HALIFAX REFINERY
(IMERoyal)

1950
HALIFAX REFINERY

(Imperoyal)

Located two and a half miles south of Dartmouth, N.S., across the harbor from Halifax.

Capacity - 22,000 barrels per day.

Major Products - Gasolines, domestic and diesel fuels, bunker fuels and asphalt.

Crude Source - Venezuela, Middle East.


Total number of employees - 495
No. of houses in company townsite - 33
No. of employees living in townsite - 33

SUPERINTENDENT

Mr. W. B. Ellsworth
August 1916 - August 1919

Mr. D. M. Allan
August 1919 - December 1930

Mr. R. L. Dunsmore
December 1930 - January 31, 1943

Mr. Charles Scrymgeour
February 1, 1943 - January 15, 1946

Mr. R. D. King
January 16, 1946 - to present
GENERAL

In 1914 the company erected storage tanks in Bedford Basin beyond Halifax Harbor proper. These facilities were found not adequate for wartime needs and early in 1916 the company built a bulk plant for trans-shipment of crude oil from ocean tankers to Montreal East refinery. The plant was located on a 535-acre site with 5,000 feet of waterfront, two and a half miles south of Dartmouth, N.S., across the harbor from Halifax. (Later expansion increased the property to 616 acres.)

Late in 1916 it was decided to build a refinery on this site primarily to serve the Maritimes and Newfoundland. The refinery was completed on February 13th, 1918. Eight hundred men worked on construction under Mr. C.B. Leaver who was succeeded in March 1917 by Mr. C.F. Mechin. The original plant contained ten crude stills, each with 1,100 barrels capacity, but originally handled only 2,200 barrels per day.

The company was able to render great assistance at the time of the Halifax explosion. This occurred on December 6th, 1917, when two ships collided in the narrows. One ship, loaded with benzol and T.N.T., took fire and exploded.

The force of the explosion razed the northern sections of Halifax and Dartmouth, killed 2,000 people and rendered 20,000 homeless. The company rushed construction material and workmen to the cities to help provide shelter and
authorized the expenditure of $10,000 to aid in relief work. One hundred and sixty refugees, including 50 - 60 children, were housed in bunk houses meant for the company's construction men.

By January, 1918, the refugees moved out and construction on the refinery proceeded.

In addition to the ten crude stills there were twenty-eight Burton pressure stills for increased gasoline yield, two steam stills, acid and lye treating plants, an acid recovery plant having a capacity of five to ten tons per day. Steam was generated in four 400 horsepower watertube boilers, (first of their type used by the company). Fresh water (for cooling purposes) is obtained from Morris Lake, about two miles inland. A company townsite, Imperial, was built to house many of the refinery's employees. It was part of a $400,000 housing project which was carried out at several of the company's refineries.

At the time the refinery began operating W. B. Ellsworth was superintendent, C. B. Leaver was assistant superintendent, J. L. Stewart, mechanical superintendent and J. L. Isonor, accountant.

The early history of the refinery was comparatively uneventful, marked only by improvements and expansion in operating techniques and equipment. By 1924 the refinery was handling 8,000 barrels per day, and employed 414 persons. In 1927, needing land for expansion, the company bought the
property on which Fort Clarence stood. This was the old eastern battery built in 1754 to defend Halifax Harbor.

Two high-pressure, high-temperature "tube and tank" type cracking units were installed in 1928 for the production of higher quality gasoline.

On July 11th, 1933, Colonel and Mrs. Charles Lindbergh arrived at the refinery to refuel their plane while mapping an aerial route from North America to Europe. They spent the night with Mr. and Mrs. R.L. Dunsmore -- then superintendent of the refinery.

Also in 1933 an aerial armada of 24 Italian sea planes under General Italo Balbo flew the Atlantic and visited Canada on its way to the World's Fair at Chicago. Italian sub-marines which patrolled the trans-ocean route followed by the armada called in at Halifax refinery to refuel.

WARTIME ACTIVITY

During both World Wars Halifax refinery played an important role supplying fuel to war ships and merchant vessels of every type. In World War I (during construction of the refinery) storage tanks were turned over to the British government for fuel oil storage as soon as they were built. The equipment was of great help in refuelling ships and as much as 225,000 barrels of fuel oil were shipped out in a single month.

The demands of World War II were much heavier and the British Petroleum Board set up a "shuttle service"
depot at the refinery to trans-ship oil products from the U.S. which was at that time neutral. At first the British Petroleum Board rented five 80,000 barrel tanks but it was decided to erect seven 100,000 barrel tanks. To make room for them Port Clarence was razed. Four 100,000 barrel tanks were erected on that site and three pre-stressed concrete tanks (to save steel) were erected at the refinery tank “farm”. Two additional docks were built, pump houses and miles of pipe installed to handle the load. In all, 33,000,000 barrels of oil products were handled and 477 tankers entered the harbor during the war. Many of the world’s greatest war ships refuelled there.

The refinery capacity was increased from a pre-war average of 3,960,000 barrels per year to 6,850,000 barrels per year during the five war years. As much as 41,000 barrels per day of crude oil was refined and an average of 400,000 barrels per month of bunker fuel produced.

With the end of the war, Halifax refinery settled back to its normal duty of supplying the Maritimes and Newfoundland. Its present capacity is 22,000 barrels daily.

**EQUIPMENT**

**Tanks** - There are 154 tanks of all sizes, the largest being 130 feet in diameter by 42 feet high. Total storage capacity - 3,251,912 (for publication, use the figure 3,000,000).

Included in the tankage are:

3 - pre-stressed reinforced concrete

2 - balloon roof (to prevent loss of volatile products)
1 - floating roof (to prevent loss of volatile products)
1 - spheroid (to prevent loss of volatile products)

Combination Unit - Capacity - 16,000 B/D

In 1938 the cracking units which were built in 1928 were converted into a combination unit by adding a crude distillation tower and auxiliary equipment. This unit now distills crude oil and cracks reduced crude and gas oil.

Gas Absorption Plant - Originally built in 1925, a new unit was constructed in 1932-33.

Treating Plant - Installed in 1938 to treat refined products.

Continuous Crude Stills - Capacity - 14,000 B/D

Installed in 1921. There are eight of these 40'6" x 14'6" shell stills.

Rerun Stills - Six stills were built in 1921 to further refine light distillates. Three of these were dismantled in 1937.

Asphalt Stills - Ten 40'6" x 14'6" stills were built in 1919. In 1932, four stills were converted to use as asphalt manufacturing unit and the remaining six stills were used for storing asphalt.

In 1938 an automatic proportioning device was installed to blend asphalt to meet specifications.

Ethyl Plant - In 1926 equipment was installed to blend ethyl fluid into gasoline.
Low-Pressure Steam Still - From 1936 'till 1942 this unit was used to make aviation gasoline. Since then it has been used for the production of solvents.
MONTREAL EAST REFINERY

1950
MONTREAL EAST REFINERY

On the north bank of the St. Lawrence River about 10 miles east of Montreal

Capacity - 44,000 barrels per day.
Major Products - Motor gasolines, domestic and diesel fuels, lubricating oil distillates, asphalts.
Crude Source - Venezuela and Middle East.
Marketing Area - Normal assignment including Province of Quebec, Eastern Ontario and Northwestern New Brunswick.

Total number of employees - 327
No company townsite - 6 company-owned houses

SUPERINTENDENTS
A. W. Foreman
D. M. Allan
J. L. Finley
C. B. Leaver
T. M. Morrman
F. C. Mechlin
R. L. Dunsmore
A. C. Harrop

TERM OF OFFICE
Mar. 1, 1916 - Summer 1918
Summer 1918 - Autumn 1919
Autumn 1919 - Jan. 31, 1921
Feb. 1, 1921 - Dec. 31, 1922
Jan. 1, 1923 - Jan. 31, 1923
Feb. 1, 1923 - Sep. 15, 1944
Sep. 16, 1944 - Dec. 1, 1945
Jan. 1, 1946 - To present
GENERAL

During 1915 the company started to build a bulk oil plant near the town of Montreal East -- some twelve miles east of downtown Montreal. However, in line with the company's expansion program due to the tremendous increase in demand for petroleum products during World War I, instructions were issued to enlarge the bulk plant to a refinery and construction on the refinery started in January, 1916.

The refinery is situated on a 200 acre site fronting on the St. Lawrence River and extending 1-1/4 miles back across Notre Dame St. to Sherbrooke St. A tank farm consisting of fourteen 92,000 barrel tanks was established above Sherbrooke St. - north east of the refinery site as part of the modernization program completed in 1948.

The first crude was run in December, 1916, and the refinery then had a capacity of 4,000 B/D.

Original equipment included fourteen 420-barrel crude stills, three 1,000-barrel rerun stills, fourteen Burton pressure stills for increased gasoline yield, six 1,000-barrel asphalt stills and auxiliary facilities. Montreal East was the first refinery in Canada to manufacture asphalt from crude oil. A dock, 250 feet long accommodated tankers bringing crude oil and ships which called in to refuel. There was also a drum plant which could turn out 350 drums per day.
In 1919 the refinery employed 500 men -- 70% were French Canadians. Increased asphalt business necessitated building four more 1,000-barrel asphalt stills, another drum filling building and increasing the capacity of the drum plant to 700 per day. The refinery could manufacture about 200 tons per day of asphalt. The following year (1920) asphalt production was doubled to 400 tons per day to meet demand.

The dock was enlarged to 750 feet early in 1923 to take care of the increased demand for bunker fuel. In the same year alterations to refinery equipment increased refinery capacity by 46%. Bubble towers, first of their kind in Canada, were installed on the rerun stills.

Two cracking units of the Standard Oil high-pressure, high-temperature "tube and tank" design were built during 1927 to produce gasoline of higher quality. At this time the refinery had a storage capacity of 1,900,000 barrels. During the same year it was stated that Montreal East's asphalt stills were responsible for 90% of the asphalt paving, roofing and linoleum flooring in Canada.

In the spring of 1928, ice blocked the St. Lawrence River and the lower refinery was flooded. During this year the refinery reached a capacity of 25,000 barrels per day. A new process for continuously distilling lubricating oils under high vacuum was devised by company engineers and the No. 1 vacuum flash unit was installed at Montreal East in 1928. In 1930 a
second unit was built. Later, in 1937, the two units were combined into a combination atmospheric and vacuum flash unit. This project necessitated dismantling of No.10 asphalt still. The same year (1937) No.2 cracking coil was converted into a combination unit for combined skimming and cracking of Quiriquire crude oil by the installation of a crude heater and fractionator ahead of the cracking coil proper.

The refinery received its crude oil by tanker. In 1939 the dock was extended to a length of 959 feet. Since the St. Lawrence freezes over in winter it was necessary to curtail operations during the period of closed navigation. During World War II a pipe line was constructed by the Standard Oil Company, from Portland, Maine, to Montreal East, to conserve shipping by eliminating the long haul around the Maritimes and up the St. Lawrence. The pipe line was 236 miles long, 12 inches in diameter and had a maximum capacity of approximately 52,000 barrels daily.

As a result, local refineries can now operate throughout the year. Following the war, the pipe line was bought jointly by Imperial, Shell, McColl-Frontenac and British-American. Imperial has a 40% interest in the line. Recent changes have increased the capacity to a maximum of 80,000 barrels per day and at the present time an additional line is being laid which will raise capacity to 127,000 barrels daily.
During the war years plans were developed for an extensive modernization program. Construction was initiated in 1946 and the job was finished in the autumn of 1948. Work was delayed by material shortages and other difficulties. The program involved increasing the refinery capacity from 25,000 to 37,500 barrels per day by the addition of new equipment and modification of existing units to fit in with the program.

New equipment included a 13,200 barrel per day crude pipe still, and 11,000 barrel per day fluid catalytic cracking unit (first of its type in Canada), a 4,200 barrel per day catalytic polymerization unit, and a light ends unit.

Additional water pumping and steam-generating facilities are included as well as 23 new 100,000 barrel storage tanks.

Revisions to present equipment have permitted increasing refining capacity to 44,000 barrels daily.

The refinery ships out over 13,000,000 barrels yearly of 1/43 brands of finished products, half of which is shipped by tankers, the balance by tank cars and tank trucks. Tank car loading racks can fill 120 tank cars per day and the tank truck loading rack serves up to 125 trucks per day, although in peak periods more than 500 tank trucks have been loaded in 24 hours.
EQUIPMENT

Tanks - There are some 250 storage tanks of various sizes, the largest being 142 feet in diameter by 52 feet high. Total storage capacity is 5,556,400 barrels (for publication use the figure 5,000,000). Montreal refinery also contains one of Imperial's two spheroid storage tanks. Shaped like an enormous tomato, the spheroid tank is used to store volatile products under pressure.

Crude Distillation Units - The new crude pipe still unit commenced operating in the spring of 1948. Other crude processing facilities consist of two three-still crude batteries and the combination atmospheric and vacuum unit. The atmospheric and vacuum unit processes raw lubricating distillates by distillation under high vacuum. Nos. 1 and 2 vacuum flash units, built in 1928 and 1930 respectively, were converted to act as a combination atmospheric and vacuum flash unit in 1937. The raw distillate from this plant is shipped to Sarnia for final processing.

Fluid Catalytic Cracker - First of its kind in Canada, this unit was officially opened in September, 1948 to make high octane gasoline. Its current rated capacity is 12,200 barrels daily.

Light Ends Plant - Separates certain hydro-carbon gases and low boiling liquid hydro-carbons from products of distillation and cracking. Started up in late 1948.
Catalytic Polymerization Plant - Processes light olefinic feed stock (C₃, C₄ and C₅ hydrocarbons) from the Light Ends plant to make high octane blending agent for gasoline.

Asphalt Stills - In 1916, six 1,000 barrel asphalt stills along with their auxiliary equipment were erected for the manufacture of asphalt. The six original stills, along with three erected at a later date, are still in service. This was the first plant to manufacture asphalt from crude petroleum in Canada.
SARNIA REFINERY

1950
SARNIA REFINERY

On the east bank of the St. Clair river
just south of Sarnia.

Capacity
55,500 barrels per day.

Major Products
Liquefied petroleum gas,
gasolines, naphtas, domestic
and diesel fuel oils, lubricants
and greases, heavy fuel oils,
asphalt.

Crude Source
Mid-continent fields of the
U.S., Southwestern Ontario.

Marketing Area
Ontario and eastern fringe of
Manitoba.

Total number of employees - 2,300
No company townsite

SUPERINTENDENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Term of Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. P. Chamberlain</td>
<td>1897 -1899, superintendent</td>
</tr>
<tr>
<td>C. O. Stillman</td>
<td>1899 -1910, superintendent</td>
</tr>
<tr>
<td>W. J. Gilchrist</td>
<td>1910 -1922, superintendent</td>
</tr>
<tr>
<td>C. B. Leaver</td>
<td>1923 -1931, superintendent</td>
</tr>
<tr>
<td>G. L. Stewart</td>
<td>1931 -1934, gen. supt.</td>
</tr>
<tr>
<td>C. E. Carson</td>
<td>1934 -1944, gen. supt.</td>
</tr>
<tr>
<td>J. Dean Bradley</td>
<td>1944 -1947, gen. supt.</td>
</tr>
</tbody>
</table>
GENERAL

The company was first organized as the Imperial Oil Company Limited in 1880 at London, Ontario. Shortly thereafter the refinery operations were concentrated in Petrolia. By 1896 business had increased to the point where greater refining capacity was needed and it was decided to move the refinery to Sarnia from where products could be shipped in bulk by boat to effect transportation economies.

In 1896 the company purchased the Bushnell Oil Co. property on the St. Clair River, just south of Sarnia. This refinery was originally built by the Dominion Oil Company in 1871 and had been operated by the Alpha Hall Oil Company and the Canadian Oil Co. (no connection with the present firm of that name).

In January, 1897, Messrs. H.P. Chamberlain and C.O. Stillman arrived at Sarnia to take an inventory of equipment. They found: three 400 barrel crude stills, one 500 barrel reflow still, two 200 barrel tar stills, two 50 barrel reducing stills, four boilers, refined oil agitators, pump houses and storage tanks. At that time the refinery had a capacity of about 300 barrels per day.

The refinery was served by a 2" pipe line running from the Lawyers' pumping station near the Rainsberry field, and crude was also brought to the refinery by team over a
planked road between Petrolia and Sarnia, with toll gates at each end. Imperial installed a 3" line from the Twelfth Line pumping station which served the Petrolia and Oil Springs fields.

Imperial set about rebuilding the refinery in the spring of 1897 and some equipment was moved in from Petrolia. The company started to hire men in May of 1897. In those days labor was paid $1.10 a day. (Among those hired was Tom Montgomery who subsequently held the position of chief engineer for many years). The refinery, as rebuilt, had an initial capacity of 900 barrels per day. In February of 1899 the Cooper shop turned out its first wooden barrel. In 1900 the Tunnel Hotel, built during the construction of the Sarnia-Fort Huron railway tunnel, was purchased by the company as an office.

By 1903 crude production in the western Ontario fields had fallen to some 1,300 barrels daily, and because of a 5% per Imperial gallon duty on crude oil it could not be profitably imported and refined. Sarnia refinery's staff had been reduced to 111 employees and it seemed that the refinery might have to be closed due to the inadequate supply of crude from the Petrolia fields. The attention of the government was drawn to this situation and in 1904, after investigation, the import duty on crude oil of .825 specific gravity or heavier, was removed, and for years thereafter crude was imported from Ohio by boat during the navigation season and by
tank cars during the winter. To compensate Canadian producers, a bounty of 1-1/2¢ per Imperial gallon was paid on all crude produced in Canada. This was paid until 1924 when it was reduced to 3/4 of a cent and then abolished the following year.

In 1904 superintendent C.O. Stillman (later president of the company) thought that the refinery was "big enough" but at this time there were only some 500 motor cars in Canada and the great expansion of the west was yet to come. The demand for products increased rapidly and by the end of 1905 the refinery was processing some 2,300 barrels daily.

In 1906 a candle works was built.

In 1910 an expansion and rebuilding program was started and by 1919 the capacity of every department had been more than doubled.

During the 1910-1919 expansion program four new refineries were built - (Ioco, Regina, Halifax and Montreal). Two hundred and twenty-two stills, 4,600,000 barrels of refinery tankage, and 2,340,000 barrels of marketing tankage were built by the mechanical department at Sarnia. As many as 4,000 men were employed at peak periods. The refinery's mechanical shops turned out hundreds of 11-1/2' x 20' prefabricated tanks for the rapidly growing distribution stations in western Canada.

A new office building was erected in 1912 and a wing was added to it in 1919. A new candle works was built
in 1914 and it contained 28 candle moulding machines, three Parowax moulding machines and facilities for the manufacture of hand-dipped and fancy candles. In 1917 over 1,800,000 lbs. of candles were shipped out.

In 1912 Ontario crude production was only 658 barrels daily compared with the refinery's needs of 3,113 barrels daily. The volume of crude oil imports warranted construction of a 6" pipe line, 153 miles long, from Cygnet, Ohio, to the international boundary (about 4 miles south of Sarnia) where it connected with the line to the refinery. The cost of constructing this line was about $1 million. Pumping stations were located at Cygnet, Ohio, and Wayne, Michigan. Originally crude came from the Ohio fields but later the Mid-Continent field became the main source of supply. At first the pipe line handled about 3,000 barrels daily but by January of 1918 it was carrying 10,000 barrels daily following construction of additional pumping stations at Sylvania, Ohio, and Utica, Michigan.

In 1916 the executive offices of the company were moved to Toronto.

In 1917 girls were employed in the laboratories at Sarnia due to a shortage of man power. In the same year the grease plants turned out 8,000,000 lbs. of grease which was packaged in 1,600,000 containers.

In 1919 the refinery's daily capacity was 10,000 barrels which was handled by 22 crude stills. Strange as it
may seem, with such an abundance of fuel in the refinery, coal was used to fire the stills. In 1918, 185,000 tons of coal were unloaded at the refinery docks.

In 1922 work began on an experimental program to produce improved types of lubricating oils by means of distillation in shell stills under vacuum. As a result, Marvelube oil was introduced to the public on April 20th, 1926.

In 1924 the refinery had 1,500 employees and processed over 10,000 barrels daily. In the same year Dr. R.K. Stratford came to Sarnia as chief research chemist.

In 1925 the first "cracking coils" were installed at Sarnia to produce increased amounts of better quality gasoline. These were of the Standard Oil low pressure "tube and tank" type. (The name "cracking coils" was derived from the fact that the oil was heated by passing through coils of pipe arranged along the walls and ceilings of a furnace rather than in the old shell stills). In the same year Dr. Stratford devised a method of treating the cracked gasoline with clay to improve its storage stability.

These cracking coils superseded the old battery of forty Burton pressure stills which had been built at #2 plant during the years 1914-1917. In 1927-28 four more cracking units of the Standard Oil high pressure "tube and tank" design were built at #2 plant. By 1927 the refinery was processing 15,500 barrels daily and manufacturing some 381 products.
Shell stills for the vacuum distillation of lubricating oils were supplanted in 1928 by a combination atmospheric and vacuum flash coil. This unit permitted continuous distillation of lube oil fractions under vacuum by using pipe coil heaters to raise the temperature of the feed stock. In 1928 the research laboratory began investigating solvent extraction processes for removing undesirable components from lubricating oils. As a result of this work the first commercial phenol treating unit was put into operation in 1930 at #2 plant. Since that time improvements have been made in the process and it is used widely throughout the world for the production of better quality lubricating oils.

A new building to house the expanding technical and research department was opened during the summer of 1930.

For better control of gasoline quality, a debutanization, stabilization and gas absorption unit was built at #2 plant in 1932. This unit regulates the volatility of gasoline and also recovers gasoline components which formerly escaped in the refinery gases.

During the summer of 1933 the Earl of Bessborough, then Governor General of Canada, paid a visit to the refinery. In this year too, the research department began investigating the use of solvents for dewaxing lubricating oils. This process, using methyl-normal-propyl-ketone, was put into commercial operation at Sarnia in 1938.
The old wooden barrels in which oil products were shipped were becoming outmoded. Modern equipment for making steel drums, kegs, etc. was installed at the refinery and the first steel drum was turned out in June of 1934. The drum plant had a daily capacity of 1,000 grease kegs, 800 asphalt drums or 750 lubricating oil drums and could turn out 15 different types of containers. (In August of 1940 the plant turned out its millionth drum and three million had been turned out by the spring of 1950).

Sarnia refinery had 1,700 employees in 1934.

The research department began work during 1934 on a project which resulted in the development and commercial operation (in 1940) of the suspensoid catalytic cracking process.

In 1936, following a study on naphtha specialties (solvents, etc.) the column steam stills were built at No.1 plant. Products having very precise boiling ranges were fractionated by using steam as the heating medium instead of fired furnaces.

In 1938 the old wax pressing building was remodelled and the presses discarded to make way for a new solvent dewaxing unit. The new unit permits the removal of wax from lubricating oil distillates as a continuous process.

The start of the second World War in 1939 brought to the refinery a diversification of activities. The suspensoid catalytic cracking process was installed on four of
of the old style cracking units in 1940. Throughput was increased when the new 26,000 barrel per day topping and coking unit was completed in April of 1941.

The refinery's mechanical shop personnel were engaged in many war jobs for "Petroleum Wartime Shops". Among the material of war turned out were reversing engines for corvettes, gun shields for cargo ships and shell storage racks for warships.

The loss of rubber plantations to the Japanese made it imperative to produce synthetic rubber and on March 27, 1942, a crown company, the Polymer Corporation, was formed. A plant was built near Sarnia refinery and Imperial organized the St. Clair Processing Corp. to train employees and to operate eight of the ten processing units at the Polymer plant. An additional suspensoid cracking unit was built at the refinery by Polymer and all units were changed over to supersuspensoid conditions to produce the amount of hydrocarbon gases required to make synthetic rubber.

The two-cracking units built in 1925 were converted to make cumene - a very high octane blending agent for aviation gasolines. (This operation was discontinued at the end of the war).

At the end of the war Sarnia refinery returned to normal conditions. The super-suspensoid cracking operation reverted to normal suspensoid. The St. Clair Processing
Corporation agreement was terminated in August of 1946. During this year the refinery throughput was 16,000,000 barrels, almost double that of 1939.

A pilot plant for more intensive study of the suspensoid cracking process was completed early in 1946. Later in the year an 80 mile "loop" of pipe was laid on the Cygnet-Sarnia pipe line thus increasing capacity of the line by 12,000 barrels daily.

In June of 1947 Sarnia refinery celebrates its 50th anniversary with appropriate ceremonies.

To meet the greatly increased demand for oil products the capacity of the refinery was expanded in 1948 by converting some old unused equipment to additional crude distillation duty. The refinery now has a capacity of 52,000 barrels daily.

As the result of trying out different catalysts and operating conditions in the suspensoid pilot plant it was decided to build a catalyst regenerator for the suspensoid cracking unit.

The growing demand for L.P.G. (liquefied petroleum gas) in areas not served by gas mains resulted in the construction in 1950 of an L.P.G. processing unit. This unit will have a maximum capacity of 800 barrels daily.

Sarnia refinery will be receiving Alberta crude oil in 1951 and a new dock is being built at a cost of some
$500,000 to accommodate the big 620 ft. tankers which will be delivering it. It is expected that the refinery will receive 10,000,000 barrels of crude from Alberta during the navigation season. In addition, 20 new 150 foot diameter by 48 foot high storage tanks are being built at the refinery to store 3,000,000 barrels of crude oil for the winter months when navigation is closed.
REGINA REFINERY

1950
REGINA REFINERY

Located near the northern limits of the city of Regina

Capacity - 20,000 barrels per day.
Crude Source - Edmonton Area.
Marketing Area - All Saskatchewan, west part of Manitoba (fuel oils).
Major Products - Gasolines, naphthas, domestic and diesel fuel oils, heavy fuel oils, asphalt.

Total Number of Employees - 307
Number of Houses in Company Townsite - 30
Number of Employees Living in Company Townsite - 33 refinery and 3 marketing.

SUPERINTENDENTS

C. M. Moore - 1916 - 1922
George Leach - 1923 - 1933
C. E. Carson - 1933 - 1934
F. C. Lantz - 1934 - 1935
A. C. Harrop - 1936 - 1939
C. R. Moore - 1940 - 1949
W. O. Longworthy - 1949 - to present
GENERAL

Late in 1915 it was decided to build a refinery at Regina. Tom Montgomery, then Imperial's chief engineer, was asked how soon he could build it and quoted the date July 15, 1916. During the winter of 1915-1916 he chose the 55-acre site on the northern limits of the city, erected temporary buildings to house the construction crew and construction began on April 1. Advertisements were placed in United States and Canadian papers for workers and in two weeks one thousand men turned up.

Construction was difficult, extreme cold of the Prairies necessitated burying water lines 7-1/2 feet below the surface to avoid frost and a sticky gumbo mud made the surface bad.

Some tankage was completed in May 1916 and the first crude oil shipped in from Wyoming. The refinery was finished by July 15, 1916 with the exception of pumps which were very hard to obtain. Operations began on September 9, upon arrival of the pumps. Cost of construction was $2,500,000.

The refinery was originally designed to handle 1,500 barrels per day of crude oil, but additional equipment was added to meet the growing demand for petroleum products in that area. By 1919 the plant was processing 2,500 barrels per day. Original equipment included a battery of shell
stills for crude distillation, six Burton pressure stills for increased gasoline recovery, rerun stills, treating plants and steam generating equipment. As there is no river or lake nearby the refinery takes its water from wells. The water used in processing is conserved by returning it to a cooling pond from which it is re-circulated throughout the refinery.

In 1927 a 5,000 barrel per day cracking unit of the Standard Oil high pressure, high temperature "tube and tank" design was installed for increased gasoline quality. The growing demand for asphalt brought about the construction of an asphalt plant in 1928. Tar from the cracking unit is processed into paving asphalt and binder for coal briquettes.

After Turner Valley came in as a major oil field in 1936, Regina refinery received much of its crude from that source. The crude had a high mercaptan sulphur content and it was necessary to build a unit to remove sulphur compounds from the white products. A bauxite treating plant was constructed in 1938-39 by Foster Wheeler Limited. The unit removes sulphur compounds by catalytically desulphurizing the mercaptans to H2S (hydrogen sulphide) which is easily removed.

World War II brought important additions to the refinery. A non-selective high pressure catalytic polymerization unit (commonly known as the cat poly unit) originally to have been built at Calgary was erected at Regina by Foster Wheeler Limited in 1941-42.
This unit chemically combines two gaseous hydrocarbons -- propylene and butylene -- to make some 250 barrels per day of high octane polymer gasoline. Clay pellets impregnated with phosphoric acid are the catalyst which guides the reaction.

In 1943 the absorption and reforming unit was constructed by the Canadian Kellogg Company as one section of a future combination unit which would have a capacity of 12,000 barrels per day. Its purpose was to increase the yield and quality of aviation and motor gasolines, increase crude throughput by cracking additional gas oil and to prepare feed stock for the cat poly unit. This addition increased refinery capacity from 7,000 barrels per day to 9,500 barrels per day.

During its early days the refinery received crude oil by tank car from Wyoming and Montana. In order to facilitate unloading tank cars in winter a shed was built in 1917 in which several cars could be heated at one time.

Declining production from Turner Valley towards the end of World War II made it necessary to go farther afield for crude oil and some crude was being hauled from Texas -- 2,000 miles to the south. Between 20 and 30 different types of crude oil have been processed at the refinery.
Since the discovery of Leduc, Woodbend and Redwater fields near Edmonton, crude from these sources has gradually replaced imported crude. During the summer and autumn of 1950 the Interprovincial pipe line was constructed from Redwater via Edmonton to Superior, Wisconsin. The first section of the line (between Edmonton and Regina) was opened on October 4 and the first crude arrived in Regina on October 23rd. Lower transportation costs permitted a reduction of up to 4 cents on gasoline and kerosene.

Since the war a "bottle-neck" removal program has increased capacity to 20,000 barrels per day. A fire and explosion in the spring of 1949 reduced capacity by several thousand barrels per day. To replace this lost capacity the bauxite plant (not needed with the new crude source) was re-modelled into crude distillation equipment.

In line with the needs of an agricultural province the refinery's main products are gasoline and tractor and diesel fuels for the mechanized farms. The refinery also supplies some 500 bulk stations with kerosene, stove oil, fuel oil and asphalt.

**EQUIPMENT**

**Tanks** - There are 109 storage tanks, the largest being 120 feet in diameter by 48 feet high. Total storage capacity is 1,351,092 (for publication use 1,200,000).
Crude Stills - Most of the crude shell stills which formed part of the original equipment were destroyed by fire in 1949. However some are still in operation chiefly for production of natural asphalt.

Cracking Unit - This 5,000 barrel per day tube and tank unit of Standard Oil design was built in 1927. In 1939 extensive alterations were made to increase the capacity.

Asphalt Plant - Built in 1928 to make asphalt from tar obtained from the cracking unit.

Bauxite Plant - Built in 1938-39 by Foster Wheeler Limited to catalytically desulphurize white products by converting mercaptan sulphur compounds to hydrogen sulphide which can be easily removed. In 1949 this unit was converted into crude distillation equipment and is now capable of processing over 17,500 barrels of Redwater crude a day.

Non-Selective High-Pressure Catalytic Polymerization Plant - This unit, built in 1941-42 by Foster Wheeler Limited makes some 250 barrels per day of high octane polymer gasoline from propylene and butylenes.

Absorption and Reforming Unit - Built in 1943 by the Canadian Kellogg Company as one section of a future combination unit. It was designed to increase the quantity and quality of gasoline, increase the crude throughput by cracking additional
gas oil and to prepare feed stock for the cat poly plant.

This unit also incorporated a special waste heat boiler which utilizes the heat in the furnace flue gases to generate some 36,000 lbs. per hour of steam.

**Water** - The refinery is supplied by water from wells on the refinery site. Owing to the lack of adequate quantities of fresh water for cooling purposes, all water is recirculated to a cooling pond 144 feet by 194 feet by 11 feet deep where there is a spray cooling system. In 1943 and 1945 cooling towers equipped with three fans each were installed to improve the cooling capacity of the system.

Due to the extreme "hardness" of the well water and the danger and damage of heavy scale deposits in the equipment and boilers all water is "softened" by chemical treatment.
CALGARY REFINERY

About 4 1/2 miles southeast of downtown Calgary on the banks of the Bow River.

Capacity: 9,200 barrels per day.

Major Products:
aviation and motor gasolines,
domestic and diesel fuels,
heavy fuel oil, asphalt.

Crude Source:
Turner Valley and Edmonton area

Marketing Area:
southern Alberta and southeast British Columbia.

Total number of employees - 370
No company townsite

SUPERINTENDENTS
C. M. Moore
J. J. Hanna

TERM OF OFFICE
1922 - 1948
1948 - to present

(This refinery is unique in that it was under the charge of Mr. Moore for 26 years. He came to Calgary for the construction and remained there first as superintendent and then as general superintendent until 1948).
GENERAL

In 1922 changing conditions in the sources of supply of crude oil and the consumption of refined products were such that Imperial decided to build a refinery at Calgary. The site selected consists of 117 acres on the bank of the Bow River. Original capacity of the refinery was to be 2,500 barrels per day but changes made during construction increased it to 4,000 barrels per day.

The refinery was built under the supervision of Tom Montgomery, then Imperial's chief engineer. Between 1,000-1,500 men worked on the construction and the refinery commenced operating in November 1923.

This was before the Turner Valley oil field had been developed and crude supplies came to the refinery by rail, chiefly from Wyoming and Montana. In 1936 oil was discovered in quantity at Turner Valley and since then this source has supplied the requirements of Calgary refinery by means of a 31-mile pipe line.

The original equipment included shell stills for crude distillation, rerun stills, treating plants and four of the then new low-pressure "tube and tank" cracking units designed by Standard Oil.

The refinery was visited in 1924 by the Prince of Wales, now Duke of Windsor, and in 1927 by Viscount Willingdon.
An asphalt plant was built in 1928 to meet increased demand for this product.

When Turner Valley became the main source of supply for Calgary refinery in 1936, it was found necessary to build a treating plant to remove sulphur compounds from the white products as Turner Valley crude has a high mercaptan sulphur content. A 5,000 barrel per day bauxite treating plant was erected for this purpose in 1937. Bauxite acts as a catalyst to convert mercaptan sulphur (hard to remove) to hydrogen sulphide which is easily removed by further treating.

In 1939 an 8,600 barrel per day combination unit was built to replace the original three crude shell stills and the four low-pressure cracking coils. This unit combines crude distillation and gas oil and reduced crude cracking in a continuous operation thus dispensing with the need for intermediate storage during processing. Changes have been made to the unit to increase its capacity to 10,000 barrels per day. The first alkylation unit in Canada was completed by the M. W. Kellogg Company at the refinery in 1944 for the Allied War Supply Corporation. Imperial operated this unit for the government. The purpose of this unit was to make alkylate - a high-octane blending agent for the 100-octane aviation fuel used by the armed forces. Imperial purchased this unit from the government after the war.
In line with the needs of an agricultural province, the refinery's production is mainly gasolines, tractor and diesel fuels. This refinery formerly served all of Alberta but since Edmonton refinery has been built the Calgary refinery production is distributed in the southern half of the province.

**EQUIPMENT**

**Tanks** There are 254 tanks of all sizes on the refinery property the largest being 120 feet in diameter by 42 feet high. Total storage capacity is 1,641,947 barrels (for publication use 1,500,000).

**Combination Unit**

Built in 1939 by the M.W. Kellogg Company to replace the original three shell stills (for crude distillation) and the four low-pressure "tube and tank" cracking coils (Standard Oil design) built in 1923. Originally designed to handle 8,600 barrels per day of crude oil, changes have been made to increase its capacity to approximately 10,000 barrels per day.

**Rerun Stills**

Built in 1923 to rerun acid treated gasoline. Occasionally two of the stills are put in crude service to improve crude throughput.

**Alkylation Plant**

Built by the M.W. Kellogg Company on Imperial property for the Allied War Supply Corporation and completed
in February 1944. This unit is designed to produce high-octane blending agent to manufacture 100-octane aviation gasoline. The unit uses sulphuric acid catalyst and a reactor temperature of 350°F to combine isobutane and butylene into alkylate. The isobutane comes from Royalite (natural gas), British American Oil Company and Gas and Oil Products Company. Butylene is derived from refining operations at Imperial's and British American's Calgary refineries. The charge rate is about 3,700 barrels per day.

**Bauxite Plant**

Having a capacity of approximately 5,000 barrels per day this plant was built in 1937 to improve octane number of gasoline and to reduce the sulphur content of white products made from Turner Valley crude.

**Asphalt Plant**

Built in 1928 to make asphalt from cracking unit tar. The furnace from the former No. 1 cracking unit is used as a heater. The unit now uses tar from the new combination unit. Vacuum equipment to improve the operation of the plant was added in 1947, and this enables the plant to use reduced crude for manufacture of additional products.

In addition to the above there are the usual treating plants, steam generating facilities and auxiliary equipment.
EDMONTON REFINERY

On south bank of North Saskatchewan River
about 3-1/2 miles east of Edmonton

Capacity - 20,700 barrels per day.
Major Products - gasolines, kerosene, diesel fuels, light industrial fuel, bunker fuel.
Crude Source - Edmonton area.
Marketing Area - Northern Alberta.

Total number of employees - 225.
No company townsites.

SUPERINTENDENT
H.H. Moor

TERM OF OFFICE
1948 to present
GENERAL

Oil was discovered near the town of Leduc, Alberta, on February 13, 1947, by Imperial Oil. After several months of development work it was found that the Leduc area could be classified as a major oil field, having an estimated reserve in excess of 100 million barrels of high grade crude oil. (Since then it has been determined that the field contains some 200 million barrels).

Oil was trucked from the wells to hastily constructed tank car loading rack at Nisku, some eight miles east of the field. From Nisku the oil was transported by rail to Imperial and other refineries.

Recognizing the urgent need for additional refining capacity in the west the company decided to build a refinery nearby to handle production and save freight costs. A 360-acre site was purchased on the south bank of the North Saskatchewan River some 3-1/2 miles east of Edmonton.

The refinery itself was purchased for $1 million from the U.S. government. It had been erected at Whitehorse, Yukon Territory, by the U.S. Army as part of the emergency wartime Canal project designed to supply Alaskan forces with fuels.

Part of the crude distillation unit and the cracking unit came from a refinery at Corpus Christi, Texas; the boilers from a power plant at Hamilton, Ontario; turbines and generators from an idle mill at Pinedale, California. Other equipment
came from 2,000 suppliers through the U.S., and the refinery was assembled at Whitehorse early in 1944. It operated for only a short time and then lay idle until Imperial purchased it.

Imperial engaged the W.M. Barnes Company of Los Angeles, California, to dismantle the 7,000 tons of refinery equipment, truck it 900 miles over the Alaska Highway and then ship it by rail 450 miles to the Edmonton site. Every piece was marked for identification in re-erection and photographs were used as an aid. Ten of the largest vehicles ever to travel the Alaska Highway travelled some 500,000 miles during the moving operation. These trucks weighed 20 tons empty and the largest had 21 forward speeds. (For additional material see "Trail of '48" and 1947-48 Reviews).

The equipment was dismantled, moved and rebuilt during the winter of 1947-48. Eight hundred men were employed to speed the work. The cost of purchasing, moving and re-erecoting the refinery was $8,700,000 (Grassaa 404). Mr. C.E. Carson, then director in charge of manufacturing, stated: "Although a complete new refinery could have been built for this amount, the purchase of Whitehorse refinery would save about eighteen months' time, speed the benefit to the surrounding areas and conserve foreign exchange by replacing imported oil".

Another reason for selecting the Whitehorse refinery was that the equipment could readily be adapted to the requirements at Edmonton.
Construction of the new refinery was under the supervision of Eric S. Davis, formerly assistant mechanical superintendent at Sarnia refinery. Mr. Davis is now assistant superintendent at Edmonton. Mr. E.H. Sherwood, formerly of Iose refinery, is mechanical superintendent.

Edmonton refinery is unique in that many of its processing units are totally enclosed within buildings as protection against the weather.

The refinery was officially opened on July 17, 1948, just ten months after the initial steps and the crude distillation unit was processing 4,000 barrels daily. (This oil was brought to the refinery by tank truck). The cracking units went into operation early in 1949 but prior to this time the refinery had been processing 6,000 barrels daily. An additional crude distillation unit was installed during 1949 which increased capacity and charge rates of 25,000 barrels have been maintained for short intervals. This raised the total cost of the refinery to $12 million.

When the refinery was opened there was an immediate reduction in the price of gasoline, kerosene, distillates and fuel oils at all points in Alberta north of Ponoka. Reductions ranged from 1/10 of a cent to 3.2 cents per gallon, depending upon freight costs.

An eight-inch diameter pipe line, 17 miles long, was laid from the former terminus at Nisku to the new refinery.
This was completed in September, 1948. Nisku still remains a tank car loading point.

Leduc crude contains good lubricating oil fractions and consideration has been given to erect a unit to process lube oils some time in the future.

On December 1, 1948, a further reduction in fuel prices ranging from 2.4 cents per gallon downwards was made throughout Alberta and Saskatchewan. This was a result of greatly increased production from Leduc displacing high-cost imported crude. At this time the price of Leduc crude was lowered by 50¢ to $2.95 per barrel and Turner Valley crude by 43¢ per barrel. Devaluation of the Canadian dollar in the autumn of 1949 brought about a 10% increase in the price of crude. This was followed by a slight increase in the price of products.

EQUIPMENT

Two crude distillation units - total capacity 20,700 barrels per day.

Combination, gas oil and reduced crude cracking unit.

Chemical Treating Units

Storage Tankage for 1,300 million barrels of crude and products.

Boiler House - 4 boilers each producing 60,000 lbs. of steam per hour.

Mechanical Shops

Office and Testing Laboratory
IOTCO REFINERY

1950
IOCO REFINERY

About 11 miles east of Vancouver on the north shore of Burrard Inlet.

Capacity - 12,000 barrels per day

Major Products - Aviation and motor gasolines, light and heavy fuel oils, lubricating oils, asphalt

Crude Source - California

Marketing Area - B.C. west of Rockies including marine terminals along the coast.

Total number of employees - 300
Number of houses in company townsite - 81
Number of employees living in townsite - 77 plus 14 Pensioners

SUPERINTENDENTS

W. Hunt 1914 - 1915
J. E. Sirdevan 1915 - 1925
E. M. Salter 1925 - 1931
A. D. Grant 1931 - 1945
L. T. McNaughton 1946 - 1948
C. Sercymgeour 1948 - to present
GENERAL

To meet the increased demand for oil products throughout Canada at the beginning of World War I, Imperial embarked upon a program of building refineries at strategic locations throughout Canada.

It was decided that the first refinery should be built at Vancouver and Tom Montgomery, then Imperial’s chief engineer, was sent out to select the property. There was a land boom in progress at that time and the sky-high prices asked forced the selection of a site about 11 miles outside of Vancouver on Burrard Inlet. The property is 1000 feet wide by one mile deep, covers over 100 acres and rises to a height of 270 feet.

Construction started in March, 1914, under the supervision of Mr. E.L. Drake and Mr. Montgomery took over from Mr. Drake in July. Six hundred men and 10 teams were used during the construction. The refinery was completed in December, 1914. Operations were to have started at that time but the first tanker load of crude was captured by German naval units operating in the Pacific. The first crude was run in the refinery during January, 1915.

The first crude came from Peru on the "S.S. Azov" and the refinery was processing 1,000 barrels per day in three crude stills.

The refinery site was named IoCo, an abbreviation for
Imperial Oil Company. It was not until 1917 that a road was completed between the refinery site and Vancouver.

Due to its remote location 16 houses and bachelor's quarters were built at the time of construction to house the employees. The townsite which lies adjacent to the refinery is complete with houses, shops, auditorium, 2 churches, school and playgrounds and now contains 81 houses.

The original equipment included shell stills for crude distillation, rerun stills, a battery of Burton pressure stills (for increased gasoline production) and stills for the production of lubricating oils. There was also a mixing and compounding plant for the manufacture of the various types of lubricants.

By 1919 the refinery was handling 2,000 barrels per day and turning out 2,000 barrels per month of 50 different grades of lubricants.

An asphalt plant was built in 1922 to meet the demand for that product.

To increase gasoline quality two of the Standard Oil design low pressure "tube and tank" cracking units were built and put into operation in 1926.

A gas absorption unit was also built in 1926. The purpose of this plant was to extract any liquid fractions remaining in the gases produced by crude distillation and cracking operations. This has since been dismantled. In this
same year Ethyl gasoline was introduced to Canada by Imperial Oil and an Ethyl blending plant was installed at Ioco refinery.

By 1928 the refinery was handling 10,000 barrels per day.

A clay-treating plant was built in 1933 to treat lubricating oils. Oil and clay are mixed, heated and then the clay is filtered out taking with it the undesirable components of the lubricating oil.

In 1934 the No. 2 cracking unit was converted into a crude distillation unit. Having a capacity of 2,600 barrels per day, the unit makes gasoline, diesel fuel and reduced crude oil. Ioco has at times run as much as 15/16,000 barrels per day.

At the present time consideration is being given to modernizing Ioco refinery.

EQUIPMENT

Crude Still - A battery of six shell stills, 14 feet 6 inches in diameter by 40 feet 6 inches long was built in 1914. At the present time four of these are still in crude distillation service.

Column Steam Still - Built in 1934 this unit makes aviation gasoline base stocks, solvent naphtha and other specialty products.

Cracking Unit - Built in 1925-26 these were the Standard Oil design low-pressure "tube and tank" type.
Crude Pipe Still - In 1944 the No. 2 cracking unit was converted into additional crude distillation equipment. It has a capacity of 2,600 barrels per day.

In addition to the above there are the usual treating plants, steam generating facilities and other auxiliary equipment.

Fresh water for the refinery is obtained from Deer Lake, located inland from the refinery. The company is licensed to take 2,000,000 gallons per day.
NORMAN WELLS REFINERY

1950
NORMAN WELLS REFINERY

Canada's most northerly refinery situated on the 65th parallel of latitude some 30 miles south of the Arctic Circle.

Capacity - 1,500 barrels per day.
Major Products - aviation and motor gasolines, diesel fuel oils and heavy fuel oil.
Crude Source - Norman Wells, Bear Island and Goose Island fields.
Marketing Area - Northwest Territories.

Total number of employees - 68.
Number of buildings on company townsite - 34 active, 40 inactive.
Number of employees living in townsite - 73, 5 Calgary Producing.

In addition to Imperial Oil Limited employees the settlement is made up of members of the department of Transport Radio Range and Radiosonde, signalmen of the Royal Canadian Corps of Signals and in the summer a detachment of the R.C.A.F.

SUPERINTENDENTS        TERM OF OFFICE
K.M. MacKenzie           January 1948 - to present
GENERAL

In 1789 Sir Alexander Mackenzie noted a seepage of petroleum near Fort Norman on the river which he named. About the year 1916 a Calgary syndicate, the most active members being Col. Woods, editor of the Calgary Herald and Freddy Lowes, a Calgary real estate agent, staked petroleum and natural gas claims at Fort Norman. These claims were taken over by Imperial Oil Limited prior to 1919, the Wood Syndicate retaining a 10% royalty interest.

This royalty was later reduced to 4% by purchase of certain syndicate royalty interests by Imperial Oil Limited. Dr. Bosworth, an English geologist, reported on these claims for both the Woods Syndicate and the Imperial Oil Limited. It was as a result of his work that in 1919 drilling equipment was moved with great difficulty to a location about 53 miles northwest of Fort Norman on the right bank of the Mackenzie River. This was some 1,300 air miles northwest of the Turner Valley oil field and, up to the present time, the farthest northern point a well has been drilled in Canada.

Drilling commenced in the summer of 1920 and on August 27 with the hole at 783 feet the well blew in. (The well was 10 inches in diameter at the top and was finished with six inch casing.) After flowing for 40 minutes the well was capped. During the winter of 1920-21 Toronto office decided on a drilling program in Fort Norman to commence on the
opening of navigation in 1921. It was planned to drill three step-out wells, one on the west bank of the Mackenzie, one on the east bank three miles southeast of discovery well and one on Bear Island, and also deepen the discovery well.

In 1921 a small steam still fabricated at the Regina refinery was shipped to what is now Norman Wells, arriving there in August. This unit was to be operated for the manufacture of gasoline and kerosene, solely to provide fuel for the operation of Imperial Oil airplane and motor boats and camp lighting, there being no thought at that time of marketing any of these products locally. The unit was operated for a short time in the fall of 1921 and a relatively small amount of gasoline and kerosene was run, probably not more than 600 gallons of both products. The still was not again utilized until 1932.

In the summer of 1924 well #2 was drilled to a depth of 975 feet before the coming of winter forced the crew to suspend operations and return to Edmonton. The crews returned to Norman Wells in July 1926 and #2 discovery was completed at a depth of 1,610 feet by mid-August and after shutting in the two wells the drilling crews returned to Edmonton.

As there was no immediate market for oil products in the Territories Imperial withdrew from the scene until 1932. During this period no one was left behind to look after company interests as travellers were few and both northern white and Indian had a wholesome respect for another's property. The
Governor General of that time, Lord Byng, visited the wells during the summer of 1925 but no representative saw the company property from that time until February of 1932.

Early in 1932 Eldorado Gold Mines Limited approached Imperial with regard to procuring a supply of crude oil for fuel in opening up and developing the uranium claims on the east shore of Great Bear Lake. In March of 1932 Mr. R.W. MacKinnon arrived by air and tested discovery wells #1 and #2 and found that they would yield practically the same flow of crude as they were capable of producing prior to being shut in in August 1925, that was, 90 barrels per day for discovery #1 and 200 barrels per day for discovery #2. On his return to the office in Toronto in May the company decided to operate the small shell still, experimentally only, during that summer. Gasoline only was recovered and the residual, reduced crude, was blended with straight crude oil for shipment to Eldorado.

Reactivating the refining equipment left idle since 1921 was difficult. Undrained steam and water lines had split, there was a shortage of valves and fittings and condensing equipment had to be practically rebuilt. Only one of the original buildings was made use of, and that for the storage of supplies and material. The personnel lived in tents.

During that summer the refinery processed 1,900 barrels of crude oil to make 10,000 gallons of gasoline and 10,000 gallons of fuel oil. Delivery was made to the mines 375 miles away on Great Bear Lake by the Mackenzie and Great Bear River
and thus down Great Bear Lake to the Eldorado camp. The company donated 1,800 gallons of fuel to the Anglican mission at Aklavik for their power plant which supplied light and energy for the x-ray equipment. In 1939 gasoline sold for 90¢ a gallon F.O.B. Wells, and $2.25 per gallon F.O.B. Fort Norman at the trading posts there. By this time five wells, two of which were producers had been drilled, one on Bear Island which showed traces of oil of a lower gravity than that of discovery 1 and 2. No oil was found on the left bank.

In 1937 an 8-1/2-mile pipe line was laid around the Bear River Rapids. This was one of the first product lines in history and eliminated a long portage to speed the flow of oil products to the Eldorado silver-radium mine some 375 miles distant. Additional tankage was erected at Norman Wells and another well drilled.

Baron Tweedsmuir (John Buchan), then Governor-General of Canada, paid a visit to Norman Wells during the summer of 1937.

In 1939 a prefabricated refinery having a capacity of some 840 barrels per day was shipped into Norman Wells. This consisted of a modern tube still, fractionating tower and stabilizer tower (for aviation gasoline). Freight limitations on weight and size made it necessary to ship the various large and heavy pieces in sections and the smaller in crates and cases, not more than 10' wide, 35' long and weighing less than 10 tons. All supporting material was made of timber cut locally.
Special measures were taken to prepare the site due to the permanent frost which penetrates 150' down. The refinery was completely constructed and in operation within 30 days.

In 1941 the refinery had produced 80,000 gallons of aviation gasoline, 112,000 gallons of motor gasoline and 230,000 gallons of fuel oil. Gasoline was 30¢ per gallon F.O.B. refinery.

The need to defend Alaska after the U.S. entered the war resulted in the construction of the Alaska Highway and the Canol project. In 1942 Imperial Oil officials were called to Washington where the U.S. army outlined a plan to build a refinery at Whitehorse, Y.T., and to lay a 600-mile pipe line from Norman Wells to supply it. On May 1 a contract was signed between the company and the U.S. Government. By June material was moving to Norman Wells; by July the first a new well was producing and by January, 1943, 16 new wells had been finished to supply the U.S. army's original 3,000 B/D contracted requirements. Then the army raised its quota to 20,000 B/D and Imperial Oil by August, 1943, had put down 25 holes of which 20 could be classed commercial producers. In all there are 65 wells capable of producing.

(Between 1919 and the winter of 1943-44, Imperial had spent well over $1 million in exploratory and development work in this area.)

It now appears that the Norman Wells field has reserves on the order of 30 million barrels.
At the height of the development work, there were approximately 650 people in the camp at Norman Wells, 500 Imperial-Canol employees and 150 Norman Exploration company employees.

The end of the war saw the end to the urgency of producing and refining large quantities of oil for the defence of Alaska. Whitehorse refinery was shut down and the pipe line abandoned. Norman Wells has returned to peacetime operations, but the demand is much greater than before the war. Additional equipment has been installed to increase the refinery's capacity from 840 to 1,500 barrels per day.

There are well-equipped mechanical shops and in addition to refinery maintenance the shops do work for transportation companies and government services in the area and for contractors doing work for government agencies.

The company maintains a 17-bed hospital staffed by a physician-in-charge, two full-time nurses, a part-time secretary and a ward aid. Every effort is made to cooperate with the Department of Indian Affairs, the armed forces and other agencies. Over 70% of the hospital's patients have been non-Company personnel from the surrounding district.

**EQUIPMENT**

There are 48 storage tanks - largest 120' x 42' and total storage capacity is 266,450 barrels product and 25,000 barrels crude oil storage. (Use 260,000 for publication).
Crude Distillation Unit

A crude topping unit was designed and prefabricated by Foster-Wheeler Ltd. in 1939. It was then shipped to the site in sections and erected by Imperial Oil personnel. This superseded the old steam still erected in 1921. The new unit enables us to supply the various grades of fuel required in Northwest Territories such as:

- Aviation and motor gasolines
- Diesel fuels
- Heavy fuel oil

Ethyl Plant

For blending ethyl fluid with gasolines.

Boilerhouse

A new boilerhouse and power plant was erected in the summer of 1946 consisting of 2-125 H.P. boilers and 2-65 H.P. boilers. Electric power totalling 82.5 K.W. at 110/220 volts is supplied by three diesel engine driven generators.

Residences, dormitories and hospital, are heating by steam piped from the boilerhouse.