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The Prolific Pipeline: Getting Canol Under Way

For over a year Southern Canadians have been hearing echoes of controversy among oil men, environmentalists, and spokesmen for Eskimos and Indians about building a forty-inch pipeline from the oil and gas fields of the western Canadian Arctic up the valley of the Mackenzie River, Canada's largest watercourse, toward the prairie provinces. The focus of the controversy is a commission appointed by the Cabinet to hear testimony about the probable effects of such a pipeline. Although several thousand witnesses have appeared before Justice Thomas Berger and his commission at sessions held in the towns and villages of the western Arctic, from Yellowknife, capital of the Northwest Territories, to Holman Island in the Arctic archipelago, not one spokesman has emphasized the results of an earlier experience with pipeline construction in the same country.

The Canol Project of World War II, a job undertaken in a hurry and with no concern for its effects, is all but forgotten by Canadians; although it, too, involved the 1100-mile Mackenzie Valley from its headwaters at Great Slave Lake to its delta on the coast of the Beaufort Sea. Perhaps one reason for the neglect of Canol as an historic precedent from which to draw useful inferences for the Berger Commission is the difficulty of establishing the exact details of the project's operations: Published accounts do not agree as to what Canol actually encompassed; they vary so greatly in emphasis and tone that the task of reconciling them, however amusing for an historian, could only exasperate a witness in search of concrete evidence for the Berger hearings.

More than a third of a century has passed since pipeline builders first entered the Mackenzie Valley. It is time for Canol to be re-examined and

a rehearsal for the more impressive performance now to come. Given its due, Canol might furnish useful analogies for the pipeline planners of today. The expansionary tendencies of this earlier pipeline project are apt to be as relevant to the Berger Commission as the mounds of data heaped before it by researchers delving into the present state of northwestern Canada.

Existing reports of the once-famous Canol Project range from Richard Finnie's heroic epic, a souvenir picture book for employees of the prime contractors, to the criticism of Trevor Lloyd, the economic geographer from McGill University, who in 1942 saw Canol as a mixed venture of opportunism and bull-headed ignorance. There is also the narrow questioning of expenditures in the record of the Truman Committee, the U.S. Senate committee that began investigating Canol in 1943 before the pipeline was completed. In addition, we have the chronicle of the American military historian, Colonel S.W. Dziuban, who drew upon the files of the American Defense Department to describe the military policies which brought the pipeline into being. More recent is the account of Colonel C.P. Stacey of the University of Toronto whose treatment of diplomatic tensions arising from Canol's activities appears in his history of Canada's military policies during World War II.¹

These authorities, along with a number of technical writers and sundry journalists, permit a summary definition of Canol as the project that brought crude oil and product from the Norman Wells oil field of Imperial Oil Limited across the Mackenzie River and through the Mackenzie Mountains to a Whitehorse refinery and storage depot where the fuel would be accessible for military transport on the Alaska Highway and the Northwest Staging Route. A different definition appears in a recent issue of a trade journal for the oil industry: Canol was intended to "evaluate the oil potential of the Northwest Territories and the Yukon."² Canol's emblematic name, a conflation of the words "Canada" and "Oil", is the most succinct statement of what the project was all about. None of these definitions conveys the essence of Canol as a nodal enterprise from which sprang a myriad of undertakings that for a time overwhelmed northwestern Canada.

In retrospect, Canol seems a minor affair, its war-time publicists notwithstanding. Aside from a chain of landing fields which opened the Mackenzie Valley to wheeled aircraft, the project produced little more for Canada's north than a scattered lot of second-hand machinery,

hundreds of miles of bush roads, and some detailed information about the rock formations a few thousand feet under the Norman oil field. Its four- and six-inch pipeline was puny by today's standards. Moreover, some of Canol's technology was the crudest to be found in the modern repertoire: the woodstove and the dogsled proved after all to be still valuable adjuncts of life in the north. Then, too, despite Canol's claim to be a serious wartime endeavor and a great undertaking for its day, its stagey mysteriousness and farcical confusion enlivened many of its doings. It often proceeded like a situation comedy, with moments of bumptious slapstick, as when the Mackenzie mud swallowed whole vehicles or a workman drove a truck through a mess hall after a lunch he did not like.

Canol's distinguishing feature, however, remains the uncanny speed with which its profusion of supplementary projects appeared. Once officially launched, the pipeline project branched prodigiously, nourishing fresh undertakings, until one writer could call it, perhaps rightly, the "biggest construction job since the Panama Canal".³

Canol's prolific nature is evident, first of all, in the extension of the actual pipeline. It was supposed to run between Norman Wells and Whitehorse, fewer than six hundred miles. Eventually, it extended to the Pacific Coast at Skagway and into the heart of Alaska to Fairbank, a total of 1600 miles. The Skagway section was an afterthought; nevertheless, it was the first section finished, and it kept on delivering oil long after the main Canol pipeline had closed down. By August 1952, an observer thought that Canol had evolved into five distinct projects.⁴ But this list is not complete. Each of these enterprises already had many offshoots, some of which, like the transport of men and materials to the pipeline site on the Mackenzie River were necessary to finish before the next major step could be taken. Meanwhile, other projects, originally subordinate, were quickly assuming a *raison d'être* of their own.

As the pipeline grew, the costs of the project increased, too. Canol planners originally expected the project to cost about \$30 million. The figure most commonly mentioned as Canol's cost is \$134 million, an estimate traceable to statements of U.S. Army witnesses appearing before the Senate.⁶ Thirty years later, Dr. Robert Leggett of Canada's National Research Council estimated that Canol had actually cost about \$300 million.⁷ To appreciate these figures one must translate them in

the inflated monetary terms of the mid-seventies, seven or more times the values of the early 1940s.

Another hint of Canol's capacity for expansion is its takeover of manpower from projects to which it was supposed to be an auxiliary. Canol was an outgrowth of a vast military enterprise which brought some 33,000 Americans into northwestern Canada by June, 1943. Although the pipeline had its own labour force, more than 8,000 persons assigned to the Highway and Staging Route in 1942 were soon diverted to work identified with Canol. In addition to these Americans, an uncounted number of Canadians, including bush pilots, river boat skippers, geologists, and civilian engineers, were sooner or later implicated in Canol's affairs. Some reports say that as many as 25,000 persons, including Army troops, eventually had something to do with the pipeline project.⁸

But the record of manpower, expenses, and miles of pipe does not explain why Canol multiplied subordinate works. More revealing are the circumstances allowing the entire summer of 1942 to pass before any pipe was laid west from Norman Wells, the place originally envisioned as Canol's starting point. Then the pipeliners built only enough to fuel the new Canol Camp opposite Norman Wells, a line that the breakup ice promptly tore out in the spring. Indeed, it was more than a year before Canol's main pipeline began to inch toward the Yukon. The Skagway supplemental line began pumping oil from the Pacific Coast in January, 1943, but in the Mackenzie Valley, river transport operations, camp construction, and road making, all intended as preparation for the installation of pipe, occupied the pipeline builders for so long that the U.S. War Department's emergency deadlines for moving oil across the mountains became meaningless.

Canol expanded "because of the conditions of the unexplored wilderness". With this apt if unintentional metaphor a publicist of Canol explains the bogging down of Canol's progress in the Mackenzie Valley during the summer and fall of 1942 and excuses the project's manifold supplements.⁹ To be sure, the hardships and frustrations of transporting men and freight in the north country had something to do with Canol's failure to reach completion on schedule. But more than ice, mountains, and mud brought about the delays, duplications, and contradictions that constitute the absurdist themes of this first major pipeline project in Canada's north. We would not be wrong to think of

the "wilderness" as an obscurity of human motives, with the tangled growth of Canol as its natural product.

The immediate cause of Canol's burgeoning enterprise is not difficult to discover. The U.S. Army, which conceived, paid for, and partly built the pipeline, wrote the principle of multiplication into the project from the outset. Canol's original contracts of May 4-20, 1942, were with Bechtel-Price-Callahan of San Francisco, Standard Oil of California, Standard Oil of Alaska, Imperial Oil Limited (itself a subsidiary of Standard Oil of New Jersey, now Exxon), and the architect-engineering firms of J. Gordon Turnbull, and Sverdrup & Parcel. The Army Engineers were to provide cheap labour to expedite construction. Among them, the private firms and the Army were to develop new oil wells at Norman, construct a four-inch crude oil pipeline over the mountains, build a refinery at Whitehorse, and undertake unspecified ancillary works.¹⁰

This last item — "ancillary works" — encouraged Canol's growth and made a joke of the contract's condition that the line was to be pumping oil five months later. The Athabasca-Mackenzie River transportation operation intended to carry the pipe to the construction site flourished under the contract's open invitation to expand. The commotion attending the northward progress of the Army Engineers and the contractors into the Mackenzie country, and the shipping of their gear by the water route into the north generated enough "ancillaries" by themselves to demonstrate that Canol's style of expanding in the wilderness was inherent in the project from the start. The rest of the essay describes some of these diverse preliminary activities, all of them arising from transport on the Mackenzie waterways and all of them illustrating the sort of multiplications that were typical of Canol. The motif of expansion to be found in the history of Canol's air fields and in the record of its oil exploration is treated in other articles in press.

Edmonton, the still tiny capital of Alberta, experienced a sudden hubbub in the spring of 1942 with 10,000 U.S. troops passing through headed for the Dawson Creek railhead to build the southern portion of the Alaska Highway, at the same time that another 2,600 Army Engineers and their several hundred officers were assembling in the city for the work on Canol that was to begin that summer at Norman Wells.¹¹ Northerners saw the true scene of emergent confusion:

Waterways, south of Fort McMurray, about June 1. Fifteen thousand tons of pipe had arrived in Edmonton with the troops, and was forwarded to Waterways with them on the Northern Alberta Railway. The pipe now had to be transported from the junction of the Athabasca and Clearwater rivers over the 1,200-mile water route to Norman Wells during an open water season of only five months. Drilling equipment, construction machinery, and supplies had to go the same route.

Although in 1942, navigation began at Waterways on May 12, the Hudson's Bay Company heard only two weeks later that the U.S. War Department had 30,000 tons of freight for Norman Wells. Normally, only a third of that amount of freight moved north from Waterways during a summer, and much of that was handled by the old wood-burning sternwheelers, *Mackenzie River*, built about 1907, and the *Distributor*, built in 1921.¹²

So far, there had been no exploration of the country the pipeline was to cross; that would not happen until the following winter when Dr. Adam Burwash did the job on snowshoes. Meanwhile, the Army and its contractors were discovering that they would have to create a good deal of their own transportation facilities before they could lay any pipe. So began whole complements of subsidiary works unanticipated by Canol's planners, but now deemed essential preliminaries to achieving the main objective.

About 70,000 tons of Canol freight moved down the Mackenzie River between 1942 and 1944, more than a third of the total freight reportedly hauled by surface transport for the entire project.¹³ This tonnage leaves out of account the bodies that had to be moved with the gear: the 2,600 troops, their officers, and 4,480 Bechtel-Price-Callahan people required for Canol work based in Norman Wells. As the Army Engineers and B-P-C made their way down the Mackenzie that first summer their people were sufficient to overwhelm the northern settlements along the way. In Fort Smith, "one looked hard for the natives."¹⁴ Nor does the record of river transport indicate the volume of freight moved by the military aircraft which soon appeared in the country. Moreover, among the cargoes fetched here and there were the odd bods and sods, who, during the dog days in Washington, headed for vicarious thrills in a region that was as exciting and "go" as a real theatre of war, although happily without its acute dangers.

Of the Canol freight travelling the water route, only some 21,500 tons of it got over the Smith-Fitzgerald portage and around the Slave

River rapids during the summer of 1942. The *Distributor* took the largest single load of freight down river, a half dozen barges loaded with 1,300 tons of gear.¹⁵ By an enormous effort, the Hudson's Bay Company, relying on its stern wheelers, moved fifty percent of the Canol freight from Waterways to Fort Fitzgerald that season, compared to the Army's thirty percent and the twenty percent carried "others". Inconveniencing its regular clients to do so, the HBC further moved sixty percent of the freight from Smith to Norman Wells compared to the Army's fifteen percent. But almost none of the freight reached its destination that year; 9,000 tons of it had gotten only halfway, and the rest was re-routed to the Whitehorse end of the operation once the War Department decided in the fall of 1942 to build the line from both ends at once.¹⁶

The freighting panic that Canol created on the Mackenzie water route made itself felt all the way to the Arctic coast. The HBC tug *Hearne Lake*, for example, left her Aklavik barges at Wrigley Harbour while she made two special trips to Norman Wells with Canol freight before starting for the delta, which she finally reached October 2. At this late date her skipper got mystifying orders to head upriver at once with one barge and the HBC store personnel. The *Hearne Lake* left Aklavik October 7, stranding many passengers and the transportation's own crews, some of whom had journeyed in from Tuktoyaktuk by schooner especially to make the trip Out.¹⁷

The success of the U.S. Army Engineers' adventure in freighting on the Mackenzie in 1942 is summed up in accounts of barge traffic during the next summer: Hudson's Bay Company shipments to Fort Smith were once more about normal. The Army and its contractor Bechtel-Price-Callahan, evidently handled nothing. But an American concern, Marine Operators, which seems to have been entering the picture the year before, moved 40,000 tons of freight from Waterways to the Wells.¹⁸

Natural hazards complicated the Army's problems of freighting its men and its gear to the scene of Canol construction. There were late storms, forest fires, and hordes of mosquitoes, blackflies, and bulldogs. The sandy soil of Fort Smith dissolved into quagmires in the rain. But the military authorities chose to ignore the knowledge about the country that already existed: the history of the Mackenzie's behaviour at breakup as experienced by HBC transportation personnel; the

destructive potential of Great Slave Lake in heavy weather, so familiar to towboat skippers; and the technique of laying gravel bedding on muskeg and permafrost, developed by the builders of the Hudson's Bay Railway to Churchill fifteen years before. *Ad hoc* solutions to problems further delayed the pipeline while new projects to solve the old problems spun off difficulties of their own. By October, 1942, the Army had strewn a good deal of heavy equipment along the northern water route and was broaching new schemes to move it further north.

In order to get as far north as they did during the summer of 1942, the Army Engineers resorted to impulsive measures that were routine for them when penetrating unexplored territory. For example, soon after their descent upon Waterways they caused to arrive by rail a number of 100-ton, 200-ton, and 300-ton prefabricated wooden barges which the troops then assembled, launched, and loaded at the rate of two or three a day. Later on, barges of steel appeared. In addition, the troops quickly hammered together rafts which they secured to old bridge pontoons. These they loaded with trucks, cranes, drums of fuel, and pipe, and attempted to push them down the Athabasca with small boats and kickers.

It seems probable that Marine Operators took over much of this shipping equipment the next year, along with the Diesel tugs the Army was importing from Missouri. Much of it remained in the north after Canol closed down; there it served a multitude of purposes for years to come. Two of the bridge pontoons were in the Mackenzie Delta until 1973. They were finally incorporated in a vessel of unorthodox design that listed so badly when launched in Boot Lake, Inuvik, that it was subsequently shipped out by barge and lowboy to find a safe harbour in Cardston, Alberta. The trader, Stan Peffer, eventually bought two Canol barges which he used to transport oil from Norman Wells to Aklavik each year from 1947 to 1965; he towed them with the diesel tug, *Alcan I*, a relic of Alaska Highway operations near the Nelson River and brought into the Mackenzie Delta via the Liard River.

The Army's notion that river freighting was simply a matter of successive inspirations required that the troops serve in the pinch as boat-builders, stevedores, and navigators. Their improvisations insured that there would be shipping losses. Several loads of pipe went down in the Slave River when choppy water swamped the pontoon rafts; another load of pipe sank in the Mackenzie near Green Island Rapids. A

dozen tractors and two motor graders on barges slid overboard in Great Slave Lake.¹⁹ Other reports, unconfirmed, tell of twenty-five cats lost from Army barges in a single disaster. During the summer, the *Prospector's* barge tow, cut adrift near Burnt Island in Great Slave Lake, lost a cargo of seven twenty-ton tractors, two bulldozers, and quantities of oil, gasoline, food, and other supplies, worth all together about \$250,000. When in September a salvage crew working from two barges attempted to locate and retrieve the lot, they very nearly lost their own cat overboard when a storm struck them. The crew abandoned its search until after freezeup, and then, having worked under the ice all winter, finally located and raised one of the tractors in April.²⁰ Only recently, another Canol tractor has been found and reefed out of the lake; discovered to be in almost perfect running order when dried out, it is now worth many times its \$10,000 value in 194

Besides expanding shipping facilities at Waterways, the Army Engineers set up their barge construction yard and road equipment depot on "The Prairie" nearby. They arranged to extend the railroad for the convenience of these works. Furthermore, until the first Can Camp, with its log cabins and woodstoves, came into being opposite Norman Wells, Waterways was the site of the base camps for the Army and Bechtel-Price-Callahan.

The messhalls and barracks at Waterways were the first of a multitude of camps built by the military and its contractors that were not mentioned in the prime contract for Canol. The summer of 194 also saw the proliferation of freight transfer camps which accommodated parties of troops at strategic locations along the water route: Fort Fitzgerald, Fort Smith, Slave Delta, Fort Resolution, Hay River, Wrigley Harbour, Fort Providence, Fort Simpson, Fort Wrigley, and Norman Wells. These lesser camps frequently had radio shacks, facilities for handling freight, and the details of men needed to prepare camps for freighting parties on the move. There is an eye-witness account of three of these ephemeral out-camps for freight-handlers. The men using the sawmill Snye camp near Fort Chipewyan were to hasten freight transfer across Lake Athabasca when the water level was discovered to be falling disastrously. "Res Delta" at the mouth of the Slave River associated with Fort Resolution was established to handle supplies freighted down river but unable to make an immediate crossing of Great Slave Lake. Wrigley Harbour on Brabant Island at the entrance to the Mackenzie River was a point for transferring freight from lake barges to river barges.²¹

Yet another extemporaneous establishment connected with Canol's freighting difficulties along the river route was the Peace River Camp. When it was clear in October, 1942, that freighting operations were far from complete, the Army Engineers moved troops from Waterways and Fort Fitzgerald to northern Alberta. There, while Army crews built another large camp, others explored for winter road locations in the country to the north, and Army and civilian tractor operators began training for the ordeal ahead by working out with their machines on the surrounding hills.²² The situation was inviting for frolic and detour.

A result of the Army's failure to manage shipping by the water route during the summer of 1942 was that the troops and Bechtel-Price-Callahan undertook extensive road making projects north of Peace River as a temporary expedient for moving more freight and supplies to Norman Wells. A preliminary venture in this line had been the portage roads, and they deserve mention first.

Two broad parallel roads materialized during the summer over the sixteen miles between Fort Fitzgerald and Fort Smith as the Army Engineers and their contractors improved the through-town street and existing portage roads so that these would better serve their ends. It was this twin portage which forest fires threatened during the summer of 1942. At first, the troops had only to truck cargo and drive equipment across the portage around the Slave River rapids. Then, as wooden barges became available for transport from Waterways northward, the men moved the bridge pontoons across to raft the freight further down river. Finally, as tugs and wooden and steel barges became more numerous upstream, the Army moved some of them to the lower section of the water route.

Meanwhile, since the portage traffic was growing bigger, heavier, and slower, the Engineers widened the roads and rebuilt the culverts. And because steel barges, when pulled by twenty-ton tractors, totally obstruct a roadway while making but a snail's progress, the crews cut interconnections between the portage roads at every mile along the way.²³ To the inhabitants of the district the Army's portaging achievements are memorable for the mountains of equipment and supplies heaped in the two settlements.

During the winter of 1942-1943, the construction of northern roads associated with the failure of river-freighting for Canol amounted to about one thousand miles altogether, according to witnesses before the

Truman Committee.²⁴ The most extensive of these was the Mackenzie Winter Road, principally the work of the stevedoring troops from Waterways and Fort Fitzgerald who had been transported to Peace River in the fall of 1942. Already there were eighty-five miles of provincial all-weather road and tractor trails between the Peace River and the mouth of the Hay. This intermittent road the Army Engineers and their contractors either improved or relocated. In so doing they made a permanent feature of the landscape of what came to be the Mackenzie Highway, now maintained by the Province of Alberta. They also cut a road from Alexandria Falls on the Hay River to the lower end of Mills Lake below Fort Providence, and they extended the whole system far into the north.²⁵

The Mackenzie River Winter Road took shape in four sections. The crews working on the first section, Army Engineers, pushed north with their cats from Peace River. Truck convoys and cat trains were moving along this section by December, 1942, although these were delayed in reaching their destination by unseasonal thaws and the lack of snow. Meanwhile, a civilian tractor crew bulldozed south from Norman Wells crossing the Great Bear River on the ice and continuing through a "unmapped" region — or so they thought — fifty or sixty miles inland from the east bank of the Mackenzie.²⁶ The stretch from Norman Wells to Fort Norman, however, was already an all-weather road. It was the "ancillary" of the oil development phase of Canol; Canada's Cabinet War Committee learned of it in October, 1942, when it was a *fait accompli*.²⁷

A third party building the Mackenzie River Winter Road was another Army crew working out of Fort Simpson. The fourth crew, civilian, progressed north from Mills Lake. On February 24, 1943, cats from north and south met at Blackwater Lake where their roadway is still visible and sometimes used. The cat trains followed with freight, namely, fuel, knocked-down camp buildings, lumber, machinery, repairs, and, of course, oil drilling equipment. The trains kept moving toward Norman Wells until mid-April, although increasingly they were grinding through mud.

Between February and late April of the same winter the Army pushed through the Fort Smith-Hay River Trail for hauling the equipment stranded in Fort Smith and now needed to make the road from Norman Wells. Thus, the trail was a spur to the main winter road. It is now a territorial highway.

A third road-making effort benefiting Canol Project was the Slave Lake Winter Road, running the 220 miles from Slave Delta near Fort Resolution to Mills Lake. Tractors pulling sledges hauled 2,200 tons of pipe along this ice road down the lake and across the low country to a point where, after breakup, the barges could pick up the pipe and move it on down to Canol Camp. The evident purpose of the lake road was to avoid the delays of the normally late breakup on Slave Lake; it is a sign that the minds applying themselves to Canol's freight were at last thinking in advance about some well-known local conditions. Some of the work of making the lake road, however, fell to sub-contractors among the local people. Bechtel-Price-Callahan also hired a crew to cut "tunnels" through the pressure ridges criss-crossing the lake, and which, being sometimes twenty-five feet high, obstructed the machines hauling pipe. The same crew also laid log bridges across the open water that appeared in the pressure cracks. The drivers who followed later, when the water had frozen again and expanded, sometimes found the bridges several feet above the roadway.²⁸

Altogether, these new roads allowed about nine thousand tons of freight to reach the Canol site on the Mackenzie by the spring of 1943. But there is a fourth road which added at least 225 miles to the roadways cut through the north country at this time: The Fort Nelson-Fort Simpson winter road running almost directly from the Alaska Highway to Fort Simpson through what is essentially the western branch of the Mackenzie Basin. Although its origins are uncertain, it apparently had to do with contractors seeking alternate routes into the north. A map published by Trevor Lloyd indicates that it was made during the winter of 1942-1943, just after completion of the pioneer road for construction of the Alaska Highway.²⁹ But it may have come into being the following winter; by then the Canol people would have realized that a direct winter route overland could circumvent some of the nastiest hazards and annoying delays of the Athabasca-Mackenzie water route. Cat trains using this trail could put freight on the shores of the Mackenzie ready for barging directly to Norman Wells as soon as the ice in that part of the river went out in the spring.

Construction of the Alaska Highway effectively opened this "back door" into the Mackenzie Valley. The work on the Highway not only facilitated a winter road to Fort Simpson for the first time. It also

encouraged the resumption of the scow and barge traffic on the Nelson and Liard Rivers which had lapsed since 1929. By 1946, two separate companies, Streeper Brothers and Ed Cooper, were in the shipping business along the four hundred miles of river between Fort Nelson and Fort Simpson.³⁰ How much of Canol's own freight actually travelled the new winter road through the same country is apparently unrecorded.

This is a convenient place to mention still a fifth road in the Canadian northwest, one in which the highest brass of the U.S. War Department had an absorbing interest during Canol's first year. What this road had to do with activities conducted under the aegis of Canol is obscure. In December, 1942, the U.S. sought from the Permanent Joint Board on Defense the authority to undertake surveys for a road to the Yukon from the Mackenzie River near Aklavik in the delta. The road was to have followed the Husky-Peel Channel and the East Rat river upstream, continuing through the Richardson Mountains by MacDougall Pass, locally known as Rat Pass, and descending on the other side by the Bell and the Porcupine, presumably to Fort Yukon. At the next meeting of the Joint Board a month later, the Canadian members approved surveys for this road.³¹ This was a transcendent honour never accorded to Canol itself under its original or renegotiated terms.

The Rat Pass Road never materialized. When and how the authorized surveys were made, does not appear in published accounts. Had the subject arisen in sessions of the Truman Committee it was erased from the record along with many other matters. The Rat Pass Road is one of the inexplicable anomalies of prolific Canol. Why Canol's master minds should turn their attention to the far northern reaches of the Mackenzie River when they had not yet got their pipe and pipeliners as far as Norman Wells remains a mystery with overtones of the ludicrous.

Canol's publicists boast that to achieve their goal of moving Norman Wells oil over the mountains the U.S. Army Engineers and Bechtel-Price Callahan pioneered more miles of road and "carved out" more air field than did the builders of the Alaska Highway. The miscellaneous construction projects devised to get the pipe to the scene of installation on the Mackenzie River are but a foretaste of the multiplication of works under the name of Canol Project. An exciting unpredictability characterized Canol's proliferating affairs so that the Army and its contractors did not complete Canol pipeline and its multifarious

Footnotes

1. Richard Finnie, *CANOL, The Sub-Arctic Pipeline and Refinery Project Constructed by Bechtel-Price-Calhan for the Corps of Engineers, United States Army, 1942-1944* (San Francisco: privately published, 1945); Trevor Lloyd, "Oil in the Mackenzie Valley," *Geographical Review*, XXXIV (1944), 275-307; Truman Committee, U.S. Congress, Senate Special Committee Investigating the National Defense Program, *The Canol Project*, Part 2: Sept. 11 - Dec. 20, 1943 (Washington: U.S. Printing Office, 1944), XI, 9287-9935; S.V. Dziuban, *Military Relations between the United States and Canada, 1939-1945* (Washington: U.S. Government Publications, (1959-1960); G.P. Stacey, *Arms, Men and Governments: The War Policies of Canada, 1939-1945* (Ottawa: Queen's Printer, 1970).
2. *Oilweek*, Oct. 6, 1975, p. 11.
3. Finnie, *CANOL*, 1-2. For the efforts of the Canadian Government to discover and keep abreast of unauthorized developments related to Canol, see the monthly reports of Major-General W.W. Foster in *Reports of the Special Commissioner for Defence Projects in North-western Canada* (Public Archives of Canada, Ottawa). RG 36/7, IV, V, and VI; on problems of land acquisition in particular, XII. I am indebted to J.M. Whelan, Carl Vincen and Gilles Langelier of the Public Archives for their help in searching out this material.
4. Lloyd, "Oil in the MacKenzie Valley," p. 279.
5. Stacey, *Arms, Men and Governments*, p. 384.
6. Truman Committee, *The Canol Project*, p. 9364; Dziuban, *Military Relations*, pp. 232, 233; Earle Gray, *The Great Canadian Oil Patch* (Toronto: McLean-Hunter, 1970), p. 79. The subject of Canol's costs is more fully treated in P.S. Barry, *Three Episodes in the North: History of the Pressures of Industrial Development on the Environment of Northern Canada*, an unpublished report in 3 vols. (I. Beaufort Sea Whaling, II. Canol Project, III. DEW-Line) (Calgary: Northern Engineering Services, 1974), II, pp. 7-9.
7. Quoted in the report of his address before the Canadian Construction Association, *Financial Post*, May 26, 1973, p. C-9.
8. Dziuban, *Military Relations*, pp. 199, 288-289; Finnie, *CANOL*, pp. 4, 108, and "U.S. Army Taps Canadian Oil," *World Petroleum*, XIV (Nov. 1943), pp. 32-36, 66; "Canol Pipeline an Historic Building Job," *Edmonton Journal*, April 8, 1975, p. 8.
9. Finnie, *CANOL*, p. 7.
10. *Ibid.*, p. 4.
11. Dziuban, *Military Relations*, p. 222.
12. Lloyd, "Oil in the Mackenzie Valley," p. 280.
13. *Ibid.*, p. 286; Truman Committee, *The Canol Project*, p. 9360.
14. C.H.D. Clarke, *Development of the Reindeer Industry, Mackenzie District*, report to the Director, Lands, Parks, and Forests Branch (Ottawa: unpublished, 1942).
15. Finnie, "U.S. Army Taps Canadian Oil."
16. Lloyd, "Oil in the Mackenzie Valley," p. 286.
17. Clarke, *Development of the Reindeer Industry*, p. 7.
18. Lloyd, "Oil in the Mackenzie Valley," p. 286.
19. *Ibid.*, pp. 282-286; Finnie, *CANOL*, p. 6.
20. William Stephenson, "Northern Salvage," *Beaver*, 276 (Sept. 1945), pp. 36-39.
21. Lloyd, "Oil in the Mackenzie Valley," pp. 286-287.
22. Finnie, *CANOL*, p. 42.
23. *Ibid.*, pp. 19, 23; Lloyd, "Oil in the Mackenzie Valley," pp. 282, 286, and photos.
24. Truman Committee, *The Canol Project*, p. 9363. See also *Reports of the Special Commissioner*, XL.
25. Finnie, *CANOL*, passim, and "U.S. Army Taps Canadian Oil." Cf. Dziuban, *Military Relations*, p. 232, where he says that the winter road from Peace River was not used after the winter of 1942-1943. In April, 1946, the Canadian Army's Exercise Muskox travelled the Mackenzie Winter Road south from Fort Norman to Fort Simpson, and the Fort Nelson-Fort Simpson Trail (mentioned below), to reach the Alaska Highway. For a brief account, see Fred Way, "Exercise Muskox," *Beaver*, 277 (June 1946), p. 4.

