

year was 339,238 at a cost of \$199,951.29 or \$0.59 per meal. Camp costs amounts to \$31,658.49, or \$0.09 per meal, making the total Boarding cost \$231,609.78, or \$0.68 per meal. Adding restaurant and roadhouse meals and Board allowance, the work was charged with \$286,450.16 or \$2.23 per shift.

Seasonal frost encountered by the dredges was about the average amount as the winter was not severe and there was a fair covering of snow.

The water supply was fairly good, although there was an extended dry spell during July. On the whole, it is considered that the supply was better than can be expected on the average.

STRIPPING OPERATIONS

No. 5 Plant:

Preliminary work was started during the week ending April 15th. The work was fairly heavy as all pipe lines had to be laid in new locations. For the first time this plant was connected to the Sulphur-Australia Ditch system from which it received its principal supply of water during 1939. There was one 10" pump set up in the channel of Dominion Creek which supplied water to a part of the plant when water conditions were favorable for its use. The first water was received on May 15th, at 10:00 a.m. and a second nozzle started the following day. The first water was received from the pump in Dominion Creek during the week ending June 10th.

The entire area covered by the plant was overlaid by a heavy layer of moss, but this was not as deep on the average as in former years.

This plant was favored with water supply as much as possible in order to have stripping completed further ahead of thawing than heretofore, and by the end of the season we were far enough ahead so that the thaw pump settling basin could be made in the stripping pit.

By September 23rd, cold weather was causing trouble and the plant was closed down for the season on October 7th. Equipment was dismantled and stored for the winter.

896,894 cubic yards of overburden were stripped off at a cost of \$33,865.82 or 3.776 cents per cubic yard.

No. 6 Plant:

Preliminary work was started during the week ending April 22nd. This plant received all its water from the Sulphur-Australia ditch system. The pipe line from the ditch remained in its last year's

location, but all distributing pipe had to be laid in new locations.

The first water was received on May 17th, and thereafter an average of one stream of water was used. The muck was good for stripping except that it was full of old trees and stumps and a great deal of hand labor was required to remove the trash.

During the summer the stripping run-off drain was extended clear through to the No. 8 Plant and water was running through a large part of it before the end of the season. Work was also done on a new bypass drain to take the run-off from No. 6 stripping around No. 6 thawing during 1940.

Cold weather forced the closing down of this plant on October 4th. All pipe lines were dismantled and stored for the winter.

576,448 cubic yards of overburden were removed at a cost of \$25,915.99 or 4.496 cents per cubic yard.

No. 7 Plant:

Preparatory work was commenced during the week ending April 15th. This plant received its water from the Indian River pump station through the Quartz Creek ditch and a 10" booster pump. A new screen box was placed in the entrance channel to the Indian River pump and sliding screens installed.

The first water was received on the afternoon of May 15th. An earlier start was prevented by shortage of power. High water at first brought down much trash, but this condition improved as the high water receded. Thereafter frequent trouble was caused by trash from the operations on Sulphur and Dominion Creeks. This finally became so bad that operations were practically at a standstill. It was decided to stop using Indian River water and carry the water of Toronto Creek and overflow from the dredge pond through a pipe line to the station and this arrangement gave very satisfactory operation.

The main pit was completely stripped to the upper end of the proposed dredging area and good progress was made on a return cut along the Right Limit. By the end of the season this cut had been opened up well below the camp and was completed nearly to Calder Creek. The formation along the Right Limit is largely a slide formation, but so far is handling well.

Operations were closed down for the season on October 6th. The pipe lines were dismantled and stored for the winter.

366,991 cubic yards of overburden were removed at a cost of \$20,757.44 or 5.656 cents per cubic yard.

No. 8 Plant:

Preliminary work was started during the week ending April 15th. All pipe lines had to be laid in new locations. This plant received its water from the Sulphur Australia ditch system through two 10" Dayton Dowd standard stripping pumps used as booster pumps. The first water was received on the afternoon of May 14th. This was hillside run-off but it lasted until regular ditch water was received from Australia Creek.

New drains gave added depth of stripping and a better understanding of how to work enabled the crews to keep the drains down to grade so that a very good job of stripping was done. Due to the heavy stripping which this plant had to do it received first call on the water and ran at about 100% capacity all season.

The deep overburden along the Left Limit contained a great deal of slide rock and it required careful handling to keep the rock out of the drains.

By the last week in September cold weather was causing trouble and operations were closed down on October 4th. Pipe lines were dismantled and stored for the winter.

954,068 cubic yards of overburden were removed at a cost of \$37,143.39 or 3.893 cents per cubic yard.

No. 9 Plant:

Stripping, as a separate operation, was resumed at this location during the summer. To make this possible a 12" Byron Jackson rock pump was secured. This is a unit having a heavy duty pump on the end of a vertical shaft with the motor above water level and gives an added stripping depth of ten (10) feet below natural drainage level. The material was elevated and pumped through a pipe line which by-passed the thawing plant and dredge. Preparation of foundations for the rock pump was commenced during the week ending June 3rd. Foundations were prepared at the same time for the water supply pump, a 10" Byron Jackson belt driven pump salvaged from No. 1 Plant. The pumping units were started on June 13th. Operations made slow progress until the sump had reached its full depth. Trouble was experienced with the lower bearing of the rock pump, but this was caused by attempting to operate away from the vertical position. The overburden contained a large amount of slide rock and this caused excessive wear in the pump inlet and impeller. We are endeavouring to get a material for these parts which will not wear so rapidly, and to make a setup where much of this rock will remain in the pit.

During the last 10 days of September cold weather caused a shortage of water and other troubles so operations were closed down on October 6th. All pipe lines and equipment were dismantled and stored for the winter.

166,264 cubic yards of overburden were removed at a cost of \$17,326.62 or 10.421 cents per cubic yard. This work greatly improved conditions for thawing to follow. Better unit costs should be obtained in 1940.

No. 10 Plant:

Preliminary work was started during the week ending April 15th. The entire plant had to be laid in a new location. Water was secured from two 10" Dayton Dowd standard stripping pumps, set up in the channel of Dominion Creek. The first pump was started on the afternoon of May 4th, and the second on the 5th. The water was used for driving tailings off the stripping area. A cold spell caused a shortage of power and made it necessary to shut down the pumps from noon on May 9th to the morning of the 12th.

Stripping conditions were fairly good at this plant but the crew did not accomplish as much work as they should have done and a change is being made in the organization for 1940.

There were many heavy tailing piles on the surface which had to be shifted before the underlying muck could be removed. The work was arranged so that panels were cleared of tailings, the underlying muck removed and then the tailings blown back onto the completed areas.

408,037 cubic yards of overburden were removed at a cost of \$28,009.00 or 6.860 cents per cubic yard.

No. 11 Plant:

Preliminary work was started during the week ending April 15th. This plant secured its water from two 10" Dayton Dowd standard stripping pumps set up in the channel of Hunker Creek. The pumps were used in their last year's location, but all distributing pipe lines had to be relocated.

One pump was started on the afternoon of May 7th, but shortage of power made it necessary to shut down from 10:00 a.m. on May 9th to 6:00 p.m. on the 12th.

An experiment was made using a bull-dozer to push the thawed moss into windrows for the water to work on instead of blowing the moss up with the water, but the surface was too rough for satisfactory operation and the experiment was discontinued.

As cold weather approached and little daily thaw was secured in the moss area, a setup was made on the Right Limit to take advantage of the accumulated seasonal thaw which averaged from four to six feet in depth. Laying of this plant was started during the week ending August 26th, and the first water was used there on August 30th.

Work on the moss area was abandoned by September 9th and thereafter all water was used on the Right Limit where a good duty was obtained.

Cold weather closed this plant down on October 4th. All equipment was dismantled and stored for the winter.

394,122 cubic yards of overburden were removed at a cost of \$24,845.99 or 6.304 cents per cubic yard.

STRIPPING GENERAL:

More efficient stripping was done in 1939 than heretofore. The crews are becoming more experienced and a different arrangement of supervision was made which is working out very well. Each stripping plant now has a full-time foreman and one man devotes all his time to general supervision of the stripping plants on Dominion and Sulphur Creeks.

THAWING OPERATIONS

No. 3 Plant:

During the week ending May 20th, a small crew started assembling the plant. The layout consisted of a 12" Gwynne Pump and standard distribution equipment for 290 points. Water was obtained from a seepage channel of the Klondike River.

Point driving was commenced on the afternoon of May 31st. Driving was through dredge tailings and was difficult as large boulders were encountered, and many points had to be restarted several times before they could be put down to the desired depth. In some cases steel bars had to be driven to make a hole for the points.

Point driving was completed for the season by July 15th.

The crew was then employed locating naturally thawed areas in the future course of Dredge No. 3 operations. The points continued to receive water until September 15th, after which date the plant was dismantled and stored for future use. Testing indicated the ground to be well thawed.

The barring campaign proved up a large area of naturally thawed ground available for Dredge No. 3 with only scattered small areas of frozen ground to be thawed.

The last of the crew was either transferred or laid off by September 23rd.

57,765 cubic yards of ground were thawed at a cost of \$6,135.61 or 10.622 cents per cubic yard.

No. 4 Plant:

A small crew started a steam thawing plant ahead of Dredge No. 4 on April 2nd to secure thawed ground for a dam to keep Hunker Creek flowing in the left limit channel away from the thawing area and circulating pump stations. This work was completed by the middle of April and thawing shifted to the face of the dredge cut. This latter work was completed by April 22nd.

The pump stations and pipe lines were set up and points distributed. The circulating pump station consisted of two 12" Dayton Dowd thawing pumps and make-up water was received from the Rock Creek ditch.

Point driving was commenced on the afternoon of May 5th with water averaging only 33^o.5 F. but we were anxious to get the points started as the dredge did not have any too much completely thawed ground available. In spite of the cold water a good driving rate was maintained. The water was clean and there was little trouble from plugged points. Driving was fairly easy except at the lower end of the area where Klondike River gravel was encountered.

Point driving was completed for the season on August 31st. The points continued to receive water until September 17th. As all ground required to be thawed for Dredge No. 4 in this area had then been completed, the plant was dismantled and equipment transferred to No. 11 where it will be used to prepare ground for Dredge No. 11.

542,989 cubic yards of ground were thawed at a cost of \$29,078.56 or 5.355 cents per cubic yard.

No. 5 Plant:

Preparatory work was commenced during the week ending April 15th. The circulating pump station consisting of two 12" Dayton Dowd pumps was set up, all pipe line laid, and points and hoses distributed.

Point driving was commenced at 8:00 a.m. on May 13th. Make-up water was taken from the overflow of Dredge No. 5's pond, and this proved a very satisfactory source of supply. The ground thawed fairly well, but much time was lost during the season by trouble with the dam at the pump station. This was built in icy muck and broke out on several occasions. Altogether about two weeks operating time was lost from this cause, and the work of the plant reduced by that proportion.

Point driving was completed for the season by August 26th. The points continued to receive water until September 19th. The pipe lines and pump station were dismantled, points pulled and all equipment stored for the winter.

A new settling basin was prepared in the completely

stripped area down-stream from the 1940 Thawing Area. The sump boxes were set in place and the pump foundations prepared. The same size plant was figured for 1940, as was used in 1939, but the exceptionally late run of Dredge No. 5 seriously depleted our Thawing Reserves and it may be necessary to increase the size for 1940 operations.

1,057,711 cubic yards of ground were thawed at a cost of \$38,854.86, or 3,673 cents per cubic yard.

No. 6 Plant:

Preliminary work was commenced during the week ending April 22nd. The circulating pump station, consisting of two 12" Dayton Dowd pumps, was used in its last year's location, but the foundations had to be raised and repaired. Pipe lines were driven and points and hoses distributed. A 6" pump was set up in the make-up water channel to Dredge No. 6's pond to supply water, for a small area of re-thaw just ahead of the dredge.

Point driving was commenced at 8:00 a.m. on May 13th in the re-thaw area and at 10:00 a.m. on the same day in the main plant. Make-up water for the main plant was taken from the Sulphur-Australia ditch until the re-thaw area was completed after which it was supplied by the 6" pump.

The formation at this plant is very difficult to thaw in the bottom and a large part of the area covered by the 1938 work required additional water. All points in re-thaw had been started by May 27th. Driving was difficult but the 3/4" points with chisel bits, which were used in the main plant, drove much better than the 1/2" open points, which were used in the area supplied by the 6" pump.

Point driving was completed for the season by August 19th. The points continued to receive water until September 19th. The pipe lines were then dismantled and the points pulled.

The circulating pump station will again be used in its old location during 1940. Owing to the difficulty experienced in thawing the ground, the size of the pump station is being increased by the addition of one 14" Gwynne Pump. This has too low a head characteristic, but it is thought to be good enough for circulating water after the points have been driven to bedrock.

555,187 cubic yards of ground were thawed at a cost of \$36,739.65 or 6.617 cents per cubic yard.

No. 7 Plant:

A small crew started a steam thawing plant on April 4th

to remove surface frost from an area in front of the dredge. The frost was in gravel and was between three and four and a half feet deep. This work was completed on April 22nd, and the crew then commenced assembly of the water thawing plant. The circulating pump station consisted of one 10" Byron Jackson stripping pump placed in the overflow channel from the dredge pond. Distributing pipes and points were all old style equipment salvaged from the Upper Dominion, or Dredge No. 1 Plant.

Point driving started at 3:00 p.m. on the 13th but pipe line trouble made it necessary to shut down until the following morning. Make-up water was derived from Quartz Creek through the overflow from Dredge No. 7's pond. There was no travelling water screen available for this pump station so fixed screens were used. There were some periods when trash from the dredge pond gave trouble, but on the whole conditions were satisfactory. Most of the thawing had to be done deep in bedrock which meant that the points had to penetrate bedrock as much as twelve feet.

Point driving was completed by September 2nd and the plant closed down on September 14th to allow certain areas of deep muck to be more completely stripped off. The circulating pump station was used for supplying water to the nozzles. After the stripping was completed a new settling basin was made for 1940 operations and the pump foundations prepared. As a greater proportion of frozen ground has to be thawed in 1940, the size of the pump station is being doubled and the number of points to be operated increased proportionately. The Byron Jackson 10" stripping pump, which has been used as a booster for the stripping water, is being transferred to the thawing plant to match up with a similar pump already there.

215,772 cubic yards of ground were thawed at a cost of \$16,618.61 or 7.702 cents per cubic yard.

No. 8 Plant:

Preliminary work was started during the week ending April 15th. The circulating pump station, consisting of two 12" Dayton Dowd thawing pumps, was used in its last year's location, but the foundations had to be repaired. Pipe lines were driven and points and hoses distributed.

Point driving commenced on the afternoon of May 13th, the first points being started in last year's area where re-thawing was required. Make-up water was taken from the overflow of Dredge No. 8's pond. After stripping operations started at No. 9 the make-up water became very dirty, as no by-pass channel had been provided, and this caused a great deal of trouble with plugged points. Dams were constructed in the dredge tailings to provide basins for settling out the mud and this improved conditions, but not enough for good operation. At the end of the season a by-pass drain was constructed around the thawing area, so

conditions should be much better in 1940.

Point driving was completed for the season on August 26th. The points continued to receive water until September 18th when cold weather made it advisable to cease operations. Equipment was dismantled, points pulled and all stored for the winter.

A new settling basin was prepared for 1940, the sump boxes set and foundations prepared for the pumps.

Owing to the dirty water, the results of the 1939 season were not satisfactory. Only 495,924 cubic yards were thawed at a cost of \$32,011.20 or 6.455 cents per cubic yard. As the dredge dug considerably more than this, our Thawed Reserves are seriously depleted. During 1940, however, we will be thawing in ground which is better prepared and with the use of the drain for by-passing, No. 9 stripping run-off will have much cleaner water to work with and should complete more than double the yardage we did in 1939.

No. 9 Plant:

Preliminary work was started during the week ending April 22nd. The circulating pump station, consisting of three 10" Dayton Dowd stripping pumps, was used in its last year's location. Due to the dirty water which was encountered a fourth 10" Dayton Dowd pump was later transferred from Granville to this station and used there for the balance of the season. Pipe lines were driven and points and hoses distributed.

Point driving commenced at 9:00 a.m. on the 12th, and the first points were started in last year's area where re-thaw was required. Make-up water was derived from the overflow of Dredge No. 9's pond, and as the dredge was digging a considerable depth of muck, this was naturally quite dirty and gave trouble in the points and cross-heads. This condition was more severe here than at any other plant and will only get better as the stripping is perfected. The quality of the water was improved somewhat by bringing in the water of Brimstone Creek through a pipe line, but this was not available until July 30th.

Point driving was completed for the season by August 23rd. The points continued to receive water until September 19th, when cold weather made it advisable to cease operations. Equipment was dismantled, points pulled and all stored for the winter.

543,394 cubic yards of ground were thawed at a cost of \$39,350.36 or 7.242 cents per cubic yard. As the material thawed was principally icy muck there was a heavy shrinkage, so the yardage available for dredging will be much less. The results of 1939 work clearly indicated that satisfactory thawing cannot be done until the ground is better prepared by stripping. Conditions in 1940 will be improved by

the stripping done in 1939, but a satisfactory area will not be reached until 1941.

No. 10 Plant:

A small crew started a steam thawing plant on April 8th, to thaw the high bank in front of the dredge. The dredge boiler was used for making steam. This work was completed by the middle of April, after which assembly of the water thawing plant commenced. The circulating pump station consisted of two 14" Gwynne Pumps. Due to the length of the area to be thawed it was necessary to divide the pump station into two units, each supplying water to approximately half the plant, and so placed that the overflow from the upper unit, which received all the flow of Dominion Creek, came into the settling basin for the lower unit.

Point driving commenced at 10:00 a.m. on May 12th. The ground to be thawed was fairly well stripped of muck and as each pumping unit was in a good settling basin, the water was clear and very little trouble was encountered from plugged points. The bottom of the formation thawed fairly easily but the top required points at close spacing to remove frost humps.

Point driving was completed for the season on August 26th. The points continued to receive water until September 19th, when cold weather made it advisable to close down. The pipe lines and pump stations were dismantled, points pulled and all equipment stored for the winter.

A new settling basin was prepared for 1940 operations. The Gwynne pumps will be replaced by two 12" standard Dayton Dowd thawing pumps which will supply about a third more water at a suitable pressure. The sump boxes were set in place and the foundations prepared for the pumps.

644,103 cubic yards of ground were thawed at a cost of \$41,078.95 or 6.378 cents per cubic yard. This was not a very satisfactory yardage, but the situation is helped by the fact of the dredge being able to re-handle, at a profit, so much of the old dredge tailings, which are outside of our Thawing Reserves.

No. 11 Plant:

No thawing was started at this plant during 1939, owing to lack of equipment, but as soon as thawing was completed at the Arlington area ahead of Dredge No. 4, the pumps and equipment were transferred to this area and stored for use in the Spring. The pump foundations were prepared and the sumps for the two 12" Dayton Dowd circulating pumps set in place. The dam and waste gate for the settling basin were also built.

The preparatory work was commenced on September 23rd and completed on October 25th.



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