

The number of men employed on all operations of the Company averaged 140 between January 1st and April 15th, 570 between April 15th and November 15th and 167 between November 15th and December 31st. The maximum number employed during the year was 678 and the minimum 82.

372,090 meals were served at the Company camps at a cost of \$0.59 per meal. Camp costs amounted to \$0.09 per meal, making the total boarding cost \$0.68 per meal. Adding restaurant and roadhouse meals and Board Allowance, the work was charged \$2.28 per shift for Mess and Camp Expense.

Due to the fact that there was almost no snow during the winter of 1937-38, seasonal frost penetrated the ground to a maximum depth of twelve feet, which is approximately twice the normal amount. Glaciers formed to a considerable depth on some of the areas and this coupled with a cold and backward Spring retarded the progress of artificial and natural thawing. This unfavorable beginning, however, was largely compensated by an exceptionally mild Fall which enabled the dredges to operate later than usual.

The water supply was fairly good in all areas, except in the Australia Creek watershed where there was a scarcity during most of the summer. This is the source which supplies the Sulphur Creek operations and they were hampered thereby.

#### STRIPPING OPERATIONS

##### Middle Hunker Area.

A stripping plant was started here and operated throughout the season using water from Hunker Creek boosted through two 10" centrifugal standard stripping pumps. The equipment used was transferred from the Arlington area where stripping was completed during 1937. This work is being done to prepare ground for Dredge No. 11.

In order to make a satisfactory course for the dredge, it was necessary to start stripping operations on the most difficult piece of ground on Hunker Creek. The lower quarter of the area was covered with easily removed icy muck but the balance of the area was covered with solid peat moss ranging in depth from 15 to 25 feet. Approximately a third of the moss was removed and with an average water season, most of the remainder is expected to be taken off during 1939.

A crew of five men were started here on April 4th. The first work consisted of clearing brush from the area in preparation for the stripping plant lay-out. The first pipe line was laid for the purpose of cutting a drain through the middle of the area to give proper

drainage. The two pump stations were set in place and actual stripping commenced on the afternoon of May 13th. Good progress was made on the drain through the icy muck section but progress through the moss was slow. As fast as the drain was cut back, giants were set up on each side and regular stripping operations commenced. During the latter part of the season, when the daily thaw was almost zero, the water was used to remove the seasonal accumulation of thaw on that part of the area which had not been previously worked over and by the end of the season all of the accumulated thaw had been removed.

During September another drain was constructed along the right limit to give drainage to an area where our next stripping will be done. This will also serve as a diversion drain to carry the water of Hunker Creek around the Dredge No. 11 construction pit. The drain was constructed by bull-dozer and small gasoline shovel, principally with the latter.

The last water was used on October 3rd and the crew was laid off on October 10th.

245,511 cubic yards of overburden were removed with 38,129 Miner's Inch Days of water at a duty of 6.44 cubic yards per M.I.D. The cost of the work was \$27,773.91 or 11.313¢ per cubic yard.

#### Middle Dominion Area

Stripping operations continued here throughout the 1938 season using water from Dominion Creek boosted through two 10" centrifugal standard stripping pumps. This work is being done for the benefit of Dredge No. 10.

The grade of the creek is quite flat and it was necessary to cut a straight drain to handle stripping run-off and take full advantage of all grade possible. Operations are also hampered by the presence of drift tailings on the surface which tend to clog the drains.

Two men were started on April 5th and five more on April 6th on preparatory work of moving and setting pumps, laying pipe lines, setting giants and clearing brush. Actual stripping was started on May 18th using one nozzle for cutting the drain and one nozzle for removing moss and muck. Most of the area which had been partially opened up during 1937 was covered with ice so it was necessary to work on new ground and this reduced the duty of the water a great deal. By the 18th of June the stripping drain had been cut back to the lower end of the area being worked on and six feet of additional grade had been secured. By July 16th the ice on the 1937 area had melted off to the point where it was possible to resume stripping there. During the latter part of the season, when the weather was colder and the daily thaw small, the water was used to remove the seasonal accumulation of thaw on new ground. Water was used until the 1st of October but for the last few days of

September was used in daytime only on account of cold temperatures at night. The last of the crew was laid off on October 16th. Equipment was stored on high ground to keep it clear of possible glaciating.

244,820 cubic yards of overburden were removed with 38,104 Miner's Inch Days of water at a duty of 6.43 cubic yards per M.I.D. The cost was \$24,012.29 or 9.808¢ per cubic yard.

#### Granville Area

Stripping operations were continued here for the benefit of Dredge No. 5. Water was pumped from Dominion Creek by three 10" centrifugal standard stripping pumps. A portion of the area across the right limit side, being a strip about four hundred feet wide, was stripped for the benefit of Dredge No. 6. This was an area which was thawed during 1937 prior to stripping. Practically the entire amount of overburden removed was a peat moss which thawed very slowly and required water at good pressure to tear it loose but ran off on a flat grade when in suspension.

Preliminary work was started with three men on April 6th. Four more were added on April 9th. The first work consisted of setting up a portable sawmill and getting the camp ready for the summer crew. The pump stations were used in the same location as for 1937 so it was only necessary to dig the sump boxes out of the ice and open up the waste gate. Actual stripping was commenced on May 11th. Three streams were in use for most of the summer. During the first part of the season, two of these were used on the area ahead of No. 6 and one ahead of No. 5 as stripping was more urgently needed ahead of No. 6. During the latter part of the season we moved back onto the area stripped in 1937 to clean up some ridges of moss which had been left under pipe line locations and to make a more thorough stripping job generally.

By the middle of June, Dominion Creek water was becoming quite dirty from the operations at Middle Dominion and considerable trouble was experienced at the pumps from this cause, especially during periods of high water where accumulations of mud would be washed down from above. At such times it was frequently necessary to stop pumping until the high water had gone down.

During the latter half of September most of the water was used for removing the seasonal accumulation of thaw on new ground and to cut a drain to the location of the 1939 thawing pump station. Operations had practically ceased by October 1st, due to cold weather, but one stream was used in the day time for a short period after that date to remove some thawed moss beneath a pipe line location. The last water was used on October 10th.

751,927 cubic yards of overburden were removed with 74,396 Miner's Inch Days of water at a duty of 10.11 cubic yards per M.I.D. The cost was \$34,091.83 or 4.533¢ per cubic yard.

Lower Sulphur Area

Stripping operations were carried on here throughout 1938 for the benefit of Dredge No. 6.

Assembly of the stripping plant was commenced during the week ending April 23rd. The first pipe line was laid for the purpose of cutting a stripping run-off drain which was also for the purpose of diverting Sulphur Creek from the thawing area. It was also necessary to cut a temporary drain at the lower end of the area to by-pass Sulphur Creek around the thawing pump station while the main drain was being cut. Actual cutting of this temporary drain was commenced on May 11th using water from the Sulphur-Australia ditch. It was completed on May 13th in time to take care of the bulk of the flood water. Regular stripping was commenced as soon as the drain had been cut back far enough to take care of the run-off. The main drain was completed and Sulphur Creek diverted through it by June 18th. Eight feet of additional grade was secured at the upper end of the drain and the creek water did a great deal of effective ground sluicing.

The overburden on the area stripped during 1938 was icy muck with only a thin covering of moss. It was the easiest stripping we had and our costs should have been lower. The high cost was partly due to the high cost of operating the Sulphur-Australia ditch and partly to the lack of experience of the men. Both of these factors should be greatly improved in 1939. During the latter part of the season, most of the water was used for removal of seasonal accumulation of thaw from new ground and a good area was opened up for the start of 1939.

During a large part of the season, the amount of water delivered by the Sulphur-Australia ditch was much below the expected average and this handicapped the Sulphur Creek stripping operations, particularly at Lower Sulphur because, when the supply was low, Middle Sulphur was given preference to expedite progress of that plant.

The last water was used on October 2nd. The pipe lines were dismantled and relaid in a new location for 1939. As the thawing plant will be operating during 1939 in the area stripped during 1938, a drain had to be constructed to take care of the 1939 run-off. This was dug along the right limit side of the area by one of the 3/8 yard gas shovels. The last of the crew was laid off by October 22nd.

644,067 cubic yards of overburden were removed with 61,223 Miner's Inch Days of water at a duty of 10.52 cubic yards per M.I.D. The cost was \$50,497.29 or 7.840¢ per cubic yard.

Middle Sulphur Area

Stripping operations were continued here throughout 1938 for the benefit of Dredge No. 8. The overburden on this area is fairly deep and the formation one of the most difficult we have to handle, being largely a slide material containing heavy sand and fine rock which fill up the drains.

To obtain the maximum stripping depth, a long drain was located and cut before much regular stripping could be accomplished. The first pipe lines were laid for this purpose and re-arranged after the drain was completed.

Preliminary work was started with a small crew during the week ending 9th April. Cutting of the drain was commenced on May 4th. By 4th June it had been completed to the lower end of the 1937 stripping area and gave an added depth of approximately eight feet at that point. After this date the water was used for removing additional overburden from the 1937 stripping area and for extending the grade back upstream to remove more overburden from the area immediately ahead of the dredge. We were able to get approximately four feet of additional depth along the left limit.

During the first part of the season, water was taken from Sulphur Creek by two 10" centrifugal standard stripping pumps at the same location as was used in 1937. After the upper end of the Sulphur-Australia ditch was completed, water was taken from that source and the pumps used to boost the pressure. This meant shifting the pumps downstream to a new location. This change was made during the latter part of July and the first water from the ditch was used on July 23rd. Just before the change, operations had been hampered by shortage of water. This condition continued after the change was made as, for a few days, ditch seepage losses were high and the dirt in the water, from material thrown into the ditch to puddle the leaks, caused loss of time at the booster pumps for cleaning.

By the middle of August, an area sufficient for the 1939 thawing plant had been cleared off and most of the water for the balance of the season was used for removing the seasonal accumulation of thaw from new ground. This gave a better water duty and left a large area ready for the start of stripping in 1939. In the short period between the closing of thawing operations and the closing of stripping operations, every effort was made to remove additional muck from the 1938 thawing area.

The last water was used on October 2nd and all men laid off by October 15th.

631,500 cubic yards of overburden were removed with 53,213 Miner's Inch Days of water at a duty of 11.86 cubic yards per M.I.D. The cost was \$42,973.13 or 6,804¢ per cubic yard.

#### Quartz Creek Area

Stripping was continued at this area during 1938 for the benefit of Dredge No. 7 on the same scale as during 1937. Water was pumped from Indian Creek into the Quartz Creek ditch and from there through a booster pump into the stripping pipe lines. During 1937 some

trouble was experienced at the Indian Creek pumping station from dirty water but this was principally during periods of high water when the channels were cleaning out. In 1938 we had very few periods of high water, particularly during the latter part of the season, so that the channels eventually filled up with debris from Upper and Middle Dominion, Granville and Sulphur Creek stripping operations. This caused an excessive amount of lost time at the pumping station and eventually made it necessary to close it down completely. For 1939 operations it is expected the Spring high water will clear the channels and make it possible to start up again. This is not a very desirable source of water but there is no other available.

Preliminary work started during the week ending April 16th and consisted of clearing the pump sump box of ice and trenching through a few small glaciers in the Quartz Creek ditch. The stripping plant was ready for operation by April 30th but the area was covered by glacier ice so actual stripping did not start until May 17th. The first work was done on the area from which brush and moss had been removed in the Fall of 1937 and advanced onto new areas as soon as the seasonal thaw had advanced far enough. At the upper end of the area the overburden was found to contain many trees and stumps and these made it necessary to use considerable hand labor for removing and burning. By July 23rd all ground had been opened up along the left limit of the creek to the upper end of the dredging area and the stripping was being extended to the full width of the area towards the right limit on the downstream course the dredge is to follow. Increasing trouble from dirty water made it necessary to close down the Indian River pump station on September 20th and it was not again started. After this date the dredging limit along the left limit for a short distance above the mouth of Toronto Creek was moved out and stripping done with water pumped from Quartz Creek by the pump which had been used for circulating water for thawing during the Summer. The last water was used on 2nd October and the crew was laid off by October 8th.

300,443 cubic yards of overburden were removed with 24,380 Miner's Inch Days of water at a duty of 12.32 cubic yards per M.I.D. The cost was \$22,273.02 or 7.413¢ per cubic yard.

#### THAWING OPERATIONS

##### Dredge No. 3 Area

No actual thawing was done ahead of No. 3 but additional probing was done to determine the boundaries between thawed and frozen areas so that a course could be laid out for this dredge to get into the virgin ground formerly covered by the Yukon Gold Company's shops and warehouses at Guggieville. This work was done in the latter part of the season when men were available from other plants.

##### Arlington Area

A thawing plant continued to operate here throughout 1938 for the benefit of Dredge No. 4 on the same scale as during 1937.

The area remaining to be thawed at the end of the season was reduced to such a size that it can be completed with two pumps. The third pump will be shifted to Granville in the Spring of 1939 and used in the plant ahead of No. 5.

Preliminary work was started on April 6th and consisted of excavating for the sump boxes and waste gate. The sump boxes were set by April 16th and a small dam built for diverting Hunker Creek. The three pump stations were in place and ready for operation by April 30th. Point driving was commenced on May 5th. During the early part of the season, the thawing water was made very dirty by ground-sludging of muck left by the stripping due to lack of grade. This caused many plugged points, filled the gravels with mud and was responsible for frost being left in units which were started during that period. Later in the season, when the dredge was having trouble with frozen ground, these frozen areas were carefully located and re-thawed. Other areas, which were thawed with reasonably clean water, gave no trouble except along the boundaries of old drifts where the water tended to channel and leave frost pillars. As these were located, additional points were driven to complete the thaw. Dredging operations proved that 1938 thawing was reasonably satisfactory but a portion of the 1937 area was bad and considerable bed-rock was missed. Fortunately this part of the area can be re-thawed in 1939 and picked up by the dredge when she returns downstream but the presence of this frost made it necessary to use a great deal of labor to re-test the ground. Point driving was much easier in 1938 than during 1937 and we had a better crew. Point driving was completed for the season by 20th August but the points continued to receive water until October 3rd. After the end of the point driving season, all spare water and equipment was used for improving the condition of units which had been considered completed but in which areas of frost had later been located. After the end of the water season, testing of the thawed areas was completed, points were pulled and straightened and equipment removed and stored for the winter. This work was completed by October 15th except for yarding some equipment and three men remained for this purpose. They were off by 5th November.

During 1938 a total of 1,668,295 cubic yards of new ground were thawed at a cost of \$65,406.84 or 3.920¢ per cubic yard. 216,759 Miner's Inch Days of water were used giving a duty of 7.70 cubic yards thawed per M.I.D.

#### Upper Dominion Area

A combination thawing and stripping plant continued operating here for the benefit of Dredge No. 1. There was practically no completed ground carried over from 1937 and as the area to be thawed and stripped was covered with glacier ice ranging up to fourteen feet in depth, the operations were severely handicapped during the first half of the season. The points had to be driven through the ice and the water returning to the pumps ran over ice so there was little opportunity for any increase in water temperature

until after the ice melted off. An unusually cold Spring did not help matters.

Preparatory work was started during the week ending April 9th. Moving of pump machinery was started and preparations made to steam thaw the face of the dredge cut. Distributing pipe lines had to be laid directly on the ice.

Stripping ahead of the dredge was started with two nozzles on May 4th to speed up the melting of the glacier and expose the surface of the ground to the sun's action. Point driving was started on May 8th. Due to the extreme depth to which seasonal frost had penetrated, it was necessary to drive points in the natural thaw areas to speed up the removal of this frost. Points were spaced on four foot centers and closer where conditions indicated the necessity. The first points were pulled on June 12th.

As during 1937, an auxiliary pump station was operated where required to pump back seepage losses from the circulating pump station pond.

The last setting of points was made during the week ending August 13th. This left the upper end of the area about one hundred and fifty feet below the mouth of Little Dominion Creek. We had hoped to extend this limit farther upstream but thawing conditions were very difficult and prospect shafts, which were sunk to supplement the information given by drilling, failed to show values which would justify starting up in 1939.

During the latter part of September and until the plant closed down for the season, all water which could be spared from the points was used for stripping. Thawing was closed down by September 17th and all points pulled by 1st October. Stripping was also closed down by October 1st but the circulating pump station continued to operate to supply water for the dredge pond. All men were off by 15th October.

No record of the amount of ground thawed or volume of water used at this plant was kept. The cost of the work amounted to \$37,134.60, all of which was charged off against the operation of the dredge.

#### Middle Dominion Area

A new thawing plant was started on this area to prepare ground for Dredge No. 10. The equipment was all standard except for the circulating pumps. Two 14" Gwynne pumps, which we had on hand, were used instead of buying the standard 12" Dayton-Dowd pumps. Their pressure characteristics were much lower than was desirable but they will do for a time.

Preliminary work, consisting of placing of sump boxes and erection of pump houses, was started during the week ending June 4th. Due to the low-head pumps used and the length of the area to be thawed, the pump stations were placed in different locations so that one supplied water to the upper half and one to the lower half of the area. Thawing commenced in the upper area on July 3rd and in the lower area during the week ending July 16th. There was a considerable depth of muck to be thawed in both areas so points were staggered to the centers of the triangles to break up the muck.

Thawing was closed down on September 20th so that additional muck could be taken off by stripping. This work was completed by September 28th and the area appears to be left in good condition for dredging.

After completion of thawing, all equipment was dismantled and stored for the winter. The sump boxes were moved to their location for 1939 and reset. The men were laid off on October 16th.

During 1938 a total of 400,733 cubic yards of ground were thawed at a cost of \$23,192.46 or 5.787¢ per cubic yard. 55,348 Miner's Inch Days of water were used, giving a duty of 7.24 cubic yards thawed per M.I.D.

#### Granville Area

A thawing plant continued to operate in this area preparing ground for Dredge No. 5. Only one circulating pump was used.

Preliminary work was started on April 6th. The plant was assembled and actual thawing commenced on May 10th.

Shortly after Dredge No. 5 began digging, it became evident that the points driven at this plant during 1937 had not been driven deep enough to reach bedrock over a considerable area. This was a deeper channel which was not picked up by our drilling and owing to the sandy nature of the formation just above bedrock was not found by the point drivers.

It was necessary to use the plant to re-thaw this area so only about one third of the amount of new ground was completed during the season as had been estimated. To prevent such an occurrence in the future, tests for bedrock will be made at all plants by driving open-ended points into the bottom and inspecting the material brought up in the plugged points.

Thawing was closed down for the season on September 23rd. The plant was dismantled and the last of the crew laid off on October 24th.

During 1938 a total of 206,954 cubic yards of new ground was thawed at a cost of \$28,987.75 or 14.006¢ per cubic yard.

The new ground had to absorb all the expense of rethawing in the old ground. 50,622 Miner's Inch Days of water were used, giving a duty of 4.8 cubic yards of new ground thawed per M.I.D. No credit was taken for water going into old ground.

#### Lower Sulphur Area

A thawing plant, using two circulating pumps, was operated here throughout the season to prepare ground for Dredge No. 6.

Assembly of plant was started on April 6th and actual thawing on May 10th. Thawing was shut down on September 23rd and all men were off by October 24th.

555,159 cubic yards were thawed at a cost of \$36,851.25 or 6.638¢ per cubic yard. 99,857 Miner's Inch Days of water were used giving a duty of 5.6 cubic yards per M.I.D.

The formation throughout the year was hard to drive and difficult to thaw. Tests by Keystone drill, made after the end of the thawing season, showed a sand streak about six feet thick, commencing at a depth of twenty feet and ending just a few feet above bedrock. The sand did not thaw well and much of the area covered in 1938 will have to have additional thawing in 1939. Only areas which showed complete thaw were taken credit for in 1938. It is believed conditions will improve after we get away from the mouth of the creek.

#### Middle Sulphur Area

A 2-pump plant was operated here throughout the season thawing ground for Dredge No. 8.

Preliminary work was started on April 6th and actual thawing on May 10th. Shortly after Dredge No. 8 commenced digging, it became evident that the thawing performed during 1937 was inadequate in many places and these had to be re-thawed during 1938, which made it impossible to carry out the full program designed for that year. This proved to be a hard formation to thaw, having little gravel in it, and points had to be on a close spacing.

Thawing was shut down for the season on September 19th and the plant dismantled and stored for the winter. The time between that date and the end of the water season was devoted to stripping off as much muck as grade would permit. All men were laid off by October 20th.

During the season, 509,980 cubic yards were thawed at a cost of \$29,402.08 or 5.765¢ per cubic yard. 124,282 Miner's Inch Days of water were used, giving a duty of 4.1 cubic yards per M.I.D. All thawing expense was charged up against the new ground.

#### Upper Sulphur Area

A thawing plant using two stripping booster pumps for circulating water was operated here to prepare ground for Dredge No. 9. The stripping pumps were used in preference to the regular thawing

circulation pumps as it was desired to take water for stripping out of the same main line as was used for thawing and the greater pressure head was required.

Preliminary work was commenced on May 18th and actual thawing on June 24th. The pumps were already on hand but the balance of the equipment had to be brought in from the "Outside." Thawing was shut down on September 19th to allow the dredge to go through the main line and was not resumed due to the lateness of the season. The plant was dismantled and stored for the winter and all men were off by October 18th.

Due to lack of run-off grade, very little of the muck had been removed by stripping so that the thawing problem at this plant was largely one of muck thawing. This proved to be rather difficult and the dredge was called upon to dig considerable frost. Additional work is scheduled for the un-dredged portion during 1939 and a rock pump has been ordered so that stripping below grade can be carried on ahead of the dredge.

During the year it was decided to operate the thawing and stripping plants at this area as a combined operation similar to the way we did ahead of Dredge No. 1. All stripping expense was taken out of deferred stripping and charged into thawing and will be written off with the thawing charges.

During the year 279,296 cubic yards of ground were thawed at a cost of \$37,498.61 or 13.426¢ per cubic yard. Of this amount, \$11,017.65 or 3.945¢ per cubic yard was deferred stripping. 51,769 Miner's Inch Days of water were used, giving a thawing duty of 5.4 cubic yards per M.I.D.

#### Quartz Creek Area

A thawing plant, using one 10" stripping pump for circulating water, was operated here throughout the season, thawing ground for Dredge No. 7. Operations were carried on in a stripped area but where stripping had not been completed far enough in advance of dredging to allow natural thaw to penetrate to the required depth. As the dredge digs as high as twelve feet of bedrock and averages about nine feet, it was necessary to get the points to this depth in bedrock to assure proper thawing.

Preliminary work was started on May 12th and actual thawing on May 28th. Considerable trouble was experienced at first from loss of water through the dredge tailings and on one occasion, a flood destroyed the settling pond and pump station set-up. Thawing was shut down on September 18th and the last of the crew laid off by 14th October.

222,962 cubic yards of ground were thawed at a cost of \$13,712.63 or 6.150¢ per cubic yard. No record was kept of the amount of water used.

#### General Remarks on Thawing

Mistakes were made during 1937 that would have been avoided if more experienced men had been available. We feel that a much better job was done during 1938 but to make sure of this, as far as we can with the men who are here, we are making Mr. George Leblond a General Foreman in charge of thawing at Middle Dominion, Granville and Sulphur Creek plants under Mr. Nordale's supervision. Mr. Leblond has been actively engaged in water thawing of ground ever since its inception in this camp and we feel that his experience will have a wider benefit to the Company under the new arrangement.

#### DREDGING OPERATIONS

##### Dredge No. 1

This dredge, a 7-1/2 cubic foot Marion, continued to operate on Upper Dominion Creek and completed all available ground before closing down. She had difficulty digging throughout most of the season. During the winter of 1937-38 a deep glacier formed on the area to be dredged, this being about fourteen feet deep as a maximum. The ice, instead of protecting the ground from the winter frost, seemed to have the opposite effect. Certainly it prevented the heat of the sun from reaching the ground until late in the season and kept the thawing water from accumulating any heat until it had melted away.

Work was started on April 1st to cut the boat free from the ice. A warm spell had started the water running and the pond was rapidly filling up. The bow floated up in good shape but the stern remained fast to the bottom until April 10th. At one time there was approximately 2-1/2 feet of water on the stern deck.

The face of the cut was thawed with steam to enable the boat to get started. Spring repairs were completed and the boat started digging at 11:00 P.M. on May 12th. Spring repairs were heavy but nothing was done on anything which was thought would last through the year. The boat continued digging through the balance of May but conditions were so bad it was decided to close down until the water thawing had greater effect. She stopped digging on the morning of 1st June and resumed on the morning of June 15th. Conditions were somewhat better at that time but all during the balance of June and July, considerable frost was encountered in the muck. Digging conditions were very good all through August and September but only fair during the remainder of the season due to the great depth of muck which remained on that portion of the area.

The grade of the creek was steep and considerable difficulty was had in holding dams along the right limit where there was a high bank of icy muck.

The dredge was finally closed down at 7:00 A.M. on October 26th and dismantling commenced immediately. A thorough clean-up was made and the gold-saving tables burned so that their gold content could be saved. Due to favorable weather we were able to complete all dismantling by December 5th on which day the camp was closed and the crew sent to town. The Dredgemaster was left in charge as watchman.

During the season the dredge handled 268,123 cubic yards of material at a cost of \$98,229.05 or 36.636¢ per cubic yard. Costs were exceptionally high due to the very poor condition of the dredge and bad digging conditions. The ground produced \$194,816.27 or 72.659¢ per cubic yard. The Operating Profit was \$96,587.22 or 36.023¢ per cubic yard.

#### Dredge No. 2

This dredge, a 16 cubic foot Marion, continued to operate on the right limit of the Klondike River below Bear Creek. 1938 was her 28th year of operation.

Spring repairs were started on April 1st. The lower tumbler was overhauled and the lower sheaves of the digging ladder suspension changed. The upper screen tread was taken out and a new one installed. New timber was installed under the stacker support. All stacker rollers were overhauled. The pumps were repaired as was the well-hole save-all. Repairs were made to the screen after the new upper tread band was installed.

The boat started digging at 7:00 P.M. on April 29th. Winter frost bothered for the first few days of operation but after that, digging was good except when crossing sloughs where winter frost was again encountered. During the first part of the season, the boat was digging in an island completely protected from the river by old dredge tailings. She entered the river on July 4th and was operating in the main channel until September 28th, after which date she operated in the island away from the river until the end of the season.

The bucket line was re-lipped in the period July 21st to July 25th and during this time the boat did not operate. She was down again from November 10th to November 14th and from November 17th to November 21st due to lack of power. She was also down on two different days in December for a similar cause and was finally shut down for the season at 5:00 P.M. on December 24th. She closed down in a favorable position. All work was completed and the crew laid off by December 28th.

During the season the dredge handled 2,071,824 cubic yards of material at a cost of \$128,693.94 or 6.211¢ per cubic yard. Considering the general condition of this boat, this cost can be considered quite good. The ground produced \$241,065.50 or 11.635¢ per cubic yard. The operating profit was \$112,371.56 or 5.424¢ per cubic yard.

Dredge No. 3

This boat, a 16 cubic foot Marion, continued to operate on Lower Bonanza re-dredging an area previously dredged by the Yukon Gold Company.

Repair work was started on April 2nd. The first work consisted of cutting the boat free of the ice. One section of screen plates was replaced. The screen tread was re-riveted and a new set of belly-bars installed. The stacker rollers were overhauled. The faces of the upper tumbler were built up and new wearing plates installed. The screen drive machinery was taken out, new support timbers put in place and the drive re-assembled. The tailraces were repaired and six ladder hoist suspension sheaves changed. Temporary repairs were made to the lower end of the digging ladder and the ladder rollers were overhauled.

Digging was started at 3:00 A.M. on April 29th. The ice in the pond was heavy and the boat had considerable trouble in getting away. Seasonal frost was heavy, particularly on the port side of the cut. Some trouble was also had during high stages of water with the hydraulic tailings sluicing into the pond. The effect of the seasonal frost was gone by the end of June.

During the season, the principal machinery trouble was with the screen. The ribs were broken and it was hard to keep the screen from twisting. Relipping of the bucket line was commenced on June 27th and completed on July 5th. Total lost time changing buckets was thirty-six hours which was considered good as the crew was green.

The dredge dug into the mouth of Lovett Gulch as far as she could to get a piece of virgin ground left by the Yukon Gold Company but was finally forced out by the depth of the hydraulic tailings. At the highest point she was digging forty-five feet below water and handling a thirty-eight foot bank. We probably recovered approximately 10% of the virgin area we were after. We turned away from this on July 25th. On her way downstream, the dredge encountered good digging to the end of the season. There was much sand in the formation which tended to block the tables but no frost.

Low power caused a temporary shutdown on November 10th. She started up again on the 11th after losing twenty-five hours. Low power finally caused her shutdown for the season at 11:00 P.M. on December 9th. The screen was dismantled, stacker and ladder rollers removed for shipment to the shop, pumps dismantled and screen casing taken apart. A bottom plate was cut off the lower end of the digging ladder to facilitate estimating the repairs required. These jobs were completed, the crew laid off and camp closed on December 23rd.

During the season, the dredge handled 2,045,872 cubic yards of material at a cost of \$147,063.93 or 7.188¢ per cubic

yard. The ground yielded \$350,511.54 or 17.132¢ per cubic yard. The Operating Profit amounted to \$203,447.61 or 9.944¢ per cubic yard.

#### Dredge No. 4

This dredge, a 16 cubic foot Marion, operated in the Mouth of Hunker Creek throughout the season.

Spring repairs were started on April 2nd. Screen plates were changed, the upper sheaves of the ladder suspension were replaced, one drum on the swing winch was changed and new bushings placed in the ladder hoist friction. A new pinion was placed on the screen drive. Ladder and stacker rollers were overhauled. The tailsluices were repaired. The faces of the upper tumbler were built up and new plates installed.

The crew started pulling on the bucket line on the afternoon of April 30th and the boat started digging at 1:20 P.M. on May 3rd. She encountered hard digging in the bottom for the first couple of weeks but had good digging after that until the first part of July when she began to encounter some frozen gravel. This condition became worse until by the middle of that month the bedrock was frozen clear across the face and only flotation was being dug. Bottom conditions were bad until about the middle of August when bedrock was again being dug. This area will be re-thawed and re-dredged during 1939. The trouble was caused by the "points" not being driven deep enough to reach bedrock. The depth of bedrock was greater than surrounding drill holes indicated and the point-drivers did not pick up this fact. From the middle of August until the end of the season good digging was encountered. The boat was bothered with sand at all times, which made it necessary to do a good deal of stern-stepping. The high bank along the port side of the cut also gave difficulty during the latter part of the season. An unusually favorable Fall enabled this boat to continue digging until 8:30 A.M. on December 26th. The crew was laid off on December 28th.

During the season the dredge handled 1,756,372 cubic yards of material at a cost of \$313,464.55 or 17.847¢ per cubic yard. The ground yielded \$629,671.25 or 35.850¢ per cubic yard. The Working Profit amounted to \$316,206.70 or 18.003¢ per cubic yard.

#### Dredge No. 5

This dredge, a 7-1/2 cubic foot Marion, continued to operate on the Granville Flats of Dominion Creek just above the Mouth of Sulphur Creek.

Spring repairs were started on April 5th. The power transformers were taken from the starboard top deck and placed on the port lower deck to give the boat better trim. The boat was then cut free from the ice. New tailsluices were installed and rubber liners put in. New wearing plates were placed on the upper tumbler. The lower tumbler was re-riveted. Changes were made in the piping from the new 10" pump.

The pond ice was blasted and after considerable difficulty the boat started digging at 3:00 P.M. on April 27th. The heavy seasonal frost caused much difficulty when it caved into the pond. A No. 1 monitor was installed in the port bow gantry to wash off some of this frozen material and was quite effective until we got close to the thawing area when it was necessary to close it down on account of too much dirt thrown into the thawing circulation water.

By the middle of June, bottom frost was being encountered and it was at this time the decision was made to pull back the thawing plant and re-thaw ahead of the dredge. This soon improved conditions and the boat had good digging from then on to the end of the season.

Re-lipping of the bucket line commenced on July 22nd. It should have commenced before but there was a delay in receiving the lips from the "Outside". Only forty-five lips were received in the first shipment and these were placed on the buckets by July 26th. The balance were received on the 29th and relipping was completed by August 1st.

During August, the dredge re-dug a portion of Dredge No. 6's area where that boat had been compelled to leave bed-rock. This ground was found to be well thawed and the values fair.

Low power finally caused the shutdown of this boat on the morning of November 21st while digging conditions were still good. Fall work was completed and the crew laid off on 24th November.

During the season, the dredge handled 798,890 cubic yards of material at a cost of \$133,490.57 or 16,709¢ per cubic yard. The ground yielded \$222,363.84 or 27,833¢ per cubic yard. The Working Profit amounted to \$88,873.27 or 11,124¢ per cubic yard.

#### Dredge No. 6

This dredge, a 7-1/2 cubic foot Bucyrus, continued to work on the right limit side of the Granville Flats of Dominion Creek just above the Mouth of Sulphur Creek.

A small crew was started on April 5th to cut the boat free of the pond ice and steam thaw the face of the cut. Other men were added as required.

Spring repairs consisted of overhauling all ladder rollers, repairs to ladder hoist, assembling 10" and 12" pumps and making some desired changes in their piping, raising the rollers at the upper end of the screen to offset tire wear and restore grade to screen, overhauling stacker rollers and building up faces of upper tumbler. All this was completed by April 25th except the work on the upper tumbler which took two days longer.

The dredge started digging at 1:45 P.M. on April 28th. The pond ice was heavy and progress was slow for the start. Seasonal frost was from eight to ten feet deep. One of the ladder suspension rods broke at 12:30 A.M. on May 6th. It was sent to the shop for repairs and dredging was resumed at 11:00 A.M. on May 7th. As far as frost was concerned, the dredge had good digging throughout the season but excessive sand was always present and the dredge had to be turned on several occasions, to get away from it. Sand elevators are to be installed before start of 1939 operations, which should do away with all dry-washing of top material. From the middle of August to end of season, the dredge was digging into an area which was thawed in 1937 but not stripped until 1938 and this area had about six feet of surface frost left on it. It dug well as long as it did not cave into the pond. During the last month of operations, some frozen bottom was encountered on the port side of the cut and this is being left for Dredge No. 5 to pick up. Due to a broken rear gantry cap, the dredge was closed down for the season at 8:00 A.M. on November 9th. Temporary repairs were not considered justified as power conditions were not good. The bucket line was taken off, the dredge turned around and the stacker taken off. The stacker was sent to the Shops to be completely rebuilt during the winter. All machinery was inspected carefully and that which required repairs was dismantled ready for shipment to the shops. The crew was laid off on November 16th.

During the season the dredge handled 708,768 cubic yards of material at a cost of \$134,811.60 or 19.019¢ per cubic yard. The ground yielded \$164,555.27 or 23.215¢ per cubic yard. The Operating Profit was \$29,743.67 or 4.196¢ per cubic yard.

#### Dredge No. 7

This dredge, a 5 cubic foot Bucyrus, continued to operate on Quartz Creek between Calder Creek and Toronto Creek. She operated in well stripped ground but was troubled throughout most of the season with winter frost and hard bedrock. The winter frost penetrated the ground to an exceptional depth and spring floods washed down a great deal of mud which formed a blanket and prevented the sun's heat from drawing it out. These spring floods caused much trouble for several days by giving the dredge a great deal of extra material to handle and by washing out dams.

Spring repairs were started on April 1st. The boat was cut loose from the ice and steam thawing of the face started on April 6th. The lower tumbler bearings were inspected and cleaned, repairs were made to the screen, new drums were installed on the stacker and all stacker rollers overhauled. The stacker belt was replaced. The bucket line was relipped, new cables were installed on the ladder hoist and a new wearing plate on the lower end of the digging ladder. Loose rivets in the digging ladder were replaced and all ladder rollers overhauled.

The dredge started digging at 10:00 A.M. on April 21st. Due to the hard bedrock dug and excessive winter frost encountered,

the bucket line was again relipped during October. Relipping started October 15th and was completed on October 21st. A total of 20 hours was lost changing buckets. A combination of low power, electrical trouble on the dredge and heavy ice in the pond caused this dredge to shut down for the season at 9:30 P.M. on November 19th. After the electrical trouble was repaired, the dredge was placed in Winter position and the bucket line and lower tumbler taken off. All work was completed and the crew laid off on November 23rd.

During the season the dredge handled 389,936 cubic yards of material at a cost of \$92,607.57 or 23.749¢ per cubic yard. The ground yielded \$208,552.17 or 53.483¢ per cubic yard. The Working Profit amounted to \$115,944.60 or 29.734¢ per cubic yard.

#### Dredge No. 8

This dredge, a new 7 cubic foot Yuba, started work for the first time on No. 49 Below Discovery Sulphur Creek at 3:40 P.M. on May 28th. During the first few days of her run, much time was lost while making machinery adjustments but her performance throughout the season demonstrated that she is a very satisfactory boat and probably capable of digging harder ground than any of our other dredges.

The thawing, which was done for this boat in 1937, was far from satisfactory and it was necessary to pull back the thawing plant and devote most of the time to rethawing. Even at that, the dredge had to dig a great deal of frost and gave a good account of herself. A much greater percentage of "old works" was encountered than was indicated by the drilling and this had an adverse effect on recoveries. A considerable amount of "gumbo" bedrock was found which did not wash well but frequent tests could not find any values in it. When the ground was well thawed, trouble was had with an excessive amount of sand and mud. Longer tailsluices to be installed before the start of 1939 operations will help this condition.

Mining of leased Claim No. 49 Below Discovery was completed on September 29th at which time a general cleanup was made. She then proceeded into claim 50 Below Discovery where she ended the season. Heavy ice in the pond and low power caused this dredge to shut down for the season at 3:00 P.M. on November 5th. A General Cleanup was made and certain items of machinery dismantled for shipping to the Shops after which the camp was closed and the dredge left in charge of a watchman.

During the season the dredge handled 455,453 cubic yards of material at a cost of \$98,914.44 or 21.718¢ per cubic yard. The ground yielded \$108,727.67 or 23.872¢ per cubic yard. The Working Profit was \$9,813.23 or 2.154¢ per cubic yard.

#### Dredge No. 9

Construction of this dredge, a rebuilt 5 cubic foot Bucyrus, was completed and the dredge started operating on September 15th

at 7:15 A.M. An earlier start by ten days, could have been made but in order not to cut through the main pipe line for the thawing plant at too early a date, the 15th was determined on. Extra construction men were transferred to No. 10 as they finished on No. 9.

Dredging operations were commenced on Claim No. 27 Below Discovery Sulphur Creek and will be carried on upstream. It was soon found that the digging ladder was too short to reach bedrock without lowering the pond level, due to filling up of the creek channel. A sand pump was installed at once and used continuously until the end of the season. Before operations are commenced in 1939, a section will be added to the ladder.

The material to be dug was almost entirely sand and muck. In spite of every effort, the thawing results were not satisfactory and the dredge had a great deal of frozen material to dig. To remove additional muck below grade, a special rock pump has been ordered and will be installed ahead of this boat in 1939.

In spite of the hard digging, this boat gave a good account of herself and we feel we have a really excellent dredge. Due to low power she was closed down at 3:00 P.M. on November 5th. She was placed in position for the winter and a general cleanup made. The camp was closed on November 7th.

During her short run the dredge handled 55,414 cubic yards of material at a cost of \$26,805.94 or 48.371¢ per cubic yard. This cost is, of course, excessive. The ground yielded \$6,839.92 or 12.343¢ per cubic yard. The Working Loss amounted to \$19,966.02 or 36.028¢ per cubic yard.

#### POWER PLANT AND DITCHES

The North Fork Power Plant operated continuously throughout the year supplying power to the mining operations and the City of Dawson. The power generated was distributed as follows:

Used by Mining Company	24,567,060 K.W.Hrs.	74.6%
Dawson Utilities	3,506,028 "	10.6%
Power Plant Service	1,086,900 "	3.3%
Line Losses	3,786,912 "	11.5%
	<hr/>	
Total	32,946,900 K.W.Hrs.	100.0%
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The cost of operation amounted to \$122,093.77. The amount of Power Expense deferred from 1937 was \$24,987.54. These two amounts were charged off against the Mining Company operations and the amount of \$20,275.72 received from sales of power to the Utilities was considered as an earning.



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