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The Prolific Pipeline:

Finding Oil for Canol

Although the Canol Project of World War II was absurdly small compared to the stupendous works envisioned for Canada's northwest today, the circumstances surrounding the building of its pipeline and the development of its oil supply provide useful insights into the potentialities of further pipeline construction in the Mackenzie Valley. The most instructive aspect of Canol as a pipeline project is not its technology, which was often simple, nor its "environmental impact", scarcely worth notice, but the manner of its proceedings, which illustrates the phenomenon of expansion as a working principle in northern undertakings.

The bold assault on the wilderness that Canol seemed to be more than thirty years ago excited nearly everybody who had a hand in its affairs. The very name of Canol, coined from the words "Canada" and "oil", subtly conveyed the thrill of challenge and conquest. As conceived by the United States War Department in the spring of 1942, a four- to six-inch pipeline would penetrate nearly six hundred miles of uninhabited northern mountains to carry crude oil and product from Imperial Oil's remote Norman Wells oil field on the Mackenzie River to a refinery at Whitehorse, Yukon (Fig. 1); there the fuel would be accessible for military traffic on the Alaska Highway and the Northwest Staging Route, key operations in the twin strategies of delivering war planes to Russia and repelling a Japanese invasion of the continent. Canol was thus important to the defence of the northwestern coast of North America and to the success of the Allies in the global conflict. It was an heroic endeavour amid attractive hardships.

To persons required to sort out its intricacies, however, the essence of Canol was its profusion of supplementary projects. Among those who saw Canol as a nurturing of manifold works and schemes was the anonymous author of a memorandum for the Canadian authorities

meeting with a delegation from Washington in December, 1943. His itemization of five authorized works of construction for Canol is followed by a list of some forty other works, including roads, wharfs, refrigerated warehousing, fueling stations, and aerodromes, for which there was no authority whatever.¹

Another Canadian who was thoroughly acquainted with Canol's essential nature was Major General W. W. Foster, who, a year after the project began, became the Cabinet War Committee's Special Commissioner for Defence Projects in the North-West, a post created to provide effective Canadian control over American activities in the region, and protection for Canadian sovereignty.² General Foster's most urgent task when he reached Edmonton on May 24, 1943, was to determine what the U.S. War Department, the U.S. Army Engineers, and their contractors had been doing during the past year in the huge portion of Canada that separates Alaska from the western states. The Special Commissioner's monthly reports to Ottawa for the next two years run to fifteen and more sections apiece, each dealing with a different aspect of American military operations. Canol, as an adjunct of the Northwest Staging Route, was more or less entangled in every one.³

Canol conformed to the pattern of intricate branchings that created in western Canada what a U.S. military historian described as a "hydra-headed monster". To Colonel S. W. Dziuban, the author of an American account of Canadian-U.S. military relations during World War II, the intertwining growth of Canol, the Alaska Highway, and the Staging Route resulted from a "geographic extension" of the existing military bureaucracy in answer to the needs of war.⁴ But Canol had too little of the bureaucratic taint to warrant such a judgment. Quite the opposite was true: when it suited them, which was often, the prime movers of the project treated protocol, red-tape, and legal process with an abandon verging on contempt. Moreover, before its one-sided collapse in Canada in the spring of 1945, Canol by itself generated impressive projects that were connected with the Alaskan defence apparatus only in the remotest sense.

The conduct of oil exploration and production that flourished exuberantly in the Mackenzie Valley under Canol's banner furnishes no real exceptions to the persistent theme of expansion to be found in the project's other works. Like the river freighting and roadbuilding intended to get men and materials to the starting point of pipeline construction on the Mackenzie River; like the installation of numerous landing facilities for the wheeled aircraft that were supposed to expedite Canol's affairs; and like the pipeline itself, which eventually reached the Pacific

coast at Skagway, the heart of Alaska at Fairbanks, and the deep interior of the Canadian Rockies at Watson Lake, the business of developing the Norman oil field swelled prodigiously. In its fullest flowering, even as events were foreshadowing its demise, Canol's oil development programme reached all the way into the Mackenzie Delta, splendidly demonstrating the power of expansion to redefine the character of northern works.

Canol's surface transportation, aerodromes, and such anomalies as its pipeline branches are the subject of separate essays now in press. This account deals only with the mysteries of getting the project's oil from the ground.

The flow of crude oil originally specified for Canol Project was three thousand barrels a day, which was also to be the capacity of the pipeline through the mountains and of the refinery in Whitehorse. A War Department memorandum on April 30, 1942, authorizing the Army Engineers to undertake construction, set a deadline for completion of the project five months hence. The order required that, for military production, Standard Oil of New Jersey (Exxon) should drill at least nine new wells on the Mackenzie Valley leases of its subsidiary, Imperial Oil Limited, where three producing wells were then yielding only two hundred barrels a day, enough to supply local customers. Such were the conditions under which the search for oil began.

It is comforting to discover that the logistics of this phase of Canol — finding oil — did not fare at all badly from the start. With remarkable promptness, even as the troops were toiling through bugs, forest fire smoke, and rain to get the pipe and other necessities down the Mackenzie, drilling had begun at Norman. During the river freighting panic, quite obviously, the rigs went first. Crews from Turner Valley, Alberta, were on hand at once. They completed the first new well July 15, 1942. It was a producer.⁵

Canol's first well was the auspicious beginning of an enterprise that prospered for three more years. By the end of September the busy crews had drilled more than a dozen other producing wells. By the end of December they had drilled at least sixteen successful wells, all of them shallow flow wells around the original Discovery Well where oil lay only eighty-five feet below the surface, just under the permafrost.⁶ These wells yielded about 8,500 barrels of oil a day, bringing the 1942 production at Norman Wells to 52,000 barrels more than 1941.⁷

Oil flowed abundantly, and the crude needed for the war was assured by the end of Canol's first year, long before the Norman Wells to Whitehorse pipeline was completed and the refinery ready to receive the

oil. Indeed, the refinery site was yet to be cleared, and effective work on the Norman Wells end of the pipeline would not begin until the following September.

Nevertheless, during the rest of the winter cat trains from Peace River were hauling more oil rigs to Norman. In the spring of 1943 drilling resumed. It continued throughout the summer and into the fall. That year all but four of the wells drilled in 1942 were deepened to the thousand foot levels. The reason for re-drilling, the company explained later, was that Imperial's geologists could not at first recognize the true character of the reservoir rock they had tapped.⁸

In October, 1943, 105 "well days" at only ten wells produced more than 23,000 barrels of oil, an average of 220 barrels a day for each well. Of twenty-six wells that the company said it had completed by November, 1943, twenty-three found oil, and estimates of crude production capacity reaching McGill University's Trevor Lloyd ranged from 7,500 to twenty thousand barrels a day.⁹

Needless to say, there was a good deal more oil than the pipeline-to-be could carry to Whitehorse, more than the refinery there was supposed to refine, discrepancies which had not escaped the notice of either General Foster or the American Senators investigating Canol. At the rate required for its stated needs, the Army could now count upon a thirteen-year supply of oil. Yet eighty percent of the oil was still coming from wells drilled on the original leases held by Imperial since 1920.¹⁰

Still the drilling went on. The crews sank another thirty wells in 1944. There were now sixty-two "completed" new wells, fifty-six of them flowing oil. In 1945 there was more drilling yet, but by then the Canadian government had taken over. Altogether, from 1942 to 1945, the years of Canol activity in the Mackenzie Valley, Imperial Oil drilled or completed a reported eighty-three wells in the Northwest Territories.¹⁴ Eighteen of these were on Bear Island alone. Goose Island was likewise punched full of holes. One of the best wells produced a thousand barrels of oil in twenty-three hours, fully a third of Canol's daily needs, while another flowed 875 barrels in nineteen hours after special acid treatment to enlarge the pore space of the rock.¹¹

Such intense and protracted activity in the Norman field leaves no doubt that some high-powered minds had changed their thinking about what Canol was supposed to be. Eighty-three wells are not exactly the same thing as a minimum of nine.

But ritual mystifications of the times obscure details of the hunt for Canol's oil. Even the U.S. Senate's Truman Committee investigation of Canol during the latter months of 1943, a widely publicized affair con-

ducted by friends of "domestic" oil producers and coal interests, held certain sessions behind closed doors and deleted most of the testimony about the oil field from the published record. Especially were maps of the country considered confidential.¹²

As a matter of course Canadian officials assisted in maintaining security in northwestern Canada. General Foster, reporting to Ottawa in July, 1943, noted that, although road control operations were functioning smoothly on the Alaska Highway and seaborne coastal traffic was under control, there were "difficulties" with unsupervised passenger traffic. "It appears necessary," he wrote in his recommendations, "to eliminate undesirable or unnecessary travel." He asked that the Alaskan Road Control Board be empowered to plan supervision of river travel in a country that included, not only the Yukon River, but the Mackenzie from its upper reaches in the Liard-Nelson and Athabaska systems to its delta at the Beaufort Sea. Four days later the Cabinet War Committee "approved in principle" General Foster's recommendations. By October he was looking forward to a conference about regulating travel in the north by air.¹³

In the north, civilians and servicemen alike were impressed with the idea that access to the country was closed to all but the military, its contractors and their workers, and authorized Canadian civilians. In October, 1943, Premier William Aberhart of Alberta handed General Foster a complaint about attempts of the U.S. Army to extend military law to Canadian citizens in the Peace River Block. "As an officer in the Canadian Reserve Army," H.E. Winch had written to the Premier, "I am well acquainted with military law . . . it very emphatically states that judicial authority as regards civilians is to be used at all times. . . . Apparently the American army law goes a lot further."¹⁴ A morbid fear of spies induced northerners to regard each other with suspicion. Trappers in Aklavik appointed themselves to keep a secret watch on a neighbor who, except that he was German-born, was no more unsavory than they. This gentleman lived out the war in a community bristling with loaded deer rifles that could at any time blow his head off.

So rigorous was the proscription of the oil country and information about it that the unannounced arrival of two independent prospectors in Norman Wells during the summer of 1944 aroused alarm and indignation. J. Webb and Gus Echternach, representing, they said, the Anglo-Canadian Oil Company of Calgary, and enroute to Fort Good Hope where they intended to prospect by canoe, rashly asked for a night's lodging at Imperial Oil's hotel before heading on down the river in a float plane.

"Their right to come in here, stay at this hotel and to prospect for oil and gas was challenged by Major Westling," wrote General Foster's liaison man in Norman Wells. "I am surprised that C.P. Airlines do not ask for credentials before issuing tickets for this region, or confer with your office if there is anything irregular."¹⁵

General Foster himself had trouble persuading Canol's commanding officer, Brigadier General L.D. Worsham, to give him certain geological data for his reports. When the issue came up at a meeting of U.S. and Canadian officials in Ottawa on December 2, 1943, the representatives from Washington agreed to authorize the release of the information to the Canadian government, insisting at the same time, however, that it be withheld from private concerns as well as from the press. The next day, Canada's special governmental panel on joint defence construction projects circulated a memo on the subject noting that, military secrecy notwithstanding, Canadian regulations required Imperial Oil to make all data available to the Department of Mines and Resources.¹⁶

In its passion for secrecy the War Department was counting on the effects of melodrama to legitimate its extraordinary interest in Mackenzie Valley oil. The original military objective in developing Canol, that is, to build an "unsinkable tanker" safe from the enemy's reach, belies the need for such security measures as the Army chose to impose. The Japanese situation in the Aleutians was already mitigated by August, 1942. The Pacific coast "tanker crisis" never materialized, so that gasoline flowed in steadily to Whitehorse from the Skagway end of the line. Then, too, the Mackenzie Basin had been generally recognized as a rich oil reservoir since 1888. At that time a Select Committee of the Canadian Senate inquiring into the resources of the north described the Mackenzie Country as "the most extensive petroleum field in America if not in the world." Ranking it among the chief assets of the Crown in Canada, the Committee recommended reserving a tract of forty thousand square miles in which to do extensive exploration and testing. Dr. Robert Bell, an assistant director of the geological Survey of Canada, prepared the map of mineral resources which the Committee published with its report. Thereafter, numerous reports by the Geological Survey described and mapped the region. "Given the need for oil and the capital to undertake the work," Dr. Lloyd wrote in 1944, "the oil field, long suspected to exist, could have been uncovered at any time between 1920 and 1942."¹⁷ The obsessive secrecy of the War Department about it, therefore, seems almost inexplicable, apart from considerations of politics back home.

In spite of precautions, news of Canol's bonanza leaked out. Soon after the first contracts for the project were signed Imperial Oil's manager at Norman Wells told Richard Finnie, a publicist for Bechtel-Price-Callahan, one of the Army's prime contractors, that he was sure that at least 5,000 barrels a day could be brought in should new wells be sunk. Mr. Finnie quickly passed the information on in *The Geographical Review*.¹⁸ The general public first learned of Canol during the summer of 1943, but few details of the oil development emerged in the popular press until after the Truman Committee hearings began in September. It was at this time that Lieutenant General Brehon B. Somervell, Chief of the Army Service Forces, attempted to justify the cost of Canol, supposedly \$134 million, by acclaiming the Norman field as the greatest oil find in North America in fifteen years."

In October, Dr. Theodore A. Link, Imperial Oil's supervising geologist at Norman Wells, carelessly overstepped rules regarding publicity about oil in the north country. He informed the *Edmonton Bulletin* that "we now have producing wells that will supply double the amount required for the pipeline needs. We had sufficient oil a year ago last September. . . ." He added that there were then about fifty proven wells in the Norman Wells vicinity, about twice the number that the company had reported to Canadian officials.¹⁹ Finally, in January, 1944, Professor Lowell R. Laudon, head of Kansas University's geology department, who during the previous summer had prospected Oscar Creek, Imperial River, and Great Bear River with an Imperial Oil exploration team, described for the world at large an oil find of almost unlimited proportions. "We found oil reservoirs a hundred times as big as we thought prevailed," he announced in *The New York Herald Tribune*. As far as he knew, there were no dry holes.²⁰

The truth is that the U.S. Army brass in charge of Canol had been seized with a wildcat fever and were bent upon finding all the oil the country would yield. For the most part they concealed their lust behind the rigamarole of security and the war effort, but in difficult moments they boasted about their perspicuity and luck. As one of Canol's most enthusiastic promoters and the man whose orders had brought the project into being, General Somervell defended his actions by telling American Senators that the development of Norman oil would yield fifty-eight to a hundred million barrels of crude. At the time, it seemed like quite a lot. Robert B. Patterson, Under Secretary of War, echoed the general's prediction when he explained to the Senate that the Army's "bold and prompt action in the dark days of '42" had led to the oil discovery in the first place. By the time delegates from the U.S. War

Department met with Canadian officials in December, 1943, to seek a "more equitable" arrangement for the Mackenzie Valley oil, the reputed size of the discovery had grown by half. There were 150 million barrels of recoverable oil, according to the U.S. delegates, who thereupon argued that American taxpayers ought to receive a just return for their pioneering investment.²¹

To the oil company such ecstatic outbursts were the naive exaggerations of amateurs in the oil business. In the beginning when the war chiefs had consulted them about Norman oil prospects Imperial Oil's experts had expressed solemn doubts that even the initial requirements for Canol could be met. Standard Oil of New Jersey, parent of Imperial Oil, was constrained to minimize the discovery in a statement handed out at the Senate committee's hearings. The Norman oil find perhaps would exceed thirty-five million barrels, the company said, but that was the size of an ordinary large U.S. oil field. Anyhow, not all of it was accessible.²²

Behind the War Department's and the oil company's disparate statements lay the irrefutable fact that there had been a sufficient show of oil at Norman to stimulate the speculative instincts of Canol's masters in Washington. As soon as their initial requirements seemed likely to be met with ease, they revised their urgent needs. Oblivious to the unpleasant implication that the Northwest would need a military presence after the war, they bethought themselves of their peacetime demands in the region. Their goal became twenty thousand barrels of oil a day, and they conceived an ambitious programme of exploration and wildcatting which they convinced each other was necessary to get it.²³ With their horizons rapidly widening, they now yearned to finance oil exploration and drilling in all of the north country as far as the Mackenzie flowed.

The War Department began as early as November 24, 1942, the day it signed a supplementary contract with Imperial Oil, to enlarge the scope of the search for oil in northwestern Canada. A month later American diplomats approached Canadian officials about renegotiating the agreements covering development of oil. Originally, Imperial Oil had held leases in the Norman area on only 3,400 acres of land. About two weeks after the Army Engineers signed the original Canol contracts, and before the Canadian government had assented to the plan, P.C. 4140 had providentially set aside a petroleum reservation for Canol comprising all the territory within fifty miles of the Discovery Well at Norman (Fig. 2). By the simple expedient of not granting further permits the Crown restricted prospecting and drilling rights on some five million acres to the nominee of the U.S. government, namely Imperial Oil.²⁴

Now the diplomats were asking Ottawa's blessing on a scheme for further expansion. As an ally in the war, Canada was obliging. In a treaty arrangement Ottawa agreed to set aside for Canol's purposes an area bounded on the north by the Beaufort Sea, on the east by the 112th Meridian, on the south by the Sixtieth Parallel, and on the west by the Alaska boundary (Fig. 1). It was an elegant refinement in the line of expanding northern works.

At the same time Canol rose in the hierarchy of things military. The project now came under the purview of the august Northwest Service Command and had a chief of its own of equal rank. A brigadier general replaced the mere colonel who had been Canol's commanding officer. General Worsham took charge of Canol in Edmonton at just the time negotiations began in Ottawa to enlarge the project's realm.

There was also talk of laying a larger pipeline alongside the smaller one that was still not completed. The Whitehorse refinery, for which the machinery was yet to arrive from Texas, was redesigned for an output of twenty-thousand barrels a day. The War Department, however, agreed to make the crude its property at production battery tanks on the Mackenzie instead of at the Whitehorse terminal. Since the customer was thus willing to accept "line losses" that always occur in the transfer of oil, and was furnishing the storage facilities besides, oil tanks began to appear in numbers at Norman Wells and Camp Canol, in addition to those already rising up at Whitehorse. Meanwhile, a few of the flowing wells were capped. General Foster did not exaggerate when, in the summer of 1943, he said that he found the situation at Norman "rather ambiguous".²⁵

During the negotiations for the expanded tract of country in which to turn its wildcatters loose the War Department had grown anxious about the hazards of "nuisance staking". A series of diplomatic notes sought to prevent the intervention of "anyone whose interest is not identical with that of the Canadian Government or of the United States Government." Evidently the Privy Council regarded Imperial Oil as having the requisite identity of interest, for its new regulations continued the previous restrictions on prospecting and developing oil. Permits would be granted only to Imperial Oil Limited.²⁶

There were now about five hundred million acres on which Imperial Oil alone was supposed to look for oil. All of the Yukon Territory and the western portion of the Northwest Territories, roughly seven hundred thousand square miles of inscrutable bush, had become an exclusive wildcatting domain, protected from intruders by the U.S. Army, and sanctified by the will of Canada. All of the exploration and drilling for

which the American military longed could now take place, with the U.S. Treasury paying for the work in a region about twice the size of Texas. At the time, it must have seemed a magnificent fiefdom in the tradition of the railroads and the Company of Adventurers into Hudson's Bay. If it proved to be a will-of-the-wisp it was not the Army's fault.

The smoothly integrated figures concerning wells and their production, most of which derive from company reports, fail to convey in all its fascinating detail a clear picture of what took place in the huge wilderness that had now become Canol Country. Nor do published accounts and the public archives manage to resolve entirely the contradictions that sprang up in the atmosphere of dire emergencies and momentous secrets. Nothing in the record accounts for the enthusiasm with which General Somervell and his cohorts vigorously pursued a few of Canol's objectives while letting others limp along. Nothing explains how, in a country swarming with geologists and leaking oil from the very river banks, Canol's wildcatters managed to avoid striking oil, except on the original leases. It is still uncertain, too, which description of the 1943 oil reserve is the true one, that agreed upon by international treaty, or the one in P.C. 1138, February 12, 1943, and P.C. 2447, March 6, 1943, which set the eastern boundary only seventy-five miles east of the Mackenzie River (Fig. 1).

In seeming chaos, however, there are perceptible traces of logic; among the confusions several certainties appear. It is no longer a secret that Imperial Oil carried on extensive surface exploration reaching as far as the Mackenzie Delta. Some geological exploration began near Norman Wells in 1942, but in April, 1943, Dr. Link was organizing thirty-six geologists into three-man teams for a methodical search of outcrops from the lower stretches of the Liard and North Nahanni rivers north to the Arctic Red and the Peel. Still another party explored the Nelson and Liard rivers from Fort Nelson, B.C. to Fort Simpson. IOL's demand for geologists swept out the senior class of the University of Alberta's Department of Geology, which could make up only a third of the quota of trained men needed for the season. Float planes supplied by the U.S. Air Force lifted the men with their canoes and Army rations close to the headwaters of creeks, whence they made their way downstream, mapping and picking rocks. By these means, they completed the surveys of thirty-five separate areas by the end of 1943, covering nearly every significant creek bed and river bank as far north as Aklavik. Meanwhile a seismic reflection crew made up of U.S. Army officers and enlisted men, with a civilian as their party chief, worked the muskeg across the river from Norman Wells and explored along the Mackenzie.²⁷

The deep interest of the War Department in the results of surface exploration was reflected in the person of Geologist Sidney Paige, known as "Somervell's hatchet man", whose function was to ease relations between civilian scientists and the military men on the scene at Norman Wells. An informal system of "honorary" ranks evolved by which the Army's officers and men learned to recognize the relative importance of civilians and the priority of their work. Dr. Link was a "colonel".²⁸

Not so well known as the geological and geophysical surveys is the photogrammetric survey made for Canol's purposes of the whole Mackenzie basin. Washington deemed inadequate the air photographs the Canadian government had made in 1930 of a ten mile wide strip following the Athabaska-Mackenzie water route. To remedy the situation the Army Air Force dispatched seven bombers equipped with trimetric cameras to photograph a two hundred mile wide belt of north-western Canada, beginning at a point about fifty miles north of Edmonton and ending at the Arctic Ocean. Parallel flights were thirty miles apart, with diagonal flights between the parallels at every one hundred miles. Additional flights "meandered" all the main rivers. Within the space of a month some thirty-four thousand photos were taken of the Mackenzie Basin, representing 160,000 square miles of the oil country to be explored.²⁹

It is not generally acknowledged that this survey took place at all. Daniel H. Gee, the cadastral engineer who published the only article on the subject, is under the impression that it happened in 1943. Actually the flights began in April, 1942, while the Army was still finding reasons to undertake Canol and before Parliament had been notified that the project was afoot.³⁰ Mr. Gee also believes that the sole purpose of the Air Force in photographing the region from the air was to help choose a route for the pipeline through the mountains. Yet the course of the bomber transects he describes was perpendicular to the pipeline traverse. Later on, prints of the Air Force's photographs were assembled with pictures eventually taken of the country between Norman Wells and Whitehorse, but when Mr. Gee and his colleagues were converting the whole collection into a polyconic projection map of the north the pipeline route had already been selected.

General Worsham touched upon a cogent reason for the photogrammetric survey of the oil country when he was answering the Truman Committee's questions about Canol's oil exploration. "We had aerial maps taken of a portion of the area," he said, "to get surface indications from a photograph."³¹ The photographs he spoke of were prior to the maps, and the pictures made by the Air Force were available at the time of the War Department's negotiations to enlarge the oil reserve.

The air photographs of the Mackenzie Valley were also available for the exploratory work by geologists in the spring of 1943. The efficiency with which the surface explorations were conducted suggests a campaign planned well in advance on the basis of an intimate aerial overview of the whole terrain. The compilation of reports on Canol's oil exploration, which was eventually published in 1945, draws heavily on a close examination of the country from the air. Descriptions of major structural features of the Mackenzie Basin mesh details obtained from exploratory drilling and exploration on the ground with those that can be read from aerial photographs alone. The description of the Arctic Red River anticline explicitly refers to aerial photographs. A.W. Nauss's account of the plateau in the Richardson Mountains depends entirely upon an aerial view, an indication that surface exploration stopped short of Aklavik although the photogrammetric survey went further on. Air photos illustrate the entire work. Through a regrettable lapse of scientific courtesy *Canol Geological Investigations* neglects to thank the Air Force for its cameras and bombers.³²

In the matter of mapping by air, the pipeline did not receive the same consideration as the oil exploration did. It was not until June 6, a month after Canol was under way, that a single aircraft made a hurried reconnaissance between Norman Wells and Whitehorse. This flight was the basis of an abortive attempt during July and August, 1942, to strike a pipeline route west through the muskeg to the Carcajou River from a point seventeen miles downstream from Norman Wells. Two months later, at about the same time that Canadian Pacific Air Lines took a block of some one thousand pictures in the vicinity of Norman Wells, the Aero Service Corporation of Philadelphia began photographing the country that the pipeline was supposed to cross. Only this set of photographs had any bearing on the labours of Guy Blanchet's snowshoe and dogteam parties who during the winter of 1942-1943 were still seeking a way for the pipeline to cross the Mackenzie Mountains.³³ In short, the War Department intended the photogrammetric survey by the Air Force only for what it thought the most vital of Canol's works. Despite what Mr. Gee and countless other people thought, the pipeline, in the military view, was really incidental to the exploration of the oil field, and not the project's crucial phase.

Other confusions about Canol's oil exploration turn upon the language of the oil business. Statements about exploratory drilling are sufficiently inconsistent to suggest that Imperial Oil was doing one thing and the Army something else, but inferences to that effect may be far from truth.

Close to the hearts of the Army brass, the very motive spring of their infatuation with the north, was the activity they called "wildcatting". Once the decision had been made to expand the territory of exploration and to supplement Imperial Oil's contract, the Army hired its own wildcatters. An American firm, Noble Drilling Company, received a contract to drill one hundred wildcat wells. True to form for Canol, these wildcats continued to multiply — at least on paper — for the Truman Committee also brought to light an Army directive ordering the wildcatters to proceed with two hundred wells.³⁴

How much of this drilling was actually accomplished depends in part upon what a wildcat is. A good deal that sifts through from the Army reflects the popular notion of wildcatting as akin to gambling, a random stabbing about the countryside with a gusher blowing at nearly every jab. Oil company reports on wildcat wells, on the other hand, exude sobriety and caution. The two points of view invite the supposition that there were two kinds of drilling, effective and capricious, and that either sort might be styled a wildcat. A more precise definition is not easily come by, even on the authority of Imperial Oil, for the company itself gave the word contradictory meanings in its information on Canol's wells. Sometimes wildcats were the exploratory wells which helped define the Norman oil field; sometimes they were wells drilled outside the Norman pool, as distinct from others drilled within. In sum, company parlance makes of the Canol wildcat a paradox, a thing which defines the very thing defining it.

The circularities of oil company language aside, a full account of Canol's wildcatting depends, first of all, on the kind of drilling Imperial Oil did itself. That IOL was wildcatting in one sense or another is plain enough from what it told Canadian officials in April, 1943, about the drilling projected for the season. In addition to drilling twenty-six wells in the Norman pool and deepening four others drilled in 1942, IOL intended to drill eight wells "outside of the Norman Wells pool" in "wildcat areas". Furthermore, of the eighty-three Imperial wells drilled in the Northwest Territories between 1942 and 1945, as reported in *The Schedule of Wells*, twenty are what the company designated "wildcats".³⁵

A second point to be clarified about the Canol wildcatting programme is the relationship of Noble Drilling to Imperial Oil, a matter which is murky at best and which the American Senators made still more problematical by their habit of asking buckshot questions. Army spokesmen were usually careful to distinguish the two companies from each other. Of the twenty-six new wells drilled at Norman, they told the Senators,

Imperial had drilled twenty-five and Noble only one. General Worsham testified further that Imperial had four rigs on the scene, and "we", meaning both the Army and Noble Drilling, had moved in seven more for wildcatting. In April, 1943, Mr. R.A. Gibson, Deputy Commissioner of the Northwest Territories, passed along to other Canadian officials the information that IOL "will not supervise the drilling by Noble Company but will make the location for their rigs and will produce the wells if oil is encountered." On the other hand, in November, Dr. Stewart informed General Foster that IOL did direct Noble's drilling procedures after all. At about the same time, General Foster was explaining to Mr. A.D.P. Heeney, Secretary of the War Cabinet Committee, that "Noble Drilling is a company employed directly by the United States government." But a few months later, Mr. Heeney was wondering if Noble was not, in fact, a sub-contractor to Imperial Oil.³⁶

Doubts are dispelled, however, by the technical summaries supplied by IOL after Canol's work was done. All assume — and rightly so — that Imperial did every bit of Canol's drilling. Had not the Canadian government agreed that Imperial should be the only permittee? Hence, Canol's wildcats, like all of its other drilling, were entirely under the company's control.

Still puzzling is the location of Canol's wildcat wells. In the new reserve from the Alaska border to the Arctic Ocean Imperial Oil had taken out by December 1, 1943, forty-eight permits convertible to leases. Thirty-six of these seem to have been granted to the company under an Order-in-Council dated January 28, 1943, even before the orders establishing the reserve. The permits taken up in the enlarged reserve are evidently the two districts, one on the Peel River plateau, and the other in the Lower Mackenzie Valley, indicated with dates of the Orders on a Dominion Forest Service map among General Foster's reports (Fig. 2). On three of the leases in the new reserve, so Ottawa understood, the company drilled a total of four wildcat wells. Curiously, *The Schedule of Wells* places only one of Imperial's twenty "wildcats" outside the fifty-mile district first set aside for the project in 1942. IOL Sans Sault No. 1, a "New Field Wildcat" seventy miles downstream from Norman Wells, is the only one of Imperial's Canol drilling operations listed as being in the enlarged reserve.³⁷

The rest of the "wildcats", then, produced only cores to help define the Norman field, although its boundaries appear to have been already known. Significantly, the rotary rig first appeared in the Norman field in 1942 so that cores could be had for analysis. Supposedly, Noble Drilling brought in seven such rigs. From "wildcatting" of this sort Imperial's

Mr. O.D. Boggs could conclude that the producing zone of the Norman oil field, about five thousand acres in extent, was an ancient coral reef lying in the Fort Creek shales. The discovery established the Mackenzie Basin as a one-time tropics, and made petroleum geologists "reef-conscious" thereafter.³⁸

Despite these genuine wonders, a rude question intrudes: what happened to the massive wildcatting programme for which the War Department had sought the great reserve of land in 1943? The answer is not a simple one. A partial explanation is that, although Canol was still to enjoy further spurts of energy, a combination of circumstances was bringing to an end its capacity for unrestricted growth. The Truman Committee, harbinger of a shift in the base of American power, did much to shorten Canol's life. Colonel Dziuban remarks on the peculiar haste with which the War Department spent Canol money once the American Senators began prying into its affairs. Between December 1, 1943, and April 30, 1944, the close of the fiscal year, the War Department expended \$17 million of the \$99 million that it cost to produce and refine Canadian oil for Canol.³⁹ This was money the Army earlier said that it had already spent. The Norman oil field was furthermore a classic instance of the market determining the capacity of the field: lest a glut ensue, one does not locate more oil than one can profitably sell.⁴⁰ General Worsham told American Senators that wildcatting would probably increase if the price of oil would go up only a few cents on the barrel.⁴¹ But with the Army withdrawn from the north, as its enemies in the Senate clearly intended should be the case, there would be no affluent customer for the oil thus produced.

In addition to all the other impediments to Canol's further growth, the Crown had been imposing increasingly stringent regulations on the exploration of the territories it so bountifully bestowed. Even if Canol's brass seemed not to have read the fine print of these stipulations oil company officials had engraved them in their minds. Before Canol days, when Imperial Oil held only five leases and one permit in the Norman area, most of its properties were covered by regulations issued prior to 1921. In a fit of generosity, however, Ottawa had agreed to forego the required royalties. New regulations promulgated in 1921 applied to only one of the company's three producing wells. For that one the normal royalties obtained, as well as a provision to surrender to the Crown half of any location producing oil in commercial quantities. The same regulations of 1921 also applied to the first Canol reservation of 1942 in which lay the largest part of the pool "defined" by Canol's drilling. By December, 1943, the company had failed to extend its properties within this fifty-mile district although it was entitled to exclusive rights.⁴²

It is understandable, then, that the bulk of Canol's oil production derived from wells drilled on the oldest leases. The conditions of the 1921 regulations helped inspire the redrilling of wells on the old leases and the acidizing treatment of the holes. One of the extended wells was the first Bear Island well. Declared unsuccessful in 1923, it now became a directional well, drilled at an angle for about two thousand feet to get at the oil under the river beyond the edge of the island. The Bear Island directional well was a celebrated innovation for its time, which, as Wing Commander P.A. Cumyn noted in a "most secret" memorandum to Canadian officials, reached into a productive area covered by leases requiring concessions to the Crown.⁴³

From the dazzling performance in this confined area of oil production the War Department inferred, not unreasonably, that an immense bonanza was at hand. But along with the huge expansion of Canol's oil reservation which the Army demanded came the oil regulations of 1943. This time the Crown reserved, without offering reimbursement, the right to half of any oil location and the properties of its permittee at the conclusion of the war. What is more, the government could appropriate everything at any time, upon compensatory payment to the permit holder, a stipulation effectively cancelling the conditions of ownership written into the Army's contract with Imperial Oil.⁴⁴

All of the wildcat wells reportedly drilled in the enlarged reserve were dry holes, of course. These include the four that officials in Ottawa knew about. Likewise dry were seven wildcats of unspecified type reportedly drilled in 1943. The evident failure of new field wildcats to bring in the Army's hoped-for gushers is eternized in a special paragraph of P.C. 2904, April 27, 1944: ". . . no oil has yet been found. . . although the Company . . . did carry out considerable exploratory work. . . ." The same Order-in-Council also announced that the War Department had given up oil exploration in the Mackenzie Valley, and that the Canadian government was taking its place. Sad to say, the partnership with Ottawa did not improve the Canol wildcatters' luck. Sans Sault No. 1, the sole wildcat drilled in the expanded petroleum reserve as reported in *The Schedule of Wells*, was drilled and abandoned in 1944-1945 — another dry hole. Oil reservoirs in the coral reefs of ancient tropical seas are exceedingly intermittent.

During Canol's last year the War Department was little more than a special customer for Mackenzie Valley oil. Both the pipeline from Norman Wells and the refinery in Whitehorse were finally operating in the spring of 1944, but Ottawa had issued a new set of regulations designed to open the north to general exploration "on a sound economic basis".

A year later, in March, 1945, even before World War II ended, Washington ordered the project shut down from Norman Wells to Whitehorse, leaving the Skagway branch to pump fuel into Alaska from the Pacific coast. Shortly thereafter the Army pulled out of Canol Country completely, selling its belongings at cut-rate prices.

Thus did Canol's oil development expand and rapidly transform itself into something new. Colonel Dziuban's theory of a distended military bureaucracy does not explain away a bourgeoning of this sort, for the routine imagination rarely contemplates a spree of oil drilling over a third of Canada's north, nor is it apt to value wildcat wells that yield more cores than oil. The extravaganza that Canol's hunt for oil became has a peculiar kinship with other ambitious undertakings in the vast and thinly populated north. Whether civilian or military, the people who traded on Canol's emergency status and the screen the wilderness provided succumbed to the same visionary magic that has beguiled whalers, fur dealers, telecommunications engineers, and the man who peddled rusty tin cans to the Eskimos. From the bewitching dreams of easy possession that the northwest continues to provoke, a magic working even yet, came the stimulus for a large part of Canol's extraordinary growth.

Notes

1. *Reports of the Special Commissioner for Defence Projects in Northwestern Canada*, hereafter called *Special Commissioner's Reports* (Public Archives of Canada, Ottawa, RG 36/7), memorandum, Nov. 25, 1943, in II.
2. C.P. Stacey, *Arms, Men and Governments: The War Policies of Canada, 1939-1945* (Ottawa: Queen's Printer, 1970), p. 386.
3. *Special Commissioner's Reports*, IV-VI.
4. S.W. Dziuban, *Military Relations between the United States and Canada, 1939-1945* (Washington: U.S. Government Publications, (1959) 1960), p. 141.
5. Trevor Lloyd, "Oil in the Mackenzie Valley," in *Geographical Review*, XXXIV, 2 (April, 1944), p. 280. On Canol's freighting by the Mackenzie water route, see pp. 282-290, including illustrations; and P.S. Barry, "The Prolific Pipeline: Getting Canol Under Way," in *Dalhousie Review*, LVI, 2 (Summer 1976). On the competition between contractors for freighting priorities, see *Special Commissioner's Reports*, memorandum, Stewart to Foster, Nov. 19, 1943, in II, File 3/2/1.
6. Truman Committee, U.S. Congress, Senate Special Committee Investigating the National Defense Program, *The Canol Project, Part 22, Sept. 11-Dec. 20, 1943*, XI, hereafter called *Truman Report* (Washington: U.S. Printing Office, 1944), p. 9319; James Smith Stewart, "Petroleum Possibilities in the Mackenzie River Valley, N.W.T.," in *Transactions*, Canadian Institute of Mining and Metallurgy, XLVII (1944), pp. 152-171. See also G.S. Hume and T.A. Link, *Canol Geological Investigations in the Mackenzie River Area, Northwest Territories, and Yukon*, Department of Mines and Resources, Mines and Geology Branch, Geological Survey Paper 14-16 (Ottawa: King's Printer, 1945), p. 77.

7. Lloyd, "Oil in the Mackenzie Valley," pp. 281 and 300.
8. Hume and Link, *Canol Geological Investigations*, p. 77.
9. Lloyd, "Oil in the Mackenzie Valley," p. 281. The number of wells "not completed" was not announced.
10. *Ibid.*, p. 281; *Truman Report*, pp. 9317 and 9357; *Special Commissioner's Reports*, memorandum, P.A.C., Dec. 1, 1943, in II, and 1st Report, in IV. Dr. T.O. Bosworth associated with Shell Oil Company, staked the first Norman claims in 1912 as consultant for a Calgary syndicate, including Col. J.K. Cornwall who discovered the oil in 1911. During World War I, while Col. Cornwall was overseas, Imperial Oil acquired the claims through a subsidiary.
11. Hume and Link, *Canol Geological Investigations*, pp. 77 and 83; *The Schedule of Wells, 1921-1971, Northwest Territories and Yukon Territories*, 11th edit. (Ottawa: Department of Indian Affairs and Northern Development; Information Canada, (1971) 1973), pp. 249-250; Stewart, "Petroleum Possibilities."
12. Henry D. Ralph, "Truman Committee Preparing Canol Report," in *Oil and Gas Journal*, Dec. 2, 1943, pp. 23-24; *Truman Report*, pp. 9300, 9303, and 9371-9372.
13. *Special Commissioner's Reports*, 2nd and 5th Reports, in IV, and Summary, Cabinet War Committee decisions, in III.
14. *Ibid.*, 6th Report, in IV.
15. *Ibid.*, letter, Stewart to Foster, June 21, 1944, in I, File 3/2/1.
16. *Ibid.*, minutes, meeting Dec. 2, 1943; and extracts, fourth meeting, Interdepartmental Panel on Joint Defence Construction Projects, Dec. 3, 1943, in II. Hume and Link, *Canol Geological Investigations* is a result of Imperial Oil's compliance with these requirements.
17. Senate Select Committee, *Resources of the Great Mackenzie Basin* (Ottawa: Queen's Printer, 1888), pp. 11, 14, and map; Hume and Link, *Canol Geological Investigations*, p. 3; Lloyd, "Oil in the Mackenzie Valley," p. 280.
18. Lloyd, "Oil in the Mackenzie Valley," pp. 278, quoting Richard Finnie, "A Route to Alaska through the Northwest Territories," *Geographical Review*, XXXII (1942), pp. 414.
19. *Edmonton Bulletin*, Oct. 4, 1943; *Special Commissioner's Reports*, letter, Foster to Heeney, Oct. 23, 1943, in II, File 3/4. Cf. *ibid.*, memorandum, Stewart to Foster, Nov. 19, 1943, in II, File 3/2/1. Dr. Link's "violation of instructions" prompted an exchange of correspondence between General Worsham and General Foster; the latter thought the published information was inaccurate.
20. Lloyd, "Oil in the Mackenzie Valley," p. 304; Hume and Link, *Canol Geological Investigations*, p. 3 and *passim*.
21. Lloyd, "Oil in the Mackenzie Valley," p. 304, quoting *Truman Report: Special Commissioner's Reports*, minutes, meeting Dec. 2, 1943, and advance copy of Patterson's speech released Nov. 23, 1943, in II, File 3/9.
22. Ralph, "Truman Committee Preparing Canol Report;" Lloyd, "Oil in the Mackenzie Valley," p. 304; *Special Commissioner's Reports*, memorandum, Stewart to Foster, Nov. 19, 1943, in I, File 3/2/1; Oliver B. Hopkins, "The 'Canol' Project," in *Canadian Geographical Journal*, XXVII, 5 (Nov. 1943), p. 242.
23. Dziuban, "Military Relations," p. 235; *Special Commissioner's Reports*, letter, Clark to Secretary of State, External Affairs, Dec. 23, 1943 (error: for 1942), copy appended to memorandum, Nov. 25, 1943, in II.
24. *Special Commissioner's Reports*, memorandum, P.A.C. (Peter A. Cumyn), Dec. 1, 1943, in II; Lloyd, "Oil in the Mackenzie Valley," p. 279.
25. Richard Finnie, "U.S. Army Taps Canadian Oil for Alaskan-based Operations," in *World Petroleum*, XIV, 2 (Nov. 1943), pp. 32f.; Lloyd, "Oil in the Mackenzie Valley," p. 300; *Special Commissioner's Reports*, memoranda, Gibson to Camsell, Apr. 29, 1943, Gibson to Cumyn Nov. 5, 1943, and Stewart to Foster, Nov. 19, 1943, all in I, File 3/2/1; minutes, meeting Nov. 30, 1943, in II; 1st and 2nd Reports, in IV.
26. *Special Commissioner's Reports*, exchange of letters, Keenleyside to Moffat, Jan 18, 1943; Clark to Keenleyside, Feb. 17, 1943; Keenleyside to Clark, Mar. 13, 1943, in II. The discussion began in December, 1942.
27. *Ibid.*, 2nd and 5th Reports, in IV, and memorandum, Gibson to Camsell, Apr. 29, 1943, in I, File 3/2/1; Hume and Link, *Canol Geological Investigations*, pp. iii, 2-3; C.R. Stelck, Dept. of Geology, University of Alberta, addressing Boreal Circle, Feb. 17, 1976, in Edmonton.
28. Stelck, cit. supra; *Special Commissioner's Reports*, letter, Keenleyside to Clark, Mar. 13, 1943, in II.

29. Daniel H. Gee, "The Mackenzie River Mapping Project," in *Surveying and Mapping*, V, 3 (July, 1945), p. 53.
30. *Special Commissioner's Reports*, 2nd Report, in IV.
31. *Truman Report*, p. 9318.
32. Hume and Link, *Canol Geological Investigations*, pp. 10, 61, and 64. The author is indebted to Miss Anne Hemstock, formerly of the Boreal Institute, University of Alberta, for arranging the loan of a copy of this work.
33. Lloyd, "Oil in the Mackenzie Valley," p. 292; Finnie, "U.S. Army Taps Canadian Oil;" *Special Commissioner's Reports*, 2nd Report, in IV.
34. Lloyd, "Oil in the Mackenzie Valley," p. 303, n. 46, citing the drilling contract as reported by Ralph, "Truman Committee Preparing Canol Report;" *Truman Report*, pp. 9364-9365.
35. Lloyd, "Oil in the Mackenzie Valley," p. 303; *Special Commissioner's Reports*, memorandum, Gibson to Camsell, Apr. 29, 1943, in I, File 3/2/1; *Schedule of Wells*, pp. 249-250; Hume and Link, *Canol Geological Investigations*, pp. 84 f.
36. *Truman Report*, pp. 9365 and 9367, cf. 9354; *Special Commissioner's Reports*, memoranda, Gibson to Camsell, Apr. 29, 1943, and Stewart to Foster, Nov. 19, 1943, in I, File 3/2/1; letter, Foster to Heeney, Oct. 29, 1943, in I, File 3/9; and memorandum, Heeney to Foster, Feb. 26, 1944, in II.
37. *Schedule of Wells*, pp. 249-250; *Special Commissioner's Reports*, memorandum, P.A.C., Dec. 1, 1943, in II; cf. 1st Report, in IV. On the thirty-six leases, see Lloyd, "Oil in the Mackenzie Valley," p. 281, n. 13.
38. Hume and Link, *Canol Geological Investigations*, p. 80 and passim; Stelck, cit. supra.
39. Dziuban, *Military Relations*, pp. 234-235. For further on the anomalies of Canol's stated expenditures see P.S. Barry, *Three Episodes in the North: A History of the Pressures of Industrial Development on the Environment of Northern Canada*, unpubl. report in 3 vols. (I. Beaufort Sea Whaling, II. Canol Project, II. DEW—Line) (Calgary: Northern Engineering Services, 1974), II, pp. 7-9. The author is grateful to Northern Engineering Services and to L.G.L. Ltd. Environmental Research Associates for the opportunity to research a portion of this history of Canol.
40. Lloyd, "Oil in the Mackenzie Valley," passim. For more on this arcane subject, see John F. Fairlie, "The Significance of Recent Canadian Oil Developments," in *Journal of Petroleum Technology*, II, 11 (Nov. 1950), Sect. 1, pp. 9-12, Sect. 2, p. 8; Anthony Sampson, *The Seven Sisters: The Great Oil Companies and the World They Made* (New York: Viking, 1975), p. 131 and passim.
41. *Truman Report*, p. 9354.
42. *Special Commissioner's Reports*, memorandum, P.A.C., Dec. 1, 1943, in II.
43. *Ibid.*: Hume and Link, *Canol Geological Investigations*, p. 77.
44. *Special Commissioner's Reports*, memorandum, P.A.C., Dec. 1, 1943, in II.