

“Dredgery”: Researching the Life and Times of Canadian Number Four

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Thanks to Pierre Berton, the word “Klondike,” has become synonymous with images of an endless chain of weary stampeders on the Chilkoot Trail, crowded street scenes in Dawson City, the fabled “City of Gold,” and hundreds of sourdoughs and cheechakos furiously building up their precious dumps in anticipation of spring sluicing. The last great gold rush was the story of a quest — a quest that started with a fluke discovery on Rabbit Creek (later renamed Bonanza) in 1896. It ended as abruptly three years later when thousands of stampeders simply turned around and either went back home or moved on to other promising strikes in neighbouring Alaska. High adventure aside, what is often overlooked in Berton’s book and similar accounts is that Dawson City not only reached the peak of its physical development after 1899 but also that efficient extraction of the Klondike’s hidden riches did not take place until after the turn of the century. This is not to deny the great wealth of the handful of Klondike “Kings” who were able to amass fortunes from their respective claims on Bonanza and Eldorado Creeks. But the gold bearing gravels of the Klondike goldfields were generally unsuited to the methods of the individual placer miner and yielded only a few cents a day in many places. It was not until the introduction of the large floating gold dredges of the Yukon Gold Company and the Canadian Klondyke Mining Company in the early 1900s that the low grade gravels could be worked on a profitable scale.

Since the first dredge was installed on lease forty-two Below Bonanza by the Lewes River Mining Company in 1901, a total of nineteen gold dredges have worked the Klondike goldfields.¹ The most famous Yukon dredge, however, was the Canadian Klondyke Mining Company’s Canadian Number Four (renamed Yukon Consolidated Gold Corporation Number Four in 1935). In researching the life and times of Canadian

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1 For a complete list of Klondike dredges, see Lewis Green, *The Gold Hustlers* (Anchorage, 1977), pp. 303-8. In his list of manufacturers, Green fails to include the W.W. Johnson Company of San Francisco, the manufacturer of YCGC Number 12.



Canadian Number 4 digging near Arlington Roadhouse, late 1930s. Courtesy: O. Berglund Collection, Parks Canada, Prairie Regional Office, Winnipeg.

Number Four, a variety of sources were consulted, ranging from contemporary technical journals to the *Dawson News* and interviews with the corporation's former dredgemen.² The most important documentary source, however, proved to be the records of the Yukon Consolidated Gold Corporation (YCGC). This material not only yielded a great wealth of information about the history of Number Four but indicated that dredging was a way of life for many Yukoners for several decades. The YCGC records also revealed an

2 To facilitate research into the technology of gold dredging and placer mining, the Historical Services Division of Parks Canada, Prairie Regional Office, let contracts for the preparation of two bibliographical indexes. The first guide, a general survey of placer gold operations around the world, was based on the *Engineering Index*, a comprehensive annual review of engineering and technical literature. It covers the period from 1896 to 1966 and contains over 1800 references. (See D. Neufeld Consulting and Research, "The Engineering Index, 1896-1966: An Evaluation of its Utility as an Historical Research Tool," unpublished report, March 1984.) The second guide contains some 630 indexed articles on gold dredging and northern mining from the *Mining and Scientific Press* (124 volumes). (See Ken Desson and Associates, "Mining and Scientific Press: A Selection of Articles on Dredges and Dredging and on Mining in the North," unpublished report, March, 1984.) Both bibliographic guides are on file at Parks Canada, Prairie Regional Office, Winnipeg. The *Dawson News* (published between 1899 and 1954) is a deceptively rich source. It was not only interested in goldfields activity, because of its importance to the welfare of Dawson City, but many of the *News* staff actively pursued mining on the side. The *News* was therefore a regular commentator on dredging operations. The names of many of the dredgemen were secured from the executive of the Vancouver Yukoners' Association and were matched up with the company personnel records in Dawson and Ottawa. In order to gain as wide a first hand perspective as possible, people who were employed in the various support or preparatory operations were contacted, in addition to those men who had worked on Number Four. Everyone approached about the project was highly enthusiastic. They were generally concerned that the story of Yukon dredging had been overshadowed by the glamour and romance of the Klondike Gold Rush, even though it was dredging that kept Dawson alive for so many years. Many also felt that the assault on the goldfields by the huge dredges was a noteworthy development in itself. The interviews were all conducted in the Vancouver/Victoria area and are on file at Parks Canada, Prairie Regional Office in Winnipeg.

interesting relationship between the operation of the dredge fleet and the nature of the records that were created and maintained by the company. They are a fine example of how a particular activity has shaped the documents. After the following introduction to Yukon gold dredging, this article will discuss the corporation's records.

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The days of the individual miner in the Klondike goldfields were relatively shortlived. Conscious of the problems experienced in the settlement and development of the Canadian West, the Laurier government initially held the view that the Yukon should be developed by individual miners and that the federal share of the region's riches would be secured through royalties.³ Clifford Sifton, Minister of the Interior, bluntly told a prospective investor, "There is no possibility of any mining companies getting a group of claims."⁴ But on 18 January 1898, in a move that "signalled that the era of small-scale mining, though barely underway, was doomed,"⁵ the Laurier cabinet approved an order-in-council that provided for the leasing of large concessions of placer mining ground for dredging operations. P.C. 125 was as much a consequence of intense lobbying by well-connected promoters as it was the result of the government's growing realization that large-scale hydraulic operations were essential for the goldfield's continued exploitation.⁶ Joseph Whiteside Boyle, the so-called "King of the Klondike," made a quick first-hand assessment of the situation in the fall of 1897 before heading to Ottawa where he enlisted the aid of James Sutherland M.P. and lawyer H.B. McGiverin to secure hydraulic lease number eighteen on the Klondike River between Bonanza and Hunker Creeks. A.N.C. Treadgold, an Englishman who spent the better part of his life trying to bring the Klondike goldfields under his control, went about securing a concession somewhat differently. He visited Sifton first before going to the goldfields; Treadgold reported within a few days of his arrival in Dawson that "there are here miles and miles of ground that cannot possibly be worked at a profit by individual claim-owners, but which taken up in blocks by capitalists and operated by means of hydraulic machinery would be exceedingly profitable. Herein lies the ultimate destiny of this country, and it is in this way only that its vast stores of wealth will be extracted."⁷ Treadgold and his backers subsequently received a vast concession in the heart of the Klondike. In fact some forty leases were eventually granted, even though the concessions were supposed to be restricted to those areas not suitable for individual placer mining.⁸ The people involved in these various schemes included not only prominent Canadian businessmen but also such international financiers as the Rothschilds and Guggenheims.

The machine that was to wrest the Klondike's gold from these otherwise "unprofitable" blocks of frozen placer ground was the floating elevator dredge. Developed in New Zealand in the 1880s and later refined in the United States, particularly California and Montana, the gold dredge by the early 1900s was a marvel of modern technology.⁹ Floating on a pond of its own creation, the dredge lifted up the gold bearing gravel by

3 D.H. Hall, *Clifford Sifton*, vol. 1, *The Young Napoleon, 1861-1900* (Vancouver, 1981), pp. 164-66.

4 Public Archives of Canada (hereafter, PAC), Clifford Sifton Papers, MG27 II D15, vol. 221, p. 930, Sifton to Henry J. Dexter, 31 July 1897. Quoted in *ibid.*, p. 189.

5 W. Rodney, *Joe Boyle: King of the Klondike* (Toronto, 1974), p. 25.

6 Hall, *Sifton*, p. 189.

7 *Manchester Guardian*, September 1898 in F. Cunynghame, *Lost Trail* (London, 1953), pp. 49-50.

8 Green, *The Gold Hustlers*, pp. 19-20.

9 C.C. Spence, "The Golden Age of Dredging: The Development of an Industry and Its Environmental Impact," *The Western Historical Quarterly* 11, no. 4 (October 1980), pp. 403-6.

means of a digging ladder with an endless chain of open buckets. The buckets emptied into a dump box or hopper which fed into a long, slightly inclined, revolving, perforated screen or trommel where the gravel was washed by water. Any fine material passed through the holes in the screen onto gold saving tables where it was sluiced again: here, gold was collected in a series of riffles and coconut mats. All other material too large to pass through the screen was carried up the stacker belt and then dumped on the tailings piles beyond the stern of the dredge. A continuous supply of gold bearing gravel was fed into the revolving screen by slowly swinging the front end of the dredge back and forth in an arc, lowering the bucket ladder each time the end of the arc was reached. This action was made possible by winching alternately on left and right bow cables anchored to "deadmen" on shore, while at the same time pivoting on a huge spud at the rear of the dredge. After bedrock was dug for a few feet, the bucket ladder and spud were lifted and the dredge stepped forward a few feet by pulling on both bow cables. The spud was then lowered, the bucket line set in motion and another dredge cut started. Throughout the process a growing pile of dung-like tailings was left in the wake of the dredge.

Canadian Number Four was probably the largest wooden hull bucket line dredge in the world. Built during the winter of 1912-13 in the Klondike Valley near the Ogilvie Bridge, it slowly dug upstream over the next decade into the Boyle Concession. At a point about a mile above Bear Creek, Canadian Number Four sank in its dredge pond in 1924 and was not refloated until three years later. It then continued upstream to the mouth of Hunker Creek, otherwise known as the Arlington area. Finding extremely rich ground, the dredge worked there until 11 July 1940 when it was shut down and dismantled. It was then rebuilt with a few minor alterations on the old Bronson and Ray Concession on Bonanza Creek (67 Below Discovery). Resuming operations on 11 September 1941, the new Number Four worked its way downstream on one side of the Bonanza Valley and then up the other side. It was shut down permanently on 1 November 1959.

When the Yukon Consolidated Gold Corporation ceased operations in 1966, dredge Number Four was acquired shortly thereafter for one dollar by Parks Canada for its proposed commemoration programme in the Klondike goldfields.¹⁰ Planning for Klondike National Historic Sites, however, has gone through a long, at times frustrating, gestation period: it was not until 1982 that the major historical theme for the Klondike goldfields, the extraction of gold and the technology and society which evolved from this activity between 1896 and 1966, was finally adopted. Given Number Four's long period of service, it was naturally regarded as the key historical resource in the commemoration programme. Yet before long-term preservation plans and an interpretive concept could be developed, a detailed structural and engineering use history of the dredge was required. This research was based largely on the Yukon Consolidated Gold Corporation's records.

Examination of the YCGC records started in Dawson City so that an on-site examination of the dredge could first be made at her final resting place on claim number 17 Below Discovery, Bonanza Creek. For anyone who drives out into the Klondike goldfields for the first time, it is difficult to imagine that the creek valleys and surrounding hills were once swarming with hundreds of gold-crazed stampedeers. Today there are few physical signs left of their activities. Even the small hamlets (such as Grand Forks) that once thrived along the various creeks are now completely gone. Much of this first phase of

10 Parks Canada, Klondike National Historic Sites (hereafter KNHS), Curator's Office, Dredge Number Four file, copy of Affidavit of Execution, 4 August 1970.

goldfield development fell victim in the early twentieth century to the huge gold dredges that devoured almost everything in their path. The former Yukon Gold Company's headquarters, Guggieville, for example, was reduced to tailings piles. Whatever was fortunate to survive has been either ransacked by vandals and artifact hunters or wiped out by modern mining companies which, in their bid to get at the ancient stream beds, seem determined to reduce the goldfields to a moonscape.

Dredge Number Four rests only a few kilometres outside Dawson City; it is reached by taking the Klondike Highway for a short distance and then following the Bonanza Road, a winding trail lined by the ever-present dredge tailings. At first glimpse, Number Four looms large against the landscape. Yet, it is only when standing beside the dredge that its awesome proportions can be fully appreciated, especially in light of the fact that a good part of its 40 foot (12.2 metres) by 65 foot, 8 inch (20 metres) hull rests in the creek bed. When the dredge was shut down in November 1959, it was left resting on a shelf it had dug for itself. The following spring, the dam on the Upper Bonanza Reserve collapsed, sending a flood of water down the creek that lifted the dredge off the shelf and swung it around 180 degrees.¹¹ Since then, in what might be regarded as nature's revenge, the dredge has been gradually claimed by the shifting silt of the creek. Unless corrective measures are soon undertaken, it may not be long before Number Four is closed to the public.

Once on board, it is easy to see why Number Four, of all the various Klondike National Historic Sites, receives the largest number of visitors each year. In a sense, it is somewhat reminiscent of the great woolly mammoths that once roamed the region.¹² The 107 foot, 1 inch (32.6 metres) digging ladder allowed the dredge to work forty-eight feet below water level and seventeen feet above with a 275 foot (83.3 metres) wide average cut. This wide arc was made possible, in part, by not one but two spuds, each 56-by-36 inches (132-by-81 centimetres) and 60 feet, 6 inches (18.4 metres) in length. The open bucket line consisted of seventy-two 16 cubic foot (.45 cubic metres) buckets (a bucket weighs 3340 pounds or 1515 kilograms; a lip 765 pounds or 347 kilograms; and a pin 496 pounds or 225 kilograms.) The buckets dumped at a rate of twenty-two per minute. As was the practice at the end of each season, these huge buckets were removed when the dredge was shut down and still lie today in two neat rows radiating out from the stern. Inside the superstructure is a 49 foot, 6 inch (15.1 metres) revolving screen with an inside diameter of 9 feet, 9 inches (3 metres) and a 12.5 per cent grade. Rotating at 7.8 revolutions per minute, the screen fed material on to 1705 square feet (158 square metres) of gold saving tables. Fragments too large to pass through the three-quarter inch holes in the screen moved onto a 32 inch (.8 metres) wide stacker belt that travelled at a speed of 356 feet (108.5 metres) per minute up the 131 foot (40 metres) stacker. With an approximate 1250 total horsepower on board, Number Four could ideally handle 18,000 cubic yards (13,770 cubic metres) in twenty-four hours.¹³

A few kilometres north of the dredge on another tributary of the Klondike River is the former headquarters of the Canadian Klondyke Mining Company and later the Yukon

11 Parks Canada, Prairie Regional Office, Dredge Number Four interviews, Robert McLaren, 22 March 1984.

12 Many former dredgemen recounted how the dredge buckets would often bring up the skeletal remains of mammoths, in particular the huge tusks.

13 KNHS, Yukon Consolidated Gold Corporation Office Files, Oversize Box B, Baird's Statistical Compilations, Dredge No. 4 New Statistics.

Consolidated Gold Corporation. Once a bustling community, the abandoned Bear Creek complex was acquired by Parks Canada in April 1975 as the main development area for the Klondike goldfields.¹⁴ One of the unexpected bonuses of the acquisition was the records of the former Engineering Office. These records had been rounded up from various YCGC locations by a former Parks employee in the early 1970s and were originally destined for the Public Archives of Canada. Only some thirty boxes of roll maps had been sent to Ottawa, however, by the time Parks Canada took over the property and hence the records.¹⁵ In June 1982 Parks Canada transferred a small collection of corporate records to the Yukon Archives in Whitehorse as well as all mechanical and architectural drawings not pertaining to dredge Number Four, Number Twelve (another Parks Canada dredge), or the Bear Creek complex.¹⁶ The remaining material, comprising some seventy cubic feet, was catalogued on contract by the Dawson City Museum in 1982-83. It is currently housed in the attic of the KNHS administrative centre, the old Court House.

The Dawson YCGC records cover an exceedingly wide range of topics and activities; and they have been organized, retaining the YCGC system as much as possible, into nine main file groups:

- A. Administration (box 1-20)
- B. Finance (box 21-32; oversize box A)
- C. Personnel (box 33-35; oversize box B)
- D. Buildings, Lands and Properties (box 36; oversize box B)
- E. Equipment and Supplies (box 37-47; oversize box B, C, D)
- F. Survey Books and Data (box 48-54; oversize box B)
- G. Blueprints, Sketches and Drawings (box 55-57)
- H. Books, Publications and Printed Material (box 58-60; oversize box E, F)
- I. Non-manuscript material (oversize box F).

There were some interesting finds, such as papers dealing with the Yukon Gold Company water pipelines and the Yukon Telephone Syndicate. There were also some disappointments. The Canadian Klondike Mining Company records largely consisted of blank forms (box 37) or journals and ledgers that had had the pages torn from each book (boxes 23 and 24). Someone was evidently intent on destroying Joe Boyle's records, probably before or immediately after his company had gone into receivership. In fact, there was little information on Boyle's activities in the collection except for a few survey books on dredging activities which were kept by his son, Joe Jr. (box 52).¹⁷

14 *Ibid.*, Curator's Office, Dredge Number Four File, copy of Bear Creek Holdings Limited proposed sale, 16 April 1975. According to the 1977 Klondike National Historic Sites master plan, the site is to feature a goldfields interpretation centre, a sequential mining exhibit, visitor service facilities, workshops, and a few selected Bear Creek buildings such as the Good Room.

15 PAC, YCGC SNAP file.

16 Yukon Territorial Archives, microfiche guide to YCGC Records, introduction.

17 The dearth of information on the early history of Canadian Number Four will perhaps be remedied by the forthcoming provision of copies of the Boyle Papers at the Public Records Office in Northern Ireland. According to Leonard Taylor, the latest biographer of Joe Boyle, (*The Sourdough and the Queen: The Many Lives of Klondike Joe Boyle* (Toronto, 1983), pp. 387-89), these papers contain regular reports from Joe Boyle Jr. on the state of his father's mining empire in the Klondike. The papers are presently being microfilmed for the Public Archives of Canada.

That the YCGC's records-keeping practices were based on its dredging operations was initially suggested by the holdings of the Administration file group. The Office Files sub-group (boxes 2-7), organized alphabetically and dating from the early 1930s to the closing of the company in 1966, provide a comprehensive record of the correspondence between the YCGC and its suppliers. They also contain detailed technical information on every dredge part from bucket lips to spud points as well as a number of files dealing with the 1940-41 reconstruction of Number Four, in particular the weekly reports of the Engineering Department (box 6). The YCGC also maintained annual repair schedules (1939-1966) for its dredge fleet (box 12). These detailed records were an extremely valuable source for piecing together the operating history of Number Four in that they review the condition of the dredge machinery, superstructure, and hull. According to the 1939-40 repair schedule, it was quite evident that old Number Four was nearing the end of its useful life. "All timber work on the dredge is in an almost critical condition," it was noted, "but no replacements will be made except where absolutely necessary."¹⁸ The assessment of other parts of the dredge was equally negative. Another key source proved to be the weekly dredge reports for the period 1959-64 (box 12). These brief reports describe how the dredge was performing, where it was headed, whether it experienced any major shutdowns, and probably most important from the YCGC's point of view, what type of pay it was recovering. They also contain references to unusual events such as in A.G. Barrett's cool report of "an unfortunate accident when the stern decker was missed off the dredge and presumed drowned. This caused a shutdown for 72 hours while dragging operations and dynamiting was carried out but body was not found and must have been buried in the sand at the back of the dredge. Some repairs were made while search was carried out."¹⁹

Personnel records were another good source for the dredge study. They consisted of force reports (1939-46), dredge crew lists (1951; 1960-63), position lists (1941-62), seniority lists (1952-64), and change of rating records (1937-63). There was also a file on dredge crew instructions and duties. Apart from sketching a very incomplete picture of the size and stability of the YCGC labour force, these records gave the names of the men who were associated with Number Four and some indication of their relative experience. A dredge crew, in order of ascending rank, consisted of a bull gang of three or four members that was responsible for cables, power lines, and deadmen; a bow and stern decker who were in charge of the bucket line and stacker respectively; an oiler who kept all moving parts well lubricated; a winchman who operated the dredge; and a dredge-master who was responsible for dredge production and usually served as watchman during the winter. (On some of the larger dredges such as Number Four, there was also a panner, in most instances an oldtimer, who took samples from the bucket line whenever the dredge was digging bedrock and checked for colours.)

One final important source was the approximately one thousand drawings of Number Four (Main File Grouping G. Blueprints, Sketches, and Drawings) currently housed in the environmentally controlled KNHS curatorial workshop. These blueprints, the majority of which pertain to the reconstruction of the dredge, were indispensable in that they provided not only the dimensions for the various dredge parts and sections but also illustrated how the machine was constructed.²⁰ The holdings of the other main file groups

18 KNHS, YCGC Office Files, box 12, Dredge Repair Schedule 1939-1940, Dredge No. 2-9, p. 6.

19 *Ibid.*, box 12, Dredge Reports, A.G. Barrett to P. Kavanagh, 6 August 1958.

20 There is a file card index to these drawings available at KNHS.

dealt with essentially dredge-related support activities. Among other things, the YCGC had to build and maintain a system of roads through the goldfields, bring in electrical power lines from the North Fork power plant, and erect base camps for the dredgemen and the survey, stripping, and thawing crews. There were also the various support operations in Dawson City and at Bear Creek.

This bias of the YCGC's records-keeping system towards dredging operations is also found in the company's business records in the Public Archives of Canada. Almost immediately after YCGC ceased operations, Dominion Archivist W. Kaye Lamb contacted the company about the possible transfer of its records to the PAC. It was not until June 1970, however, that the company decided to turn over its Vancouver head office records and then almost another two years before the actual transfer took place. A further thirty boxes of material arrived from Dawson in June 1973.²¹ By the time all the material had been processed in 1975 and a finding aid (Number 414) prepared, the YCGC material at the PAC (MG 28 III 43) consisted of 206 volumes, exclusive of maps and plans. These records are organized into seven main groupings:

- Working Papers (volumes 1-32)
- Vancouver Transfer Files (volumes 33-34)
- Finance/Accounts (volumes 35-48)
- North West and New North West Corporations (volumes 49-56)
- Subsidiaries (volumes 57-67)
- Court Action (volumes 68-82)
- Record Books (volumes 83-208).

The Working Papers, by far the most valuable source for the dredge study, consist of annual and auditor's reports (1936-1966), the papers of YCGC accountant Andrew Baird, Bear Creek files, cost sheets, weekly and monthly reports, head office schedules, old company reports on various creeks, and the correspondence of several company directors. The Vancouver Transfer Files, on the other hand, were of more limited value but did contain some interesting material on security investigations, labour difficulties, and increased gold recovery. The Finance/Accounts section provides a fairly clear picture of the economic history of the YCGC and dredge production in particular. Similar information for earlier dredging companies was located in the next two groupings; unfortunately, once again the material on Joe Boyle and his Canadian Klondyke Mining Company was skimpy.²² The Court Action papers deal with the successful legal action by

21 Lamb told a company official that "a large and important slice of the history of the Yukon is tied up in your records, and I am most anxious that the basic documents should be preserved." PAC, YCGC SNAP file, W.K. Lamb to W.A. Arbuckle, 5 October 1967. Access to the YCGC material is subject to the approval of Teck Corporation.

22 In an effort to flesh out this period, I contacted the Marion Power Shovel Company (formerly Marion Steam Shovel Company), the manufacturer of the dredge, and asked to consult the company's records at its office in Marion, Ohio. My request was timely in that the firm was celebrating its centenary. The company was thus most cooperative but warned me not to be too optimistic. These words of caution were well-founded; apart from a few letters dealing with the formation of the company, all early correspondence, in particular that dealing with Joe Boyle's Canadian Klondyke Mining Company, had evidently been destroyed some ten years earlier.

My few days in Marion were not a complete loss. For its ninetieth anniversary, the company had made a collection of all surviving "historical" material and deposited it in a row of filing cabinets. This potpourri included a number of interesting documents such as the original purchaser ledger for Marion machines which indicated that the company produced only twenty-four elevator dredges during the twelve-year

Patton *et al* in the early 1930s to strip A.N.C. Treadgold of his YCGC assets.²³ Finally, the Record Books section was composed of field survey books (elevations, sections, dredge cuts, yardage) and company ledgers on such topics as stripping, thawing, and yardage. This information corresponds in many cases to the company maps in the National Map Collection.

The YCGC records in Ottawa reveal certain characteristics of the company and its records-keeping practices. In the first place, dredging was a sophisticated business and all aspects were carefully planned and monitored. This was not always the case. Until the early 1930s, in the words of Dawson lawyer C.M. McLeod, one of the company's directors, "dredges have been started in the spring irrespective of what ground has been prepared for them and have staggered along attempting the impossible. That the company might save money by closing down dredges not provided with suitable dredging material does not seem to have been thought of."²⁴ This haphazard operation of the dredge fleet is reflected in the records, which are not as detailed or complete for the early years. In 1932, however, with Treadgold effectively removed from any association with the company, the YCGC hired New York mining consultant E.H. Dawson to make an inspection of its properties. Dawson praised the potential of the company's holdings in the highest terms. But the problem was how to ensure that this potential was fully exploited. In March of the following year, E.A. Austin, a former Yukon Gold Company engineer who was working in neighbouring Fairbanks, was named YCGC manager. Austin's tenure with the company was limited to a few months because of health problems. He did manage, nonetheless, to prepare a programme of development and expansion that was strongly endorsed by the company. "You cannot imagine," McLeod confided to fellow director Tom Patton, "what a relief and satisfaction it is to me to see at last our operations receiving treatment in accord with sound mining practices."²⁵

period from 1904-1916. One quarter of these machines were shipped to the Klondike goldfields. (Marion Power Shovel, Historical Files, original Purchase Ledger, Elevator Dredges.) This historical material also included written specifications for some smaller Marion dredges. Although those for Number Four were missing, the existing specifications gave some indication of the general structural features of Marion dredges. There were also a number of company catalogues as well as several hundred pictures. The catalogues were quite valuable; they not only suggest how the dredges were being promoted but also provide an accurate picture of the state of the technology. The photographs, meanwhile, include several images of Number Four and its companion dredge, Canadian Number Three, under construction. Unfortunately, the photographs, although numbered, were neither catalogued nor in any order.

Marion Power Shovel also allowed me to rummage through the holdings of two storage vaults. In one I found the original sales department machinery order and shipping instructions for Number Four (no. 2786) and Number Three (no. 2712). According to the 13 March 1912 contract, the parts for both dredges were to be shipped to Dawson that summer where the two machines were to be erected under the supervision of Marion engineer Howard Brenner. The massive wooden hulls for the two dredges were the responsibility of Boyle's Canadian Klondyke Mining Company. Each Marion machine cost \$134,800. (*Ibid.*, Sales file, 13 August 1912.) In the other storage vault I turned up a specification number for Canadian Number Four but no drawings. In fact, the only Marion blueprints of the dredge that I located were part of the YCGC material at the Yukon Archives in Whitehorse. These drawings, originally from Dawson, were probably those employed by Brenner during the erection of Number Four; they provide the basic dimensions of the dredge prior to its 1940-41 reconstruction.

23 For an understanding of the intricate corporate struggle for control of the Klondike goldfields, see Green, *The Gold Hustlers*.

24 PAC, YCGC Records, MG28 III 43, vol. 20, J.T. Patton files — White Tissue Copies — 1933, C.G. McLeod to T. Patton, 19 April 1933.

25 *Ibid.*

What Austin proposed was a meticulously orchestrated plan of attack for the company's dredge fleet which was subsequently developed and refined by his successor, W.H.S. McFarland, and his assistant, R.E. Franklin. Under the new plan, the ground to be dredged was first prospected by drilling a series of test holes with Keystone drills at intervals across the creek valleys. On the basis of these cross-sections, the payable values were calculated as well as the dredge path and the width of the dredge cut. The next step was the stripping of the overburden which varied in depth from ten to thirty feet. This task was accomplished by setting up a row of hydraulic "giants" and washing away the vegetation and muck in stages as it was naturally thawed by the sun. Once the frozen creek gravels were reached, thawing operations were commenced. Dredging of frozen ground in the past had invariably resulted in excessive wear on the machinery, reduced yardage, and, most importantly, the loss of gold as it passed through the dredge in frozen clumps of gravel.²⁶ To avoid these problems the company now saw to it that all frozen ground was properly prepared in advance of dredging. Water was pumped into the gold bearing gravels by means of a series of regularly spaced three-quarter inch pipes or "points" that were gradually driven down to bedrock as the adjoining gravel thawed. This process took anywhere from one to three months and ideally was done two years in advance of dredging so that a supply of thawed ground was always available.

This reorganization of dredging activity resulted in another feature of the YCGC records — the company's obsession with statistics. Largely through the efforts of company accountant Andrew Baird, the YCGC not only kept the customary business records on operating and capital expenses but began to compile highly detailed information on dredging operations. There were summaries of the stripping and thawing operations listing the equipment used, the depth worked and the number of men involved. There were also dredge reserve inventories that indicated the amount of dredgeable material and its potential value for each of the various creeks. There were even monthly tables on the size and nature of the dredge cuts.²⁷ One of the most significant sources, however, was the monthly and season-end dredge data sheets.²⁸

Through the collection of such data, the YCGC knew exactly how well each dredge was performing and how much gold it was recovering per cubic yard dredged. When the company moreover combined these computations with operating and non-operating charges per cubic yard, it was fully aware whether or not a profit was being realized. These statistics were important in helping company management decide whether a dredge would continue to operate in a particular creek, be moved to another area, or simply shut down. They also gave some indication of the operating condition of the dredge and the competence of the dredgemaster and his crew.

Finally, the YCGC records demonstrate how closely company management followed the operation and production of the dredges and planned strategy accordingly: the monolithic machines were almost human in the eyes of the company and their maintenance and operation dominate the records. On 6 August 1932, Andrew Baird reported that Number Four "digging in the middle of the Klondike River pulled a deadman to which the starboard stern line was anchored while the spud was raised in stepping ahead and was carried by the force of the river approximately 300 feet downstream before the spud

26 G.R.F. Troop, "Gold Dredging in the Klondike," *Mine and Quarry Engineering* (June 1939), p. 190.

27 These various tables are found in PAC, MG28 III 43, vols. 83-208.

28 See, for example, *ibid.*, vol. 12, Cost Sheets — 1934, Dredge Canadian No. 4, Season, 1934.

could be lowered.”²⁹ Luckily, the dredge was not damaged and resumed its steady march towards the mouth of Hunker Creek. “It seems almost certain that a permanent berth, in very profitable ground will be established in this section for Canadian 4,” McLeod reported to Secretary-Treasurer G.F.R. Troop in early September 1933. “This development alone will have a very strengthened effect upon earnings of the company in future years.”³⁰ On 17 October, however, this plan appeared in jeopardy. A heavy ice jam came down the Hunker slough and completely immobilized Number Four before it could be properly laid up.³¹ Over the winter the company prepared for the inevitable, fully expecting the dredge to be crushed by ice during spring breakup. “I am hoping that fortune will favour us,” a philosophical Troop wrote McLeod, “and that Canadian No. 4 will not be damaged by the ice flow. If unhappily the boat is damaged or sunk it will be a great misfortune. But even if this untoward event should occur we shall keep straight on with the work which we have planned and try to avoid similar occurrences in future.”³² Miraculously the dredge survived but the incident only exacerbated its already deteriorated state. In his report on the 1935 season, McFarland spoke of Number Four finishing its productive life in the Arlington area, with the qualifying “if she holds together.”³³ He added, “The condition of the dredge is bad. The ‘hump’ on the starboard side is worse and the stern on that side is under water while digging. It is impracticable to build a new hull.” Over the next four years, Number Four not only held together but dredged some of the richest ground in the Klondike. In 1939 alone, it recovered 34,390.215 ounces in gold valued at \$941,236.15. This figure represented one-third of YCGC’s gross revenue for 1939.³⁴ Any plans for abandonment were consequently shelved in favour of salvaging it. McFarland reported at the end of December 1939, “It is very possible that another year and a half of operation in her present field, if practicable, would be the very thing needed to tide us over the period required to build up our finances enough to enable us to assume the financial expenditure required to rebuild her on Bonanza.”³⁵ This expenditure eventually totalled \$606,049.69.³⁶

What, then, had innocently started out to be an essentially technical study of Canadian Number Four had evolved after examination of the YCGC papers into a story of far greater potential and significance. Simply to have produced a structural and engineering use history of the dredge would have been shortsighted and constitute a missed opportunity. Rather, the research indicated that YCGC records-keeping practices were determined and shaped by the operation and maintenance of its dredge fleet. The records when examined also revealed the extent and breadth of the operations associated with dredging activity and along these lines, suggested that Number Four could serve as an effective vehicle through which to tell the history of human activity in the Klondike goldfields during the first half of this century.

29 *Ibid.*, vol. 6, Andrew Baird — 1931-1932, Dredge reports, 6 August 1932.

30 *Ibid.*, vol. 20, Patton files — White Tissue Copies — 1933, C.G. McLeod to G.R.F. Troop, 8 September 1933.

31 *Ibid.*, vol. 14, R.E. Franklin — Dawson 1933, R.G. Franklin to G.R.F. Troop, 9 November 1933.

32 *Ibid.*, vol. 20, Patton files — White Tissue Copies — 1934, G.R.F. Troop to C.E. McLeod, 11 April 1934.

33 *Ibid.*, vol. 23, McFarland Report Data, 1935-1936, Memorandum for Agnew, p. 3.

34 *Ibid.*, Head Office Schedules and Statements YCGC, 1940-41.

35 *Ibid.*, vol. 26, Old Reports — Arlington to 1949, W.H.S. McFarland to A.F. Daily, 30 December 1939.

36 *Ibid.*, vol. 46, Dawson Account — Schedule of Operation, 1943.