SPECIAL ISSUE ON REFINING: 'this hugest of beasts, though he winds back a thousand miles leaping and leaping from unimaginable deeps beneath Alberta's plains, is led to these shores at last and hour by hour engaged'
The Eyeful Towers of a Refinery
Midway through the planning of this issue—by which time we were already gleaning Discordant from technical words like "stream," "mid-level distillate," and "atmospheric and vacuum unit"—we wondered: does a refinery have to be dull to non-technical people? Surely some of—poets, maybe—find it awesome, mysterious, even beautiful?

At least two poets do. The verses of Earle Birney and W.R. Chadwick (see opposite page) speak for themselves. We need only add that Dr. Birney is professor of English and head of the school of writing at U.B.C., has published two novels (his "Turvy" won the Leacock medal for humor) and five books of poetry two of which won Governor General awards. His latest, Near Falak Creek Mouth, is coming out this month. English-born Chadwick has lived in Canada 13 years, has been lecturing in English at Regina Campus, University of Saskatchewan, and has published poetry in Queen’s Quarterly and Fiddlehead.

And at least one artist does (see Doug Johnson's paintings on pages 22-28). Johnson literally climbed the walls of a catalytic cracker during his assignment. He did his drawing of Montreal refinery from the top of the crane, the tallest building in the refinery. "In Winnipeg," he says, "it had rained for 3 weeks before I arrived, and was 90 degrees on my arrial. From across the fields the refinery danced and shimmered as though I was looking at it through amber glass."

In Vancouver he worked two days in the rain, and when the mist cleared on his third day he realized that the grey masses he’d been sketching were actually snow-covered mountains. Halifax? When he awoke on his first Halifax morning, he thought somebody had pulled the blinds on my hotel window, the fog was so thick.

Johnson, who saw his first refineries on this review assignment, spent last year on an Ontario College of Art scholarship, painting his way through England, Spain and Morocco.

Loose Ends Department
As with all special issues, this one was like an overloaded steam trunk. We all stood on the lid at closing time, but just couldn’t pack everything in. For instance, we wanted to tell you about Charles Maesen, our refinery fire marshal at Montreal. Everybody in the city seems to know Maesen. He’s active in a hundred extra-curricular organizations, including the Gnomalas, a group of baby-sitters to which he delivers an annual course on first aid and fire prevention.

We also wanted to mention Edouard Rivet, a day foreman with Imperial and maybe the only Canadian mayor (Montreal East) to also work in a refinery.

Then there’s Jimmie Glass, who runs an automobile shuttle service around the vast Salem refinery. Every half hour he makes a sweep of the premises picking up meals, packages, messages and people. Glass drives some 75-85 miles per day, and 70 percent of his passengers are engineers. The refinery is almost like a small town (it even has streets, some of them named) and, like a small town, anyone can hitch a ride as Glass goes by.

And there’s the refinery employee at Regina who relents orchids in his spare time, and another who’s a beekeeper. Which reminds us that Winnipeg refinery is on an ex-farm, and still owns 200 adjacent acres of farmland. Rents them out to a farmer. This year it was probably the only refinery in Canada to raise gasoline, fuel oil, asphalt—and wheat.

You see that we mean about the overflow-lying trunk.

Earle Birney, Vancouver, British Columbia

Under the breath of the first dragons— those spell-kinders who watched over gold-heards—whole fields of warriors waded. Even hero Breowski died in the hot blood gushing from the firedrake’s mouth. But this hognest of heats, though he winds back, thousand miles, heaping and leaping from unimaginable deeps beneath Alberta’s plains is tied to these shores at last and hour by hour engaged Not without blue fairy he fights flames in the night clouds while against the sky but only the great birds watch while unreserved a few score humpies in gogglies and gas helmets beset him Silver towers are their swords, magic they work with diesel engines catalysts and cyclopean sealers Calmly they draw under their interests shingles and cut the old earth-demon to his endless death death that is his birth into a hundred spirits that speed into the uncoupling wheels and valves of a nation death unlocking the new treasures of unimaginable power; liberal movement the new treasures that bind us all to their new spells.
From a Crude Beginning

It's a long journey from the�ing earth at the wellhead to a refined
happy ending. But last year 380,000
barrels of crude made the trip ever
day through Canadian refineries.

Two pictures hang in the otherwise
draft office of Jack Douglas, a super-
visor at Imperial's Sarnia crude oil
refinery.

One is an antique watercolor
scene of the Douglas domain, one of the
areas into which the refinery is divided;
a bewildering conglomeration of steel
pipework and smokestacks. The other
is a tantalizing pin-up of a hippy, honey-
blonde calendar girl in a brief, red-and-
white checked bathing suit.

Of the refinery workers who regularly
work through, several spend an un-
common amount of time studying the
date on the calendar. But even more
stop to marvel at how cleverly the un-
known Canadian artist captured the charac-
ter of the atmosphere and vacuu-
num unit, with what poetry he has re-
created the fluid catalytic cracking unit,
with what grace and beauty he has cap-
tured the central heating plant.

All of which shows what can happen if
you work long enough at this or any
other of Canada's 41 crude oil refineries.
It's a little like being married through
the years to the same somew-
what unattractive woman. In your
heart, you know she's not beauty. But
your love is a triumph of imagination
over intelligence—the crude oil refinery.

"I've worked here 35 years," says Jim
Lennox, bushy-browed supervisor of oil
movement and storage, "and almost
every day I find something new about
the place."

Few of Imperial's 1,400 Sarnia staff
know exactly what's going on in every part
of the refinery. The place is just too big
to be assimilated. Its $130 million
worth of buildings and equipment
spreads over 450 acres of flatland along
the St. Clair River, south of the com-

Dustilation

1. The first, basic separation of crude
oil into its various components for fur-
ther processing is a continual, continu-
ous one. The crude arrives by pipeline
at the atmospheric distillation tower.
There it is heated to about 650 degrees
F. At this temperature about 60 percent
of the crude oil changes to vapor.

As the vapor swirls upward in the
tower they begin to cool. Those which
condense at the lowest tempera-
tures settle on trays near the top. Those
which condense at higher temperatures
settle in trays further down: light gases,
gasoline, kerosene, heating oil, gas oil.

The unvaporized heavy residual at
the bottom is pumped next door to the
vacuum distillation unit. The vacuum
permits the residual to boil at less than
650 degrees and be separated into gas
oil, several raw lubricating oil distillates,
and unvaporized heavy pitch used
mainly in asphalt and heavy fuel oil.

How much of what comes off this so-
called A & V unit or the similar topping
and cosk distillation towers (called
the T & C unit and used to make coke
rather than pitch) depends on the kind
of crude oil and how the refinery is
attuning itself to meet market demands.
2. Enter the fluid catalytic cracking unit, a noisy 148-foot tower, a kind of torture chamber for molecules. It takes gas oil from the T & C and A & V units and heats it (at about 950 degrees) at a low pressure. The molecules of gas oil literally crack to form molecules of gasoline, light gases, home heating and industrial fuel oil. A silica-alumina catalyst used to speed up the process is so fine that when dumped along with air at low pressure it flows like liquid. This phase of refining squeezes out more gasoline, and of a much higher quality, than that from a straight distillation.

3. Meanwhile though, back at the Powerformer, the distillation product is getting a workout. The Powerformer is a $5 million production dedicated to persuading this low-octane gasoline to rearrange its molecules into powerformes, a form of high-octane. It's expensive persuasion because less high-octane gasoline emerges than the low-octane that went in, and the master persuader is a platinum-type catalyst costing about $17,000 a ton.
Now for the first time it’s possible to see the stuff. A sample is shipped to the inspection laboratory where, among other tests, it is used in two single-cylinder engines which compare the anti-knock characteristics of gasoline in terms of octane numbers. One engine simulates a car’s engine under normal driving conditions and the other under high-speed driving conditions. If it passes its tests, gasoline then goes out into the world by pipeline, tanker, railway tank car and tank truck.

Other crude oil fractions from the A & V and T & C units are meanwhile being split, refined and refined into hundreds more products. Some 50 odd processes in Sarnia go on simultaneously every hour of the year, except for occasional maintenance shutdowns. Pitch from the bottom of the vacuum unit is heated, injected with oxygen for the production of solid asphalt and mixed with solvents to be separated into various grades of liquid asphalt. Light gases from the top of the atmospheric and topping towers are shuttled to the liquefied petroleum gas apparatus, across the road from the cat cracker, where propane is separated from the gases before they’re sent on to the chemical products cracker. Raw lubricating oils from the vacuum tower are sent along to the phenol treating plant where a form of carboxylic acid removes the poorer lubricating oils. The treated oils are sent to the solvent dewaxing plant, where a chemical called ketone separates any waxes lurking in the lube oils.

The waxes are pumped along to the wax recrystallization unit. Here they’re heated, mixed with a solvent, then chilled slowly—different grades crystallize at different temperatures. The lube oils are frisked by hydrogen for any sludge-forming tendency. A small portion of lubricating oil stocks are pumped over to the greases plant. Automation hasn’t quite taken over the greases plant yet. While a small panel controls its manufacture in most phases, Charlie Richards—a 36-year veteran in the service of grease-making—still dips a long-handled spatula into his vats to test the mixture of lube oils and soap made chemically by combining a metal hydroxide with a fat or fatty acid.

‘Still, it isn’t like the old days,’ says Richards. ‘The man in the grease plant used to decide which of five grades the grease would be merely by feeling the blends between his fingers. Those were real educated fingers.’

Now, after cooking for about 16 hours, finished greases from the dozen 4,000 to 12,000 pound capacity kettles are discharged directly into packages on the floor below.

Still, Charlie Richards is somewhat of an enigma, a man who actually gets to see and touch his product. There’s no room for this in the chemical products complex, where a mere 10 men in a $30 million Ducochrome factory control panels, spheres and towers, direct the flow of about 10,000 barrels a day of gas oil and control three high temperature furnaces that crack the oil into light and heavy products. The heavy products are processed further in a vacuum unit while the light products are treated, hammered, conformed and eventually separated into the main petrochemical building blocks—benzene, ethylene, propylene, butadiene and butadiene. Benzene, a widely used chemical, has a part in the process of making detergent alkylate, the base stock for household detergent. The detergent alkylate and the others are shipped off to customers, some of whom are the refinery’s neighbours in Sarnia’s chemical valley, who convert them to finished petrochemicals. Feed stocks from various parts of the refinery are directed to the naphtha specialties plant where solvents are made for dry cleaning, rubber manufacture and surface coatings.

Petroleum is the potential aristocrats of crude oil society. Crude oil upgraded into chemicals is several times more valuable than crude oil transformed into motor gasoline. And in the commercial world of the refinery, anything that promises growth and profit gets preferred treatment.

Not that a small profit is overlooked. After completing their tortuous routes through distillation unit and catalytic cracker, through powerformer and chemical products cracker, through furnaces, treating plants and assorted lesser sufferings, many of the fuels are transferred to the tank farm known as Skunk’s Misery, there to await transport to the outer world. It’s about the only opportunity a molecule has of slipping out of the system (because of the precautions taken throughout the plant to prevent wastage and pollution). A pump leaks occasionally, and fuel sometimes dribbles into nearby trenches and trickles into a small pond which also collects rainwater.

The Sarnia refinery does not allow these stowaways hydrocarbons to rest in peace. Each day, filters suck an average of 16 barrels of oil products from the pond, and reneute them back to the A & V unit for another exhausting journey through the refinery.

Blending

4. Gasoline is scientifically blended with the help of computers. Metering pumps flow to the tank in a variety of additives; tetra-ethyl lead to boost the octane number; butane in winter for quick starting; a solvent oil to keep intake manifold deposits from forming; an oxidation inhibitor to keep gum from forming in the engine when oxygen combines with gasoline; and in colder weather, an anti-icing compound, of which Esoo gets less than Esoo Extra.

Esoo Extra also gets methyl alcohol to keep fuel lines from icing in winter and, where needed, a phosphorous compound to help keep the combustion chamber clean. Esoo is dyed orange, Esoo Extra red, for identification.
It's Still a People Place

Once upon a time crude oil refining was crude indeed. The first petroleum refineries back in the 1860s, were simply stills, in principle much like the things mountain-towners use to make moonshine whisky. A typical still was a cast-iron vessel shaped like an ink bottle and mounted on brickwork over a fire. The heat caused the dozen or so barrels of oil in the still to boil, forming vapors that passed through a pipe or gusset which led from the top of a still to a condenser. The condenser was simply a coil of pipe immersed in a tank of running water.

To measure the contents of the still, a reclaimer sloshed a dipstick into it. To estimate the content of an oil storage tank, he measured the depth with a weighted tape measure. Sometimes he just tossed stones against the outside; the echo from inside indicated the approximate oil level.

Gradually products became more sophisticated and so did the equipment. But as recently as the 1930s a refinery had—in lieu of a control room—a kind of glassed-in peephole called the 'look box' through which he watched and sampled the refinery product stream.

Since then the demands on petroleum refining have been swift and dramatic, and refineries have changed accordingly. Today's refining equipment would have looked like science-fiction to oilmen of even 35 years ago. Even now, to the layman, it is probably the epitome of 'automation'. Yet it is not automation in the popular sense of machines that have suddenly and arbitrarily replaced people. People aren't going out of fashion in refining. But they, and the machines they operate, are becoming more skilled and more complex by the year.

Automation, in terms of refining, really means 'keeping control of the situation'. Refineries couldn't have resisted the new technology, even if they had wanted to. For one thing, it enables the maximum use of the raw material, crude oil. A refinery is one of the most efficient users of raw material in Canada, which is one reason why the price of oil products hasn't gone as high as the general Canadian cost of living. Automation is also essential because of the variety and quality of products that the market now demands. Once it was good enough to produce kerosene, a crude gasoline and some lubricants, and that's it. Today crude oil gives up a host of petrochemicals, a whole family of refined oils, and motor gasesolines at octave level undreamed of even 20 years ago. Today, instruments not only enable operators to control the temperature, pressures and flow of oil, but also to measure and control its quality. (The flow of oil is continuous in each operation, with hundreds of gallons being distilled each minute. It would be physically impossible to sample the oil by manual means.)

And take the catalytic cracker,' says Sarnia engineering assistant manager Joe MacDonald. 'It has dozens of variables, dozens of things that could go wrong. It would take an unmanageable number of men to handle those variables and they couldn't do it as well as the equipment.'

MacDonald feels automation will make its greatest impact on refineries within five to 10 years. At the beginning of 1964, just 75 digital computers were planned or in operation in the free world's refineries and petrochemical plants. But many companies, like Imperial, are conducting full-scale systems studies, a prelude to the selection of a computer control system.

Some companies already use computers in other refinery activities. Imperial at Sarnia uses a computer to equilibrate the most economical combination of components for Esso and Esso Extra motor gasoline. Just eight years ago, this job was done by hand by lab technicians, who laboriously put together a small test sample. The same computer, in Sarnia's engineering building, processes detailed problems in laboratory analysis, mathematical and statistical problems, operational research and planning, and equipment design for all Imperial refineries.

The next step, says MacDonald, is digital control of refinery units. A computer interprets process measurements such as pressure, temperature and rate of flow, swiftly and automatically monitors each process instrument and instantly adjusts any malfunction. At last count, eight refineries (all in the U.S.) use digital control computers on their catalytic crackers. The computers monitor and automatically adjust operating conditions like pressures and amount of catalyst to be used with kinds of fractions flowing through the units. It also monitors the equipment to determine its efficiency, and will regulate a unit's operation to compensate for any weakening equipment. It even evaluates the condition of the catalyst, and will signal for necessary adjustments.

With this kind of equipment coming to the fore, refineries are constantly upgrading their employees. Sarnia has put almost 520 processing personnel through a three-year course at 360 hours yearly of on-the-job instrumentation training and off-the-job instruction in physics, chemistry and mathematics. Maintaining the pace, people get a four-year course in mathematics, drafting and instrumentation techniques. Engineering people are trained to understand computer techniques.

This continuous improvement of the individual's knowledge sums up Imperial's plans for the future: 'We'll attempt to obtain men with high educational standards and demonstrated learning ability,' says George McMillin, an assistant general manager of Imperial's manufacturing department. 'If we can find that kind of employee, I'll be his and management's joint responsibility to carry out his necessary updating of knowledge.'

'I think some day we'll see computer-controlled units in the refinery,' adds McMillin's boss, R.W. Dunlop. 'But computers can do only what people make them do. There'll still be plenty of hard work here. They'll simply be doing different jobs and their overall skills will be higher.'

Are refineries operated by button pushers? Yes—and no. No matter how automated refineries may become, they will always need people like Keith Louis, refinery manager, and Jack Jamison (upper left and right) of Edmonton. Everywhere across Canada Imperial employs men like Nick Kanski and Roger Gimby (lower left and right) of Calgary. Machines, after all, cannot be taught to operate themselves.
Perched on the banks of the Mackenzie River is the refinery town of Norman Wells, the world's farthest north refinery. Some people living there feel they're a long way from home. And, for some, Norman Wells is home.

That mid-May afternoon in 1956, when Auguste Jeske stepped off Imperial's Douglas DC-3 at the Norman Wells airport, the settlement was admittedly not at its best. The chilly 40-mile-per-hour north-west wind sweeping in from the Arctic Circle—about 85 miles north—hammered a slushy rain-snow mixture against the 40 or more wooden frame living units and refinery buildings crouched along the Mackenzie riverbank. Ice, more than six feet thick in mid-winter, still coated the three-mile-wide Mackenzie, and snow on the Franklin mountains to the north and the Carcassous across the river to the south seemed to be melting, but reluctantly. The company station wagon carrying Jeske to the single men's quarters slithered along dirt roads, turning rapidly to mud.

Jeske, a burly, red-faced carpenter from a farm near Langenburg, Sask., had campaigned during World War II throughout northern Europe. He's no stranger to rigorous conditions. But he recalled the muggy, 65-degree weather he left just six hours ago in Calgary, 950 miles southeast.

'If that plane hadn't left yet,' said Jeske, 'I'd like to climb back aboard.'

The plane had left, not to return for three weeks. Jeske promised himself he'd be waiting when it arrived. Today, eight years later, Jeske is still carpentering at Norman Wells, the world's northernmost refinery. In this near-isolated corner of the Northwest Territories, a community of 200—43 of them Imperial refinery workers—exists to provide motor and aviation gasoline, fuel oil, diesel and bunker to the frozen Yukon and Northwest. Only Norman Wells prevents that part of the north from succumbing to the deadening cold. (And sometimes even Norman Wells succumbs. Some years ago intense heat from the boilerhouse thawed permafrost on which it was built. The building's wooden supports, and the building, shifted slowly into the thawing ground. The new boilerhouse is set on steel piles driven into the bedrock. So is the new workshop.)

'Before I drifted here, I knocked around a lot,' says Jeske. 'Never found a place I could really call home. Now I'm at home in Norman Wells.'

Not too many can honestly call Norman Wells 'home'. It takes a special kind of person, coming from a world of TV aerials and concrete sidewalks, to find home on a one-mile strip along the bleak north shore of an east-west crook in the 1,000-mile-long Mackenzie. Residences have the peppy 130-pounder who was Imperial's refinery manager at Norman Wells for 15 years before he retired in 1947 to Calgary. Before he died five years later, he asked to be buried in the overgrown, underpopulated graveyard just west of his beloved settlement. Mackinnon thus became its first permanent resident by choice. (The other seven graveyard inhabitants aren't planted there by choice. They represent a suicide, two drownings, a hunting accident, one burst appendix, a four-month-old Slavey Indian baby, and, in 1960, the latest arrival—an aged Indian from Fort Norman, the closest community at 50 miles south, who expired in the ambulance halfway between the airport and the 13-bed company hospital. He was preserved one week in the camp's food freezer till a priest could fly in to bury him.)

To call Norman Wells home, even for a little while, takes some adjustment— the adjustment of despair, or imagination, or necessity, or resignation, or shiftlessness, or love for a disappearing way of life. To be sure, its setting is magnificent: mountainous landscape of bogs, lakes, and rivers stocked with fleshy pike, trout and grayling; thick forests of spruce, jack- pine and tamarack, broned by bear and moose, caribou and mountain goats. Norman's homes and hospital have long been havens for the sick and travellers of the north.

But Norman Wells started as a jumble of tents and shacks, clustered about the refinery, then graduated to oblong-shaped barracks erected by the U.S. army during World War II. Because the giant-sized Wells refinery couldn't turn out enough to support the U.S. troops and supplies stationed in Alaska, the army built a 595-mile crude oil pipeline from the Wells to a larger refinery at Whitehorse, Yukon Territory. And from its army barracks days, Norman Wells' architecture has never really recovered. To the west of the refinery, five rows of box-like bungalows, mostly converted barracks set on wooden piles driven into the ground above the bedrock, stretch back from the riverbank. Here live Imperial employees and their families, a little more than half the population. On the other side of the refinery, the employees and families of Pacific Western Airlines, and of the Department of Transport, which operates the airport, collects meteorological data and maintains radio-telephone communication—the only means of rapid contact with the outside.

You can walk the width of Norman Wells in five minutes, its length in 20. But you might not want to go in mid-winter. Average yearly snowfall is four-and-a-half feet, and doesn't start melting till late April. The temperature often goes to -40 to -50 degrees F., and -60 or -70 isn't unusual.

'Up here, we get nine months of winter and three months of poor sledding,' says Bob Kern, who has worked 22 years in the refinery, longer than any one else. 'It's a miserable country with miserable weather. There's nothing here for anybody. When I retire, I'm going to where I can plant one leg on either side of the equator.'

Outdoors: boardwalks and dust. indoors: broadloom and hi-fi.

It isn't quite as bad as Kern makes out. Summer days bloom with 24 hours of daylight. On the longest day of the year, the citizens watch the sun dip below the horizon around one a.m., then bounce up for the rest of the day 20 minutes later. The brief summers are warm, even blazing hot—the hottest place in Canada on July 24, 1962, with an 89-degree temperature, was Norman Wells. Most people have flower gardens. But, oh, that dust. The wind whips it up from the unpaved roads and sifts it through hair and fingernails, clothes and automobiles, into houses and cracks in the furniture.

'You can't be too particular a housewife up here,' says Shirley Bennett, wife of producing engineer Ed Bennett. No matter if all doors and windows are closed, an hour after you dust a table it's dusty again. Same with your children. When we first came up, 3 changed them three times daily, they were so filthy from playing outside. Now they get one set of clothes for the morning and, that's it.'

At least in summer you have a little more contact with the outer world. Besides the company aircraft, which arrives every two weeks, Pacific Western Airlines increases to three its weekly stops on its Inuvik-Edmonton route. When the ice breaks up in May, ships and barges shuttle with supplies along the Mackenzie from Great Slave Lake northwards to the Beaumont Sea. (One transport company plans tourist cruises to begin next summer.) About 35 summer workers, including university students and young Slavey Indians, arrive to help in the peak season. And from their private motor launches emerge
the least expected representatives of civilization.

'About four years ago,' recalls Mary Kenison, golden-haired wife of PWA pilot Ted Kenison, 'a man got out of his motorboat and rapped on my door.

'Good morning, ma'am,' he says, 'I'm your local Fuller Brush man.' I almost fell over. If the others bought as much as I did, he must have made a killing.'

But when the river begins to freeze over in October, the life of the Norman Wells citizen becomes tightly circumscribed. No boats. No trains. No roads lead in. Only the scheduled stops of PWA, and company and private aircraft. Papers are four or five days late. No TV. Spotty radio reception. Dawn arrives about 10 a.m., twilight about two p.m. Parking and mud holes, over-shoes made from moccasin (a thick, felt slippers) and animal skins living on the outskirts, are pulled on for protection against the dry, crisp winter.

Morale is Seasonal

'You can easily chart Norman Wells morale,' says Howard Smith, radio director and public relations manager in Edmonton, who funnels most of the labor up to the Wells. 'Lowest in March and April nearing the end of another intolerable winter. People snap at each other over the slightest things. Then the ice breaks up and spirits instantly soar. Quarrels are forgotten. And people who've been thinking they can't stand it any more decide maybe it's not such a bad old place after all.'

'It was May 29 this year, about three in the afternoon,' Shirley Bennett remembers. 'I was having coffee when the refinery whistle sounded. Everybody rushed down to watch the ice break and move down river. We cheered like children. It was like chewing a dozen pep pills. At last, summer was coming.'

For a few, it doesn't come soon enough. A handful of the staff leaves every year, taking what they half-kiddingly call 'The Freedom Plane' back on the five-hour, 800-mile trip to Edmonton. (Some of these involvolc in-company transfers.)

'So why come all at once?' asks Bob Kern, one of the 12 who've lasted more than a decade. 'For the money, that's all—a young fellow comes up for a year or two for a stake, it's a good deal. But to stay any longer—well, look what happened to me. I came up for a year or more. But one year drifts into another. You eat, sleep and work, and before you know it you're a man in his fifties with more than 20 years' service. You're out of touch with everything. I'd be lucky to find a job outside, let alone find a job at the same money. That goes for a lot of people here.'

A first class mechanic in Norman Wells can make about $7,000 yearly. And it takes great ingenuity to spend it. If you're single, the company gives you your own furnished room. If married, you get one of the 22 rent-free company bungalows, drably designed outside, but comfortably furnished, some even with wall-to-wall carpeting and combination radio-phonographs.

Single employees eat in the company mess hall at company expense. Married men get a $75 monthly allowance for food, bought at the company store where most prices are a few cents lower than in Edmonton. The company supplies free laundry and dry cleaning, and all soaps, waxes and polishes.

There are precious few ways of getting rid of your money in Norman Wells. You can buy stamps at the post office. For $3 monthly, you can join the local recreation club, which runs dances and bingo and flies in motion pictures for showing twice weekly, free, in the community hall. You can spend $2 for a life membership in the 3,000-book library. You can run a car. The doves in the settlement were all brought down river by barge during the summer. But driver's and motor vehicle licences total only $3, and since few can drive more than 400 miles a year, it's hard to spend more than $50 in operating expenses.

'But don't think,' says Tom Tribe, the refinery superintendent, 'that everyone here has piles of money saved up. Nobody saves as much as he thinks he can.'

Nevertheless, isolated Norman Wells citizens bust out on some spectacular holiday trips they couldn't afford if they lived elsewhere. Many take leaves of absence of two and three months during the winter. Carpenter August Jeske took a three-month $2,500 European holiday three years ago, and is doing it again this year. Bill Tomansky, a refinery operator, spent $1,500 on a recent two-month tour of 13 European countries. River Monaghan, the barrel factory supervisor, took his wife and five children around Europe and the Middle East for four months this past winter. (Imperial pays the air passage to and from Edmonton once yearly.)

Bob Kern hasn't been to Europe. 'Don't want to go either,' he says. 'Hell, when you've been in Norman Wells, even Edmonton is a holiday.' Actually, Kern, like several others, is putting his money into property. He owns a ranch in southern Alberta. Rudy Speer, the assistant cook, has bought 40 acres in west Edmonton (its value has doubled since the purchase), and another 100 acres in New Brunswick. Vic Johnson, a carpenter who has been at the Wells 17 years, owns houses in Calgary and New Westminster.

Leisure is Expensive

Many put their money into costly playgrounds. Almost everyone has a high-quality radio to catch short wave broadcasts, and camera equipment to capture the blood-red winter sunsets. Bob Hattie, a unit operator and father of six children, paid $8,000 for a used single-engine Stinson aircraft to fly himself around to the better local fishing spots. And Mary Lamash, the 22-year-old housewife, has, after little more than two years in the Wells, a $5,000 sports convertible waiting for him in Lacombe, Alta.

'When I get home for my holidays,' says Lamash, 'I just get into my car and I drive. I don't care where. In Norman Wells, people will say you've got all the advantages of any small town. Well, you haven't. If you're fed up with the place, you can't get into a bus or a car and drive out for awhile. You're stuck.'

Lamash may have been feeling hemmed in after watching the two somewhat what allusive films flown in for showing that week at the recreation hall—No Man is an Island and Nowhere to Go. 'Nowhere to go—but into a woman's arms,' read the poster advertising the performance. And as Roger York, the 22-year-old Protestant student minister up for the summer, exclaimed, 'But into a woman's arms? Well, that sure can't be Norman Wells.'

Seven single women work in Norman Wells—two nurses, two waitresses, a secretary, a coffee bar attendant and a laundress. And though there've been about a dozen marriages in the past decade between couples who've met in Norman Wells, the odds on a young
A Challenge for Wives

Imperial selects Norman Wells personnel carefully. 'The best employees,' says Edmonton employee relations manager Howard Smith, 'have a small-town background, preferably from somewhere in Alberta or Saskatchewan. Or they may have come over from Europe and want to make their stake here.' A lot of single men who’ve drifted around wind up on a plane for Norman Wells. That way they’re reasonably sure the life up there won’t be too much of a shock to them.

Sizing up an employee’s wife is just as important. Smith recalls once rejecting a possible employee. Smith had flown up with the man and his wife to look over the operation during the winter, and they were coming back to Edmonton with some extra passengers—a group of local Indians. Before Smith settled alongside the man’s wife, he asked her politely: ‘Mind if I sit here?’

‘Oh, please do, Howard,’ she whispered. ‘I was afraid one of those Indians was going to take the seat.’

‘She’d been spending two years living alongside Indians, perhaps even having them in her house occasionally,’ says Smith. ‘It was pointless to subject her, or her husband, to Norman Wells. They’d have been miserable.’

Certainly it’s a challenge for a lady used to city life. You don’t go window-shopping. You get your extras by Ext-o-catalogue. You do your own hair. You buy what they’ve got in the company store—a good selection, but the meat that came in last September is a little debauched in the freezer by June and forget the taste of fresh milk.

‘What I miss most,’ says ex-Calgarian Barbara Fry, ‘is getting dressed up and going out for dinner occasionally. Here, there’s no chance from the routine of making three meals a day, every single day.’ Still, Mrs. Fry tries to regard Norman Wells as a two-year adventure. She snowshoes across the river in winter for barbecues, ski, hikes—and gets along well with people.

Some can’t take it. Some hate to leave it. ‘My wife and my kids really wanted to stay after my two-year term as refinery superintendent was up last year,’ recalls Art Wirth, now group head of investment analysis in Toronto. ‘In these two years, we became a much closer-knit family. When you’re only three minutes from your work, you have to do things together. My wife made many close friends. My children learned to do things for themselves, rather than being taken here and there, given this and that. They survived without TV. But, well, my future was outside.’

Some merely endure it. Mary Keniston knows she must go where her husband’s work as a pilot takes him. But for the past five years, her work has placed her in Norman Wells—and she’s had about enough. ‘I want my daughter to grow up in the kind of world they’re going to live in eventually,’ she says. ‘This is a good life for children for awhile, but I want them to know what it’s like to take piano and dancing lessons.’ Eventually, with no high school in Norman Wells, Mrs. Keniston would have to ship her children off to school in Innuvik or Yellowknife, 375 miles southeast.

How you react to this kind of society depends on your age, background, marital status, personality and, especially, how long you intend to stay.

August Jeske, for example, intends to stay. He’s 56 and too old to move. Besides, he likes carpentry and in Norman Wells he gets the chance to do what he likes without too many people bothering him. ‘There’s something about this country,’ says Jeske. ‘It’s free, and meaningful.’

Jeske will probably retire to his cattle ranch in Saskatchewan. Father Antoine Biname says he’ll probably die in the north, ‘but it won’t be for a while yet.’ He is a Lithuanian-born, 64-year-old Roman Catholic priest who has been working among the Rabbitkind Indians ever since he arrived in the north almost 40 years ago. ‘This northern weather, she’s a freezer that preserves you long after you should be dead.’

Father Biname first sailed past Nor- man Wells in 1926, and remembers it as just one derelict and an abandoned shanty. At the time, it was abandoned.

Oil had been discovered there in 1919 by a six-man Imperial crew. But it wasn’t till 1933 that enough customers were found to make it worthwhile commercially to milk the 40 million barrel reserves of caramel-colored crude.

Today, Father Biname works part time for Imperial, probably the only Roman Catholic priest on an oil company’s payroll. ‘It’s a good life,’ he says, in his pronounced French accent. ‘In summer, I run the barge here and take services every Sunday. In winter, I go back to my work among the In- dians. One spring, I won’t come back.’

Some Men Can’t Leave

Men like Father Biname who love, or at least have grown used to life in the north are gradually disappearing. There’s Hjalmar Nelson Hamar. Hamar was born in Sweden 70 years ago, came to the Canadian northwest to look for gold, but took 11 years off till 1959 to work as a battery operator in Norman Wells. On retirement day, he flew into Ed- monton, and decided Edmonton was not the place for him to retire. Now, twice a year, he materializes in Norman Wells to pick up foodstuffs, equipment, a pack of dog-eared magazines and a fresh set of husky sled-dogs. Then he troops back into the bush, his Shanari-li. If he runs out of food, as he did once across the frozen wastes of an 1,100-mile trek from Norman Wells to Churchill, Man., there are always the sled-dogs.

And there’s Angus Sherwood, the lively septuagenarian who spent most of his years in the north (many of them as an Imperial employee) and now operates the government liquor store.

A few years ago, Sherwood glanced out at the 15 m.p.h. signs on the road, at the chlorination system erected to keep snow off the water system, at the Brosow Creek, at Imperial’s giant food freezers and vegetable cooler (the cooler has to be heated in winter to keep it at about 32 degrees). Sherwood sniffed, shuffled out into the streets, and...
and erected a plaque by a large stone which explains only half jokingly what he thinks of today's modern pioneers. The plaque still stands: "Upon this stone, August 2, 1789, sat Alexander Mackenzie, whilst fighting mosquitoes and planning this present refinery. Since that date, this stone has been a saluting point for dogs, foxes and wolves, in honor of the man who led the missionaries, fur-traders, tuberculosis and tin cans down this great river to the polar sea. Looking matches, cigarettes, radio, Eno gargle, rubber boots and tissue paper, Mackenzie made the round trip from Lake Athabasca to the frozen ocean in 102 days in a back canoe, powered by internal combustion Indians.

"Modern pioneers complain if the toast is cold or the mail plane is late."

**The People in the Town**

If you're process supervisor Trevor Morgan, civilization be damned. Morgan tried civilization in Calgary for two years, after spending four years in the Wells. He found it lacking.

"I came back four years ago," he says, "all my life I'd lived in large cities, but after four years in Norman Wells, I just couldn't stand Calgary. Everybody outside is in a hell of a hurry to get somewhere. Here, it's relaxed, free and easy. I don't have to wear a tie. I can fish in the summer, hunt in the winter. It's my kind of life. I guess I was always a small-town boy at heart."

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**Turnaround is Fair Play**

Even refineries get that tired, rundown feeling.

Operating 24 hours daily every day of the year is hard on even the most powerful of Powerformers, the stoutest of solvent dewatering plants, the cream of the catalytic crackers. Every crude oil refining unit falls victim eventually to the corrosive elements it segregates, as part of its job of refining, from crude oil products. Salt water in petroleum decouples during distillation, forming hydrochloric acid which corrodes condensing equipment. Sulphur, chlorine and nitrogen in crude oil et al at a unit's insides, corrode its pipes, attack its pumps and vessels. The units ultimately need time off for good behavior.

Which is why refineries have turnarounds. In a turnaround, a unit is shut down, cleaned and inspected, deodorized, overhauled and refurbished, and otherwise made fit once more to refine crude oil. Ultrasonic testers probe its metallic thicknesses. Certain sections are painted with silicone-based, temperature-sensitive paints that change color if temperatures rise above safe limits.

At turnaround time, larger refineries close down individual units on a programmed schedule so that product supply isn't interfered with. (Imperial Ioco, a smaller refinery, closes all its units down at the same time.) In Sarnia, most units are refurbished every two or three years. How long it takes and what it costs depends on how complicated is the overhaul.

Sarnia's fluid catalytic cracker gets almost a month's rest every three years. During its hiatus in August, it cost more than $250,000 for housecleaning and another $250,000 for adding extra equipment to step up production. It's hoped the unit won't need a rest cure for at least another four years.

Few pauses that refresh are as elaborately plotted as a refinery shutdown. Last year's turnaround at Sarnia's chemical products cracker, a complex of six integrated units, took 3,000 man-hours to prepare. That's equivalent to one man working 18 months to figure out how best to deploy 380 men hired to take it apart, clean it of corrosive influences and add equipment to boost production. It cost $500,000 before the units were working again.

And this for a layoff for the cracking of just 18 days.
The Realities of Change

by W. O. Twain

The most irrevocable fact of life, and often the most painful, is change. It has been with us—in its basic forms of birth, growth, death—since the beginning of mankind. Every day brings all kinds of familiar variations: the passing of seasons, the necessity of leaving a familiar home or city, the growth of children into adults, the fading of adults into old age. And most of us, consciously or otherwise, resist change.

Yet, we cannot avoid it. It is essential to the life of a person, a company, a nation, a society. We must grow; therefore we must change. And rarely in history has change been as swift or acute as we know it today. It pervades such deep-rooted institutions as churches and schools. It is engulfing business and all our old ways of doing business. It is revolutionizing agriculture. It is reflected in the attitudes of millions of people around the world who are newly conscious of their right to aspire to a life rather than a mere existence.

This is why I think it imperative that all of us, not only as members of industry but as members of the human race, learn to welcome change, foster it and use it.

This is no easy task. I realize. It is not simply a matter of individuals saying, ‘We will accept change.’ Companies cannot set up departments of change and turn the problems over to them. Change must be encouraged deliberately, painstakingly, by everyone at all levels. We should always be seeking it out. We dare not sit back and wait for change to come to us.

Now I don’t suggest that there should be no sanity or order in our organizations or our personal lives. No individual or firm can flourish in a state of constant unrest. But the company or person that does not generate new ideas, that does not even provide a receptive climate for such ideas, that has a rule or a precedent for everything, generally develops a kind of creative hardening of the arteries.

A writer once said that the last act of a dying organization is to get out a new and enlarged edition of the rule book. Sir Henry Bessemer, speaking of his invention of the steel-making process that bears his name, put it another way: ‘I had an immense advantage over many others dealing with the problem... I had no fixed ideas, derived from long-established practice, to control and bias my mind. I did not suffer from the general belief that whatever is, is right.’

One of Our Greatest Resources

I suspect that most inventive and creative people share this point of view. There is really no reason why all of us should not share it, to a degree. Biologists tell us that one of man’s greatest resources is his ability to change. Over the ages, he has tended to grow more than any other species, in a manner that has enabled him to flourish. Man is obviously capable of the act of change; only the idea is frightening.

How can we overcome this fear? No one can pretend to have all the answers. But the more successful individuals and organizations seem to be those that have accepted the fact of constant change and built this acceptance into their everyday lives. They have said, ‘Change is with us. There is no escaping it. Now, what can we do about it?’

Our own industry and company are beset by change. We don’t pretend to have mastered it, if only because it is a continuous process. But we have lived with it for longer than many other industries, and perhaps some of our experiences are worth recounting.

Training and retraining, for instance, which have received so much public emphasis lately as a result of the popular rediscovery of automation, have been an essential part of our business for decades. Technological change in petroleum manufacturing is such that a refinery—of which much more is said elsewhere in this special issue—must be essentially replaced every 10 to 12 years. Unless retraining is constant, such a rate of change would have to be accompanied by complete staff turnover. So, we are involved in continual training and retraining of refinery people.

There has been retraining and reorganization in many other areas—ranging from dealers to management—reflecting other kinds of changes in our business. Motorists’ shopping habits and tastes are changing and competition for their business is increasingly fierce; hence we have new dealer-company relationships, new kinds of service stations, new kinds of products for sale in the stations, new marketing methods.

These, and other changes, have brought about a virtual realignment of the company’s operations in a relatively few years. I do not deny that they have caused pain at times. But they have been effected with a minimum of disruption and a maximum consideration for the individuals and communities concerned. There have been no wholesale lay-offs or re-hirings. The company anticipated change and followed up with planning and training. Thus, I think, are keys to the problem.

Inevitably, a new situation is less painful or frightening if you prepare for it. I mention these examples only to illustrate a point, not to beg praise for whatever success we have had. Management deserves no medals for merely doing its job. Its responsibility is to keep an operation running efficiently, not only in the interests of the shareholders but in the interests of national welfare. Nowadays, efficiency means keeping abreast of change.

Indeed, our company believes that one of business’ prime roles is to be the continuous agent for change. ‘Our justification in this society,’ one of my colleagues, Ronald Ritchie, said in Vancouver earlier this year, ‘is the justification of continually seeking new methods of producing goods and services of finding new goods and services that will give the consumer satisfaction; of finding better ways to use the scarcer resources of our society more effectively.’

I heartily endorse his statement. However, neither of us suggests that

William Osborn Twain is president of Imperial Oil. He was born in Galt, Ontario, grew up in Sarnia and joined Imperial in 1933 after graduating from the University of Toronto with a Bachelor of Commerce degree.
business should bear the sole responsibility for dealing with change. One can apply the principles of corporate existence to the national scene and ask: are we, as a nation, organized for growth and change? Are we in sound instances building resistance to them?

In this country, segments of the economy have been traditionally insulated by government subsidies or special tax exemptions. These have deep social, as well as practical, political aspects. We are, in fact, preserving obstacles in some areas at an increasing cost to the total economy in terms of future replacement, thus postponing the day when major changes must and will take place. These changes cannot take place quickly. They should be implemented over a long period of time.

Problems for Government

Change has other national implications. Because it is inexorable and increasingly vigorous in today's society, it creates an atmosphere for which our constitutional processes were not designed. They present special problems to our federal system of government as compared to the unitary government of Europe. Canada has overlapping and ill-defined responsibilities between the federal, provincial and municipal bodies of government. All of these problems are in need of economic planning, regulation and stimulation. Consequently these actions are often in conflict and the interests of an area may be opposed to those of the country as a whole.

Too frequently, though, we tend to blame government for the change—in fiscal or monetary policy, in educational standards and many other areas. Actually there is an inherent inertia here that can only be relieved by wider public acceptance of the realities of change.

All of us, for example, must recognize the need for more education—not only for those people who have little or none, but higher and continuing study for all who wish to increase their education. We may not see a substantially shorter work week in the foreseeable future. But I suspect that the average Canadian will spend much more of his 'working' time in study, constantly upgrading his education.

The reason, of course, is that our ways of doing business are undergoing a revolution. For instance, we are approaching a revolution in communications which, as far as industry is concerned, will eliminate much of the paper passing. Already, to mention one small area, there are business machines that transmit words and pictures across our country in microseconds; intercommuni- cating telephone systems that permit full-scale meetings without any of the participants having to leave their desk; card-diaper telephones that dial numbers automatically. Eventually we’ll have worldwide telephone communication satellites.

We’ll see a vast expansion of computer processing. This form of automation—so-called (really, a better term is 'instrument control'), is no newcomer to the petroleum business. Through necessity, our industry virtually pioneered computers in this field. As our manufacturing processes became more sophisticated so did the instruments that operate and control them. We are now getting into computer control of the refinery itself.

Imperial Canada operates computers in two main areas: computing—processing the raw numbers of business preparing of payrolls and paycheques, analyzing all kinds of data, performing all kinds of scientific calculations. The other is computing in a short time, and thereby enabling them to draw conclusions and lay plans. These uses not only call for higher skills and much higher education levels among employees who use these techniques; they actually change the functions and responsibilities of management.

Change is Continuous

I must stress that computers will never make people obsolete; they are only as good as the skilled people who use them. But they are an essential tool to efficient business today—and they represent change, fundamental change. I would speak for those industries or facets of Canadian life, but we can see many continuing changes in our own industry. Our company will continue to be very much a part of the oil industry for many years. We now have oil and gas reserves in quantities understood of even a few years ago. But it will not be business as we knew it. The field just depends upon it. We dare not stand still.

Catalysts are the pep pills of the re- refinement. They catalyze into a slow moving chemical reaction and they speed up the reaction without being chemically changed themselves. The only trick is to find the right catalyst. Any substance, solid, liquid or gaseous, could be a catalyst if it found a compatible situation. And no one knows for sure why specific catalysts affect specific reactions. Correlating the correct catalyst to hasten a particular chemical reaction is still a trial-and-error process.

Chemists know some substances to be better for certain types of reactions. For example, a certain nickel compound is among the best catalysts for the removal or addition of hydrogen. None of the different catalysts normally used by Imperial is one substance. They’re mixtures of substances usually embedded or in a disposable base like alumina or some form of synthetic porous clay which distributes the working particles of the catalysts. (For instance, Imperial uses a combination of cobalt and molybdenum on a clay bed to reduce the sulphur level in lubricating oils.)

Besides saving time, catalysts usually help produce a better product. Before World War II, most refineries used a process called thermal cracking—a mixture of high pressures and temperatures to split gas oils into coke, heavy oils and 60-octane gasoline. Then came silica alumina, which when introduced into the cracker transformed some 50 percent of the gas oil molecules (about twice as many as before) into gasoline with a 92 to 99 octane number. Like all good catalysts, silica alumina remains untouched chemically by the reaction, though it’s changed physically. In the reactor, under extreme heat and pressure and helped by the catalyst, gas oil molecules literally crack into smaller molecules of gasoline, home heating and industrial fuel oils. The catalyst becomes coated with carbon in the process, but this is burned off in a regenerator and the catalyst is used again.

No catalyst works out chemically, but small amounts are lost to the atmosphere, and after long use in many cases the rest weakens physically. When it is no longer economical to regenerate them they’re replaced. Imperial uses yearly 600,000,000 pounds of a form of sulphuric acid and 1,500,000 pounds of aluminum chloride in making deter- gent alkylate, the base stock for syn- thetic detergents. Luckily, platinum—Imperial’s most expensive catalyst—can go on indefi- nitely. As of April of this year, Imperial had some $3 million worth of platinum on hand and working in its refineries.

Manufacturers, always improving their catalysts, guard their formulas jealously. Imperial uses three catalysts known only by their trade names (one to help remove the smell of sulphur from light naphtha gases; two others, in the chemical products cracker, to sort out ethylene and propylene gases). Some catalysts must be handled with great care—such as hydrofluoric acid, which Imperial uses in its Winnipeg and Edmonton alklylation plants to help combine propylene and other gases into high-octane gasoline. A whole new fashion in refinery wear has grown up around hydrofluoric acid, which is so powerful it can eat through glass containers. Any worker who enters the unit must wear rubber gloves, rubber and a face shield, while men who work directly with the stuff peer out at the re- finery world from an air helmet (similar to a diver’s helmet and supplied with compressed air), rubber boots, gloves and a tight-fitting rubber suit. On the remote possibility that a drop of the acid might get on someone’s skin, show- ers (some of which run on automatic- ally if someone steps under them) are spotted through the unit.
The Eye of the Beholder

Refineries, most people imagine, are sprawling miles of towers and pipes, unblessed by a single sign of beauty. But beauty, the old saying goes, is in the eye of the beholder.

And the dreaming eyes of art can soften harsh lines here, highlight a voluptuous curve of building there.

Doug Johnson, a young artist who had never travelled west of Toronto, went to four of our refineries with fresh vision and an open mind.

And he found beauty — T.D.

Vancouver

Even the crisp white, efficient refinery structures look romantic, surrounded with the almost aggressively beautiful backdrop of trees, water and mountains.
Winnipeg

The refinery, raising its towers against the horizon in the shimmering heat, seems to beken across the uncompromisingly flat landscape.
Halifax

Five docks perched on stilts poke out from shore, enabling big ships to be loaded or unloaded regardless of tides (left). Even from the Royal Nova Scotian Yacht Club (above) the refinery, across the harbor in Dartmouth, looks bustling.

Montreal

Montreal's refinery complex (there are six refineries located around the same area) stretches almost beyond one's line of vision.
The Learning Page

Being a collection of informative and sometimes amusing items for students, teachers and other interested parties

PETROCHEMICALS ARE OFF AND RUNNING
The fastest growing crude oil refining area is in petrochemicals. At last count, there were 914 petrochemical plants in the free world, more than 100 additional to the previous year. And in the next three years, refiners expect to build or expand upon another 311. The U.S. has the most, 511, followed by France and Canada in that order.

MEET THE FAMILY
In case you're still bewildered after 28 pages of refining talk, here's a formal introduction to the family. Imperial has nine refineries: at Vancouver, Calgary, Edmonton, Norman Wells, Regina, Winnipeg, Sarnia, Montreal and Dartmouth. The oldest is Sarnia (1877) with Ioco in B.C. the runner-up (1915). The biggest? That's Sarnia, too. It can process 100,000 barrels a day.

ABOUT OCTANE NUMBERS AND ALL THAT
Refining is the art of antagonizing the carbon and hydrogen atoms in crude petroleum into making something respectable of themselves. The gasoline stream from the A & V and T & C units, for example, has an octane number of from 50 to 60--too low for today's engines. (A research octane number is the measure of a fuel's power under normal driving conditions. The more a fuel resists uneven burning, premature ignition or too rapid burning, the higher its octane number.) Eso regular gasoline must graduate with a research octane number of 94, higher than the octane number needed by Eso Extra a decade ago. Eso Extra, the blueblood gasoline which makes up about 20 percent of Sarnia's gasoline shipments, needs a 99 to keep today's higher compression engines from knocking.

REFINERIES ARE BUSYING OUT ALL OVER
At present, 21 countries in the free world are building their first refinery. Ten are in Africa, six in central America, two in Asia and the Far East, and one each in Malta and Paraguay and Cyprus. Total capacity, when they're finished, will be about 264,000 barrels daily, from the Congo's (Lusakville) expected 5,000 to Nigeria's proposed 39,000 barrels.

THERE'S A LONG, LONG ROAD
You could build a lot of roads—and Canadians do—with the asphalt that pours out of Imperial's Montreal refinery. It was the first refinery in Canada to make asphalt from crude oil and it now makes 4,700 barrels per day.

WHERE THERE'S SMOKE THERE'S NO FIRE
The reason you hardly ever hear of refinery fires, despite the highly flammable nature of almost all the products handled in a refinery, is because of super safety precautions and equipment. Refinery fire fighting systems, for example, are the envy of many communities. Imperial's manufacturing department maintains among its refineries enough equipment to protect a large city—including 30 fire trucks, 14 trailer pumping units, six powerful floodlights, and 151 miles of fire hose. The equipment is manned by trained employees. In some areas, such as Montreal East, refineries pool their men and equipment. Result: a force capable of quenching any fire.

DO-IT-YOURSELF OIL REFINING UNIT
A British manufacturer has devised a portable refinery, for those who like to make their own diesel fuel, gasoline or kerosene. The idea is to sell it in areas remote from normal sources of supply. The units, about as large as a summer cottage and with capacities of from 800 to 1,000 barrels, can be hitched onto skids and towed along behind a pick-up truck. All you need to keep it running is a supply of crude oil.

FOR THE MAN WHO HAS EVERYTHING
If you were thinking of buying an out-of-the-ordinary gift for the man in your family, come next Christmas or Father's Day, don't overlook a refinery. To build from scratch a modern refinery such as Imperial's 39,000 barrels a day set up at Dartmouth would cost about $60 million, taking the modern refiner's rule of thumb for capital cost $1,000 per barrel per day.

WORLDWIDE ROLL CALL
If all the refineries of the world were laid end to end—well, it'd be pretty noisy. Last time we counted there were 662 in the free world, capable of handling 27.39 million barrels of crude per day. As you might expect, the U.S. has the most refineries, 288, and Canada ranks second with 42. But maybe you didn't know that Italy is third with 37, Japan fourth with 33 and West Germany a close fifth with 30.

COOL, MAN, COOL
As deep freezes go, nothing goes much deeper than the underground storage pit for liquid petroleum gas, completed at Imperial's Montreal refinery last year. It's the first of its kind in the world drilled in solid limestone with a steel roof. Holds 50,000 barrels and can be kept at minus 45 degrees F.