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Norman Wells: The Oil Center of the Northwest Territories

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ABSTRACT. In 1920, a drilling team funded by Imperial Oil discovered a petroleum deposit along the shore of the Mackenzie River north of the settlement of Fort Norman. This wilderness site later became the community of Norman Wells and its growth has been directly attributable to petroleum. The current expansion of production at Norman Wells is aimed at southern Canadian markets and a pipeline is being constructed from Norman Wells to existing pipelines in northern Alberta. As the focal point of this major resource expansion, the character, size, and functions of the community are changing. These changes are transforming Norman Wells into an important regional center.

Key words: Norman Wells, petroleum development

RÉSUMÉ. En 1920, une équipe de forage financée par Imperial Oil découvrit un gisement pétrolifère le long de la côte de la rivière Mackenzie au nord du village de Fort Norman. Ce site en région reculée devint plus tard la communauté de Norman Wells et sa croissance a été directement attribuable au pétrole. L'augmentation actuelle dans la production à Norman Wells vise les marchés du sud du Canada et un pipeline est en voie de construction reliant Norman Wells aux pipelines actuels dans le nord de l'Alberta. Puisque Norman Wells est le point central de cette croissance majeure en exploitation, son caractère, sa taille et ses fonctions sont à ressentir des changements qui sont en train de transformer cette communauté en un centre régional important.

Mots clés: Norman Wells, l'exploitation du pétrole

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INTRODUCTION

Norman Wells, unlike many other Canadian communities, is presently experiencing "boom" economic conditions. This small community on the banks of the Mackenzie River owes its origin to the petroleum industry, and the current expansion of its oil production by Esso Resources Canada Ltd. (Esso) is simply one more step in its growth as an oil center. In the current phase of its evolution, Norman Wells is destined to become an important exporter of crude oil to southern Canada. This industrial growth requires not only an increase in oil production at Norman Wells but also the construction of a pipeline from Norman Wells to Zama, Alberta, which is being undertaken by Interprovincial Pipe Line (NW) Ltd. (IPL).

With the accompanying increase in government and business functions in Norman Wells, its prospects for becoming a regional center in the central Mackenzie Valley are bright. From 1980 to 1985, its population is expected to double to over 600 persons. This growth along with above average per capita income will create a strong demand for more goods and services. Already Norman Wells is the acknowledged transportation center in the central Mackenzie Valley area and the signs are promising that its role as a retail and service center will grow in the 1980s. Its present trading area, extending north to Fort Good Hope, east to Fort Franklin, and south to Fort Norman, encompasses a population of approximately 2000.

Unlike most Mackenzie Valley settlements, Norman Wells is not an old native community with deep historic ties to the land. Rather, it is a creature of the oil industry and its primary *raison d'être* is oil production. Though Alexander Mackenzie first noted seepages of oil along the Mackenzie River in 1789, this hamlet is only about 70 years old, dating from the time when the first oil drilling rig was sent into this area. The make-up of its population has been shaped by its relationship to the oil industry — almost all the residents of this community are employees of Esso or are otherwise connected with the oil industry. Most have come north to seek employment and few remain in Norman Wells after their employment ceases. In 1981, an estimated 82% of the population was white (GNWT, Bureau of Statistics, 1982) [the Bureau used "other" to describe the non-native population, but "white" is the more popularly used term].

HISTORICAL BACKGROUND

The emergence of commercial hydrocarbon interest in the Canadian north began in 1898 when an application for an exploration permit was issued by the Department of the Interior in Ottawa (Rea, 1968:16). While this show of interest in the commercial potential of oil seepages along the Mackenzie River did not lead to serious field investigations, it represented a positive response to the report of the Special Senate Committee of 1888 which, in its review of the potential oil riches of the Canadian Northwest, extolled this mineral wealth as "...the most extensive petroleum field in America, if not the world." (Senate of Canada, 1888:163). Yet the commercial exploitation of this deposit did not take place at that time because of its inaccessibility to world markets and the lack of sufficient local demand for refined petroleum products.

The first serious investigations of the deposits at Norman Wells were conducted by J.K. Cornwall of the Northern Trading Company in 1911. His findings were encouraging as his samples revealed a light, good-quality crude oil. Three years later, P.O. Bosworth obtained the mineral rights to three parcels of land in the Norman Wells area (Fumoleau,

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1973:332). Imperial Oil later purchased these parcels through its subsidiary, the Northwest Company, and a wildcat drilling team was sent into the area near the present site of Norman Wells in 1919 (Lloyd, 1944:275). Oil was struck on 24 August 1920 (Hopkins, 1943:239). At the time, this was the most northerly oil well in the world. The rate of flow from this well, known as the Discovery Well, was about 15 $m^3 \cdot day^{-1}$ (Page, 1981:18). The Northwest Company quickly erected a 50 $m^3 \cdot day^{-1}$ refinery designed to serve the demand of communities along the Mackenzie River. However, the refinery (described by some as nothing more than a "glorified boiler") and Discovery Well were closed in 1925 as local demand for petroleum products proved to be insufficient (Page, 1981:18).

The viability of the Norman Wells hydrocarbon industry was largely contingent upon finding a suitable market area, one ready to consume petroleum products at the higher prices necessitated when production occurs in isolated, small-scale settings. Fortunately, two areas of new mining activity were opened in the Northwest Territories during the 1930s and they provided the requisite market for Norman Wells crude. With a contract to supply diesel fuel to the Port Radium pitchblende mines which were to open in 1933, the refinery was reactivated in the summer of 1932. Just six years later, the opening of the "Con" and "Negus" mines at Yellowknife created even greater demands for Norman Wells petroleum products. The significant petroleum requirements of the mining industry provided the core sales, and production figures mirrored this development as output of oil at Norman Wells increased from less than 150 m^3 in 1932 to over 3600 m^3 in 1938 (Table 1). Such a sharp rise in production led Imperial Oil to construct a refinery which could produce aviation gasoline and diesel fuels for aircraft and riverboats as well as fuel oil for the mines (Rea, 1968:157). The new refinery was constructed in 1939 and had an initial production capacity of almost 80 $m^3 \cdot day^{-1}$.

TABLE 1. Petroleum production at Norman Wells, N.W.T., 1932-1982 (1 m^3 = 6.29 barrels)

Year	000 m^3	Year	000 m^3
1932	.14	1958	73.1
1933	.74	1959	68.8
1934	.70	1960	75.0
1935	.82	1961	82.7
1936	.86	1962	91.5
1937	1.8	1963	101.0
1938	3.7	1964	97.4
1939	3.2	1965	103.2
1940	3.0	1966	120.0
1941	3.8	1967	108.5
1942	12.1	1968	120.0
1943	47.0	1969	128.2
1944	197.4	1970	135.4
1945	55.2	1971	151.1
1946	28.4	1972	142.4
1947	36.4	1973	154.0
1948	56.1	1974	152.6
1949	24.9	1975	161.0
1950	29.9	1976	143.4
1951	36.4	1977	138.6
1952	50.3	1978	147.2
1953	50.7	1979	143.2
1954	59.2	1980	160.5
1955	64.7	1981	172.2
1956	71.9	1982	158.0*
1957	67.3		

Source: DBS (1956); Statistics Canada (1957-1981).
*Preliminary estimate (Statistics Canada, 1982).

A key wartime development affecting Norman Wells was the CANOL Project (CANOL was an acronym for *Canadian Oil*). Fearing a Japanese attack on Alaska, the United States Army devised a plan to supply oil to the area — oil which would be delivered unimpeded by a Japanese submarine or air strike. This plan, known as the CANOL Project, saw the Norman Wells field linked to Alaska by pipeline and the Alaska Highway. A refinery was built at the terminus of the 101-mm (4-in) diameter pipeline at Whitehorse, Yukon Territory (Finnie, 1947:138). Also, the project pressed Imperial Oil to drill some 67 new wells (of which 60 were producers) and expand its refining operations to almost 175 $m^3 \cdot day^{-1}$ (Rea, 1968:158). All of these plans were initiated in 1942 and the CANOL Project was completed in early 1944. By that time, however, the threat of an attack on Alaska by the Japanese had diminished considerably. Without the rationale of a "military" need for such a pipeline, economic considerations forced a dramatic refinery shutdown at Whitehorse in March 1945. To the chagrin of the U.S. Army, the 960-km (595-mi.) CANOL Pipeline was declared obsolete, and by 1947 much of the infrastructure — from pipe to pumping equipment to vehicles — was sold as surplus. At that time, Imperial Oil moved its Whitehorse refinery to Edmonton and located it on the site of the present Strathcona refinery, where it processed products of the Leduc oil field.

The impact of the CANOL Project on the production of oil at Norman Wells was, not surprisingly, enormous. Annual outputs from 1942 to 1944 increased exponentially, from 12 000 m^3 to more than 197 000 m^3 (Table 1). After the loss of the military market, production plunged to 28 000 m^3 in 1946. By this time, most of the new CANOL-funded wells had been capped.

With the post-World War II industrialization and modernization of northern Canada, Imperial Oil slowly built its annual production through the 1950s and 1960s from under 30 000 m^3 to over 130 000 m^3 (Fig. 1). As domestic demand for petroleum products such as fuel oil and gasoline increased along with the growth of the urban population, some of the CANOL wells were brought into production. The market area for Norman Wells crude extended from Hay River to the Mackenzie Delta by the 1950s, and the mines at Yellowknife and Port Radium were its best customers.

In the early 1970s production levels stabilized at around 150 000 $m^3 \cdot year^{-1}$. A number of factors had contributed to this phenomenon either directly or indirectly. First, extension of the southern highway network into the Mackenzie District (Grimshaw, Alberta, to Hay River by 1948, and Hay River to Yellowknife c. 1961) permitted cheaper petroleum products from larger refineries in southern Canada to capture these markets. Second, the extension between 1962 and 1965 of the

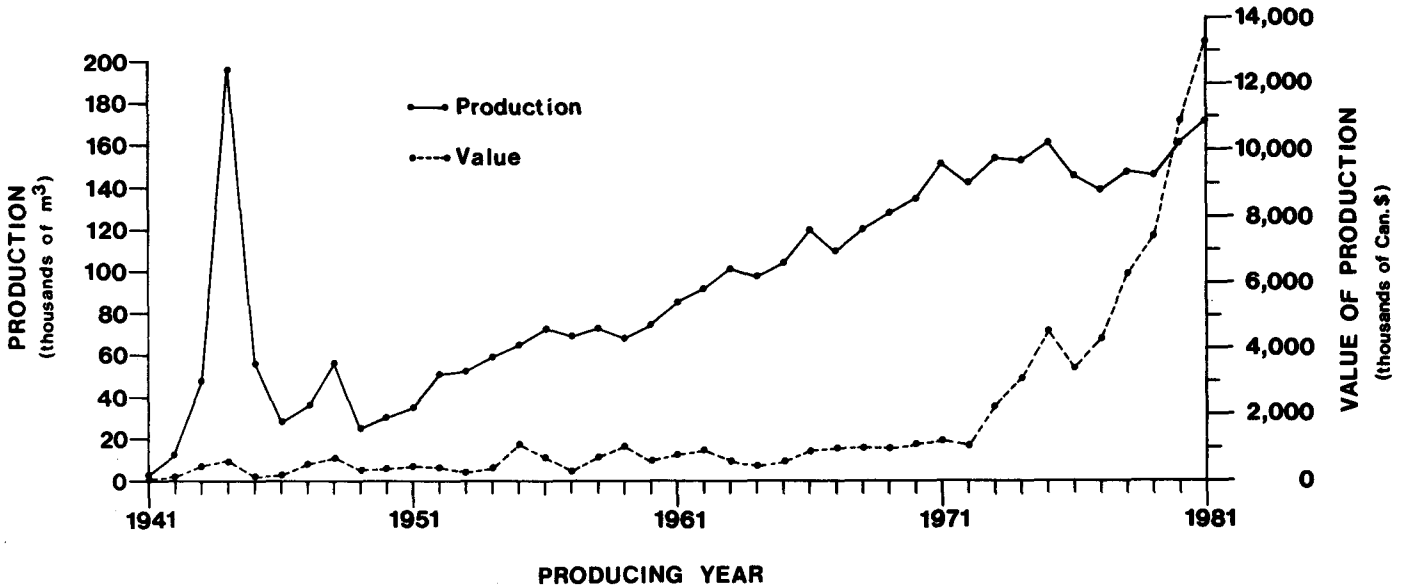

FIG. 1. Production and value of Norman Wells petroleum, 1941-1981. Source: DBS (1956); Statistics Canada (1957-1981).

railhead from Roma, Alberta, to Pine Point, N.W.T., site of the Canadian Consolidated Smelter Corporation's lead-zinc operations, lowered the transportation costs of Alberta petroleum producers to reach this new northern market. Thus, by the late 1960s the market for Norman Wells refined products was restricted to the area serviced by the Mackenzie water system north of Fort Simpson, which marked the northern terminus of the Mackenzie Highway system. This shrinking market included the Mackenzie District north of but not including Fort Simpson, the Arctic coast west to Alaska and east to Gjoa Haven, and the more southerly of the Arctic Islands to the north: essentially all those territorial areas reasonably accessible by river-barge but not serviced by a major highway from southern Canada (Weir, 1967:134).

A new era in petroleum pricing was ushered in by the formation of a world oil cartel, the group known as Oil Producing and Exporting Countries (OPEC). This group, able to influence world oil prices by establishing supply and export controls, caused the drastic inflation of world oil prices between its formation in 1972 and 1981 when the world oil glut first appeared. Prices for Norman Wells oil were affected by OPEC policies and actions, as evidenced in the dramatic rise in the value of Norman Wells production (Fig. 1). Between 1961 and 1972, Norman Wells oil generally fetched around $7/m^3$. After OPEC's formation the price skyrocketed, from over $14/m^3$ in 1973 to more than $77/m^3$ in 1981 (Fig. 2). This rapid increase in the price of oil made formerly "uneconomic" projects viable.

The price per cubic metre of daily domestic production was now less than that of foreign production. Esso Resources Canada Ltd. (formerly Imperial Oil) had been carrying out tests for secondary recovery of hydrocarbons at Norman Wells since 1968, and in 1980 Esso and IPL produced a joint development proposal. Esso would expand its oil field facilities at Norman Wells through a secondary recovery project, while IPL proposed to construct a 324-mm (12-in)

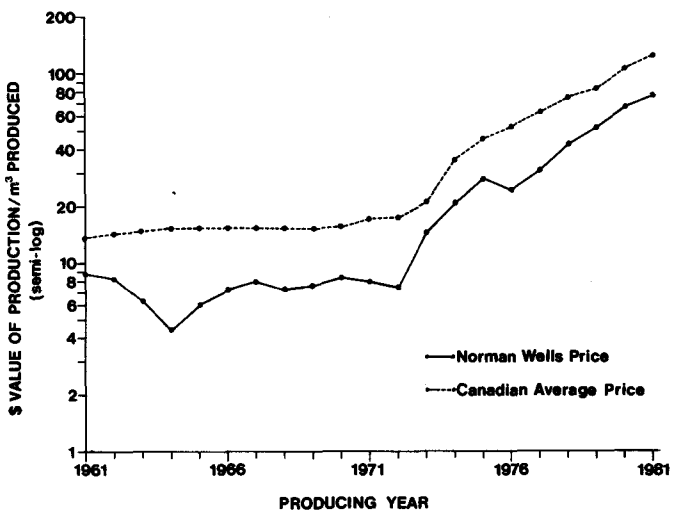

FIG. 2. The rising price of Norman Wells petroleum, 1961-1981. Source: Statistics Canada (1961-1981).

diameter pipeline to transport Norman Wells petroleum products to a terminal near Zama, Alberta, some 868 km (540 mi.) to the southeast. At that point the line would join the existing southern Canadian pipeline network. In August 1981, the Government of Canada approved the $1.4 billion project — northern Canada's first industrial mega-project. Ironically, the worldwide economic recession began in 1981, resulting in a weakening in the demand for petroleum products and a softening of its price. By 1985, when Norman Wells crude will reach southern markets, the world economy will probably have fully recovered from the recession and the demand and price for oil should then regain their former position.

THE NORMAN WELLS PROJECT, 1982 - 1985

The Norman Wells Oilfield Expansion and Pipeline Project is a major industrial development in northern Canada. Fi-

nanced by Esso and IPL, its purpose is to increase oil production in the Norman Wells field from 500 $m^3 \cdot day^{-1}$ to 4000 $m^3 \cdot day^{-1}$. Most of the petroleum will be transported to southern Canadian markets via a completely buried 324-mm pipeline. According to Esso, oil should be flowing through the new pipeline in mid-1985. By 1986, the Norman Wells Oilfield will have become the third largest producer in Canada (Esso, 1980:1).

The expansion of the Norman Wells oil field calls for a substantial increase in the number of production wells. Some 150 new wells will be drilled, half of which will be used to enhance the recovery rate and the others for oil production (Esso and IPL, 1980:5). The enhanced recovery method, a waterflooding scheme, is expected to more than double the amount of oil produced from this Devonian deposit. This method will permit 42% of the petroleum deposit to be recovered as compared to 17% using conventional recovery methods (Esso, 1980:1). Because much of the 100 million-m^3 Kee Scarp oil-bearing reef lies beneath the Mackenzie River,the development plan requires the construction of six artificial islands (Fig. 3). The islands will house approximately half of the 150 wells which will extend some 500 m deep into the Devonian formation.

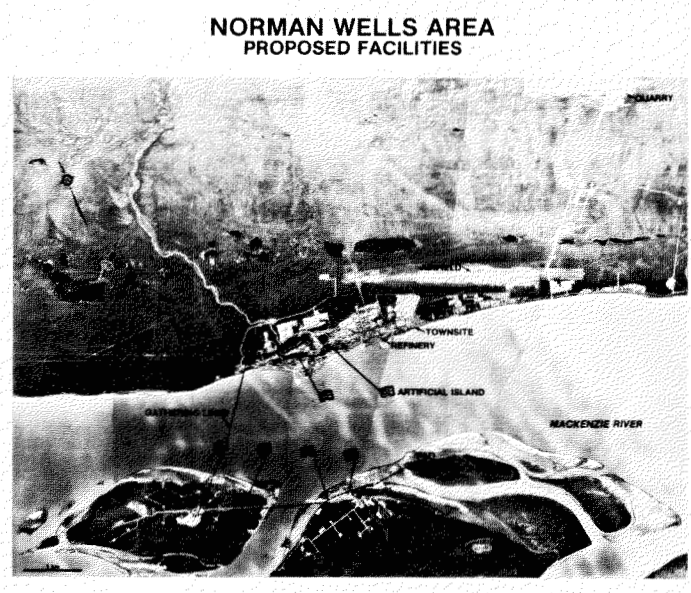

FIG. 3. Norman Wells Oilfield Expansion Project: proposed facilities.

The main processing facility, the fieldgate, provides the industrial infrastructure. It is designed to service the wells and to produce gas for the plant, the refinery, and the community. The fieldgate will also supply crude oil to the Norman Wells refinery (500 $m^3 \cdot day^{-1}$) and to the pipeline (4000 $m^3 \cdot day^{-1}$). This processing facility will house the separation equipment which is designed to receive oil from the pipeline gathering system, and the equipment for crude oil stabilization and dehydration, natural gas compression and dehydration, fresh water treatment, electrical power generation and bulk storage for processed crude oil.

The production of refined products of gasoline, aviation fuel, and diesel fuel from the Norman Wells refinery for its established northern markets will continue at its present rate of about 335 $m^3 \cdot day^{-1}$. As much of the new oil production is aimed at southern markets, a pipeline will be built to the northern terminus of the Alberta pipeline system at Zama. From there, the oil will be transported via the existing Rainbow Pipeline System to Edmonton where the link with IPL's extensive trans-Canadian system will be made. The route of the Norman Wells Pipeline will be along the east side of the Mackenzie River to a point near Fort Simpson where it crosses the Mackenzie and then southeast to Zama (Fig. 4). Construction of the pipeline involves two major river crossings, the Great Bear River and the Mackenzie River. IPL's pump stations will be located at Norman Wells and near the communities of Wrigley and Fort Simpson, with terminal facilities located at Zama.

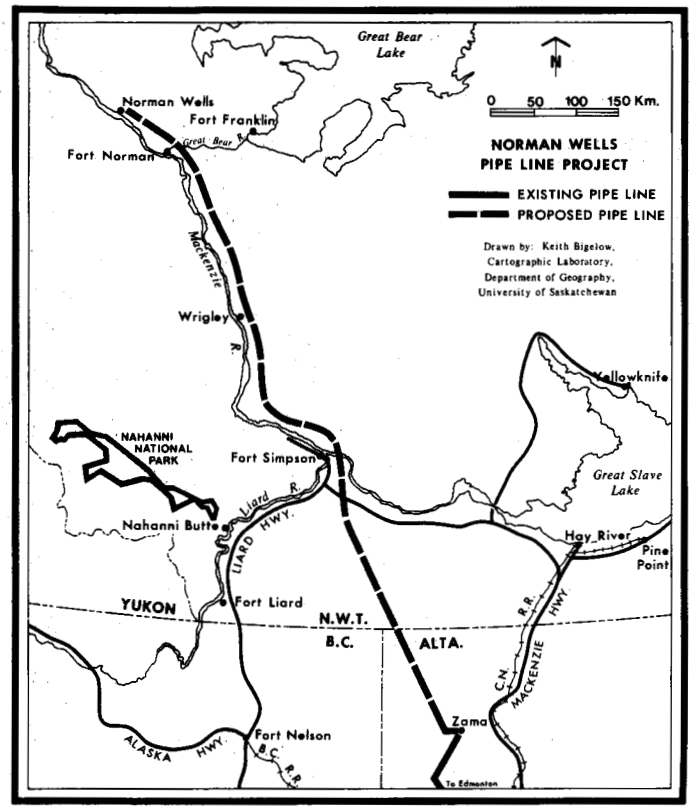

FIG. 4. Norman Wells Pipeline Project: route map.

The benefits of this energy project will have far-reaching effects for Canada. At the national level, Canada will move closer to its goal of energy self-sufficiency. In turn, by reducing its need for imported oil, Canada will save some $8 billion over the lifetime of the oil field (Esso and IPL, 1980:1). Federal revenues will also increase substantially through corporate and personal income taxes. These two sources of tax revenue plus a one-third share in the project's profits are expected to increase the size of the federal treasury by some $172 million per year (FEARO, 1981:22).

During the construction period, the demand for equipment and materials will stimulate both southern and northern Canadian industries and reduce regional unemployment. Perhaps the biggest single beneficiary will be Canada's steel industry, which will supply the thousands of tonnes of steel pipe to be installed at Norman Wells and along the pipeline route. Numerous other firms will supply a variety of equipment ranging from pumps to compressors to storage tanks. Much of this equipment will be manufactured in Edmonton, Alberta, and other Canadian cities; the pipe is being manufactured by Interprovincial Steel and Pipe Corporation (IPSCO) at its plants in Edmonton and Regina, Saskatchewan. From Edmonton, these materials are moved by surface transport to Hay River and then shipped by barge to Norman Wells or to selected stockpile sites along the pipeline route.

At the regional level, the principal benefits of this project will fall to the N.W.T. and Alberta. Given the logistics of the existing air routes and road network, most project-related freight and passenger movements are expected to originate in Edmonton. For example, a significant number of Esso's (and its primary subcontractors, Partec-Lavalin and Northern-Loram) skilled construction workers are residents of Edmonton and other southern Alberta centers. These commuters will work in Norman Wells for a number (usually two to three) of weeks and then return to their southern residences for a week off. The Government of the Northwest Territories (GNWT) is expected to receive a small share of the tax revenues — some $6 million per year (FEARO, 1981:22-23). The GNWT has expressed disappointment at the size of its share, which amounts to around 3% of the sum received by the federal government (FEARO, 1981:24). The State of Alaska, by comparison, is receiving a much larger proportion of royalties and taxes on Prudhoe Bay production; there, oil and gas lease sales are divided nearly equally by the state and federal governments (Thomas and Thomas, 1982:54). Nonetheless, businesses in settlements along the pipeline route and near the focal community of Norman Wells, should, by virtue of transport costs, have a competitive edge in supplying certain goods and services to the two major proponents. In fact, considerable benefits have already accrued to northern business and residents in the form of contract services and employment, respectively. According to Esso (Esso, 1983:6), during 1981-82 more than $37.5 million had been disbursed to bona fide northern businesses, and 2876 worker-months of northern-resident employment created, through the Norman Wells Expansion Project.

At Norman Wells, most benefits should accrue to local businessmen and workers. Already there has been an increase in the work force, an expansion of the industrial, educational service, and recreational infrastructure, and a growth in population. Esso expects the number of construction workers to exceed 900 from mid-1983 to mid-1984, swelling the Norman Wells population to over 1200 at peak construction periods. The pressure on community services and housing will be mitigated by the establishment of separate housing for rotational workers. The primary camps for Esso and its major subcontractors are expected to accommodate over 900 workers.

CAMP	CAPACITY
Esso Resources - Camp 1	200
Mackenzie House	200
Northern-Loram	450
Partec-Lavalin	60
	910

The Report of the Federal Environmental Assessment and Review Office (FEARO, 1981:73) recognized that this project would provide "...a needed economic stimulus" to the Mackenzie Valley. Its recommendations are intended to insure that economic benefits, particularly local employment and business opportunities, are realized. FEARO believed that impacts on the people of the Mackenzie Valley can be kept "within acceptable limits" and provided a number of examples where socioeconomic disruptions should be minimized, including: (1) inflationary effects of the project upon the local economy; (2) wage differentials between project workers and workers in other sectors of the northern economy; (3) pressure on housing stock, public services, and recreation facilities; and (4) the well-being of the trapping economy.

FEARO stressed the importance of minimizing the social pressure from the construction workers upon the communities of Norman Wells, Fort Norman, Wrigley, and Fort Simpson. Esso has responded to this request by housing its Norman Wells workers in self-contained work camps and by employing an air commuting system for rotating workers to Edmonton and to northern centers. The needs of the construction workers for housing, services, and entertainment will thereby be satisfied mainly in the camps and in their home communities.

THE INITIAL IMPACT OF THE PROJECT

In 1982, the pre-construction phase of the Norman Wells Oilfield Expansion and Pipeline Project began. By the spring of 1982, thousands of tonnes of freight — from prefabricated buildings to drilling rigs — had been stockpiled at Hay River, prior to being barged to Norman Wells. During the summer months, supplies and materials were shipped along the Mackenzie River to Norman Wells. One of the major subcontractors to Esso, Northern-Loram (a joint-venture firm of Northern Construction Company of Vancouver and Loram International of Calgary), signed a $100 million contract to carry out drilling, blasting, and hauling of rock from a shale and limestone quarry near Norman Wells. Much of this rock has been used to build a road from the quarry to the river and to construct a new dock. In early 1983, trucks began hauling the rock over specially constructed ice roads to the sites of four of the six artificial islands.

During 1982, the federal and territorial governments took measures to assist the hamlet in dealing with the increased population pressures. These measures included the addition of new positions in the public sector, an increase in the number of public services, and the genesis of a long-range community plan. The need for new or upgraded recreational facilities has

been recognized and the principal developer, Esso, has provided the hamlet with a grant for new recreation services.

Similar growth has occurred at Norman Wells in the private sector, where a number of small businesses have been formed in response to the demand for goods and services. From 1982 to 1983, the number of local businesses increased substantially, from 37 to 51 (DIAND, 1983:5).

The first wave of construction workers arrived in Norman Wells in summer 1982. According to Esso estimates, there were 225 rotational workers in summer 1982 and 300 by winter 1982-83 (Esso, 1982: 060-002). This influx of workers has nearly doubled the population of Norman Wells. Concerns about the social implications of the population boom were expressed by local and federal officials. However, the initial impact of this project seems to have been well within the guidelines set by FEARO. According to a report of the RCMP detachment at Norman Wells submitted to the Hamlet Council on 23 November 1982, crime rates over the preceding three years (1980 to 1982) had not varied significantly. This report included an analysis of various categories of crimes, such as liquor offences, motor vehicle infractions, break-and-enters, theft, and assault. The main conclusions of this report were: (1) the total number of complaints for 1982 (to October) were only slightly higher than for 1980 and 1981; (2) the number of complaints per capita for 1982 were below those for 1980 and 1981; (3) the total number of liquor offences, thefts, break-and-enters, and assaults had actually declined in 1982 compared to 1980 and 1981; and (4) the greatest increase in complaints occurred for motor vehicle offences, namely speeding, traffic accidents, and impaired driving. The number of complaints in this final category had more than tripled over the 1981 figures. However, the RCMP estimated that the number of motor vehicles had increased by more than four times (Norman Wells Hamlet Council, minutes of meeting held 23 November 1982).

The construction boom that has begun at Norman Wells has brought many changes. Perhaps the most dramatic signs of the boom are: (1) the physical shift of the Esso operations employee residences from the original Esso lease site to a new hamlet subdivision; (2) the quarry work; and (3) the heavy truck traffic. A spinoff of the rapid growth is pressure for family housing and for commercial lots, but in general supply is keeping pace with demand. This balance is probably a result of company control of the project: housing has been arranged for all employees in the work camps or in company residences. Since both the federal and territorial governments supply housing to their employees, the demand for more private housing has been relatively low, thus far (Fig. 5).

FIG. 5. Norman Wells, 1981.

IMPLICATIONS FOR THE FUTURE

The role of Norman Wells as the regional center of the central Mackenzie Valley is being strengthened by the expansion of its oil field and by the building of a pipeline to southern markets. With a larger population in Norman Wells, the business and public service functions of the center are growing. In turn, the retail and service sectors are expected to augment their regional trade area into surrounding settlements such as Fort Franklin, Fort Norman, Colville Lake, and Fort Good Hope. The oil reserves of the Norman Wells field are expected to last for more than 20 years at the projected rate of extraction (Esso, 1982:110-001). By that time, other industrial developments may provide an additional economic base for Norman Wells. These developments could involve the discovery of additional energy resources or a better means of recovering more in-place oil. Exploration in the Mackenzie Valley is continuing and seismic crews have been busy in recent years in the Colville Lake (200 km northeast of Norman Wells), Fort Norman, and Wrigley areas.

The development of Beaufort Sea hydrocarbons could also have a marked effect on the future of Norman Wells. Currently, the three major operators in the Beaufort region (Esso Resources, Dome Petroleum, and Gulf Canada) are proposing several alternative methods of hydrocarbon transport to the federal government. One of the proposals receiving considerable attention would see an overland pipeline from the Mackenzie Delta south to existing pipelines in Alberta, using the Mackenzie Valley as a natural transport corridor. Such developments may permanently establish Norman Wells as a regional center in the central Mackenzie Valley.

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APPENDIX

Chronology of Events Affecting Hydrocarbon Development at Norman Wells, N.W.T., 1888-1982

1888 — Special Senate Committee investigates Great Mackenzie Basin's potential mineral wealth.

1898 — First application made to Department of Interior for exploration permit at Norman Wells.

1911 — J.K. Cornwall of Northern Trading Company investigates oil seepages at future site of Norman Wells.

1914 — P.O. Bosworth submits formal claims for petroleum and natural gas parcels in the Norman Wells area.

1919 — Northwest Company (subsidiary of Imperial Oil) acquires Bosworth claims. Northwest Company moves crews into Norman Wells area to test for petroleum deposits.

1920 — First oil well is struck in Northwest Territories on 24 August: Discovery Well is drilled at Norman Wells by T.W. Link.

1921 — A 50 $m^3 \cdot day^{-1}$ refinery to serve local Mackenzie Valley needs is built at the Discovery location.

1925 — Insufficient local demand forces closure of Discovery refinery.

1930 — Silver-radium ores are discovered by G. Labine at Great Bear Lake, N.W.T.

1931 — Northern Transportation Company Limited (NTCL) establishes Mackenzie River barge system.

1932 — Refinery at Norman Wells re-opens for summer production in anticipation of new market demand for petroleum products at Port Radium, N.W.T.

1932-33 — Port Radium mine (Eldorado Gold Mines Ltd.) produces first silver ores in 1932 and first radium-bearing ores in 1933.

1938-39 — Yellowknife mines ("Con" and "Negus") create increased demands for Norman Wells products.

1939 — Imperial Oil increases refining capacity at Norman Wells to accommodate up to 130 $m^3 \cdot day^{-1}$ of product. Imperial drills one new well.

1940 — Imperial drills one new well. Eldorado Gold Mines Ltd. of Port Radium closes temporarily in June.

1942 — Eldorado Gold Mines Ltd. of Port Radium re-opens in April.

1943 — Operations are suspended at "Con" mine in Yellowknife. Imperial expands refinery to 175 $m^3 \cdot day^{-1}$. CANOL Project begins. Sixty-seven new wells (60 producers) are drilled at Norman Wells. CANOL Pipeline is built from Norman Wells to Whitehorse, Yukon. Imperial Oil erects refinery for CANOL products at Whitehorse.

1944 — CANOL Project is completed in March.

1945 — CANOL Project is terminated in March. Imperial Oil acquires lease for Norman Wells oil field in May. Most of the new CANOL-funded wells are capped to await increased local demand.

1947 — CANOL Pipeline and operations facilities are declared surplus by U.S. Army, and subsequently dismantled and sold.

1948 — Mackenzie Highway route from Grimshaw, Alberta, to Hay River, N.W.T., is completed. Giant Yellowknife Mines begin milling operations.

1954 — Significant lead-zinc reserves are observed at Pine Point, N.W.T.

1961 — Major highway extension from Hay River to Yellowknife is completed.

1962-65 — Great Slave Lake Railway is constructed from Roma, Alberta, to Hay River and then to Pine Point, N.W.T.

1968 — Imperial Oil drills two development wells to initiate a secondary recovery scheme.

1968 — Consortium of 16 companies forms Mackenzie Valley Pipeline Research Limited (MVPRL). Extensive oil reserves are discovered at Prudhoe Bay, Alaska.

1970 — Imperial Oil discovers hydrocarbons at Atkinson Point on the Tuktoyaktuk Peninsula.

1972 — American interests decide to opt for a trans-Alaskan pipeline route to transport Prudhoe Bay products. MVPRL project collapses in light of American decision. Proponents of a pipeline from Beaufort Sea to northern Alberta form Beaufort-Delta Oil Project. Oil Producing and Exporting Countries (OPEC) begin to alter supply and price of oil to world markets.

1978 — At National Energy Board (NEB) Hearings, Norman Wells recoverable reserves are estimated at 42 million m^3.

1979 — Esso Resources drills three delineation wells from winter ice platforms on the Mackenzie River, confirming extent of the Norman Wells Oilfield reservoir.

1980 — Minister of DIAND refers Norman Wells Oilfield Development to FEARO for public review of environmental and socioeconomic implications. Esso Resources and Interprovincial Pipe Line (NW) Ltd. apply to DIAND to increase production from the Norman Wells oil field, and construct an 868-km, 324-mm diameter oil pipeline from Norman Wells to Zama, Alberta. IPL applies to NEB to construct an oil pipeline. FEARO Panel hearings conducted August-September. NEB Norman Wells Project hearings conducted October-November.

1981 — Government of Canada approves $1.4 billion expansion of Norman Wells Oilfield and facilities, as well as Norman Wells Pipeline Project from Norman Wells to Zama, Alberta. Oil prices begin to decline owing to global economic recession and resulting weakening of demand from consumers to petroleum products.

1982 — Esso Resources Ltd. begins pre-construction phase of Norman Wells Expansion Project. IPL tenders contracts to northern businesses for pipeline right-of-way clearing. World oil prices continue to moderate with OPEC crude oil set at about $212/$m^3$ (US).

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