Canaetal Fuel Oil Station

Located on a narrow strip of land far up the Magdalena River, in Colombia, lies Canaetal. It is the most unique emergency fuel oil station under the Tropical Oil Company’s jurisdiction.

Canaetal is one of the most dangerous parts of the river and during the dry season when the water is low, this emergency station plays an important part in supplying vessels unable to proceed beyond the shallows with fuel oil. The accompanying photographs embrace the entire town of Canaetal, and a fair proportion of its population.

Oil and gas has been encountered in all parts and corners of the Province. This is not surprising when one considers that practically the entire Province is underlain by sedimentary rocks which can be regarded as possible sources of hydrocarbons. Currently, however, the production of crude oil in large quantities is still to be realized while gas is found in sufficient quantities to supply all the larger cities and many smaller ones with enough volume to successfully compete with coal for domestic purposes.

Gas Fields

With the exception of the gas produced in Turner Valley, all gas fields are found in the Plains of Alberta, and production is encountered in the Mesozoic sediments. I shall outline in brief the principal gas fields of the Province, which are at present being used commercially.

Medicine Hat Field—Redcliff Gas Fields

Drilling in this field was begun as early as 1888. In 1901 and 1908 more drilling was accomplished with encouraging results; the gas bearing beds are in the Eagle or Milk River Sandstone. Volumes up to 5,000,000 cubic feet per day is the maximum production at present, although this amount was actually produced by a lesser number of wells some time back.

Bow Island Gas Field

Near the town of Bow Island, and covering an area of about 20 square miles, is a gas field which was opened in 1908. Here production is encountered in sandy phases of the Benton Shales. This horizon is generally known as the Bow Island Gas horizon and varies here in depth from 1900 to 2500 feet. The largest volume of gas delivered to Calgary, 170 miles distant, through the 10" pipe line from this field was given as 37,000,000 cubic feet per day. The pressure and volume is today on a decline.

The Foremost Gas Field

Between Erskerom and Chin Coulee, some 7 miles southeast of Foremost is another important gas field which is connected by a 10" pipe line to the main line of the Bow Island field. Gas is here encountered at depths between 2,070 and 2,280 feet in the Bow Island gas sand of the Benton. Eight wells have been drilled here on a terrace structure. The largest volume recorded from this field was near 60,000,000 cubic feet, but here again the volume is decreasing rapidly.

The Viking Gas Field

In an area lying between Viking and Birch Lake there has been developed an extensive gas field in which the open flow capacity of the well averages 2,750,000 cubic feet. This field is connected with Edmonton, the capital of the Province by a 77 mile line of 10½ inch and 12 inch diameter. Production here is probably from the base of the Benton and Lower Cretaceous Sands.

Near Irma and Wainwright several large commercial flows of gas were brought in during the last few years in what is regarded as the base of the Benton and also in a second horizon in the Lower Cretaceous.

The Turner Valley Field

The excess gas derived from the crude napthla wells of the Turner Valley field is piped to the city of Calgary. The average gas production per day of Royalist 4 is 17,000,000 cubic feet. The continuation of development in this field will therefore assure a plentiful supply of gas for Calgary for the immediate future. More will be said about the Turner Valley Field in connection with oil production.

Other Commercial Areas

As already stated the just described Gas Fields are being used for commercial purposes. There are, however, numerous other potential areas of commercial gas production which were discovered during the wild-cat oil drilling programs. In fact the volume of available gas
production encountered while searching for oil is probably in excess of the volume obtained from the present fields which are connected to the gas mains. The areas surrounding these out of the way wells will undoubtedly be drilled up sooner or later as the present fields continue to decline.

The following wells indicate the location of future natural gas reservoirs in the Province:
1. At the Erickson Coulee Well, one mile north of the International Boundary, due north of West Butte, gas was encountered in the Ellis Formation with a volume of about 10,000,000 cubic feet at depths of 2,376 feet and 2,488 feet. A sharp nose or terrace justified drilling here. (No. 6 on map).
2. The Rogers-Imperial and Deadhorse Coulee wells are five miles north of the boundary, northeast of West Butte. (No. 7 on map). The former well is regarded as the largest gasser in Canada. An open flow production of 30,000,000 cubic feet was claimed for this well but the actual flow probably never exceeded 21,000,000 cubic feet. Production was encountered in the Ellis Formation at a depth of 2,650'. Here again a conspicuous northwest plunging nose with a possible south closure gave promise of either oil or gas. (No. 8 on map).
3. At Many Islands Lake at least 3,000,000 cubic feet of gas are available at a depth near 1,550' in the Eagle S.S. formation. This field lies about 25 miles northeast of Medicine Hat. (No. 9 on map).
4. During the last 5 years several large gas fields were encountered in the vicinity of Irma and Wainwright where the search for oil on low structures apparently justified the drilling of numerous test wells. No doubt this field will later on be linked up with the Viking-Edmonton gas main. The production here is encountered in the Lower Benton and Lower Cretaceous sands. (No. 10 on map).
5. At Pelican Rapids on the Athabaska River a well drilled by the Dominion Government in the year 1897 encountered a flow of some 5,000,000 cubic feet of gas between the shallow depth of 837 to 920 feet. Four subsequent holes were bored here. Production is encountered in the Tar Sands of the Athabaska. The age of these sands is disputed; some regard them as Dakota, while others place them in the Lower Cretaceous.

6. Along the Peace River, (No. 11 on map) nine shallow holes encountered large volumes of gas with water in probable equivalents of the Tar Sands. The depths range from 980 to 1,400 feet. All wells here have been damaged by the heavy flows of water.
7. At Pouce Coupe, in the Peace River block near the B.C. boundary line, (No. 12 on map) a well drilled by the Imperial Oil Limited, encountered 10,000,000 cubic feet of dry gas in formations regarded as possibly Upper Cretaceous. Production was encountered at a depth of 1,676 feet on a problematical structure. The hole was abandoned at a depth of 3,057 feet.

OTHERS

The above outline indicates quite conclusively that gas is a plentiful resource in Alberta. There are numerous wells scattered all over the Province in which minor flows of gas and showings of oil have been encountered, but these need not be enumerated. The completion of commercial oil wells is another problem. There are only three fields to date which could be classed as proven areas, and two of these are still in the doubtful stage.

The Irma-Wainwright Field
(No. 9 on Map)

In this area some encouraging results have been obtained in spite of considerable water trouble. The oil produced from this field is of asphaltic base and has an average gravity of 18° Baume. Several wells drilled here can be regarded as commercial producers, but to date no startling discoveries have been made. Oil is encountered at an average depth of 2,300 feet in sands of the Lower Cretaceous and Lower Benton.

The Skiff Wells
The Dominion Government in the year 1897 encountered a flow of some 5,000,000 cubic feet of gas between the shallow depth of 837
Valley is in some respects extremely complicated, but in other respects quite striking and impressive. Drilling activity is in this area during the coming season.

The Turner Valley Oil and Gas Field
(No. 9 on Map)
The history of the field dates back to the notorious "Calgary Oil Boom of 1914." The true story of the development of this field reads like a fairy tale with plenty of heart-breaks, failures, and successes. Even today the heart-breaks still out-number the moments of merit for many of the operators. The failures of the earlier days in this field can be attributed to two main factors as follows:

1. Inability to drill within a reasonable time to depths approaching 4,000'.

2. Inadequate geological information and especially the mistaken idea that formations below the Mesozoic were not worthy of testing.

Apparently the driller can blame all this on the geologist because he naturally asks "If there is no chance deeper down, why drill any deeper?"

But the geologist can at least say that not one of the earlier holes ever reached the top of the line. It seems almost pathetic to think that several of the old wells ceased drilling within 150 feet of the Paleozoic Limestone. Little did they know in those days what lay in wait for them with only a tribune more effort. However, not until 1924, or ten years after the disastrous boom, did Royalite No. 4 tap the tremendous gas and crude naphtha zone and burst forth with a flow of 17 million cubic feet of wet gas under a rock pressure not known to this date. Since that time production has increased steadily, and today this well furnishes 5%3 of the oil production in Canada, so says nothing of its use for Calgary.

Royleite 4 is the "wonder-ful" because of the following peculiarities.

First: Its production during the last three years has shown an increase rather than a decline.

Second: In addition to the gas production, crude naphtha is extracted by flow through separators, to the tune of more than 500 barrels per day. Gravity 73°.

Third: Its depth is 3,740' and production is from Paleozoic rocks in a structure where the fixed carbon ratio is close to and locally beyond the generally prescribed limits.

Fourth: The scenery surrounding the Turner Valley is, contrary to the usual oil-field landscapes, simply beautiful.

The geological setting in Turner Valley is in some respects extremely complicated, but in other respects quite striking and impressive. Drilling activity is in this area during the coming season.

In one sentence I might describe it as being an extremely complex structure in which many structures with an equally simple stratigraphic column. Until very recently a drillers report made to complicate the stratigraphy by bringing in extra formations such as the Triassic and Rocky Mountains quartzites, in spite of the fact that these formations are not present at Moose Mountain, the nearest outcrop, where the complete stratigraphic column is exposed to view.

The Turner Valley Anticline is a narrow steep, Sequestrite-type, fold surrounded by a rim-rock of Belly River Sandstone with a core of Benton Shales. (See Fig. 11.) Dips in the rim-rock measure from 50° to 80°, with a slightly higher average on the east flank. A structural syncline runs through the middle. The top of the Blairmore or the Dakota is encountered at depths from 900 to 2,000 feet, but one hole on the steep east flank failed to reach the Blairmore as deep as 6,000 feet from the surface. Obviously the incompetent Benton shale has been broken up and faulted. It is impossible to state with certainty what are the true thicknesses of the various formations encountered. We speak only of "estimated" to date. There has been a thinning of incompetent beds on the flanks. Repetition by fault or vertical dips alternating with almost flat beds are common and met with all the time. In addition to strike faults, transverse or epi-anticlinal faults are also suspected as being present. One hole, for example, encountered the Blairmore at a depth of about 1,500 feet and again struck this marker at 2,500 feet and again struck this marker at 2,500 feet due to either a transverse or a longitudinal fault or combination of both. Obviously a normal fault is out of the question.

Through the kindness of Mr. P. D. McCooe, our submarines geologist, the structural conditions in Turner Valley are gradually becoming known, and I feel confident that in a year's time problems will be near its solution, because of the persistency of the stratigraphic column, which is shown in Fig. 12. The thicknesses given are, as already indicated, average quantities.

At the present time there are about 120 drilling programs in progress and well locations. However, about 50 of these are mere wildcatting locations on paper, and may never be spud-in, 16 are producers and about 12 or 14 definitely abandoned.

Light oil is encountered at the base of the sequence in the "Home sand," in the Upper Blairmore or Dakota in what we term the "McDoulgah-Segar sand," while gas and oil also are encountered in the "Royalite Dye and Two Sand" near the base of the Ferrite. The main object, however, is to reach the dolomitized Triassic and Paleozoic limestones where the high pressure and volume of crude naphtha is encountered, at depths from 70 to 290 feet below the top of the lime.

Dripping Methods

Due to the faulted nature of the structure, the alternating high and low dips as well as alternating hard and relatively soft formations, and also the extreme faulting, the metamorphism of some of the beds, drilling difficulties are almost unbelievable. Fortunately caving is not very common, though not absent. Standard rigger, rotary and diamond-core drilling machinery are all in operation in Turner Valley. Each has its advantages and disadvantages and at the present time it is impossible to predict which type will be the most favored in the future. Fortunately there is no water problem at all after the surface water has been cut off. The rotary drill finds it difficult to maintain an absolutely straight hole, and in my opinion that many don't have to wait ten years after the initiation of the Hughes rock-bit cones are worn out in trying to drill a hard limestone seam less than a foot thick.

The cable tool drillers find their cables wearing out rapidly due to friction against the hard limestones. Tremendous gas pressures also make it difficult to keep the cable tool in the hole. Drilling with the diamond-core has been reported to be overcome by V.S. some of the holes after reaching the dense, hard, upper portion of the Paleozoic Limestone. Here again jamming in the core-barrel hampers progress.

In the case of diamond-drill cores and those taken by the rotary method the greatest drawback is that all the lithologi
cal information is gathered. On the other hand, the cable tool cuttings are of great value, and may be used as a guide for rotary cuttings for obvious reasons. The hole depth in the field, that of the British Dominion, is drilled to the 6,600 foot mark. An oil well was sunk 6,590 feet, and it was a great disappointment that, after such a notable en
ergineering feat, production was not found. Several other holes have passed the 5,000 foot mark and many of those drilling at shallower depths now will have to go close to the surface to find oil. Before encountering the "Royalite No. 4 zone," while other holes are still valuable, then the drilling technique makes a phenomenal advance before the money runs out. In addition to all of this, the drilling of a hole to a pay horizon sometimes is the beginning of the more serious trouble, such as freezing of the tools in the well, uncontrollable gas, etc. etc.

Other Foot-hills Structures

The question asked by most of us is: "Are there other structures in the foothills belt which might parallel the Turner Valley situation, or is this field in a class by itself?"

As a partial answer to that I can only refer you to numerous oil companies intending to and actually drilling on what appear to be similar structures. The only thing that might parallel the Turner Valley situation, or is this field in a class by itself?"
DUGGED DOES IT

J. H. McLoughlin—Western Field Manager

One of the most recent additions to the growing number of producing wells in the Turner Valley is Dallhouse No. 1, which "broke in" with between 15 and 19 million cubic feet of wet gas daily, yielding quantities of that crude naphtha for which Alberta is becoming world famous.

The Dallhouse Oil Company being of comparatively recent origin and this well being denominated "No. 1," might lead the casual reader to conclude that it was a social upstart, one of the "nouveaux riches," which had taken a mean advantage of the work of the pioneers and was reaping where others had sown.

Such, however, is not the case. Dallhouse No. 1 is a direct descendant of the patriarchs of the Turner Valley, tracing its ancestry back to the boom days, when it was spudded in as No. 1 of the Southern Alberta Oil Company.

Drilling commenced early in 1915 and by the summer of 1916 production was found at a depth of 3,327 feet, oil of 26° Bumeze gravity being obtained to the extent of some 65 barrels per day.

This crude was put through a Topping Plant which had been erected close to the well site, and the bulk of the production was taken in steel drums to Okotoks by team, the distance being approximately 18 miles. There were times when the roads were almost impassable for a wagon, and stone boats or wooden sleighs were used for the purpose of getting the product to the railroad.

The well had very little gas, made towards its recovery. Various methods were employed but eventually it was given up as lost, the principal trouble being that fresh water from the upper horizons had broken through the oil string and the sand had thereby become flooded.

Early in 1926, after the Dallhouse Oil Company had been formed as a subsidiary of the Royalite Oil Company, it was decided to make a serious attempt to deepen this hole to the limestone production.

The first thing that was done, after a standard rig had been placed on the well, was to cement the hole well up inside the string of casing, and by this method the water was successfully shot off.

Attempts at deeper drilling were considerably interfered with by the presence of large quantities of iron in the hole. These were short pieces of rusted and worn-out tubing which it was necessary to pulverize and bail out before reaching the original bottom at 3,527 feet.

Once this difficulty was overcome drilling went steadily, reaching a depth of 3,600 feet where the sand was hit.

Owing to a badly caving hole at this point fishing was very difficult and the hole had to be plugged and blasted.

In view of the dwindling production of the well attempts were made to increase it. Standard tools were abandoned, it was decided after due consideration, to attempt to complete the well with the diamond drill, and a giant Sullivan P. K. machine was secured for the task.

Once more the hole was cemented and the diamond drill "struck its stuff." At a depth of 3,673 feet a very hard formation was encountered and, before this could be penetrated, 4½" casing had to be run.

It was thought that this hard bed indicated a near approach to the dolomite, but the steep dip of the formation was misleading and it was not until a depth of 4,410 feet had been reached that the producing limestone was first encountered.

Once satisfied that success was within reach, a string of 3" Interior standard tools was run and cemented and drilling continued to 4,656 feet where the productive horizon was reached.

The tremendous gas pressure encountered made the withdrawal of the diamond drill from the hole hazardous and this difficulty was aggravated by the drilling rods becoming "seized."

Upset casing was run and cemented and drilling continued to 4,365 feet where the producing horizon was reached.

Gas pressure and consequent freeing, in conjunction with the small diameter of the hole has caused a falling off in the subsequent yield but Dallhouse No. 1, in spite of these fluctuations, hopes to continue in the "Big League."

ON LEAVE FROM NEGRITOS

D. R. BULMER, who is connected with the Negritos hospital in Peru, is back in Toronto accompanied by Mrs. Bulmer and his daughter Margaret, on holidays.

Dr. Bulmer looks hale and hearty from his sojourn in sunny Negritos and though he professes to admire the fair "Queen City," he claims he won’t be contented until he reaches the sands of Negritos again. "Here in Toronto," he says, "construction work has gone ahead with a rapidity that is surprising but we in Negritos build down into the earth and that is doubly interesting."

"Ray" is quite interested in the medical work in Peru and has promised to forward the "Review" some interesting articles connected with the work there. He will return in August.
The old and the new—The Bremer Frey, Baron Von Hülfeld, left, and Captain Kuhh, right, assisting in refuelling the Ford relief plane at Greenly Island.

IMPERIAL TO THE RESCUE

THE great impress which has been given to aviation in Canada during the past few months has afforded an interesting commentary upon the breadth of distribution enjoyed by Imperial products in the Dominion. It may be said without exaggeration that it is Imperial production and distributing facilities which hold aircraft aloft in this country. The arrival of the German plane "Bremen" at Greenly Island off the Newfoundland coast is a sudden and urgent demand for aeroplane spirits and lubricating oils upon our organization in Quebec. This demand was immediately accommodated and the work of the rescue planes which brought the flyers out from their isolated landing place was made to save the life of Floyd Bennett, who was rushed by plane from Murray Bay to Quebec where he died of pneumonia, the return of Colonel Lindbergh from Quebec to New York, all were contingent upon Imperial refuelling these ships.

"We think we ought to write you expressing our entire satisfaction with the service you have given, not only during the course of the winter but more so during the last two weeks. Due to the presence of a great number of airplanes at our St. Agnes base which were depending on us to be refueled, and among which was the giant Ford trimotor of Commander Byrd, it alone requiring 600 gallons, we depended on special effort on the part of your Company and are pleased to say that your cooperation has been all that we could desire." When Colonel Lindbergh landed in Quebec he, too, looked to Imperial Oil Limited for service and that he was not disappointed is evidenced by the reproduction here of the delivery slip for one hundred gallons of Imperial Aerator spirits which he received. Fost was coming out of the ground at Battleford Park at the time of Colonel Lindbergh's arrival and although there was a light covering of snow the ground was too soft to permit passage of a heavy motor tank wagon. Accordingly, the gasoline was transported by motor to a point near the field and was there transferred to a small tank sled which conveyed it to the plane. In addition to supplying gasoline and oil, Imperial rendered the usual services of any mission station by furnishing a supply of hot water which was needed for his motor.

DIRECTORS of the Standard Oil Company (New Jersey) and executives of the Standard Shipping Company, joined with Mr. C. O. Stillman, President of Imperial Oil Limited, Mr. G. H. Smith, President of International Petroleum Limited and Mr. C. A. Eames of the Imperial Directorate, in an inspection of the "C. O. Stillman", the world's largest tank ship, on April 18th when she completed her first trip from South America to northern latitudes. Apart from the interest attaching to the "C. O. Stillman" by virtue of her size and her ultra-modern design and equipment, a very interesting feature of this inspection was that it was conducted within a few miles of the Bayonne refinery where Mr. Stillman began a career in the oil business which culminated in 1919 with his election to the Presidency of Imperial Oil. In naming the new tanker in honor of Mr. Stillman, officials of International Petroleum fittingly recorded the esteem and affection in which he is held by all his associates. The inspection party was put ashore from the Battery, New York City, at the Commodore Hotel and Mr. Stillman's private yacht, "Charlie White", was kindly placed at their disposal by Standard Oil (N.J.) and a pleasant luncheon was enjoyed as the "Charlie White" headed towards Constable Hook. A toast to the "C. O. Stillman" was honored and in a few words Mr. Stillman expressed his appreciation of the honor conferred upon him by naming International Petroleum's new boat after him.

As the "Charlie White" headed towards the Kill, the "C. O. Stillman" was sighted and shortly after she dropped anchor off Stapleton and the inspection party was welcomed aboard by Lieutenant Commander C. R. Frye, R.D., C. R. R.N., who conducted the tour of inspection. Mr. Stillman and the party, which also included Mr. E. M. Clark, President, and Mr. E. R. Hayes, Vice-President and General Manager of the Standard Shipping Company, together with Mr. W. R. Elsworth, head of Imperial's Marine Department and Mr. H. J. Rahles, all expressed their admiration for the splendid equipment and appointments of this new ship and were particularly interested in and pleased with the operation of her enormous Diesel engines which afford her a loaded speed of 11 knots.

One outstanding attitude of the "C. O. Stillman" in the beauty of her lines and the excellence of all her appointments. Though the world's largest bulk oil carrier, she has the graceful sweep of a yacht and from her first fittings are the most modern, efficient and pleasing. Her power unit consists of two Bremen-Vulkan six-cylinder, two-cycle, single-acting Diesels developing 4,300 horsepower. The cylinders have a bore of 275 inches and a stroke of 47.24 inches. So quietly do the engines operate that conversation can be carried on in the engine room in an ordinary tone of voice. All the essential auxiliaries are electrically operated. The emergency auxiliaries are steam operated. She has three horizontal duplex compound steam pumps with a total capacity of 9,000 barrels an hour.

As the inspection terminated, the party wished Commander Frye bon voyage and rejoined the "Charlie White." Almost immediately the "Stillman" weighed anchor and headed out to sea on the second leg of the triangle service for which she has been chartered and in which she will operate for the balance of this year. This takes her from Bayonne to San Pedro, California, where she arrived on May 9th. There she will proceed to Chile from Talara, Peru, and back again to Bayonne.

Carrying 116,000 barrels of Colombian crude which she took aboard at Cartagena, the Imperial motor ship "Victrice" completed her maiden voyage at Montreal early May. Her cargo was the heaviest cargo of oil ever discharged at Montreal. The "Victrice" was built at Glasgow and is powered with two reciprocating vertical engines direct acting and two vertical engines, each developing 1,750 horsepower. She is 510 feet long with a beam of 68 feet and a depth of 38 feet. Her gross tonnage is 12,409 and her hull is divided into 20 main tanks, in addition to which there are 12 summer tanks. Her master is Captain G. D. Williams who has previously served the company in the old "Victrice" and in the "Calgolite" and the "Albertolite."
LEAVING the subject of these notes busy for the moment, we turn to the new province of Southern Alberta, where we visit for a few minutes in the town of Petroleum, the capital of the province. Here, we find that both the Canadian oil industry and Mr. J. H. McLeod had their beginning. Mr. McLeod should become an oil man and a good one at that. It is said of Petroleum that it has a heavier foreign mail than any other town in this country of ours, and that among such a mail is evidence both of the number of its sons who have gone into all parts of the world at the behest of the universal petroleum business and of the affection in which they hold the scenes of their thorough apprenticeship. Wherever oil is drilled for and perhaps, too, wherever it is refined, there you will find someone who is a native of Petroleum. As a matter of fact, the history of the scene of Canada's enterprise in Petroleum is the history of Mr. McLeod. He was born and brought up in Petroleum and very likely the habits and tricks are as familiar an association in his earliest recollections as the telephone poles to the present-day son of that town. His environment was oil and the heroes of his romantic dreams were the men who were pioneers in the world of the earth in quest of it. It was only the natural instinct of '14, he, like most of the boys in Petroleum, at that time, should decide to learn the drilling business. For a time Mr. McLeod had to forgo the delights of the drilling rig and he turned his hand to the reining business in what then was known as the old M. J. Woodward Reiner. He did not like reining, however, and when there came a boom in drilling in Bothwell he was quick to pack his bag and return to his first love. In Bothwell he remained until 1916 in the service of the Canadian Oil Company. About 1916, Mr. F. J. Carman, a member of the company, decided to do some wildcatting in Western Ontario. "Wildcatting" is a compound word which is the most descriptive of many descriptive terms peculiar to the oil man's phraseology. petrolia is a thriving community in the prairies of Canada, and it is itself an oil town. The story of its development is of interest, and it is inevitable that Mr. McLeod should become an oil man and a good one at that. It is said of Petrolia that it has a heavier foreign mail than any other town in this country of ours, and that among such a mail is evidence both of the number of its sons who have gone into all parts of the world at the behest of the universal petroleum business and of the affection in which they hold the scenes of their thorough apprenticeship. Wherever oil is drilled for and perhaps, too, wherever it is refined, there you will find someone who is a native of Petrolia. As a matter of fact, the history of the scene of Canada's enterprise in Petrolia is the history of Mr. McLeod. He was born and brought up in Petrolia and very likely the habits and tricks are as familiar an association in his earliest recollections as the telephone poles to the present-day son of that town. His environment was oil and the heroes of his romantic dreams were the men who were pioneers in the world of the earth in quest of it. It was only the natural instinct of '14, he, like most of the boys in Petrolia, at that time, should decide to learn the drilling business. For a time Mr. McLeod had to forgo the delights of the drilling rig and he turned his hand to the reining business in what then was known as the old M. J. Woodward Reiner. He did not like reining, however, and when there came a boom in drilling in Bothwell he was quick to pack his bag and return to his first love. In Bothwell he remained until 1916 in the service of the Canadian Oil Company. About 1916, Mr. F. J. Carman, a member of the company, decided to do some wildcatting in Western Ontario. "Wildcatting" is a compound word which is the most descriptive of many descriptive terms peculiar to the oil man's phraseology.

In our last article we outlined the history of asphalt and traced its gradual development as an integral part in the industrial construction, first as a component of mortar and transport, then as a binder for ancient buildings to a binder, shock absorber and preservative in our modern structures and highways. From the standpoint of large scale utilization, however, we pointed out that its chief place is in the construction of roads and the highways. We pointed out that asphaltic materials for roads, and therefore, incumbent to the full understanding of our subject first full, the main fields of its application, to fully clarify the demands it has to meet in respect to having certain properties and to what degree, before taking up basic definitions and methods of production. Knowing what properties are required of asphaltic materials to produce these products or rather methods used to produce a material having certain desired properties, acquires greater significance in this writing.

So coming first to roads, here again we are at a subject that has been an ever-present consideration from the day humans first developed societies and began to live in aggregates to communities. The development of roads in the early times continued as it joins, however, meaning communication, whatever any comprehensive system of these developed the effect was always revolutionary in scope. We shall have to look at the development itself to the outstanding points and the early development of roads, for any distant accomplishments were hardly known. Even within a city itself was regarded as a useless luxury and depended on the whim of the masters or the ruling despots. Some of the monument of the sectional roads could be paved in a manner hardly inferior to the floors within the temples and palaces themselves and the rest of the city wallowed in the mire and dust of the natural subsoil. With the appearance of the Romans, the modern of antiquity, the problem of roads became a matter of widespread concern. The Romans soon learned the value of good roads as an aid in speed of massing troops at different points of their far flung frontiers. They introduced the system of highways, portions of which are still to be found all over Western Europe, man power in that day was of little consideration. Thousands of war prisoners and slaves were herded into construction gangs and highways were carried through as a rule in straight lines from point to point. Hills were leveled and mountains tunnelled at places where a short detour would have saved immense labor.

The interesting point to us, however, is the methods of construction employed by the Romans. First they cleared away as much as possible of all natural obstructions and the marked route was leveled and graded. They then proceeded to cut into the subsoil to the depth of three and more feet. This road foundation was usually filled with stone blocks and broken stone and the whole pounded down and then consolidated. The top courses of their roads were as a rule one or more layers of granite slabs set in mortar. Remains of some of these bases were excavated where the granite slabs are imbedded in asphalt or asphallic conglomerate (a mixture of asphalt and fine mineral material such as sand). The clay mortar or asphaltic conglomerate was laid in between the blocks and acted as a filler in the joints.

Early Roads

A road as we understand it today is supposedly a predetermined and marked line for communication. This basis for its appearance would presuppose, first of all, removal of obstructions, such as stones, vegetation, grading and levelling, filling in depressions and bridging ravines and rivers. Consider the scope, there is no limit to the efforts that may be made to make a road more perfect for travel. Our present system of highways can be spanned with bridges, hills may be levellled and tunnels dug through mountains, all to reduce grades and shorten distance. The
was decidedly decentralized and the individual petty states could not continue along the same lines as the Romans. Consequently we find a general drift away from the massiveness and rigidity of the Roman highway. The bases for the roads decreased in thickness and the layers of cemented granite slabs disappeared and small blocks, the cobble stone, took its place as a surface course. In many cases the cobble stone was set direct on the subsoil in a bed of sand tightly packed. The sand took the place of the clay mortar or asphalt gran. It did not bind one block to the other but it had this advantage over the Roman idea, it had a certain amount of flexibility and give, which fact was decidedly in advance of the Roman practice of rigidity.

The general tendency has, therefore, been to go to smaller size stone for the construction and resurfacing of roads. Originally this tendency was dictated by necessity for economy. Smaller size stone blocks were easier to handle and transport. From the technical standpoint it was rather a development in the right direction. For a long time the Roman road was regarded as the last word in pavements, and its existence for centuries was pointed to as incontestable proof of quality. It has since been shown that the fact of its long life was due mainly to the absence of heavy wheeled traffic as we have it today. In England there were in existence considerable stretches of old Roman roads. During the war heavy military traffic was turned onto the best of them and they were found completely incapable of withstanding the stresses of rapid moving heavy traffic. Under similar conditions some of the cobbled stone roads of France and Belgium withstood the shock of even more severe traffic.

**Roads in Early Europe**

Thus granite blocks gradually became the standard paving material particularly in the cities. The cobble stone was laid in various forms and sizes from the standard six inch cube to the two inch cube in some of the German cities.

The wood block pavement is a further development of this sectional type pavement idea, but this material never acquired the same importance in road construction as the granite block. In the first place, wood block required a smooth and solid base. The base would, therefore, have to be some well constructed road with a smooth serviceable surface to start with. Secondly, wood block has to be treated with some kind of preservative oil with toxic proper ties. Considering the base and treatment, wood block was limited to localities where there was an abundance of the proper wood and even there it was restricted to the residential and busy parts of the cities. Noise and dust is the outstanding objection to the stone pavements and wood block sort of held its own in European cities as it is noiseless and dust proof.

The main importance of the wood block pavement, however, in the history of roads is that it introduced oil and other bitumin ous materials in road work. First, oil was used to impregnate the blocks with and to preserve and waterproof them. Secondly, solid asphalt or rather coal tar pitch was filled in the spaces and hold the blocks in place. The blocks are first set in rows on the prepared base and the asphalt or coal tar pitch is molten and poured in. Thus the oily block and the solid bitumen gave a dustless, waterproof and noiseless pavement, a distinct advance over the granite blocks set in sand.

**Road Development and the Growth of Centralized Government**

The above outlined developments all relate mainly to the city pavements. This is necessarily so since with the passing of the central Roman Government, the matter of roads received only scant consideration outside the cities. The breaking down of the Feudal System and the development of central governments, particularly in France, again brought this matter of road communication to a head. The French were really the pioneers in centralized communication. For military and rapidly developing commercial purposes it was decreed that roads as direct and as straight as possible should be laid our connecting all central points within the Kingdom. The existing narrow roads and foot paths were to be widened and made available for the ever growing volume of wheel traffic, roads having previously been used mainly for riding, pack animal and foot traffic.

Methods of construction were sufficiently advanced that day, they included drainage, compaction of subsoil, spreading of stone of all sizes from large boulders to broken fragments. This in a way was the beginning of the macadam road as we know it today. Systematic efforts, however, at an actual study of road construction were not made until the matter was taken out of the hands of local districts in England and turned over to a national body. When the demand for roads in England became pressing the first move to remedy conditions was to turn sections of the country over to private companies who built and maintained roads under a toll system known as the turnpike road. This was a radical departure from the hap hazard condition where roads were everybody’s and nobody’s business. The development of the English turnpike road came somewhat later than the movement towards central communication in France but once local hindrances were broken down the movement towards a national system was rapid and vigorous. In 1810 we find the attempt at combining the private roads under a parliament ary commission and the first project consisted of a road 194 miles long. The whole was to be reorganized, widened, drained and resurfaced wherever necessary. The moving spirit in these efforts was Thomas Telford. Telford is of particular interest to us not only on account of his incessant activity in behalf of national roads but also on account of his systematic studies in construction of a stable road base. His previous experience as a stone mason stood him in good stead in his road work. His method was to so lay together stone blocks so that they would interlock and not shift. This method has descended to us practically without change in principle as he originated it.


The first service station in Canada

The evolution of the service station

Many are the changes which have been effected in our commercial life through the agency of the automobile. Among the more notable of these has been the evolution of a system whereby at all times and places the motor car has easy access to the two essentials for its operation, gasoline and oil.

The development of the service station and its metamorphosis from the unsightly shack to the aesthetically considered structure of today is one of the most interesting of many interesting histories of our own times. Beauty of design, ease of access and all the equipment necessary for prompt, efficient and complete service, are the essential considerations in modern service station design.

Imperial Oil Limited was the first company to operate a public service station in Canada. This station was located at Vancouver and Mr. C. M. Rolston, our divisional manager at Vancouver recalls the time in the early days of the automobile when motor cars drove up into the yard of the Imperial plant at Vancouver, and were filled from a 5-gallon bucket. As registrations of cars increased, these visits in quest of fuel became more numerous and in a little while there was such a number of cars calling for oil and gasoline that the Company's yard was becoming congested and provision to overcome this condition became necessary. Necessity, as the mother of invention, gave birth to the first service station.

This first service station comprised a measuring tank installed on the wall in front of the Vancouver plant. By its means the motorists were enabled to refuel without entering the plant yard. It was an arrangement that found immediate favor with the motorists and patronage developed to such an extent that on a Saturday there would sometimes be a line of cars two blocks long waiting for fuel. Accordingly, seven filling tanks were installed along the wall.

Some time later the first real service station was erected at the corner of Broadway and Granville Streets, Vancouver. Incidentally, this was the first building in Vancouver to have a slate roof. The next station followed in 1915 and today there are more than forty service stations in Vancouver, forming a link in a chain that stretches from Victoria to Halifax.

An ice bridge in the St. Lawrence below Montreal in early April backed up the waters of the mighty river to such an extent that our Montreal East refinery was inundated and considerable damage was done. The high waters completely submerged the Imperial dock, floated a large barge onto the docks, half submerged tank cars, covered the separator and surrounded the dock pump house. During the night of April 10th, the floor of the east wall of the pumphouse pit developed leaks and the rushing water covered three of the water pump motors. Temporary pumps were set up for fire protection but the sewers throughout the refinery property were filled and the stills were unable to operate for a week.

A diver was engaged and he recovered the motors from the pump house. These, fortunately, after being treated in a drying oven, proved to have sustained but little damage.

The culverts under Notre Dame Street, and under the Canadian National Railways' right-of-way were flooded and it was necessary to remove high tension wires from them. The barge which floated onto the wharf had to be removed at a time when a 12-foot barrier of ice made the operation exceedingly difficult. A clamshell digger was employed to remove the ice from the dock. Fortunately the water receded gradually, thus preventing very considerable damage which would have been sustained had the ice swept over the top of the wharf.
THE GASOLINE TAX

In other provinces roomy circulators, from time to time, about contemplated increases in the tax.

Some years ago when Mr. Ford announced a reduction of a very few dollars in the price of his car, the facetiously inclined chaffed him about his moderation, but Mr. Ford could take this chaffing in good spirit for he knew that small as the price reduction seemed it meant a very considerable extension of his market. In making this reduction Mr. Ford lifted spoked wheels which had been bending many cameos' backs. When the price of his product was reduced by five or ten dollars, thousands of people were able to buy without subjecting their resources to a strain. For every individual there is a very definite demarcation between what he can afford and what he cannot afford. Of necessity that demarcation must be reducible to the very dollar and the very fraction thereof. That is to say, to the very cent.

This is an indisputable fact which proponents of the higher gasoline tax may not have taken into account. As a revenue producer the gasoline tax may yet defeat its own purpose, and the greatest it becomes the more likely is such a result. Theoretically cents is very little and five cents is but very little more. But the practical aspect of the gasoline tax is the millions by which the three or five cents may be multiplied, and it is as certain as tomorrow's dawn that the multitude of the three or five cents is far more than the multitude of six or more cents. The gasoline tax has made motor transportation more costly, and because it is so costly fewer people can afford it.

It is an inevitable conclusion that because of the gasoline tax there are fewer cars in operation today than there were before, just as it is an inevitable conclusion that because of the extension of the poor roads on which the proceeds of the gasoline tax have financed, there are more cars in operation than there would otherwise be. When is the benefit of extended good roads systems offset by the detriment of increased motor transport costs? In our opinion we verge upon that condition with a tax of three cents a gallon paid, perhaps actually impinged upon it with a tax of five cents per gallon.

An aspect of the gasoline tax which is infrequently considered is this: it requires one of the essentials of modern transportation to bear a disproportionate burden. If a gasoline tax is sound upon the grounds that through it those who must use our roads pay most in taxes, so, too, is a tire tax upon the same grounds.

Another aspect of the gasoline tax which merits serious thought is that it sets a new and somewhat menacingly high level of taxation upon a commodity which by no means is a common necessity may be classified as a luxury. A tax of three cents per gallon on gasoline is, in Canada, a tax of approximately 12 per cent., and a tax of five cents a gallon is a tax of approximately 20 per cent. The precise figure is governed by the retail price of gasoline which varies in different localities.

In view of the circumstances it is nearer than large that any further increases in the gasoline tax are very undesirable and that they may not be expected to win public approval.

WINNERS OF FIRST AND SECOND SERIES

"ETHIELA" Bill Burnett, Holdridge, Camp, Walter, Treasure (Andy Tomkins (Cap.).

WINNERS OF THIRD SERIES

Group "A"

"ROYALITES"

Group "B"

"ATLANTICS"

Fred Gowinford, Jack Mer, Tommy Hawks, Ernie Gamble, Len Hardman.

Group "C"

ROX tied with SERVICE for first place.

High average: Howard More... 205

High Single Game: Walter Overend... 290

PINS ARE TOPPING

UNDER the auspices of the 56 Church Club the Five Pin Bowling League held their 3rd Annual Banquet in the Carlisle Hotel.

The President of the Club, occupied the chair and the distinguished guest was Mr. F. J. Wolfe, Editor of "Imperial Oil" and donor of the Wolfe Trophy. After a banquet which emitted nothing from soup to nuts, and amid a soothing haze of tobacco smoke (the function being purely "stag") the various toasts were offered and responded and a vivid picture of Imperial Oil's care and thoughtfulness for its personnel. The toast to the "56 Church Street Club" was proposed by Col. E. A. Oliver and responded to by the Chairman, Harry Mohr did the honors and Mr. F. J. Wolfe in reply expressed the interest of the Director of Imperial Oil's physical well-being and recreation.

He called upon Len Hardman, captain of the winning team, to accept the F. J. Wolfe Trophy and 10x lire, very briefly, signified the intention of his team to defy all comers next season.

The remaining prizes were awarded as follows:

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The C. O. Stillman Trophy and miniature

High Three Games, Eddie Paint... 790

High Single (Team Plan) Improved... 1298

High Single (Team Handicap) Improved... 1180

High Three (Team Plan) Royalties... 1174

High Three (Team Handicap) At Large... 1696

Community singing was heartily indulged in under the leadership of Mr. Fred Denney with Mr. G. H. Fretter at the piano.

Mr. J. Gibson and Mr. W. S. McLeod contributed songs which were appreciated and applauded and the banjo selections of Ernie Richardson brought down the house.

A cordial welcome was given to Mr. McNair and Mr. Gable who spoke briefly, the former gentleman and Mr. Kolios representing Galena Signal Oil, who mean to represent the names on the rolls of the bowlers next season.

"Auld Lang Syne" brought a thoroughly enjoyable evening to a harmonious termination.

Mr. Stillman got into action and staged a very enjoyable dinner dance at the Terrace Gardens.

This being a newly formed branch of "56 Church Street Club" athletic activity it was a source of great satisfaction to all the officials that Mr. C. O. Stillman should give evidence of the goodwill of the Directorate, and tangible proof of his personal interest, by presenting a handsome trophy for annual competition.

The "C. O. Stillman" Trophy was the one thing needed to ensure the continuance of the "Mixed" league and the keen rivalry which will thus be injected into the competition between the various teams for the custody of the shield, which bears a wealth of history and largely increased interest.

Mr. Ness, who presided at the dinner, performed several interesting tricks and some what unnecessary task of introducing Mr. C. O. Stillman to the gathering.

Mr. Stillman, who was received with acclaim for his many years spoken of the benefit which might well accrue to the organization of a "Mixed" league through the activities of the 56 Church St. Club. He stressed the point that it was necessary for the Bowling League by giving them something to fight for.

In addition to the Trophy for annual competition Mr. Stillman announced his intention of presenting replicas to the members of the winning team. These had not
IN SUNNY NEGROITS

It is true there is very little rain in Negroits, Peru, but there is instead an abundance of sunshine, which makes Negroits a wonder health resort of the tropics. Judging from the photo forwarded to us by Dr. Ellis, showing a group of “Peruvian white babies” and their mothers, we are inclined to envy them this equatorial climate.

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Here and There

ON MARCH 27th, last, the members of the executive and staff, together with their wives did honor to their superintendent, Mr. D. M. Allan, on the occasion of the 40th anniversary of his advent into the oil business. The occasion was celebrated by a surprise party held at Mr. Allan’s home at Imperial. The event was totally a surprise to Mr. Allan and he welcomed the guests with that spirit of cordiality that characterizes his work. Mr. Allan’s four sisters who were with him on this occasion are to be credited with much of the “inside” staging of the celebration.

Mr. C. V. Humphrey took charge of the evening and in a short address, reviewed Mr. Allan’s activities in the oil industry from the time of his birth near the Shale Oil Fields in Scotland to date as Superintendent of Imperial Oil Refinery at Imperial.

Mr. Allan replied in an able address in which he stressed his appreciation of fair and generous treatment and cooperation accorded Mrs. Allan and himself by all Imperial since his inception as superintendent. On behalf of the premises, Mr. Humphrey then presented Mr. and Mrs. Allan with a diamond-set platinum “Shiner’s pin” plus Mr. Allan’s in the form of a scarf pin and Mrs. Allan’s as a scarf.

Entertainment followed, after which refreshments were served. Among the refreshments was a large cake on the top of which was inscribed, “Congratulations on 40 years of service.”

Colorit Ollie Pitches The First Ball

The second game between Interpetes and Filler-ups was marked by heavy hitting, with the official scorekeeper working overtime to keep track of the errors.

Each side had one big innings, but the Service Station boys had the edge all through, Turner and McLean proving a better batter than Hamilton and McNeely, the more seasoned Filler-ups in the field playing their positions to better advantage than the Interpete rookies.

The latter, however, are not lacking in enthusiasm and will improve with practice.

In the intervals between the two games the formal opening ceremonies were carried through.

Our old friend P. F. Sinclair said a few appropriate words and took his place at the plate, facing the pitching of Col. A. E. Oliver with Frank Holbrook of the International catching.

John Nees, President of the 56 Club, acted as umpire, giving evidence of being in the big league class by calling the balls and strikes without fear, favor or intelligence.

“P. F.” eventually reached first base on a catcher’s error after being struck out, and only the umpire’s call of time prevented him from stretching it into a home run.

The Friday evening game had an element of surprise as the Royalites scored a win over the Filler-ups. The batteries were Williams and Lent for the Royalites and Pickard and McLean for the Service Station.

On both evenings there was a good turnout of employees and their friends to cheer on the different clubs and it appears that the new venture will commend itself to the members of the 56 Church Street Club, whether they are athletically inclined or merely the onlookers who see the game.
SARNIA

AFTER July 1st, the Treasurer's Office will be unable to accept changes in the monthly deposit slip of Imperial employees who are participating in the Second Co-Operative Investment Trust. The Trust terminates on December 31st next, and there is a great volume of work necessary before the books of the Trust are closed. It is, on account of the burden of work thus entailed, that the Treasurer's office will be unable to accommodate requests for changes in the amounts of monthly deposits.

HAMILTON

The recent annual five-pin tournament conducted on the Gistar alleys by the Hamilton City Bowling Association was brought to a close by the Imperial team capturing the championship in class A with a score of 3371, walking off with the tournament medals.

Much credit of the victory goes to Eddie Behrens on whose decision the team made entry into the league.

“Behrens & Co.” did their bowling on the second night of the tournament and with successive scores of 3178, 1099 and 1146, compiled a grand total of 3371, a mark which withstood the attack of thirteen other strong class “A” teams.

With its five-man team in possession of the city championship, Bob Woods holding the position of secretary of the Hamilton City Bowling Association and Eddie Behrens the newly-elected president of the Hamilton City Bowling Association, the Hamilton division is making a bid for athletic honor in pin-splitting.

Air Transport in Canada

Consistently increasing air traffic is imposing steadily increasing demands upon Imperial Service from the many interests now operating air transports in Canada.

Recently a Fokker tri-motor biplane was a visitor to the Leaside aviation field just outside Toronto where it landed after a few hours' flight from Montreal. At Leaside, as at Montreal, the pilot represents the Imperial and organization for a supply of fuel and oil. Above, the Fokker taking on fuel. Below, Imperial equipment alongside the giant plane.

Industrial Research

"WE MUST not consider effort in research the exclusive asset of technically trained minds. Its possession and practice is within the sphere of every inquiring mind desiring to secure knowledge, which will enable him better to understand the 'why' and 'what' associated with his daily work. This diligent inquiry, this search for facts and principles, this examination with continued care, and the determination to seek diligently, with a resolute purpose to make use of the knowledge acquired, should be considered a necessary objective in the discharge of our duties whereby if we will, we may solve the problems within our reach, and may build constructively and co-operatively with one and another upon knowledge thus secured."

- Sir Joseph Flavelle, Bart.