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The REVIEW is published periodically by Imperial Oil Limited, in
the interests of shareholders and employees. Correspondence should
be addressed to the Editorial Office, 58 Church Street, Toronto, Ont.

3 1/2 MILLION GALLONS on the shelf

LOOKING like a giant silver pumpkin, this new
spheroid tank at the Imperial Oil Refinery at
Montreal East holds more than three and one half
million gallons of casinghead gasoline.

Spheroid tanks are the result of the oil man's
search for storage tanks that would best withstand
the vapour pressure of volatile petroleum products
like casinghead gasoline. Taken straight from the
casinghead of the oil well, this highly volatile gaso-
line is blended with natural and cracked gasolines
from crude oil to provide the quick start which is
a necessary quality of a good motor fuel. The high
vapour pressure of these light ends make them an
excellent agent for quick starting, but this same
vapour pressure makes them more difficult to store
than less volatile gasoline.

In designing a tank which would stand the vapour
pressure of highly volatile petroleum liquids, as

well as the weight of the liquids themselves, petro-
leum engineers tried an interesting experiment. They
took a rubber bag, filled it with liquid, placed it on
a flat surface and pumped gas into it. Obeying
natural laws, the bag assumed a shape in which the
tension stresses on the skin were the most
uniform. While the weight of the liquid tended to
flatten the bag, the gas pressure tended to round
the upper portion into a spherical shape. The result
was a definite spheroid.

Eventually the form taken by the rubber bag
was reproduced in steel. Known as "smooth" spher-
oids, these tanks have an external support an outside
girders with steel brackets to uphold the overarching
weight of the stored liquid when there is no internal
gas pressure pushing upward on the steel. The
first spheroids were riveted, but in recent years
welded construction has been largely used.
Oil Comes to Lands Forlorn

By the Right Reverend A. L. Fleming, D.D.,
Bishop of the Arctic

Reading the papers nowadays, it is easy to think of oil as the Great Destroyer—to think of it as a vicious, slow-moving tidal wave, crawling across the world and swamping all before it that is fair and good. It is a dismal picture and I think a wrong one, for my own experience along the rim of the north has taught me to regard oil as a Great Liberator, freeing men from want and relieving them from suffering.

After leaving school I spent eight years in the drawing office of John Brown & Company, Ltd., the famous shipbuilders of Clydebank, and I recall that even then we used to wonder whether someday oil would be used to propel the battleships we designed. Almost I witnessed the beginning of that tidal wave which has so nearly engulfed the world. But in 1908 I threw up my career as a Naval Architect and volunteered for missionary work among the Eskimo, and for three years, now, I have watched another wave gathering in volume—a wave of oil, fueling torches, not extinguishing them, bringing good instead of destruction. It is this wave, I believe, which truly symbolizes the future.

My first post was at Lake Harbor on the southern coast of Baffinland and from the very beginning oil bulked large in my reckoning, for Lake Harbor was a whaling station. My work was with the natives, but I met the crews from the whaling ships and listened to their talk of whale-oil and whale-bone, of prices and prospects. To them, whale-oil was a commodity and nothing more—but to those of us living in the country it was something beyond price, for it represented both fuel and food. Later on, as I shall describe, oil was shipped in from wells in the south, bringing a new era for the Arctic, but in the early days of my ministry we were solely dependent upon whale-oil and seal blubber.

In my mission house at Lake Harbor I burned coal brought in by the annual ship—but burned it sparingly, for there was never enough and freight costs raised the price to a fabulous figure. However, during the winter I spent comparatively little time at the post. Instead I travelled with sled and dog team, visiting the various groups of Eskimo at their hunting grounds. On these trips I lived native fashion in snow igloos, and did such primitive cooking as I could manage over a stone lamp burning seal-oil.

Memory has held the door on my first attempt at igloo cooking. With May-ock-tok, a native friend, I had left Lake Harbor, intending to make a journey of several weeks to visit Eskimo families seal-hunting down the coast. It was hard going, the first day, with an icy wind blowing the snow down from the north-west like steam under pressure. We travelled along the shore-line and because of the hummocky ice we were forever hopping on the sled or extricating the dogs from difficulties. By nightfall I was dead tired.

May-ock-tok selected a place in the lee of a cliff to build the igloo and I helped him as best I could, chinking with soft snow between the blocks. When he had done I crawled inside and the picture was as clear now as it was then—the candle-

An Eskimo family at home. The igloo at the right of the picture has not been completed.

Left—The igloo is completed and the family moves in. Although they lack the comforts of home as we know them, these hovels of snow can keep an Eskimo family warm in the coldest weather.

Right—Building an igloo. Made from blocks of snow, it takes shape quickly. Here the roof is being pieced together.
the seal, walrus, white whale or narwhal. The wick is made from moss and cottonwood. The moss, gathered from the banks of streams in summer, is dried and rubbed down in the same fashion that a man teases tobacco before filling his pipe. It is then mixed with the cottonwood bloom to form a tinder wick.

My first job in getting the kotlik going was to smash up lamps of frozen blubber in a stone beater, then I melted a little of it with the candle and soaked the wick. Before long the heat from the lamp was sufficient to melt the remaining blubber and I was ready to start cooking.

It was a wearisome job, first melting ice for water, then bringing it to a boil over the smoky lamp and making tea. Then frying-pun stew. May-ock-tok must have been famished by the time I was ready, but he looked cheerful enough. And certainly he did justice to the meal.

Today, thanks to gasoline and coal-oil, a meal can be cooked in half the time it used to take. For the small, portable pressure stove was the first blessing which the wave of oil brought to its wake. The stove in general use in the Arctic is a small brass affair, with a single burner and a reservoir about eight inches in diameter. The reservoir is filled with coal-oil, pressure is pumped up, the burner is primed with gas and in a couple of minutes the stove begins to burn with a good, blue, hissing flame.

The small stove was oil's first blessing to the north and the power boat was the second—and perhaps the greatest. During the early days of my ministry, if I wished to travel after break-up, the only craft available for a journey of any length was the oomiak—an unwieldy sailing boat constructed of seaweed stretched over planks. It was an ingenious craft with sails made from the intestines of a seal, but it was neither safe nor comfortable. Oomiaks are still used by the Eskimos, but nevertheless the power-boat has brought them a much greater measure of security.

The Eskimos are a migratory people, spending their lives in one long hunt for food. In the Arctic it frequently happens that although game may be plentiful in one district, there will be, for some unaccountable reason, a complete dearth of it in another. I can remember, for example, times of near-famine at Lake Hazen and bearing later that while our people were starving, natives along the coast had been enjoying abundance. The distance between feast and famine was less, perhaps, than a hundred miles, but because of the primitive means of transportation available neither group could know the circumstances of the other.

The coming of the power-boat changed all that. Police, traders and missionaries were able to keep in touch with the encampments scattered along the Arctic coasts, carrying news of where hunting was good; where it was poor. They were able to move Eskimo families from one district to another, or supply them with food until hunting conditions improved. Now that gasoline and oil are becoming increasingly available, the Eskimos themselves are acquiring power-boats.

In 1927, after being 'outside' for several years, I was asked to assume charge of missionary work in what is now the Diocese of the Arctic—a district extending from Herschel Island in the west to Pangnirtung, Raffinland, in the east. In this new work it was necessary to travel thousands of miles every season, visiting existing missions and establishing new missions, schools, and hospitals. But for oil, and the power-boat, and later on the aeroplane, my task would have been an impossible one.

Oil, however, did more than facilitate travelling; it proved an invaluable boon in the hospitals and schools which we were now establishing in the north. Already there was a hospital at Pangnirtung and one of my first tasks was to build another at Akvik, near the mouth of the Mackenzie, which was fast becoming the trading and mining centre for the Western Arctic. Money was provided for the building, for up-to-date equipment and for an operating theatre—but the value of these things would have been diminished if it had been impossible to furnish the hospital with X-ray equipment and electric light. Our problem was to generate electricity at reasonable cost.

A few years before I had been confronted with a similar problem at Pangnirtung. There an X-ray machine had been installed together with a diesel engine to provide electricity. At Pangnirtung we were able to secure plenty of whale-oil at low cost but found by experimentation that while this made very good diesel fuel it could not equal mineral oil. At Akvik the situation was different. Because it is an inland post whale-oil is scarce and so we had to look elsewhere for an assured supply of low cost oil. Imperial Oil Limited came to our rescue and supplied us with diesel fuel from the company's wells some fifty miles north of Fort Norman on the Mackenzie. It was fitting that the most northerly hospital in the Empire should be supplied with oil from the world's most northerly well.

The value of these wells on the Mackenzie River can hardly be over-rated, for by facilitating the establishment of mines and providing fuel for arctic transportation they are indirectly alimenting the lot of both the Eskimo and Indian. This was clearly recognized by Lord Tweedsmuir, for when in 1887 he visited the Arctic, he spoke to me often about our northern land and its future. Recognizing the importance of an oil supply, he foreshadowed great possibilities. He saw mining towns growing up to become feeders for the cities in the south, he saw a better balanced economy and as a result, greater security for the people of the north.

In 1928, when I travelled up the Mackenzie, two wells had been completed above Fort Norman and a modern tapping and stabilizing plant with a maximum capacity of 840 barrels a day was already in operation. In that year—to meet the needs of the northern market—the production amounted to 85,000 gallons of gasoline and 410,000 gallons of heavy diesel fuel oil. That production has meant for us the efficient operation of our hospital at Akvik and it has meant for that whole area comparatively low cost transportation by boat and plane.

The most spectacular blessing coming to the north in the wake of oil was unquestionably the aeroplane, for aerial transportation has been de-
Children who play with mud pies today may study the same material tomorrow as a major subject in petroleum engineering. How scientifically compounded muds help lick tough drilling problems is told here.

The fascinating story of drilling muds involves chemistry and physics, delicate instruments and modern laboratories, endless research and patient experimentation.

Mud is the bane of motorists and the despair of mothers of small children. To Webster it is “a slimy or pesty mixture of earth and water.” But to the oil driller mud is a tool indispensable as the churning bit it lubricates. It has become one of the greatest factors in successful deep-drilling.

There is nothing very impressive about the mud circulating system. The pits are merely wide, shallow holes close by the derrick, filled with a sluggishly moving, coffee-colored mud. At one end, powerful pumps monotonously chug along, sucking the fluid out of the pits to force it on up through a hose high above the derrick floor into the hollow drill stem and down into the well. And at the other end of the circuit another pipe pours the mud back into the pits as it returns from the well. Not a very thrilling process.

Yet that same uninteresting flow of mud may be the cause for sudden excitement and fast action.

You are standing by the pit, idly watching the stream of mud pour back after its round trip perhaps a mile or more into the earth. It has a sort of pulsing flow, the effect of the pump strokes. But as you watch, the flow quickens, fills the pipe and gushes out into the pits with considerable force. It seems strange, because the even tempo of the mud pumps has not speeded. You notice, too, that the smooth texture of the mud has changed to a mass of tiny lumps, bubbles which break and give off a strong odor of gas.

About the time you think someone ought to know about the change, your guide returns, takes a look and yells just one word to the driller up on the derrick floor.

“Gas!”

The man at the draw-works does not even look around. In a single motion his hand knocks down a control, and beneath the derrick floor the massive blow-out preventer rams shut around the drill pipe with a solid clunk. Simultaneously he opens the mud pumps to capacity while two of the crew leap to shut down special chokes and safety valves on the mud discharge line in an attempt to slow the rush of mud from the well.

An ominous silence falls on the rig, broken only by the laboring pumps, as they force more and more heavy mud into the hole to overcome the rising pressure far down in the earth. Tensely, the driller watches the gauge hands as they creep on up around the dial, higher and higher. Long minutes pass before the rush of mud into the pits slackens and the gauge hands stop, then slowly crawl back down. The gas pressure has been controlled, and a ruinous blow-out averted, thanks to the warning of the mud, and split-second action by the alert crew.

That is one of the more dramatic services performed by modern drilling muds. But there are many others. Mud cools and lubricates the drill bit as it grinds downward through rock and sand. It washes the bottom of the hole clear of cuttings and carries them to the surface. Mud builds a thin, protective wall against the sides of the drill hole to guard against a cave-in and block off dangerous formations. By sheer weight (a column of weighted mud compound a mile or so high standing in an oil well is considerable of a load) it holds back the tremendous gas pressures which the bit may suddenly release and send roaring upward to wreck the well. All these jobs mud does, unseen, far down in the earth. But there is still another service, and one which can be seen.

In the mud, as it returns to the surface, an experienced eye can read the complete story of what is happening down there at the bottom of the well. Obviously, the cuttings which the mud brings up show very clearly what kind of rock, sand or clay the drill bit is piercing and how thick the formations are. This information is checked against the cross section of that particular area prepared from estimates based on geological and geophysical work, and the map corrected accordingly.

More than that, the mud can be made to tell what the various formations contain, be it oil, gas or salt water. In fact, many times mud returning from the well has warned the driller that the bit is approaching an oil sand as much as 20 feet before it drills in.

The oil industry has not always been so “mud conscious.” In the early days of cable tool drilling, mud or liquid of any sort in the hole was something to be avoided. Drillers used batters to keep the holes dry. But with the development of rotary drills and deeper holes, they started to circulate plain water to cool the bit and keep it clear of rock cuttings. Naturally, the water mixed with the earths walls of the drill hole and formed a thin mud.

Gradually rotary drillers came to realize that for some reason muddy water made a better drilling fluid than plain water. They also found that some formations made better muds than others. Then operators began to add clay-like, non-gritty earths to their drilling water. Other experiments fol-

Weight material and colloidal clay are added to the drilling mud to help overcome gas pressures.
loved and the scientific business of mud conditioning was evolved.

Today, most producing oil companies and drilling contractors keep a trained mud engineer on their drilling staff. His job is to maintain the drilling mud in just the right condition. So thoroughly does he work that there are hourly records of the mud’s weight in pounds per gallon, the per cent of solids it contains, the per cent of sand, its alkalinity, the treatment it has received, the formations being drilled, and so on. Behind the mud engineer’s skill is the research work of mud laboratories where chemists and physiicians do nothing but study the oil industry’s mud problems.

Strictly speaking, drilling muds are not really muds but clay slugs. And that complicates matters right at the start for there are many kinds of clays, running all the way from those used in the manufacture of fine porcelain pipes to the kind youngesters roll into nurseries.

Primarily, a clay’s fitness for use in drilling fluids depends upon the fineness of its particles and its chemical properties. Good clays have a high colloidal content, which means that their grains are microscopically in size—almost small enough to pass through a filter paper. But that is just the beginning.

A good drilling mud must be fluid enough to pump easily, yet it must be capable of building strong, thin walls. It must be thick enough to carry rock cuttings to the surface, yet drop them out in the mud pits. When circulation stops, a good drilling mud promptly “gels” and builds the cuttings in suspension so they won’t drop to the bottom of the hole and jam the drill bits. But the same mud must immediately become fluid again as soon as the pumps start up.

It must be heavy enough to hold back gas under high pressure, yet cannot be too heavy for the pumps to handle. Its must wash the bottom of the drill hole clear of sand and rock cuttings, but must clean itself of all abrasion so that pump parts will not wear. A good drilling mud must be resistive to salt, water, corrosion, and must not permit its own water content to filter into formations. There are still other requirements, but these are enough to show that the modern mud engineer must fill a pretty large order.

Needless to say, no one mud, or clay, possesses all of these characteristics. But thanks to scientific research, various compounds can be added to the natural mud which will enable it to qualify for the job the oil man has lined up for it.

One of the oil driller’s most perplexing problems is the so-called “inconsistent” formation, such as loose sand or shale, that cannot support itself. Unless the drilling mud builds a wall to support such formations down in danger of them collapsing into the bore and jamming the bit. Mud of high colloids are sought for this purpose.

The drill bit also may piece a formation that is horsepowered with large crevices. Through the mud, instead of gaining straight up the hole to the surface, may flow out into the crevices, wash them even larger, and cause serious cops-in.

Along this same line, the bit might encounter a formation of porous gravel or limestone that would absorb the drilling mud. When the mud cannot escape with such formations, sealing agents such as cemented bull, various gums or thickeners must be added to plug up the crevices. At one well in the Evangeline Field, Louisiana, the crew, plagued by serious loss of mud, pumped down the hole 1,475 barrels of Filibuster, 290 sacks of cemented bull, 800 tons of gravel and 21 tons of sand. Finally, in desperation, they pumped down nearly 5,400 empty sacks. The holes were stopped and circulation was restored.

Not only must a drilling mud build a wall to protect the drill hole from the formations, but that same wall must keep the mud’s own water content from entering the formations. Strangely, enough, bentonite, which makes a fine colloid drill mud, also is a driller’s nightmare because it is the dreaded “bearing shake” which has cursed many wells.

Bentonite swells enormously when water strikes it. If a drill bit should be passing through a horizonta! formation, not even the driller can tell what may happen. In one instance on record a drilling crese penetrated a layer of bentonite, then had to pull out the drill pipe to change bits. When they tried to lower the string again, it stopped short. The hole had been closed completely by the swelling bentonite. There have been cases where bentonite shake crushed flat heavy steel casing and pipe.

To solve this knotty problem of water filtration, mud engineers try first to mix good well building muds. It would seem that a thick wall would give the best support to weak formations and at the same time block the passage of water from the circulating mud to the formations. But a thick wall narrows the drill hole, makes it difficult to pull pipe and let out of the hole. Both laboratory and field tests have proved that a thin, impermeable wall is the best.

No show girl watches her weight more carefully than does a mud engineer the weight of his drilling fluid. As long as the weight of the column of mud in the drill hole is greater than the gas, oil or water pressures which the bit may receive there is little chance of a disastrous blow-out.

Unfortunately, weighting materials are readily available—finely ground barytes or iron oxides—which can be added to the mud to make it heavier. The mud engineer also takes the slogan "Stay on the Alkali Side" seriously and is a firm believer in "Irene." A good drilling mud should eschew everything it touches with a fabricating film of slippery "oil to speed up drilling and scarce power costs. It should be free of electrolytes, as well as acids and strong alkalis which promote corrosion. Because high temperatures in the drill hole thicken the mud and increase water filtration into formations, the mud engineer should use those clays least affected by heat. Altogether, mud conditioning in complicated work. And more than once a sudden rainstorm, pouring water into open mud pits, has rendered a supply of drilling fluid undesirable for use.

In his work the mud engineer uses a number of interesting tests. It is not surprising to see him dip a finger into the mud, then put the finger to his lips. Sometimes he can actually taste the mud. But for more accurate results there are a number of scientific instruments for measuring the properties of different muds.

One of the mud’s most useful jobs is keeping the mice away. It is possible for an unskilled oil man, using delicate instruments, to "read" the mud as it returns from the well and actually see what kind of rock, sand or gravel the drill bit is working through, how thick and how far down these formations are, and whether they contain gas, oil or water.

This unique method of "reading" thousands of feet into the earth is based upon the simple fact that a drill bit chosen up and distorts a circular cut of the formations it drills through. If the tiny spaces between the particles comprising ore core contain gas, oil or water, the drilling mud, as it carries the particles to the surface, also will pick up the gas or oil or water. And if the mud is continuously analyzed and correlated with the depth from which the cuttings came, the content of the formations can be determined accurately.

(Continued on Page 2)
SOME 360 miles from the Caribbean coast of Colombia in South America, up the shallow, wandering Magdalena River, only six or seven degrees from the equator, lies the oil field of Tropical Oil Company at El Centro. In the low jungle lands where the oil is found, one would hardly expect to find a pleasant place to live, and yet such is the transformation that this huge industrial development has wrought. Where once was only dense tropical jungle scarcely populated by other than wild life, there is now a fully integrated and thriving community of nearly 10,000 people. Only a few years ago it took weeks by ocean and river boat to reach El Centro from New York. Today it requires barely three days by air, and there is frequent service for both passengers and mail. Before the advent of short-wave radio, news was scanty and old—today the magic of radio keeps one in tune with every event throughout the world. Further, by means of radio-telephone it is now possible to phone “home” as easily (if more expensively) as if you were just next door. The old feeling of great distance and isolation known so well to the early pioneers has ceased to exist.

In this setting some 250 Canadians and Americans and sundry other nationals have their homes and work, spending two years at a time before vacationing back to where they came from. For those who have been there since the beginning in the early 20’s the development they helped to build has become almost awesome in its extent and some still look back with longing to the far-away days when roads were being blasted out of the jungle and one’s home was frequently little more than a bed in a mosquito-net tent. Today with electricity everywhere, modern homes, shops and stores, ice and potable running water, cars to drive and endless roads to drive on, it has ceased to be the “great adventure” and has become just another industrial center placed in a tropical secrete, more pleasant than most.

Mrs. O. L. Raymond of El Centro, Colombia, Writes Her Impressions of Life in a Tropical Industrial Centre.

Even so, a married woman going to the oil camp at El Centro or the refinery center at Barranca for the first time, will find herself placed in an environment so strange and new that bewildermment will usually be her first sensation. In point of fact it is indeed a different world from the customary routine of the average American or Canadian town. Fortunately, people are friendly and helpful and it takes but a little time before initial fears are banished and habit has taken the edge off the strangeness.

Comfortable small brick or frame bungalows with modern conveniences, including even electric refrigerators, are furnished by the Company to all married employees. Basic furniture is provided and there only remains the hanging of curtains and one’s own personal appointments before you are well settled. Each home has a living room, dining room, kitchen, and one or more bedrooms and a large porch—all well ventilated and screened. Probably the greatest surprise around the house is the lack of glass in the windows. In such an extreme climate only screen doors and shutters to keep out the rain, are required.

Because of the climate, work hours differ quite those in the north, and women’s day necessarily conforms. A large sign on the central power plant advises the camp at 5 a.m. each day with the implied warning that work will start at hour hence. As the sun does not rise until about 6 o’clock, and then most abruptly, it usually seems like the middle of the night. For the man of the house it means a definite arising, but most women are fortunate enough to be able to remain in bed until a more reasonable hour (mine being both plentiful and reasonable in cost). Sleep is somewhat stifled because of the 5:45 warning whistle and the final two short blasts at 6 o’clock when work starts throughout the field.

The housewife’s morning usually is spent in a trip to the commissary for provisions, or perhaps a round of golf on the tricky nine-hole course before the sun grows too hot, or even a canteen for those who like horses. Frequently, too, a session of bridge is indulged in, although Red Cross work has largely supplanted such morning activities since the outbreak of war.

At 10:30 the men come home for lunch, a shower and a quick siesta until the whistle calls them back again at noon. For the women, the afternoon is either a continuation of the siesta or occasionally a tea at the Club until the 5:25 whistle signifies that work is over for the day and the men dash for the golf course and a rounds before the sun goes down about 6 p.m.

After dinner there may be entertaining, either at home or at the Club. Or perhaps a long drive is taken on the many miles of roads in the road of the evening. In any event bed follows at a compar-

IMPERIAL OIL REVIEW

SPRING • 1942
MUD (Continued from Page 9)

Instruments used in this logging are housed in an auto trailer laboratory and are electrically operated. A telephone connects the driller on the derick floor with the logging expert in the trailer.

The gas detecting instrument is hooked up with an automatic alarm which warns the operator of gas in the mud. The device is so sensitive that in some areas it has warned that the drill bit is approaching a gas sand 15 or 20 feet before the sand was actually penetrated.

To detect the presence of oil in the drilling mud ultra-violet light is used, and the apparatus is so accurate that it can pick up quantities as small as one part oil in 100,000 parts of mud. To detect salt water in the mud, electrodes are placed in the mud stream and the resistance of the two mud streams to an electric current is measured. Instruments to correlate the detection of gas, oil or salt with their depth of origin complete this mud analysis equipment.

These are the high spots. There is much more to this mud business, highly technical stuff having to do with chemistry and physics, geology and other sciences.

Reproduced from "The Lamp" with permission.

REFINERY FIRE FIGHTERS

Unceasing vigilance and never-ending research into the science of fire prevention have kept fire losses in oil refineries to a minimum.

Making products of a highly combustible nature from inflammable crude oil—using temperatures as high as 1400° in the process—the oil refiner must keep unceasing vigil to prevent fire. The petroleum industry has developed so high a standard of fire protection that its fire losses are only approximately 4½ cents per hundred dollars of insurable value as compared with 28 cents for industry in general.

Fire prevention in a refinery begins before the equipment is installed. The experience of years goes into the design of specifications of material and fittings, to make sure that the completed unit will be as leak-proof and free from fire hazard as it is possible for man to make. A refinery is laid out with fire prevention always in mind. Units of one section are protected against each other and the whole is protected against other sections.

Storage of petroleum products represents one of the fire hazards faced by the refiner. Here vigilance is the watch-word. If it were possible to keep petroleum products in air-tight tanks, there would be very little fire hazard in their storage. This is because liquid petroleum do not burn—it is only their vapours which will ignite. And these vapours will not burn unless an adequate supply of air is present to form a combustible mixture. For instance, the proportion of gasoline to air in the mixture that powers your car is from 5 to 22 parts of gasoline to 100 parts of air. If this mixture becomes richer than 12%, it is more difficult to ignite, until in a mixture of 30% at normal temperature and pressure combustion will not take place.

Fire prevention of petroleum products in storage requires unceasing vigilance to see that no spark or flame is allowed to ignite the vapours. Under the conditions existing, the remarkably few fires in storage tanks is a tribute to the vigilance of refinery crews.

 Tanks which have been emptied and are waiting to be cleaned are first steamed to remove the explosive vapours. Air is then circulated through as an added precaution. However, fire precaution does not stop here. Electrical instruments which in-
HOW A REFINERY FIGHTS A FIRE

When fire breaks out in a refinery trained fire fighting crews quickly move into action as shown in the following photographs. Naturally, the refinery crew could not start a fire for the benefit of the photographers. But they very obligingly turned valves which allowed steam to billow around the unit. A dark filter on the camera—and there is your fire as it would appear if it really happened.

1. Fire strikes at the flash coils. Immediately the operator in charge telephones the fire marshal, while another shuts off the valves to isolate the unit from all others.

2. First step in combating the fire was to try to smother it with live steam. Here the valves have been turned and the steam has completely enveloped the coils.

3. In the meantime, others of the crew ran out the hose lines stored nearby. These are connected to the fire hydrant, which are located at strategic points throughout the refinery.

4. Billowing gas in the nearby monitors. These throw a stream of water so powerful that it knocks the flames away from the unit which may catch fire. Underneath at all Imperial Oil refineries there is a maze of "foam" lines. Foam used in fighting refinery fires is produced from aluminium sulphate, sodium bicarbonate and water. When mixed these chemicals create bubbles of carbon dioxide which settle like a blanket over the burning surface and completely smother the fire.

5. The fire truck arrives and the crew unrolls more lengths of hose. Notice the large funnels on the back of the truck. These are part of the portable foam equipment.

6. Coupling the portable foam equipment to the hose lines takes but a moment. Constant fire-fighting drills have ensured that every man does his job quickly and efficiently.

7. Two chemicals are used in the foam-making equipment. Aluminium Sulphate and Sodium Bicarbonate.

8. The foam line in action. When mixed with the water in the hose, the chemicals produce a "foam" which smothers the fire.

9. The fire is out. A few wisps of smoke is all that is left to mark its end.

(Continued on Page 19)
ALBERTA DIVISION

British Columbia

NEWFOUNDLAND DIVISION

MANITOBA DIVISION

56 CHURCH STREET

SASKATCHEWAN DIVISION

TREASURER'S OFFICE

MARINE DIVISION

IMPERIAL OIL REVIEW
...1942 INDUSTRIAL COUNCILS—Marketing Division
OIL COMES TO LANDS FORLORN

(Continued from Page 5)

veloped in Arctic Canada to an amazing degree. Planes are used for carrying passengers and mail, of course, but they are used as well for transporting fur, fish, machinery, coal and even sledge dogs. Sometimes it seems to me that the Far North passed from the stone age to the oil age in a single generation.

The Eskimo were not nearly as impressed by aeroplanes as one would imagine they might have been. An old Eskimo seeing a plane for the first time just shrugged his shoulders.

"Ah, these white men!" he grunted, "their brains are working all the time."

Better still was the comment of Ipuik at Coppermine River when he first saw a plane land there in 1928. Somebody asked him what he thought of it. After gazing intently for a while he said: "A fine big bird—but not much meat on it."

In all I have travelled over forty thousand miles by air in Arctic Canada and I can realize better than most what aerial transportation has meant. There have been many flights, lives have been saved, men have been rescued, but I am thinking of the good done in a more general sense than this. In those far-off days at Lake Harbor, it was difficult to realize that our lands forlorn were a part of Canada. We seemed set in a world apart with a people apart. The plane has made the Arctic a part of Canada and it has brought her people into the Dominion in truth as well as name.

From the kudlik to the twin engined Beechcraft—that is the story of oil in the Arctic and set against that other picture it is a story of hope.

Editor's Note: The foregoing will be embodied in a forthcoming book by Right Rev. A. L. Fleming, Bishop of the Arctic.
A Canadian-made Bristol Bolingbroke bomber being refuelled at Toronto Island Airport. As the vast Commonwealth Air Training Plan moves into high gear a major undertaking is the supply of high quality aviation fuels and lubricants in adequate quantities for its widespread operations.