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PLACER MINING IN ALASKA IN 1922

by

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MR 195-6

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Introduction.

This report is intended to give early publication to a review of placer mining operations and developments in Alaska during 1922 as well as touching briefly on economic features affecting the industry. In conducting field work during the past season, the writer visited Seward Peninsula and the Ruby, Hot Springs, Rampart and Fairbanks districts. Information on other districts has been obtained from many sources, but it is regretted that at the time of the preparation of this report more detailed data were not available.

The writer wishes to extend his thanks to the many Alaskans who have so kindly assisted him with information and for the many courtesies shown him in the field. The work of the U.S. Geological Survey has been liberally consulted and used in this report, for which special acknowledgment is made.

Production.

The Alaska placer mines in 1922 according to estimate based on early returns produced gold to the value of $4,100,000(1) or about 23% of the total value of the mineral production for that year. Final returns should increase this amount from $100,000 to $200,000. While this advance estimate on the output

(1) Mining in Alaska in 1922. Advance statement U.S. Geological Survey.

indicates a small decrease from the preceding year, it does not signify that a proportional lack of interest is being taken in the industry, for new plants are being installed which will be productive during the coming season.

In 1922, according to the U.S. Geological Survey, about 560 Alaska placer mines, employing 1900 men, operated during the summer and about 100 employing 300 men, during the previous winter. About 600 men were employed during the year installing large placer mining plants, which are as yet unproductive. This is a much larger number than has been employed in similar work, for several years. Among the reported number of operations are many small mines which were operated for only a short time during the year and which produced but a few hundred dollars each.

The gold production by dredging increased in value from $20,000 in 1903 to $2,300,000 in 1913. Dredges had been built so actively before the war that, in spite of reverse conditions, they continued to increase their output, which did not reach its maximum until 1916, when its value was $2,679,000. The dredges reached their minimum output of gold in 1920 when its value was $1,130,000. (1)

(1) Mining in Alaska in 1922. Advance statement U.S. Geological Survey.

In 1921, 24 dredges were operated handling 2,799,519 cu. yds. from which the average gold recovery was 57 cents per cu. yd. or 37% of the placer gold produced. (2)

(2) Alaska Mining Industry in 1921, U.S. Geological Survey Bulletin No. 739-A.

Placer Mining Operations.

The methods of placer mining used in Alaska are dredging; various forms of hydraulic mining; steam scraper and drag line excavation; drifting, during both summer and winter, by shaft and in a few instances by adit; and the more primitive methods of ground-sluicing and shovelling in.

In 1922, 23 gold dredges were operated producing about $1,530,000 worth of gold.(1) This is about 37% of the total placer

(1) Mining in Alaska in 1922. Advance statement U.S. Geological Survey.

gold produced. During the year 15 dredges were operated on Seward Peninsula, 2 on Otter Creek, 1 on Candle Creek in the Kuskokwim near McGrath, 1 on Yankee Creek in the Innoko, 1 on Cache Creek in the Yentna, 2 on Fairbanks Creek in the Fairbanks district and 1 on Mammoth Creek in the Circle district.

The season of 1923 will show an important increase in the number of dredges operated for new construction is under way, and some of the dredges on the Seward Peninsula which have been idle for a number of years will again resume operations. Following several years of investigation, the two largest dredges in Alaska are being constructed near Nome. These dredges are equipped with 9 cu.ft. buckets, digging 40 ft. and 60 ft. below water level and each one is expected to dig about 200,000 cu. yds.

per month. The operation of these modern dredges under up-to-date and systematic management will mark a new era in Alaska gold dredging. While three of the smaller Seward Peninsula dredges finished operations during the season, it is reported that two will be moved to new locations. Three or four other Peninsula dredges, which have been idle, will resume operations during the coming season, some of them being moved to new locations.

The transportation of dredges to Little Creek and Gaines Creek in the Innoko district has met with much delay. They are now, however, landed in the district and will be ready to start operations in 1923.

Table No. 1 gives the major details on Alaska dredges.

Prospecting has also been more active than for several years. The most important work of this kind was the prospecting conducted on a large and systematic plan on Cleary and Goldstream Creeks in the Fairbanks district where the dredging possibilities of these creeks were being investigated by strong California interests.

Hydraulic mining methods are being more generally adopted in most of the districts, although, unfortunately, favorable conditions for this kind of mining on anything but a small scale are generally lacking. Conditions for large scale operations which require sufficient water supply under suitable

head, proper stream gradients and extensive gravel deposits are more favorable in the mountainous belt extending several hundred miles back from the sea coast, such as in the Copper River, Kenai Peninsula, Yentna and adjoining districts. On the Seward Peninsula, some large water supplies have been made available by extensive ditch systems dug in the early mining days, and, although stream gradients are generally not favorable, the district is still the scene of considerable hydraulic mining. Some form of hydraulic mining was conducted in practically every district. The most notable instances were in the Chistochina and Nazina districts in the Copper River Region, on the Kenai Peninsula, in the Cache Creek, Kantishna and Circle districts, and on the Seward Peninsula. On Seward Peninsula, the largest hydraulic elevator operations were conducted, and one of the larger hydraulic elevator plants long idle has again been placed on the active list. Preparations are being made for future operations in the Copper River and the Kenai Peninsula Regions, and in the Yentna, Bonnifield, Chulitna and other districts. Many of the operations in districts not mentioned are of a smaller scale and in some cases water supplies are so limited during the larger part of the season that water can only be obtained by storage and used in short intermittent periods.

The steam scraper operations and other somewhat similar mechanical operations are limited to those districts affording

a fuel available at a reasonable cost. The principal scraper operations were conducted in the Fairbanks, Tolovana, Hot Springs, Forty Mile and Iditarod districts. The largest operations were conducted on the Goldstream watershed in the Fairbanks district. The scrapers used are of the bottomless and the slip tooth types. Several cable way excavators and one small drag line excavator were operated in the Fairbanks district and a drag line excavator was operated in the Iditarod.

Drift mining was mainly conducted in the Fairbanks and Tolovana districts and to a lesser extent in the Hot Springs, Ruby, Chandalar and other Yukon Basin districts where deep gravels are found. But little drifting was done on the Seward Peninsula on account of the high cost of fuel and timber. A few of the drifting operations in these districts fortunately struck some good ground and were able to make a good return. Most of the work, however, is in small isolated areas of ground left by former operators and these operations employ from 3 to 12 men each. Operations employing 15 men or more are rare. The day of drift mining is rapidly passing, although the past year has seen an increasing number of these small operations.

The more primitive methods of ground-sluicing and shovel in are used in all the districts, the work being conducted by one man or in groups of two or three.

The day where this form of small scale mining can be profitably conducted has practically passed in most of the districts, but affords a meager livelihood for a large number of prospectors.

Transportation.

Transportation has always been a serious handicap to the Alaska mining industry. The completion of the Government railroad connecting tidewater with the interior Alaska has been one of the greatest steps in improving interior transportation. It has placed the interior in a position to obtain supplies during the entire year at a reasonable cost and has made some of the districts more readily accessible. This has lead to a reduction of mining costs and has been reflected in increased placer mining activities in the districts affected. However, with the completion of the railroad, transportation on the Yukon practically ceased for there were only four trips made during the season by a regular river boat. This service was augmented by weekly trips of the mail launches which also carried passengers, from St. Michaels to Tanana, and a trip [illegible] every two weeks on the upper Yukon. On the Tanana, the only service was by irregular trips of small river boats plying between Nenana and points down river as far as Holy Cross and the Iditarod, and weekly trips of launches between Nenana and Tanana. This condition will, however, be bettered in 1923, for the

Alaska Engineering Commission has been authorized to operate the two former army river boats and will inaugurate a service in connection with the railroad between Nenana and Yukon River ports. In Tables 2 and 3 the ocean and river freight rates from Puget Sound ports to the principal Alaska centers and joint rates to Fairbanks via Government Railroad are given. Further mention of these rates and overland transportation costs are made in reports on the districts. The high cost of transportation to these centers is further increased by the overland haul which in itself amounts in many cases to much more than the ocean freight, and, unless the property is located within a reasonable distance of a road system tributary to the main distributing point, this charge becomes prohibitive. For this reason the more isolated districts have experienced a rapid decline and have been so slow in subsequent development. It is one of the best arguments for more road building, at least the construction of suitable trails. Seward Peninsula has been not only handicapped by high freight rates made so by high lighterage charges, but storms along the coast make it difficult to reach the other districts by water, and overland transportation facilities to the more distant ones is lacking. In the purchase of the Seward Peninsula railroad, which will be placed in condition to allow the haulage of light freight and passengers on flat cars drawn by dogs, the Kougarok and Fairhaven districts

will be greatly helped.

To facilitate passenger travel and the dispatch of mail, serious consideration has been given to air transportation in many of the communities. This is not a new idea, but its possible benefits are worthy of an early development.

In 1922, Alaska experienced one of the coldest and wettest summers in its placer mining history. Prolonged cold rains were general throughout practically the entire territory. It was a handicap to the dredging operations, for not only did the cold weather retard the natural thawing of the gravels, but many of the operations were further delayed by high floods. The scraper operations in the interior were unusually hampered by the slow thawing of the gravels. The hydraulic operations derived the greatest benefit, but on the whole it was an adverse summer.

Following herewith are detail reports by districts, in which are given brief accounts of the more important operations and developments.

COPPER RIVER REGION

The principal placer mining operations in the Copper River Region were those of the large hydraulic plants on Dan and Chititu Creeks, tributary to the Nazina River, south of Kennecott, and those on Slate Creek, near Dempsey.

14-68-17 The Slate Creek Mining Co. operated its hydraulic plant on Slate Creek and another one was operated on Miller Gulch.

K-87-16 The Dan Creek Mining Co. operate one hydraulic plant on Dan Creek.

K-87-11 John E. Andrus operated two hydraulic plants on Chititu Creek, where during 1922 approximately 24,600 sq. yds. of ground averaging 6 ft. in depth were handled at the No. 9 operations, and 4,600 sq. yds. averaging 15 ft. in depth on No. 1. According to the general manager, Mr. Bert Carvey, the ditch supplies on an average of 4,000 miners inches of water under a 350 ft. head. Only creek gravels are now being hydraulicked. The average season for hydraulicking is from 125 to 130 days, some years 150 days. From 45 to 50 men were employed. The slate bedrock is soft and easily piped. Grade is sufficient for box grades but tailing is stacked by giant. A considerable number of large boulders are encountered which are blasted or removed by donkey hoist. From 3 to 5 tons of powder are used each season in the blasting of the boulders. The pits worked average 1000 ft. in length and 300 ft.

in width. A 4 ft. rock sluice is dug and blasted through the center of the new area for the entire length. A giant is set each side of the sluice and the material is piped to and into the sluice and goes to the boxes which are set at the lower end. In cleaning up this sluice a hose and small nozzle is used and content is washed down and into the boxes.

Several small operations were conducted on Rex Creek and some drifting of the bench deposits by adit was done. A number of outfits were working on a small scale and others were prospecting on Young Creek.

KENAI PENINSULA REGION

Placer mining was conducted during 1922 on Crow, Resurrection, Canyon, Mills and Bear Creeks. Six hydraulic plants are reported to have been operated, the largest operation being that in the Girdwood district on Crow Creek. Numerous small ground-sluicing operations were conducted throughout the region, most of which were on Bear Creek. The gold output for 1922 was small. Average wages for placer labor are $5.00 for 8 hours and board. It costs from $1.75 to $2.00 per day to board a man.

Several of the larger hydraulic plants which have been idle during the past season are making preparations to resume operations the coming year.

Girdwood District.

K-85-41 The Crow Creek Hydraulic Mines, six miles from Girdwood, were operated by Denhart and Holmgren with a crew of about 20 men. They have given a "lay" to Erickson and Totland, who will operate the property next season.

Sunrise District.

K-95-141 The Canyon Creek Development Co. under the management of N.O. Anderson is constructing a hydraulic filled timber dam on Canyon Creek. As reported, this dam is to be 110 feet high and will divert the water in the Creek allowing the hydraulicking

of the Creek gravels and also provide some of the water to be used in the mining operations. The company expects to have this work completed and start mining next spring. Allison and Plowman, working alone, operated a hydraulic plant on Canyon Creek and Bob Michaelson reports successful prospecting results on Mills Creek. No placer mining is reported on Lynx or Palmer Creeks.

Hope District.

The Matheson Bros. hydraulic plant has been idle, but will be actively operated the coming season. A half interest has been acquired by J.E. Ketchum of Cordova. Togstad, Beaswanger and Carlstrom operated their hydraulic plant on the Busy Bee Claims. The Russians hydraulicked on ground above the Pearson property, the latter being idle. Haun Bros. conducted hydraulic operations on the Carson ground and Capovich and McComb ground-sluiced on bench near the mouth of Resurrection Creek. About 12 men were ground-sluicing on Bear Creek. Ed Belmont plans to install a hydraulic plant on this creek.

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SUSITNA REGION

Yentna District.

The gold production for 1922 from the Yentna or Cache Creek District will show a large increase over that of 1921. The successful season of the Cache Creek dredge and the good water supply, due to the wet season, available for the 14 hydraulic plants operated on Cache and Peters Creeks with their tributaries, account for it. These hydraulic operations all report a fine season, and plans are being made at several of the properties to enlarge the scale of operations. Five of these hydraulic operations are working on a very limited scale using water under low head thru canvas hose; the others have standard equipment, using as a rule No. 1 Giants, with water up to 210 ft. heads. With the exception of seasonal frost, the deposits are not frozen. In general the creek deposits mined are from a few feet to 12 ft. in depth and contain coarse gold. Deep bench ground is hydraulicked on Dollar, Falls, Thunder and Bird Creeks. About 100 men were engaged in mining. This district was formerly reached via the Susitna River, but since the completion of the Government Railroad, Talkeetna is now the point of access. It is 45 miles from Talkeetna to Cache Creek, 15 miles of fine wagon road has been completed, the rest of the distance being by trail. This piece of road has been under way

for the past three or four years and it is hoped will be rushed to an early completion. Freighting costs from Talkeetna to Cache Creek during the summer is 20 cents per pound. Winter freight is $65 per ton. The benefit of a completed road can be readily seen. Wages are $5.00 per 8 hours and board, board costing $2.00 per day. Lumber at Talkeetna sells for $35 per thousand.

Cache Creek.

K+75-66 The Cache Creek Dredging Co. reports a very successful season regardless of two floods which stopped operations for 26 days. Dredging started May 17 and continued to November 5th. The ground averaged 9 feet in depth and a total of 398,323 cu. yds. were dug. This dredge was formerly steam operated using lignite fuel mined close by. The dredge is now electrically operated, the hydro-electric plant being completed in 1921. This change has brought about a big saving in power cost as well as improving conditions on the dredge. The plant consists of a 23 inch double discharge Leffel turbine water wheel, operating a 300 KW alternating current General Electric generator delivering current at 2300 volts.

On upper Cache Creek, Dick O'Rourke and one man are piping in 6 to 10 ft. gravel with a No. 1 Giant.

Dollar Creek.

K+75-56 Hillman and Barhenberg conducted successful hydraulic

operations in deep bench ground on the B & B claim, operating from June 7 to October 20, with a crew of nine. Work this summer was along a 1500 ft. cut having a bank from 175 to 200 ft. high. Water under 200 ft. head is piped against the face, the material washed down, being piped into the boxes. A string of 140 boxes is used, dumping the tailing in the Canyon below. Plans are also under consideration to hydraulic the shallow creek gravel at the mouth of the Creek.

Short Creek.

KK 75-27 H. Price and two men using water under low head through canvas hose equipment piped in shallow creek gravel.

Falls Creek.

KK 75-27 Geo. Anderson with about eight men using two giants piped in four to eight foot creek gravel. Frank Irvin with six men hydraulicked deep bench ground.

Thunder Creek.

KK 75-58 Al Wolf with a crew of six hydraulicked deep bench ground. Plans are reported to be under way to more than double the scale of operations next summer.

Nugget Creek.

KK 75-64 The Nugget Creek Hydraulic Company with 7 men worked the shallow creek gravels. An abundant supply of water is obtained thru 3 miles of ditch at a 200 ft. head. One No. 1 Giant is used for stacking tailing.

Peters Creek.

K+75-67 Harper Bros. with a crew of 7 men continued their hydraulic operations after digging 3 miles of ditch. Natural grade of creek averages 2-1/2%. A short string of 30 inch boxes, usually not over 3 lengths being used, are set on 6 inch grade. The gravel is medium size with but few boulders and averages 5 ft. in depth. The conglomerate bedrock is readily cleaned with the giant. A No. 1 Giant under 210 ft. head is used to pipe into the head of the boxes and a No. 2 giant with 3" nozzle is used to stack the tailing. An operating cost of 6 cents per sq. ft. is reported.

K+75-67 Shell, McDonald and others have purchased the Harper Bros. interests and plan to operate next summer on an enlarged scale.

K+75-67 Elmer Carlson and one man hydraulicked with one giant on lower Peters Creek.

Other Creeks.

Among those operating on other creeks, hydraulicking shallow ground with the use of canvas hose outfits were Chris. K+75-66 Hammersmith on Bird Creek, Frank Jenkins, and Rice and Hatch on Willow Creek. K+75-71 Cast and Mack on Poorman; Andreausen and K+75-73 Wetherell on Gold Creek. Bedar, Gray and Vest were ground-sluicing on Clear Creek.

Valdez Creek District.

K+ 67-24 The largest operations in the Valdez Creek District

to be conducted this year were those of the McKinley Placer Mining Co. on Valdez Creek. This Company operated its large hydraulic plant, although the season's operations are stated to have been handicapped by the excessive number of boulders encountered.

Chulitna District.

The Three Forks Mining Company have been prospecting the gravels of the Chulitna River at Mile 287-1/2 Government Railroad. It is reported that about 15 men will be employed during the winter sinking prospect shafts and that a large hydraulic plant will be installed next spring.

Talachulitna District.

This district lies at the headwaters of the Swentna River, in the Rainy Pass country. Prospectors returning from this district report the finding of deep extensive auriferous gravel banks along several of the larger creeks. Conditions are reported very favorable for hydraulic mining.

KANTISHNA DISTRICT.

Placer mining in the Kantishna district has been carried on by a number of small operators for many years, but, due to the inaccessibility and the comparatively low grade gravels found, the returns have been meager. Two hydraulic plants have now been installed and were operated for a short period during 1922. Ground-sluicing and shovelling in, in some instances with the use of automatic water gates, were conducted on a number of the creeks.

Summer freight is brought from Nenana down the Tanana River and up the Kantishna to Roosevelt by small boats, a distance of about 250 miles, at a contract price in large lots of $35.00 per ton. The usual rate on small shipments is $60.00 per ton. From Roosevelt it is taken by road to Eureka at a cost of $100.00 per ton. As this road is now being improved, this cost will be greatly lessened. During the winter, supplies can be freighted in by dog team from Kobe on the Government Railroad to Eureka at a cost of 10¢/per lb. Hauling ore by tractor over part of this route to the railroad will be tried this winter. There is a small saw mill on Glacier Creek where lumber sells for $80.00 per thousand.

K+66-14 The Mt. McKinley Gold Placers Inc. operated its hydraulic plant on Caribou Creek during 1922, this being the

second season of operations. Water Supply is obtained from Caribon Creek through 450 ft. of ditch, 458 ft. of flume and 4000 ft. of pipe line 30 inches in diameter at the intake and 9 inches in the pit. An average water supply of about 2000 miners inches is available at a head of 150 feet. The depth of ground mined is from 10 to 14 feet. The tailing is stacked by giant.

1466-13 The Kantishna Hydraulic Mining Co. on Moose Creek completed the installation of its hydraulic plant this summer and operated for a period of about 35 days. From 15 to 20 men were employed during the season. Washouts in the recently completed dam and ditch occasioned by unusually heavy rains caused considerable trouble and delay. A 13000 ft. ditch line with a 268 ft. syphon across Willow Creek, having a capacity of 2500 miners inches, brings the water from Wonder Lake to the penstock from where 5300 ft. of pipe of 26 inch diameter reducing to 9 inch conveys it to the giants under a head of 250 ft.

The creek deposit mined is practically all thawed and averages 10 ft. in depth, there being about 2 feet of moss and soil and 8 feet of medium size gravel. A false bedrock clay is mined to. This clay has been found to be from 10 to 15 ft. thick and underlain by about 25 ft. of gravel, which will be prospected. Bedrock is very flat and a method of "piping in" over the side is used.

This method as described to me by Mr. J. Howell, is

in general as follows:

A giant is set up and a cut made across the channel sufficiently large and at a grade so that from 9 to 10 lengths of 40 inch boxes can be set at a grade of 9 inches to the box. As a rule the head of the boxes is about 20 inches below the surface of the ground, the lower end being a foot or so above bedrock. These boxes are heavily built out of 2 x 10 lumber with liners of similar size and the portion exposed to battering of the gravel and water is reinforced and protected. A heavy board apron extending 7 ft. or more above the top of the boxes is constructed on the upstream side and set at a high angle so that gravel driven against it will fall into the boxes. An 8" x 8" timber is bolted lengthwise along the apron at a sufficient height to keep the gravel from falling behind the boxes and also to serve as a protection to the edge of the box.

Two giants are set from 200 to 250 feet downstream from this line of boxes so that each giant can cover its field to the best advantage. A third giant is placed so that it can pipe material into the field of the middle giant and also stack the tailing. The material is then piped upstream or against the slight grade, but is piped into the boxes well toward the head so as to allow sufficient riffle area for good gold saving. As the gravel is driven towards the boxes, the bedrock is piped clean, the boulders being piled to one side,

and giants are moved forward if necessary. When cut is finished to the boxes, they are cleaned up, pulled to one side, the giants brought up and operations continued to the next set of boxes, which had in the meantime been set about 200 feet farther upstream. The method is well adapted to the shallower gravel deposits where but little grade is available. A good supply of water under fairly high head is necessary to move sufficient gravel. There is very little time lost. As some of the giant water does not reach the boxes a good supply of water must be turned into the head of the boxes. Seven men are employed each shift of 8 hours. Wages paid are $5.00 and board. In 62 - 8 hour shifts, 50,000 sq. ft. of gravel averaging 10 feet in depth was handled by this system.

BONNIFIELD DISTRICT

This district, while in part a portion of the Nenana Coal field has been placer mined more or less for the past 20 years producing in 1921 about $16,000. While the gravels are low grade, some extensive areas are reported which would justify prospecting. The district is difficult of access due to lack of roads, and, while the Government railroad has now made it more accessible, the creeks being worked are from 20 to 40 miles to the east. The gravels are in creek deposits and while frozen in places are mostly thawed. The average season is from June 1st to October 1st.

X-58-306 Fairbanks interests have taken over the Keevey ground on Gold King Creek and are installing a hydraulic plant and expect to be ready to operate the coming season.

X-46-18 Val. Diebold installed a small hydraulic plant on Platte Creek during the past season and operated to the close of the season with a crew of five. Further ditch construction is planned to increase the water supply. This property is reached by trail from Moseana on the railroad and is 22 miles distant. Heilig and Smith on Thistle Creek are preparing to hydraulick and ground-sluicing was done on Margaret Creek and on the headwaters of the Totalanika River and on the Tatlanika.

FAIRBANKS DISTRICT

Placer mining in the Fairbanks district has shown a marked increase during the past year, both in the number of operations conducted and the gold output. It is estimated from early reports that the placer gold production for 1922 will show an increase of about $200,000 over that of the preceding year, when a production of $570,000 was reported. This is attributed mostly to the increased production from drift mines at Dome, Little Eldorado, Gold Hill and Ester Creeks, where some small blocks of high grade gravels were mined, and also to the successful dredging operations on Fairbanks Creek. The steam scraper plants as a whole have had a bad year, because of the cold wet weather experienced this summer greatly retarding the natural thawing of the gravels.

The Government Railroad has made Fairbanks an all year camp, making it possible to obtain supplies on short notice, and its operation has shown its benefits in many ways. While locally the cost of supplies is still high, it is probably more so than is justified. Freight rates via the railroad are being reduced, and a new joint rate tariff between Puget Sound ports and Fairbanks has been made on carload lots, at $42.00 per ton for mining machinery, oils and general groceries. See table 3.

A transfer charge across the Tanana River at Nenana of $3.00 per ton is added on freight and $.50 per ton on coal. This charge will be abolished on completion of the Nenana bridge early this spring. The narrow gauge branch of the railroad as well as auto stages complete the haul from Fairbanks to the Creeks.

Very little coal has so far been used in the placer operations, although with a better quality of lignite now being mined at Healy, which is delivered in carload lots at Fairbanks for $4.50 per ton, its use will be more generally adopted.

Most of the wood for mine power purposes is cut on lower Goldstream Creek, where it costs $8.00 per cord on the car, or $10.00 to $14.00 per cord at most of the properties, which includes freight and hauling from the siding. Wages for labor are $5.00 per day and board, on 8 hour basis. Pointmen and nozzlemen $6.00. Steam scraper engineers $8.00 to $10.00 per day and board. Board costs from $1.75 to $2.50 per day.

More prospecting is being done than for some years, and of particular interest is the drilling which has been done on Cleary and Goldstream Creeks by the Humphries-Bigelow Co., representing the foremost California dredging interests.

The following are the principal placer operations conducted during the year:

Coldstream.

K+58-266 H. Atwood, F.C. Bleecker, Henry Wagner, Rogge-Wagner and Chas. Grill operated Bagley scraper plants on Coldstream, a total of 60 men being employed in these operations. A. Hanot on Discovery with a crew of 12 men took out a small pit with a cableway or trolley excavator. A similar outfit was operated by A. Zimmerman on Twin Creek, both of these operations contending with unusually bad conditions.

Gilmore Creek.

K58-~~45~~ 229 James McPike on #3 below Gilmore operated a 2 yard Bagley scraper plant with a crew of 12. An old pit was completed and a new pit 300 x 400 was opened but only partly cleaned up before cold weather set in.

Pedro Creek.

K49-185 Guis and Krize on #7 below installed a hydraulic plant and were able to take out several cuts before the freeze up. A total of 10 men were employed.

Nelson and Zimmerman on #2 above continued hydraulic operations up to the first cold spell, September 25th. The ground worked averaged about 15 feet deep, with a crevieed and blocky gneiss bedrock which required cleaning by hand. Two No. 2 giants are used under 120 feet head for "piping in" and two No. 1 giants for stacking tailing, only one of each being operated at one time. About 24,000 sq. ft. of ground was

worked at an operating cost of $.30 per sq. ft.

Fairbanks Creek.

KK49-125 The Fairbanks Gold Dredging Co. operated its two dredges employing about 30 men A most successful season is reported. The old Risdon dredge is being overhauled and will be changed from steam to Deisel power. This dredge, using steam, consumed 5 cords of wood per day at a cost of $130.00, the long, heavy tractor haul from Gilmore Railroad station bringing the cost to $26 00 per cord. The new plant will consist of two 60 H.P. Werkspoor Deisel engines estimated to consume about 135 gals. of crude oil per day at $.40 per gal., or $54.00 per day.

Cleary Creek.

KK49-194 Ten small operations consisting of three small drift and seven ground-sluicing operations were conducted on upper Cleary Creek and its tributaries, Wolf, Chatham and Bedrock Creeks. A steam scraper was operated for a short time at the mouth of Bedrock, and Pearson and Johnson did a little drifting on #6 below Cleary. Sam Weiss with a crew of 8 men on #16 below Cleary took out about 16,000 sq. ft. of gravel ,mining from an old 80 ft. shaft. Two levels of "pay" were found. Schaup and Larsen with a crew of 5 men drifted on the Hope and Totem claims KK49-174 on Chatanika Bench. Three Keystone drills were operated on Cleary Creek and around Chatanika by the Humphries-Bigelow Co.

Little Eldorado.

#149-191 The Idaho Mining Co. on the Idaho Assn. claim conducted drifting operations with a crew of 11 men. This ground is 160 feet deep and the gravel is tightly packed. A small air compressor is being operated to deliver air to a Jackhammer drill-type BCRW 430. With this outfit one man drills on an average of 20 - 9 ft. holes in 8 hours and sets the sweaters in these holes. Before adopting this system it took 2 men 8 hours to set from 4 to 6 of these points.

Rehn and Freeman with 11 men, Hans Hess & Co. with 7 men and Andresen & Co. with 10 men were drifting "side pay" and old pillars.

Three or four small outfits drifted on ground farther up the creek. Some drifting is also being done on the creek this winter.

Dome Creek.

#149-185 Kinney and Gillis did some drifting and further drilling. They are sinking a new shaft this winter and will drift on ground prospected on the Diamond C. Claim.

Cameron and Hansen with a crew of nine are drifting on an overlooked block on #4 above. The shaft is 100 ft. deep and in a block stated to contain about 30,000 sq. ft. of ground averaging close to $2.00 a sq. ft.

K+49-35 119-163 Magnuson and Anderson and Shermer Bros. were "sniping" side pay in 180 ft. ground on the Niggerhead Assn. at the mouth of Dome Creek.

Vault Creek.

K+49-9 Honkamen, Niemi & Co. were drifting on the Alabama Claim at the mouth of Vault and several other small outfits were working farther up the Creek.

Engineer Creek.

Sanson, Gove and Hughes continued drifting on Engineer Creek, employing 9 men. A new shaft is being sunk this winter.

Ester Creek.

K+58-212 Sholseth & Co. operated on Cold Hill in 110 feet ground which was thawed and dry. A. Benson tried underground sluicing on Pioneer #2, excess water and fine material going thru bedrock drain, the coarser material being hoisted by self dumper. Difficulty was encountered in holding the roof.

Driscoll & Co., Ed. Hess & Co., Hyland & Co., Swanson & Co. conducted drifting operations on a small scale on Ester Creek. Six or more operations were to be carried on this winter. Kinney and Cosgrove are drifting on Happy Creek this winter.

Nome Creek.

K+50-45 McClelland and Opdyke operated a small locally constructed drag line excavator with a 40 foot boom and 3/4 yard bucket. A 20 H. P. boiler produced the power. Three men were engaged in the operations and satisfactory results are reported.

CIRCLE DISTRICT.

Early reports from the Circle district show that the district had a very successful season and a large increase in gold production was made. This is due to the resumption of the Berry dredge operations and the unusual wet season which was of great aid to the open cut operations.

K4 50-6 The Berry dredge at its new location on Mammoth Creek started dredging on July 3nd. In the 92 days operated, 187,132 cu. yds. were dredged. Frost encountered delayed the operations.

K4 50-57 The C.J. Berry hydraulic plant was operated with a crew of 10 or 12 men on Eagle Creek, and Jack Anderson with about 20 men operated two hydraulic plants on Mastodon Creek. Most of the other operations, including a few winter drift mines, were small.

TOLOVANA DISTRICT.

Reports from the Tolovana district for 1922 indicate that the gold output will be about the same as produced in 1921, when the production reportedwas $285,000. The unusual wet season has been a great help to a district which has in average years suffered from a lack of water for mining operations. From 150 to 200 men have been engaged in mining during the season. While the drift mines are rapidly diminishing in number, several of the comparatively larger mines are still being operated on Amy and Livengood Creeks, but most of this kind of mining has reached a point where small outfits are working ground left behind by former operations. More attention is being given to the mining of the shallower creek and bench gravels by ground-sluicing and small hydraulic operations.

Livengood or Brooks is the main camp of the district and receives its summer freight via the Tolovana River. At ordinary stages of water, freight is brought from Nenana by small boat and scow, transferring around the Log Jam by tram to another fleet and taken upstream to Trappers Cabin, or to West Fork if water permits. Then by trail to Livengood. Freight is brought in this way for 10¢ per lb. Winter freighting from Olnes or Dunbar is 5 to 6¢ per lb. Even with this high freight charge, with labor at $5.00 per day and board (cost of board $2.50 to $3.00 per day per man), wood $8.00 to $9.00 per cord, the cost of

drifting 80 ft. ground as reported by operators varies from 60¢ to $1.00 per sq. ft., the average being 75¢ sq. ft.

The following are some of the operations conducted during the season:

Amy Creek.

K-49-45 Arndt and Moran with about 15men drifted on a new block of ground during the summer and will continue during the winter. J. Nielson operated an open cut at the head of Amy Creek this summer and will do some drifting this winter.

Livengood Creek.

K-49-16 Jurick and Radak with about 15 men will mine on #16 above this winter. The ground is reported to be easy to work, the pay occurring in "chicken feed" gravel and averages about $1.00 to the sq. ft.

Tony Silva is sinking a new shaft on ground struck this summer and will work 7 or 8 men this winter. This block of ground is stated to be 60 ft. wide and averages about $1.00 per sq. ft.

J. McClelland with a small crew conducted hydraulic operations. Several other outfits drift mined and prospected on the creek, and drilling was done on Ready Bullion Creek and lower Livengood.

Lillian Creek.

K-49-266 M. Begler with one man hydraulicked bench ground on #1 above Discovery, using a canvas hose outfit with intermittent splashes of water. Barker and Godfrey and Chas. Lynn also

operated.

Olive Creek.

1944-1 There were two summer operations on this creek, J.B. Hudson operating a steam scraper plant. The gravels at the mouth of Olive Creek are being considered for dredging.

Gertrude Creek.

Two operations were conducted during the summer by ground sluicing.

Wilbur Creek.

1944-41 Several open cuts were worked this summer and some prospecting was done. Last winter Enstrom Bros. and Patterson, Wurzbacher, Healy and Koda and Brown Bros. operated. There will be several underground operations on the Creek this winter.

HOT SPRINGS DISTRICT.

During 1923 there were 30 mining operations conducted in which about 80 men were engaged. There is great diversity in the mining methods used in the district, most of the Alaskan methods in some form, excepting dredging, being in evidence.

In the Tofty section, where some of the gravels also carry a considerable amount of tin concentrate, the operations will be materially assisted through the increasing price of tin. The district has produced as a by product of gold mining about 300 tons of tin concentrate containing about 60% tin. During the period of low price of this metal and due to high freight rates but little attention was ~~been~~ given to it.

The Hot Springs district now obtains its supplies thru Nenana. Freight from Nenana to Hot Springs Landing is carried by small launch and scow at a cost of 20^{00} to $30.00 per ton. American Creek receives its supplies from Tanana via Fish Lake at a freight cost of 3¢ per lb. From Hot Springs Slough there is a wagon road, 11 miles to Tofty, with a branch road 5 miles farther to Woodchopper. Freight rates from the slough to Tofty are 2-1/2¢ lb. and to Woodchopper 3¢ lb. A first class road connects Hot Springs and Eureka, a distance of 24 miles. Eureka is practically a district of its own. The freight to Eureka is hauled by tractor at a cost of $55.00 per ton.

While the season was ~~been~~ a wet one, it was not anticipated and no provisions had been made, so it was of little

aid to the operators. Wages for labor are $5.00 per day and board. Board costing $3.5(to $3.00 per day.

Tofty Section.

K+48-16 Cleveland and Howell, employing 8 men, have opened one of the largest hydraulic pits in the district, on the benches back of Tofty. The ground, part of which was formerly drifted, averages 50 feet in depth, interbedded layers of frozen muck and silt overlying the 3 to 5 ft. of gold and tin bearing gravel. This muck and silt was formerly removed by the aid of ground-sluicing in deep cuts with the assistance of four giants, and the undercutting and caving of the banks, the fine material and water, being carried off thru a long open drain. Last spring some 10 ft. points using cold water were tried and with the combined nozzle and thawing action of this water under pressure the muck was quickly honey combed and could then be more easily removed with the giants. The results obtained by this experiment were so satisfactory that the same principle will be adopted next spring on a larger scale using 20 and 40 ft. points, the spacing of the points and time required still being a matter of experiment.

After the muck has been stripped off, the gravel is piped to a small Hendy elevator, elevated 15 ft. to sluices, the tailing being stacked with a giant. There is an insufficient water supply during the larger part of the season. Future operations will dispense with the elevator and the system of

"piping over the side" will be adopted.

American Creek.

K-48-21 Ed. Hess with a crew of 6 men operated the only steam scraper plant in the district. The ground mined averages 9 feet in depth. About 3-1/2 ft. of muck and light gravel is stripped by ground-sluicing, the "pay" gravel being dug and conveyed directly to the elevated sluice by a one yard slip tooth scraper. One cut just an acre in size was taken out during the season and a new area stripped for the next season.

Others mining on American Creek are M. Murray - ground-sluicing with automatic gate - Gallon & Miller - drifting - and H. Besonen and partner are ground-sluicing and prospecting. K-48-17

Other Creeks.

K-48-12 L. Anderson, A. Mathoone and Fredlund and Nurstes conducted open cut operations on Boulder Creek. Otto Hovely K-46-3 drift mined on Cache Creek. Hansen and Lindeberg with 2 men drifted during winter and summer in 115 ft. ground on K-46-13 Hokeley Creek. Hosler and Albrecht drifted on a small block of ground on the Mohawk Claim K-48-9 at Woodchopper. Jno. Radovich K-48-13 and 2 men, using a small portable prospecting outfit, did some drifting on Miller Creek and will continue thru the winter.

Early reports were that 5 or more small drifting operations would be conducted during the winter on the Rock ground near Woodchopper.

Eureka Section.

K+48-95 The Eureka section is characterized by its small hydraulic plants and ground-sluicing operations, most of which depend on an intermittent water supply regulated by automatic dumping or hand operated gates. The largest of the hydraulic operations are those of Frank & Co. on Pioneer Creek. Seventeen men were employed during the spring but due to a period of low water this crew was cut to 6 men and on return of better water conditions additional help was not available. Operations were principally the hydraulicking of the shallow bench gravels averaging 7 ft. in depth, on the right limit of the creek. When sufficient water is available two No. 1 giants are used in the pit, with a head of from 60 to 80 ft. and gravel piped into head of the boxes, otherwise two 2 inch fire nozzles using canvas hose were used. Three pits totaling 150,000 sq. ft. were taken out this season. It is claimed that twice this amount is handled when water is plentiful. Due to a cold spell of weather and a lack of water, these operations closed Sept. 7th.

Similar operations were conducted by Johnson, Sundstedt and Johnson near K+48-92 Glenn Gulch; Lane and Lund on Rhode Island Creek; Sidney K+48-44 Ridge; Farmer and Jones K+48-44 on Eureka Creek and Frank Stevens on Excelsior Bar. The first four of these operations mined 210,000 sq. ft. of ground varying from 2 to 12 ft. in depth

and carrying from 5 to 10 cents in gold per sq. ft., and for the greater part of the season have water only in intermittent splashes of from 5 to 10 minutes at a time. The ditches are used as reservoirs and released when reaching a certain level by automatic or hand operated gates. The average cost of four operations of this type during 1922 including depreciation and interest charges on plant was 6¢ sq. ft. for an average depth of 6 ft. or 27¢ cu. yd.

K48-46 On Omega Creek, Olsen and Evenson with hand operated gate, ground-sluiced and shovelled in 8 ft. ground at a cost of 37¢ a sq. ft. Erickson and McLeod also ground-sluiced with automatic gate. A little drift mining was also done on this creek during the winter.

Others mining in the district were Chas. Smith on Alameda Creek, Louis Siler on K48-27 Thanksgiving Creek, Frank Stevens, J.R. Green and Jno. Malin on Eureka Creek. K48-44

Ground-sluicing with automatic gate and shovel-in operations - Rampart District.

Hydraulic elevator operations in the Hot Springs District.

RAMPART DISTRICT.

In 1922, nine open cut operations employing 19 men and three winter drifting operatinns employing 6 men were conducted. It is estimated that the gold production for the year will not exceed $20,000.

A wagon road which follows up the Big Minook Creek from Rampart is kept in repair to the Six mile post. There is a branch road going about one mile up Hunter Creek and a good branch road to the head of operations on Little Minook Creek. Most of the mining is from 5 to 9 miles out Rampart, the main operations being on Hunter and Little Minook Creeks. Freight from Rampart to camps during the summer is from 1 to 2-1/2¢ per lb., winter freighting from 1/2 to 1-1/2¢ per lb.

Hunter Creek.

K46-43 A. Ott with one man is operating a hydraulic plant on shallow bench gravels on the left limit on Discovery.

K49-48 K48-43 The largest operations in the district are those of Chas. Swanson, who is operating a hydraulic plant on the left limit bench on #21 above just below Dawson Creek. The ground is all frozen and in the face of the present pit there is 30 ft. of muck and 9 ft. of gravel. The average size pit mined is about 200 x 100 ft.

Water supply is obtained from Upper Hunter Creek by

4000 ft. of ditch, 600 ft. of flume and 5400 ft. of pipe line from 19 inches to 7 inches in diameter, with an effective head at the pit of 180 ft. The gravel is stripped of the ~~overlying~~ muck by using two giants on top and one in pit for undercutting. Powder is at times used to break down bank. Gravel is piped into head of the 18 inch boxes. Lots of boulders are encountered which are carried and piled to one side. Due to lack of sufficient dump room a No. 1 Giant with 2-1/2 inch nozzle must be kept in almost constant operation, stacking tailing. When running full shift six men are hired. Only one pit was opened this season, and, due to lack of water from July 10th until the first frost in early September, one corner of the pit was not completed. These operations were first started by Mr. Swanson in 1903. A larger plant being installed in 1917.

Little Minook Creek.

K+48-34 Markoff and Ross on #3 below completed their first cut, booming with an automatic boxgate and shovelling in. Climie, La Porte and Nelson on #7, by similar methods, took out a cut 600 ft. long, 12 ft. wide, in ground formerly drifted, averaging 20 ft. in depth. While drifting on #9 claim last winter they found a $350.00 nugget.

K+48-35 Others mining in the district are Thos. Gamble on Hoosier Creek, Thos. Antonsen, on K+48-46 Little Minook, Jr.,

Frank Hawley, Geo. Pride on Slate Creek, all using booming gates. O.C. Clemens did a little ground sluicing on Hunter Creek and Geo. Ledger drifted on Idaho Bar. Crocker and Yantiss prospected on Hoosier Creek during the winter.

RUBY DISTRICT.

Early reports indicate that the gold production in the Ruby District for 1922, was about $120,000, a considerable decrease from that of the preceding year. During the year there were about 25 operations, engaging 75 men, most of the production coming from the drifting operations on Spruce, Poorman, Flat and Solomon Creeks and the operations on Trail Creek. One drift mine was also operated during the summer on Hoketchum Creek and one on Long Creek and several outfits operated on Tamarack and Glacier Creeks. Open cut methods by ground-sluicing and shovelling in were conducted on Greenstone, Swift, Bear Pup, Trail and Nowitna and Ruby Creeks.

Freight costs are unusually high. A small amount of freight still comes up the Yukon via St. Michael, but by reason of better service most of the freight now comes down river by small launch from Nenana. Freight from Nenana is $25.00 per ton. See Table 3. There is a good wagon road from Ruby to Long, a distance of 29 miles. All mining operations are being conducted within 25 miles of Long. Those on Flat and Solomon Creeks being most remote. From Long, the old winter sled trail is used for summer hauling by team and wagon, and as much of it is thru low swampy country it is almost needless to mention how bad it is. Summer freight from Ruby to Long is 3¢ per lb., 10¢ to

Greenstone Creek, 9 miles beyond, and 20 to 25¢ per lb. to Flat and Solomon Creeks. During the winter, when most of the general supplies are taken in, the rate to Long is 2 to 3¢ per lb. and 5¢ to the most remote camps. The bridge across the Solatna was built this summer and a road to it is a necessity.

The ground being drifted varies from 60 to 80 ft. in depth with narrow and comparatively short "pay" channels, a condition which adds materially to the mining cost. Average value of the gold in the gravel mined is from 75¢ to $1.25 per sq. ft.

While mining conditions vary considerably on the different creeks, the cost of drift mining, exclusive of cost of plant, as obtained at 6 operations, varies from 60¢ to $1.00 per sq. ft., or an average cost of 85¢ per sq. ft., from 4 to 5 feet of gravel being mined, or about $5.00 per cu. yd. The average steam thawing costs are 45¢ per cu. yd. Sluicing, 33¢ per cu. yd. Wood costs from $8.00 to $12.00 per cord at the mines. Wages are $6.00 and board for 8 hours. Average cost of board is $3.00 per day.

The principal operations in the district are as follows:

Meketchum Creek.

45624 Farrell and Warren with four men are drifting ground 80 ft. deep. The pay channel here is from 50 to 75 ft. in width, most of the gold occurring in clayey "sediment" on a blocky

greenstone bedrock. Due to the angular blocks of bedrock in this ground, much difficulty has been encountered in setting the thawing points. To overcome this, a drill of the jackhammer type has been obtained to drill the holes for the steam sweaters.

Spruce Creek.

K-1506-25 M.D. McCarty and 3 men conducted successful drifting operations last winter continuing on into the early summer. The ground mined is 55 feet deep, easy to mine and a free washing gravel. Spruce Creek and Tamarack Creek are similar in character and afford the cheapest mining costs in the district. Prospecting has been done during the summer and a new shaft will be sunk this winter.

Poorman Creek.

K-1506-14 Dennis Coyle with 7 men conducted one of the largest drift operations in the district. The ground is 80 ft. deep with much ice in the gravel. Some heaving ground and water encountered in one portion of the workings added materially to the cost of mining.

True Manuel and 2 men operated during the winter and summer on a small block of ground adjoining Coyle. Some heaving and wet ground was also encountered.

McGedigan & Co. drifted on 60 ft. ground on Duncan Creek, a tributary of Poorman.

Solomon Creek.

K56-16 At the Big Four, 7 men were engaged in drifting 80 ft. ground. The gravel here also contains much ice with occasional thawed streaks. Maximum width of pay is 60 to 70 ft.

Fulkinson and Mossy with 2 men are drifting further up the Creek in ground of similar depth but easier to mine, being free of ice streaks and solidly frozen. The pay channel is 25 ft. wide, and it is claimed to carry $3.00 to the sq.ft.

Flat Creek.

K56-5 Wm. Midgley, Morton and McDonald, Willeby, Perry and Cannon, Gilman and McKelvey, Powers and Bailey were drift mining and prospecting in a small way.

K56-1 On Tamarack Creek, Bettles and Pilke were conducting profitable drifting operations. On Long Creek, K56-3 Chas. Walker with 4 men was "sniping" a corner of ground using a No. 3-1/2 Keystone drill as a hoisting and steam plant. B.J. Bowers K56-27 and 3 men were ground sluicing and shovelling in on Greenstone, and small open cut mining was conducted on Bear Pup, Swift, Trail, Nowitna and Ruby Creeks.

KOYUKUK DISTRICT

There are about 75 men in and around Nolan, which is the principal camp of the district. While there is still a little drift mining going on, most of the attention is now being given the bench deposits, the mining of which is however handicapped due to lack of water at sufficient elevation. Most of the operations are small, many of them being conducted by 2 or 3 men partnerships.

The district is one of high costs. Freight is brought up the Koyukuk River from the Mouth to Bettles in from 6 to 7 days by small boats at a cost of 4¢ per lb. At Bettles it is transferred to shallow, horse drawn, or poling, boats and taken to Nolan, a distance of 70 miles, at a cost of 6 to 7¢ per lb.

Wages are $6.00 per 8 hour day and board, which costs from $3.50 to $4.00 per day. Wood costs $16.00 to $17.00 per cord at Nolan.

Most of the operations are on Nolan Cr., seven small outfits were open cutting the bench deposits, which are reported to be extensive and good pay found on the third tier bench. What little drift mining was done was mostly of a "sniping" natures.

K-1 30-31 30-39 Workman, Dow, Foley and Wool and Wanamaker, sluicing on the left limit benches, report a successful season.

KK30-76 Watts and Brady, and Pingel and Ness mined on the Harmon River benches, Jensen and Larsen on Wild Cr. and Matthews KK30-52 KK30-53 with several men on Rye Cr., ground-sluiced and shovelled in shallow creek ground.

There was very little mining on Emma, Porcupine and Slate Creeks, or in the Hog River section. Gilbert and KK31-9 Ellington, on Jim Pup, report good pay, and James Kelly was KK13/-33 mining on Bettles River.

KK30-20 The discovery of coarse gold on the benches on Sixty Mile Creek about 60 miles up John River was reported during the summer as having been found by Ben Sirr.

CHANDALAR DISTRICT

The Chandalar district which lies north of the Yukon River and easterly of the Koyukuk district is one of the most isolated of the placer camps. From Beaver on the Yukon, it is 75 miles to Caro, the main settlement of the district. It is 40 miles from Caro to Little Squaw Creek, where most of the mining is being done. Freighting into the district from Beaver is practically all done during the winter by dog team, the rate being 15¢ per lb. to Little Squaw Creek. Cost of wood and timber is excessive, as it is obtained from 12 to 40 miles distant. Last winter the cost of wood at camp was from $40.00 to $50.00 per cord.

Prevailing wages for labor are $6.00 per day and board. Cost of boarding men is reported to be $4.00 per day.

Winter drift mining has produced most of the gold during the past season, the largest and most successful operator being Curley Smith on Little Squaw Creek, where he employed about 15 men drifting bench ground. It is reported that about 20,000 sq. ft. of bedrock was mined, from which a big clean up was made. An interesting feature regarding this bench ground, which varies from 30 to 70 ft. in depth, is that the ground during the summer is wet, draining as the creeks lower in the fall, and can then be mined during the winter.

Several other parties were prospecting on Little Squaw Creek.

Two outfits were shovelling in shallow ground and others were prospecting on Big Squaw Creek. A little mining and prospecting was also done on Tobin Creek.

IDITAROD DISTRICT

Early reports on the placer gold production from the Iditarod district for 1922 indicate an increase over the preceding year, and it is estimated will be about $450,000. Most of this gold came from Otter, Flat and Willow Creeks. The two dredges operated on Otter Creek account for a large portion of this gold, and most of the other operations report a successful season. The hydraulic operations, which in average seasons suffer from lack of water, were greatly aided by the prolonged heavy rains.

The Iditarod district receives its freight via Holy Cross on the Yukon River and while most of it has heretofore been brought up the Yukon several small privately owned river steamers now maintain a service from Nenana on the Government Railroad direct to the district. From Holy Cross, the route is up the Innoko and the Iditarod Rivers to Dykeman and during a period of high water to Iditarod. Freight rates from Holy Cross to Dykeman are $40.00 to $45.00 per ton. From Dykeman to Iditarod $18.00 per ton. See Table 3. The scale of wages in the district for open cut work is $6.00 to $7.00 for 10 hours and board, cost of board averaging $3.00 per day. Wood costs on an average, $20.00 per cord. Lumber at the Dykeman saw mill sells for $100 per thousand.

Otter Creek.

K+73-23 The Riley Investment Co. operated its dredge on Otter Creek from May 20th well into November. A very successful season is reported. About 30 men were employed.

K+73-23 The Beaton-Donnelly dredge operated all season, digging its way downstream towards its ground on lower Flat Creek, where it should be operating next season. While working downstream, a creditable gold recovery has been made. About 15 men are employed.

K+73-31 On Granite Creek, the Finn boys were hydraulicking creek gravels. Three men were ground-sluicing on the Malamute Pup, and at the mouth of Glenn Gulch the K+73-46 Richardson Bros. with 2 men were ground-sluicing shallow creek gravels. A small hydraulic plant is being installed. Four men have been ground-sluicing on the Pack Mule Assn.

Flat Creek.

K+73-31 D. Strandberg with a crew of about 20 men operated a steam scraper plant on the bench at the head of Flat Creek and on the Upgrade claim he conducted hydraulic operations with a crew of about 30 men.

Thomas, Myrtle and Johnson are installing a hydraulic plant and will be ready to operate in the spring.

K+73-18 Hydraulic operations were conducted on the Summit Claim,

where the water is stored in small reservoirs and is supplied intermittently. Ground worked here this year is reported to have been 8 feet deep and averaged $1.50 to the sq. ft.

Pete Givovich with 6 men conducted hydraulic elevator operations in ground averaging 20 feet deep.

Chicken Creek.

14 13-6 Mathison Bros. with 6 men hydraulicked with intermittent water supply at the head of Chicken Creek, which flows into Bonanza Creek. A very good clean up is reported, the ground being rich but water supply very limited.

Willow Creek.

14 13-15 Hanley and Olson with 10 men conducted winter drifting operations in ground 24 feet deep and continued operations through the summer. Three outfits of the French boys operated hydraulic elevator plants on 8 to 10 ft. ground. About 20 men were employed. While a fair supply of water is available, all three operations cannot be successfully worked at the same time. Loranger & Co. operated their steam scraper plant. Harry Johnson and Mentohler Bros. with 7 men operated their drag line excavator on Willow Bench. This Bucyrus excavator has a 60 foot boom with 1-1/2 cu. yd. bucket. The 60 H.P. boiler burns about 1-1/2 cords of wood, costing $16.00 per cord per day. Ground worked is

22 to 24 feet deep, of which about 18 feet is muck. This muck is ground-sluiced off; the gravel is dug by excavator and dumped into movable hopper running on a track and dumps into the boxes. It is reported that ground running as low as 16¢ per sq. ft. will pay expenses, and that 100,000 sq. ft. have been handled by excavator in six weeks time.

KUSKOKWIM DISTRICT

The placer gold production for 1922 in the Kuskokwim District will show an increase over the preceding year, and it is estimated to be about $550,000. This is, however, not due to any increase in the number of operations but principally to the most successful season of the Candle Creek dredge. There are numerous small open cut mines and a few small drift mines being operated on the many scattered creeks, but prospecting and mining is handicapped by high costs. Wages are $6.00 to $7.00 per 10 hour day and board. Average cost of board is $3.00.

The lower Kuskokwim has been quiet. A little sluicing was done on Bear, Mabel and Canyon Creeks. The hydraulic plant of the Tuluksak Mining Co. on Spruce Creek, a tributary of Bear Creek, is reported to have operated with a crew of 5 or 6 men. Further drilling on the Tuluksak is reported to have been done.

K-8-13

In the Georgetown section, a new hydraulic plant has been installed on Crooked Creek by Al. Walsh and will start operations in the spring. Harry Stevens, with several men, has been ground-sluicing on a tributary of Crooked Creek and some drift mining was done. A little sluicing was done on the Holitna, although most of the work was of a prospecting nature.

K-13-22

In the upper Kuskokwim, a few men were conducting small

open cut and drift operations on Ruby Creek. Prospecting was also conducted on the Tatalina River. The Kuskokwim Dredging Co. K-74-1 operated its dredge on Candle Creek for 128 days out of a total available time of 145 days, 164,230 cu. yds. were dredged, and the gold production is estimated at about $435,000. The ground dredged averaged 14.2 ft. in depth. Floods handicapped the operations.

INNOKO DISTRICT.

Of main interest in the Innoko is the dredging, although several small hydraulic plants were operated during the season on Little Creek. Several open cuts and a number of small winter drift mines were worked on Ophir Creek.

1464-48 The Plume Dredge Co. operated successfully on Yankee Creek. This dredge started its first season's operation in 1921. It is digging ground averaging 12 feet in depth. There is about 2 feet of overburden which is ground-sluiced off, and, in keeping the ground stripped well ahead, the gravel becomes thawed. The machinery and material for the Little Creek dredge has been hauled by tractor from Tacotna, and the dredge will be ready to start operations in the spring. The company will install a 300 H.P. hydro-electric plant in the Innoko for the operation of these dredges.

1464-40 The Innoko Dredging Company shipped the machinery of the old Greenstone dredge from Ruby this summer via St. Michaels. It is now at McGrath, and is being hauled to the property on Gaines Creek. It is reported that the dredge will be ready for operation early in the coming season.

MARSHALL (WADE HAMPTON) DISTRICT.

Placer operations were conducted on a small scale in the Marshall or Wade Hampton district, on Willow, Disappointment, Elephant, Buster and Stuyak Creeks. The main operations were on Willow Creek, about 12 miles from Marshall or Fortuna Ledge, where a hydraulic plant employing 4 to 6 men was operated and five outfits employing a total of about 25 men were ground-sluicing and shovelling in. Local interests have been drilling and sinking shafts on Lower Willow Creek for the past few years and plan to install a hydraulic plant.

On Disappointment Creek, 5 men were engaged at a hydraulic operation, and one man was hydraulicking on Elephant Creek.

On Buster Creek, near Russian Mission, it is reported five men were shovelling in, and on Stuyak Creek, which enters the Yukon about 8 miles above Russian Mission, seven men were shovelling in.

SEWARD PENINSULA.

Within a period of 25 years ending 1921, Seward Peninsula has produced gold with its alloyed silver to the amount of $82,400,000. In 1921, the production was $1,452,000, when a total of 126 placer mines employing about 622 men were operated during the summer and 14 mines employing 64 men, the previous winter. Included in these operations were 16 dredges, employing 182 men, which dug 1,690,000 cu. yds. producing about $690,000 or 47.2% of the total gold production for that year.*

* The Alaska Mining Industry in 1921. By A.H. Brooks. U.S. Geological Survey Bulletin 739-A.

Early reports indicate that the production for 1922 was about $1,250,000,and, while a decrease, it is a creditable output considering the unusual cold, rainy, backward season experienced and which greatly delayed the starting of operations. While but few of the summer operations start until after the arrival of the first boat, which this year was June 14th, there had been but little thawing and no appreciable water was available until the latter part of June. Most of the hydraulic operations did not get under way until early in July. Dredging operations were handicapped through the retarded natural thawing of the gravels, and, in some instances, floods caused considerable trouble and delay. Very little drift mining was done. Most of the gold production came

from the Nome and Council Districts. It is estimated that over 65% of the gold output was produced by the dredges and by the large hydraulic elevator operations conducted at Little Creek near Nome. With the successful thawing of frozen gravels by the cold water method, a new field has been opened to gold dredging. This is evidenced in the most important development of the year, in what is being done by the Hammon Consolidated Goldfields Co. This Company has acquired the holdings of the Pioneer Mining Co. and is now having constructed at Little Creek the two largest dredges in Alaska and a Diesel engine electric power plant at Nome to supply the necessary power, at a total cost of about $1,250.000. All construction work is being done by the Yuba Manufacturing Co. The dredge hulls and housing have been completed, and the machinery is being installed this winter. It is expected to have everything ready to start dredging operations by June, 1923. These dredges will have 9 cu. ft. buckets on a close connected line and it is estimated each dredge will dig from 6000 to 7500 cu. yds. per 24 hour day, or about 200,000 cu. yds. per month. The hull trusses and gauntrees are of steel, the bottoms, sides and decks are wood, as this type of construction is considered superior to all-steel construction for northern conditions. One dredge is designed to dig 40 feet, the other 60 feet, below water level. The revolving screens are 7 feet in diameter and 40 feet long, with 1-1/2 inch holes in the nugget section. The screen openings are

The jetty at Nome, Alaska.

Yuba dredges under construction at Little Creek, near Nome, Alaska.

1/2 and 3/8 inch tapered holes. One stacker is 160 ft. long, the other 142 ft., the stacker belt is 36 inches wide. The gold table area is 4000 sq. ft. Five pumps will supply 12,000 gals. of water per minute. The main drive for the bucket line is equipped with a 250 H.P. motor, the pump motors 150 H.P. and the total motor horsepower provided is 592. The power plant consists of three 525 H.P. Werkspoor full Diesel engines directly connected to three 538 K.W. General Electric generators. Current will be generated at 2200 volts, stepped up to 11,000 volts and transmitted 3-1/2 miles to the dredges. Ground to be dredged contains much clay and muck and varies from 30 to over 70 feet in depth. Bedrock is usually a schist, which is easily dug. The deeper ground will be ground-sluiced of muck bringing it within the digging depth of the dredges. The dredges will be steam heated, and, by keeping the ground thawed well in advance, a season of 6 to 7 months is expected. Several acres of ground were thawed with a 150 point cold water plant this fall and improvements in the practice were worked out. A 350 point plant will be placed in operation early in the spring.

Another attempt to prospect for and work the erroneously reported rich gravels lying off the Nome beach was made this summer by Seattle interests. With a small 35 H.P. gasoline launch capable of travelling 6 miles per hour and containing a pump to operate a combination water jet and suction tube in which the gold saving device was enclosed, it was hoped to dredge off shore, running to cover when a storm came up. Rough weather kept the

boat within the jetty most of the time. The riches were not found and the operations were finally postponed indefinitely.

The first boat of the season, the "Victoria", arrived at the Nome roadstead on June 14th, but, due to shore ice, freight could not be discharged until about 4 days later. Ice conditions also interferred with coastwise boats so that operators and their supplies were delayed in reaching their properties. Fairhaven District operators were unable to reach their properties until about July 5th. There were four sailings of the "Victoria", the last sailing from Nome being October 24th. The closing of the season's operations are more or less regulated by this last sailing. There were three sailings of regular freighters to Nome, Solomon and Golofin and one under private charter to Nome. Stormy weather during most of the season made the lightering of cargoes from the ship to the beach a difficult undertaking. The jetty which has been constructed by the Government at the mouth of Snake River has been deepened and the bar at the mouth dredged. It is now a safe harbor for small boats and barges. Docks will be built inside this jetty and it is expected that this will overcome many of the lighterage difficulties and lead to a reduction of this charge.

Freight rates from Seattle to Nome vary according to classification. The following are rates per ton in carload lots: Coal in sacks, $13.65; general merchandise, $16.00; hay and grain,

$16.00; mining machinery $13.50 and up, depending on size of piece; explosive oils $16.00; fuel oils $15.00. The lighterage charge at Nome of $8.00 to $10.00 per ton by ships manifest is to be added plus an additional 50¢ to $1.00 per ton for wharfage. Lighterage at Bonanza is from $8.00 to $12.00, at Teller, $7.50 per ton. The steamer service has been bad, and, while the freight rates alone on weight basis would not be high, it is the steamship company's option to charge on measurement basis of 40 cu.ft. to the ton, and this basis is always used when to the company's advantage. For example, on one shipment of fuel oil, the approximate weight was 62 tons, while rates were made on measurement basis of 73 tons.

The effect of freight rates on the cost of oil is illustrated by the following, which was taken from a 1922 invoice and receipt:

Cost at Seattle	
122 drums, 12630 gals. Calol Diesel oil 24° gr. at $.06375 per gal.	$805.16
Transportation	
Freight 2928 cu.ft. at $15.00 per ton	1098.00
Lighterage at Nome - 2928 cu.ft. at $8.00 per ton	585.00
Wharfage at Nome " " " " .50 " "	36.60
	$1720.20
Return freight on 122 empty drums at $3.50 ton(measurement)	$ 256.20
Depreciation on 122 drums $15.00 ea. in 4 trips	457.50
	$ 713.70
Total cost of 12630 gals. at Nome	$3239.06
Cost per gal. on dock at Nome	$.256

On a similar basis, distillate in 106 gal. drums, at Seattle costs 17¢ per gal., and landed on the dock at Nome, 39¢ per gal. Overland transportation on diesel oil to properties adds from 3¢ to 25¢ per gal. and on distillate from 4 to 50¢ per gal., loss by leakage not considered.

There were one or two sailings of the freighters to Teller and Kotzebue Sound this year. Passengers and small freight shipments to coast ports go from Nome via small launches and boats, many of which are unfit for such service. Freight charges per ton from Nome on these carriers are: To Teller $15.00 to $19.50; Deering $27.50 to $33.00; Candle $30.00 to $37.50; Solomon $10.00; Bluff $12.50; Golofin $15.00.

After freight is landed, the operator must still meet overland haul. This in many cases is the heaviest charge of all. Out of Nome and Bonanza summer hauling on made roads is on an average $1.50 per ton mile, where no roads $2.50 and more per ton mile, in winter $1.50 to $2.00 per ton mile. In some cases as from Davidson Landing out of Teller to the Kougarok, the summer hauling over rough trail is as high as $5.00 per ton mile and in the winter $1.00 to $1.50. In the Council District, the freight up river from Golofin to Council is $35.00 per ton, to which is to be added the land haul to the camps of from $10.00 to $30.00 per ton.

The above rates show the excessive costs of overland transportation, and, unless the property is on a good road tributary

to the ocean port, there are but few properties that can stand this expense.

The old Seward Peninsula Railroad, a narrow gauge between Nome and Shelton, has been purchased by the Territorial Government. It will be repaired so as to permit the public to operate "pupmobiles" or small flat cars drawn by dogs for the transportation of passengers and light freight. This will be a great assistance to the Kougarok operators, and also a part of the much needed means of overland transportation between Nome and the Kotzebue Sound, thereby lengthening the summer operating season for that district.

During the summer, the organization of an aeroplane company at Nome was seriously considered as a means of providing quicker passenger and mail transportation over the Peninsula. The plan has many merits and could no doubt be profitably conducted if suitable arrangements could be made for the mail contracts.

At Nome, the price of coal per short ton was $39.00 during the winter and $36.00 in the summer. Common lumber was $100.00 per M, sluice box lumber $150.00. There was a scarcity of crude oil during last winter, the only small lots selling for $6.00 per bbl. Case gasoline this summer was $5.65 per case and distillate $4.85. Dime Creek, in the Koyuk District, where there is timber, wood was $16.00 per cord.

There was no idle labor, although much of the labor

available was considered below the old standard in efficiency. Average wages were $5.00 to $6.00 per hour on 8 and 10 hour basis and board. It cost from $2.00 to $3.00 per day to board a man. There has been a reduction from 5 to 10 cents per hour in the wages at some of the camps around Nome. Dredge engineers and winchmen are paid from $7.50 to $9.00 per day and board on 12 hour basis, and in most cases transportation from and to the States each season is also paid by the operator.

Dredging.

In 1922, 15 gold dredges were operated on the Peninsula, and, while details of these operations are still incomplete, it is estimated that about $650,000 worth of gold was produced. One dredge was operated in the Kougarok, six in the Nome District, three in the Solomon District and five in the Council District. (See Table 1). About 145 men were engaged in the operations. The Arctic Creek dredge operated for only 2 or 3 weeks. The Bangor dredge at its new location on Anvil Creek started operations in August and in the 53 days operated recovered over $1100 per day, about 85,000 cu. yds. being dredged. The Behring dredge dug downstream through old tailings all season. It has now reached its ground and will resume regular operations in the spring. The largest producers were the two dredges on Ophir Creek operated by the Wild Goose Co., whose No. 1 dredge operated for about 115 days, the longest operating season reported for 1922.

K453-204

K453-177

A Seward Peninsula gold dredge.

Hydraulic mining of creek gravels.

The average operating season was about 86 days. The season was unfavorable for dredging, because of the retarded thawing of seasonal frost and with trouble and delays from floods experienced by some of the dredges. The Warm Creek and Crooked Creek dredges are reported to have completed the dredging of their ground. The former may be taken to Dime Creek; the latter may be taken to the Niuluk River. Two other dredges will finish dredging operations in 1923, and in 1924 dredging on Ophir Creek will be finished. It is reported that the Kugruk dredge is being taken to the Keewalik River at Candle and is to be operated there next season. The Casadepaga dredge is being moved this winter to a new location 2-1/2 miles down river, at Canyon Creek. From more or less incomplete data obtained from the operators of 11 dredges on the Seward Peninsula for the year 1921, an attempt has been made to estimate the cost of dredging for that year. Each operation has been separately estimated and the average dredging cost derived. Included in these estimates are the operations of 4 dredges in the Nome District, 3 in the Solomon District and 4 in the Council District, operating under greatly varying conditions. While in two cases a very small amount of ground was thawed during the season's operation, this item can be disregarded and the estimates given are for naturally thawed or unfrozen gravels.

K45-47

These 11 dredges dug 1,323,500 cu. yds. at an average operating cost of 21.6¢ per cu. yd. Where there was superintendence

or management this item has been included in the operating cost. The individual operating costs range from 15 to 38¢ per cu. yd. Three of these dredges dug 740,000 cu. yds. Many of these dredges have been acquired by the present owners at a very nominal cost. The total capital invested in these dredges and equipment is estimated at $590,000, but they could not be duplicated for twice this amount. The amortization of this invested capital must be considered. The depreciation charge amounts to 4.64¢ and simple 6% interest to 2.67¢ per cu. yd., or a total of 7.31¢ additional. This method of amortizing the invested capital for each operation shows this item to range from 2 to 20¢ per cu. yd. The cost of land, royalty, etc., has not been considered. The number of operating days varied from 75 to 129 - the average was 100 days.

It should be noted that the season of 1921 was longer and operating conditions were more favorable than the average, so, were it possible to obtain these dredging costs over a period of years, the average cost would be materially higher.

The cost of power in most cases, particularly when distillate is used, is a large and serious item. From data on the same dredges, the following estimates of power costs have been made. Only the cost of fuel and lubricating oil and the cost of labor in attendance has been taken into consideration. On most of the distillate dredges, the engineer devotes only a portion of his time

to the engines.

No. and type of Dredges	Cu.yd. dug in season	Total H.P.	Cost of Power Per day	Per Cu.yd. dredged	Per HP day	% of operating dredging cost
5-Distillate	309,700	320	$441.00	$.142	$1.38	48.6%
4-Semi Diesel (24° oil)	475,250	342	331.50	.069	.96	33.1
1-Diesel, electric (24° oil)	278,000	200	87.75	.034	.44	20.0
1-Hydro-electric	2020 per day	140	50.00	.025	.36	12.9
Averages 11 dredges	12,470 per day	1002	$910.25	$.073	.908	33.8%

Average cost per gal. for distillate is 63¢. Semi diesel oil 36¢; diesel oil 30¢. In the estimate of hydro-electric power the charge of $50.00 per day includes only the proportional ditch maintenance and labor cost. The plant is operated about 100 days each season, an auxiliary distillate engine being used when water supply is low.

Hydraulic and Other Open Cut Mines.

K452-42 The largest placer mining operations conducted in Alaska are the Pioneer Mining Co.'s hydraulic elevator operations at Little Creek. These operations were this year conducted by the Hammon Co. Four pits were operated and a total of 400,000 cu. yds. mined. About 100 men were employed. The first elevator was started June 12th, although there was hardly enough water for it at that time. Operations continued until October 14th, the ditch remain-

ing open until the 19th. Other hydraulic elevator plants operated were Lee and Swanberg on Osborne Creek, Wild Goose Co. on Ophir Creek, two were reported as operated in the Kougarok and three in the Inmachuk. 44-148 A. Cordavada & Co. have acquired the old Fairhaven Ditch Co. holdings in the Inmachuk. This company, employing 22 men, operated for 59 days, and will operate on a larger scale next season. A. Nydeen on Bear Creek in the Candle Section operated a Rubble elevator plant with a crew of 14 men. The Keewalik Mining Co. near Candle operated a Rubble elevator on the old Candle Ditch Co. property, employing 18 men. The company reports its most successful season, operating for 100 days and mining 38,000 cu. yds. of high grade ground.

Thirty-five or more hydraulic plants, some of them very small, were operated in the various districts. About 12 or more plants were operated in the Nome Section; 4 in the Kougarok; 2 in the Inmachuk; 3 in the Solomon; 2 at Dime; 3 at Candle; 1 in the Casadepaga and 4 at Bluff. It was an unusually good season for the hydraulic miners.

One steam scraper plant is reported to have been operated on Dime Creek by Wallace Porter.

Numerous small ground-sluicing and shovel in operations were conducted in the various districts, although the gold produced by this form of mining was very limited. A few men were also

engaged in mining on the Nome and Bluff beaches, where the adept still make good wages.

Drift Mining.

Due in part to the high cost of fuel and timber, only a very small amount of drift mining was done and practically all of that was during the winter. The largest drifting operations were those of Mebes & Co. on the Submarine beach west of Nome where about 25 men were employed and about 6000 cu. yds. of gravel was mined during the winter. Five or six small outfits did some "sniping" at the head of Dexter Creek, on the Third Beach Line and on Anvil Creek, and a small number of similar operations were conducted in other sections. Most of the drifting was done at Dime Creek in the Koyuk District, where wood is obtainable. As a whole, however, the operations are reported as not having been very successful, and several of the Dime Creek operations were flooded out. Early reports state an increased number of drift operations are being carried on around Nome this winter.

Drifting under the lava capping in the Inmachuk district is still being conducted. Good indications have been found in these buried gravels, although no "pay" has as yet been reported.

MR 195-6

TABLE 2

ALASKA FREIGHT RATES 1922

Seattle to-	Ketchikan	Juneau	Cordova: Seward	Anchorage	Nenana Fairbanks Via Seward: $1.50 Via Gov.Ry: (b)	Nome at Anchorage (c) Lighterage additional	Nome Lighterage [illegible] 50¢-$1.00	Kotzebue at Anchorage: $8. to $10. additional lighterage (c)	St. Michael: at dock (d)	Seattle charge wharfage & handling additional
Wharfage charge additional	$ 1.00	$ 1.00	$ 1.50-1.60	$ 1.50						
Coal in sacks	*4.50	5.50	7.50	8.50	-- --	$15.65	$ 8.00	$17.00	$23.00	- --
per 2000 lbs.	*4.50	4.50	5.00	6.00	-- --	13.65	- --	14.00	20.00	$1.05
High explosives-Dynamite	20.00	20.00	26.50	31.50	$168.00	35.50	12.00	60.00	52.00	- --
	17.00	17.00	21.50	24.00	84.00	33.00	-- --	53.00	47.50	3.75
Freight N.O.S. ordinary					51.00 to					
General groceries	8.00	9.00	13.50	15.50	84.00	19.00	10.00	29.00	28.00	- --
" merchandise	- --	- --	-- --	-- --	42.00(e)	16.00	-- --	21.00	23.50	1.05
Lumber-common	9.50	10.00	16.50	18.50	51.00	23.00	8.00	27.50	30.50	- --
usual lengths per M	8.50	9.00	16.00	17.50	37.00	21.00	-- --	25.50	28.50	1.00
Mining machinery in (a)	8.00	9.00	13.50	15.50	51.00	16.00	8.00	27.00	24.50	- --
pieces not over 4000 lbs.	[illegible]	[illegible]	[illegible]	[illegible]	42.00(e)	13.50	-- --	17.50	20.50	1.05
Oils-explosive	10.00	10.00	22.50	23.50	59.00	20.00	12.00	25.50	31.50	- --
110 gal. drum at 24 cu.ft.	-- --	-- --	14.50	15.50	42.00	16.00	-- --	21.00	25.50	1.75
Oils-fuel,engine,etc.	8.00	9.00	13.50	15.50	59.00	18.00	8.00	25.50	29.50	- --
110 gal.drum at 24 cu.ft.	- --	- --	-- --	-- --	42.00	15.00	-- --	20.50	23.00	1.75
Return or south bound-										
Carriers, empty drums	3.50	3.50	4.25	4.75	51.00	3.50	-- --	4.50	7.00	- --
110 gal.drum at 24 cu.ft.					32.00	3.50	-- --	4.50	7.00	.80
Ore and concentrates										
25% added for each 10% over	4.00	4.00	6.50	7.50	80.00	7.50	-- --	9.00	13.50	- --
value of $50.00 ton	- --	- --	4.75	6.00	13.50(b)	7.50	-- --	-- --	11.00	1.05

Rates are per ton of 2000 lbs. or 40 cu.ft., unless otherwise specified

*Upper figure-less than carload lot rate. Lower-carload lot rate.

(a) Additional charges for pieces over 4000 lbs.
(b) Transfer charge at Nenana-$3.00 per ton additional. Rates per 2000 lbs.
(c) Lighterage charges additional
(d) " " at St. Michael already added
(e) In mixed carloads, minimum wts. 12 to 15 ton lots
Seattle wharfage and handling charges and local wharfage are additional

TABLE NO. 1

DATA ON GOLD DREDGES IN ALASKA, 1922

Name	Location	Type	Size bucket: Cu.ft.	Bucket line	No. buckets per min	H.P.	Fuel used: Kind	Consumption: daily	Digging depth below water	Capacity in cu.yds per 24 hrs.	Size of hull	Manager	
SEWARD PENINSULA													
1(d) Alaska-Kougarok	Taylor Cr.	Stacker	2-1/2	open	15	70	Distillate	---	11 ft.	----	34x60x5-1/2	J.Kelliher	1
2(d) Alaska Mines Co.	Wonder Cr.	Stacker	8	open	--	330	Oil-electric	---	70	----	48x114	J.Keenan	2
3(a) Arctic Cr. Dredge	Arctic Cr.	Flume	2-1/2	open	--	60	Distillate	---	12	----	28x60		3
4(a) Bangor Dredging	Anvil Cr.	Stacker	3-1/2	close	--	140	Crude Oil	200 gals.	25	2000	36x92x6-1/4	C.Mitchell	4
5(a) Behring Dredging	Kougarok R (g)		2-1/2	close	24	100	Distillate	200 gals.	15	1500	30x60x5-1/2	J.Matthews	5
6(d) Candle Cr.Dredge	Candle Cr.	Flume	1-3/4	close	16	50	Distillate	---	12	900	24x44x4-1/3	B.Pierce	6
7(a) Center Cr.Dredge	Snake R	Stacker	3-1/2	close	26	112	Crude Oil	220 gals.	30	2000	35x74	A.Anderson	7
8(c) Casadepaga Dredge	Canyon Cr.	Flume	2-1/2	open	--	60	Distillate	100 gals.	12	1000	28x60	C.L. Peck	8
9(a) Crooked Cr.Dredge	Crooked	Flume	2-1/2	open	16	65	Distillate	110 gals.	12	900	26x50	S.Fernegal	9
10(a) Dexter Cr.Dredge	Dexter Cr.	Stacker	2-3/4	open	12	85	Distillate	152 gals.	16	1000	30x60	A.N.Kittleson	10
11(d) Dobson Dredge	Bark Cr.	Stacker	2-3/4	open	--	100	Distillate	---	15	----	30x60x5-1/2		11
12(a) Eskimo Gold Mg.Co.(i)	Solomon R	Stacker(f)	5	close	21	200	Diesel-Elect.	220 gals.	20	3000	40x86	R.S.Oglesby	12
13(d) Fries Dredge	Immachuk R	Flume	2-3/4	open	--	50?	Distillate	100 gals.	12	800	24x56	H. Fries	13
14(a) G & O Dredge	Farm Cr.	Flume	1-1/4	open	18	20	Distillate	55 gals.	7	500	16x30x3-1/2	A.N.Garrod	14
15(a) Glacier Cr.Dredge	Glacier Cr.(g)		2-1/2	open	15	60	Crude oil	100 gals.	18	1000	26x50x4-1/3	J.J.Guinan	15
16(b) HammonCons.Ggfds.	#53 Little	Stacker	9	close	--	592	Diesel-Elect.	---	40	6000(m)	56x115x11-1/2		16
17(b) " " "	#54 Little	Stacker	9	close	--	592	Diesel-Elect.	---	60	6000(m)	56x140x11-1/2		17
18(d) Immachuk Dredge	Immachuk R	Flume	3	open	--	100	Distillate	---	18	1500	30x62x5-1/2		18
19(a) Iversen-Johnson	BigHurrah	Flume	1-1/4	open	18	20	Distillate	55 gals.	10	500	25x55	P.Iversen	19
20(a) Julian Dredge	Osborne Cr.	Stacker	2-3/4	open	14	80	Distillate	140 gals.	15	1000	30x60	V.Julian	20
21(c) Kugruk Dredge	Keewalik R	Flume	3-1/2	close	22	100	Distillate	---	15	2000(m)	30x62-1/2x5-1/2		21
22(a) Northern Light	Ophir Cr.	Flume	2-1/2	open	16	70	Distillate	130 gals.	15	1000	28x60	G.Russell	22
23(a) Shovel Cr.Dredge	Shovel Cr.	Flume	2-1/2	close	19	70	Crude oil	120 gals.	15	1500	---	A.Nylan	23
24(d) Swanson Cr.Dredge	Swanson	Flume	2	open	--	--	Distillate	---	--	----	---	G.C.Mahla	24
25(a) Wild Goose No.1	Ophir Cr.	Stacker	3-1/2	close	17-33	140	Hydro-elect.(h)	---	21	2200	36x75x6-1/2	F.Ayer	25
26(a) " " " 2(j)	Ophir Cr.	Stacker(f)	3	close	21	100	Crude oil	180 gals.	20	1800	32x96	F.Ayer	26
27(d) Uplift Dredge	Camp Cr.	Flume	2	open	--	60	Distillate	110 gals.	15	1000	24x46x4-1/3		27
CACHE CREEK DISTRICT													
28(a) CacheCr.DredgingCo.	Cache Cr.	Flume	7	close	--	300	Hydro-Elect.	---	--	4000	54x87	J.W.Boles	28
CIRCLE DISTRICT													
29(a) Berry Dredging Co.	Mammoth Cr.	Flume(e)	3-1/2	close	25	150	Wood	3-1/2-4 cds.	16	2200	30x62-1/2x5-1/2	Wm. Heitman	29
FAIRBANKS DISTRICT													
30(a) Fairbanks Gold #1	Fairbanks	Stacker	4	close	21	220	Crude Oil	260 gals.	30	2500	40x90x6	G.Aarons	30
31(a) " " #2	Fairbanks	Stacker	3-1/2	open	13	85	Wood(k)	5 cords	23	1000	38x90		31
IDITAROD DISTRICT													
32(a) Riley Inv. Co.	Otter Cr.	(g)	3-1/2	close	22	110	Crude oil	160 gals.	15	2000	30x62-1/2x5-1/2	S.Atwell	32
33(a) Beaton & Donnelly	Otter Cr.	(g)	2-1/2	close	20	110	Crude oil	160 gals.	--	1600	30x60x5-1/2	Jno.Beaton	33
INNOKO DISTRICT													
34(a) Flume Dredge Co.	Yankee Cr.	Flume	2-1/2	open	14	60	Distillate(l)	100 gals.	12	1000	28x60x4	J.Saupe	34
35(b) " " "	Little Cr.	Flume	2-1/2	open	--	60	Distillate(l)	---	12	1000(m)	28x60x4	J.Saupe	35
36(b) Innoko Dredging Co.	Gaines Cr.	Flume (e)	3-1/2	close	--	150	Wood	8 cords	18	2200(m)	38x66x5-1/2		36
KUSKOKWIM DISTRICT													
37(a) Kuskokwim Dredge	Candle Cr.	Stacker	3-1/2	close	22	140	Crude oil	200 gals.	35	2200	36x90x6-1/3	T.Aitken	37

(a) Operated 1922.
(b) Under construction.
(c) Moving to new location as given.
(d) Idle.
(e) Rev.Screen and two flumes.
(f) Shaking screens.
(g) Combination screen, flume and stacker.
(h) Auxiliary distillate engine.
(i) Old Three Friends Dredge.
(j) Old Blue Goose Dredge.
(k) Changing to Diesel crude oil.
(l) To install hydroelectric plant.
(m) Anticipated yardage.

TABLE 3

ALASKA FREIGHT RATES - 1923 - YUKON RIVER POINTS VIA ST. MICHAEL

LESS THAN CARLOAD LOTS

Seattle to -	St. Michael	Marshall	Holy Cross	Iditarod	Koyukuk: Ruby : Tanana	Rampart	Beaver	Circle	Eagle
Coal in sacks per 2000 lbs.	$25.00	$38.00	$44.00	$82.00	$44.00	$50.00	$66.00	$70.00	$72.00
High explosives- Dynamite	52.00	76.00	88.00	126.00	88.00	100.00	132.00	140.00	144.00
General groceries, hardware, merchandise	28.00	38.00	44.00	82.00	44.00	50.00	66.00	70.00	72.00
Lumber-common per 1000 ft. B.M.	30.50	47.50	55.00	93.00	55.00	62.50	82.50	87.50	90.00
Mining machinery (a) pieces not over 2000 lbs.per ton	24.50	38.00	44.00	82.00	44.00	50.00	66.00	70.00	72.00
Oils-explosive 110 gal.drum at 24 cu.ft.	31.50	38.00	44.00	82.00	44.00	50.00	66.00	70.00	72.00
Oils-fuel-engine 110 gal.drum at 24 cu.ft.	29.50	38.00	44.00	72.00	44.00	50.00	66.00	70.00	72.00
Return or south bound- Carriers,empty drums 110 gal.drum at 24 cu.ft.	7.00	15.50	19.00	37.50	22.00	25.00	29.50	31.50	32.50
Ore-concentrates Value not over $200 per ton	13.50	31.00	38.00	75.00	44.00	50.00	59.00	63.00	65.00

Rates are per ton, of 2000 lbs. or 40 cu.ft., unless otherwise specified.

(a) Additional charge for pieces weighing over 2000 lbs.
Freight on upper Yukon above Rampart generally shipped via White Pass Ry.
Wharfage and handling charges additional.