Progress Costs Money

When we were digging up illustrations for the story on Petrolia (page six) we came across some old pictures of the company's original refinery there. By present standards it looked an ugly, primitive establishment, but it had one thing in common with today's most modern refining units—at the time it was built it was the best equipment that could be provided for the company's employees.

Seventy-five years later the company's annual report (1954) shows that Imperial has more than half a billion dollars invested in plant and equipment. To put it another way, each of the company's 13,370 employees has a personal tool chest valued at $19,000; a small manufacturing plant in itself. Over the past five years alone $316 million has been spent to enlarge this tool chest and make it more productive.

Some of the new tools were purchased by money borrowed by the company for that purpose or raised by sale of company assets. Others were bought with money provided by the company's 45,000 shareholders, some 37,000 of whom live in Canada. For years the shareholders have taken only part of the company's net earnings in the form of dividends (last year it was little more than half). The balance has been put back into the company to buy bigger, better and more modern tools for the employees to use in carrying on and expanding Imperial's operations.

These tools—refining equipment, pipe lines, modern packaging plants, marketing distribution centres and office buildings—have increased the employees' and the company's service to Canadians and supplied the highest volume of business—in sales, crude oil produced and refined—in the company's history.

Cover: Quai de la Roncière, St. Pierre—by Gordon McKean

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WHAT'S AHEAD FOR CANADIAN OIL?

by W. O. TWAILS

AN OIL-POOR NATION EIGHT YEARS AGO, CANADA NOW RANKS AS ONE OF THE WORLD’S MAJOR PRODUCERS WITH MORE CRUDE THAN IT HAS MARKETS

WHERE WILL WE SELL THIS CRUDE?

TAKING A LOOK INTO THE FUTURE, AN IMPERIAL DIRECTOR SAYS WE WILL NEED ALL THE OIL WE CAN FIND TO KEEP PACE WITH NORTH AMERICA’S GROWING DEMANDS

IN THE EIGHT YEARS since Imperial discovered oil at Leduc, Alta., Canada has vaulted from an oil-poor nation to the position of seventh largest oil producer in the world, able to produce 420,000 barrels a day. Before another five years have passed—by 1960—we should be able to produce one million barrels a day.

From a nation that had far more markets than it had production, we have become a nation with more production than we have immediate markets. The industry’s very strength has created its biggest short-term problem—where are its future markets?

Before trying to see where we are going, let’s take a look at where we have come from.

Canadian oil wells today supply the needs of virtually all of Canada west of Toronto, in contrast to 1947 when only an area near the Arctic circle and another around Calgary were supplied with domestic crude. Our total known reserves have risen from 72 million barrels to some two and three-quarter billion barrels. There are other measurements of progress, but perhaps the most striking is that current oil production with a 1954 value of $245 millions, effects a foreign exchange saving of considerably more than that. This saving of foreign currency by reduction of crude imports is in U.S. dollars, and is increased by the investment of American capital, by companies and individuals, in Canada’s oil development.

This is all the more noteworthy because 1947 was a year of crisis for Canadian currency. Drastic controls were introduced in that year to prevent the Canadian dollar from going to an excessive discount. Today, after eight years of oil development, our chief exchange problem is to prevent the Canadian dollar from going to an excessive premium. In fact, the exchange premium over the past few months has cost Canadian oil producers up to 10 cents a barrel in wellhead price—the amount by which competitive imports are reduced in price by the exchange differential.

While it would be wrong to credit oil with being more than one factor among many in changing Canada’s exchange rate, it is certain that the oil development has contributed heavily to a northward shift that has taken place in North America’s economic centre of gravity.
The Canadian oil industry has been financed in much the same way as that in the United States: with risk capital furnished by the oil industry, and by federal and provincial governments, with the state money from the investing public and mortgage money from insurance companies, pension funds societies and other lending institutions.

The role that new U.S. capital has played in the Canadian development is important and yet sometimes exaggerated. While it is not new news to point out that a substantial portion of the new Canadian oil industry has been financed by U.S. funds, American investment now represents some 50 to 60 percent of the new oil capital. In that in 1949 when you consider that a total of more than two and one half billion dollars has been invested in the industry since 1947. But more surprising is the amount Canadian capital has contributed when the smallness of our crude oil resources before 1947 is taken into account.

Perhaps the most significant difference between the U.S. and Canadian sources, from an operational standpoint, is the ownership by governments, of from 20 to some 100 percent of the mineral rights. This means that the mineral owner's revenues which go to the private investor in the U.S. largely go to provincial governments in Canada.

RAPID EXPANSION REFINERY

The Canadian oil development since Leduc has been influenced by a combination of factors. Discovery of two major pools at Leduc and Cold Lake within a year, an area dependent on high-cost imported supplies, led to rapid expansion of local refinery capacity and early need for a major pipe line outlet.

At the same time, government leases forced quick evaluation and rapid development of discoveries. Because of this the Canadian oil industry has had to curb a lot of experience into five years or less it is able to borrow from U.S. experience and oil conservation legislation.

One of the advantages that we have gained from U.S. experience is that we are better at this early stage to estimate out our oil reserves and to have the ultimate prospect of the Canadian industry.

Known reserves of light crude—currently estimated at as high as 300 million barrels—lie about 370 million barrels in 1954, which may in time with revisions and extensions approach 600 million barrels. This is six times the year's crude production. Going by American exploration experience, at this rate Canada should find from 20 to 25 billion barrels of light crude over the next 30 years—about 10 times the present known reserves. There are, of course, additional resources in the form of heavy crudes, oil shales and the famous tar sands of Alberta—the last alone is estimated to hold up to 300 billion barrels.

The current problem of Canadian oil however, is not connected with ultimate possibilities so much as with near realities. Today, oil wells in western Canada could produce about 420,000 barrels daily. Actual production for 1955 will probably average about 330,000 barrels daily, with closed-in potential (crude we could produce if we had markets for it) of some 100,000 barrels a day. The markets supplied in 1955 will, it is estimated, be as follows: British Columbia, 49,000 barrels a day; Puget Sound, 37,000; prairie provinces, 118,000; United States—lakes-Minneapolis area, 21,000; Ontario, 10,000; a total of 330,000 barrels a day.

Canadian oil has spread out to serve these markets in three successive phases. First came the prairie provinces, whose needs were supplied by the middle of 1949. Then followed the move eastward to Ontario, by construction of the Inter-provincial pipe line which now carries 550 barrels a day to Sarnia and has an ultimate capacity of about 300,000 barrels a day. When western Canadian crude invaded the Sarnia market it cut the price of crude oil from a monopoly's selling price of 40 cents a gallon to the new customer of 28 cents a gallon. Additional taxes on crude oil supplies entering the Great Lakes area—crude from the Mexican Gulf, Mid-Continent and U.S. Rocky Mountain regions, and even from South America. This area represents world-wide crude oil competition. The price of Canadian crude accordingly has reflected, and continues to reflect, all these forces.

The latest market to be added is that between British Columbia and the Pacific coast, came with the completion of the Trans Mountain pipe line in 1953. Despite low ocean tanker rates, Canadian crude is competitive in this area with all sources of supply. Each time it reached out for a new market Canadian crude was to a large extent controlled by its position. Canadian oil fields are almost in the centre of the continent, far from ports, and thus they must compete at long range with sea-borne imported crude.

Whereas the markets of most competitive crude are decided by large ocean tanker carrying costs, Canadian crude, at least until recently, must be moved by transport costs which are three times as high. Canadian crude must move at costs of roughly three cents a barrel per 100 miles in big-inch pipe line systems, which are discriminator on the other hand, distance which brings them heavy costs to move Albertus crude 1,772 miles from Edmonton to Sarnia. In addition, the tanker-carried crude has the advantage in flexibility of route as well as cost.

The comparatively rigid and high cost transportation by which Canadian crude must travel suggests that Canadian crude's price will inevitably carry a heavy transportation penalty and that any decision for marketing Canadian oil—because of the relative inflexibility of pipe lines—will have lasting effects.

MINERAL RIGHTS HELD IN TRUST

There is a third consideration. Since the majority of mineral rights in western Canada are held in trust for the people, the governments of these provinces represent the mineral owner's interest in granting leases. This is a function of the provincial governments, which are elected by the people. This natural function of the producer to the people's interest in granting leases may be best expressed in the statement: the government. This is the natural function of the producer to the people's interest in granting leases. This is the natural function of the producer to the people's interest in granting leases. This is the natural function of the producer to the people's interest in granting leases.

The benefits from the development of the oil industry must be shared with all the people in the province, who have the same rights to the future. In this way the community interest in the development of the resource is protected.

One of the most significant features that the community interest in the development of the resource is protected.

In a period of ample supply, reducing price is no assurance of capturing a market, but the big catch is the permanence of supply on a production basis. This is the development of the industry. This has led some people to suggest imposing a protective tariff on crude entering Canada.

Most oil men feel that tariffs, quotas and other trade restrictions are repugnant in principle, even though there seem to be exceptions which justify such practices. Only a very serious situation could justify such a move, especially one which has so great a record in trading policies as Canada.

A second objection to a protective tariff is that gasoline is already one of the most heavily taxed commodities in Canada—far more so than in the United States—and any additional tax on this major source of energy would represent a handicap to the ability of Canadians to carry on their work economically and competitively.

What then, is the answer to the problem of future outlets for Canadian crude? If it is defined as some time beyond the point of accurate prediction, then the answer is exceptionally simple—the problem will disappear.

We have been talking about the problem of 1960; the time when Canada's growing crude potential will find the bonds of land transport most testing. But we need not be too preoccupied with the 1960 problem with the thinking of 1953. This is a year in which oil supplies are ample, and there is a tendency to think in national, rather than continental terms.

A realistic look at the future must take into account a growth in continental oil requirements to at least 12 or 14 million barrels a day by 1960. The 1952 report of the U.S. Materials Policy Commission predicted the demand for crude oil in the United States alone by the year 1970 to be more than double by 1957. It can logically be expected that Canadian crude will help fill this increased continental demand.

MAXIMUM DEVELOPMENT NEEDED

The Canadian industry's long-term problem really then is to ensure that the maximum development of oil resources against this outlook. Within this framework, the forecast Canadian production is not a problem but an objective.

We have the historical record of the oil business to show that the joint forces of supply and price cannot remain out of balance for any length of time. In this balance, it is axiomatic that the industry has one great resource, a ready-made market, representing the maximum incentive to the producer and the royalty owner. Any devices which try to ignore this axiom must inevitably result in market depression. In the short-run, the solution to the need for more marketing is likely to be the most immediate. West Canada’s markets will grow city by city; the developments of the next few years by the tremendous leaps they have taken in the last eight years. What we can look forward to is steady growth and consolidation.

Possibly the most important development to watch is the eight mile stone, Canadian oil is approaching maturity.

Mr. Truts is a director and a vice-president of Imperial Oil

[Imperial Oil Review, June 1955]
THE TOWN THAT ROCKED THE OIL CRADLE

Petrolia, 18 miles from the refinery city of Sarnia in southwestern Ontario, has a population of 3,300 and resembles a hundred Canadian communities of comparable size. It has the same tree-shaded streets and comfortable homes, the same kind of stores and public buildings. But three things make it different—its oil derricks, its history and its oddly cosmopolitan atmosphere.

Signs on two miniature derricks, one on either side of the highway, announce to the visitor that he is entering Petrolia. Inside the town there are real derricks—timber tripods silvered by sun and wind. They stand in front yards and backyards, in flower gardens and vegetable patches and orchards. One, over a well that has been pumped slowly but steadily for 50 years, is within a few feet of the United Church.

The wells under many of the derricks have long since run dry but the derricks remain because sentimental Petrolians are unwilling to tear down these three-legged reminders of the fact that Petrolia, nearly a century ago, caused Canada's oil industry and trained scores of skilled drillers who opened up major oil fields all over the world. Petrolia's children don't climb trees; they climb oil derricks. Oil is in the town's blood. Oil streams through all its memories. Oil has tempered its character.

To a Petrolian, oil is the most fascinating commodity on earth. There was proof of this at the Petrolia Old Boys' Reunion in 1946. A traveling carnival, imported for the occasion, pitched its show tents and erected its rides in Greenwood Driving Park. Bill Hussey, a veteran Petrolia driller who wanted to add to the fun, set up his drilling rig, the Morning Glory, a short distance from the midway, and declared that he would strike oil between the time the reunion started and the time it ended a week later.

As the days passed, the interest in Hussey's project mounted like fever. Crowds deserted the midway to press around the Morning Glory, which far outdrew all the other attractions. Drillers who had drilled wells on six continents pleaded and begged for the privilege of helping Hussey, who let them take turns. On the final day of the reunion, at a depth of 580 feet, Hussey reached his goal. Amid wild cheering, he added the final touch and "shot the hole" with 70 pounds of dynamite "to give the folks a bang."

A small producer, the Greenwood Park well was like thousands of others sunk since 1860 in the Petrolia field. Of these thousands, which yielded more than half a million barrels annually in the 1890's, only 360 are being pumped today. Their output is piped to Imperial's Sarnia refinery. It amounts to 36,000 barrels a year—a 12-hour supply for the big refinery.

But, if Petrolia's wells are drying up, the stories of its great days flow as freely as ever. They flow through the conversation at Bill Jackson's recreation hall, a favorite meeting place of old drillers, and ripple between the green slatted benches of Victoria Park, stories of the famous plank road, of the prodigiously 1865 boom, of the strange adventures of Petrolia drillers who journeyed to distant lands, and of Imperial's first large refinery there, which was one of the wonders of its age.

This refinery was shut down in 1897 and moved piece by piece to Sarnia, but the life of the town, economic and social, is still closely linked with Imperial. Besides, for years, buying all Petrolia's oil, Imperial's Sarnia refinery employs more than 300 of Petrolia's residents. Sick Petrolians are treated in a hospital which was once the mansion of J. L. "Jake" Englehart, one of Imperial's founding fathers. He gave the town the building and enough Imperial stock to maintain and improve it without cost to the taxpayers. Healthy Petrolians golf on a nine-hole course —another gift from Englehart. Whether they are in hospital or relaxing at their golf club, Petrolians are likely to reminisce. This doesn't mean that they live in the past. They don't. But they are fond of the diverting history of their community.

They chuckle about their grandparents, who were too busy drilling oil wells to bother with water wells and bought their drinking water from teamsters who hauled it in from springs miles away and sold it in the streets by the bucket. They chuckle about the wandering Italian baron who strayed into Petrolia and was smitten by oil madness. The baron had a wife and four daughters back home. He wanted them to join him but didn't want them to have to travel alone so he hired a Petrolian to go to Italy and escort them to Canada.

They chuckle, with a slight undertone of resentment, about Pennsylvania's claim that the jerker-rod system, which enables
In 1890, these primitive-looking reducing stills were among the best anywhere. They provided the kerosene that lit the lamps of Canada in it so they'd be there when Petrolia acquired street cars—but Petrolia never did acquire street cars so the track was never extended beyond the ends of the bridge.

There's also a tinge of sadness in their voices when they chuckle about the 11 hotels which once did a rip-roaring trade on the eastern side of the town and aren't there any more. These flourished in the era when Petrolia had a permanent population of 5,000—compared with the present 3,300—and always had hundreds of tramps moving in and out.

But Petrolia, now an attractive town, was less attractive if more exciting in its heyday. Its water is now piped from Lake Huron but until fairly late in the last century it had no water system. Its streets, now paved, were a mass of mud swimming in brine and oil that leaked from the surrounding wells. So deep were the ruts that delivery carts were two-wheeled; four-wheeled wagons were too hard to turn. Scattered through Petrolia were small makeshift oil "distilleries" put together by plumbers, blacksmiths and handymen. They looked like overgrown ink bottles, belched acrid fumes and had a habit of exploding. The earlier dwellings didn't help the scenery, for Petrolia was thrown up in a hurry.

In the spring of 1865 the settlement consisted of six log cabins and has been described as "unundreamt mudhole which extended for miles." But as drillers and speculators flocked in, the prices of wood lots soared beyond the value of lots in the downtown Toronto of the day. Living space was at a premium. One record tells of a Wyoming man who eventually found lodgings in a 16 by 24 foot, and one-and-one-half storey log shanty.

It was already housing 23 other boarders and a family of seven. Every room in the first hotel was taken before the foundations were laid.

By the fall of 1866 the town had 2,300 residents, four churches, a school, stores and hotels, and new residents were still flooding in as fast as shelter could be provided for them.

A lot of them came from Oil Springs on Black Creek, nine miles to the south, where, in 1857, James Miller Williams, an enterprising businessman from Hamilton, Ont., dug the first producing well in North America and launched the continent's oil industry.

Petrolia freely admit the birth of the industry at Oil Springs, but regard their town as the cradle of the Canadian industry, for it was in Petrolia that the young industry was nursed through its worst infant days into a lusty boyhood. It was in Petrolia too, that many drilling methods and pieces of equipment were devised and perfected and later found their way to almost every producing field in the world. With pride, Petrolians also point out that no other community has produced and trained more oil drillers from its native stock than Petrolia. The bits of Petrolia drillers have carved their town's name on rocks in the four corners of the earth.

However, it was at Oil Springs, in 1862, that Hugh Nixon Shaw drilled and struck Canada's first gusher. Soon, there were other gushers and Oil Springs for a brief period had a frenzied population of 7,000. A plank road—the planks were really squared timbers embedded in the soggy ground—was laid to Petrolia and Sarnia and hundreds of oxen and horses hauled barrels of oil over it on sledges.

But the gushers stopped gushing at Oil Springs and the boom died as quickly as it had been born. One three-storey hotel, although fully constructed, was abandoned before it was swept out and without having had a single guest.

As the Oil Springs wells petered out the drillers moved in on Petrolia, where a scum of oil floated on brown sluggish Bear Creek. Wherever they sank holes on the banks of Bear Creek they found oil. The rush was on. It gained momentum in 1866 when a Captain C.K. King, of St. Catharines, Ont., moved his rig from Bear Creek to higher ground and proved there was oil there too. This well had a daily flow of 263 barrels, which, for Petrolia, was extremely large.

If Petrolia had few gushers like those at Oil Springs, neither were its wells short-lived. Most of them were to be steady producers for years and years. In the beginning much of Petrolia's output was hauled over the plank road to Sarnia to be sold either to steamboats which carried crude petroleum to U.S. refineries or to be shipped by rail to refineries at London and Hamilton. The plank road was owned by a private company headed by Andrew Elliot, and Elliot collected a toll of 15 cents a load. The teamsters, a hard-muscled hard-drinking devil-may-care gang, took the better part of a week to make the round trip from Petrolia to Sarnia and complained that they spent more than they earned in the four taverns that lay on their route.

Petrolia's first refinery, or, as it is then called, distillery, was erected in 1863 by two men from Joliet, Ill. Within the next two years there were a score of others, all small. The first one of any size was that of the Carbon Oil Co. It opened in 1871 and ran for a year, then exploded. A whole year was spent re-building it and on July 30—the very day it reopened—it exploded again.

But such disasters were common to Petrolia's infancy. The custom was to store surplus crude in surface tanks—mostly wooden, but some metal—when the market was glutted temporarily. This practice led to the worst oil fire in the town's history.

It began the warm summer evening of Saturday, August 2, 1867, when a maintenance man inspecting a 400-barrel storage tank brought his lantern too near the stream of gas rising off the crude. The gas ignited with a blinding flash.

In hours the fire was burning over 20 acres of land covered with oil tanks containing 40,000 barrels of oil, some 12 wells—one of which was flowing and burning at the same time—engines, pumps, ditching and rig equipment. Flames mounted hundreds of feet in the air as wooden tanks caught fire and burst. Bursting steam boilers—used to power the drill rigs—sent fragments of smokesacks, derricks and flaming debris high into the air. Flaming oil raked down ditches into Bear Creek so that one eyewitness said, "It had the appearance of a fiery dragon roaring through the valley.

The great heat melted metal tanks adding further tributaries of burning oil to the devastated area. The fire burned for two weeks and no reliable estimate of its damage was ever formed, though, by the second day, it was estimated the loss had reached more than $100,000.

This disastrous fire led to a new development in the oil industry—underground storage tanks, specimens of which were excavated only this year when rebuilding was underway in Imperial's Sarnia refinery.

But in spite of explosions and fires, Petrolia grew and prospered. By 1880 it counted its oil wells by the hundreds and had six large distilleries. The biggest plant was J. L. Englehart's.

Plant fires were constant hazards in 19th century oil refineries.
Engelhart's company was one of several refining enterprises that merged to form Imperial Oil in 1880, and its plant became the nucleus of the large Imperial Oil refinery—it handled more than 3,500 barrels a week, a huge capacity for its day—which was constructed at Petrolia and opened with Engelhart, vice-president of the new company, as manager.

Petrolia, by now, was firmly established as Canada's first oil centre. Its refined products were shipped as far away as Germany and the world's first Oil Exchange stood on Petrolia street, its main street. And Petrolia's drillers were gaining international renown.

J. S. Berghem, a German interested in Europe's petroleum resources, visited the Pennsylvania oil fields in 1879 looking for experienced drillers. While there he heard about Petrolia and crossed the border to Canada.

At Petrolia, impressed with what he saw, he hired Cyrus Perkins, Alvin Tornesend, John Martin, A. E. Slack, Eugene Yager, Nell Sinclair, William H. McGarvey, George McIntosh, George Fair and Angus McKay, and took them back to Europe with him. McGarvey eventually acquired Galician oil properties and amassed such a fortune that he was known as "the Rockefeller of Europe" until the Allies overran his properties during World War I. His daughter married a son of Count Zeppelin, the dirigible inventor.

These men were the first of an elite company called, in Petrolia, "foreign field drillers." Petrolia has sent hundreds of drillers out through the years to sink wells in far-off places. Many of them eventually return to Petrolia, bringing stories of exotic lands and high adventure, and sometimes bringing foreign wives and children who speak no English. This fact accounts for Petrolia's cosmopolitan atmosphere—a world of different land, cultures, and customs, all mixed in a town of Petrolia's size—and a week seldom passes without Harold Ramage, editor of the Petrolia Advertiser-Topic, interviewing somebody who has just popped in from Africa, India, Mexico or one of the South American republics.

One foreign field driller who had been in Poland for years finally settled down in Petrolia and started a real estate business, laying out two streets. That's why Petrolia has one street called Ossolensky and another called Ignatieفس-names even Petrolians have trouble with.

Among the foreign field drillers who often sit around chatting in Bill Jackson's recreation hall are Fred Edward, who drilled in Persia and elsewhere and is now in Petrolia's leading oil producer, Fred Webb (Borneo); W. O. Gillespie (Borneo and Burma); Fred Zimmer (East Indies); Ross Sutherland (East Indies); Roy Gregory (Trinidad) and Scotty Miller, a restless individual who has worked in most of the major oil fields in the world. These men are just a few of many. Once, 80 Petrolians were drilling in Australia alone.

Whole families in Petrolia make a career of drilling—like the family of Bill Hussey, the man who drilled the well in Greenwood Driving Park during the Old Boys' Reunion, Hussey, a lean, pleasant, white-haired man who is now 76, retired a year ago after drilling 1,200 oil wells in Canada, the U.S. and Mexico—many of them for Imperial. Among the rigs he owned and wore out were the Morning Glory, the Morning Star and the Morning After the Night Before.

One of Hussey's sons, Derwood, has his own rotary rig and is drilling in southern Alberta, while a second son, Eric, who drilled in India for years in a toothpick on a rig in Saskatchewan, Eric's own sons, Wayne and Darwin, are also oil drillers.

In Petrolia the Hussey family is not unusual. A score of families can boast three generations of drillers. While the sons and grandsons are drilling new fields in faraway places, the elders wisely watch their own field dwindling after producing in the last century an amount of oil which some experts estimate at 16 million barrels and others place at 26 million.

But if all the wells go dry, the memories will go flowing on. Petrolia, with or without oil, will always be an oil town, with foreign field drillers coming and going and new generations of Petrolians preparing to take their places on the drilling rigs of the world.

**SUBTERRANEAN STOREHOUSES**

Man-made caverns, half a mile underground, offer Sarnia refinery, now store oil products to meet seasonal demands

A customer to drilling wells to get petroleum out of the ground, Imperial has drilled two wells to put it back down again. It happened in the backyard of the company's Sarnia refinery, where a half mile below ground, two caverns, each as high as a six-storey building, are being used to store liquidified propane and butane.

The two underground chambers have a combined capacity of 90,000 barrels and 8,000 barrels, respectively. The caverns were constructed by washing out the salt from 300,000 barrels and creating two separate caverns with a total capacity of 90,000 barrels.

Once the caverns were filled with liquidified propane and butane, they were connected to the refinery through a network of pipes and valves. The gas is stored at a pressure of 2,000 pounds per square inch, ensuring safe and efficient storage.

The caverns are used to store large quantities of propane and butane, which are essential for various industrial and commercial applications. They provide a secure and reliable storage solution for these valuable commodities, ensuring a steady supply to meet the demand.

Schematic drawing (not to scale) of products storage caverns

Imperial Oil Review, June 1955
How to drive 10,000 miles... and live!

by ALAN BURT

Spending your vacation on the road? Then these touring hints from an experienced traveler will help you return alive and in good humor.

The migratory season is upon us again—the happy time when you stuff the kids in the back seat, your wife in the front seat and, with firm upper lip, a full tank of gas and a trunk full of suitcases, take off for two or three weeks' care-free vacation driving. Probably you're an expert at this annual event, but it might be interesting to compare notes just the same. For, as you no doubt know, it's a simple matter to turn a dream vacation into a tourist's nightmare. It happens to hundreds every year. Their car breaks down, they take the wrong turn or misjudge the other driver's intentions. Instead of arriving at their destination they end up behind a tow truck, in a farmer's field, in hospital, in an insurance adjuster's office or in a column of figures as another unfortunate statistic.

At this time of year, when my wife begins to leave travel folders around the house and the kids hand me advertisements featuring the latest in Bikinis, I usually start a self-instruction program on "How to drive 10,000 miles this summer and live." Getting there and back in safety and comfort isn't only a matter of good driving. Roughly the plan falls into these four sections: Is the car in shape or should we go by bus? Why sacrifice sleep for the sake of an early start? How not to get lost or are all maps printed upside down? On staying alive or was it the other guy's fault?

First, before you pipe all hands on board, you'll want to be sure your car will last the distance. Your service station is a good place to check this. If you follow him around you'll see that your dealer, while he has the car on the hoist for a lubrication check, will also take a look at the tires. You should have plenty of tread and no cracks in the rubber; six out of 10 tire failures occur in the last twothirds of a tire's life. If he has a long reach, he'll get between the two front wheels and grab one in each hand. He'll push, then pull. If he can move the wheels in opposite directions the front suspension is worn and needs attention.

Next he'll eye, shrewdly, the exhaust line. Holes and cracks in the muffler may emit carbon monoxide where you don't want it. While under the car, he'll examine the shock absorbers. Signs of oil indicate leakage, which is not good. Shocks in good condition are essential for safety and comfort.

At some time during your travels you'll want to stop, so of course he'll check the brakes. If the brake pedal, when depressed, is down near the floor boards, you may need new linings, or at least a linkage adjustment. While inside the car, he'll try all the lights; fool the horn and turn on the windshield wipers—even if it is your vacation, it might rain. Under the hood he will check the battery and look for obvious signs of mechanical delinquency—oil drips, loose fan belt, dirty spark plugs. If the outside of a spark plug is smeared with oil and dirt, this could bypass the spark into the engine block.

After some adjustments your dealer tells you the car's in shape. So now you're all set. You've warned the milkman, the paper boy and the mailman and boarded the cat. You've left the key under the front mat to save any burglar the trouble of kicking in a window. It's seven o'clock on a Friday evening, you've had a hard day at the office, you've missed your after-dinner nap, but you want to get away as soon as possible, so you count the children and let in the clutch.

ROADS PACKED ON WEEK-END

That isn't the way to do it, is it? The roads will be packed with week-end drivers heading for the lake, and toilers heading for the suburbs. Very early Saturday morning would be a better time to leave, but best of all is an early start on a weekday between Monday noon and Friday noon—when the roads will be clear of everybody except milkmen and truck drivers. Friday, Saturday and Sunday are the worst driving days of the week, and the three major holidays, Dominion Day, Civic Holiday and Labor Day are the worst of the year.

So unpack the kids and put them to bed, to get up early the next morning. Now, you've just had a good, energy-sapping breakfast, the children are still a little sleepy and your wife is silent, wondering if she turned off the hot water heater. The birds are singing, the gasoline gauge reads "Full", and your route has been marked carefully on the road maps tucked inside the sun visor.

Probably, to save trouble and ensure the best route, you gave the map-marking chore to Imperial's Esso Touring Service. Tens of thousands of Canadians do, every year. From its map-library office at King and Toronto streets, Toronto, Touring Service is in constant contact with provincial highway departments across the country, thus gets up-to-the-minute information on which routes are best, where construction is going on, how the roads are and other useful facts.

There are, of course, some questions that even touring Scots find hard to answer. For example: the man who was going to Rhode Island and wanted to know what kind of food was available, and the little boy who wanted a route from Brandon, Man., to Winnipeg—but "via Peru, Chili." There was also the fastidious gentleman who drove a 1926 Rolls Royce and wished to be routed only over by-passes first-class roads; the Halifax-Windsor hitchhiker who wanted to know on which route he'd have the best chance of being picked up; the man who was going with a lady friend to Tenne., and inquired about the marriage laws in Tennessee; the undertaker with a body on his hands who want- ed the fastest possible route so he'd arrive in time for the funeral and the lady bargains who wanted a good, dry route—a damp one made the strings of her harp droop like spaghetti.

Whether you mark your own route or not, you will find that Imperial's road maps are invaluable on a trip. They're lithographed in Canada from plates made by General Drafting Corp.—an outfit started in 1922 by a Finnish-born freelance draftsman and motorist named Otto G. Lindberg. Before Lindberg came along, motorists had to pay up to a dollar for a map that was hard to read and not always correct. Lindberg varied his type with the size of the town, used different colors for adjoining provinces, tinted lakes and rivers blue so you wouldn't drive on them—and made sure he had all the facts.

Even with a good road map, you can get lost. I usually accomplish this by ignoring the mileage accumulating on the speedometer. A seasoned traveler, of course, looking for a particular sideway (say) will first find it on his map, measure its distance along the highway back to his present position, mark it off on the edge of a postcard and set this against the scale of miles on the map legend.

LET WIFE CHECK MAP

However, it is advisable not to do this while driving—it's harder to keep the truck going at 45 miles an hour. If you need to check the map, let your wife do it, or pull off the road before you spread it out.

A road map is simply a picture which uses symbols for easy identification. Thus a red circle becomes an airport, a red cross a landing field and an anchor with two hooks denotes a seaplane base. Elevations are marked, so are cities, towns and villages—each one with a different-sized circle depending on its population.
as we're not flying, the most important symbols are the roads. These are separated into dual highways, and first, second and third class roads. First class roads are marked in thick red and blue lines; both are equally good. The map makers try to bring out in red a limited pattern of the principal routes between larger cities. These are usually the main direct routes. But those shown in blue of the same width may be just as good and almost as short. If all the main roads were put in red the map would be hard to read. You might find it worthwhile to use the blue roads; they are often less crowded because so many motorists follow the red roads exclusively.

First class roads are always hard-surfaced and are usually wider, smoother and less winding than second class roads which are normally gravel. Second class roads are almost always usable in wet weather and sometimes they may save mileage and avoid bottleneckes. Third class roads are usually dirt or gravel, and should be avoided in wet or bad weather; you may end up pushing yourself.

The distance between major érantes are shown right on the map—in small figures, either red or blue, set adjacent to the highway between the towns in question, which are represented by red or blue stars. In general, figures in blue show local distancies while figures in red indicate the bigger hops between widely separated centres.

Spoking of roads brings up the question: do we go by dual highway or pick a nice, parallel hard-surfaced route? If you're in a hurry, you probably pick the dual, with its divided highway to separate traffic going in opposite directions. If not, you may prefer a more leisurely side route with less traffic.

WHAT CAUSES ACCIDENTS?

Which is safer? This opens up the whole tangled question of what causes accidents. In the first place. Statistics over the past decade show that three out of four accidents take place on good straight roads, and that nine out of ten mishaps are caused by faulty driving on the part of the other driver. Hence, if the driver has not had a few simple rules: don't pass on the right, the other driver is blind on that side. If you're not absolutely sure of anything else you know—your forward vision—if you are passing at 55 m.p.h., a car doing 50, you need 1,100 feet of clear highway to pass safely.
An oil lease buyer will try his hand at almost anything to beat his rivals. When he has his lease, he's signed his company to a one-sided gamble in which the landowner can't lose and the odds are 22 to one against finding oil.

At two a.m. when the wobbly little calf had arrived in the world and was enjoying its first meal, the man from the city stood up to take the kink out of his back. Then he wiped his forehead of the perspiration that had somehow collected in spite of the chilly night air. The farmer looked up with a twinkle in his eye and said, "Thanks for giving me a hand. Now where's that oil lease you wanted me to sign?"

Few western Canadian landmen have played assistant mid-wife to a calving heifer as this Imperial Oil lease buyer did on a farm near Sylvan Lake, Alta. But none would hesitate to do so if it meant the difference between leasing and not leasing the petroleum and natural gas rights on a likely looking piece of land. So fierce, in fact, is the competition between rival landmen that if one of them discovered he could buy leases regularly by delivering calves, he would probably take steps to become a full-blended veterinarian.

Ever since the demand for oil and gas rights began gaining momentum after Imperial's discovery of the Leduc oil field in February, 1947, landmen have been pitching hay, shovelling grain, driving tractors, shingling barn roofs and putting unfriendly dogs in a frank effort to win the farmer's favor before somebody else did.

Of all the factors involved in the complex job of finding oil and getting it out of the ground, none is more important than land. Trying to operate a producing oil company without mineral leases would be about as easy as operating a bank in a country that had no monetary system. The company that fails to get mineral rights doesn't get oil; it's as basic as that. That is why Imperial landmen, who work closely with the scouts, the geologists and the geophysicists of the company's western producing division, are playing a vital part in the unending search for oil.
Since those who own the mineral rights to the land must be dealt with fairly and tactfully, and since the landman is often driven by the well-founded suspicion that a rival lease buyer is breathing down his neck, he must somehow combine the patience of a saint with the fervor of a Fuller Brush salesman.

One Imperial lease buyer once spent more than a week paying day-long visits to a prospective lessor, an elderly woman in northern Alberta who had him build a fire, cook her breakfast and do most of the housework. Wobbled by a warm cup of tea, she finally signed, and the landman walked out with the lease, counting his time well spent.

But even without such inducements, the landman expects, and usually gets, a much warmer welcome than any door-to-door salesman. For one thing, he is buying and not selling; and, as long as he represents a major oil company or a reputable independent operator, he is offering a fair and sound business proposition which could—and often has—put the mineral-rights owner on Easy Street for the rest of his, or her, life. The least the deal is likely to do is to pay the farmer’s land taxes for the next several years.

SETS UP REMARKABLE PARTNERSHIP

The most widely used Petroleum and Natural Gas Lease sets up a remarkable partnership between the mineral-rights owner and the oil company. It is remarkable because one partner—the oil company—takes all the risk while the other partner—the mineral rights owner—can’t possibly lose. Lease buyers call themselves landmen and often talk glibly about “getting land.” Actually, they do no such thing. All their companies get for a lease in the right to explore for and develop whatever oil and natural gas can be found under the land, except when—and if—it decides to drill, the company does not intend to first secure the surface. When the option to drill it runs out, the oil company must pay the “right of way,” or “royalty,” to the landowner, and if it decides not to drill it on the given term, the landowner gets it back for free. Or if the oil company fails to perform, the landowner can sue for loss of rent.

But it happens that mineral rights to many important areas are owned by individuals, and it is with these mineral owners that landmen work, buy or negotiate.

In dealing with these mineral-rights owners, known as individual freeholders, landmen have found it takes all kinds of patience and tact. Such as the central Alberta man who didn’t trust banks or cheques and insisted on receiving his entire $5,000 consideration in one dollar bills.

Landmen are not always a hundred percent serious. Here’s a list of some of the more colorful:

- One man, in a humorous vein, described the lease buying business as being a lot like selling ice cream: “Out in the country, you have to catch them in the right mood, you understand? A cold, windy day is our best time. We come along and offer our deal, and then we try to make the sale.”

- Another uses a more straightforward approach: “I’ve learned that the best way to sell leases is to meet the landowners where they are. Whether you’re dealing with a rich man or a poor man, you must respect their values. They may be hard to get along with, but you have to remember that you’re asking them to give you a lot of money for something they probably don’t fully understand.”

- A third, perhaps the most practical, says, “I’ve found that the best approach is to be honest and straightforward. Give the landowners what they want, and they’ll give you what you want.”

- And finally, one landman who has been in the business for many years, says, “I’ve learned that the most important thing is to be patient. You have to give the landowners time to think about what you’re offering them.”

Recent oil developments in Saskatchewan, for example, illustrate that co-operation of mineral-rights owners leads directly to exploration that is beneficial to all. If bonus demands were high, in the initial exploration stage, Saskatchewan would not be the scene of intense exploration activity that it is today.

Holdouts that are toughest to sign are those who have mineral rights where the prospects of oil seem “hot.” The “hottest” land of all, of course, is property that has somehow remained untested while successful wells have been drilled nearby. But even the indications of oil, without any actual results, are often enough to make an area “hot” overnight.

On the other hand, when a hole proves dry, a “hot” prospect will become unattractively chilly as fast as the word gets around, and the bonus that any oil company is willing to pay will drop to zero within a matter of minutes.

Some holdouts have discovered this the hard way. Imperial offered an Alberta couple a $20,000 bonus for a lease on their 160-acre farm shortly before the discovery well came in at nearby Golden Spike field. The woman wanted to accept the offer but her husband said he was sure he could get even more if wells came in around him. He was sure still, when the first Golden Spike well came in. A few weeks later a hole on a farm adjacent to his proved dry. Imperial withdrew its $20,000 offer.

Another farmer, just east of the Leduc field, accepted the first bonus he was offered and became the only one to profit from the deal. Imperial paid him $100,000 for leasing the oil
Changes on Imperial’s Board

F. G. Hall

F. G. Hall, whocame from office boy to director and vice-president, has retired under the company’s annuity plan. He was a member of Imperial’s board of directors for 10 years and a vice-president of the company for seven.

Born and educated in Toronto, Frank Hall joined the marketing department there as office boy in 1912. He was transferred to the order division and by 1916 was assistant to the manager of lubricating sales for Ontario division.

Two years later when the division was split into two sections, he became a sales trainer in Owen Sound. The following year he transferred to the general sales department in Toronto. In this department his responsibilities increased until he was appointed assistant general sales manager for Canada in 1935.

In the ensuing years, Mr. Hall was appointed co-ordinator of sales and vice-chairman of the marketing committee and in 1945 he was made general sales manager and chairman of the general marketing committee. Later that year he was elected a director, and in 1948 became a vice-president.

During World War II he served on a number of advisory committees which assisted the federal government’s controller to supply petroleum products for Canada’s war effort.

W. D. C. Macdonzie

W. D. C. Macdonzie, who for the past four years has been manager of Imperial’s western producing division, was elected a member of the board of directors at the company’s annual meeting in April. He has been associated with the exploration and production phases of the company’s operations for the past 19 years.

Don Macdonzie was born in Macleod, Alta., and attended the University of Alberta where he graduated in mining engineering in 1913. The following year he joined Imperial’s geological department in Calgary. He worked on sub-surface geological surveys and took post-graduate work in geology at the University of Chicago. In 1917 he took charge of sub-surface geological work in the United States and later transferred to the petroleum engineering department there.

During the war Mr. Macdonzie helped to develop the Normain college as part of the Canal project to supply defense forces in Alaska. Later he spent several months in New York and then went to Toronto as chief engineer of the producing department. He returned to Calgary in 1949 as assistant manager of western producing and became manager in 1955.

During 1954, Mr. Macdonzie was chairman of the board of governors of the Canadian Petroleum Association.

Imperial Oil Review, June 1955
Putting the bees out of business

Paraffin wax is turning up in places that bees never thought of. Coating turnips, lining beer barrels, plucking fowl and restoring cavities in tree trunks are just a few of its many uses.

Some time ago, George Van Yahres, a tree surgeon, faced a neat surgical problem: how to restore unsightly and destructive cavities that appeared in the trunks of trees when they lacked certain vitamins.

It was fairly simple to restore the arboreal vitamin counts but plugging the holes was another matter. Van Yahres tried filling them with cement, but it cracked each time and the holes wouldn’t seal.

Eventually he arrived at the solution: he fitted rubber blocks across the cavity, bored a hole from one side and pumped in melted paraffin wax. The hot wax filled the cavity and killed any organisms present. The bark grew over the rubber.

While the paraffin wax injection may have surprised the trees, it certainly didn’t surprise paraffin. This unassuming material, a by-product in the refining of lubricating oils is one of the most versatile of all petroleum products and is accustomed to turning up in odd situations.

Its uses range from making milk cartons leakproof and stopping radiocarbon emissions to lining beer barrels. You can even bathe a sore elbow in it.

Physiotherapists have long been using wax baths to produce a moist heat for treating the hands, feet, knees, elbows or shoulders of arthritic or fracture cases. A little mineral oil is added to lower the temperature of the molten wax to about 123 degrees. The patient, for example, dips his elbow about 12 times to build up a good coating; then it is wrapped in paper and towel for 30 minutes to keep it in the heat. In the case of arthritis this therapy seems to loosen the joints, help blood circulation and relieve pain.

Waxes now imported to be made in plant being built at Sarnia

Within two years, petroleum waxes which never before have been made in Canada will be available to Canadian industry from a new wax plant in Imperial’s Sarnia refinery. The new plant will cost about $4.5 millions and will produce 35 million pounds of wax a year—about half the present Canadian demand. It is expected to be in operation by January, 1957, and will manufacture a complete series of paraffin and micro-crystalline waxes, including those used for milk cartons, wax paper, book-binding paper, polishes, industrial, agricultural and medical purposes.

The projected plant is the result of seven years’ research with a semi-commercial pilot plant. In the pilot plant, Imperial chemists have developed one new wax and have been able to produce others not now manufactured in Canada. They will all be made in the new plant.

The new wax is extremely pliable and has a very low melting point. Imperial chemists believe it will have a large role to play in the medical treatment of arthritis. It will also have commercial uses such as a preservative coating for vegetables and as a base for cosmetics.

Another major industrial wax problem was solved in the pilot plant. In recent years there has been a high demand for a wax that will withstand high temperatures without melting. This type of wax is used for insulating, and as it usually has a very high gloss there is also a large demand for it in floor polishes. Imperial chemists have produced a wax with a melting point of 165 degrees—one of the highest melting points ever achieved in a petroleum wax. It will be produced in commercial quantities in the new plant.

Other waxes the research team has been developing will be used for such things as waterproofing textiles, coating cheeses, and making candles. Many of these waxes, which will be produced in the new plant, are presently imported. Manufacture of them at Sarnia will result in savings of U.S. funds.

The present wax plant will continue operations while its successor is being built. The new plant will be so constructed that additions may be made as the demand for petroleum waxes grows.

The new plant will incorporate the most modern unit for recrystallization. This process not only allows the manufacturer to produce a much wider range of products, but, more important, it allows him to get more products from the original base stock, thus reducing waste and cost.

Some of the other process units will be unique in Canada. They include a hydrofining unit which will improve the purity of the waxes. Hydrotreating is a process first introduced into Canada by Imperial in the manufacture of lubricating oils. For wax manufacture it involves passing hydrogen through the wax in the presence of a catalyst.

One of the big headaches of a wax refiner is sludging the wax and packaging it. This process is presently done in several operations. The wax is pumped into moulds, cooled and then removed for packaging. It is expected that this long and tedious process will be handled by automatic equipment.
Wax even played a role in an attempt to determine the sex of unborn children. Paraffin wax is useful medically because it is chemically neutral—indeed, "paraffin" is a French derivative of the Latin parum (meaning "little") and affinis (meaning "affinity"). For this sex determination scheme, the pregnant patient bit on a chunk of wax, thus producing a sample of saliva. This was analyzed for the presence or absence of certain hormones, which were supposed to indicate the sex of the ensuing child.

**HIGH DEMAND FOR PACKAGING**

Paraffin's purity and non-contaminating virtues keep it in high demand for food packaging. Bread wrappers, cereal box liners, milk cartons (last year 125 million quarts of Canadian milk were sold in wax-coated cartons), coffee containers, and meat wrapping paper probably account for the largest single chunk of the almost 78 million pounds of paraffin used annually in Canada. Wax for the home and candles account for only about three percent of the total. The rest goes into other paper finishing materials such as building paper and wallboard.

Paraffin wax is tasteless, odorless, slightly greasy to the touch, chemically inactive and solidsified at room temperatures. It is found in various types of crude oil.

Petroleum is of little use until it is treated by a refiner. By a process of heating the liquid and condensing the vapors, a distillation is made of various "fractious"—gasoline, kerosene, fuel oil and so on. One of the fractions is lubricating oil. Here we find paraffin wax. It boils at much the same temperatures as lubricating oils so it can't be separated by further distillation. This created quite a problem for refiners. For, of course, the wax would tend to solidify at room temperature. It was barricading and frustrating its users as well as a waste of a valuable product.

The wax is now removed by solvent dewaxing, using a special solvent developed by Imperial's research group under Dr. R. K. Stratford.

The wax-containing oil is dissolved in the solvent and then chilled until the wax crystallizes. This mixture is forced through rotary filters that trap the wax crystals but pass the oil-solvent component. This "slack" wax contains waxes of different melting points which are separated into different grades by "swaying". The huge cakes of slack wax are slowly heated, and the low melting waxes come off first, leaving behind, still solid, the higher-melting-point waxes.

Wax made from the heavier lubricating oils is known as "micro-crystalline" wax. It gives a tougher coating that is more flexible and resistant to heat. Because of these qualities it is used for building paper and, in a blend, on milk and coffee containers.

It is also used on some cheeses. Good cheese, for instance, is coated with paraffin wax dyed a bright carmine red, but cheeses which need a more impermeable coating to protect their freshness and flavor are often coated with a mixture of paraffin and micro-crystalline waxes. In the brewing industry, the "brewer's pitch" which lines metal or wooden kegs seldom contains pitch—it really is made of micro-crystalline wax.

Just who first separated wax from crude oil is hard to establish. It was probably the Scotsman, Dr. James Young. In 1847, Young found petroleum, in the form of oil shale, in Derbyshire, England. In 1850 he patented his methods of recovering heavy lubricating oils and paraffin. By 1854, paraffin was being used by candlemakers. Large-scale commercial production, however, had to wait until 1880, and the introduction of horizontal filter presses. Before this, the refiner put chilled waxed oil in a bag and squeezed it in a hydraulic press to get the oil out; a tedious and rather messy business.

In pathological laboratories, tissue is boiled in wax before it is stored. A busy lab will use tons of paraffin a year.

Wax has always been highly useful to human beings. In fact, there are so many applications that it's difficult to understand how the bees kept up with the demand before paraffin wax was developed. The Egyptians often buried waxen images of their gods along with a dead Egyptian. The Greeks gave their kiddies wax dolls, while the Romans—in the upper tax brackets—preserved wax masks of their ancestors.

**USED FOR IMAGES, MASKS**

In the Middle Ages, the memory of departed monarchs and other notables was kept alive by treasuring their wax masks. It may have been about this time that the practice began of making a wax mask or doll of an enemy and sticking pins in it. This was not uncommon strategy until about the end of the 17th century and still survives in more primitive regions. In Spain, for example, work was done in producing wax figures of saints, skillfully colored.

Today, petroleum waxes have taken over many of the jobs formerly done by the bees' favorite building material—either alone or in combination with other waxes such as carnauba (exuded by the young leaves of a Brazilian palm tree, montan (obtained from brown coal) and Japan wax (from the berries of the lac tree). Ski wax, for instance, may be a blend of paraffin and carnauba waxes. The bright-colored stuff your dentist slips in your mouth with the request, " Bite, please," will be a blend of paraffin and other waxes.

Used alone, paraffin has hundreds of applications. It can be used as a radiation shield in atomic energy devices—nothing leaks out "hot" neutrons like hydrogen atoms and paraffin has a good supply of them.

Canadian turnip growers dip their rutabagas in melted paraffin which acts like a germicide and also prevents the turnips from drying out. Many fruits have a natural wax coat, but they have to be washed, which removes the coat, and the fruit shrinks through losing moisture. Some oranges are sprayed with a coating. Of course this not only times that times are waxed include apples, pears, tomatoes, egg plants and melons. Tobacco leaves too, are protected by wax.

At home, you can use paraffin for rubbing on an electric iron to prevent sticking to starched shirts; lubricating sticky drawer slides; coating window boxes; greasing snow shovels; sealing jam and even for waxing stockings.

This last notion seems to have been invented by the Netherlands, some of whom wear wooden shoes that are fairly rough on the hose. The wax acts as a lubricant between the dog and the stocking. The United States Department of Agriculture once solemnly tested this scheme. Its results showed that by waxing the heels and toes of cotton stockings, it took four times longer to wear them than usual. It recommended first drawing the hose over the feet, as usual, then applying wax by rubbing with a stick of it. It isn't necessary to apply the wax more often than once every four wadings of the stockings.

A quick dip in melted wax has long been used by poultry processors for plucking fowl; as soon as the wax hardens the operator pulls off the coat and the pin feathers come with it. The wax is melted down and used over again.

**LOST WAX PROCESS**

A method of metal casting favored by Benvenuto Cellini, the 16th century Italian sculptor, came back into prominence during World War II for making precision parts for bombsights, jet engines and orthopedic appliances. This is the "lost wax" process, by which a wax object is made, removed and then invested with plaster. When the plaster has hardened, the wax is melted by heat, escapes through one or more tiny openings in the mold, through which molten metal is then poured. When the metal has solidified, the plaster is broken away, leaving the article finished except for the removal of the metal formed in the "sprue," or pouring aperture. This method calls for a new plaster casing for every casting, but is very accurate. The wax is usually a mixture of paraffin plus carnauba and other vegetable waxes.

One of the oldest users of wax is, of course, the candlemaker. He has changed a lot since the 13th century, when members of a guild of travelling candlemakers went from house to house making "tallow dips". Now continuous molding machines can turn out 1,500 candles an hour, and the wick comes off a reel. Besides the plain (or power-failure) candle, you can buy heart-shaped candles, U-shaped candles that burn at both ends, candles that look like beer mugs, apples or pears.

As an insulating material, paraffin wax is widely used in the manufacture of numerous products. Other ingredients may be added, for there are micro-organisms which attack paraffin-impregnated material. Indeed, there is one bug, known as Penicillium glaucum, which can actually use paraffin as its sole source of energy. Since paraffin is inactive chemically, it must be a fairly tricky problem to digest it, and would undoubtedly be impossible for anything except Penicillium glaucum.

Another paraffin addict was John W. McMillan, an early producer and refiner of oil in Petroleum. He died in 1891, after expressing the wish that the refiner had been. This wish was more than faithfully carried out. Not only his coffin, but his whole grave in Petrolina cemetery was filled with almost a ton of paraffin wax.

Maybe he was afraid of neutrons?!
Science-fiction writers have a favorite plot in which man loses control of the earth and insects take over. Few writers, if any, have varied the plot to have man remain in control while teaching the bugs to do menial jobs most suited to their abilities.

But that is the story of what is going on at Imperial's Sarnia refinery, and it's all science and no fiction.

The bugs in the plot are not insect-type bugs, but microscopic, one-celled aquatic creatures that accomplish one thing that in no way could ever do; they eat up the refinery's waste phenol, a form of carbolic acid which has been a serious waste disposal problem in refineries all over North America.

The men concerned are a handful of Imperial engineers and chemists who taught the bugs to eat the phenol in a disposal plant which some experts predicted would never work.

Phenol is present at all times in a refinery. It is found in crude oil, it is a by-product of catalytic cracking and it is used to help purify lubricating oils. Some of it inevitably gets mixed up with processing water which ends up as waste. At Sarnia refinery nearly all the phenol that gets into the waste water is extracted and used over again. But a comparatively small amount—less than two barrels a day—remains as waste because the cost of removing it from the waste water is not out of all reason.

In past years the refinery got rid of waste phenol by burning it. But this method did not do the job as efficiently as Imperial's engineers thought it should be done. Small amounts of phenol would sometimes go down the drain and out into the St. Clair river. As refinery production increased (fivefold, in fact, over the past 30 years) and new processes utilizing phenol were introduced, the amount of waste phenol naturally increased.

The International Joint Commission, which studies and makes recommendations about waste disposal affecting waters common to Canada and the United States, accepts the fact that small amounts of phenol can be discharged into the St. Clair river without adverse effects. But it sets very low limits because the St. Clair system supplies drinking water to many surrounding communities. A trace of phenol in a glass of water is not harmful, but it smells like a hospital corridor and tastes even worse—particularly if the water has been chlorinated.

In keeping with the policies of a new program under which Imperial is spending nearly $4 million over a four-year period to eliminate waste problems in its nine refineries, the Imperial men wanted something better at Sarnia than a low discharge of phenol; they wanted, if it were humanly possible, a system that would make it unnecessary for them to put any phenol into the river at all.

The company at that time was spending $60 a day to burn only 135 pounds of phenol. It didn't take a financial wizard to realize that $2.96 a pound is a steep price just for getting rid of something.

What about other methods? There were several involving chemicals. But the best of the cost, $1,500 a day and even the cheapest catalysts (for $70,000 a plant with operations costing 45 cents for every pound of phenol destroyed. In a search for a better method, the Sarnia men were attracted to the huge Dow Chemical Co. plant at Midland, Michigan. There, thousands of pounds of waste phenol were being destroyed every day by a system called biological oxidation, in which phenol was fed to billions of tiny, round and egg-shaped bugs. With the aid of an enzyme it exerts through the cell wall, this type of bacteria is capable of absorbing or "eating" phenol by breaking it down into simpler substances and leaving only carbon dioxide and water as waste.

But you can't try the same system at Imperial? That suggestion sounds reasonable now, but at that time it seemed ridiculous to those most familiar with the Dow plant. Phenol disposal system that was grappling with 80,000-acre tract dotted with thousands of boulders to which the little bugs cling in slimy masses, waiting for phenol-laden water to be sprayed over them. It was obviously no place to try Imperial's weird, hard pressed to find five acres—let alone 500—to devote to the destruction of phenol.

"Why," asked A. D. "Alex" McRae, an engineering expert concerned with waste disposal problems, "couldn't the bugs be induced to eat phenol inside a tank, just as well as on the rocks in an open field?"

The Dow experts were sceptical. After all, their system used specially designed jets to inject the phenolic water with plenty of air, without which the bugs can't do the job. Furthermore, the rocks were natural place for the bugs; they were not likely to thrive for long in a tank. If biological oxidation were practical in such artificial surroundings, why were there no refineries using it? McRae and his colleagues decided to find out for themselves.

A. A. "Al" Sheppard and G. R. H. "Bob" Fern, two chemists in Imperial's Sarnia refinery's inspection lab, got a small jarful of the bugs from the Dow plant. So small that billions of them can live on a dime without overcrowding, the bugs are in dust-like places where waste materials are being broken down—in streams (which they purify), in plowed fields, and in manure piles.

"But wait a minute!" said the chemists. "How can we be sure that waste water is not harmful, but it smells like a hospital corridor and tastes even worse—particularly if the water has been chlorinated.

In keeping with the policies of a new program under which Imperial is spending nearly $4 million over a four-year period to eliminate waste problems in its nine refineries, the Imperial men wanted something better at Sarnia than a low discharge of phenol; they wanted, if it were humanly possible, a system that would make it unnecessary for them to put any phenol into the river at all.

The company at that time was spending $60 a day to burn only 135 pounds of phenol. It didn't take a financial wizard to realize that $2.96 a pound is a steep price just for getting rid of something.

What about other methods? There were several involving chemicals. But the best of the cost, $1,500 a day and even the cheapest catalysts (for $70,000 a plant with operations costing 45 cents for every pound of phenol destroyed. In a search for a better method, the Sarnia men were attracted to the huge Dow Chemical Co. plant at Midland, Michigan. There, thousands of pounds of waste phenol were being destroyed every day by a system called biological oxidation, in which phenol was fed to billions of tiny, round and egg-shaped bugs. With the aid of an enzyme it exerts through the cell wall, this type of bacteria is capable of absorbing or "eating" phenol by break-
Off Canada’s east coast lie the barren wind-swept islands of St. Pierre and Miquelon. In a quaint old-world atmosphere, the islanders lead an austere but happy life entertaining tourists and wresting a living from land and sea.

The Atlantic Isles with the Gallic Charm

by GORDON WESLEY

Ten miles south of Newfoundland lies a cluster of tiny, Atlantic-swept islands, whose granite shoulders are hunched in Gallic fortitude while the sea pounds upon them, and time all but passes them by.

The islands, known as the territory of St. Pierre and Miquelon after the two most important in the group, encompass some 90 square miles and are the last remnants of France’s once-vast North American empire.

Here, descendants of 17th century settlers from Brittany, Normandy and the Bay of Biscay lift their wine glasses to toast the codfish, the tourist and the government of France. They have good reason to be thankful for all three.

Cod from the nearby St. Pierre banks which filled the stomachs of their forefathers, do the same for them and also go out as salted and frozen fillets in exchange for precious U.S. and Canadian dollars. Tourists, lured there for a taste of French living, spend dollars on French perfumes, liquors, wines, gloves, lace and silks offered by some of the world’s friendliest shopkeepers at prices that seem almost a steal. Low prices are possible for most commodities because excise and luxury taxes are either extremely low or non-existent. And the French government, symbolized in the town of St. Pierre by the tricolor

< St. Peter, patron of fishermen, adorns St. Pierre’s only church

A policeman’s lot is a happy one as even petty crimes are rare >
St. Pierre’s townpeople, who account for all but about 700 of the territory’s 5,200 odd inhabitants, tend to ignore the foul weather and the bleak interior and exhibit a joi de vivre that more than makes up in sincere friendliness what it lacks in Parisian finesse.

Nevertheless, the islands’ basic austerity occasionally shows through. Butter, sugar and canned milk, imported from Canada or the United States, are rationed; and fresh milk, produced locally and peddled in old wine bottles, is in short supply.

St. Pierre’s constant love of living seems almost calculated to make tourists and residents forget that the town is nestled on the shores of what nature obviously intended as wasteland; for St. Pierre Island, though more heavily populated by far than the rest of the territory combined, is, ironically, the most naturally barren of all.

SHOPS LOOK LIKE HOUSES

The town itself manages to give the impression not of austerity but of quaintness. Narrow streets divide rows of clapboard buildings. Visitors often find it difficult to distinguish at first glance between the 700 houses and the 100 odd shops that are scattered throughout the town. As one visitor remarked facetiously, the best way to tell a house from a store is to open the door and walk in.

The territory’s detachment of gendarmes is seldom bothered even by petty crimes, but the St. Pierre merchant usually “locks” his shop by pulling off the outer door handle and slipping it into his pocket. The merchant’s life is easy-going and, though not luxurious, is made reasonably comfortable by indoor plumbing, electricity and a slightly erratic telephone system.

In contrast, the household of families who farm St. Pierre’s interior and the few dozen who till the soil of the much-larger Miquelon island lead a grim and primitive life. Farming has changed little from what it was when the first settlers landed in 1660. The farmer tills the soil with a primitive plow while his wife scrubs the family wash in one of the streams that wind across the treeless slopes.

Neither the hardships of the interior nor the rigors of fishing are apparent to the tourist, but they are just as much a part of life on the islands as the numerous hillside shrines or the statue of St. Peter that looks down on the Roman Catholic populace from above the front door of St. Pierre’s only church.

Life is equally tough for the fishermen of St. Pierre town and of Miquelon, a village of 400 on the island of the same name. In St. Pierre the cod are fast-frozen and exported to North America and France. In Miquelon they are salted and packed in the village’s old-fashioned fish plant.

Fishing from properly rigged trawlers would be easier, but the rugged pêcheurs prefer the independence of their smaller boats. Long before daybreak they set out in pairs in 21-foot dories powered by coughing little one-cylinder engines that sound hopelessly weak against the rolling Atlantic. They sail for as long as four hours before baiting and casting their hand lines. If fishing has been good, a dory will head back at mid-afternoon with 600 to 1,200 pounds of cod.

One fisherman familiar to all the fishermen is that of lean, energetic Louis Hardy, the Imperial dealer who supplies all their gasoline and oil and much of the diesel fuel taken on in St. Pierre by visiting coastal vessels and foreign trawlers. Thus it is he also has the distinction of being a one-man link between Imperial Oil and its only foreign customers. Barrels of gasoline and lubricants are picked up at Halifax refinery by the French government motor vessel Miquelon, which also carries passengers and general cargoes. Hardy’s diesel fuel was handled the same way until last fall, when he had a 3,750-barrel tank installed on St. Pierre bay, enabling Imperial tankers to make direct deliveries. He also supplies St. Pierre’s 250 odd trucks and cars. Since the town is without a full-fledged service station—there is no gasoline pump at any of the three repair garages—the St. Pierre motorist buys gasoline by the barrel and stores it privately.

Tourists are not encouraged to bring their own cars, but few would care to, after a look at St. Pierre driving habits. Vehicles—predominantly trucks—race madly along the narrow streets, Parisian fashion, weaving between pedestrians and honking excitedly at each intersection. At night, when honking is prohibited, drivers blink their headlights at every corner.

The auto, of course, are relatively new, but the old French charm has been there from the start. During the 18th century, when France and England were struggling for possession of the New World, St. Pierre and Miquelon changed sides faster than a leaf in a windstorm. France gained permanent possession in 1814 with the Treaty of Paris.

In those days the very name of St. Pierre and Miquelon was enough to strike terror into the hearts of brave seamen. The reason was La Dune, a treacherous neck of sand stretching southward from Miquelon island to Langlade, a fertile but still sparsely populated island that is the second largest in the group. Between 1800 and 1930, some 550 ships foundered on La Dune, and salvaging was among the island’s most profitable industries.

Their biggest boom came with prohibition in the 1920’s, when rumrunners used to load French liquor, quite legally, at St. Pierre and deliver it, most illegally, at isolated spots on the U.S. coast. A few American gangsters even rented offices in the town and hired St. Pierrians as assistants.

An earthquake in 1929 is said to have created a tidal wave that washed 7,000 cases of liquor into St. Pierre bay. For several years after, visiting ship’s crews enjoyed some of the most profitable “fishing” on record.

The end of prohibition spelled hardship for the islanders, who reluctantly put the fleet back into the codfish business and began promoting the tourist trade as a second industry.

The St. Pierre Chamber of Commerce was formed in 1971, but tourist promotion has been one of its chief concerns only in recent years. Among the Chamber’s first jobs was to help organize a municipal council, which now functions in conjunction with a governor and a deputy appointed by Paris.

As anxious as they are for tourists, the St. Pierrians do not go overboard keeping up with the changing world around them. A travel folder issued by French authorities there in 1954

Tillers of the soil eke a bare existence from the barren interior.
Two examples of countries.

The islanders' apparent ignorance of foreign affairs is understandable. There is no newspaper, and the single radio station goes on the air only one hour each evening, broadcasting music, recorded drama and news items picked up from North American stations. Local news—spiced by generous portions of gossip—travels by the grapevine, and ship movements, along with billings for the two local movie houses, are chalked up on blackboards outside the store of Henri Morozé, general merchant and shipping agent.

Probably the most important incident to occur on the islands in modern times came after the fall of France in 1941. Some 1,400 men from the French fishing fleet escaped across the Atlantic and swarmed into St. Pierre. To their dismay, they found the local administration favored the Vichy government, rather than the Free French. The issue, which split the town in two, was settled rather abruptly on Christmas Eve by the French submarine Suroît and three corvettes which took control on behalf of Free France and made sure Vichy sympathizers held no influence for the rest of the war. Not long after this incident, a group of St. Pierre men mobilized themselves into a Free French regiment and went overseas.

Typically, they took an oath before leaving that if all returned they would erect a shrine on the hillside above the town. All came back, and the shrine stands today among many others that have been erected for various reasons by members of the deeply religious community.

St. Pierrais pray and play with almost equal enthusiasm. They pack the church for mass each Sunday and during the rest of the week show a boundless enthusiasm for bird hunting, soccer, tennis and dancing. Dances are held every Saturday and Sunday nights most of the year, but in January and February, St. Pierrais dance every night until a Mardi Gras climaxizes the celebrations and marks the beginning of Lent.

This desire to live to the full was perhaps illustrated best by the events that took place many years ago, after the islands' only murder was committed. The killer was caught, convicted and sentenced to death, but the town fathers could find no one willing to be executioner. Finally, at considerable expense, they had a guillotine and an executioner brought from France. The executioner found the townspeople reasonably friendly and polite during the first few days, while he used a goat or two to practise for his grisly task. But after the deed was done, the townspeople's attitude changed. Not a soul in the town would speak to him and no merchant would serve him. Hungry, bewildered and as lonely as a shipwrecked sailor, he jumped onto the first boat bound for France.

Madame La Guillotine was dismantled by the townspeople, tossed into a government attic and never used again. Thus, while the fishermen are willing to gamble their lives against the sea, and the farmers are reconciled to a daily struggle with nature, St. Pierre townspeople would say they are merely doing what must be done, and these necessary labors do not alter the fact that life is meant for living.

In such a philosophy there is no room for murders, for executioners or for guillotines.
This summer, centres throughout the Maritimes will mark the 200th anniversary of the expulsion of the Acadians in 1755. This pencil drawing of the migration is from the C. W. Jefferys Imperial Oil Collection.