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ON THE FRONT COVER:

Drilling for oil in the Canadian west is a job for strong, alert men. The man on our cover, holding a rotary drilling bit on his shoulder, is George Tosh, "shift boss" at one of Imperial's Proven wells in Alberta. He must keep equipment operating smoothly and is responsible to the men on his shift.

TWO ARTICLES appear in this issue of the Review which, by contrast, give rise to a pointed question. One story describes the difficulties of building a road through the wilderness to a site in Alberta where a million dollar search for oil will be undertaken. The other tells how an equally costly search ended in disappointment without finding oil in commercial quantities.

The reader well may ask why the oil companies continue to expend money and energy in these ventures when there is such evidence of failure as the Stolberg well, the two-and-a-half-mile deep "dry hole."

The answer is that Canadians must find new oil reserves to satisfy the increasing needs of our economic life and that even the failures are an investment in our national future. At present we produce at home only 15 per cent. of our oil requirements and the remaining 85 per cent. must be imported. Yet, on a per capita basis, Canada uses more petroleum than any other nation in the world except the U.S.

Experts believe the Dominion has great undiscovered reserves of oil. Unfortunately nature has hidden the deposits in areas where transportation is a major problem and where every phase that precedes discovery is expensive. This is not peculiar to Canada for many of the world's major oil fields have been found only after long, laborious, and costly exploration like that now in progress in the Canadian west.

The oil companies do not make haphazard decisions to undertake large projects like the Stolberg test or the new Operation Muskrat. Drilling starts only after the area has been thoroughly investigated and the reports, obtained by the most modern methods, indicate that a rock trap which may contain oil lies beneath the earth.

Many "above the surface" aids have been developed to help in the search for oil and many accurate predictions have resulted. The hazards of drilling have consequently been reduced, as statistics clearly show, but science still can do no more than point to formations where oil may be trapped or may have been trapped.

Drilling remains the sole final test, and, as the story of Stolberg clearly proves, the test may encounter heartbreaking setbacks with little to show in the end. But again a comparatively small area suddenly may prove to be a great new reservoir of petroleum.

Thus test must follow test if Canada eventually is to obtain the oil she needs so urgently. Each new project, each new investment, requires faith and confidence. The ultimate successful results will outweigh all that goes before them.
ROAD TO MUSKEG

HEAVY EQUIPMENT FOR "OPERATION MUSKEG"
WILL TRAVEL ON A ROAD PUSHED
70 MILES THROUGH ROCKY MOUNTAIN WILDERNESS

WHEN Engineer John "Chris" Christopherson moved into the tiny hotel at Entrance, Alberta, 200 miles west of Edmonton on the Edmonton-Jasper railway, the half-dozen families which comprised the major part of the town's permanent population knew that the full impact of "Operation Muskeg", an important exploration project of the Canadian oil industry, was about to reach them.

Christopherson arrived late in July last year. At Entrance the annual preparations were being made for the big game season—the little town is famous as a taking-off spot for hunting parties seeking grizzly, moose, caribou, mountain sheep and goat. Trappers were speaking of the fall and winter season, ready to take up the trappers which the government appor-

Looking south across the Athabasca river, the camera pictures tiny Entrance, railroad for Muskeg Anticline. "Chris" Christopherson, right, is the engineer in charge of the Muskeg road

itions. On the Athabaska ranch, by the banks of the swiftly-flowing, deep-gorged mountain river of the same name, they discussed the killer grizzly which had left gruesome traces of his presence. Tiny En-
trance, set in the wooded, mountainous, stream-
laced and muskeg-laden terrain of the Rocky moun-
tains foothills, was living its normal quiet life, meeting its six trains a week, and preparing for the winter.

Christopherson, too, had come to make ready for this winter. Into the haven of wild animals and trap-
ers that stretched undisturbed to the north he had to thrust, before freeze-up, a modern, all-weather road. It would run 70 miles past mountainous "hills", over muskeg, across dozens of small and not-so-small
streams. To the average person it would seem to end in the nowhere of wilderness.

To oil-seeking geologists, however, the road would lead above a subsurface structure which, because of the bog deposit that buries its contours, has been named the Muskeg Anticline. Christopherson's job was to build a road that would carry heavy duty rotary drilling equipment and supplies to the Muskeg Anticline before the heavy mid-winter snows came. Then the drilling equipment would be used to drill down some two miles into the earth, a task which would take perhaps 18 or 20 months in all.

If oil were found, Entrance would be famous; if not, the heavy equipment would lumber away, the road would be abandoned to the forest patrol, the fur-sellers and the Indians. They would probably call it their million-dollar highway. There is no way of finding oil except by the expensive gamble of drilling a hole down into rock formations which seem likely to be oil traps. All costs on the Muskeg operation would likely exceed a million dollars.

For several years the eyes of oil-seeking geologists had been on the district about the Muskeg river. Pock horses and packers had been engaged to transport surface geological parties. They had disappeared into the forest on the month-long treks and upon occasion had come back with enthusiastic reports. Core parties, too, had run down streams in the area. From these the area below, Geologists studied the contours of the rock and tried to visualize the shapes of formations beneath the surface.

It was commonly known that the cost of exploration in that rugged country was tremendous. It surprised no one, therefore, when it was learned last winter that a group of oil companies had decided to test a part of the area, sharing equally the costs of the project. These companies were McCall-Fontaine Oil Co., Sempervirens Exploration Co., Gulf Research and Development Co. and Imperial Oil Ltd. A reservation of 207,060 acres was obtained from the Alberta Government.

The five companies wasted no time carrying out further tests. Within days after the reservation was obtained a seismic party arrived, prepared to work its way across the country in one of the most spectacular operations in the industry. Building its own winter trail and logging such cumbersome equipment as a portable drilling unit the seismic group forced its way 78 miles over the rugged country, drilling holes over the area of the Muskeg Anticline and setting off dynamite charges to create man-made earthquakes. The rock strata far below felt the shock of the explosion, and bounced vibrations back to the surface in much the same way a rubber ball might bounce off pavement. Electrical recorders measured the vibrations, and geologists drew from these a picture of what they thought lay beneath the surface. The work was done at a feverish pace; the party ar-rived back at Entrance last year just ahead of the spring thaw, which would have marooned their equipment.

Thus in July, when Christopherson arrived in Entrance, a majority of expert opinion was in favor of testing the Muskeg Anticline. From the work of the geologists it had been defined as a structure possibly four and a half miles wide by 14 miles long; the 16,000 feet deep "Madison lime," the porous rock formation which produces oil in Turner Valley, was to be the objective of the drills.

The building of the road presented problem after problem. The muskeg did not confine itself to the valleys between the mountains; it was found on the side of high, steep slopes which had to be circumvented, and on the gentle grades where road-building should have been easy. In places it was necessary to blast rock to get around precipitous hillsides. The elevation of the hills ranged from 3,200 to 5,000 feet. Great boulders sometimes barred the way.

The rains and the early fall freezes sent moisture seeping through the miles of dry forest turf, which the tractors and earth movers and gravel trucks churned into a quasy muck. The bogs sucked up the water and time after time gently pulled equipment down into its maws until the machines were half buried. Lack of equipment was a constant handicap.

But the road went ahead. Trees were cut on the spot to bridge streams with names like Winter creek, Moberly creek, Pinto creek, the Little and Big Berland—a packhorse had his feet swept from under him in the fast flowing water of the latter—Cabin creek, Tepee creek... on to the Muskeg river, where a muskeg curvy road led down the last miles to the anticline.

As the days shortened, tractors and other heavy equipment were equipped with lights, and the darkness of the forest was broken by their beams. The "cuts" dragged in 20 and 30 spruce logs as it time and left them to be slugged for the bridges, and the home.
ers and builders were hard pressed to bridge the streams in time to permit the camp to move forward in pace with the roadbuilding. Sometimes the route broke out of the forest onto a gravel flat or a stretch of flat rock bed, and then the grateful grade men surged ahead, smoothing a highway out of the gravel or pushing the turf aside.

Christopherson, as engineer-in-charge, forged ahead to survey and lay out the road for the contractors, striving for the line of least resistance across the broken rock ridges. If possible he travelled by jeep, if not, by packhorse or on foot. At Entrance, as Christmas trees were being decorated, the huge drilling equipment was unloading at the railroad siding.

It would go over the road in lots as heavy as 38 tons. The equipment came directly from the Stolberg well, where a hole 13,747 feet deep produced no oil in commercial quantities. The estimated costs would be $50,000 to set it up for Operation Muskog.

When the drills began to move, they would be writing an important chapter in the history of Rocky Mountain foothill drilling. They could expect the folded and broken rock formations of the foothills to give them plenty of trouble. There would be hits stuck in "sickersided" formations; there would be times when the hole would want to cave in; there would be formations of such a hardness the bits would wear down to the ball bearings on which the cutters turn without, perhaps, making an inch of hole—and this at a depth of some two miles. There would be nothing less than two years of concentrated, challenging effort before the formation was fully probed.

As this article went to press there were temperatures of 35° below zero on the Musdog road. The gamble against the harsh winter of the Rocky Mountain foothills and the rugged countryside was being speeded in an effort to have the well drilling equipment in by the end of the year. If it was successful the drills will now be turning out the surface rock cuttings in the most spectacular and expensive of the efforts of the oil industry to provide Canadians with an increased oil supply from within their own national boundaries.

Many streams, big and small, had to be bridged as the road wound into the hills. Timber usually came from trees along the bank of the stream. Here the builders line up a log for cribwork which will support a bridge across a little brook.

The road crew, plagued by rain-soaked log, start rescue operations on a crawler-tractor and earth-mover stuck deep in the mine.
years for International Petroleum. This area is situated in the Magdalena River valley about 350 miles inland from Colombia's northern coast. Before Tropical's advent, the entire region was a dense jungle, sparsely populated. Today El Centro is a thriving community in the heart of what was once wilderness.

Since the beginning of operations, over 1,200 wells have been completed on the concession. Tropical and the Andean National Corporation which transports its crude from El Centro to the Manosalva docks at Cartagena employ more than 7,000 persons.

On joint interest with affiliates, Tropical initiated drilling of two exploratory wells off the concession in new areas at Costa Rica and Tubara in northern Colombia. Additional wells will be spudded in the near future in the Llanos, south of the Meta River and in San Antonio near La Dorada.

The production from International Petroleum's fields on the La Brea-Pinaris estate in northern Peru is refined at the company's plant at Tubara. This important refinery supplies the domestic market and provides export products for the west coast of South America and Australasia.

International Petroleum has been operating in Peru for more than 30 years. The productive area of the estate at present is about 20,000 acres. To date 3,500 wells have been drilled. Under the Company's conservation policy all surplus natural gas is returned to the sands to increase the ultimate recovery of petroleum.

The strategically located Peruvian field was a major factor in naval and military operations in the Pacific theatre during the war. Today, it is making an important contribution to industry and the general economy of the west coast countries.

International Ecuadorian has explored in the neighborhood of 15,000,000 acres of territory and drilled 18 deep exploratory wells. These wells were located by the most modern exploration methods in well-defined geological structures, in an area strategic for hemisphere defence and peacetime development, but oil in commercial quantities has not yet been found.

The area explored extends from Puna Island and the adjacent mainland south of Guayaquil along the coast north nearly to the Colombian border. Nearly 700 persons are engaged in this exploration work which has entailed large expenditures.

In Peru, Colombia and Ecuador operations involve the maintenance of living facilities for thousands of employees on the payroll and their families. The high level of employment and increased payrolls are an important contribution to the national economy of these countries.

Along the Magdalena River in Colombia the search for oil entailed an extending fight against the jungle. Springing up almost overnight, dense foliage hides in many drilling rags.

Eighty-four young folk, like these girls busy sewing, took part in the Canada-wide 1946 competitions of Rural Youth Week

40,000 YOUNG LEADERS

JUNIOR FARM CLUBS STIMULATE THE SCIENTIFIC DEVELOPMENT OF AGRICULTURE IN CANADA, AND FOSTER AN APPRECIATION OF RURAL LIFE

In a little community on the western prairies not long ago a group of young girls formed a sewing circle. At first their meetings were held in the farm homes with each girl taking her turn as hostess. But the membership grew; the circle became a club; and the girls began to meet in the schoolhouse.

Funds were needed for new activities and so the members organized sales, pie sales, teas and dances. With the proceeds they bought sewing machines, electric irons and other equipment. The school trussers co-operated by getting electric power installed in the school.

Now the girls are holding regular classes and making much better articles of clothing than would have been possible otherwise. Their club is one of those under the sponsorship of the Canadian Council of Boys' and Girls' Club Work.

The spontaneous growth of this small western group is typical of many of the clubs across the Dominion that are linked together by the Council. Membership in junior farm clubs, such as this one, is stimulating a new concept and appreciation of rural life among young Canadians. With a total of almost 40,000 members, the clubs are helping to train
young boys and girls who will become leaders in their home communities. Their enthusiasm is so great that for 99 per cent. of them city life has no permanent attraction.

Through their clubs under the direction of the extension branches of the provincial departments of agriculture, young people between the ages of 16 and 21 group together to study the latest developments in scientific farming, how to get the greatest return for their toil and how to increase home comforts. More than 10,000 girls—future rural housewives of the Dominion—are receiving instruction in home economics.

The clubs also provide a medium for the exchange of ideas. One main result is the development of a community spirit.

"Over the years, the rural youth clubs have brought about a tremendous improvement in livestock, field crops, poultry, girls' work in home practices, and training in citizenship which stands the young people in good stead when they assume adult responsibilities," says A. E. MacLaurin, Ottawa, secretary of the Council.

Older folk are learning from the younger people too, and there is more consultation with government scientists today than ever before. The interest taken by girls is especially keen and reasoned. They advocate scores of improvements ranging from greater use of disease-free and weed-free seed to more tractors and increased rural electrification. Boys want such developments as co-operative marketing and improved breeding of herds.

The Council executive includes representation by the dominion and provincial departments of agriculture, the extension branch of the University of Saskatchewan, the principal cattle breeders' associations, the C.P.R., C.N.R., International Harvester Co., Massey-Harris Co., Canadian Meat Packers, Imperial Oil Ltd. and other commercial firms.

Professor J. G. Rayner, director of the University of Saskatchewan's extension department, Saskatoon, was chosen as president for 1947.

Imperial Oil is represented on the board of directors by R. P. Fey, of the company's farm division. Mr. Fey was formerly professor of agricultural engineering at the University of Saskatchewan for 18 years and has a full knowledge of farm problems.

A highlight of the rural youth year's work is the chance to go to the national contests. Until the war, they were held to coincide with the Royal Winter Fair. During the war when the Fair was suspended, the contests were continued at various locations but on a reduced scale. Last fall when the Winter Fair was resumed, the competitions for the junior farmers were again held in Toronto and set a new record—this was during Rural Youth Week. Forty-two two-member teams from the nine provinces competed for the Dominion championships in seven judging contests. This was the largest number of entries since the Council was established 16 years ago.

Junior farmer teams from Canada's nine provinces competed in dairy cattle judging. On the right are twin Saskatchewan sisters.

Marie Dion and Albert Dumas of Bellechasse county, Quebec, won the swine judging, one of seven events being sponsored by the Canadian Council of Boys' and Girls' Club Work.

Amid all the pageantry and bustle of the Winter Fair, the teams competed in judging projects in dairy cattle, beef cattle, swine, poultry, grain and potatoes. An added feature, inaugurated in 1946, was the girls' clothing competition held at the Ontario legislative buildings, Queen's Park.

Quebec and Saskatchewan junior farmers tied for top honors. Each province won firsts in two events. Donald H. McCaig and Eric McCartney of the Orme town Dairy Calf Club, Quebec, took first prize in the dairy cattle competition against teams from all nine provinces. Violet Dornier and Robert Wylie of Norquay, Sask., teamed up to win the seed grain judging. Two French-speaking boys, Albert Dumas and Marius Dion of the Honfleur Swine Club, Bellechasse County, P.Q., won their five team contest.

The Lang brothers, Edward and Harry, of Aylesbury, Sask., came first against six other teams in the beef cattle section. Dorothy Blair, Laidner, B.C., and Ralph Gilmore, Eburne, B.C., won the seed potato trophy for the Richmond Potato Club. Marion Leslie and Dorothy Perris of Holland, Man., composed the top poultry team. The clothing contest honors went to Orphie Orr, and Evelyn Hare of the Valmalie Home-Making Club, Maple, Ont.

The winners were decided on the basis of proficiency in the judging rings and oral examinations. Both girls and boys have the benefit of expert advice from government specialists which most of their parents never had an opportunity to obtain.

While in Toronto, the teams saw the horse show, beautiful chrysanthemums topping six-foot stems, farm machinery displays, visited the Union stockyards and meat packing plants to see how livestock is graded, slaughtered and dressed. They were taken on a tour of Niagara Falls, the fruit belt and Hamilton district and then to the Central Experimental Farm and Houses of Parliament in Ottawa.

The trip to the annual contests gives these young people from all parts of Canada an opportunity to become acquainted, get a broader vision of the Dominion and of Canadian agriculture. It also affords extension officers an occasion to discuss methods and problems of junior agriculture. The young people return home with a new reminder of their goal— the development of Canada's agricultural future and rural life.

Dorothy Blair and Ralph Gilmore from British Columbia were best in the seed potato contest. After the competitions the young people toured Toronto, Hamilton, Niagara and Ottawa.
NEW SHIPS FOR OLD

FOUR NEW TANKERS – THE FASTEST IN CANADA'S MERCHANT MARINE – ARE NOW FLYING THE IMPERIAL HOUSE FLAG, REPLACING VETERAN SHIPS OF THE FLEET LOST DURING THE WAR

Four big, fast and rugged tankers were added to the Imperial Oil ocean-going fleet late in 1946—the fastest tankers ever to fly the Canadian flag. Other year's end news of Imperial's ships, the largest company-owned tanker fleet under Canadian registry, came with the scrapping of the 28-year-old Trustolette, veteran of World War II sea service.

In the same period the names of five Company ships were changed and now bear names prefixed by "Imperial". Ocean-going tankers have been named after provincial capitals and lake tankers after lake cities and towns.

In addition to these changes, radar equipment was installed on the Imperial Halifax, which is on east coast runs, the Imperial Victoria and the Imperial Vancouver, both on the west coast. The ships are the first of the fleet to be fitted with this war-developed navigational aid.

The four new tankers are all the "T-2" type of ships developed by the United States Maritime Commission for sea service during World War II. Their service speed of 14 1/2 knots and individual cargo capacities of 138,000 barrels will facilitate supplying Canada's increasing needs of crude oil and petroleum products.

The new ships, Imperial Quebec, Imperial Edmonton, Imperial Toronto and Imperial Winnipeg, are larger and faster than the four ships they replace. These were the Canadadite,Victoria, Montanaite and Calgadite, lost by enemy action in World War II.

The T-2 tankers were built in 1944. They are 555 feet overall, with a beam of 89 feet, a mounded depth of 39 feet and a loaded draught of 30 feet. The cargo is carried in 26 individual tanks. They are of all-welded construction.

Exceptionally good accommodation is provided for the Canadian crew of 42 men. Officers, engineers and petty officers have individual cabins with private baths and other personnel have semi-private quarters.

Shipkeepers have taken over the worn hull of the Trustolette to end a career of 28 years' useful service. The tanker was the first in the Imperial Oil fleet to use diesel propulsion, a capacity of 380,000 barrels each, the four new fleet additions will speed the importation of crude oil into Canada.

Lack of housing at home for the men of the ship, the Victoria, now under repair, and lack of engineers to man her, caused the scrapping of the Trustolette.

Navigation equipment, all of the latest design, includes a Sperry gyro-compass, fathometers and direction finders. The turbines develop 6,600 shaft horse power. Two water tube boilers deliver steam to the main turbine-driven generator which operates at 3,750 R.P.M., and drives the shaft motor and single propeller at 93 R.P.M. Two auxiliary turbo-generator sets of 430 volts each supply current for cargo pumps and auxiliaries. Pumps have a discharge capacity of 8,000 barrels an hour.

The four ships will be used on east coast runs between Canada and oil ports in the United States and South America.

In name changes for the ocean-going fleet, the Reginaite became the Imperial Regina and the Ontaritone was renamed Imperial Victoria. The Imperial Regina is in service between South America, Portland, Me., and Halifax, and the Imperial Victoria plies between Lake Erie and California.

The Imperial, Crescentite and Mervadite, which sail on the west coast, became respectively Imperial Vancouver, Imperial Nanaimo and Imperial Numa.

Not long before the first T-2 was added to the Imperial fleet, the Trustolette, oldest diesel-powered ship owned by the Company, was sold for scrap. She had been a lucky ship, for two and a half years during World War II she sailed safely through submarine-infested waters of the east coast of North and South America, both in convoy and alone. Once three ships immediately around her in convoy were targeted and two sunk, but she escaped to become known as a "lucky ship" to her crew. Severe shaking from depth charges dropped by her escort vessels was the extent of her war damage.

Capt. G. V. Thomas commanded the Trustolette during the war and was made an officer of the Order of the British Empire for his services as commodore of convoys. Later he was port captain at Guayaquil, Ecuador, before assuming command of a new Company tanker. Capt. T. K. B. Knight commanded the tanker when she finally tied up at Halifax.

The Trustolette was built at Seattle, Wash., in 1938 and was powered by steam. Diesel engines were installed in 1954, and the Trustolette became the first of the Imperial fleet to use diesel power. A decade
later she was fitted for casinghead gasoline cargoes, with a capacity of some 72,000 barrels.

Her principal sea routes were between South America and ports in the southern United States and eastern Canada.

The rigors of the sea and war service also took their toll of the Albertville and Vancolite and, by a few months, these veterans preceded the Trentonite to the scrap yard. There was little of the spectacular in the career of either vessel, but each had well served a useful purpose.

The Albertville was launched as the Adorna. Later her name was changed to Cuddo which she retained until she was bought by Imperial Oil Ltd. in 1929. She was built at Newcastle-upon-Tyne in 1912, with a capacity of 66,000 barrels. Under the Imperial Oil house flag, she maintained the supply of crude oil from California to Ioco, B.C. For the greater part of the time in this service she was commanded by Capt. A. A. Mosher of West Dublin, N.S.

The Vancolite, of 122,000 barrels capacity, built at Glasgow, Scotland, in 1928, in her time was well known at most oil ports on the American continent and had also traded in the trans-Atlantic service. Throughout World War II, she sailed in many a convoy, remained unscathed, and never failed to deliver her cargo. During the war years, and for several years previously, she was commanded by Captain R. F. Sarty of LaHave, N.S.

The seafarers of the Imperial Queen: “Toss the boilers” as the Canadian crew tows over the ship. To landlubbers it means that the boiler fires are being started to make steam.

When a ship goes to the shipbreakers, men who have sailed in her usually feel they are losing an old friend. But tankers become worn out and must make way for newer, faster and more efficient ships, so that Canada may be better served with petroleum and its products.

Now the Imperial Quebec, the former Port Royal was taken over by her Canadian crew at Bayonne, N.J. Here one of the men who will sail her comes aboard, getting a hold to his shoulder.
Oil in Wonderland

In Petroleum Research the Gasoline and Oil Laboratory of the National Research Council May Call Upon All the Council's Great Scientific Facilities

This low-set, compact building is the Gasoline and Oil Laboratory of the National Research Council. It is on the Council's Montreal Road site, outside Ottawa, where a great scientific centre has been developed for mechanical engineering research.

Five Miles east of Ottawa, on the Montreal Road, Canada's closest approach to a wonderland of science exists in the buildings of the Division of Mechanical Engineering of the National Research Council. The buildings are of ultra-modern architecture, and they stretch in rows of strange and sometimes puzzling shapes. For each peculiarity of construction, however, there is a reason—the fundamental purpose for which the buildings were erected. In meeting the functional needs of the laboratories a consistent pattern of architectural design has been followed throughout which is very pleasing. There is nothing like them anywhere else in the Dominion.

This is the centre where Canada conducts a major part of her aeronautical research and within these white-walled buildings are great wind tunnels, testing basins for hydrodynamics, and other apparatus used in experiments on aeroplane engines and models. Not all the buildings are spectacular, however. Comparatively modest, and for that reason often overlooked by the usual visitor, the Gasoline and Oil Laboratory stands in the farthest corner of the development. It houses research of importance to the petroleum industry and to Canadian aviation. The research program in which this laboratory was a key factor enabled Canadian airmen to fly farther and more safely during the war. Because of it, civilians now are being flown farther and more safely in all parts of the Dominion.

The National Research Council conducted petroleum research projects at intervals over two decades before deciding to establish a separate laboratory for gasoline and oil testing and research. But in 1937 space was made available in a converted lumber mill where Dr. J. W. Broughton was placed in charge of a staff of four research workers.

Dr. Broughton is a graduate of the University of Alberta and of McGill, who came to the Council after working in the laboratories of several Canadian oil companies. Under his direction, work in the newly created laboratory increased to the point just before the war when plans were made for the present building. In 1941 the move was made to the Montreal Road site; the war made great demands upon the laboratory; staffs were increased; the building project was almost doubled; and now in peace Canada has a specialized laboratory for petroleum research which can be adapted to a wide variety of needs.

The Gasoline and Oil Laboratory fits perfectly into the conception that the National Research Council exists to help Canadian industry. It does not duplicate the work of industrial laboratories. Rather it assists and in some respects gives guidance to research conducted by individual oil companies. Through this co-operation, developments in petroleum research are passed on to the public most rapidly.

The building on the Montreal Road site is entirely "Dr. Broughton's Lab", because, working with a government staff architect, he planned all its construction details. Accordingly the compact series of chemistry rooms, testing areas, and general work rooms of the Laboratory have many features which contribute to perfect working conditions for petroleum scientists.

There are two air conditioning units, special floors that prevent vibration interference during experiments, glass walls and splendid lighting facilities. As a fire-protection measure and for other reasons, a detailed wall panel at the main entrance flashes light signals wherever electric current is being used by apparatus in any part of the building.

A plant in the basement can turn out 500 pounds of ice a day. For low temperature research the laboratory has a low temperature cabinet capable of operating at —79°F, and also makes frequent use of cold rooms elsewhere in the Council's laboratories. At present the Division of Mechanical Engineering is constructing extensive new low temperature test facilities on the Montreal Road site.

In "Dr. Broughton's Lab" much of the equipment is that which can be found in standard petroleum laboratories. For several years, however, the supercharged knock test engine was the only one of its kind in eastern Canada. It was designed during the war by the Chemical Research Committee of the United States for testing higher octane fuels. The engine is an elaborate device which reproduces the temperature, speed, and general severity of conditions at which aircraft engines operate.

During the war, refineries in eastern Canada sent their base gasoline stocks for testing. The supercharged knock test engine gave close indications of the rich mixture performances of aircraft fuels in full scale engines. Standards were set for safe mixtures which protected airmen in take-off and in combat.

Without the standards fuels might have been supplied that would produce extreme detonations, blow the tops off cylinders, and wreck an aircraft engine. Similar tests were conducted at Imperial's Calgary refinery where the only other supercharged knock test engine in Canada had been installed. A third engine now is being placed in the research laboratory at Imperial's Sarnia refinery.

"Dr. Broughton's Lab" differs from industrial laboratories not because it possesses unusually extensive or special equipment but because it has at hand all the related facilities of the National Research Council work as a whole. Next door is the great Engine Testing laboratory where experiments can be conducted on engines that range from the small, 1½-horsepower type, to the big, 1,000-horsepower Rolls-Royce Merlin, and on up to those of 5,000 horsepower.

In the adjoining Hydrodynamics building, scale models of Canadian rivers are built to reproduce real water-flow conditions for the study of harbor problems. This, of course, has nothing to do with petroleum problems but another phase of aeronautical research is conducted elsewhere in the building where model aircraft are examined for structural performance in the Model Testing Basin which looks like an elongated indoor swimming pool, 450 feet long, 25 feet wide, and 10 feet deep. (The research men aren't allowed to swim in it—they might interfere with experiments.)

In other buildings the great horizontal and vertical wind tunnels are available for specialized tests, and most important, delicate apparatus can be constructed in the instrument and model shops when needed. Finally, the new Flight Research Section at RCAF Station Amari now is in operation to prove or disprove under actual flying conditions the theories and conclusions of the Laboratory.

The Laboratory's work falls into four general classifications: fuels, lubricants, gasses, and hydraulic fluids. During the war it was primarily concerned with the objectives of the Canadian government purchasing standards committee, the National Research Council's associate committee on petroleum, and other bodies acting with the department of national defence.

The supercharged knock test engine was used in much of the work with aviation fuels, and other standard tests were constantly employed. When it seemed a shortage of aviation fuels would develop, extensive research was undertaken to find out how much training planes to use gasoline, obtained by the cracking process, which had been considered suitable.
The Laboratory carried out development and research work which resulted in the issue of specifications for hydraulic fluids suitable for both Arctic and tropical temperatures. A hydraulic pump test stand was designed and constructed. A new method for determining and standardizing the rubber swelling characteristics of petroleum-oil type aircraft hydraulic fluids was investigated.

Many other related problems were studied. In all, 2,605 reports were prepared during the war years, and 4,929 samples went through the Laboratory.

These results represented the concentrated effort of patient, uneventful, hard work. During the war, research was conducted on a wide variety of problems for all three branches of the Defence Services. However, the Laboratory's prime function is to carry out research on aeronautical problems, and these will continue to be its chief concern.

Two main projects are planned for future work of the Laboratory. An extended program of low temperature research on petroleum products will be conducted. The Laboratory also will pay special attention to combustion research and investigations of fuels for use in gas turbines, jet engines and propulsive ducts.

Like the other laboratories of the National Research Council, the Gasoline and Oil Laboratory is transferring from work conducted principally for the Armed Services during the war, to peacetime projects that are important in the post-war development of Canada.

Oil research in the Gasoline and Oil Laboratory uses the facilities of other laboratories on the same site. This aeroplane is being tested in the engine laboratory.

Petroleum research in the Gasoline and Oil Laboratory uses the facilities of other laboratories on the same site. This aeroplane engine is being tested in the engine laboratory.

These are electrochemical titration units being used by the research worker in analysing oil samples in the Laboratory.

This supercharged knock test engine was the only one of its kind in eastern Canada during the war. In testing high octane fuels it reproduces the conditions of aircraft operation. Dr. J. W. Broughton (above) heads the Gasoline and Oil Laboratory
F. B. BIMEL
Retires from Imperial Oil

K. A. HENDERSON
Imperial’s New Treasurer and Vice-president

After 42 years in the oil industry, Fred B. Bimmel has retired as chairman of the board of International Petroleum Co. Ltd. The travels of his long career have made him as familiar with the geography of Alberta, Peru, Oklahoma, Texas and Colombia as with his own back yard.

Mr. Bimmel came to International in 1928 as a director and took charge of their casinghead gasoline production in Peru and Colombia and also of Imperial Oil’s casinghead production in Canada. He was elected vice-president of International in 1944, and became chairman of the board in 1945.

His association with the oil industry began in 1904 in a job with a mid-west pipe line construction gang. He became a construction foreman and worked on some of the most important lines on the continent, practically living out of a suitcase.

In 1915, Mr. Bimmel left pipe line operations with his appointment as a producing assistant in a northern Louisiana field. Three years later he was placed in charge of the gasoline department in that district.

In 1922 he organized a system of recovery of gaseous known as light ends which increased the production of casinghead natural gasoline for one company in six years from 20,000 to 550,000 gallons a day. This has been a major contribution to the industry’s oil resources conservation program, and Mr. Bimmel came to International as an expert in this production.

Kenneth A. Henderson, new treasurer and a vice-president of Imperial Oil, played a major role in the success of Canada’s Victory Loans. Mr. Henderson was executive chairman of the National War Finance Committee. He came to Imperial from the Bank of Canada where he was securities advisor and also served as advisor to the Foreign Exchange Control Board.

In announcing Mr. Henderson’s new position with Imperial, President H. H. Hewston said that his experience in investment banking and his wide knowledge of foreign control exchange operations will be of great value to the Company. Mr. Hewston pointed out that Imperial is conducting activities which involve large commitments, extensive provisions for maintenance of supplies, and sizable capital outlays in connection with its post-war program.

Mr. Henderson was born in Acton, Ont. He attended McGill University, and graduated in 1925 when he joined the firm of Wood Gundy as a junior in Toronto. In 1927 he was transferred to the Montreal office and a few years later formed a partnership as an investment dealer. In the fall of 1934, Mr. Henderson opened a branch of his firm in Toronto and soon after was persuaded by Governor Graham Towers to join the Bank of Canada. He moved to Ottawa in 1935, becoming securities advisor to the central bank.

Geologists shared the drillers’ disappointment at Stolberg, for they had toiled long hours to locate a promising site for oil.

Million Dollar Disappointment

The Hardships of Drilling the Stolberg Well Illustrate Why the Search for Oil Is Costly

Before this winter’s snows closed in, Joe Jackson moved his towering rotary drilling equipment away from the Stolberg well. The move is the disappointing end of a million dollar operation on a hillside deep in the Alberta foothills of the Rockies.

In the past two years, Jackson and his drillers had forced their bits down to 12,747 feet—more than two and a half miles below the hillside, probing a deeply buried formation which, it was believed by expert opinion, might contain oil. The million dollar investment, a joint enterprise of Imperial Oil Ltd., and the Shell Oil Co. Ltd. of Canada, included costs of

The original exploration and the actual drilling. Expense and effort were not spared—but the Stolberg well did not produce.

The Stolberg deep test—the deepest in which Imperial has had an interest—is another of the bitter climaxes which must accompany Canadian oil industry efforts to find new reserves for an oil-hungry nation.

The foothills of Alberta are one of the world’s most breathtaking hunting grounds for oil. In the enormous earth pressures which built the Rockies some layers of rock were folded back and forth like a Chin...
ese fan. As a result there are formations which threaten to seize and hold the drill pipe in a vice-like grip thousands of feet below the surface. There are others of such hardness they will scratch glass, and here the bits can drive only a few inches before they become so dull that the drills must start the laborious pulling of thousands of feet of pipe to change them.

Yet this tough drilling territory contains, poten-
tially, some of the world’s major oil fields. Geologic evidence points to this conclusion, and the discovery of “teases” prove the oil is there—somewhere. Al-
ways before the man like Joe Jackson, is the dram-
atric possibility that his swirling bit may crunch through the top to a great oil supply... a thrill men dream about.

The Stolberg well had its beginnings when geolo-
gists surveyed the area from the air, by canoe, by pack horses, and on feet years before the drills arrived. They found what is called an anticline, a vast under-
ground arch or rock trap which might contain oil. Then they located the well site five miles from the only road in the area, a clay surface leading to Nor-
degg, the railhead, about eight miles away.
The next stage of the work began in the winter of 44-45. With the spring thaw, the bent road would be well-nigh impassable and there was making lots of it between the road and the well site. Bulldozers sluiced over the snow and scoured a winter trail through the poplar, fir and pine. The drilling rig, bunkhouses in prefabricated sections, fuel tanks, an electric power plant and all the other components of a drilling camp were hauled in, with supplies needed for the semi-isolation of the spring thaw.

Nature began to take the measure of the camp from the very beginning. As the road building equip-
ment got to work the wettest spring in years bogged down the muskeg and turned clay into a gluey gumbo. One section of road, costing hundreds of dollars, was completed and abandoned as the muskeg demonstrated its ability to suck it down. In other parts the sinking was more gradual, and it was suf-
ficient to renew a furrowed surface from time to time.

Throughout the building a small caterpillar, the only thing that could get through, hauled a wagon back and forth carrying cookhouse and other essen-
tial supplies. The cost was more than $5,000 a mile for what was little better than a wilderness trail.

At the site they discovered that the excavation for the well “cellar” and the “mud pit”—containing the drilling fluid which flows down inside the drill stem and back up the outside to the surface—had to be blasted from solid bed rock. They made their holes, erected the 136-foot steel derrick, hauled their en-
gines and other heavy installations into place and spudded in, on March 29, 1945.

Trouble came soon.
The drills were biting nicely into the surface rocks when they opened what is known as a fractured for-
nation. As the name indicates there is plenty of open space in such a formation. Through this, with con-
siderable force, flowed a subterranean spring. Thus, almost before work had begun, drillers struck water.

Then they called into play some of the magic of their trade. Against the force of the subterranean current they sealed the walls of the hole with mud— thick, heavy, flowing mud. It fell down through the drill stem it lubricates the drilling bit and carries away the rock cuttings and on the way up it has a plastering effect on the walls and if of the right type it forms a seal on the sides of the hole which prevents caving. Mud may be thick or thin, heavy or light, and may contain a variety of chemicals and other agents to combat the destructive effects of the constantly changing forma-
tions met as the hole deepens.

At Stolberg the mud engineer went into action and sealed off the flowing spring in the shattered forma-
tions near the surface. He weighted his mud until it had gained several pounds per cubic foot, and the total weight of the mud in the hole was greater than the pressure of the water. As it pressed back the underground spring, its sealing properties provided a delicate film of wall surface whose life depended chiefly on the ingenuity of the man up above who made the mud.

When a well is drilled to the depths of the Stolberg hole, however, it isn’t wise to take any chances with the surface formations. At 500 feet Jackson reached the hole to a width of 16 inches, dropped in a steel casing just over 15% inches in diameter, and cemented it to the sides of the hole.

Cementing is another ticklish job, and always the work of specialists. Trucks designed solely for the purpose, costing as much as $25,000 each, are brought to the well. Usually, at a deep well like Stol-
berg, two trucks are brought in because if anything goes wrong—especially at greater depths—there may be costly and sometimes disastrous delays.

When the pipe is set, the cement specialists calcu-
late the amount needed to fill the space between the inside surface of the drill hole and the outside of the casing. Then, in place of the mud which has been flowing through, they introduce pure liquid cement. It is pumped down inside of the casing and forced up the outside, in just the right quantity, and is fol-
lowed again by mud. It is allowed to set and then work starts again, with a drilling bit of smaller dia-
ter, inside the casing. In this way they set their “surface” casing at Stolberg.

Then began the monotonous, grinding job of "making hole,"... three shifts and a swing shift... the geologists watching the shale shaker and

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ferry, which usually carried trucks across, was ice-bound; there was not enough ice, however, to hold the oil transports.

Down from the well came the drillers to build a plank road over the ice. The ice sank dangerously and in spite of the urgency the trucks were sent back, shipped in by rail, and driven the last miles to the well.

This first load of oil failed to budge the bit, stuck solidly as it was in a coal seam. Another load was called for, and this time it was brought across the planked ice of the Saskatchewan, the ice rolling up in front and behind and cracking as the oil transport swayed across. The snow was piled deep on the 50 miles of bush road between the well and Rocky Mountain House where the crossing was made. The camp caterpillar went out to meet the transport and cleared a road through, like a tiny scoter escorting a lumbering freight.

Again the oil failed to loosen the bit. The Saskatchewan crossing and caterpillar escort were repeated and a third attempt also ended in failure.

The unhappy drillers decided it was beyond their power to lift the bit. A "shooting outfit" was summoned from Montrose. Down into the hole went a time bomb and five quarts of nitroglycerine. The nitro exploded in and swaged up gently behind the caught bit and the recalcitrant formation, and blasted it into submission. The bit itself and part of the collar were smashed into tiny pieces. The rest of the collar split and flanged out, and part way up threatened more trouble by sticking again. This time it was worked loose with oil.

At the bottom of the hole the pieces of steel were washed up with mud into a drillers' gadget called a junk catcher, a couple of larger pieces were thrust aside and by-passed by a fresh bit, and at last the outfit was making hole again.

Now it was really hard drilling; hard labour for the men who had to stack two miles of pipe every time they changed a bit; tense concentration for the men with the responsibility. There may be close to a hundred tons of mud in the hole, making a round trip from the mud pit to the bottom and back every couple of hours. That spindle of frail pipe suspended from the top of the derrick weighs roughly another hundred tons. Down below, the drill is whirring around, biting into who-knows-what formation; maybe sitting, maybe running free, maybe turning through to the ball bearings the cutters turn upon.

At 12,170 feet the drill stem twisted off in the hole, leaving a jagged end sticking above the 368 feet of pipe sitting on the bottom. In an unknown field, especially in the Rocky foothills, difficulties are expected. A good "tool pusher" like Jackson, is always ready in the language of oilmen, to go "fishing"—though with many protests because no matter how bad the drilling, he considers fishing as a reflection on his personal ability to keep everything running smoothly.

When the twisted steel end began coming out of the hole they were able to choose the bait for the long steel "fish", the broken pipe sitting on end two miles down. First they tried a fishing tool that is supposed to slip over and grab. But the frayed ends of steel where the twist-off occurred prevented this. So they sent down a milling tool and ground the top of the fish for three hours, making it flat and bold on top so that an "overhead" fishing tool was able to grab and lift it right to the surface. The fish weighed 10 tons.

Then back again to the gruelling labour of drilling. Now they were approaching their objective—the big line, they call it, the same line to the formation which held oil in Turner Valley, which has given a promise of oil in countless places, which might here give a new field to Canada's dwindling reserves.

For an idle moment some of the men reflected on the enormous pressure oil and gas fields could store up, and of how some wells came in by driving a mile or two of pipe down straight up out of the hole. It was a comforting thought to know it could happen here, with the great steel clamping jaws of the blowout preventer ready at the head of the hole. But there was no danger of a blowout. The rock cuttings from the big line, as they came up didn't even have a smell of oil.

Then the secrets of those many ages ago, when the Rockies were being formed and the rock was tortured and twisted, began to reveal themselves. The drill hit a fault in the rock; the men sweated through 250 feet of hard drilling—and found themselves at the top of the big line again! Two miles underground this layer of rock had folded completely over on itself. What was underneath? They pushed the drills deeper.

At 13,094 feet they struck another fault, and again went through the hard drilling and back into the big line for the third time! At 13,747, convinced the deep test at Stolberg had given them only geological information, they pulled out the 60-ft drilling hit and prepared to cement in casing for a final test. There is always some hope until the final test. With all the tons of drilling mud that sit in a hole two and a half miles deep on oil field which did not generate much pressure might be sealed off and missed during the drilling. So there was the elaborately difficult job of cementing casing again—seven inch casing down to 10,931 feet, and below that five inch and four and three-quarter inch casing.

Then the specialists' job—gun perforating. All the formations are sealed off from one another by
the steel casing, which has been cemented to the rock sides of the hole it sits in. Into the casing is lowered a gun perforator—a long, cylindrical steel tube, with openings in the side into which powder charges and hardened steel bullets are inserted. Opposite first one formation and then another these bullets smash their way through the casing and cement into the rock inside.

Then the tons of drilling mud in the hole are gently swabbed up to ease the pressure, and if there is oil or gas it will flow into the casing and up into the hole above.

They thought that it would be clear sailing at Stolberg when they started the gun perforating. Then, suddenly, the line carrying the gun perforator snapped. Down it plunged to the bottom of the hole, lost—two and a half miles down.

Worried and not without some recriminations they again started to “fish.” It was finally necessary to run the fishing tool in on a string of two-inch diameter pipe. They got the gun and continued their job of perforating.

Then came the test, but in place of the crude oil which would have made all these hardships a matter of little moment, there was a puff of gas and a copious flow of salt water. In one formation a small “shoe” was obtained but Stolberg did not produce oil in commercial quantities.

There were many other incidents in the drilling of Stolberg well that challenged the knowledge and experience and ingenuity of Jackson and the 31 persons in his camp. Perhaps the most dramatic came at the moment the outfit got its orders to move camp and try again: for this was a decision that called for courage, vision, and faith—courage to try again in the face of bitter disappointment, vision to see that the development of Canada’s oil resources is inevitably bound up with her welfare, faith in the industry and the future.

The worn teeth of these costly bits tell part of the story of difficult drilling at Stolberg, where 601 bits were blasted.

This girl veteran, using a jeweller’s lathe, is typical of the ex-service personnel being taught in Canada’s training schools.

SCHOOLS FOR SKILLS

IN TEACHING THOUSANDS OF VETERANS, THE CANADIAN VOCATIONAL TRAINING CENTRES ARE BECOMING SUPER-TECHNICAL INSTITUTIONS FOR THE FUTURE

CANADIAN industrialists from coast to coast are beginning to realize that the facilities of the Canadian Vocational Training Centres have become an invaluable school for all industry. The centres are supplying thousands of skilled workmen taught the way industry needs and wants them to be trained.

In 42 centres from North Sydney, N.S. to Nanaimo, B.C., Canadian Vocational Training operates 70 special training schools. In addition to these, it has made use of 200 private business colleges, 106 private trade schools and about 50 provincial or municipal schools. These are all used for the training of discharged members of the Forces. The total number of veterans under training last fall was 55,898, of whom 958 were in correspondence courses, 11,310 being trained on the job in industry and the remaining 33,630 were in private or Canadian Vocational Training schools.

From the beginning of the Dominion-Provincial Training Program in 1937 up to the present, the gross enrolment under Youth Training has been approximately 300,000 and under War Emergency and Rehabilitation Training over 500,000. The cost of training veterans is paid almost 100 per cent. by the Dominion government, but the expenditures for youth training, student aid, and apprenticeship training are shared equally with the provinces. The total appropriations for 1946-47 administered by the Dominion Department of Labor for training amount to over $21,000,000.

Today these schools are concentrating on providing the veterans with a skilled trade or matriculation requirements to enter university. Tomorrow they may become the nucleus of a nation-wide system of super-technical schools.

Through industry’s co-operation, the advisory committees at the schools can tell the principals and instructors the best and most essential training required in any line. The advisory committees in turn can be consulted on the most modern equipment and latest techniques.

Besides matriculation and commercial training, the schools teach a returned man or woman activities that range from running a diesel engine, making a
Training, job safety training, job methods training and two series of job relater training.

Since 1942 the "J" courses have been taken directly or indirectly by 135,000 in Canada. In Ontario alone they have been responsible for the training of 56,000 supervisers. More than 900 business and manufacturing firms, including Imperial Oil Ltd., are participating in the plan.

The "J" programs deal with basic principles and the benefits are not limited to production jobs. Businessmen are loud in their praises of the results and in one Dominion government department in Ontario, 600 suggestions for improvements were received through the courses, of which better than 200 have been adopted.

More spectacular in equipment and range of activities is the work being done now in the centres, crowded with returned veterans, both men and women. As an example, the Training and Re-Establishment Institute, located in a seven-and-a-half acre city block housing 11 buildings in downtown Toronto, is considered by many the largest training centre of its kind in the British Empire.

Today veterans are receiving thorough industrial training at the centre. Trades run the entire gamut from bricklaying to power sewing machine operation. Approximately 13,000 veterans have been trained by the school in courses averaging six to nine months.

The school is a little world—an entity unto itself. Furniture shop students build tables, chairs and other equipment to help furnish new sections. The tailor shop can make student's clothes. They can go to their own student barber shop. The bakery and chef section cooks an average of 4,900 meals a day which are served in the school cafeteria and dining room.

The teaching methods and conditions for building, metal working, and motor mechanics—trades which, perhaps, have the most direct connection with the petroleum industry—can give an overall picture of the school. The situation in the Toronto school is like that in the other centres across Canada. Of course, there are some variations: for example, some courses are given at only one centre in a province, such as diesel engine mechanics, now taught at the former Army Trades School in Hamilton.

In Toronto, the automotive trades, machine shop, and tool and die making courses are in what was built as an R.C.A.F. drill hall. The school was getting jammed as attendance jumped in two years from 600 to 6,000. How could they be housed? Carpentry students were called into the breach and they built partitions and made classrooms around the balcony of the hall. Painting students then got to work and electrical students did the wiring. After this, insurance regulations made it necessary for the plaster students to do a special job. They did the lower walls and balcony ceiling with fire-resisting plaster. This is a mica-base plaster: you can hold a blow torch up against it for two hours and 12 minutes before it will fuse.

Similarly, in the main building "Rehab" students did a concrete rat-proofing clean-up job in the ancient basement. Now there are several stationary engineering classrooms down in what used to be a dungeon-like old cellar. A good deal of the improving in the motor vehicle repair end was directed by a man who served under Lawrence of Arabia during World War I.

Nine of the courses including the automobile trades come under the Provincial Apprenticeship Act and graduates are given third year apprentice standing. In tool and die making, one of the special aptitude courses, to the veteran who has completed it successfully is rated as a fourth year apprentice. He is then subject to the rules of some fourth year journeyman tests elsewhere. This particular course requires three years machine shop practice for admission. It is a 12-month course and graduates are much in demand.

In the machine shop, run under actual factory conditions, in addition to the practical week, the student receives a course in shop theory, shop mathematics and blueprint reading. He also takes instruction in the application and use of the precision tools and instruments in the standards and tool inspection room, where the Sheffield gauge can check accuracy to 1/25 millionths of an inch. And that's cutting a hair pretty fine!

In the motor vehicle repair division, veterans are taught all about an automobile's anatomy and how to diagnose mechanical ailments and operate on them. Many of the students have been in mechanized divisions in the arm and their military trade experience is taken into consideration in arranging their course and in what apprenticeship bracket they fit. Students in the designated building trades—bricklaying, carpentry, sheetmetalting, plumbing etc.—have erected model houses in their section—right from the ground up to the sheet metal work for the esven-
troughs. Everything is student-made including the doors and window sashes. Courses average six months and qualify the veteran to begin his third year apprenticeship within industry.

In the carpentry school, the novice finds out that there is a lot more to be learned than how to hit a nail on the head without squashing his thumb under the hammer. Besides practical work, among other intricacies of the trade, he is taught to tell the difference between a knurled and a milled, a bare-face tenon and a double tenon with a bevel—which sounds like so much double talk to the layman.

In the well-equipped electronics labs, the student learns everything from what makes a “peanut” tube tick to superhydrodine receiver alignment and the know-how of industrial rectifiers. Students learn, too, how to check metal базes with industrial X-ray machines. Research is also being carried on in the school’s laboratories. An aluminum boiler manufacturer was able to fill hundreds of orders because the school supplied him with 16 veterans trained as Grade-A aluminum welders. The school has helped similar industries by giving them the kind of trained men they want.

Government sponsored trade schools, run to meet the demands of industry and supply the exact type of skilled worker required, had been set up in Germany years ago. This was one of the factors which contributed so much to the Nazis’ industrial potential. Italy and Japan had similar institutions. It has been wisely felt that if Canada, Britain and the United States had had technical trade super-schools on such a scale before Munich, the conversion of Allied industry from a peace-time to a wartime footing would have cut the duration of the war in half. Such training schools are being carried on in Russia today on a wide scale with a view to developing her vast natural resources to the full. More and more nations are realizing the need for super-technical schools.

Canada’s Re-establishment centres are doing a tremendous job in turning out thousands of better-trained youthful artisans. They are proving a boon to industry in the steady march of progress.

HELP FOR HOSPITAL BILLS

Revisions in Imperial’s Benefits Plan
Provide Increased Protection for Employees and Dependents

Imperial Oil employees are receiving increased help in meeting the higher costs of hospital care, under revisions to the Company’s Hospitalization and Daguest Benefit Plan, effective January 1, 1947. The revisions, as recommended by the Benefits Committee, will provide increased protection for both employees and their dependents. These further benefits are made available without increasing the employee contribution to the cost of the Plan, the additional premium being paid by the Company.

Four major revisions in the hospitalization plan raise the daily hospital benefit from $3.50 to $4.00; increase from 31 to 40 days the maximum period of hospitalization for which benefits are payable; increase the benefit for special hospital services from a maximum of $17.50 to $24.00 and increase the maximum maternity benefit for a dependent from $50.00 to $60.00.

With the $4.00 rate in effect, employees may draw this full amount while in hospital. Their dependents will continue to be reimbursed for actual hospital charges up to the $4.00 daily limit. The increase in the maximum hospital period from 31 to 40 days does not apply to maternity benefits for employees which remain limited to 14 days.

Benefits for special hospital services, now increased to a $40.00 maximum, apply to hospital services and supplies for medical and surgical treatment, but do not include charges for special nurses. The new $40.00 maximum for dependents’ maternity benefits applies to all hospital charges including special hospital services.

No revision was made in the surgical benefit plan, which pays employees and their dependents amounts ranging from $50.00 to $100.00, depending on the nature of the operation they undergo.

An adjustment to the revised plan in coverage and premium was made for Saskatchewan employees in order to co-ordinate with the benefits provided under the Saskatchewan Hospitalization Act.

At present more than 10,000 Imperial employees are participating in the hospitalization and surgical benefits plan. Benefits paid since the plan was introduced three years ago have exceeded $700,000.
Every operation in modern refineries is recorded on charts. Here a young woman uses a device called a planimeter to compute from a chart the oil flow through one of the units.

This young lady is selecting boxes containing some of the many types of charts used in the handiwork of instruments in the refinery. Used charts form a permanent operating record.

**PRODUCTION CONTROL**

A SPECIALIZED DEPARTMENT KEEPS PATIENT VIGIL OVER REFINERY PRODUCTION METHODS AND COSTS TO OBTAIN THE OIL PRODUCTS CANADA NEEDS

THE MEN of the Production Control department are the efficiency experts of the modern oil refinery. They are the link between the roasting, pulsing oil refining units and the offices where these same units are represented by figures and words on paper—costs and yields, profits and losses, production and efficiency.

Production Control men are often found in office conferences with refinery management. In the refinery a major part of their time is spent poking about the units, in reading a meter chart or two and making a quick calculation on their ever-active slide rules, and in talking with unit operators, foremen, gaugers and instrument men. As a family doctor knows his patients, so these men know their units.

Production Control has grown up with the oil industry. The early refiners cooked their crude oil, drew off the products and sold them without giving much thought to efficiency and economy. As the industry developed, competition became keener and it was evident that refining practices would have to be improved and integrated to extract the fullest measure of each product from every barrel of crude oil processed. Economy of operation means less costs to the consumer who buys petroleum products.

In general, the men chosen for this job are graduate engineers who have worked about the refinery in many capacities and have become thoroughly experienced in the problems of processing oil. The size of the department in each refinery varies according to the complexity of operations carried on.

In the modern refinery, production control men supervise the processing of oil from the time it enters the refinery until, in the form of finished products, it rests in storage tanks waiting to be shipped. In general, each member of the department supervises the operation of a unit, or more than one unit if their operations are closely related. For instance, one man may supervise the crude oil distillation units, another the cracking units, another the lubricating oil processing units, and the like.

The efficient operation of refining units is governed by "flow sheets" or operating standards, which are compiled from laboratory tests on the oil being treat-

Complex calculations are usually involved even when working out minor changes in processing. Here the mathematics of an adjustment at the phenol plant are computed on a slide-ruler.
ed and from practical operating experience. These sheets show a point by point, what percentage of each product should be obtained from wherever crude oil is being processed.

It is part of the job of production control men to supervise the operation of the refining units so that the products are in accordance with the flow sheets and the product quality meets the specifications laid down by the laboratories. In addition, they are charged with the responsibility of forecasting and scheduling refinery operations.

This involves estimating future requirements of refinery products, selecting the type of crude oil best suited for processing into these products, arranging for the units will be available for specific duties when the crude oil arrives, and finally making sure that there are enough storage tanks free to hold the finished products.

Crude oil from one area may be more suitable than that from another for refining into certain products, and also may be processed several different ways to obtain varying yields of products. Accordingly, a great deal of calculation and paper work is involved as well as thorough knowledge of the capabilities of the processing units.

The life of a production control man is not an easy one. He is on call to his refining units day and night. If a new operating procedure is being tried out, or piping changes have been made, or an experimental test run is in progress, the production control man is constantly on hand working the best combination of temperatures, pressures, flow rates and other information to produce the most efficient operation.

These men are forever trying to improve the operation of the units of the refinery by making more of the products from established units, and by adding additional units to the refinery. The products of these additional units will be used to improve the quality of existing products or to add new products to the refinery.

Production control has become one of the refinery's most important departments. It is due to this unit that the proper flow of these men in cooperation with other departments that the refinery maintains the quality of its products at a consistent level, and at the same time brings forth new and better derivatives.

From stop a tank a gage unwind a steel tape until the pan reaches the end of the oil. The temperature reading is recorded and compared with the gage tables to calculate the volume of the oil which maintains with hairline accuracy, the temperature, pressures, flows and liquid levels which have been determined by the production control men for efficient operation. The instrument department installs instruments to measure the flow and the units, at points selected by the engineering or production control departments, and keeps them in good running order.

The instruments charts are changed daily and brought to an office where the fluids and the various charge stocks and products are computed, checked, and tabulated. Then, in conjunction with the reports from the men who gauge the storage tanks, a yield statement covering the refinery operation is prepared. This yield statement shows the volumes of products obtained from the crude processed. The yield statement contains all the facts about the actual operation of the refinery. The accounting department supplies details of costs, and the production control must see that the total yield has been obtained from the crude oil processed, but also that the costs of the operation are what he predicted when the operating schedule was drawn up. If his predictions have been wrong he must explain why.

To perform these duties production control men must have a broad knowledge of petroleum refining technology as well as win the confidence and cooperation of the men who are actually operating the units.

Production control has become one of the refinery's most important departments. It is due to the unique working of these men in cooperation with other departments that the refinery maintains the quality of its products at a consistent level, and at the same time brings forth new and better derivatives.

HE WORKS FOR THE EMPLOYEES

“ROLY” MOORE HANDLES THE
PROBLEMS OF IMPERIAL’S 10,000 WORKERS WITH
THE UNDERSTANDING WHICH MADE HIM
POPULAR AS A REFINERY ENGINEER

WHEN R. C. Moore was appointed manager of Imperial’s department of employee relations, employees who did not know him might have wondered why the Company named an engineer to this particular post. To the hundreds of Imperial men and women who did know him, his appointment was a natural sequel to his long-term interest in them and in their hopes, needs and aspirations.

Long before the department of employee relations was organized Mr. Moore was performing some of its functions privately and quietly. His office was always a Mecca for visitors and it was a rare day that did not bring someone from South America, an old friend from his native Nova Scotia or a western caller to his door. They always found “Roly” Moore warmly human, always approachable, never too busy to discuss a problem and recommend a solution.

Some of his beliefs were expressed in a recent speech: “First and foremost on the scale of importance for good employee relationship is the worker’s right to representation and his right to negotiate matters involving wages, hours and working conditions. Men and women who are politically free must also be industrially free—the two freedoms are inseparable.”

“We all believe in government by representation; why then should we not believe in representation for the worker in governing his working life, so that through the voice of the workers as bargaining-committee, peace and cooperation may be substituted for strife and conflict. Workers’ representation is a vehicle for conveying to management the grievances of employees and for informing workers about the problems of management.”

Lea further, Mr. Moore’s philosophy might be expressed as: “Men are entitled to be treated as individuals, as well as citizens and free men.”

To make this policy work with Imperial’s 10,000 employees it is a big task, for each of them has different problems, different traits, different personalities, and different qualities. This task calls for a man with patience, understanding and tact.

Mr. Moore is a native of Halifax, who admits he can’t get the “Bluenose” out of his speech. He was educated there, taking pre-engineering at Dalhousie University and engineering at the Nova Scotia Technical College, where he obtained the degree of bachelor of science on graduation in 1919.

He became a junior engineer in the firm operating the existing facilities at terminals and was assistant chief engineer before the job ended. After a year with the Nova Scotia Provincial Highway Board he joined Imperial Oil on February 14, 1921. He was hired by F. C. Medlin, then chief engineer of the Imperial refinery and now still holds “boss” as director-in-charge of employee relations.

A year later Mr. Moore was transferred to Florence as a draftsman under the then chief engineer, Mr. Montgomery. Then he remained until 1926, when he became superintendent of refineries and transferred to Toronto. He was concerned with the establishment of the refinery there, and the supervision of operations until 1939, and then switched to general refinery operations. From 1927 to 1932 he made annual trips to inspect refineries in Colombia and Peru. His present appointment dates from June 1, 1947.

Mr. Moore is married, and Mrs. Moore shares his deep interest in their home and garden, which they share with their dogs—a house and two spaniels.

In this office Mr. Moore’s accurate memory and painstaking attention to detail aid in furthering the aims of his department. He has this to say about that aim: “Adaptable, with opportunity the advancement; good working conditions; reasonable provisions for rest and recreation; and security for the worker’s family and the two industries in its declining years, are the earmarks of our endeavor.”

FEBRUARY • 1947
SKY MERCHANT

Newest thing in air merchandising, the Atlas Sky Merchant is touring more than 800 airports in Canada and the United States with automotive and aviation accessories on display.

VETERAN OF THE SOUTH PACIFIC

FIGHTING FRONT IS BACK ON "CIVIL STREET"

AS A FLYING SHOWROOM.

IN GRANDFATHER'S day, the visit of the local tea company's wagon with its variety of aromatic wares was quite an event after the spring break-up. With the advent of the automobile a new impetus was given to merchandising methods. New aviation has made another notable commercial stride.

Billed as the first of its kind, the Atlas Sky Merchant is now touring the continent, dedicated to the basic idea of safety, convenience and comfort of all people in aviation.

The giant four-engined DC-4 plane, reconverted to peacetime use, has a proud war record as a U.S. naval air transport. During the heavy days of the Japanese bid to subdue the Orient, she became a veteran of the South Pacific doing ocean travel duty between Pearl Harbor and the combat fronts carrying men and material. During the war the Sky Merchant was known as a "Sky Master". Today she is back on "civvies' street" carrying the material of civilian progress.

Her happy landing at Moncton airport, Toronto, December 10, was one of the first on her maiden North American itinerary.

Dealers from coast to coast will receive up-to-the-minute information on the complete list of Atlas automotive and aviation products in person—and by air. The Sky Merchant, newest thing in air merchandising, is specially fitted with a streamlined display of its entire Atlas line—tires, batteries and related automobile and aviation parts. The plane also makes an efficient dealers' meeting-room for sales and training conferences.

The big plane's modern radio equipment is supplemented by constant telephonic communication with the ground. When the Sky Merchant came to Toronto, a two-way telephone conversation through a regular telephone system switchboard was held for the first time in Canada. The talk was between the captain of the craft and Mayor Robert Saunders...
Portable drilling rigs that fold up like jackknives have speeded the search for oil where extensive deep drilling is not required. Here a "roughneck" is aloft, guiding the drill pipe.