Daman gasoline engines. These engines operate an average of 22 hours per day, consuming during that time an average of 110 gallons of gasoline and 6 gallons 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 1,000 cubic yards per day during the season, the actual digging time being about 80 per cent. On this basis the 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.

12-11-1944 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-foot head was used along with a

small quantity of ground-slucice 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, groundsluiced, 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.

Kt 49-174 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 & Company with 3 men on Discovery, Chatanika Flats. Connolly & McPherson with 3 men hired conducted both summer and winter drift operations, and Odegard & Company with 4 men, Freeman & Company with 3 men, and Haggbloom & Company with 3 men took out small winter dumps.

Kt 49-41 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.

Kt 49-50 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 toward 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 5,000 square feet during the winter.

K+ 49-125 On Fairbanks Creek the Fairbanks Gold Dredging Company 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 2,500 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.

Kt 49-250

Martin Sather & Company, with 8 men, conducted drifting operations during the winter and summer on the bench at No. 12 below on Fairbanks Creek, and ^{Kt 49-125} 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.

Kt 49-83

In 1924 the Goldfields American Development Company 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 Company, 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 Company 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.



Miller & Company, with 4 men, hydraulicked creek ground on Homestake Creek, a tributary of Faith Creek. L. Schmidt groundsluiced 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.

44-49-251 On Kokomo Creek, a tributary of the Chatanika River, James Bros., Eagan Bros., Victor Graham, H. Steese, F. Stander, Chris. Sathel, and several others were prospecting their ground. Most of this work is done during the winter.

The gold production during 1924 from the Chena River 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.

44-50-55 Joe Chesna & Company, with 6 men, hydraulicked creek ground 14 to 16 feet deep on upper Shamrock Creek. A. McIntosh & Company 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 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 in gold per square foot. Several men were prospecting on Teuchet, Blackshell, Munson, Demar, Ottertail and other tributaries of the Little Chena River.

Placer mining in the Fairbanks district in 1925 showed a considerable decrease in the number of operations and the number of men engaged and placer gold output for the year is estimated to be less than in 1924. This can be attributed to the activities of dredging interests in that district who have either purchased or have under option, the principal claims on the creeks so that operations formerly conducted there have been brought to a close. There were 43 summer mines with 227 men engaged and 13 winter drift mines with 64 men, operated during the year. Six of these drift mines engaging 35 men continued on as summer operations. The summer mining was conducted by three dredges employing 39 men; 9 hydraulic plants with 45 men; 2 Bagley scraper operations with 27 men; and 10 groundsluicing or other open cut operations with 13 men.

Drift mining was conducted mainly on Little Eldorado and Fairbanks Creeks, although also to a lesser extent on Ester, Big Eldorado, Smallwood, Engineer, Vault and Dome Creeks and at Chatanika. Four drift mines were operated on Little Eldorado Creek, chief among which were the operations of the Oregon Mining Company on the Oregon Assn., with a maximum crew of 17 men, and Hansen and Lotti on No. 2 above with 10 men. The method of operation on the Oregon Assn. claim has been described in detail in previous reports under the operations of the Idaho Mining and Leasing Company. The company was reorganized

late in 1924, operations being resumed this spring by the present company, using the same method of drilling and blasting down the frozen ground but shoveling the broken material into cars. The duty per shoveler dropping to 12 square feet per shift and the difficulty to obtain good men and retain them is given as the reason for later resuming the use of the scraper operated by air hoist for loading the cars according to last year's practice. The new management has encountered difficulties in blasting down the gravel in that many of the shots do not break to the bottom, leaving the face too irregular for good scraper practice and much of the gravel often breaks down in large chunks. To some extent this is due to some change in the character of the gravel but probably mostly to the pointing and shooting of the holes. Gas troubles have been practically overcome by using 40 per cent gelatin. The cost of the explosives this season is stated to be about 23 cents per square foot of bedrock with gelatin costing \$11.10 per box at the mine. The cost of explosives last year at the time (Sept. 17) the operation was visited by the writer was stated to be 10 cents per square foot of bedrock. After the close of last season's operation 28,000 square feet had been mined and a check-up of the explosives showed this cost to be $17\frac{1}{2}$ cents per square foot. It has been found that considerable more powder is required in driving cross cuts than along the working face. This season many cross cuts were driven, accounting in part for the exceptionally high cost of explosives. About 15,000 square feet of bedrock was mined this season. The principal drifting operations conducted on Fairbanks

pt 49-250

Creek were those of Sather & Company, on No. 12 below, who operated both summer and winter with 4 to 7 men engaged. Toole and Eagan with 6 men on No. 8 below and Kinney and Gillis with 6 men on No. 2 below did winter mining only. At the Sather operation a light 3-cubic-foot⁰⁰ scraper, equipped with handles at the back for controlling it, was used for a while for scraping the gravel to the car in the main drift, after it has been thawed and picked down by the usual methods. This scraper was operated by a small single drum hoist installed at the surface and controlled by wires leading from the working face to the hoist. Three men by undercutting and picking down the thawed gravel and soft bedrock for one hour supplied material to keep the scraper busy for two hours. One man then handled the hoist, one attended to the scraper, while the third did the tramming. With everything running smoothly as high as 480 wheelbarrows of material was hoisted some days, which was about 35 per cent more than was averaged by the old method of shoveling and wheeling. While the equipment was a make-shift, and the paystreak was found to be too irregular to permit a long enough working face to justify further use of the scraper, the operators were well pleased with the results and plan to use the same method on a new block of ground to be developed this winter. Toole and Eagan will conduct experiments in drilling, blasting, and scraping the frozen gravels this winter on No. 18 below, using hydraulic methods for sluicing the dump in the spring. The hydraulicking into the boxes of the broken material will assure its complete thawing and disintegration. Other drift operations are planned on Fairbanks Creek this

winter. The principal drifting operations on Ester Creek were conducted this summer by Peterson & Company on No. 9 below with a maximum crew of 18 men. This operation has now shut down for good. Henry Benson with four men drifted on Gold Hill. Blake and Hilty, with a crew of 7 men drifted on the Steer claim during the summer and Freeman & Company with 5 men did winter drifting, these being the principal drifting operations around Chatanika. Sjoberg and Everman with 5 men drifted on Engineer Creek this summer.

49-125 Both dredges of the Fairbanks Gold Dredging Company have been operating well all season and the clean-ups have been larger than usual. No. 1 dredge started the season on June 2, No. 2 starting June 26. Twenty-eight men are employed by the company, 3 being engaged on the ditch, 4 on the thawing and 2 on the tractors, the rest being directly concerned with the operation of the dredges. Thawing with water at natural temperature was done ahead of the No. 1 dredge. An average of 120 points consisting of $\frac{1}{2}$ -inch pipe with open ends (sweaters) are easily driven to bedrock, the ground here averaging 20 to 25 feet deep. Ditch water under 40 foot head is used for these points. The limited supply of ditch water available caused the company to install a small pumping plant this season consisting of a 13 H. P. Scandia semi-diesel engine and a 6-inch Morris sand pump which supplies water to 80 additional points. The ditch water is warmer than the pumped water. Points are spaced at 5 foot centers. The time required for a thaw is most variable.

49-50 The small dredge of the Chatham Gold Dredging Company on Cleary Creek operated all season digging to the mouth of Chatham Creek. This dredge was originally intended for Chatham Creek and in the future will be digging up this creek which averages 12 to 15 feet in depth. The dredge was operated its first season in 1924 when it was driven by gasoline power but was under powered. Early this spring, the hull was lengthened 6 feet and a 80 H. P. boiler was installed. An 8 x 10 single cylinder steam engine now operates the sluice pump, a 10 x 12 engine operates the bucket line and winches, and a 7 x 9 engine operates the 6-inch sand pump. An undercurrent 4 feet wide and 20 feet long, paved with cocoa matting and covered with expanded metal, has been added, receiving the fines which pass through the grizzly placed in the bottom of the flume at its lower end. This undercurrent has saved on an average of \$150 in fine gold every 10 days. The sand pump pumps the fines from the sump at the end of the undercurrent and deposits it beyond the end of the flume. The changes made have increased the average daily digging capacity by 100 cubic yards, it now being 1,000 cubic yards per day. Five tons of Healy mine run coal, costing \$10 per ton, landed at the dredge, are burned per day, which with the labor and board cost of an engineer and fireman amounts to \$85 per day or 8½ cents per cubic yard dredged. The labor employed on the dredge amounts to the same cost as it did last year when gasoline power was used, so that the main increase in cost of the steam power is that of fuel which is \$12.50 per day more. This is compensated to

a large degree in the increased digging capacity and the use of steam during the freezing weather. Healy Cobble coal costing \$1.50 less per ton is being given a test.

The hydraulic mining in the Fairbanks district was conducted at the two plants on Pedro, one on Twin Creek, two plants on tributaries of the Chena River, one plant on Homestake Creek, one on Last Chance Creek and two small operations on Gilmore Creek. A. Zimmerman & Company operated one plant on Pedro Creek and another on Twin Creek, 8 men being engaged at each operation. The ground mined at each operation averages about 15 feet in depth. The method of piping into the head of 4 to 5 lengths of sluice boxes and stacking the tailings with a Hanot cableway excavator is used at both places. A water shortage necessitates using it in short intermittent splashes so that the excavator which is operated by steam permits all the water to be used for piping in. The company expected to mine 40,000 square feet on Pedro and about 30,000 square feet on Twin Creek this season and was laying plans to mine about 120,000 square feet per season with the two plants in the future. Guis & Company with a crew of ten men hydraulicked on lower Pedro Creek first stripping off 4 to 6 feet of moss, muck and top gravel, then setting 6 boxes and piping in the remaining 6 to 8 feet of creek pay gravel. Tailings are stacked with a giant. About 65,000 square feet of bedrock were mined this season.

1450-15 A. McIntosh & Company hydraulicked with a crew of 5 men on Palmer Creek, a tributary of the Chena River and Joe Chesna & Company with 5 men hydraulicked on Shamrock Creek. Miller & Company with

4 men operated their hydraulic plant on Homestake Creek, a tributary of Faith Creek and Jackson & Wickander conducted small hydraulic operations on Last Chance Creek, a tributary of Fish Creek.

At 58-266 Dredging development on Goldstream Creek has brought to a close most of the large Bagley scraper operations formerly so typical of the placer mining on this creek. The only operations of this kind conducted in the district this season were those of F. Bleecker on No. 10 below Goldstream Creek who with a crew of four men early in the season completed the scraping of a small incomplected cut of the previous season, and those of the Fairbanks Exploration Company on No. 6 and 7 below, Goldstream Creek. This company operated two Bagley scraper plants on the former Wagner ground, completing two large cuts in an area lying beyond the limits that will later be dredged. F. Bleecker plans to resume his operations next season on No. 11 below and it is reported that the Hanot operations on Discovery Goldstream may also resume next year.

The prospecting of dredgeable ground by shaft sinking and drilling, ditch construction and other developments for dredging were exceptionally active during 1925. The number of men engaged in such work fluctuated greatly, but during the summer ranged from about 300 to a maximum of 500. This placer development has now reached a point where the district is assured of large dredging operations which will extend over a period of many years.

At 58-49
49-83 The Fairbanks Exploration Company stands foremost in the field. During 1925 this company had from 250 to over 400 men engaged in the systematic drilling and investigation of the placer resources

and water supply, ditch construction, experimental stripping of overburden, research work, surveying, building construction, etc., the July pay roll including a maximum number of 436 men. This company operated ten churn drills, drilling on Ester, St. Patrick, Goldstream, Dome, Little Eldorado and other creeks and last winter did some hand drilling on upper Chena River and tributaries. A resurvey was made of the Davidson ditch which is to bring water from the Chatanika River below the junction of Faith and Manus Creeks to Cleary and Goldstream Creeks and those lying between for stripping and thawing purposes. The resurvey shows that this ditch will be 75 miles long from the intake to Goldstream Creek at Fox, with 4 miles on Goldstream, and includes about 48,000 feet of 4-foot syphons and about a mile tunnel through the hill between Dome and Goldstream Creeks. The construction of this ditch, also known as the 79 mile ditch, will no doubt be started next spring, although this will not be decided until this winter. Besides supplying water for stripping and thawing ahead of deredging, it will later be available for the hydraulicking of much placer ground in that area which is not dredgeable because of its position and other physical conditions and which could otherwise probably not be profitably or extensively mined, thereby adding greatly to the future placer life and gold production of the district. The construction of the 12 mile ditch, bringing water from the Chatanika River, a short distance above Kokomo Creek to No. 9 below, claim on Cleary Creek, was started and practically completed. This ditch will have a carrying capacity of 3,000 miners' inches and follows down the left limit of Chatanika River. It has a grade of 2.6 feet per mile. Graders drawn by

tractors were used to level the ground to the cut, the cut being made by steam shovel. Two steam shovels were used and a crew of 90 men were engaged on this work. Several stretches of frozen ground along steep side hills were encountered where steam thawing points were used for thawing holes which were loaded with powder and blasted. Construction at these places required much hand work. Old ditches on Goldstream and Cleary Creek were rehabilitated and a short ditch was constructed on Cleary Creek to bring the local water from No. 3 below to the lower end of the creek where a 175-foot head is obtained. About 20 men were engaged on lower Goldstream Creek in stripping the moss with tractor and grader and by hydraulic methods, and hydraulicking the muck overburden. The small local water supply from the Peterson ditch was used through a 3-inch nozzle under about a 75-foot head. The main pipe line runs down the center of the area from which lateral lines running at right angles conduct the water to the different giants. With the present average water supply one giant is operated at a time. This limits the work to a small scale but was done mainly for experimental purposes, the results of which have been very satisfactory. An office, garage, and heating and lighting plant are under construction on the outskirts of Fairbanks. It will probably be 1929 before any dredges will be operated.

K 49-173 The Goldfields American Development Company put down prospect shafts and drilled on the South Fork of Beaver Creek, French and Alaska Creeks, tributaries of the Chena River, during several months early in the year. This company also operated 3 Keystone drills on Ester Creek from February to the latter part of June and had 2 drills

at work to prospect the Salchaket River and its tributaries Caribou and Butte Creeks. This latter work had hardly started when in the latter part of June all of the work of this company was suspended and its engineers returned to London.

1249-83 The Tanana Valley Gold Dredging Company, Ltd., was engaged in the erection of its dredge on Fish Creek. The hull was launched August 28 but the dredge was not completed before the close of the season. This dredge was constructed by the Yuba Mfg. Company and is of the stacker and revolving screen type and as now being erected will dig to a depth of 40 feet below water level. There are 84 buckets of 5 cubic foot size in the close connected line, four of these being of special design, having deep segments cut out of them so as to provide three long prongs or points. The manager contends these will be of great service in loosening the gravel and for digging bedrock, whereby the regular buckets will be able to dig a full load. Two 150 H.P. boilers installed aboard the dredge will deliver steam to the 300 K.W. steam turbine direct connected to the turbo-generator. Coal will be used for fuel, which will be hauled 14 miles from the nearest railroad station—Gilmore. The estimated daily digging capacity of the dredge is about 4,000 cubic yards.

The placer on Fish Creek above its junction with Fairbanks Creek varies from 18 to 50 feet in depth. Beyond the banks of the creek proper, the gravel is overlain by frozen muck. Naturally thawed channels and patches have developed, although most of the gravels are frozen. These interests also hold options on ground on Engineer Creek.

Six prospectors engaged in further prospecting by shaft on Kokomo Creek last winter. The ground is deep, over 90 feet in places, and contains thawed channels. Encouraging prospects are reported, but nothing has as yet been found that would afford profitable drift mining. McCombe Bros. prospected with a hand drill on Nugget Creek, a tributary of lower Goldstream and Ed Holbrook & Company prospected on upper Nome Creek, a tributary of the Beaver, to ascertain its dredging possibilities.

Valdez Creek District:

Gold was first discovered in the Valdez Creek district in 1903 and to date about \$500,000 in placer gold has been produced. Three small open cut operations were conducted in 1925, employing eight men. The placer gold output for the season was about \$3,000. Soon after the first discovery of placer in this district practically all of the gravel deposits of Valdez Creek and its tributaries, Timberline Creek, White Creek, Lucky Gulch, and Roosevelt Creek, and their tributaries, were staked and prospected and some gold was found on all of them. Gold was also found on other creeks of the district, but mining has been restricted principally to the western end of Valdez Creek, Lucky Gulch and to a less extent on White and Rusty Creeks, and Timberline Creek.

Denali, the post office of the district is located on Valdez Creek, about two miles up from its junction with the Susitna River and lies east of Cantwell, a station on the Alaska Railroad.

The distance from Cantwell to the Susitna River crossing by summer pack trail or winter sled road is 55 to 60 miles. The Susitna River is a glacial stream which spreads out over a wide valley and cannot be forded by horses because of treacherous quicksands. During open season, the crossing must be made by rowboat, several being available there for this purpose. The creeks above mentioned are reached from Denali by trail, the most distant operation which is on Lucky Gulch is about 7 miles to the east while the distance to the upper reaches of Roosevelt Creek is about 12 miles. No pack train or other regular freighting service is maintained to the district, the miners taking in their own supplies and equipment usually during the winter months. The cost of freighting to the district is most variable, although large quantities have in the past been freighted in from Cantwell during the winter at a cost of \$150. to \$200 per ton. Should a reasonable amount of business again develop this freighting could probably be done at a cost not exceeding \$100 per ton or five cents per pound and summer freighting for 10 to 15 cents per pound.

With the exception of a small scattered growth of spruce along the benches of lower Valdez Creek and a better growth on the Susitna River flats, the area under consideration is bare of timber. The elevation of the placers on the various creeks ranges between about 2,800 to 4,600 feet above sea level partly accounting for the comparatively short placer mining season which normally begins about June 15 and closes by the middle of September. The wage scale for labor is \$6 for 10 hours plus board. A crew of 30 to 35 men has been boarded in this district for \$2.25 to \$2.50 per man a day.

The north side of the Valdez Creek valley is a region mainly of schist and altered intrusive diorite, while the mountains on the south side are of slates and schists with intercalated igneous flows or intrusives, intruded by diorite and related porphyritic rock. Intrusives are much less abundant on the north side and are less altered. The geology of the district is fully described and mapped in the U. S. Geological Survey Bulletin No. 498 by Fred H. Moffit, published in 1912. Prospecting of the tributaries of Valdez Creek coming in from the north has shown very little gold while those from the south cut a well mineralized formation, particularly from Timberline Creek to Roosevelt Creek, although Lucky Gulch, and to a lesser extent White Creek, have so far been the only tributaries of Valdez Creek to yield gold in commercial quantities.

The Valdez Creek district has experienced heavy and extensive glaciation causing the erosion of the formation of the surrounding mountains and deeply scouring the valleys of Valdez Creek and its tributaries, destroying such placer which existed at that time, and scattering it over a large area. With the retreat of the glaciers, a deep bed of glacial material was deposited in the valleys through which the streams have cut new channels into the underlying bedrock. This unsorted glacial material contains some gold and small isolated spots may at times be found containing considerable gold, but rarely supports profitable mining. The resorting of such material by subsequent stream action, whereby large quantities are reduced to relatively small volumes, may form workable placer. Some of the preglacial

placers, or those existing prior to glaciation, may have escaped its action and this fact is evidenced in the old channel found in the bench of lower Valdez Creek and which will be later described. It is possible that other portions of this old channel may still be found elsewhere beyond the present suspected limits and portions of similar old channels, but of lesser size and importance, may exist in the benches of some of the tributaries which have been the object of search but have so far not been disclosed. The deep covering of glacial material on most of the benches, the depth of the creek gravels of Valdez Creek above the canyon and of its tributaries, the generally very heavy gravel with many large boulders and the unfrozen condition of all of the ground in the district, has been a great handicap to prospecting and mining.

K+⁶⁷⁻²⁴₆₇₋₃₅ Valdez Creek is a clearwater stream about 14 miles long. The discovery claim is about a mile up from its mouth. Downstream from No. 9, above discovery claim, Valdez Creek has cut a deep canyon through the overlying gravel into the slates beneath to a depth of 175 feet and more, and in so doing has intersected the old gravel filled channel on No. 2 above discovery claim. This canyon is about 3 miles long and at the present creek level ranges from 85 to 125 feet in width with some local widenings. Leaving the canyon, the valley widens out and about a mile below emerges on the flats of the Susitna River. The average grade through the canyon is 175 feet per mile. Upstream from No. 9 above discovery claim the valley floor has several distinct widenings, attaining its greatest width above No. 15 above

discovery claim where for about a mile its maximum width is about 300 feet. Its average width above the canyon is otherwise 125 to 150 feet and the average grade is about 50 feet to the mile. The creek gravels here are deep, and many large boulders are present. Bedrock has been reached only in a few instances, holes having been drilled to depths of 50 to 60 feet. One hole on the left limit on No. 25 above claim reached bedrock at 30 feet but encountered no pay gravel. Nevertheless there is probably considerable gold in this part of the Creek. The average grade of this creek for 10 miles above the western or lower end of the canyon is 100 feet to the mile. Valdez Creek affords a large steady supply of water and is available for hydraulicking on the lower part of the creek under high pressure. The local miners report that the flow below White Creek is seldom less than 5,000 miners' inches. Mining in the creek, especially in the canyon, is attendant to dangers from occasional high water conditions.

The mining of the creek placers of Valdez Creek was restricted almost entirely to the lower end of the creek up to No. 5 above Discovery claim. Discovery, No. 1 below, and the lower half of No. 2 above Discovery, claims were the richest, lying downstream from the old gravel filled channel known as Tammany bench, which the present creek intersected. No. 1 above Discovery claim has been mined but very little, as it includes the narrowest and deepest part of the canyon. These claims are now covered with a deep layer of tailings from the Tammany bench workings. The original gravels as mined on

those claims usually ranged from 3 to 8 feet in thickness, being 10 to 12 feet thick on No. 5 above. A great number of very large boulders were encountered. Mining was done by shoveling-in methods, diverting the creek with wing dams and shear boards.

No mining is now being done on Valdez Creek or its benches. Drift or underground mining was conducted on the Tammany bench or the right limit prior to 1912 where 1,450 feet of this old channel was mined. Hydraulic mining was then started and this portion was so mined until 1923, when it stopped where the former drifting had ceased. Drift mining was then resumed during the following winter, but very little gravel was mined. Since then this property has been idle. A little drifting had also been done in the early days on the left limit bench opposite No. 2 above in what is probably the continuation of the Tammany channel. Some partly frozen but wet ground was encountered here and other conditions were adverse to a continuance of mining at that time. A little open cut mining was also done on the left limit bench opposite No. 1 below and while a small amount of mining was done elsewhere, it was mainly of a prospecting nature. The total gold production to date from the Tammany bench and the creek claims mentioned has been estimated at a little over \$400,000.

The Tammany bench or channel and its mining is of special interest. Valdez Creek has intersected this old channel which now lies 50 feet above the present creek level. The general course of this old channel for a distance of 1,250 feet from its lower end is N. 28° E., magnetic bearing, then making a pronounced turn to the east.

The rock rimmed walls of slate stand at a high angle. Its width at the bottom or floor is 40 to 60 feet with a widening to over 100 feet at the turn mentioned. A typical section from bedrock to the surface of the gravel is as follows: 14 to 16 feet of pay gravel containing flattened diorite with well rounded edges and rounded slate and schist; $1\frac{1}{2}$ to 4 feet of clay containing some fine gravel; 15 feet of loose brown gravel with very little gold; 10 to 15 feet of tight gravel containing a little fine gold; up to 13 feet of gravel containing gold in workable quantities. The thickness to this horizon averages 50 to 52 feet and is of sorted material. This is overlain by 50 to 60 feet of mixed up gravel, apparently most of it being of glacial origin. The rock rims of the channel rise to within 7 to 25 feet of the surface of this upper material. The total thickness of the deposit is 100 to 110 feet. The average width across the cut at the surface is about 300 feet. Many large boulders are present in all of the gravel although this seems more pronounced in the upper 50 to 60 feet. The grade of the channel floor is about 3 per cent. The gold is of the "pumpkin seed" variety, being flat with round edges, and coarse, the size of most of it ranging from pieces worth 10 cents up to 50 cents. The largest piece recovered was worth \$18.

The early drifting removed an average of 6 feet of the lower pay gravel for a width of 40 to 60 feet. It is stated that some of this yielded up to \$20 per square foot as drifted, the average yield being \$20,000 per 100 feet of channel. The ground was unfrozen and wet, requiring closely spaced and heavy square set timber-

ing. The subsequent hydraulic operations were conducted by the Valdez Creek Placer Mining Company, later reorganized as the McKinley Gold Placers, Inc.

The property is now splendidly equipped for hydraulicking. A ditch 1-1/8 miles long with 8 to 10 foot bottom with a carrying capacity of 3,400 miners' inches brings the water from No. 11 above on Valdez Creek to the penstock from where a pipe line, 5,000 feet long of riveted steel pipe 36 inches in diameter reducing to 18 inches, delivers it to the top of the pit. Four inch, six inch, and one-eighth inch nozzles are used under a maximum head of 300 feet.

The hydraulic methods used have been changed from time to time. A deep rock cut was blasted through the right limit rim. The upper gravels were piped off and put through sluice boxes installed in this cut and dumped into Willow Creek, a small short tributary of Valdez Creek. The lower gravels were piped down and sluiced through 5-foot boxes set in the bedrock floor of the channel on a grade of 6 inches to 12 feet and equipped with rail riffles. To obtain this grade a deep cut was blasted in bedrock. Boulders were drilled with air drills, blasted and piped into the head of the boxes. A double boom steel derrick on a revolving base was for a short time used for stacking boulders. The water of Valdez Creek was not able to keep the dump clear at the mouth of the channel, but this was later remedied, at least partly so, by installing a giant for stacking until the time of a freshet when the dump could be carried away. Since 1912, but 1,450 feet of this channel has been hydraulicked. About 35 men were employed. After present financial and legal difficulties have been settled,

operations will no doubt be resumed.

Kt 67-15 A little prospecting but no mining was done on Timberline Creek until this year and that was mainly of a prospecting nature. This creek is about 3 miles long and occupies a narrow valley, Last spring, Monohan, Olson and Colligrossi started prospecting on the right limit bench of Timberline Creek on Discovery Claim. Ground-sluicing methods with pipe and hose were used in making cuts along the bench. Coarse gold was found on a high point nearest Valdez Creek and in a few days about \$150 worth of coarse gold was recovered from a small cut along a high rim of bedrock. The extent of this pay was very limited and by this time worked out. Word of this reached Anchorage and soon created a small stampede into the district. Some 40 to 50 participated in this and all ground open for location was staked, including the creeks mentioned early in this report, and their tributaries. As most of the ground on the more important creeks was not open to placer location, the new staking was done mainly on upper Valdez Creek, Roosevelt Creek and its tributaries, Eldorado and Surprise Creeks, Rusty Creek, Timberline and others. This also lead to a prospecting of other creeks in the district, but no work was done on any of the newly located claims. A number of the locators, however, expressed intentions of returning next season to prospect their holdings.

Monohan and his partners have since groundsluiced out other cuts within a distance of about 300 feet southeasterly of their first one, in search of a possible old channel. Some fine gold had been

recovered from these cuts but at the time the operation was visited (September 2) no pay channel had been found. No mining has been done in the creek bed of Timberline Creek. It is stated that what little prospecting was formerly done here, failed to uncover any pay ground, although bedrock was not reached, as the gravels are deep and wet.

Kt 67-114 White Creek is about 7 miles long and has three branches, known as Big Rusty, Little Rusty and Rusty Creeks. The creek deposits have been prospected in the past under difficult conditions of deep wet gravel and the results obtained were not encouraging. The little mining formerly done in the creek bed was in shallow gravel overlying a false bedrock of only local extent. An attempt was made to put down a drill hole some years ago in the creek bed of White Creek opposite the mouth of Rusty Creek. It reached a depth of 60 feet without encountering bedrock or pay. Most of the mining has been done on the right limit benches and has been restricted to a number of small groundsluiced cuts.

Kt 67-114 Stewart, Tronstad and Stinnes mined on No. 5 claim, right limit bench of White Creek this season and last, the ground varying from 10 to 20 feet in depth. Bedrock is a blocky schist and slate. The gravels here are tightly packed and laid down in no regular order, but are not nearly as heavy or bouldery as those on Valdez Creek. Both coarse and fine gold is recovered, which is mostly rough and bright, although some of it is worn and some has a rusty coating. The distribution of the gold is spotty and the average of the gravels mined were low grade. A small but fairly steady water supply is obtained from White Creek

and brought to the workings through a mile ditch. By groundsluicing and using the water under low head through a 6-inch canvas hose, equipped with a small nozzle, the gravels are sluiced through short boxes. A natural dump for the tailings is available, as the benches lie 40 to 50 feet above the level of the creek. The concentrates recovered in the sluice boxes are of unusual interest, for besides containing magnetite, garnet, rutile, iron pyrite and bits of native copper and chalcopyrite, some small rounded pebbles of galena, occasional small pieces of a blackened mineral, some portions of which have a bronze to golden tarnish or with a particle of gold adhering to it, are found. This last mentioned mineral cuts like metallic lead and has a silvery streak. It has been analyzed and assayed by Mr. Paul Hopkins of the U. S. Bureau of Mines at Fairbanks and found to be hessite, a telluride of silver. A portion taken from one of the pieces free of adhering gold was assayed and found to contain 61 per cent silver and one ounce of gold per ton. An assay made of the galena pebbles consisting of grains of galena and small particles of native bismuth gave returns of 1.90 ounces in gold and 283.60 ounces of silver per ton. No presence of tellurium was detected. These valuable concentrates are recovered only in very small quantities, particularly the hessite. ^{K467-1} Rusty Creek, a main tributary of White Creek, has been prospected at different times and some years ago a long cut was boomed out, using an automatic dam. The gravels in the bed of this creek are deep, bedrock being reached at only a few places. The gold production to date from White Creek is estimated to be about

\$10,000 and several hundred dollars were recovered from Rusty Creek.

KT 67-21
67-30
Lucky Gulch is a steep narrow V shaped gulch about 1 mile long. It possesses characteristics very different from any of the other placers in the district. Heading practically at the top of the divide with White Creek, where the placer ranges from 3 to 8 feet in thickness, it follows down the gulch on a grade of about 12 per cent, the thickness of the placer increasing to 20 to 30 feet at the lower end, then fanning out over the thick gravel bench of Valdez Creek. Along the right limit of the lower half of the gulch is a narrow bench deposit. The gravel in Lucky Gulch consists mainly of angular fragments of slate, and a little diorite and quartz. The wash is generally small, with practically no boulders present. Bedrock is a rough slabby slate and schist containing small blobs of quartz, and cut by some small diorite dikes. The gold is coarse and rough. A \$900 nugget and another worth about \$500 were recovered some years ago. The gold has apparently been derived from the erosion of the local bedrock, probably since the time of the glacial period. The only mining conducted on the gulch this season was the small ground-sluicing operation of L. S. Wickersham and partner, located well at the upper end at an elevation of about 4,600 feet. Lucky Gulch has to date produced about \$60,000 in placer gold but barring a little bench ground and the alluvial fan at its mouth, which has not been well prospected, it is practically mined out.

Following the placer stampede this season, a number of lode locations were made. The lode prospects of the district are described in another report.

Tanana Precinct:

Included in the Tanana mining precinct are the Salchaket, Delta and Richardson districts, drained by streams emptying into the upper Tanana River. Placer mining has been conducted in all of these districts for many years, mainly in the Richardson or Tenderfoot district. Very little mining was done during this season, ⁽¹⁹²⁴⁾ although interest has been renewed during the past two years. Most of the present work is prospecting, or small development, indicating a general increase of mining in the near future. Points of access to the districts are via the Richardson Highway from Fairbanks.

The Salchaket River is crossed by the Richardson Highway about 40 miles southeast from Fairbanks at Salcha P. O. (Munsons). The center of the district lies about 50 miles up river from Salcha Post Office and is reached best from there by winter travel up the river. Summer access is difficult as there is no regular trail, although travel can be accomplished by canoe or rowboat via the river. The principal mining in the past has been conducted on Caribou and Butte Creeks. The gold production has been small. Caribou and some of the other tributaries contain mostly unfrozen ground and the ground on the main Salchaket, while generally frozen, contains thawed channels and spots. The discovery of some coarse gold in 1924 in a shaft sunk in the Salcha Flats about 3 miles above the mouth of Caribou Creek caused a small rush to the district. A number of shafts were sunk by some of these prospectors but some could not get to bedrock because

of the water encountered. No pay gravel was found in this prospecting, but it is reported that further prospecting will be undertaken this winter.

K-59-35 No actual mining was conducted in the district in 1925, although about a dozen prospectors were engaged in prospecting and the Goldfield American Development Company had two Keystone drills at work for a little over a month during the early part of the season, prospecting on the Salchaket and its tributaries, Caribou and Butte Creeks. This work had hardly gotten under way when all the prospecting conducted by the company in Alaska was brought to a close so that the dredging possibilities of these creeks are still to be determined. Jno. May installed an automatic dam for next season's work on George Creek; Roy Heinzerling put in a drain in preparation for future groundsluicing on Bullfrog Creek; McDowell and Stevens were prospecting on the various creeks during the summer; Gus Hagg sank a prospect shaft on Butte Creek; Tom Murphy prospected on Caribou, Pasco and Butte Creeks; Killian & Company prepared for open cut mining on No Grub Creek. Kolhaus and Gobracht, who made the discovery on the Salcha Flats last year, returned to the district this fall to resume prospecting.

K-68-33 Three ground-sluicing and shovel-in operations with 7 men engaged are reported to have been conducted in the Delta district in 1925. Jno Wahlgren and two partners prospected on the South Fork of Rainy Creek, a tributary of the Big Delta River. A prospect cut 460 feet long was boomed out with an automatic gate. The ground is 2 to

7 feet deep and contains heavy bouldery gravel. Some fine flat but heavy gold was recovered and encouraging results are reported. C. Sutkoff associated with Dr. J. A. Sutherland prospected on Rainy Creek. Chas. Miller shoveled-in on Jarvis Creek and M. Teodoroff shoveled-in on Little Delta Creek.

Placer mining in the Richardson district has been conducted mainly on Tenderfoot Creek, and on Banner Creek and its tributary Democrat Creek. The Richardson Highway about 73 miles out of Fairbanks, follows down practically all of Tenderfoot Creek. The highway crosses Banner Creek at about 70 miles from Fairbanks, the Banner Creek workings, being upstream by trail about $1\frac{1}{4}$ miles, with Democrat Creek a few miles beyond. The Richardson district from 1905 to date has produced \$1,750,000 in placer gold. The production in 1925 is estimated at about \$3,000.

⁴¹⁵⁴⁻¹⁵ The only activity on Banner Creek in 1925 was that of I. Isaacson, who sluiced in a dump from his former drift mining on No. 1 above claim, left limit. The ground formerly drifted on this claim averages from 85 to 93 feet in depth. The pay is low grade and is split into two narrow channels, the main one being 70 feet in maximum width. This creek was formerly mined downstream from this claim, but there has been no mining above this point. Isaacson plans to prospect on No. 5 above this winter.

⁴¹⁵⁴⁻¹⁶ A. Ekiewicz and Melvin groundsluiced on the left limit bench of Democrat Creek on No. 2 above. The material mined here is angular and is a residual deposit formed by the disintegration of the local porphyry bedrock which contains some small stringers and blobs of gold

bearing quartz. Democrat Creek occupies a narrow V shaped valley which on this claim is but 25 to 35 feet wide at the bottom. The creek placer was formerly mined by drifting, later by groundsluicing. Booming in the creek with an automatic dam will be resumed next year. The creek ground is 15 to 25 feet and more in depth, consisting of alternating beds of muck and gravel. Most of the gravel is angular, with no large boulders present. A thin bed of rounded wash is present in the creek placer lying on bedrock. The gold from Democrat Creek is usually very fine and coated with iron oxide. The gold bearing sands or concentrates recovered in the sluice boxes at this operation are put into a clean-up barrel, amalgamated, and put over amalgam plates.

Kt 59-16 Wm. Tokola with one man, operated an automatic dam in the creek bed on No. 1 above Democrat Creek in formerly drifted ground averaging 10 to 14 feet in depth. The muck and upper wash is removed by booming, leaving 1 to 2 feet of gravel to shovel into the boxes.

Kt 59-22 Fred Campbell, working alone, mined on the divide between Buckeye Creek, a tributary of Banner Creek and Bush Creek, the head of Tenderfoot. In the summer when water is available mining is done with a small canvas hose hydraulic plant. In the winter, the deposit is mined by drifting from a tunnel, the gravels being thawed with wood fires.

Kt 59-2 Tenderfoot Creek has been mined by drifting since 1906 and up to 1916 the gold output averaged close to \$100,000 per year. Since 1916 very little mining has been done and in the past few years practically no mining was conducted. A small rush was made to this

creek two years ago by prospectors which was probably caused mainly by the return of F. A. Jorgensen, a pioneer of the district who had been away for 20 years. Practically nothing resulted from this stampede, although with the return of a few of the operators of the earlier days further prospecting has been done and a number of operations are to resume this winter. Former mining was done on practically all the claims on Tenderfoot Creek from No. 2 above which is No. 1 claim on Bush Creek, a tributary, to No. 18 below. The best pay was found on the upper end of No. 1 below and on Discovery claim where rich ground was mined up to a width of 200 feet. Claims Nos. 9, 13 and 14 below were good claims. In general the pay on the other claims was found to be spotty or confined to narrow streaks so that much of the ground was mined at a loss. No appreciable amount of gold has been found at the head of Tenderfoot Creek above its junction with Bush Creek, the gold apparently having been carried down Bush Creek. On No. 1 Bush Creek the average depth of the ground is 40 to 45 feet, gradually increasing in depth to 160 to 170 feet at the lower end of Tenderfoot Creek. Little is known about No. 19 below claim which is located at the junction of Tenderfoot Creek and the Tanana River. The thickness of the gravel ranges from 8 to 12 feet on the upper claims to 25 to 30 feet on the lower ones. The gravel is overlain by muck containing sand streaks. All of the ground mined was frozen to bedrock excepting the lower half of No. 14 below claim, which contained a thawed channel. Bedrock is Birch Creek schist. The average width of the valley ranges from about 1,000 to 1,200 feet. The gold is unusually low grade,

averaging \$11.50 to \$12.50 per oz. on Discovery claim and above, increasing to \$14 per oz. on the Lower claims. It is coarse and well worn, and much of it is blackened with a coating of oxide. One nugget worth \$700 was recovered on No. 1 below.

⁴⁻⁵⁹⁻²⁴ F. A. Jorgensen, working alone on No. 3 below last winter, drifted out a small area, and will sink a shaft on this claim this winter and operate with a small crew. During the summer he was sniping old tailings on No. 1 below. J. P. Kuhl prospected alone on No. 1 Bush, sinking a shaft 45 feet deep last winter, using wood fires for thawing. He will put down another shaft this winter. Emil Westerberg with 3 men was setting up a 50 H. P. boiler plant on No. 17 below and preparing to mine this winter. Lkievicz and Melvin stripped some ground on No. 2 above to prepare it for next season's open cut mining and plan to sink a shaft this winter on Discovery.

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-slucing 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 a valuable aid to many of the operators, who traveled to and from the district by that means. Fresh meats and provisions and a sectionalized scraper, were also transported by aeroplane.

K-49-18 On Livengood Creek during 1924 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 & Company, with a crew of 12 to 14 men, drifted on the Letrum bench; Bostrom & Company, 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 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.

K-49-45 Bachner and Company drifted on the right limit bench of Amy Creek with a crew of 12 men, and Jack Nielsen with 3 men employed, groundsluiced and shoveled-in creek placer.

K-49-43 On Ruth Creek Bentley Falls with 4 men conducted hydraulic operations and J. Hudson with 2 men groundsluiced.

K+49-266 On Lillian Creek H. 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.

K+49-70 On Olive Creek N. R. 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 Liven-good Creek is being considered as possible dredging ground.

K+49-41 Tom Verdes with 1 man groundsluiced and shoveled-in on the left limit bench of Wilbur Creek and 2 or 3 other parties were doing similar mining at the mouth of Wilbur. Johnson and Healy conducted small drifting operations.

In 1925 there were 27 placer operations employing 112 men conducted in the Tolovana district. Ten winter drift mines employing 67 men were operated, 3 of these mines with 33 men continued as summer operations and 3 continued during the summer by prospecting and preparing for this winter's mining. Twenty-two summer operations were conducted with 83 men, as follows: 7 hydraulic plants with 28 men; 5 ground-sluicing operations with 8 men; 3 summer drift mines with 33 men; 7 drift prospecting operations with 14 men. The Tolovana placer mines have always been handicapped because of the small water supply available. A period of very dry weather was experienced from

the latter part of July until the latter part of August, but the season has been a normal one and gold production of about \$200,000 will be made. The gold output of this district since its discovery in 1915 to date is estimated to be over \$4,500,000.

Livengood, the post office and only town in the district, lies 60 miles northwest by airline from Fairbanks. Aeroplane service for passengers and some supplies has been available between these two points for several years, the one way trip being made in 45 minutes. The regular summer route is otherwise by launch from Nenana down the Tanana River and up the Tolovana River to the Log Jam, a distance of about 210 miles. At the Log Jam a transfer is made to shallow draft launches which operate to Trappers Cabin, a distance of 30 miles. A wooden track railroad now owned and maintained by the Alaska Road Commission is operated between Trappers Cabin and Livengood, a distance of 13 miles. An automobile and trailer equipped with flange wheels constitutes the rolling stock. The freight rates via this route from Nenana to Livengood are 5 cents per pound for staples and 6 cents for perishables. The shallow water conditions between the Log Jam and Trappers Cabin and the transfer at these points account to a considerable extent for these high rates. The Alaska Road Commission now has under consideration a plan to extend the railroad to Trappers Cabin, which will reduce the distance between these points to about 13 miles. About 100 tons of freight were brought into the district by this route this summer. Winter freighting is now all done from Dunbar on the Alaska Railroad. This distance to Livengood is

65 miles. The freight rate is 5 cents per pound. Last winter 150 tons of supplies were freighted in. Average wages paid to labor are \$5 for eight hours underground and \$6 for 10 hours at the open-cut mines, and board. Lumber is sawed at West Fork, where it sells for \$120 per M. Water is available for mining from about May 5 to October 1, the supply becoming very small during the dry months which are usually the latter part of June, July, and the earlier part of August. The water supply is now obtained mainly from Livengood Creek and its tributaries. To supplement this small supply, a project was at one time considered to bring water from the South fork of Hess Creek. By constructing a dam about 1300 feet long and 25 feet high across Hess Creek about 1500 feet below Alabam Creek, this water could be stored in the large reservoir that would so be developed and taken off through a tunnel, or a cut about 3200 feet long, and conducted by ditch to the operations on Livengood. This tunnel would encounter only frozen gravel or a cut through this gravel divide would be 80 feet deep at the deepest places. On August 2, when but about 100 miners' inches of water were flowing in Livengood Creek at No. 4 above, the flow on Hess Creek at the above mentioned locality, was roughly estimated to have been not less than 300 miners' inches. This condition is sometimes reversed for the climatic conditions in the two drainage basins differ at times.

X-49-18 The Livengood bench has produced the greater portion of the district's gold output. It follows down the right limit of Livengood Creek for a distance of about $4\frac{1}{2}$ miles and has varying dimensions and

differing characteristics, but a defined main pay streak has been mined from the Jewel claim at Wonder Gulch to the Ready Bullion Assn. claim just east of Myrtle Creek. This portion of the main pay streak has shown a width ranging from 80 to 250 feet, averaging about 150 feet, excepting opposite Amy, Gertrude and Ruth Creeks, where the pay which came in from these creeks caused decided widenings. Thus at places on the Letrum claim opposite Gertrude Creek some of the pay was 800 feet wide and on the Ready Bullion Assn. it was over 1,000 feet wide. Three other distinct benches of lesser consequence lie between the main bench and the present Livengood Creek in the vicinity opposite Gertrude Creek. The depth of the ground varies from 25 feet on Jewel Claim to 130 feet on the George Assn. The gravel ranges from a few feet to 30 feet in thickness and is overlain, sometimes by a clean muck, while at many places the muck is often mixed with clay, sand and rock fragments. Bedrock is a slate, chert and limestone and while the bedrock surface is often quite regular, the limestone bedrock especially, is sometimes most irregular. The gold is coarse, heavy and well worn. The gold content of the gravel mined has ranged from about 50 cents to \$2 per square foot of bedrock with some small areas that were richer. The average gold content recovered has been about \$1 per square foot. Conditions for drift mining this deposit have in general been favorable for low costs as all of the ground is solidly frozen, most of the gravels permit easy driving of thawing points and relatively quick thawing, the gravels are easily picked down, very little timber is required, and bedrock is usually not difficult to clean up. The average height of face mined is 5 to

6 feet which includes from 1 to 2 feet of bedrock. Rough slabby bedrock, especially the limestone, may require more of the bedrock to be taken up. The cost of drift mining usually ranges from about 45 to 75 cents per square foot. Bostrom & Company some years ago drifted a large area on the Marietta claim at a cost of 32 cents per square foot, a 4-foot face being mined, the gravels were of "chicken feed" size, bedrock was even, and all conditions were favorable for such a low cost.

Livengood bench terminates at Myrtle Creek. Drilling in the flats of Myrtle Creek and lower Livengood has failed to disclose any pay ground, some of the holes going 214 feet to bedrock, showing a little gold distributed throughout the gravels. Some mining has been done on Livengood bench east of Wonder Gulch, but east of Last Chance Claim no definite pay channel has been found. Further prospecting has, however, recently been done at this end, and good prospects are reported. No mining has been done in the creek placers of Livengood Creek, the main gold distribution there having been found to occur principally within comparatively small areas just below the junction of Ruth, Gertrude, Amy and Lucky Creeks.

The principal drift mines operated on the Livengood bench during 1925 were those of Bostrom and Company on the Ready Bullion Assn. and O'Connor and Kelly on the Letrum Assn. who mined both summer and winter. McIntosh Bros. drifted throughout the year on Eureka Assn. Winter drift mines were also operated by Aarvik and Sjoberg on the Letrum claim; Fisko & Simons; Bulatovich & Marin on Hidden

Treasure claim; Julius Larsen on Eldorado claim; Andrew Soderland on the Deep Channel Assn.; and Enstrom Bros. on the Sunnyside Assn. Enstrom Bros., A. Soderland and Julius Larsen prospected elsewhere on their ground during the summer and did development for this winter's operation. Pat Carroll sank prospect shafts on the Last Chance claim in ground 70 to 75 feet deep, in search of an eastern continuation of the bench pay streak. F. Koda prospected on the Red Top claim. Fisko Bros. & Neramo were engaged in ditch construction for bringing water from Heine Creek to the Fisko Bench Assn. claim located at the far eastern end of Livengood bench. They also did some prospecting in ground 45 to 50 feet deep. Some good prospects are reported and the ground will soon be developed for drift mining.

Bostrom & Company, with a crew of 11 men mined 45,000 square feet of bedrock on the Ready bullion Assn. last winter but only a portion of this dump had been sluiced up by August 1. The summer's operations were conducted on the same scale, but handicapped by lack of water for sluicing. The shaft here is 48 feet deep and is fully timbered. The main drifts are timbered with three piece sets and lagged across the top. The bedrock to the north of the shaft averages 7 feet higher than that to the south. The gravel on the south side is small and contains heavy gold, characteristic of the pay from Ruth Creek, while the gravel to the north is larger and contains typical Livengood bench gold. The horizontal distribution of the gold is quite irregular, but is practically all in the limestone bedrock. This bedrock is irregular in contour, containing soft spots with hard

siliceous ribs. The average thickness of the gravel is 3 to 5 feet. The height of face mined varies from 4 to 5 feet; the greater part of it being in the limestone bedrock. No timber is used at the face, although small frozen pillars are left to support the roof where required and are later recovered. One shift only was worked, 8 men being employed underground. Thawing points are driven easily at the top of bedrock, 15 ten-foot points being driven at 3-foot centers per man per shift. These points are withdrawn, sweaters inserted and ground steamed for 12 hours. The gravel is easily picked down but the limestone bedrock is difficult. The material is shoveled into wheelbarrows and wheeled to the bucket. The shovelers average 100 wheelbarrows per man shift. The dump is hydraulicked into the sluices, using pumped water through a small nozzle, and with water from Myrtle Creek. The operating costs are 40 to 50 cents per square foot of bedrock, the higher cost being due to unfavorable bedrock. The operators state it is cheaper to mine in the winter, for besides requiring no timber, better miners are then available.

O'Connor & Kelly employed 19 to 20 men on their summer operations on the Letrum Claim and 8 to 15 men during the winter. The shaft is 90 feet deep, being 8 feet in bedrock. The gravel here is 4 to 8 feet thick. Bedrock is a black chert and white slabby limestone, and but for occasional high reefs is fairly regular in contour. Thawing points are driven with water or steam and spaced $2\frac{1}{2}$ feet apart. Points are withdrawn and 10-foot sweaters inserted. The ground is thawed 4 to 5 hours, the sweaters are then pulled half way out and steaming continues for 5 to 6 hours longer. Two men,

working double, set 20 to 24 points per shift. To prevent the slabbing of the roof, posts with a short cap are set along the face with each thawed advanced. They are spaced 15 to 25 feet apart. The operating costs are about 55 cents per square foot of bedrock.

J. McClelland hydraulicked on the first bench, right limit of Livengood Creek on No. 4 A above creek claim, with a crew of 3 men working one shift only. The gravel is comparatively small in size with no large rocks and averages from 8 to 9 feet in thickness, but is overlain by 5 to 40 feet of muck and silt. The bedrock is a black chert. This overburden is stripped in the spring by ground-slucicing and hydraulicking. The gravel is piped into the head of 3 to 4 lengths of sluice boxes and the tailings are stacked with a giant. Hydraulicking of the gravels is only done when a full head of water is available to operate both the 3-inch nozzles in the field and the 3-inch stacker nozzle under the 75-foot head which holds for only about one month during the average season when 5,000 to 6,000 square feet of bedrock are mined.

Kt 49-43 Bentley Falls with 2 men hydraulicked on No. 3 bench claim on Ruth Creek. A pay streak 50 to 60 feet wide follows along the right limit of the hill. Bedrock is a siliceous mineralized limestone intruded by a porphyry. The slate contact is close by. Most of the material mined is angular, only some of the lower wash on bedrock in the main channel being slightly rounded. There are no large rocks. It is mostly a residual deposit and contains a high gold content. The thickness of the material sluiced into the sluice boxes averages

from 6 to 10 feet, the overlying 3 to 20 feet of muck first being stripped off. The operation is handicapped by a very small water supply usually only available for a few short splashes per day, during a great part of the season.

Kt 49-266 The largest hydraulic operation conducted in the district is that of C. W. Hudson on Discovery Assn. claim at the lower end of Lillian Creek. After stripping the 4 to 10 feet of gravel of 8 to 15 feet muck, the gravel bank is piped down and piped into the head of a long string of 20 inch sluice boxes. The upper 20 boxes are set on 7-inch grade and paved with pole riffles, the lower 13 boxes are set on $4\frac{1}{2}$ -inch grade and are equipped with perforated steel plates lying on cocoa matting. The gold is fine and rusty. A natural dump is available for the tailings. Water for hydraulicking is brought from No. 3 above Livengood Creek through the Samson ditch, 2 miles long, and delivered to the giant with a 3-inch nozzle through a short pipe line 10 to 7 inches in diameter under a head of 25 to 75 feet. During periods of low water supply, the water is impounded in the ditch and used in short intermittent splashes. A crew of 8 men is employed, two shifts being worked. These hydraulic operations first started in 1924. M. Beegler hydraulicked on No. 1 above on Lillian Creek, just above Hudson's operation. A pay channel is mined here about 75 feet wide containing high grade gravel 2 to 10 feet thick overlain at the lower end by 8 to 10 feet of muck and silt overburden which is up to 35 feet thick at the upper end. The very small water supply limits the mining here to a short period in the spring and fall, much of the time water being available only in short splashes. Barker & Godfrey

also conducted a small hydraulic operation on the claim above Beegler's where some good pay is also found.

K+49-10 N. R. Hudson installed a hydraulic plant on his property on Olive Creek early this season and hydraulicked the creek gravels on Discovery Claim. Mining on this property was formerly conducted by groundsluicing and hydraulicking with a small hose outfit. The creek wash ranges from 20 to 25 feet in thickness and consists mostly of slide and angular material with some fairly well rounded gravel. There is practically no muck overburden. Bedrock is a slate and porphyry. The gold is fine but heavy and distributed mostly on bedrock. Small fragments of cinnabar are found. The water for the No. 1 giant used in the field with a $2\frac{1}{2}$ to 3-inch nozzle under a 125 foot head, is brought from Ester Creek by a $1\frac{1}{2}$ mile ditch. Water for the groundsluice comes from Olive Creek. During the dry weather period the water is impounded and used intermittently, an average of 4 to 6 ten minute splashes being obtained in 24 hours. The material is piped into the head of a long string of 24-inch sluice boxes set on a grade of 7 inches. Tailings are disposed of by adding additional boxes from time to time to the lower end. A stone boat operated by steam hoist is used for taking the boulders out of the pit.

K+49-10 Olive Creek has built up a large alluvial fan about $1\frac{1}{2}$ miles long, extending from Discovery Claim down to and over the flats of the Tolovana River, covering about 300 acres. This fan is from 25 to 45 feet thick and overlies 8 to 10 feet of stiff clay which is underlain by the Tolovana gravels. It is composed of successive

layers of material most of which is angular at the upper end and more rounded on following downstream. From 4 to 6 feet of muck covers the greater area of the fan. The ground is all frozen. Fine gold can be panned almost anywhere. A considerable number of prospect shafts have been sunk, which are mostly confined to the main valley of Olive Creek over a width of 500 to 800 feet. The owners contend that this prospecting has given an average of better than 50 cents per cubic yard. Some open cut mining has also been done at different places on the fan. A long cut was boomed out several years ago on the Perfection claim and one on the Gas Bag claim adjoining below and continuing across No. 3 below and onto the Clifton claim. These cuts did not reach the clay bedrock but the clean-up is reported to have closely equalled the shaft prospecting.

B. Douglas groundsluiced on the right limit bench of Gertrude Creek; Tony Corgan groundsluiced on Lucky Creek and Oscar Oliver sniped with a rocker on Lucille Creek. Tom Verdie ^{KX 49-41} groundsluiced, and Johnson & Healy drifted a small area during the winter on Wilbur Creek, a tributary of the Tolovana River. G. J. LeNont prospected on Tolovana River near Wilbur Creek, and McDougall and Brown sunk an 80 foot prospect shaft on the Tolovana River just above Livengood Creek which did not get to bedrock but showed prospects of a little fine gold throughout the deep gravel. Jno. Lakso and partner prospected and groundsluiced on Butte Creek, a tributary of upper Hess Creek where some gold had been found. Olson & Browman operated a small hydraulic plant on Quail Creek.

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-sludging and shovel-in, 1 slip scraper, 1 open cut with a self-dumper, and about 6 drift operations were conducted with about 60 men.

KX 48-94 In the Eureka section Farmer & Jones hydraulicked on "High Bar" between Alameda and Eureka Creeks. *KX 48-101* 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. Frank & Company 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. 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. 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. Olsen and Evenson groundsluiced and shoveled-in on Omega Creek; Bob Hieght, and J. Green did similar mining on Eureka Creek.

1440-16 In the Tofty section 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 groundsluicing 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. Hanson and Lindberg with a crew of nine; Mellon, Strand and Hardwick, and Albrecht, Demmic & Company on Woodchopper; Radovich & Company on Miller Creek; Otto Hovely on Cache Creek; and several others, conducted drifting operations. M. Murray, on American Creek, with 5 men, after stripping off the muck and overburden by groundsluicing with an automatic dam, shoveled the gravel and bedrock into wheelbarrows, 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 groundsluiced and shoveled-in on American Creek. Anderson & Anderson did hydraulicking on Boulder Creek.

Placer mining in the Hot Springs district was conducted during 1925 at 27 operations with 85 men engaged. Eight hydraulic mines with 29 men; 11 ground-sluice and shovel-in operations with 21 men; 4 summer drift mines with 24 men, and 4 winter drift mines with 11 men were operated. Seven men were also engaged in prospecting during the summer at five localities, and St. Louis interests investigated the possibilities of the district, employing 12 to 25 men. The open cut mines in the district have always been handicapped by the lack of sufficient water during the greater part of the season and

the inability to procure a reasonably reliable water supply, even should long ditch lines be constructed. The 1925 season experienced an exceptionally dry period during July and August, and as options had been given on some of the properties, the number and size of the operations were somewhat reduced. The gold production from this district this year is not expected to be as large as in 1924.

Stream tin is an important by-product of placer mining in the Tofty section. Thirteen tons of stream tin averaging 53 to 58 per cent in tin metal were shipped from Hot Springs to the smelters at Singapore this summer and about 5 tons more were to be shipped in the fall. Six tons of these tin concentrates were, however, a three seasons' accumulation at one of the drift mines. With the present price of tin a good profit is realized as the cost of recovering the tin concentrates is incidental to the gold recovery. One of these shipments of 13,585 pounds averaging 53 per cent in tin metal netted a return of 23.8 cents per pound of ore after allowing for sacking, freight of 3 cents per pound to Hot Springs, freight to Singapore, brokerage, insurance, smelting charges, etc. with the price of tin metal at 50 cents per pound.

Summer freight rates by road from Hot Springs to Eureka, a distance of 22 miles, are $2\frac{1}{2}$ cents per pound. Freight to the Tofty section is taken from Hot Springs, 6 miles down the slough by boat to the landing, from where it is hauled over a good road for 12 miles to old Tofty for $2\frac{1}{2}$ cents a pound and to the present Tofty P. O. in the Woodchopper area, 5 miles further to the east for 3 cents per pound. Very little winter freighting into the district is now done.

Most of the placers that have been mined in the Tofty section show the main pay gravels to have been confined to more or less separated and isolated areas located on the upper end of Cache Creek, the benches of Sullivan Creek east of old Tofty, and at the lower end of Tofty, Idaho, Miller, Willow, Innesville, and Hokely Gulches and on the right limit of Woodchopper Creek opposite the mouths of Deep and Camp Creeks. This characteristic also holds east of Cache Creek in the western end of the Eureka section. These separate areas of pay gravel contain the same kind of gravel, the same character of gold and all contain stream tin and are located within relatively close distances to each other in a general line bearing east and west. A plausible explanation of their origin could therefore be, that an old channel may at one time have existed at a higher elevation along the northern edge of the valley and which was destroyed by subsequent erosion and its contents resorted and transported to the present location of the placers. The placers on American Creek and Boulder Creek lie beyond this general belt and do not possess any unusual characteristics. The placers on Cache Creek are from 40 to 55 feet in depth and on the Sullivan benches up to 65 feet, consisting of 5 to 10 feet of gravel overlain by muck and silt. On Discovery Claim at Tofty Gulch, the shallowest ground is 28 feet deep. At Miller Gulch the ground is 50 to 65 feet deep, 70 to 90 feet at Willow Gulch, 90 to 130 at Hokely Gulch and 130 to over 200 feet deep at Woodchopper. All of these placers have gravels overlain with a deep covering of frozen muck and silt and excepting a few thawed spots are solidly frozen. These placers have been intensively

mined by drifting for which conditions have been generally favorable. Large areas were formerly drift mined at costs of 45 to 65 cents per square foot of bedrock, but with the small remaining areas that have been so mined in recent years, the costs have increased.

The placers in the Eureka section are bench or "bar" and creek deposits. The bench or "bar" deposits are located principally along the right limit slope of Pioneer Creek and along the slope of the hill on the north side of the valley from Eureka Creek to Rhode Island Creek. They range from a foot up to about 15 feet in thickness on the more important "bars" which are known as What Cheer Bar, Excelsior Bar, and Glenn Bar. These deposits are mined mainly by hydraulic methods, most of this mining having been handicapped by the inability to procure suitable water supplies. Small creeks such as Seattle Jr. and Doric Creek have cut down through What Cheer, Jordon and Pippin bars, making rich gulch placers and Glenn Gulch lying between Excelsior and Glenn bars was an exceptionally rich placer. These gulch placers have been drift mined and were later groundsluiced or hydraulicked. The creek placers have not been very productive, excepting for a relatively few claims on Eureka Creek above Pioneer Creek. The placers mined on the other creeks have been principally bench deposits. At the western end of the Eureka section at the head of Baker Creek and its tributaries Gold Basin and Kilarney Creeks, gold and tin bearing placers with other characteristics similar to those on the Tofty section are found and have at different times been drilled and otherwise prospected, but have been mined only to a very small extent.

The principal placer mining in the Tofty section during 1925 was conducted at the drift operations of Dimmich, Albrecht & Millianic with a crew of 15 men on the Olga Assn. on Deep Creek opposite Innesville Gulch, and Miljevich Bros. & Fredlund on the Hard Luck Assn.; and the hydraulic operations of Cleveland and Howell with a crew of 6 on the Sullivan Creek bench. Hansen & Marco drifted out an old pillar at the line between the Wild Goose and Golden Star Claims. On Tofty Gulch, ^{K-48-76} Donahue & Strand put down a prospect shaft on the Peg Leg Assn. Claim; C. P. Schneider prospected on Discovery Claim, and Chas. Grill groundsluiced at the upper end of the gulch. J. Sissford working alone, prospected on the hillside between Hokeley and Innesville Gulches in search of bench ground. A scraper operated by steam hoist was used in making a cut, but the operation at the time had not been successful. J. Howell & Company with 6 men conducted winter drift operations on Deep Creek on the Cleopatra Claim. A narrow pay streak was mined, but the operation encountered wet heaving ground. Donohue and Donnelly drifted out a small area on Idaho Gulch during the winter. Otto Hovely conducted small drifting operations on Cache Creek and Wm. Stewart mined a small area by drifting during the winter. On American Creek, ^{K-48-21} M. Murray used an automatic dam in stripping the pay gravels of muck and top gravel overburden. The pay gravel was shoveled into wheelbarrows and wheeled to a self-dumping carrier and hoisted by steam power to the sluices. Besonen and Nurstes, and Ed Ness, groundsluiced and shoveled-in, and J. Noreen dug a small ditch and prospected. Louis Anderson conducted a small hydraulic operation on Boulder Creek.

St. Louis interests under the direction of Roy H. Elliot, a mining engineer, investigated the placer possibilities of the Tofty and Eureka sections during the summer. A Keystone drill was used for prospecting the deeper and the wet ground, and shafts were sunk on the shallow benches. The possibilities of bringing in suitable water supplies were also investigated, the principal investigation in this respect being that of the Hutlinana River. The company withdrew from the district in August.

Considerable new prospecting will be done during this fall and winter. A. Bock will drill on Deep Creek and Kilarney Creek; J. Howell will drill on the Sullivan Creek benches and to the eastward; F. Hansen will drill on the Woodchopper flats; and Tilleson & Lind will sink prospect shafts on Cache Creek. Some good prospects are expected and indications are that an increased amount of placer mining will be conducted next season.

448-44 In the Eureka section, J. R. Frank & Company with a crew of 3 to 6 men, hydraulicked for a short while on What Cheer Bar, but their principal mining was done on Doric Creek, a tributary of Pioneer Creek. On Doric, a cut about 750 feet long averaging 85 feet in width at the upper end and 50 feet at the lower has been boomed out by the aid of two automatic dams to where 3 to 7 feet of pay gravel remains. This work was started several seasons ago. In order to provide the necessary grade to further reduce the thickness of the remaining gravels a Bagley scraper operated by a steam hoist has been installed at the lower end for scraping out a deep sump from which the tailings will be

scraped and stacked. It is the plan to boom down to about 1 foot of gravel, which will then be shoveled into sluice boxes. This gravel is stated to be unusually rich in gold. M. S. Gill and two men hydraulicked with a small hose outfit on Last Chance Bar, a bench of Pioneer Creek, east of Seattle Jr. Creek. Jno. Malin sniped on What Cheer Bar and Chas. Allen sniped on Seattle Jr. Creek. Bob Hight shoveled-in on No. 1 below on Eureka Creek and J. R. Green groundsluiced and shoveled-in on the bench on No. 8 above.

K4 48-96 Farmer & Jones hydraulicked on a bench on the left limit of Eureka Creek on what is known as the McCaskey Bar. While this bar was known for many years to be gold bearing, it was not mined until last season. The lower end of this bar lies about 85 feet above the level of Eureka Creek on a slate bedrock. The portions so far mined show an average thickness of 10 feet, although the deepest prospect shaft put down is 24 feet deep. The average gold content is about 10 to 15 cents per square foot with a width of pay indicated about 250 feet wide. A 2-mile ditch from Kentucky Creek and an 800-foot pipe line, 10 to 7 inches in diameter, delivers water to two No. 1 giants with $2\frac{1}{2}$ -inch nozzles under a head of 65 to 100 feet. The water supply is small and must be used in short splashes most of the time.

K4 48-92 Johnson, Sundstedt & Hensley hydraulicked on Alice Bench, located well to the base of the hill just east of Glenn Gulch. The ground averages 5 feet in thickness. The gravels are piped into the head of the boxes with two No. 1 giants with $2\frac{1}{2}$ -inch nozzles operated under 30 to 45 foot head. The water supply is small and much of the

time must be used in short splashes. Tailings are disposed of without stacking. In an average season about 100,000 to 120,000 square feet of bedrock is mined.

Stevens & Gill groundsluiced a short while on Shirley Bar and plan to install and operate a small hydraulic plant there next season. Lund and Anderson hydraulicked on the benches of Rhode Island Creek and Tom Loveland groundsluiced and shoveled-in on Seattle Creek, a tributary. On Omega Creek Olson & Evenson groundsluiced and shoveled-in, and Heath & Overby took out a small dump last winter by drifting. V. Erickson with one man hydraulicked on Chicago Gulch and Reider & Barker prospected on Thanksgiving Creek and elsewhere.

Rampart District:

In 1924 the Rampart district was very quiet, there being two hydraulic plants, four automatic dam and shovel-in operations and two winter drifting operations, engaging about 20 men. 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, 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.

In 1925 two hydraulic operations with 8 men engaged; 7 open cut operations with 10 men engaged in booming with automatic gates or groundsluicing, and shoveling-in; and 3 winter drift operations with 4 men, constituted all the placer mining conducted in the Rampart district. The principal operations conducted were those of Chas. Swanson with a crew of five men, who hydraulicked on the benches of Hunter Creek at Dawson Creek; A. Ott with 2 men who hydraulicked on lower Hunter Creek; and the automatic dam and shovel-in mining of Climie, LaPorte and Crockett on Little Minook Creek. Groundsluicing and shovel-in mining was done by C. O. Clemens on Hunter Creek; Geo. Pride on No. 40 claim, Big Minook; McKenty and Hautier, and Frank Hawley on Slate Creek; Tom Antonsen on Little Minook, Jr. and Jno. Ross on Little Minook. Winter mining was done by Crockett and LaPorte on Hoosier Creek; H. Miller, and J. Climie, on Idaho Bar.

Ruby District:

The operations in the Ruby district are now rapidly diminishing in both size and number and consequently the gold production is declining. About 65 men were engaged in mining and prospecting in this district in 1924.

L. Sturtevant with two men on No. 4 above, Al Burke on No. 3 above, and R. Deacon and one man on Discovery, groundsluiced and shoveled-in on Bear Pup. B. J. Bowers with a crew of four men groundsluiced 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. Horton, 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.

Detailed reports from the placer operations conducted in the Ruby district during 1925 are lacking. General indications are that the gold output for this year will show a decrease from the previous year. Small shovel-in operations were conducted on Bear Creek, Greenstone, and other tributaries of Long Creek. Drift mining was conducted on a small scale, but by a considerable number of operations, the principal ones being located mainly on Poorman, Flat and Trail Creeks. Drift mining is also reported to have been conducted on Long, McKetchum,

Little Pup, Timber and Big Creeks, with some prospecting on these creeks and Birch, Spruce and Glacier Creeks. The wagon road from the Settlement of Long has been completed to the Solatna River and a short way beyond.

Koyukuk District:

Reports received from this district for 1924 were meager and general. This district, lying about 150 miles in a straight line north of the Yukon River, is one 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 recent 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 shovel-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.

In 1925 reports from the Koyukuk district indicate a general improvement in placer mining and an increase in prospecting. From 80 to 90 men were engaged at the comparatively large number of small drift, open cut and prospecting operations. The district is very isolated, the open cut mining season is short, the water supply is generally small, particularly on the benches, and the cost of mining is high, but the placers are generally richer in gold than those being mined in most of the other districts and good clean-ups are reported. Most of the placer mining is conducted in the Nolan-Coldfoot area and to the south on the South Fork of the Koyukuk River and its tributaries. Very little mining is being done in the Hog and Alatna River areas. An increase in drift mining is noted, most of which is done during the winter. The summer operations are conducted mainly by groundsluicing and shovel-in methods, the principal operations being on the benches of Nolan Creek and Hammon River, where high grade placer was discovered several years ago. Gold in pay quantities has recently been found on Porcupine Creek and on the benches of Vermont Creek and elsewhere. The placers on the Hammon River, Nolan and 12 Mile Creeks and the South Fork of the Koyukuk River are under consideration for hydraulic

mining. Drilling was done on Slate Creek.

This district is severely handicapped because of its isolated location which naturally adds greatly to the cost of mining and prospecting. Freight for the district comes via the Alaska Railroad and Nenana and is taken down the Yukon River to Koyukuk Station. From here it is taken up the Koyukuk River to Bettles at a cost of \$65 per ton. From Bettles, it is taken further up the river in small shallow draught scows pulled along by horses, to Wiseman (Nolan) a distance of about 65 miles at a cost of 8 cents per pound. The freight costs from Seattle to Wiseman average around \$300 per ton or 15 cents per pound. The people of the district are asking the Alaska Road Commission to construct a suitable trail from Bettles to Wiseman for tractor haulage which they contend will reduce the freighting cost between these points to 3 cents per pound. The project appears to be well justified. An aeroplane landing field was cleared this summer at Wiseman and several trips of the plane were made from Fairbanks with passengers and supplies. The average wage scale for the district is \$6 per day and board or \$10 per day without board. Wood around Nolan costs \$16 to \$17 per cord.

The following list of placer operations conducted in the district during 1925, giving their location, the method of mining and the approximate number of men engaged at each one has been compiled from information received from different sources. While it is not complete and may contain some errors, it will serve to give a general idea of the placer mining in the district.

<u>Name of Operator</u>	<u>Creek</u>	<u>Method of Mining</u>	<u>No. Men</u>
Watts & Brady	Hammon River	Open cut	2
" "	" "	Winter drift	4
- Ness	" "	Open cut	1
Baton, Wool, Wanamaker & Co.	Nolan Creek	Winter drift	5
Workman & Wanamaker	" "	" "	?
" "	" "	Open cut	2
Pingel & Jones	" "	Open cut	2
Peter Dow	Archibald Cr.	Open cut	3
" "	" "	Winter drift	?
Martin Sliscko	Vermont	Open cut	2
Miller & Davey	Smith	Winter drift	2
E. Poss	" "	" "	3
Tom Brady	Swift	Open cut	?
James Wilson	Emma	Open cut	?
" "	" "	Winter drift	2
E. Morton	" "	Open cut	?
Ed. Marson & Co.	Porcupine	Winter drift	4
Stanich Bros.	" "	Open cut	2
Bob McIntyre	Fay	Open cut	1
Sam Sanderson	Twelve Mile	Open cut - prospect-	?
Tom Kovich	" "	Open cut ing	?
Jno. Kleffenz	" "	Open cut	?
Alexon & Gilbert	Slate	Drift	4
James Manana	" "	Open cut	3
James Kelly	" "	Drilling	?
Larson & Johnson	Wild River	Open cut	2
Joe Matthews	" "	Open cut	?
Frank Smith	John River	- -	?
Martin Josephson	" "	- -	?
Matthews & Co.	Jim Pup	Open cut	3
Patterson & Co.	Lake Cr.	Open cut	3
" "	" "	Winter drift	?
Sheely & Swift	Tramway Bar	Open cut	2
Bob Burford	So. Fork Koyu- luk	Open cut	1
Henry Mistparzo	" "	Open cut	1
Giest, Summers & Smith	Lake Cr.	Drift	3
J. Stevenson	Gold Bar	Prospecting	1
Jno. Peterson	60 Mile	Drift	1
Joe Metzberg	" "	Drift	1
Ben Sayres	" "	Drift	1
Wm. McCamant	Eureka Cr.	Drift	4
H. F. Byram	" "	Drift	3
Andrew McLeod	Hog River	-	?
Jack Dodds	Gold Cr.	Open cut	1

Chandalar District:

In 1924 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 groundsluiced 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.

In 1925 twelve placer mining and prospecting operations with about 22 men engaged were conducted in the Chandalar district. The principal mining was conducted by three small winter mines on Little Squaw Creek; and two small winter drift mines, and one ground-sluicing operation on Big Creek. The gold output for 1925 was small but several new discoveries have been made which should increase the output for next year. The accessibility of the district is being much improved by the wagon road which is now under construction from Beaver, a settlement on the Yukon River to Caro, a distance of 74 miles. From Caro it is 46 miles farther to the operations on Little Squaw Creek. Present freighting rates from Beaver to Little Squaw Creek are 15 cents per pound during the winter and 40 cents per pound

during the summer. Labor is paid \$6 for 8 hours and board. The cost of boarding is about \$4 per man day. Wood costs \$16 to \$20 per cord at most of the operations on Little Squaw Creek. The most important happening in the district was the discovery of pay last winter on Little Squaw Creek by Carlson, Buckley and Amero. A prospect shaft was sunk 164 feet to bedrock through solidly frozen ground on Discovery claim, two claims below the rich bench ground formerly mined by Fred Smith. Two claims below Discovery, Little Squaw Creek enters the flats of Lake Creek. The upper 80 feet of this deposit is a mixture of muck and big rocks, which overly 84 feet of heavy gravel. The main pay is in the 3 to 3½ feet of gravel, lying on top of bedrock, and so far has been found to be restricted to a streak about 25 feet wide with low grade side pay. The gold is coarse and shotty. A small area was drifted, yielding an average of \$2.30 in gold to the square foot of bedrock. A larger steam plant was shipped in this fall. The prospect shaft is to be enlarged and active drifting will be done this winter.

Wm. McDaniels with one man drifted last winter on the Smith ground on Little Squaw Creek; Joe Wilkes working alone took out a small winter dump; Oscar Otterson, and McCauley prospected.

O. J. Nicholson with 5 men drifted during the winter on Big Creek, prospecting during the summer; Joe Shaw also drifted; A. Newton with 2 men groundsluiced; and D. A. Murphy prospected. The Chandalar Gold Company had two men prospecting on Tobin Creek. Coarse gold was found last spring by French Joe on a rim of Tobin Creek well downstream

from where most of the former prospecting was done. Ellis Anderson prospected on Baby Creek and found very encouraging gold prospects. Olson prospected the benches of Dictator Creek and found some gold.

Iditarod District:

During 1924, 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 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.

On Otter Creek the Riley Investment Company operated its dredge until September, when a mechanical breakdown 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 $7\frac{1}{2}$ 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. Frank Salen with 6 men employed, hydraulicked on Granite Creek, and H. Galneck and partner groundsluiced on Malamute Pup, tributaries of Otter.

On Flat Creek Capt. Becker with one man operated an automatic dam on Bonanza Claim; 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 the Upgrade; O. Olson and 3 men hydraulicked on the Hill Top; Paul Wabnig mined on the Idaho Claim.

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

Pete Steger and two men groundsluiced 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.

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

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 groundsluiced.

In the Georgetown area 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.

In 1925 the placer gold production from the Iditarod district showed a further decrease. This is partly due to the very dry season experienced and the smaller production made by one of the dredges. Twenty-seven placer operations engaging about 140 men are reported to have been conducted during the year. These include two dredges employing 38 men; 12 hydraulic mines with 74 men; 9 groundsluicing operations with 20 men; and 4 snipers. Besides these about 15 men were engaged in drilling and ditch construction.

The Riley Investment Company dredge on Otter Creek was delayed in starting operations as new engines were installed and the dredge generally overhauled. The dredge of the Northern Alaska Dredging Company operated the full season. Richardson Bros. and Pete Miscovich hydraulicked on Otter Creek and Frank Salen hydraulicked on Granite Creek. Ten placer operations with 30 men were conducted on Flat Creek and at its head, chief among which were the hydraulic operations of Hays & Savage, who purchased the ground and plant of the Alpha Mining Company this summer; and the hydraulic operations of Olaf Olson

on the Hill Top Assn. Pete Steger groundsluiced on the Summit Assn. and Loranger & Company wheeled to a self-dumper on Willow Creek. Frank Manley had a crew of men at work on the construction of a 10-mile ditch from Bonanza Creek to bring water to Willow. He also did some drilling on Willow Creek, but the dragline excavator was not operated. The Chicken Creek Mining Company employed about 14 men at its hydraulic operations at the head of Chicken Creek and a very creditable clean-up is reported. On the Kuskokwim side, hydraulic plants were operated by Barney Walsh, and by Harry Stevens on Donlin Creek; by Riley & Kirk on George River; and by Jno. Keller on Moore Creek. Geo. Glass did further drilling on Moore Creek during the spring in the investigation of its dredging possibilities. It is reported that the options have since been given up.

Innoko-Tolstoi Districts:

In 1924 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.

On Ganes Creek Guinan & 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.

On Yankee Creek the Flume Dredge Company operated its $2\frac{1}{2}$ 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 under way, 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.

On Little Creek Schmeirly Bros. resumed their hydraulic operations; Vibe & Cameron operated a slip scraper; Dan Nicholson groundsluiced and operated a scraper; and F. Speljack groundsluiced.

Edwards & Nicholson and Riech & Daniels groundsluiced and shoveled-in on Spruce Creek.

On Ophir Creek Collins & Hard, and Johnson & Johnson operated steam scrapers; John Staton groundsluiced, shoveled-in and wheeled to a self-dumper. Berg and Meier groundsluiced 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 and 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.

Nothing new has been reported from the Tolstoi district where a few small drift and groundsluicing operations are reported to have been conducted in the Mt. Hurst area on Esperanto and Madison Creeks, and in the Cripple Creek area on Cripple, Colorado, Eldorado and Boob Creeks.

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 $2\frac{1}{2}$ cents in the winter. The average base rate on freight from Seattle to Marshall is about \$35 per ton.

In 1924 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 groundsluiced 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 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. Geo. Pilcher, working alone, hydraulicked on Elephant Creek.

Dougherty and Gertler groundsluiced and shoveled-in on Buster Creek, a tributary of the Kako, in the Russian Mission district. J. H. Wick shoveled-in on Montezuma Creek, a tributary of Buster.

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.

In 1925 very little placer mining activity is reported from the Marshall district. A few small open cut operations were conducted on Willow Creek, and on Disappointment and Elephant Creeks, tributaries of Wilson Creek. Several men were shoveling-in on Buster Creek. Only 3 or 4 men are reported as mining on the Stuyahok River.

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.

In 1924 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 $22\frac{1}{2}$ feet in depth after being stripped of from 20 to 35 feet of overburden by groundsluicing 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 1,000 cubic yards per 24 hours. A large amount of drilling was also done on the lower ground.

The New York-Alaska Gold Dredging Company 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 Tuluksak-Aniak district and a small amount of similar mining was done in the Goodnews Bay district.

In 1925 the principal placer mining conducted in the Kuskokwim Region continued to be the operation of the 4 cubic foot diesel driven stacker dredge by the Kuskokwim Dredging Company on Candle Creek, near McGrath. About 30 men were employed by this company. Schuttler & Schuler groundsluiced on Carl Creek and a similar small operation was conducted on Candle Creek. Dick Matthews with a crew of 7 hydraulicked, Goebel and Pontella, and Hugh Sherwood and partner groundsluiced on Hidden Creek, a tributary of Nixon River; Strand & Pearson groundsluiced on Ruby Creek; Jno. Strand with two men mined on Eagle Creek, and several others mined and prospected in that vicinity. About 7 men have been prospecting on the upper reaches of Story River where encouraging results were evidently obtained as some of these prospectors have recently taken in additional supplies.

The New York-Alaska Cold Dredging Company has been most active in drilling additional dredging ground on the Tuluksak River in the vicinity of Bear Creek. The machinery and material for a 4 cubic foot diesel driven, combination type of dredge was landed at Aniak during the summer. It will be freighted to the property this winter and erected and operated next season by this company. It is reported that recent drilling has developed enough additional ground for another dredge. Several small open cut operations were also conducted elsewhere in the Tuluksak-Aniak district, mainly on Spruce and Canyon Creeks.

A small amount of placer mining by open cut methods was conducted in the Goodnews Bay district, reports indicating an increase over recent years.

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 in the first part of this report, 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 Company. 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 largest interest there has recently changed hands and a consolidation with large adjoining dredge holdings may result in the near future.

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 November 8, or 136 days, handling 426,943 cubic yards. No. 2 dredge operated from

May 1 to December 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 October 7, running until November 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 3,150. 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 $1\frac{1}{2}$ 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 2,300 volt, 538 KVA. General Electric alternating current generators. This current is stepped up to 11,000 volts and transmitted $3\frac{1}{2}$ miles to the dredges.

The company thawed a large volume of ground during the season with water at natural temperature. 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 generally 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.

The Alaska Mines Corporation operated its $3\frac{1}{2}$ 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 1,000 gallons per minute at $17\frac{1}{2}$ 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.

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.

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.

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.

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.

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 Kurrah Creek dredge, and the Crooked Creek dredge, all operated for the greater part of the season. The dredge of the Casadepaga Mining Syndicate 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 & Development Company on Osborne Creek operated for about 20 days. The Alaska Kougarok Dredging Company's dredge on Taylor Creek operated for about 36 days. The Luther Gold Dredging Company's dredge on Budd Creek operated for a short period during the fall.

The dredges and holdings of the Alaska Dredging 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 Neilson Mining 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 districts, where the larger operations employ hydraulic elevators. In the Nome district, the

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Harmon 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 Company conducted a hydraulic elevator operation on Ophir Creek, mining 19,791 cubic yards.

In the Koyuk district, Porter, Leonard & Company, 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, with 5 men, hydraulicked on Bear Creek, a tributary of the Suckland River; Swanson and Nordling 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 Company 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.

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. D. Hoogendorn with 4 men, and R. Eschold with one man, hydraulicked on the Inmachuck River benches.

Numerous small open-cut operations employing groundsluicing 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 and Holmes drifted on No. 7 above with 4 hired men, taking out about 10,000 square feet during the summer; Valentine and Porter with 7 men

took out a winter dump on No. 1 below left limit bench, from a 140 foot shaft; and Olson Bros. with a crew of 6 men drifted about 20,000 square feet during the summer on No. 1 above, left limit bench. McDonald and McIntosh drifted on No. 12 left limit bench, Candle Creek, in the Fairhaven District.

Statistics for 1925 on the placer gold output of the Seward Peninsula were not available when this report was written, but general reports indicated that it was less than that of the previous year. About 70 per cent of the placer gold output of the Seward Peninsula in the past three years has been produced by the dredges and most of the balance by the hydraulic plants and other open cut mines. This year's decrease in production can be attributed to the smaller yardage dug by the dredges, the reduced scale of operation of the hydraulic elevator plants on Little Creek, and the shortage of water experienced during midseason by some of the hydraulic plants in the northern part of the Peninsula. The season around Nome was, however, an unusually wet one after about July 15. There were 16 dredges operated on the Seward Peninsula in 1925, compared to 18 dredges operated in 1924. A number of the dredges did not start operations until late in the season. Of the dredges operated in 1925, six are located in the Nome district, 3 in the Solomon; two in the Council; one in the Casadepaga; one in the Koyuk; one in the Kougarok; and two in the Fairhaven district.

The most important event in placer mining during 1925 was the acquisition of the Hammon Consolidated Goldfields Company interests and those of the Nome Mining Corporation (formerly the Alaska Mines

Corporation) by the U. S. Smelting, Refining & Mining Company. This brings the principal dredge holdings on the Nome tundra under one ownership and after this season all of the company's dredges will be operated, in which event a large increase in gold output will result.

The U. S. Smelting, Refining & Mining Company employed from 200 to 350 men during the season, most of whom were engaged in connection with the water thawing operations. Further experiments were conducted in thawing with water at natural temperatures under the direction of a special corps of technicians who conducted most systematic studies of all features involved. A large volume of ground was thawed in advance of dredging, as many as 1,700 thawing points being in service at one time. The method of churn drilling holes to bedrock in which the thawing points (1½-inch pipe) are inserted, has been adopted at places where difficulty has been encountered in driving the points to bedrock by the usual practice. These holes are drilled in equilateral triangular relation to each other with 32 foot spacing and experiments were made to increase this spacing up to 64 feet. The No. 1 dredge was not operated, but the No. 2 and No. 3 dredges started the season's work on September 8 and 6, respectively. The 3½ cubic foot dredge No. 4 (formerly operated by the Alaska Mines Company) was operated on Snake River, although it was shut down for eleven days early in the season because of a broken upper tumbler shaft. The hydraulic elevator operations on Little Creek were restricted to one pit, which had not been completed the previous season. These elevator

operations will probably not be conducted for the next few seasons as their water supply will be used for thawing purposes ahead of dredging. This company also did much work on their ditches and will have the water from three ditch systems available next season.

The dredges and holdings of the former Alaska Dredging Assn. and the Candle Creek Dredging Company were acquired last year by the Fairhaven Dredging Company, and these two dredges were operated the latter part of the season on Candle Creek, in the Fairhaven district, under the management of the Keewalik Mining Company. These dredges were idle in 1924. Most of the ground on Candle Creek is frozen, but is thawed with water under pressure. The old Flower dredge which has been lying idle for a number of years was put in repair and will be operated in 1926 by the Solomon Valley Dredging Company on the lower Solomon River. J. Bellevue rebuilt and operated his dredge on Dry Creek, near Nome. The Crooked Creek dredge (Mebes & Hansen) operated on Albion Creek, a tributary of Crooked Creek. The Dime Creek Dredging Company moved its dredge upstream a short distance, installed a water thawing outfit, and resumed dredging on September 14. The dredge of the Lomen Reindeer & Trading Company was operated under lease on Solomon River by Scott & Newberg. The dredge of the Alaska Investment & Development Company on Osborne Creek; the Luther dredge on Budd Creek; and the Alaska Kougarok dredge on Taylor Creek, were idle. The dredges operated during 1925 are mentioned in the general report.

The U. S. Smelting, Refining, & Mining Company on Little Creek conducted the principal hydraulic elevator operations. E. W. Quigley on Big Murrah Creek; Lee & Swanberg on Osborne Creek; Stewart Bros. on Monument Creek; Tom Jensen on Jess Creek; Olson Bros., Porter & Company, Porter Leonard & Johnson, and Hegberg & Holm, on Dime Creek; L. A. Sundquist, Swanson & Nordlund, O. A. Lundberg, and the Keewalik Mining Company on Candle Creek and its tributaries, operated their hydraulic plants and hydraulic mining was also conducted by a number of smaller plants, mainly in the Nome and Fairhaven districts. Ground-sluicing, shoveling-in and similar methods of mining were employed in practically all of the districts. A small number of men continued to work the beaches around Nome and Bluff, using long toms and surf washers. An operation at Bluff is reported to be using a scraper or excavator operated by diesel engine power for mining the placers along the beach near the mouth of Daniels Creek.

Very little drift mining was done during 1925. Several small drift mines were operated on Dime Creek in the Koyuk district and several small winter dumps were taken out in the Nome and Fairhaven district. Prospecting by sinking shafts through the deep lava capping and drifting in the underlying gravel is still being done on the Immachuck River.

American Creek in the Casadepaga district, and Coal Creek, a tributary of Solomon River were being drilled during the season to ascertain their dredging possibilities. A large dredging field is

reported to have been developed during recent years on Bonanza Creek about 125 miles east of Nome.

Kobuk Region

Placer mining in the isolated Kobuk region was conducted in the Squirrel River and Shungnak districts on streams tributary to the Kobuk River, which empties into Kotzebue Sound. According to reports some large clean-ups were made during 1925 in the Shungnak district, where Frank Ferguson and partners on California Creek, and Fred Johnson on Dahl Creek conducted the principal operations. The placers on these creeks are reported to be very rich with coarse gold, some nuggets worth up to \$300 being found. Hydraulic plants have recently been installed on these creeks according to reports. The principal operations in the Squirrel River district were conducted ~~mainly~~ on Klery Creek, where a few small open cut and drift mines were active.

REVIEW OF LOPE MINING BY PRECINCTS

Hyder Precinct

Mining development in the Hyder precinct was fairly active during 1924 and 1925. A number of prospects and properties had only the necessary assessment work done on them and on those properties no serious attempts were made to develop the showings.

The country adjacent to the West Fork of Texas Creek was actively prospected and ore exposures were found over a wide area. The fact that most of the prospects discovered were at relatively high altitudes and a great deal of initial effort was spent in trail building to the showings has made development slower than would seem warranted in view of the interest being shown toward ^{exposures} showings of lead-zinc ores.

Mountain View Mine:

KT 120-8
120-50
Development work at the Mountain View Mine was carried forward under the direction of Arthur Moa. This property, situated at the forks of Skookum and Fish Creeks, has exposures of silver-lead and gold-silver ores. These deposits occur as fissure veins both in the grano-diorite and the contact metamorphic rock adjacent to the grano-diorite. There are several short tunnels on the gold bearing veins on the Fish Creek side which are not under development at the present time. Work is being concentrated on the silver-lead showing on Skookum Creek.

A tunnel designed to explore the nearest croppings at depth has been started from Skookum Creek and has been advanced a distance of 100 feet. An average of 5 men were employed during 1924 and 1925. Equipment has been ordered for a power plant installation and also an aerial tram. The company is being financed by Ketchikan interests.

Riverside Mine:

Kt 118-41
The Riverside Mine, situated at 7 Mile on the Salmon River road, was operated intermittently during 1924 and 1925. A substantial production of lead-silver concentrates was made. Mine development was carried on under the direction of J. D. Littlepage. The surface, mill and power plant equipment was completely installed during 1924 and put in operation. A crew of 25 men was employed during operations.

Daly Alaska:

Kt 118-50
The Daly Alaska Mine, situated at 11 Mile on the Salmon River road, was actively developed during 1925. Some 2,000 feet of underground tunneling has been done. The ground so far developed is a brecciated greenstone zone in which occur lenticular veinlets of silver bearing minerals, the principal ones being tetrahedrite, galena, ruby and native silver. Work in progress during the spring of 1925 was the driving of a crosscut to explore a granitic zone southeast of the main workings. Power is furnished by a 25 H. P. semideisel gas engine driving a 14 by 16 Sullivan air compressor.

Important discoveries of lead bearing ores have been made in the Texas Creek watershed during 1924 and 1925. Several of the showings have excited considerable attention. Difficulties of transportation have seriously hindered the prospector in developing the showings. The improvement of the Texas Creek trail by the U. S. Forestry Service has improved the condition to a limited extent.

The Texas Comstock:

K+118-16 The Texas Comstock group is located on Joe-Joe Mountains, west of Ferguson Glacier. The showings are quartz fissure veins metallized with galena and pyrite. Only trail work and surface trenching was in progress during 1925. The claims are controlled by Jackson and Hummel of Hyder.

Texas Discovery:

K+118-29 The Texas Discovery claim, located by Smith and Ferguson, is situated directly on the Texas Creek trail. The showing consists of a quartz fissure vein in granodiorite metallized with galena. Only assessment work was done on the showing in 1925.

Homestake:

K+118-33 The Homestake group, situated on the hillside above Ibez Creek, is a quartz fissure in granodiorite mineralized with small shoots of solid galena. The property belongs to Carlson and Hewitt who intend to drive a crosscut at a shallow depth to explore the vein beneath one of the mineralized showings.

The Ibez Group:

KX118-31 The Ibez group, also the property of Carlson and Hewitt, situated on Ibez Creek, has a quartz fissure vein in country rock of quartzite and argillite. Short shoots of solid galena and sphalerite are present in parts of the exposure. The property was bonded by the Day Brothers of Wallace, Idaho who plan to explore the showing at depth.

A number of other prospects have been located with showings of a similar character upon which only assessment work has been done.

Ketchikan Precinct

Mining in the Ketchikan precinct was almost at a standstill during 1924 and 1925. None of the copper mines of the district were operated and it is not probable that there will be any great revival of the mining industry until the aspect of the copper market changes. Increased activity will necessarily have to come from gold lode development.

Helm Bay Gold Mining Company:

K+120-88 The property of the Helm Bay Gold Mining Company is situated about 1 mile from the head of Helm Bay on the west shore. A small amalgamating mill was erected on the property. During 1924 and 1925 a limited amount of development work was done.

Gold Standard Mine:

K+120-88 At the Gold Standard Mine, situated on the west shore of Helm Bay, operations were discontinued after a thousand feet or more of drifting and crosscutting had been done at a shallow depth on the deposit which is gold bearing quartz and calcite stringers in schist. Operation of the 5-stamp mill, situated on the bench, was also discontinued.

Peerless Mining Company:

K+120-86 A limited amount of surface stripping was done by the Peerless Mining Company at its property near sea level on Thorne Arm. Several gold bearing quartz veins in schist were disclosed.

The Moonshine property of the Chomley Mining Company was not operated during 1924 and 1925.

Kasaan Gold Mining Company:

KX 119-197 The Kasaan Gold Mining Company, owners of the old Julia property on Harris Creek, reconditioned the mine and mill in preparation for carrying on a development program. A 75 H. P. Fairbanks-Morse semidiesel engine was installed to furnish power.

Alaska Palladium Company:

KX 119-1 The Alaska Palladium Company, operating its Salt Chuck Mine, was the largest mining operation in the Ketchikan district. The mine and mill were operated continuously during 1925. An average of 55 men were employed. Mining was confined to shoots of ore adjacent to the original workings. These ore shoots occur as separated lenses in pyroxenite and gabbro. The mill treated 125 tons daily, making a concentrate carrying copper, palladium, gold and silver. It is the intention of the operators to enlarge the mill capacity to 200 tons per day.

Vermont Marble Company:

KX 119-126 The Vermont Marble Company operated its Tokeen and Calder quarries throughout 1924 and 1925. During 1924 an average of 78 men were employed and over 5,000 tons of crude marble was shipped to the manufacturing plant at Tacoma. During 1925 a substantial increase in tonnage was produced with a crew of 90 men.

Wrangell Precinct

Mining activity in the Wrangell precinct was at a low ebb during 1924 and 1925. The geology of the district is exhaustively covered by A. F. Buddington in Mineral Resources of Alaska, 1921, U. S. Geological Survey bulletin 739.

At the Berg property in Berg Basin the adit tunnel was advanced a short distance.

Ground Hog Basin:

K+117-50 Several examinations were made of the zinc-lead bearing veins of the Ground Hog Basin. These veins are nearly solid sulphides of fine ground sphalerite, pyrrhoite and galena and reach a width of 5 feet. Three tunnels have been driven on the main vein which shows a constant width of 4.5 over a distance of 700 feet. About 300 feet of drifting and crosscutting has been done and the vein as exposed underground is similar both in size and character to the surface exposures. Big boulders of solid mineral are present in the talus along the hillside.

Lake Virginia Mining Company:

K+117-28 At the property of the Lake Virginia Mining Company, situated above the head of Mill Lake a camp was established and construction work of a fifty ton capacity concentrating mill started.

A portable one-drill Ingersoll Rand air compressor was installed at the mine and 250 feet of crosscutting and drifting was done.

An aerial tramway from the mine tunnel to the mill site was partially erected.

Petersburg Precinct

There was no mine development of any kind in the Petersburg precinct.

Juneau Precinct

Alaska Juneau Gold Mining Company:

Kx 112-65 The Alaska Juneau Mine at Juneau continued to produce at full capacity. About 10,000 feet of development work was done yearly. The mill enlargement program was carried forward as scheduled and the tonnage was gradually increased as completion took place. Over 9,000 tons per day was milled during 1925. An average of 527 men were employed during 1925. It is expected to increase the tonnage to 12,000 tons per day during 1926.

Alaska Peerless Mining Company:

Kx 115-45 The Alaska Peerless Mining Company, situated at Windham Bay, had 16 men at work during 1924.

The Daisy Bell Mine at Snettisham was idle during 1924 and 1925.

Williams Property:

Kx 112-32 The Williams property at Hawk Inlet was under bond to R. K. Neil during 1924. Substantial camp buildings were erected and a tractor road $1\frac{1}{2}$ miles long constructed from the beach to the mine. The showings are large gold bearing quartz veins upon which 472 feet of development work was done. 15 men were employed. During 1925 the property was idle, the bond having been relinquished by Neil.

Alaska Dano Mine:

Kx 112-23 A limited amount of development work was done at the Alaska Dano Mine at Funter Bay during 1924 and 1925.

Alaska Admiralty Mine:

Kx 112-100

At the Alaska Admiralty Mine, commonly known as the Peko-
vich mine situated at Funter Bay, 5 men were employed and 1,100 feet
of development work was done during 1924. Operations were slightly
curtailed during 1925, but substantial progress was made in the
driving of the main tunnel.

Sitka Precinct

Gold mining in the Sitka precinct went forward on a sound basis during 1924 and 1925. Three mines were active and produced at full capacity.

The Chichagoff Development Company:

K+ 114-62 The Chichagoff Development Company operated the Chichagoff Mine and mill. Extensive development work was carried on. The work of rehabilitating the old workings went forward as scheduled. A crew of 127 men was employed during 1925. Operation of the cyanide plant was temporarily discontinued.

The Hirst Chichagof Mine:

K+ 114-169
114-70 At Hirst mining went forward steadily. Development of the Hirst shear zone was continued. Structural problems of post mineral faulting was solved by the management and led to the finding of new orebodies. Additions were made to the camp equipment. During 1925 20 men were employed.

Apex El Nido:

K+ 114-5 The Apex El Nido Mine was operated throughout 1924 and 1925, with the exception of the winter months when snow conditions made operation too costly. Ore milled came from the Apex veins, the El Nido Mine being idle. 23 men were employed during 1925.

Klag Bay Mining Company:

K-112-15 The Klag Bay Mining Company vigorously developed the Louis Smith property during 1925. The shaft was sunk to the 400 foot level and drifts along the shear zone were pushed out both north and south. During 1925, 14 men were employed.

Willoughby Island:

K-111-10 On Willoughby Island 32 feet of tunnel was driven by the Treadwell Yukon Company in an attempt to crosscut a showing of lead-antimony ore. The showing outcrops on the face of a limestone bluff and consists of one foot of solid mineral.

Skagway Precinct

There was no mining done in the Skagway precinct during
1925.

122109-9 Prospecting was done in the mountains adjacent to the White
Pass & Yukon Railroad and reports of the discovery of silver-lead ores
having been found were current during the fall of 1925.

Cordova Precinct

With the exception of assessment work in the McKinley Lake district, there was no mining activity in the Cordova precinct during 1924 and 1925.

Kayak Precinct

There was no mining done in the Kayak precinct during 1924 and 1925.

McCarthy Precinct

McCarthy precinct continues to lead the Alaskan districts in the production of copper. Some development took place outside of the Kennecott Mines which were the large producers.

Kennecott Mines:

K+ 87-64 The Kennecott Mines, which include the Erie, Jumbo, Bonanza, Glacier, and affiliated Mother Lode Mine, were operated at full capacity.
K+ 87-9

During 1924 the main power plant was completely destroyed by fire. This was immediately reconstructed with very little cessation of operation. The mill was reconstructed and modernized throughout. A feature of note in metallurgical practice is the successful flotation of copper carbonate which is being carried on. Production in 1925 exceeded that of 1924. During 1925 an average of 405 men were employed at the mines and mill of the Kennecott Company. 129 men were employed at the Mother Lode Mine under Kennecott management.

K+ 87-9

Green Butte Copper Company:

K+ 87-69 Development work continued at the Green Butte Mine and a substantial tonnage of high grade ore was shipped. The main shaft was sunk to the 700 level and crosscutting was continued. During 1925 fifty men were employed until November when operations were discontinued for the winter.

Westover Group:

K+ 87-18 Assessment work was done on the Westover group of claims
which is located on the mountainside above Dan Creek.

Chitina Precinct

Lode mining in the Chitina Precinct was almost non-existent during 1924 and 1925. The mines and prospects of the Kuskilana Valley were all idle.

The only occurrence of note to the mining world was the discovery of lead-zinc ore on the west side of the Chitina River at Mile 144.

This deposit was found by Frank Farnum and Jack O'Hara. The showing consists of a sheeting of mineralization 12 feet wide dipping 40° west in marblized limestone. Cerusite is present on the surface as an alteration product of galena. In 1925 an opencut 15 feet long with a depth of about 10 feet had been made. A pile of lead ore was stacked at the mouth of the cut.

A mild stampede occurred to the old Valdez Creek area during 1925 and some quartz claims were staked. A limited amount of surface work and trenching was done on some of the showings by Harry Staser and associates of Anchorage. It is planned by the owners to continue development work.

Valdez Precinct

In the Valdez precinct the Beatson Mine at Latouche was the largest ^{Mineral} producer. Some small development was done at the various gold lodes of the mainland, but no large production was made.

Beatson Mine:

K+ 95-88 The Beatson mine of the Kennecott Copper Corporation was operated at full capacity during 1924 and 1925. The development of the succeeding block of ground below the 200 level was started. A large amount of development was done at the Girdwood Mine which was purchased by the Beatson Copper Company. The Girdwood ground adjoins the Beatson ground and the haulage level of the Beatson mine was extended to facilitate the tramming of ore. Great difficulty was experienced by the operators both on account of ^{heavy ground, the} orebody being badly faulted, and the complex nature of the Girdwood ore as compared to the Beatson ore.

During 1925 there were 285 men employed throughout the year.

Copper Bullion Mine:

K+ 95-96
95-99 At the Copper Bullion mine, Rua Cove, Knights Island, work of prospecting the orebody was carried on. The development work exposed a large body of pyrrhotite-chalcopyrite ore in which a great preponderance of pyrrhotite is present.

Thomas-Culross Mine:

K+ 95-206 At the Thomas-Culross mine situated on Culross Island, a limited amount of development work was done. A test shipment of 50 tons of ore was made to the Tacoma Smelter.

Brook Eaton Mine:

K+ 95-28 The Brook Eaton Mine at Bettles Bay was acquired by R. J. Merrill who drove the adit tunnel a short distance. It is the intention of the owner to explore the vein at a depth of 200 feet below the surface and to connect the old shaft workings with the adit tunnel.

Granite Mine:

K+ 95-33 The Granite mine was acquired by Bert Carley and a test mill run of representative mine rock made. The mine was closed pending the installation of hydroelectric power which is expected to be installed by the fall of 1926 when mine operation will be resumed.

Mayfield:

Assessment work was done at the Mayfield property.

The Cliff Mine:

K+ 86-46
86-47 The Cliff mine was idle during 1924 and 1925 with the exception of a small amount of work performed by H. E. Ellis, the owner.

Big Four, Millionaire, Cook & Barret:

K+ 86-91
K+ 86-3
K+ 86-94 Assessment work was done on the Big Four, Millionaire and Cook and Barret groups which lie on the high mountainside on upper Mineral Creek. A small production has been made from these properties.



Little Giant:

K+86-9 The property of the Little Giant Mining Company is situated on the hillside above upper Mineral Creek. About 500 feet of underground development has been done on two veins; namely, the Little Giant and Rose veins. It is the intention of the operators to drive an adit tunnel to explore the veins at depth.

Midas Mine:

K+86-48 The Midas property of the Granby Consolidated Company, situated on Solomon Gulch, was idle during 1924 and 1925.

Ramsey Rutherford:

K+86-115 The Ramsey Rutherford mine was operated intermittently by lessees and a production of several thousand dollars made.

Valdez Gold:

K+86-54 Assessment work only was done on the claims of the Valdez Gold Company, a property situated on the east side of Valdez Glacier and owned by T. H. Donahue and associates.

Kenai Precinct

In the Kenai precinct mining activity has been greatly renewed by the discovery of gold-bearing quartz in the vicinity of Nuka Bay. One property has been equipped with machinery and has reached the production stage. Many prospects are being held and a small amount of development work has been done on each. The prospects are all quartz veins in slate and graywacke country rock.

The Alaska Hills Mining Company:

Kt 104-28 At the property of the Alaska Hills Company, situated 2 miles from tide water on the Nuka River, head of Nuka Bay, production was continued throughout the season of 1925. Sixteen men were employed at the property during the operating season.

The mill is equipped with a small jaw crusher, a 40-ton capacity ball mill, amalgam plates and concentrating table. The ore is a free milling gold quartz and a good recovery was made by amalgamation. Plans to cyanide the tailings were discontinued when it was found that the gold content was too small for the operation of a small plant.

The ore is brought from the mine which is 1500 feet distant from the mill by a jib-back aerial tramway. At present mining is done by hand, but it is planned to add an air compressor to the mine equipment and install power drills as soon as possible.

Power for the mill is obtained by taking water from a nearby stream at a head of 60 feet and leading it to the mill through 1,000 feet of 16-inch wood pipe.

There are several quartz veins of a similar character to the one being mined on the property, but at the present time only one is under development.

Babcock & Downey Property:

Kt 104-2 The Babcock & Downey property is situated about one mile from the head of the east fork of Nuka Bay. The property has a quartz vein cutting black slate which it is the intention of the owners to mine on a small tonnage basis. Material for a jig-back aerial tramway and a small Ellis Chili ball mill have been ordered. Log buildings have been constructed on a flat below the outcrop.

Nuka Prospect:

Kt 104-30 The Nuka prospect is situated on the high hillside above Nuka River about one mile from tidewater. The showings consist of quartz veins cutting slate country rock. A 40-foot shaft has been sunk and several opencuts made. A company has been formed for the purpose of developing the claim and it is planned to install a small mill on the property.

Alaska Minerals Company:

Kt 95-47 During 1924 and 1925 production was continued at the Hershey property. Development work was carried on and a fault problem solved. A crew of 12 men was employed throughout the operating season. The mine was under the management of Sumner S. Smith.

Jewel Mining Company:

Assessment work was done on the Jewel Mining Company property and a limited amount of development work done. During the operating season 6 men were employed.

Heaston Mine:

At the Heaston mine a limited amount of development work was done. The installation of a small mill is planned by the owner and operator Mr. R. B. Heaston.

Knik Precinct

The Knik precinct embraces what is known as the Willow Creek mining district which has been a steady gold producer for many years.

The ores are free-milling gold quartz which lend readily to amalgamation processes. At some of the properties small cyanide plants assist the mill recovery.

The building of the Alaska Railroad greatly lowered the cost of operation in this district as supplies were formerly landed by boat at old Knik, on the head of Cook Inlet, and thence freighted to the mines. Now Wassila, on the Railroad, is the distributing point although some of the mines in the Willow Creek watershed freight from Houston during the winter.

Fern Mine:

⁴⁸⁵²⁶
₈₅₁₀₅ Development at the Fern mine was the outstanding feature in the district during the year. This property disclosed a remarkable ore shoot at a depth of 700 feet below the surface. The ore consists of grayish ribbony quartz with a banded structure, slickensided gouge seams and gray quartz mixed with calcite, the latter forming about 30 per cent of the ore. The calcite causes the vein to slack rapidly when it is exposed to the air and all ore removal must be immediately followed by timbering and filling. Mining is at present done by hand drilling.

The mill is connected to the mine by a jig-back aerial tramway of 75 tons per 24 hours capacity. Milling practice is jaw crushing, fine crushing by a 30-ton capacity Denver chili mill, amalgamation, table concentration, desliming of tailings and cyaniding of tailing sands by a straight leaching process. Mill power was formerly derived from a 25 H. P. semideisel engine. During the spring of 1925 a water-power installation was completed which furnishes 80 H. P. during the summer season.

Mabel Mine:

*7785-102
85-254* During the 1925 season the Mabel property was operated by Bartholf and Horning under lease.

Operations consisted of sniping in the old workings and exploratory drifting along the fault zone. Some small bunches of ore were encountered which encouraged further operation. Six men were employed throughout the season. Machine drills are used at the mine.

The mill is connected to the mine by a jig-back aerial tramway. Milling is the usual Willow Creek practice of crushing, amalgamation, concentrating of amalgam tails and cyaniding of ponded mill tails. Power is derived from a small water turbine.

Bear Property:

K+ 85-54 At the Bear property, owned by Thorpe and Brassel, situated on Grubstake Gulch, about 400 feet of tunnel was driven on a decomposed quartz vein which cuts the schist formation. Stripping work on the vein has disclosed considerable free gold heavily coated with iron oxide.

A small Ellis chili ball mill rated at one ton capacity per 24 hours was operated part of the year. A sixteen-inch wood pipe line 1500 feet long with a 200-foot head furnishes power for operations.

Willow Creek Mines Company:

¹⁸⁵⁻⁸³ The Willow Creek Mines Company operated the War Baby and Lucky-shot mines throughout the season. The Gold Bullion Mine was worked part of the year by four lessees.

At the War Baby and Lucky-shot mines a crew of fifty men was employed. The mill was operated steadily handling ore from both mines. Milling steps are jaw crushing, fine crushing by ten stamps, amalgamation, table concentration and cyaniding of tails. Air drills are used at the mine. Power is derived from a water turbine taking water from Craigie Creek.

Other properties:

Assessment work was done at the various properties and prospects throughout the district.

REVIEW OF COAL MINING BY FIELDS

During the calendar year 1924 coal was produced in Alaska from three fields and in 1925 from two fields. The production from each field is shown in the following table:

<u>Field</u>	<u>Production in short tons</u>	
	<u>1924</u>	<u>1925</u>
Matanuska.....	64,195	50,762
Nenana.....	35,294	32,784
Cook Inlet.....	1,771	
Total.....	<u>101,260</u>	<u>83,546</u>

The coal production of the Territory in 1924 was 17,816 tons less than that for 1923, and the production for 1925 was 17,714 tons less than that for 1924. All of the coal was produced by private operators during these two years.

Matanuska Field

In the Matanuska field production was made in 1924 from three leasing units and two prospecting permits, and in 1925 from three leasing units and three prospecting permits. This field produced 63 per cent of the coal produced in the Territory in 1924 and 61 per cent in 1925. Prospecting for coal was carried on in this field on several permits other than those mentioned below.

Evan Jones Mine, Leasing Unit 6:

K+ 85-111
The mine of the Evan Jones Coal Company at Jonesville continued during 1924 and 1925 to be the largest producer of coal in Alaska, and it filled several large contracts for furnishing coal to the Alaska Railroad during these two years. Up to the end of 1925 a total of approximately 185,000 tons of coal had been mined from this property. Coal was produced continuously from the mine during 1924 and 1925 with the exception of about three months in the summer of 1925 when it was idle.

A new unit was added to the original cleaning plant with shaker screens and loading facilities which increased the storage capacity. A small unit was also added to the drying bins, together with the necessary conveyors and loading chutes.

A rock tunnel crosscutting the measures for a distance of 1350 feet was completed. The ventilation was considerably improved by the completion of an air chute to the surface, a distance of 1430 feet, and also by the installation of two small fans—one at the intersection of seam No. 4 and one close to bed No. 1.

The power plant was enlarged, including 2 return tubular boilers, 250 H. P. each; a 75 kw. generator; an Ingersoll-Rand compressor; and a Jeffery mine fan of 70,000 cubic feet capacity, driven by a 50 H. P. motor.

Haulage was increased and improved by the addition of 30 new mine cars and 4 mine horses. A 6-ton storage battery locomotive was also installed during the latter part of 1925 which was expected to reduce the haulage cost and increase production. Some difficulty was experienced in operating this locomotive over the old track of 20-pound steel.

In 1924 an average of 58 men were employed underground and 35 on the surface, and in 1925 there were an average of 41 underground and 23 on the surface.

Agostino Mine, Leasing Unit 1:

KT 85-112 The mine on the Agostino lease was operated continuously during 1924 and 1925 by the Premier Coal Mining Company, with the exception of a short time in March, 1925. The side track from the narrow gauge main line of the Alaska Railroad was completed to the mine and a trestle built from the mine opening for loading purposes during the latter part of 1923 and early part of 1924.

Some difficulty was experienced in driving the slope, which was started late in 1923, owing to the limited amount of overburden while crossing a small canyon. This slope of 490 feet on an angle of 32 degrees, and a counter 30 feet above the main slope, connected a small blower fan on the surface with a capacity of approximately 12,000 cubic feet. 300 feet of gangway and counter were driven south, and in this distance a fault was penetrated 125 feet from the main gangway station. The second fault was penetrated 240 feet south of this station.

The formation penetrated in cutting the strata overlying bed known as No. 2 was 20 inches coal, 60 inches rock, 30 inches coal with large nigger-heads and nodules of iron pyrite embedded in the coal, in places displacing the greater part of the coal seam; 28 inches coal, 12 inches rock, and 13 inches coal. At this point the fault above referred to had broken the coal beds, forcing all three close together. Four rooms were driven up the pitch a distance of approximately 175 feet from the counter, which will remain intact until the overlying beds are prospected to determine their commercial value.

Improvements on this property in 1924 and 1925 included a 30 H. P. steam engine with a small generator for charging the Edison storage battery, mine lamps and town lights; a locomotive house; blacksmith shop; a fan of 20,000 cubic feet capacity; a hoisting room and fan-house of galvanized sheet iron; a 16 by 24 wash-house; and a 50 H. P. boiler installed in the power plant. The mine portal was also enlarged and the old trestle reconstructed to gain 3 feet in height at the screening chute.

In 1924 an average of 10 men were employed underground and 10 men on the surface, and in 1925 there were an average of 8 underground and 10 on the surface.

Baxter-Bedell Mine, Leasing Units 2 and 3:

KT 85-112 Some production was made from this property by the Alaska Bituminous Coal Company during the first four months of 1924 and in December of that year. About 2,000 tons was mined during the first half of 1925.

During 1924 and the early part of 1925 considerable prospect work was done on Units 2 and 3, during which time 2,000 tons of coal was mined from a 4-foot bed located 960 feet southwest of the original mine opening. About 2,400 tons was mined from the denuded croppings to the fault line and shipped, leaving about 1,000 tons owing to the loose ground and badly broken walls. This coal may be recovered with safety later when the surface is frozen. Three prospect tunnels in rock were driven—one 90 feet plus a drill hole of 35 feet, another 30 feet, and the third 185 feet.

The prospect work done so far between the Premier mine and the old mine portal of the Alaska Bituminous Company indicates that this strike turns from N. 10° east to N. 77° east in a distance of approximately 2600 feet, and the dip in this case has changed from 35° SE. to 80° NW. Eight hundred feet northeast of the Premier mine portal the measures appear faulted, and from this point the dip has changed as above stated. The second fault southwest of the original mine portal, Unit 2, had broken the measures to a point whereby the cost of mining coal became prohibitive; therefore the available pillars were drawn and the tunnel abandoned.

An average of about 9 men were employed underground for four months, and 8 men on the surface for the same length of time during 1924. Two or three men were employed in prospecting work during the

balance of that year. In 1925 an average of about 7 men were employed underground for four months and about 5 men for five months on the surface. There was very little work done on this property the latter part of 1925.

Rawson Mine, Unit 4:

→ 85-169 A small tonnage of coal was mined from Unit 4 each month during 1924, with the exception of September and October, and about 1,100 tons was mined during the first three months in 1925, after which only a small amount of prospecting work was done. A tunnel was driven crosscutting the measures for a distance of 150 feet which penetrated three coal beds, known as 3, 4, and 5. On the east side of bed No. 3, 45 feet of gangway was driven and conditions indicated that a roll or break such as that previously cut in seam No. 2 would be reached in approximately 12 feet. The west side gangway has been driven a distance of 54 feet on bed No. 3, which continued in good condition, except for the amount of water which was due to the limited amount of overburden. On bed No. 4 west a gangway 80 feet in the coal appeared to be much better and less water due to the solid formation and increased amount of overburden. On the east side of bed No. 4, 62 feet of gangway was driven, and from these four gangways, counters and gangway chutes, and a raise to the surface, sufficient coal was mined to complete an Alaska Railroad contract and for the use of the company during the time that sledding was possible from the mine to the railroad, a distance of two and one-half miles.

A large bunker was built in which to store coal during the summer months.

During 1924 a crew of 6 to 9 men were employed at this mine, and in 1925 an average of 8 men were employed during the first three months and 1 to 3 men the balance of the year.

Ross Heckey Permit:

A small amount of prospect work was done during 1924 on this property during which 36 tons of coal was mined, with a slight increase in development work in 1925 in which 498 tons was mined. The gangway and counter were driven west for a distance of 265 feet in which two small faults were penetrated, the first being 145 feet south, 80° W. from the mine portal, making a displacement of 12 feet in the coal bed. Ninety feet from this fault line, south 75° W., a roll of 6 feet was penetrated, and from this point the bed continued turning to the natural strike.

A blacksmith shop and wash-house were constructed during 1924, and in 1925 a trestle was constructed for a distance of 150 feet to the new loading and storage bin which has a capacity of approximately 150 tons. The gangway which had caved close to the fault was timbered and repairs were made on the tramway over the Matanuska River.

Leroy Permit:

Development work was carried on steadily at this property during 1924 and 1925 by the Alaska Matanuska Coal Company, and the mine was producing at the close of 1925.

1785-112^{or}
85-166

A prospect tunnel was driven a distance of 550 feet cross-cutting the measures in which five seams of coal were penetrated. It was found that this tunnel was not large enough to use as a mine opening and haulageway, and it was therefore necessary to enlarge the tunnel. It was enlarged to 7 by 10 and timbered with sets and lagged 6 foot centers.

A two-story office building was constructed during 1924 and sufficient timber was cut to build a tibble and loading bin. During 1925 a trestle, 33 feet in height at the loading point, was completed from the mine portal to the loading bins paralleling the narrow gauge railroad, a distance of 550 feet. A dormitory, blacksmith shop and stable were also constructed. The mine track is of 40-pound steel over which will be operated ten 2-ton cars, Lincoln roller bearing type. At the close of 1925 the company had two 125 H. P. boilers, and one 100 kw. generator on the track at Palmer. A picking table was purchased and ready to install, and beds, stoves, tools and mine lagging were also purchased. The mine began operations on December 2, 1925, with 8 men underground.

The crew at this property during 1924 varied from 1 to 11 men, and in 1925 from 1 to 19.

Linguist Permit:

Considerable prospect work was done on this permit during 1924 and 1925. Several prospect holes were sunk, one of which was approximately 60 feet below the surface through gravel, with 4-piece sets lagged on four sides. A tunnel was driven for a distance of 80

feet, but it later caved. No coal beds were discovered with the exception of those badly faulted, and work was temporarily suspended during the latter part of 1925 owing to difficult transportation facilities.

Adolph H. Johnson Permit:

On this permit three tunnels have been driven, one of which is 60 feet, another 20 feet, and one 110 feet, making a total of 190 feet of prospect tunnel work. Only small beds of carbonaceous shale have been discovered, but work is still being carried on. A small steel car and one and one-half tons of steel rails have been installed on the property.

W. A. Vinal Permit, Unit 5:

A few weeks' prospecting work was done on this permit during which time coal croppings were discovered in places, but the condition of the measures has not as yet been determined.

Eska Mine, Reserved Unit 7:

Y+ 85-173 No production was made from this mine during 1924 and 1925, but several inspections were made and some repair work done to keep the mine in readiness for reopening should an emergency arise. The repair work consisted of replacing lagging and gangway sets in the

main gangway and the clearing out of ice and rock. The main haulage track leading from the portal to the mine bunkers, which had been washed out by high water, was cribbed underneath and filled in with rock taken from the mine. The track leading from the east side to the mine run tippie was disconnected and the main track cribbed up and repaired. A bridge was constructed from the stable over Eska Creek, and the reservoir was cleaned out and covered.

Nenana Field

Suntrana Mine:

K-167-89 The Suntrana Mine of the Healy River Coal Corporation was second largest producer of coal in Alaska during 1924 and 1925. The mine operated continuously during these years, with the exception of a short time in May and June of 1925 when operations were discontinued while the steel span over Healy River to the Alaska Railroad was being completed.

For a period of about three years operations of this company were concentrated principally to the Bowen Bed which is 47 feet in thickness, with about 12 feet being mined on the room and pillar system. The rooms are 20 feet in width, leaving a 20 foot pillar with crosscuts above the counter appearing from 40 to 50 feet apart for a distance of approximately 300 feet on the angle of 42°. Twenty-two of these rooms were driven upward the required distance, and the pillars left, pending further recovery of this coal after the gangway reached the boundary line of the property. Practically all of the rooms between No. 1 and

18 caved shortly after being abandoned, and part of these small pillars sloughed out due to the pressure, breaking the timbers, closing the chutes or rooms, and crushing these small blocks of coal beyond recovery.

In the Donaldson bed west of the main tunnel, which is 18 feet in thickness, 12 feet was mined, leaving 6 feet under the hanging wall to recover later when the pillars were being drawn, but which was later found to be impossible owing to the soft walls and the entire area being caved.

The Lathrop bed west of the main tunnel, which is 24 feet in thickness, is also being mined on the room and pillar system with 12 feet being mined and 30 foot pillars. The rooms have caved and the pillars are also crushed to a point whereby if mined months later little lump coal would be recovered.

No pillars have been drawn during the time this mine has been operated owing to a provision in the leasing laws which provides that no pillars in underlying beds shall be extracted before available coal in all upper beds has been mined.

Upon recommendation, a rock tunnel was driven to the overlying bed (No. 6) which is being developed by the block(panel) system. This system has proven very satisfactory, and has reduced materially the production cost and increased the percentage of lump coal. This system provides for the extraction of pillars in each panel and for the sealing of mine fires which may occur from spontaneous combustion or otherwise.

A fan having a capacity of 12,000 cubic feet per minute was installed to ventilate bed No. 6. It is connected with 24-inch flexoid tubing for a distance of 1200 feet, with stoppings, and sufficient ventilation was maintained in four rooms for a distance of 400 feet where the air-way had holed through to the surface.

On November 12, 1925 fire was discovered in the old workings of the Bowen seam east of the main opening. This fire was caused by spontaneous combustion. Upon endeavoring to seal these openings the return opening had been closed before sealing tightly the main intake which was much the cause of a blowing out of stopping in the main opening, and the fire gained headway through the portal. The fire was controlled by blasting down the sand rock hanging wall which filled and covered up the main portal and sealed it in good shape.

During 1924 the company installed a new power plant consisting of three 50 H. P. boilers and two generating sets of 30 kw. each. They also built a men's dormitory of 13 rooms, wash-room and lobby, which is steam-heated and lighted by electricity; a small shower-bath house with two showers, and other washing facilities; a locomotive house and a stable; and also a large room was added to the office building.

In 1925 a tipple and bunker was completed in which were installed a 25 H. P. motor, two 5 H. P. motors, a tandem shaker screen, a conveyor to the boiler room chute, and an automatic coal feed to the shaker screens. The plant is steam-heated and a snowshed of corrugated galvanized sheet-iron connects it with the mine portal. A flume has

been constructed for a distance of 600 feet to the river in which is carried the mine water and waste screenings or refuse from the separating plant. A cable footbridge has been constructed crossing the river to the town site. The main haulage track inside the mine was changed from 20-pound steel, 2-foot gauge, to 40-pound steel, 3-foot gauge over which is now being operated a 6-ton electric storage battery locomotive which was installed November 23, 1925. A social hall was constructed in connection with the new company store. This was being used as a school room at the close of 1925.

The average crew employed during 1924 was 20 men underground and 14 on the surface. The average crew employed during operations in 1925 was 20 men underground and 17 on the surface.

R. F. Roth Permit:

K+67-101 Considerable prospecting work was done on this permit during 1924 and 1925, and about 160 tons of coal was taken out in 1924 and 590 tons in 1925 which was used in making tests to determine the commercial value of this coal. A loading bin was constructed on the river, and a tunnel driven through the overburden cutting the coal seam (Moose bed) at a distance of 60 feet south, 15° west. From this point a gangway was started south 80° east 24 feet, and the first chute started to the surface with a manway on one side. A log cabin 16 by 24 feet was constructed on the property.

Broad Pass Field

Mt. McKinley Bituminous Coal Corp. Permit:

K766-27 Work was continued on this permit until the latter part of March, 1924, when operations were discontinued and had not started up again at the close of 1925.

The camp consists of a mess house and several log cabins. A tramway has been built for a distance of 1,000 feet to the railroad track. A small air compressor and a 35 H. P. stationary boiler were also installed in 1924. It was found that a displacement in the coal seam of 45 feet was caused by the fault encountered in 1923, and in the original course or strike the tunnel had been continued for 280 feet parallel to the coal bed. When this was discovered a crosscut was driven close to the fault line in which coal was located. A crew of 6 to 10 men was employed at the property during the time it was operated.

Cook Inlet Field

Edward T. McNally Lease:

K7104-1/2 Production of coal was made from this property in 1924 by the Bluff Point Coal Company from April to August, inclusive. The mine is located on Units 1, 2 and 3 of the Cook Inlet field and has been operated for a period of about eight years. The original workings were abandoned and a new tunnel opened up from which coal was mined during the summer months to supply the canneries operating along Cook Inlet and other points tributary to boat transportation. This

tunnel is $5\frac{1}{2}$ feet in height, 7 feet wide, and about 20 feet above the beach line. It is driven in soft sand rock a distance of 150 feet N. 5° E., with chutes on the coal seam driven out on the hillside 35 feet above the tunnel and dipping N. 60° east, strike due east. The gangway or entry was driven to the westward for a distance of 523 feet with a back entry paralleling it for 480 feet, with pillars 20 feet between these openings.

A trestle was constructed a distance of about 150 feet over the beach from the mine portal to a storage bin of about 30-ton capacity. This bin is equipped for loading scows at high tide. The mine camp consists of a mess house which is a $1\frac{1}{2}$ -story building 16 by 24 feet, two frame tents 10 by 12 and 6 by 10 used as bunk houses, and a meat house 6 by 10. The company also had a large tugboat which was used for barging coal along the Inlet.