CANADIAN PETROLEUM INDUSTRY MEETS THE WAR CHALLENGE

On multi-phased petroleum rests the fate of democracy. The production and use of the many products from this basic commodity is the measure of a people's ability to produce matériel, requirements and to defend their way of life. The greatest oil reserves are on the side of the democracy's, their utilization will shape the course of the war. So vital is petroleum to a winning nation that discussion of petroleum developments must be restricted by regard for their effect on combatant tactics. The purpose of this article is to disclose, as far as conditions permit, how the Canadian petroleum industry has taken up the challenge of war.

Pacific Oil Panorama

To zoom the changes entailed in turning from peaceful processing to wartime production, and to appreciate the strength of the Canadian petroleum industry as a war factor, it is necessary to present a panoramic sketch of the industry as it existed before the machines of war made their demands. This is particularly desirable since much of the industry's war contribution to date has been due directly to its pre-war status.

Table 1 reveals the extent of the pre-war petroleum industry and its war-stimulated rate of growth. The magnitude is shown in terms of commodity volume and refinery capacity for the last peace year and first war year. If all the petroleum required by Canada were placed in standard 35-gallon barrels, a 1938 line-up along the equator would extend two-thirds the distance around the world. The increase of 1940 over 1938 would bridge the Pacific.

In 1938, 87 per cent of all the petroleum products used in Canada were refined from crude petroleum in Canadian refineries. Only 13 per cent of the required crude was of home production, 96 per cent of this originating in Turner Valley. 75 per cent of the imported crude was from the United States, the remainder from South America.

Pacific Physical Status

The technical and physical status of the petroleum industry as developed in peace years is now a bulwark of Canada's defence. The evolution of an industry that has always been a step ahead of the demands to be made on it was due to its highly competitive nature and to its extensive use of scientific research.

Competition for new crude sources, for new processes and for increased sale of products has demanded an ever-accelerating increase in technologic developments. The unsurpassed scale in which the petroleum industry engages in scientific research has resulted in a knowledge of petroleum so intimate that crude petroleum utilization, process operation and chemical characteristics of products can be manipulated almost at will.

The products of early refineries were completely defined in yield and characteristics by the composition of the raw material—crude petroleum. The modern refinery creates products of precise and pre-determined characteristics independent of the composition of the crude and its yields to meet the needs of its markets. Technical developments in distillation, cracking and treating have caused this diversification of crude composition and product characteristics. Freed from the restrictions of crude composition, the modern refinery can use its flexibility to meet the economically varying market requirements. In time of war this flexibility is of vital importance since it allows immediate supply of abnormal war demands.

Flexibility is due largely to developments in fractional distillation and cracking. For example, a crude may be fractionated in a modern atmospheric bubble tower to produce gasoline, naphtha, (gasolines, solvents, etc.) kerosene, gas oil and residual fuel oil. If a vacuum bubble tower is used in conjunction with the atmospheric tower, the residual fuel oil can be segregated into waxy lubricating oil stocks and asphalt stocks. If a cracking unit replaces or is used in conjunction with the vacuum tower, the residual fuel oil or the vacuum tower heavy distillates may be converted to cracked gases (starting point of many synthetic...
The Petroleum Industry has supplied the vast British Commonwealth Air Training Plan with high grade aviation fuels and lubricants whatever they are needed.

Chemicals, gasoline, fuel oil and tar, the properties of these being varied according to the operation of the unit. The above operations and the ability of cracking units to utilize almost any readily liquidable hydrocarbon as a feed stock demonstrate the versatility of the modern primary units.

The flexibility of the modern refinery would not be possible without modern treating processes. Chemical treatment removes components from petroleum fractions as desired and further refines crude to depend on crude composition. Although the treated products are from widely differing crude, they are of uniform composition and also of greatly improved quality. For example, lubricating oil as obtained from the crude are usually unsatisfactory for the requirements of modern machinery. They contain wax, which causes the oil to congeal at low temperatures, and also a variety of compounds which at elevated temperatures give poor corrosion, oxidation and viscosity characteristics. Treating processes separate wax from the crude and remove these other components which attack bearing metals, form gum and carbon, and cause excessive “thinning out” of the oil when it is heated. As a result of the development of these modern treating processes, components are segregated as desired from certain stocks and may be added as desired to others. For instance, the components which in lubricating oils would attack bearing metals and tend to form gum and carbon, may be added to cracking coil stocks with a resultant improvement in the octane of gasoline produced from these stocks. A knowledge of crude composition and the chemistry of treating agents, plus the flexibility derived from unit manipulation, has made the modern refinery relatively independent of variations in his raw materials.

Technological developments in the laboratory and in mechanical design are rapidly incorporated into the refineries of Canada. Existing units are modified to derive advantage from the operation economies and improved products developed by research. New methods and efficient combination of existing processes create new units that increase the nation’s capacity to produce. Organized research and the carrying into practical operation of the results of research have developed a truly modern industry an industry streamlined for Canada’s eventualities.

Wartime Petroleum Panorama

War came, and a thousand needs faced the nation. Among the many necessities to create and maintain a wartime Canada, petroleum held a vital position. The machinery of war called for new petroleum products and vast quantities of the old. Without delay, without hold-ups and without the aid of public funds, Canada’s petroleum industry has supplied the petroleum needs of industry and the armed forces. The ability to do this was primarily in the developed flexibility of the refining units and the capacity of the industry to be a step ahead of the demands made on it.

Wartime Processing

Although a refinery consists of many distillation units, cracking units and treating units, it functions as an integrated unity. Integration is obtained by careful balancing of the output of one unit against the capacity of another. A change in the output of one unit without consideration for other units would disturb the refinery balance. Consequently a change in volume production of a product is undertaken only after product routes, throughput and running schedules have been redrafted for the refinery as a whole. War made great and varying increases in volume requirements of the various petroleum products with equivalent upset of the normal peacetime operation. The flexibility of modern refining units permitted redistribution and balancing of operations to meet the new requirements and the new volume ratios. Petroleum products reached Canada’s accelerating industries and expanding armed forces as required and in the quantities needed.

Aviation Gasoline

Air power is measured in three essentials: personnel, planes and the fuel that powers the planes. It is the petroleum industry’s task to provide aviation fuels of maximum efficiency in enormously increased quantities. The industry has been able to do this primarily because of the flexibility of its refining units. It has increased the production of aviation base stocks by more than 1,000 per cent and has accomplished this largely by modification of operating methods to supply the ever-increasing requirements of the Departments of National Defence and Munitions and Supply.

Aviation requirements call for saturated hydrocarbons and of these the branched forms have the highest octane blending values. Within the past five years, synthesis of aviation blending agents, essentially iso-octane together with similar hydrocarbons, has attained production on a commercial scale. So far Canada has imported her requirements of blending agents to blend with the aviation base stocks produced in Canada. Plans have been drawn for a plant at Calgary to make these blending agents from Turner Valley and refinery gases. It is expected that this plant, the first of its kind in Canada, will be in production this fall.

Motor Gasolines

Much of the naphtha content of crude, normally available for motor gasoline, has been diverted to right. A petroleum engineer inspects a diesel engine. Construction is based on proven facts that the maintenance which powers Canada’s war effort are provided with correct fuels and lubricants.

Below: Shells of all types are pouring out of Canadian factories. To protect them against corrosion during storage and shipping the petroleum industry supplies special rust preventative compounds.
aviation gasoline. This motor gasoline diversion problem has been solved by enlarged throughout of the refineries, which fortunately have adequate cracking capacity, and by a modified form of cracking known as "reforming" in which the heavy naphtha not required for aviation gasoline fractions and not suitable for fuel oils is converted into a product that distills and replaces, in the complete gasoline range, the product diverted to aviation gasoline. It has thus been possible to increase the output of motor gasoline over that of pre-war years and produce more gasoline for aviation and more fuel oils.

Of importance in the gasoline situation is the recent Canadian development of "scraping" cracking, which affords approximately an 8-point improvement in octane rating over usual thermal cracking process.

Fuel Oils

The term "Fuel Oil" embraces those heavier petroleum fractions which serve as fuels for diesel engines and the furnaces of homes, buildings, locomotives, ships and industrial processes. The lighter fuel oils, such as diesel and furnace fuels, are distillates from crude and cracked stock; the heavy fuel oils, bunker fuels, are the residuals of crude distillation. Each of these diesel, furnace and bunker fuel oils is subdivided into specific products designed for specific applications. Consequently the fuel oils make up a large family of products. War has drastically changed the relative amounts of the fuel oils needed and at the same time increased the demand for more than one-third of the petroleum consumed in Canada. The great increase in the use of diesel power for transport, construction and manufacturing has determined requirements for the various types of diesel fuels. The merchant ships powered with bunker fuels require enormous quantities to maintain the flow of goods to Britain.

The increase in the total product volume confronted the refinery with a major production problem. However, the flexibility of modern refinery units permitted redesign of unit operating conditions. Much of the gas oil and lubricating oil which normally went to the cracking units for conversion to gasoline was diverted directly to fuel oils and the cracking units were operated for a maximum recovery of cracked fuel oils instead of gasoline. This, in conjunction with the importation of crude with a large fuel oil content, solved the problem without recourse to costly and time-consuming construction of new equipment. While some importations of fuel oils were required, particularly at seaboard, to meet the increased demand for fuel oils as rapidly as they arrived.

Production of the fuel oils does not end the petroleum industry's concern in them. Of vital importance is the maintenance of reserves of fuel oils at those Canadian ports where the merchant fleets and ships of war refuel. It is the industry's task to provide vast tankages on the eastern and western seaboard and keep it full for the great and unpredictable demands of convoys and warships. When a battleship's captain says the equivalent of the motorist's "Fill 'er up" he is requesting 750,000 gallons of fuel oil for his ship's bunkers—an indication of the enormity of the task of maintaining a marine fuel-refueling station in wartime.

Lubricating Oils

Canadian requirements for lubricants have increased more than two-fold since war began. The Canadian refiner's ability to meet these requirements is typical of a modern refiner's ability to expand itself. The largest lubricating oil manufacturing plant in Canada accomplished this within a period of a few months by additions of equipment and major modifications in the operation of existing equipment. With these improvements the plant alone can now take care of Canada's increased need for superior lubricating oils which are used in aircraft, motor vehicles, ships and industry.

Greases

A carburettor knows the difference only between grease and no grease, raising its squeaky voice in the latter event; but modern machinery has precise and diverse requirements for greases. Making greases for a carburettor could be a matter of hit or miss; making grease for airplane instruments or for the ways down which a battleship must glide at launching requires precision control of composition, temperature, reaction time, mixing, etc. Early machines were designed to use what greases were available; today greases are designed for what use are necessary. Some of the war uses are in the sub-stratosphere, others beneath the surface of the sea; some greases must be equally suitable for service at either Spitbergen or Tohruk. War found Canada equipped with a grease plant that was one of the most modern in the world. This plant, supported by extensive research facilities, has proved an important adjunct to the war effort, both by developing new, highly specialized products and by supplying substantially increased demands.

Asphalt

Asphalt is one of the most versatile products of petroleum and consequently plays many roles in Canada's war effort—fuel oil, air- and land-construction programme for roads, barracks, warehouses and factories required thousands of tons of asphalt. It was needed for roofing, siding, insulation, waterproofing and other purposes. However, asphalt's major role has been in the British Commonwealth Air Training Plan. Here, as in many other instances, it was not alone a matter of supplying a product in enlarged quantity, but also of providing a technological service to ensure the most effective and economical use of the product. The asphalt technologist has long been engaged in the study of soils and their relation to low cost construction of durable base courses for highways. The knowledge thus attained enabled construction of suitable runway bases from materials usually locally available to the airports and so was an important factor in the development of the Plan at relatively low cost and in the shortest possible time. By 1940 alone, 51 airfields in Canada were paved with more than 10 million square yards of asphalt surface. This is equivalent to 840 miles of 20-foot pavement. Canada may well take pride in the accomplishment of one of her greatest achievements—the British Commonwealth Air Training Plan—and so may the petroleum industry for the part it has played in it.

For years the petroleum industry has been dominated by a fierce competition which stimulated research for improved products and improved processes. This activity is reflected by the fact, for instance, of an improved quality, motor gasolines today sell (tax free) for approximately one-half the price of 20 years ago. The technological personnel developed by the various components of the industry are now available to work as a large, co-ordinated research and development staff to evolve ways and means of serving the war effort most effectively. In this respect, co-operation, with industry-wide planning and free exchange of information, has supplanted competition.

Of equal importance has been the co-operation of the petroleum industry with the Canadian Government. All of the industry's facilities have been at the Government's disposal at whatever time required. Requests by the Government for new products and services, for specially trained chemists, engineers and executives, for tankers and for the construction of great storage reserves at seaboard have been met. It is perhaps unnecessary to comment upon the savings in foreign exchange which have been effected by the industry's ability to meet increased product requirements and to dispense with or substantially reduce imports and supplies whose purchase entailed the use of U.S. dollars.

The Canadian petroleum industry has served the war effort well and will be able to meet any challenge that war can make in the future.
Here are a few tips on how to make your car last longer and deliver more miles to the gallon.

With new car production discontinued, and gasoline rationed, how to make his car last longer and how to get the most mileage from the gasoline he is allowed, is foremost in the mind of the motorist today.

Long car life and efficient gasoline mileage are dependent on many factors. The majority of drivers today have neither the tools nor the mechanical skill needed to make adjustments that keep a car "tuned-up" to peak efficiency. The following are suggestions on what to have checked on your car.

For the actual work, put your car in the hands of a good mechanic. Sticking to one operator will allow him to get to know your car and its peculiar "tune-up" problems.

Driving Habits

The Summer, 1941 issue of the "Imperial Oil Review" contained an article on bad driving habits and their effect on gasoline mileage. So much has been written about high speed and jack-rabbit driving that by now every one should be familiar with their gasoline-robbing tendencies. Before gasoline rationing was put into effect, bad driving habits were an expensive luxury—now they are downright foolish.

To make your car last longer and to go farther with your gasoline—take it easy! You'll find also that easy driving is less wearing on the nerves.

Ignition System

From the mechanical end, the ignition system of your car is one of the biggest gasoline robbers if it is allowed to get out of kilter. What is more, practically all units of the starting and ignition system employ metals which are already curtailed and which may be completely unavailable at some future date.

Faulty spark plugs can waste as much as one gallon out of every ten. They should be cleaned and sea...
9 points on your car that affect gasoline economy

1. ENGINE LUBRICATION
   Poor lubrication causes engine wear with resultant loss of power.

2. CARBURETOR
   Incorrectly adjusted carburetor prevents proper mixture of fuel and air for efficient combustion, resulting in fewer miles per gallon.

3. SPARK PLUGS
   Badly worn or dirty plugs may waste as much as one gallon of gasoline in ten miles.

4. ELECTRICAL SYSTEM
   Condition of battery, distributor points, electrical connections, etc., affect engine efficiency and gas economy.

5. COOLING SYSTEM
   Correct engine temperature is essential to good mileage.

6. FUEL
   The right grade of fuel should be used for your particular type of engine.

7. UNDER-INFLATED TIRES
   Soft tires make car harder to move, and increase tire wear.

8. BRAKES
   Dragging brakes put extra load on engine, waste power.

9. SLIPPING CLUTCH
   Dissipates power before it gets to the rear wheels.

Miscellaneous

The gasoline filter should be inspected and cleaned.

The windshield wiper blades should be inspected and cleaned. Incorrectly installed or adjusted, they can cause poor visibility with a possible accident which may place your car permanently out of service.

Shock absorbers should be inspected and serviced. Low fluid levels fail to hold rebound, causing the car to bounce, wheels to spin, tires to slip and bolts to loosen.

Inspect your gas tank cap and install a new one if necessary. A missing or defective cap may cause loss of fuel and entail the danger of fire. While we’re on the subject of gas tank caps—one which bolts is a good investment.

The muffler connections should be inspected and tightened.

Tires

Tires are so important that they have been dealt with in a separate article on page 14 of this issue. With respect to gasoline mileage, under-inflated tires cause drag with resultant loss.

In the course of their duties, Imperial sub-station agents encounter many situations which call for quick thinking and initiative.

Mr. G. W. Sveinson, Imperial Oil agent at Sioux Lookout, Ontario, was faced with such a situation when he was called upon to deliver 8,000 gallons of Intava Ethyl Aviation Gasoline, and 220 gallons of Intava Aviation Oil to 22 Stranraer Flying Boats of the R.C.A.F.

The appearance of these aircraft on a Northwestern Ontario Lake caused about as big a sensation as would the arrival of the “Queen Mary” at a Lake Winnipeg fishing port. However, Mr. Sveinson remained unperturbed and the fuel and oil were delivered on schedule.

Matters were complicated by high water which prevented some of the flying boats from being serviced from the dock. Due to the extraordinary size of the aircraft it was necessary for them to be anchored off-shore and our agent was obliged to fill the fuel into barrels which were, in turn, placed on board a boat and hauled out to the aircraft. Pumps were set up on the improvised fueling tender and service was rendered “a la Imperial Oil.”

Some idea of the size of these craft may be gathered from their wingspread which is 85 feet. The fact that they can remain in the air for 11½ hours is a great advantage for the coastal reconnaissance work in which they are engaged.

Surviving aircraft is all in the day’s work for Mr. Sveinson, as some American sportsmen discovered last year when they set down their planes at Sioux Lookout and wondered whether or not they would be able to obtain aviation gasoline for their planes at such an isolated point. They were pleasantly surprised to find that Mr. Sveinson had just what the doctor ordered, and, in addition, provided canvas leather filters to ensure that no foreign matter entered the fuel tanks.
ALASKA HIGHWAY

Oil is playing a vital part in the building of this highly important military highway.

by W. R. WALLACE
Imperial Oil Limited, Edmonton, Alberta

A MECHANIZED army has invaded Canada's Northwest. "Jeeps," multiple-wheeled transport trucks, caterpillar tractors, bull dozers, scrapers, ditch diggers, graders—all under the skilled direction of army engineers, are hacking out of the wilderness a road to link Alaska with Canada and the United States.

The army is a friendly one. Lean Texans, soft-voiced Virginians, dusky lads from Harlem and wily citizens of the Bronx—the boys of the United States army are blazing a Victory trail through Canada.

One of the vital links in hemispheric defence, the "Alaska Highway" when finished will become also a springboard for possible offensive action. As well as providing facilities for the transportation of arms, it will be essential to the effective servicing of the chain of airports to be constructed between Edmonton, Alberta and Whitehorse, Alaska. Its strategic inland location is a prime safety factor and the excellent communication system from all parts of Canada and the United States to the "jump off" point adds to the value of the route.

Although it comes into being a grim necessity, the Alaska Highway will be no mere transitory venture, to become a weed-choked ghost trail at the termination of hostilities. Reaching across hundreds of miles of varied terrain, it provides access to new vistas of scenic grandeur, taps some of the world's richest mineral deposits and opens up vast new areas for settlement. To be built and maintained by the United States with U.S. funds, six months after the war it will become an integral part of Canada's highway system. The immediate task of the Engineers is to build with all speed a nine-foot-wide pioneer road for the passage of military equipment. They will be followed by private contractors who will construct a modern high-speed highway.

The magnitude of the task is enormous. Although the details of the precise route are military secrets, it is known that the road must cross wide prairie and bottomless muskeg; great rivers and mighty mountains; dense forests and barren wastes. The temperatures will range from sixty degrees below zero in winter to torrid summer heat. Inclement annoyances—such as mosquitoes with the build and characteristics of Spitfires—will not make the job any easier.

Nevertheless, the road will be completed. Oldtimers in the North who have seen the failure of many attempts to open an overland route to Alaska said emphatically that it couldn't be done, but after witnessing the resource and determination displayed by the U.S. Army in overcoming the first obstacles, they have decided that this time it will be done.

Long mooted as a military necessity, the actual undertaking of the Alaska Highway was launched with startling suddenness. The first practical move was made in mid-February when a party of U.S. Army Engineers flew over the proposed route to survey its practicability. A week later the leader of the party reported it "entirely feasible". In two weeks an agreement in principle had been reached by the United States and Canadian Governments. By the end of the third week, train loads of U.S. Army Engineers were pouring off the end of steel
at Dawson Creek in Northern British Columbia and establishing their first base camps. Within a month, full details of the vast plan had been worked out.

A temporary base for work on the pioneer road was set up at Fort Nelson—360 miles north of Dawson Creek. The first contingent of soldiers arrived a little more than a month before spring "break-up" time, and with them came a heterogeneous assembly of equipment—all power driven and all possessing voracious appetites for petroleum fuels and lubricants.

Between Fort Nelson and Dawson Creek the trail is crossed and recrossed by eight rivers and innumerable creeks. Usually placid, they are raging torrents during the spring break-up period. Huge ice masses are hurled downstream by the floods, and traffic is halted for several weeks. Consequently, it was necessary for a supply of fuel and lubricants to be placed at Fort Nelson in a little over a month to take care of immediate requirements, to provide adequate reserves, and to tide over the break-up period.

Dawson Creek had facilities for handling only normal local traffic. From there to Fort St. John—50 miles north—the road was mud with only a thin veneer of gravel. From Fort St. John to Fort Nelson the road consisted of two deep ruts in the snow.

Refueling: Gasoline from cisterns is poured into special containers. These containers can be carried as auxiliary tanks.

The problem of transporting supplies was not easy.

Imperial Oil Limited assisted in this gigantic venture, and the resources of the Company were thrown into a fight against time and the elements to fill the urgent army orders. Steady streams of tank cars rolled up to the unloading standards at the staunch little Dawson Creek Warehouse. Its walls cracked and its floor threatened to collapse, but it gave yeoman service. Day and night, seven days a week for six long weeks, tank cars were unloaded, barrels filled and trucks dispatched from the warehouse platform with machine-like regularity.

Although an immediate enlargement of the plant at Dawson Creek is planned, little could be done at such short notice to improve facilities other than the addition of an extra barrel filler, but the limited space and equipment was so well organized that nearly 200 privately-owned trucks were kept in constant motion between Dawson Creek and Fort Nelson, fully laden with barrels of petroleum products—and the local farmers and dealers were given the usual efficient service to boot.

With fair weather and a following wind a loaded truck could reach Fort Nelson from Dawson Creek in 24 hours—but few did. Mud and steep grades, snow-drifts, engine trouble and extreme cold—added to the near absence of anything resembling a road—were routine hazards. It was strictly a one-way trail, the loaded truck having the right-of-way and the empty unit being compelled to truck up—a mile, if necessary—to the nearest "passing track". Temperatures ran up and down the thermometer with carefree abandon, and on several occasions water was running down the streets of Dawson Creek in the afternoon and the temperature was recorded at thirty below that next morning.

Whenever an unusually difficult obstacle impeded progress an ubiquitous army caterpillar tractor rendered aid, and although many a load had to be dumped on the roadside while trucks limped home for repairs, only one near catastrophe occurred when a truck with its load of gasoline caught fire on the trail, fortunately without mishap to the crew.

Over-night accommodation was conspicuous by its absence. To enable the truck drivers to put some rest, each truck carried a coffee-like structure, open on one side and roped to the top of the load. With a handful of straw and a few blankets the relief driver could at least stretch his limbs. Once in a while—if he wore an especially bulky soul—he might catch an hour's sleep.

To bridge the rooms the trucks drove across the ice. To prevent the continuous stream of traffic cutting through the ice, the large rivers were bridged with four-inch planks on loads of thick sawdust. This protected the ice to some extent against the sharp rises in temperature.

One of the chief problems was a shortage of steel barrels, but with such vital issues at stake governmental machinery was put into high gear to obtain the necessary steel, and co-operative with the first tank cars of fuel from the refinery, car-loads of galvanized new barrels turned out at top speed by the drum plant at Imperial Oil's Sarina refinery—arrived at the end of summer. This streamlined co-ordination between the various departments of the Company continued throughout these hectic days and as a result, this particular phase of the venture was not at any time threatened with that hue of war production—the bottlenecks.

With camps established and supplies on hand, the U.S. troops launched their "offensive". Parties set out by dog team under the guidance of experienced bush men to survey the route and on their return followed the main body of engineers with weary modern road-making devices, to build a highway where it was said a highway could never be built.

Oil at the end of steel. Into Dawson Creek a steady stream of steel casks brought petroleum supplies to be transported in steel barrels to Fort Nelson for the army equipment.
HOW TO MAKE THEM STRETCH

Tires are the most important item in car conservation today. Suggestions on how to make them last longer are given here.

Under present conditions, the operating life of most automobiles in use today depends on the life of their tires and tubes. The tremendous demand for rubber for our war machines, coupled with the loss of our former sources of supply, has resulted in severe restrictions in the use of rubber for practically all civilian purposes. The sale of tires except for cars in certain categories has been banned.

Tires and tubes, then, head the list in the conservation plan which every motorist must follow in order to keep his car operating.

Proper Inflation

The first rule in tire maintenance is to keep the tires properly inflated. Whether or not the car has been in use tires should be checked once a week. Tire pressures recommended in the past usually represented a balance between riding comfort and tire wear. Now that emphasis is on wear, slightly higher tire pressures are advisable.

Under-inflation is serious. It reduces tread wear life—5 pounds of under-inflation cuts tread wear life by approximately 25%. It weakens the tire fabric due to excessive flexing. It causes greater heat which weakens the cords, the bond between the cords and the bond between the carcass and the tread. Under-inflated tires are more easily damaged by impacts against curbs etc.

Switch Wheels

Because there is a wide difference in the tread wear on the tires of your car, greater mileage can be obtained by cross-switching them every 5,000 miles. The ratio of wear on the four tires is as follows: left front 14%, left rear 29%, right front 19%, right rear 38%. The diagram on page 14 shows the way in which tires should be switched.

Wheel Alignment

Tires should be checked periodically for uneven and spotty tread wear. If this appears, the wheels should be checked immediately for alignment. Another indication of misalignment is a rounded corner on one side of any one rib with a sharp corner or feathered edge on the other side.

Wheels that do not track or run true, scrape off tread rubber. If a tire is only two degrees out of alignment it is literally dragged sideways a distance of 184 feet in every 1,000 miles. This is equivalent, in total tread rubber lost on all four wheels, to the brakes being locked and the car dragged a distance of 46 feet.

High Speed

A cardinal rule in saving tires is—"Take it easy". The power in your car should be used for better handling and for getting out of tight places easily—not for driving at racing speeds. The safe life of a tire at 50 miles per hour is only half of what it is at 30 miles per hour. At 70 miles per hour it falls to only 30% of normal expectancy.

High speed on curves is especially tough on tires. It has been found that motorists who drive in regions where the roads are high in curves, seldom get as much as 7,000 miles from a set of tires. When encountering a curve, driving speed should be reduced to the point where there is the minimum of side thrust.

In city driving, rapid acceleration and quick stopping do your tires no good. In fast acceleration all the punishment is put on the rear tires. Jumping starts and nose-dive stops will soon ruin a set of tires.

Curb Damage

More than is generally realized, tires are damaged when they strike curbs and other obstructions. Usually the damage is not immediately evident, as the tire rarely blows out at once. Later, the damage inside of the tire will cause the tube or the break will completely progress through the tire. Park carefully—don't ram your car into the curb. And on gravel roads—don't "hit it up" in an effort to smooth out the washboard effect. You may have a smoother ride, but if you strike a stone at high speed your tire will be badly bruised, perhaps causing a ruinous blowout at some later time.

(Continued on Page 16)
Because of excessive strain at the extremities of a cut in a tire, it will tend to progress inward and if allowed to continue will break completely through. Tires should be examined periodically for such cuts, and if any found should be repaired at once.

**Driving on a Flat**

Driving on a flat tire is ruinous. If you find your car steers with difficulty, an inspection should be made at once to see if the tire is going flat. A tire should not be driven on at all if the deflation is as great as one-half the tire section height. If a tire is completely flat it can be completely ruined by driving on it for even a very short distance—perhaps in one revolution of the wheel.

**Oil or Grease**

Oil is a natural enemy of rubber. It penetrates rubber and makes it soft so that it loses much of its resistance and strength. Oil is as hard on rubber as acid is on metal. Garage floors should be kept free of oil.

**Mounting**

Carelessness in mounting tires and tubes on rims is responsible for many injuries to both casings and tubes. Proper tools should be used and care taken in using them so that the tire bead will not be injured nor the tube pinched. Under no circumstances should graphite and glycerin be used as a lubricant in the mounting. If it is necessary to use a lubricant, such as soap, it should be used as sparingly as possible.

**NURSING DIVISION FORMED AT SARNIA REFINERY**

The ladies who appear in the picture above are employees of Imperial Oil Limited at Sarnia, who have formed a nursing division under the auspices of the Saint John Ambulance Brigade. Since the forming of their division in February of this year the girls have given a great deal of their spare time to earn first aid and nursing. Recently they tried their examinations, all passing with honors.

It is planned that each of the girls receive practical experience in the first-aid room at the Refinery. Also, they have offered their services to the Sarnia General Hospital and it is expected that some of them will spend their summer vacations doing actual wardwork. With the experience thus gained the girls will be in a position to render valuable service should an emergency arise.

This month the group goes to Saint Thomas to join with other Western Ontario nursing divisions in celebrating the 25th anniversary of the founding of the Saint John Ambulance Brigade in that city. His Excellency the Governor General and Her Royal Highness Princess Alice will be present at the ceremonies.

**LADIES OF TORONTO OFFICES DO THEIR PART**

Concert by Imperial Oil War Services Group raises $550 for military hospital.

Ladies give generously of their time and talent in Red Cross work.

A sub chaser cuts through the chill Atlantic spray a crewman pulls his scarf snugly about his neck and fingers his new helmet appreciatively... A thousand miles away a bombed out English mother weeps tears of gratitude as her "young uns" are outfitted in comfortable new clothes... In a Canadian military hospital a surgeon switches on a powerful lamp before he begins a delicate operation.

These seemingly unrelated incidents are yet related by their common cause—a group of ladies in the Toronto offices of Imperial Oil Limited who are doing their bit by devoting a considerable part of their spare time to war work. The scarf and helmet of the crewman are an article, as are the new clothes of the English kiddies and the lamp which lights the surgeon's steady hand.

The Imperial Oil War Services Group, as the organization is called, has a long list of achievements to its credit since work was started shortly after the outbreak of war. The latest and most ambitious effort was a song recital at Eaton Auditorium, Toronto, on April 21st by Miss Vera Wilkinson, contralto, and President of the Group. Miss Wilkinson is well-known in the city for her fine voice and the recital attracted a large audience. The net proceeds of the recital, $350, were added to $250 taken from the reserve built up by the Group and the $600 lamp referred to above was purchased for the operating room at Cheyler Park military hospital, a valuable contribution that was greatly appreciated by the medical authorities.

The Group had a busy and successful winter season. The Service Knitting Department in charge of Miss Irene Griffiths completely outfitted the crew of two submarine chasers (30 men) with tartan neck swaters, scarfs, helmets—and they are now completing outfits for the crew of a corvette (45 men). At Christmastime boxes were packed and sent to all.

(Continued on Page 24)
NEW JOINT COUNCILS

INDUSTRIAL COUNCIL
WINDSOR, ONT.

(Left) Standing, left to right—C. W. Peterson, R. R. Weston, A. Tannay. Seated, left to right—W. J. Car- 
michael, G. M. Thomas (Chairman).

INDUSTRIAL COUNCIL
LONDON, ONT.

(Below) Left to right—E. A. Mould, C. L. Bloomdale, V. Unstead, Geo. J. Dall (Chairman), I. S. Garner, 
R. Quick, Bruce Martin.

DIVISION OFFICE
COUNCIL
BRITISH COLUMBIA

(Right) Standing, left to right—J. M. McIlhah, D. I. Copetick, W. C. Carter, 
R. A. Fraser, R. D. Great. Seated, 
left to right—Miss I. A. Wilson, R. M. 
Pulno (Chairman), Miss M. B. 
Dyer, C. F. Waring.

DIVISION OFFICE
COUNCIL
MARITIMES

(Left) Standing, left to right—M. G. 
Smith, F. J. Maher, A. C. Blakely, R. M. 
Franco, J. W. Mahon, M. M. Kelly. 
Seated, left to right—Miss F. J. Phillips, 
L. G. Dunlop (Chairman), Miss M. F. 
Bodachin.

DIVISION OFFICE
COUNCIL
QUEBEC

(Left) Standing, left to right—T. F. 
Vachon, W. P. Dunlop, R. I. Reid, 
N. E. Wooley, J. Sarrarin, Leo Mclaren. 
Seated, left to right—E. Garvie, Mrs 
M. Reid, A. E. Patterson (Acting 
Chairman), D. F. Harris, R. Doon.
W. T. A. BELL APPOINTED MANAGER, QUEBEC DIVISION

T. A. BELL has been appointed Manager of Imperial Oil's Quebec Marketing Division, succeeding the late C. S. Griffith.

Tom Bell was born in Rostock, Ontario. His boyhood days were spent in Winnipeg and Calgary. He attended the University of Toronto, graduating with a degree in Mechanical Engineering.

His first position was with the Northern Crane & Hoist Works Ltd., Walkerville, as Sales Engineer covering Ontario and Quebec. In 1933 he joined Imperial Oil Limited as salesman in Western Ontario. In 1937 he moved to Hamilton as Industrial Engineer, and in 1938 he was appointed Industrial Sales Manager of Ontario Division. In 1939 he became Merchandise Co-ordinator in Ontario Division, and in 1940 was transferred to British Columbia as Sales Manager of that division. This post he held until his appointment as Manager of Quebec Division.

LADIES OF TORONTO OFFICES DO THEIR PART (Continued from Page 17)

enlisted men from the Company's Toronto offices.

As each employee enters the service he is presented with a sweater, a scarf and two pairs of socks by the War Services Group.

A great deal of work has been done by the Group's sewers and knitters for the "bombed out" victims in Britain. The tailoring done on garments of all sizes, from outfits for women down to little four year old boys, would do credit to the finest shops. Interlined winter coats, dresses, blouses, skirts, jumpers, berets and underwear have been made for girls of all ages, each outfit being completed with a beautiful hand knitted sweater.

How the girls manage to accomplish so much is a source of wonder to those who have inspected displays of their sewing and knitted goods. But the reason is clear when they are seen hard at work four nights a week at the Red Cross centre on Bloor Street East. A different group goes each night and fortunately each group has several experienced sewers who have given generously of their time and talent in instructing others who were willing and anxious to learn. Many of these novices have surprised themselves as much as others by their accomplishments.

Other officers of the Group, in addition to Miss Wilkinson, President, are Arhol Mitchell, Vice President; Anne Gagnon, Secretary; and Vera Plant, Treasurer.

The girls are happy and proud to be doing a worthwhile job, and are grateful to all who have supported them, financially and otherwise, in their work.

MAJOR CHARLES M. KINDERSLEY PROMOTED

ONE of Sarnia’s Royal Canadian Engineers, Major Charles M. Kindersley has been promoted to the command of a Field Company of the Royal Canadian Engineers overseas.

Charles Kindersley served in the R.A.F. at the end of the last war. Subsequently joining Imperial Oil Limited he spent part of his fifteen years of service with the Company in Colombia and Peru. Later he was stationed in Montreal, and then in the laboratory at Sarnia, where he joined the 11th Field Company Non-Permanent Active Militia as lieutenant in January, 1939. When his company was mobilized at the outbreak of war he was given the job of recruiting for his unit in Sarnia and Windsor. In May of 1940 he was sent to England for a Company Commander’s course.

In his new command, Major Kindersley succeeds Major Gordon MacIvor, also of Imperial Oil Limited at Sarnia.

Assembling a tray for a bubble tower. In modern refining operation it is the bubble towers — tall silvery giants — that separate the various fractions of the crude one from another. There may be from 4 to 60 trays in a bubble tower, depending on its size and functions.
Angles become curves as the shadows of stairs and walkways are bent by the storage tanks. Front cover: A section of Imperial Oil's Sarnia Refinery as seen from the wheel house of an Imperial tanker.