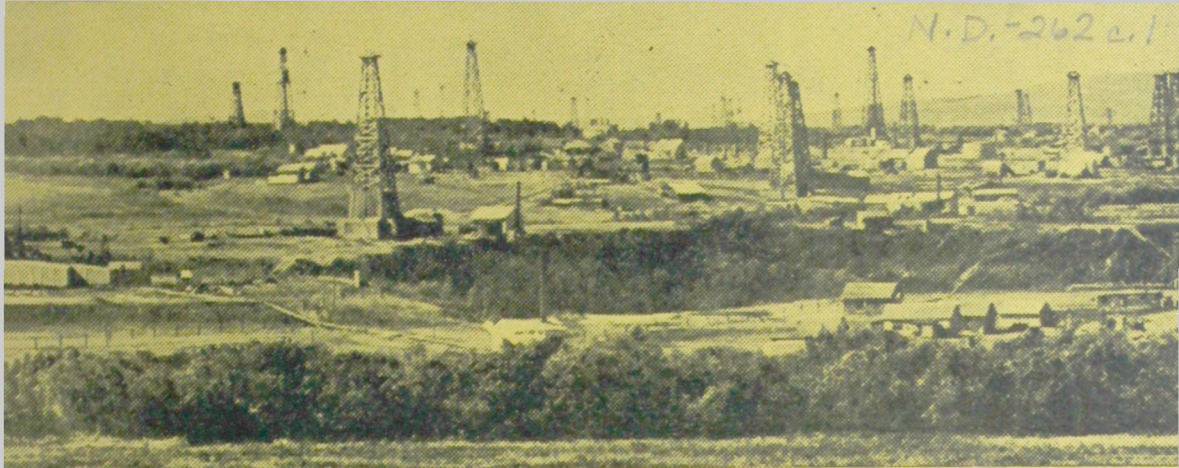


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Oil to Alaska

CANOL UNVEILED

OIL
TO
ALASKA

**DEDICATED—TO THE MEN WHO
PUT THE PIPELINE THROUGH**

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By C. V. Myers

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FOREWORD

The Canol Project was under the supervision of Brig.-General L. D. Worsham, Division engineer in charge of all engineering projects in Northwestern Canada and Alaska. Civilian contractors were directed by General Worsham's corps of engineer officers.

Civilians and Army combined into a team which was able to—

Conquer an undeveloped area half the size of the United States.

Pioneer 2,000 miles of roads over undeveloped country—Los Angeles to Detroit.

Lay 1,800 miles of pipe—Denver to New York.

All in the space of 20 months.

This is the story of how it was done.

The Canol Mystery

"What is it all about anyway—this CANOL?"

It was the summer of 1942 in Edmonton. The man on the street corner spoke to the stranger beside him, and pointed to the big truck rumbling by. It had the word CANOL painted on its side in large gold letters.

"Bless me, if I know," said the man. "I work there, but I still don't know. Building a pipe-line or something like that."

"But where are they building it to?"

"I hear it's right across the NORTH-WEST TERRITORIES."

"Just swamps, and muskegs, and mountains up there. No towns, no roads or railroads. I don't believe they can build a pipeline there."

"Maybe they can't. I dunno."

"Maybe it's something else altogether. But what do they mean—CANOL?"

The Canol Project began in June, 1942, but strict Army censorship kept CANOL a mystery name until well on into 1943. People knew about the Alaska Highway. They did not know that the project which would be a large factor in determining the value of that highway, which would cost several times as much money, the like of which had never been attempted

before — they did not know that this job was already under way. No fanfare heralded the beginning of the Canol Project.

Even the men who endured the extreme temperatures, the swamps, the flies, had no clear conception of what it was all about. Employees who worked at Whitehorse, or Prince Rupert, Fairbanks, Skagway, Waterways, Peace River, Canol, or Edmonton, could have no idea of how they fitted into the master plan which embraced one of the most tremendous undertakings ever attempted by man.

Now the pieces can be fitted together. Every man can see where his job fitted in. He can look at a map, glance over it, and see how his job helped to conquer hundreds of thousands of square miles of the wildest, most rebellious country in the world, and all in the space of twenty months.

Turn to the map on page twenty. This is the Canol Project. Twenty-five thousand men worked on it. It covered over a million square miles of undeveloped territory.

How it was accomplished — the almost insurmountable difficulties encountered — the unexpected developments — man battling tooth and nail against nature on the rampage — that is what this book is about.

Dodo Canyon



One hundred miles south of the Arctic Circle. Resembles Grand Canyon in Arizona. Walls 400 to 700 feet high. Hot springs keep the ice thin in winter.

A Jap Inspired Vision

“He who holds Alaska holds the world.”

Colonel Mitchell said it. No one paid much attention. Apparently the Japs believed Mitchell, for in 1942 they were based in the Aleutian Islands pointed at Alaska.

With both Germany and Japan now being crowded back into their corners, it is hard to remember the panic that grew to high pitch after Pearl Harbor, the blackouts along the coast, the threat of bombing. It was not hard to envision a Jap attack then, and the American fleet lay crippled. Alaska was in peril. Could the crippled fleet keep the coast route open? How could men and materials be moved to Alaska if the fleet could not keep it open?

The Alaska Highway seemed to be the answer. But war requires hundreds of thousands of barrels of oil, and if the sea traffic were cut how would this oil be supplied? Thousands of miles over a highway already strained to capacity?

There was one partially explored oil-field — at Norman Wells on the Mackenzie River. If the oil could be brought to Whitehorse, distribution from there on would be a relatively simple matter. Especially with the aid of the Alaska High-

way to take the oil north or south. And the Alaska Highway was already building.

If there was any answer to the problem poised by the Japanese threat, Norman seemed to be the answer.

In the spring of 1942 the Army picked its contractors for the job. The W. A. Bechtel Company and the W. E. Callahan Company were old-time constructors with well established reputations. The H. C. Price Company was an outstanding welding organization backed by years of experience. These three combined into Bechtel-Price-Callahan, the sole purpose of whose existence was to build the pipe-line, and bring the oil from Norman Wells across the mountains to Whitehorse. The Imperial Oil Company, under the direction of U. S. Engineers, undertook to develop the field to its capacity.

The project was named CANOL, after Canadian Oil. Camp Canol would be established across the river from Norman Wells.

With very little to go on because of the rugged and unexplored nature of the country, but with the urgent pressure of necessity, the CANOL vision was undertaken.

“This Is No Picnic”

“Working and living conditions on this project are as difficult as those encountered on any construction job ever done in the United States or Foreign Territory. Men hired for this job will be required to work and live under the most extreme conditions imaginable.

Temperatures will range from 90 degrees above zero to 70 degrees below zero. Men will have to fight swamps, rivers, ice, and cold. Mosquitoes, flies, and gnats will not only be annoying, but will cause bodily harm. If you are not prepared to work under these and

similar conditions — DO NOT APPLY.”

This notice was posted in all the hiring offices in the States, in Dallas. Denver, Minneapolis, in San Francisco, Los Angeles, Seattle, New York, St. Louis, and Tulsa.

The constructors moved in in June. They knew generally what the conditions would be, but little more. They did not know because no one in the world knew. They knew only that the job had to be completed by Christmas.

They knew they would have to rush it from both ends. They would have to start in at Canol and at Whitehorse. In order to maintain Whitehorse, they would have to establish a base at Prince Rupert.

Freight and supplies for Whitehorse would come to Edmonton by rail. Continuing on to Prince Rupert they would be reloaded there into barges, and shipped by sea along the coast to Skagway. Then by rail again to their destination at Whitehorse.

As long as the west coast route remained safe, other supplies could be loaded at Seattle and Vancouver, shipped directly to Skagway, then up the Yukon-White Pass Railway to Whitehorse. Lines of communication with Whitehorse were therefore well established routes, and as it proved later, secure.

The constructors knew the water communication system with Canol.

Thus, as the map will show, with Edmonton as the mother base a giant pincers could be applied on the unknown intervening area between Canol and Whitehorse.

But the intervening area was to prove itself a hard nut to crack. A nut so hard that it would take the efforts of ten thousand men to

smash it, and twenty months instead of six.

Canol was the weak end of the pincers. Fifteen hundred miles north of Edmonton by the ordinary water route. No railroad, road or trail of any kind. The end of steel was at Waterways, Hudson's Bay Post, three hundred miles north of Edmonton. A thousand miles of inter-connected rivers and lakes led then to Norman Wells.

Water transportation opens about the first of July. By October first it is all over. Three months to ship the necessary supplies. Three months more to push the pipe-line through.

Between Whitehorse and Canol lay the Mackenzie mountains which form a watershed between the Mackenzie and Yukon Rivers. Starting out at nearly sea level at Canol you go over the mountains, which rise to almost nine thousand feet, and then back again to low altitude at Whitehorse.

Only one man had ever been over this country and written anything about it. Joseph Keele, a Dominion Government geologist, had travelled it by boat and dog team in the year 1907-1908. His report described it as the most rugged terrain imaginable, claiming that even the Rockies were no match for the Mackenzie Mountain Range.

But even Keele had not come within a hundred miles of where Norman Wells stands to-day, and it was possible that there might be easier and shorter routes than the one he had taken.

Reconnaissance began immediately. First by airplane, then by dog team and on foot. Northern fliers were consulted, every pioneer who might know something about the conditions that would have to be met.



The unknown Mackenzie Mountains, 1,000 miles from civilization. They'd have to push a road and pipeline through.

Within two weeks the Mackenzie Mountain Range and surrounding territory had delivered the Canol Project one of the greatest shocks it was ever to receive. Completion by Christmas would be utterly impossible. The country was rugged beyond all stretches of the imagination. Conditions generally were even worse than anticipated.

Men Against Water

A man is trying to push a bookcase. He is standing out from it at arm's length and pressing on the bookcase with his fingers. He cannot exert any of his strength. He cannot move the bookcase.

Before he can move it he will have to get up to it. If he can get behind it with his shoulder he will have no trouble. If the bookcase is surrounded with furniture, he will first have to move the furniture. But he has to get there.

Pushing a pipeline through from Canol was like trying to push a bookcase at arm's length. First you had to get there. That was the purpose of Waterways—to get there.

The camp at Waterways opened about the middle of June. By July 7th, two hundred and eighty-five men were on the job, building the camp to house the men, and the office to supervise and pay the men, who would build the camp for the men, who would unload the freight from trains and load it again onto barges.

The camp was erected on the river flat about a mile down from the town of Waterways with its four hundred people. Because of the level prairie-like nature of the ground it was called **CAMP PRAIRIE**. Behind to the west lay the mountains and the uninhabited hinterland. To the north the town

So the plans were revamped. Schedules changed. The urgency of the work had not diminished. It would have to go ahead.

In the meantime the base at Waterways had been established. The fight against time to get all the freight to Canol before the three months' season closed was already in progress.

of McMurray with two hundred and fifty inhabitants. Along the front ran the river.

The only automobile road in the whole country was for a distance of five miles between the towns of McMurray and Waterways. About once a month the Hudson's Bay boat made the trip north with freight and mail for Norman Wells and Aklavik. The only communication in from the south was the single track railroad of the N.A.R.

A glance at the map will show the water transportation system north.

The Athabasca River flows into Lake Athabasca. The Slave River drains Lake Athabasca into Great Slave Lake. Out of the western end of Great Slave Lake the Mackenzie River runs for a thousand miles down to the ocean. A hundred miles south of the Arctic Circle the mighty river passes Camp Canol in a stream bed four miles wide and at an elevation of about three hundred and twenty-five feet above sea level. It lumbers by at the rate of five miles per hour, down to its Arctic destiny, discharging itself into the sea at the rate of 500,000 cubic feet a second.

The Mackenzie is the eighth largest river system in the world. On the North American continent it is second only to the Mississippi.



Second greatest river in North America, the Mackenzie lumbers past Camp Canol in a stream bed four miles wide, to discharge itself at the rate of half a million cubic feet a second into the sea.

On account of the rocky country through which it flows its water is remarkably clear and clean. It varies in depth from 50 feet at low water to nearly 70 feet during flood time in June. The Mackenzie is the life line of the north.

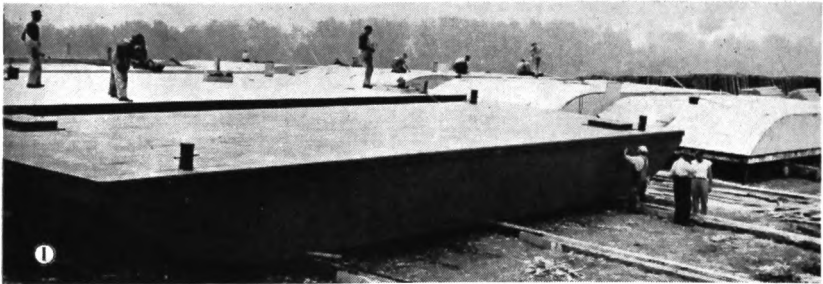
But getting to the Mackenzie is not as simple as a glance at the map would indicate. At Fort Smith, just north of the Alberta boundary, transportation is confronted with a stone wall. Literally a stone wall, for here a very hard limestone ridge cuts across the country. This ridge refuses to be worn down, and slows up the river behind it, and precipitates the river beyond it, in a series of rapids, which drop one hundred and twenty-five feet.

These are the **RAPIDS OF THE DROWNED, THE DEAD HORSE RAPIDS**, and many others. No boat can pass over them. Every barge has to be unloaded. The

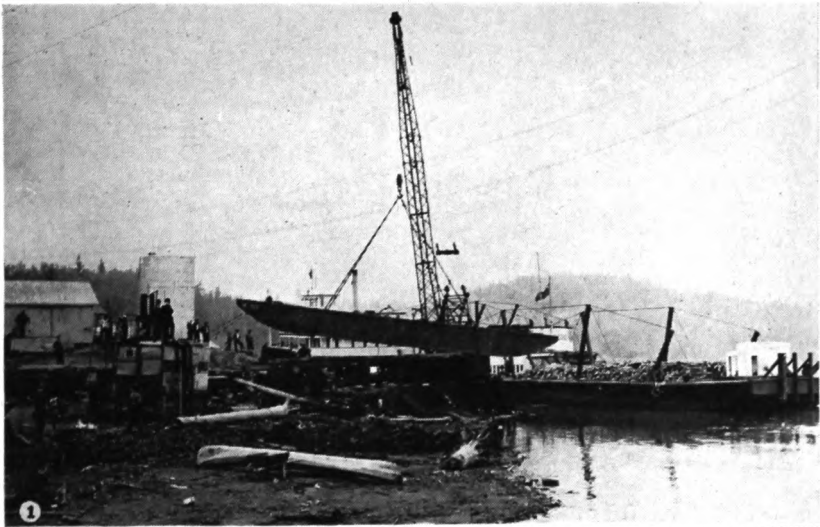
freight has to be transported by truck or wagon across the portage of sixteen miles, and loaded onto other boats waiting to receive it.

Until July, 1942, all northbound freight had been handled in this way. But in the wild race to move thirty thousand tons in the brief three-month period, the constructors for the CANOL project saw defeat staring at them from the rapids.

But how was the delay to be overcome? There was no time to blast, to dredge, to dam. And yet the boats must pass. Of course, there was only one other alternative — the land. Huge trailers were built, trailers big enough to accommodate barges weighing up to three hundred tons. These massive rubber-tired platforms were then pulled down to the ways at the water's edge to accept their bulky cargo.



- 1. They built the barges on the spot.**
- 2. Loaded them with heavy equipment.**
- 3. And fuel and supplies of all kinds.**



- 1. At the DEAD HORSE RAPIDS they hoisted them bodily out of the water.**
- 2. Yanked them over the 16-mile portage.**
- 3. And launched them again.**

The barges arriving at Fort Smith from Waterways were unloaded at the portage. Loaded trucks drove down onto dry ground. Caterpillars rumbled off the deck. Bulky freight was hastily transferred to waiting vehicles. The caterpillars pulled the barges bodily out of the water onto the big trailers. Then the caterpillars would hook onto the trailer and tow it across the sixteen mile stretch.

Down it would go into the water again. The caterpillars would drive back onto the deck, followed by the trucks laden with freight and fuel. Within ten hours from the time of arrival at Fort Smith the same barge would again be on its way up the Slave River, Canol bound.

But the man pushing on the bookcase at arm's length had more than one obstruction to remove before he could put his shoulder to the task.

At Resolution Delta a second change-over had to be made. Here the Slave River enters the lake in a wide delta, and river conditions change suddenly to conditions approaching those met out on the open ocean.

Great Slave Lake is the fifth largest fresh water body in the world. The wind whips across its 12,000 square miles, lashing it to a fury, and the waves rise twenty feet in the air, and beat with impact against the shore.

On the river, barges were PUSHED by the tug-boats. They were lashed securely out in front and at the sides, perhaps as many as five or six to a tug. But on Great Slave Lake it is a different story. Such a combination would be smashed to pieces by the raging choppy swell.

At Resolution Delta all the barges were unlashd. Strung out at the end of 300 foot cables, one after the other, three to a tug-boat, the tiny convoy moved out for its

hundred and fifty mile trip across the lake.

At Wrigley harbor, on the opposite side, a change-over again was necessary. The barges were unhooked, lashed once more securely to the tug, then into the placid water of the eight-mile wide Mackenzie, and off on the five-hundred mile trip down the river as a single unit to bring supplies to the infant camp at Canol.

But all this took time. It all took organization. It was all a part of the "getting there". The real job had not yet commenced.

There was something more to the "getting there". When it was found that the prospects of completing the job before Christmas were absolutely hopeless, other provisions had to be made. If a camp was to be sustained all winter at Canol, some means of communication would be absolutely necessary. The only communication possible would be by air. But planes require landing fields. Over a distance of fifteen hundred miles, emergency landing fields at least.

And so a system of airports had to be established. Construction started early in the fall at all points. Eight airports up the line, Embarras, McMurray, Fort Smith, Resolution, Hay River, Providence, Simpson, and Wrigley. It was all a part of "getting there". The man still hadn't got the furniture away from the bookcase.

And all these camps had to be transported bodily, and the equipment to clear the trees, to make muskegs into landing strips, and the men to do the job, and the food and housing the men would require. And warehouses at these points, and shops, and a winter's supply.

All this freight was in addition to what was required by Camp Canol. There was three months to do it in.

Waterways was only incidental to Canol. Yet Canol was depen-



They pushed the barges down the river.

dent upon it. An unexpected setback to Waterways was a setback to Canol. And an unexpected setback came, almost at the very beginning.

The constructors had believed, and the U.S. Engineers had believed, that the river transportation equipment already in existence would be ample to meet their requirements. They found themselves to be misinformed. The barges simply were not there. Not half the number required to move the vital freight to Canol.

And anything that stopped the movement of freight was nothing short of disaster.

Something had to be done, and done at once.

A barge building programme was immediately undertaken. The camp at Waterways swelled to over five hundred men, with more coming in. Great floodlights illuminated the yards at night, and the pitch of daylight activity never slackened. Soon the barges were sliding into the water. Ten additional tug-boats were brought in by rail. The freight moved on.

And so during the summer and throughout the fall Waterways became a hive of industry. Day and night it hummed with the steady pounding of hammers, the putting of tug-boats on the river, groaning monsters of caterpillars, the constant whine of sawmills.

Suddenly all activity ceased.

Night had dropped down like a curtain over the north. The rivers slackened and stopped. Freeze-up had arrived!

Thirty thousand tons of supplies were to have gone up the Athabasca. Despite the barge building program, less than twenty thousand had passed across the docks at Waterways.

The two last barges in tow on Great Slave Lake reared and plunged at the end of their cables. These barges carried vital supplies. They carried tractors for the men who would be isolated at Camp Canol during the winter months. They carried parts, food, clothing, and tools. And nature, as if aware of the precious contents, churned the lake in her fury. The barges rose on the crests of colossal waves, then plunged unmercifully out of

sight in their troughs. The men in the tug-boat ahead saw that their cargo was doomed, and cut loose the cable.

The barges capsized, spilling forth their contents into the hungry waters. Now the vital supplies could never be shipped in time!

Men Against Mountains

Fifty thousand years ago a sheet of ice nearly a mile thick passed over the Mackenzie Basin and came down almost to the border of the United States.

Fifty thousand years ago Nature was dreaming up trouble for the modern pipeline - layers. With a head start like that small wonder Nature won the first few rounds thumbs down.

No one knew exactly what Nature had been up to until the first reconnaissance was undertaken. Then they found her out.

Imagine a sheet of ice to a height of four or five thousand feet, and many miles across. Not so long ago fighter airplanes were flying at five thousand feet. Imagine such a thickness of ice, and imagine what it would do to the ground underneath as it advanced. Every bit of soil was scraped from the surface of the land, leaving only the bare live rock behind. Mountainous boulders, frozen into the bottom of the glacier, gouged great holes in the face of the earth.

Then in thirty thousand years or so the glacier receded, and disappeared. It receded by melting, of course, at its south end first.

But the glacier had stripped the earth. The northern soil lay now in the south, and in the north lay a surface of bare, gouged-out rock.

The hollows in the rock became gradually filled with water. And so in the north thousands of shal-

low lakes abound. Seen from an airplane in the winter time it is like a mottled mass of light and dark.

And ten thousand tons of freight had missed the boat. Yet the supplies had to be moved. The camp at Canol was already established. It was like an infant isolated from the world. It could not be deserted. Some way, somehow, supplies must still go north.

The glacier destroyed any orderly drainage system that might have existed before. And no decent drainage system has as yet developed. Consequently muskegs, swamps, and bogs, prevail in great number. And in the swamps and bogs the mosquitoes breed and flourish.

But that is not all. Not only did Nature create such almost impossible conditions, she also cunningly contrived to conceal what she had done.

For over all the surface there grows a carpet of moss. In twenty thousand years since the glacier disappeared, the rock has been pulverized enough by erosion to form a fine dust or silt. For many hundreds of years the moss has been growing on the silt until now it has attained a depth of ten to eighteen inches.

This moss acts as an insulator. The frozen silt and ice beneath it never thaws; the boggy underlying holes refuse to freeze. A man walking over the ground finds the surface over the boggy holes identical with the surface over the solidly frozen foundation of permafrost. The bogs await the unsuspecting caterpillar following the man. The twenty ton monster lumbers on. Suddenly it drops, sinks into the muskeg, and may disappear completely from sight.



It took a lot of fuel and equipment to transport a civilization 1,000 miles over a wilderness into an unknown land.

This mossy condition prevails throughout the region, in the mountains, the valleys, and on the plateaus. It is an ever constant hazard to heavy equipment. Dozens of pieces were rescued when they had all but disappeared.

The only advantage gained from the moss and silt is that it forms the base on which the scanty timber grows. Moss and timber both are scooped into piles to make the road-bed through the mountains.

These conditions were discovered early in the fall of 1942. They took little reconnaissance. They were no encouragement to the constructors and the men who had still to find out about the conditions in the unknown Mackenzie Range.

Before the pipeline could go through a road must go through. Before a road could go through a survey must be made. Before a survey could be made a route must be chosen. Before a route could be chosen the mountains must be explored.

The first man over the mountains from the east side was Guy Blanchet, employed first by Bechtel-Price-Callahan, and later by the Architect Engineers, J. Gordon Turnbull and Sverdrup & Parcel.

On October 25th Blanchet set out with three Indian guides and dog teams to make the 250-mile journey and find a way through.

Winter had just begun to set in. All the boats had been put into winter quarters. The small camp at Canol of roughly two hundred men were prepared now as much as men can be prepared for a winter of isolation. The tents in which they had lived during the summer had been replaced by permanent quarters. Necessary warehouse and repair shop space had been provided.

Blanchet left the tiny cluster of buildings nestled on the river bank on that dull Sunday, and made off

along the pioneer road, leading through the scrawny growth of trees, across the level sloping river flat for thirty miles to the base of the forbidding mountains.

Soon they were into the unknown country. They encountered half-frozen streams with flowing open channels that had to be rafted. They gathered logs, made their own rafts, and crossed the rivers, skirted uncharted lakes, sure of their general direction only, trying to find a feasible route for the road.

Ten days later the camp was far behind. Blanchet sprained his ankle between his toboggan and a large boulder. He patched it up with hand-made splints and together with one of the guides attempted to cross a stream on its flimsy bridge of ice. Toboggans and men broke through the ice, and the leader dog plunged forward into the open stream. Lightning action rescued both dog and toboggans, and they sped across to the other side. The moment they had set foot, the ice bridge went out with a crash, and the full width of the flowing river separated them from the opposite shore.

The winter came down severely cold. At nights the party pitched their tent, set up the small stoves they carried, and the Indians followed their age-old custom of squatting by the fire telling long stories of the past.

It was a lonely trip for Blanchet, and with the sprained ankle a painful one. Often the food supply ran low. The dogs consumed a tremendous amount, and it was impossible to carry more than a few days supply on the sleds. They depended almost solely on the game of the country.

The Indians shot mountain sheep, caribou, moose, and sometimes the snow-white ptarmigan—the only game bird of the north.

But when the Indians had plenty they ate plenty. Dogs and men feasted. There was never any thought of to-morrow. If to-morrow came and the Indian had none, he would hunt again. If unsuccessful he would remain hungry until he was successful. Then there would be a gala feast celebrating the good fortune of "to-day".

At first Blanchet tried to impress the idea of a rainy day. But to them it was uncomprehensible, and finally he had to give it up. He found it easier to accept the philosophy of the Indians and go hungry, than to try to impose the white man's philosophy upon them.

He learned not to question them about their hunting trips, learned to wait until the information was volunteered, learned that no Indian likes to talk as soon as he returns. Learned painfully that the most luscious cuts of meat must go to the dogs, the Indian preferring the hard portions for himself. To him these things were also uncomprehensible.

There were many experiences and many narrow escapes. And each was a threat not only to Blanchet and his tiny party, alone deep in the mountains, but also a threat to the vital pipeline which one day would come snaking up out of the canyons, following in places the very footsteps Blanchet and his men had taken.

Perhaps the very footsteps which on one occasion to the shouts of an excited guide, brought Blanchet hastening up out of a canyon and onto the plateau. As he emerged a pack of wolves made off across the snow. The guide stood beside the overturned toboggan, amidst his tangled mass of dogs, axe still in hand.

The fourteen wolves had closed in on him, six large black ones, and eight yellow. The dogs went wild. The wolves howled. The Indian

had yelled at the top of his voice, brandishing his axe fiercely. Only Blanchet's approach had sent the wolves scurrying off down the valley.

"For heaven's sakes, man, why didn't you shoot?" Blanchet demanded.

The Indian merely mumbled: "Bad medicine". And went about the business of straightening up his outfit.

Blanchet was forced to wonder what would have happened if the wolves had closed in on him an hour earlier when he had been deep in the rugged canyon alone. They found the closely picked bones of a moose nearby.

They proceeded and came soon after to an unmapped stream. Blanchet called it Deka (Wolf) River.

Sometimes they were lost temporarily, but the Indians by climbing nearby mountains were usually able to recognize some distant peak, and the party was able to push slowly forward.

After forty days they came at last to the summit and through Macmillan Pass to the comparatively mild country on the West side, where the water flows no longer to the Mackenzie but down the relatively easy gradients to join the Yukon further on.

A good growth of trees covered the land, there was soil again. At last the beginning of long and gentle slopes. It was easy to see that the job from Whitehorse east would be simple compared to the 250-mile titanic task confronting the Canol crews.

On Nov. 25th, after a long period without food, with both men and dogs hungry and exhausted, Blanchet arrived at his pre-determined destination, a lonely cabin near a lake. At last, as they feasted on the supplies he had sent

by plane in September, he was able to demonstrate to his Indian friends the real virtue of thrift and foresight.

Blanchet had explored the first trail from the east side. Less than a month later, three days before Christmas, in a temperature of 60 degrees below zero, the first road construction crew set out from Canol.

They numbered twenty - three men under the direct supervision of J. B. Porter, General Superintendent for the Constructor. It was a train of nine cabooses and sheds drawn by caterpillar tractors. They had an office and radio cabin, repair shop, grease shop, two mess-halls, bunkhouses, kitchen and kitchen store room. The sleigh-mounted cabins were ten by twenty, equipped with stores and emergency repairs and supplies.

Those men must have thought more than once of the warning posters they had seen in the employment offices in the States — THIS IS NO PICNIC.

Diesel fuel froze to the consistency of vaseline, and would not pour. Light motor oil became as hard as cup grease. The best grade of anti-freeze froze solid in the tins.

The walls of the some-day-to-be famous Dodo Canyon rose vertically four hundred feet above them. As they progressed the height of the walls increased to seven hundred feet. The bottom was rocky with coarse gravel. Sleigh runners scraped on the jagged surface and wore out in no time.

Sometimes tractors stopped as often as every fifteen minutes. Intense cold caused condensation. Condensation caused ice. The ice lodged in the fuel system and cut off the fuel supply. In 70 below zero temperatures mechanics had to get out and clear the lines.

The cold rendered the sleigh runners as brittle as cast. Time after time they broke. Welders and mechanics repaired them, and again the snail pace continued.

Motors had to be kept running twenty-four hours a day. To stop a motor once and let it get cold meant stopping it for good.

In Dodo Canyon underground hot springs kept the ice thin and treacherous. Twenty ton caterpillar monsters would drop through the ice and have to be hauled out by other caterpillars. Fuel sleighs overturned on steep grades.

Three days after New Year's, an hour before dinner the temperature stood at 35 below zero. Five minutes later it was 15 above zero. The thermometer had risen ten degrees a minute. By noon it was 35 above. Four days later it had climbed to 39 above, and the snow in the canyon actually began to melt.

Then it dropped to 15 below suddenly, and culminated in such a terrific blizzard that for two days the train dare not move an inch from where it stood.

Bulldozers attempting to clear the road ahead struck large rocks frozen solidly. Steel snapped. The rocks could not be moved. It was necessary constantly to snake around obstructions of every kind.

In forty-seven days Porter broke trail 106 miles into the Mackenzie Mountains, and had climbed from almost sea level to an altitude of over five thousand feet. On Feb. 6th he found himself out of radio communication with Canol and almost without fuel. As caterpillars bringing it up to him would use up tremendous quantities en route, he had little prospect of securing more. He decided to use his dwindling supply for the return trip. The next day he turned back taking whatever equipment he could,



The intense cold caused condensation in fuel lines and stopped the tractors dead.

and leaving the remainder to be picked up in the spring.

In the meantime another gang of men had crossed the Mackenzie on the ice to Norman Wells and were forging south in an attempt to

make junction with the other company forces who were struggling to bring forward the ten thousand tons of freight that had failed to pass the docks at Waterways before the freeze-up arrived.

Ten Million Ton-Miles North!

The hotel owner at Peace River watched the bulldozers tearing up the trees, levelling the ground.

"Now what the devil do you suppose those Canol people are doing here?" he said to the bartender.

"Building a pipeline, or something, I hear."

"Now, why would we want a pipeline to come to Peace River?"

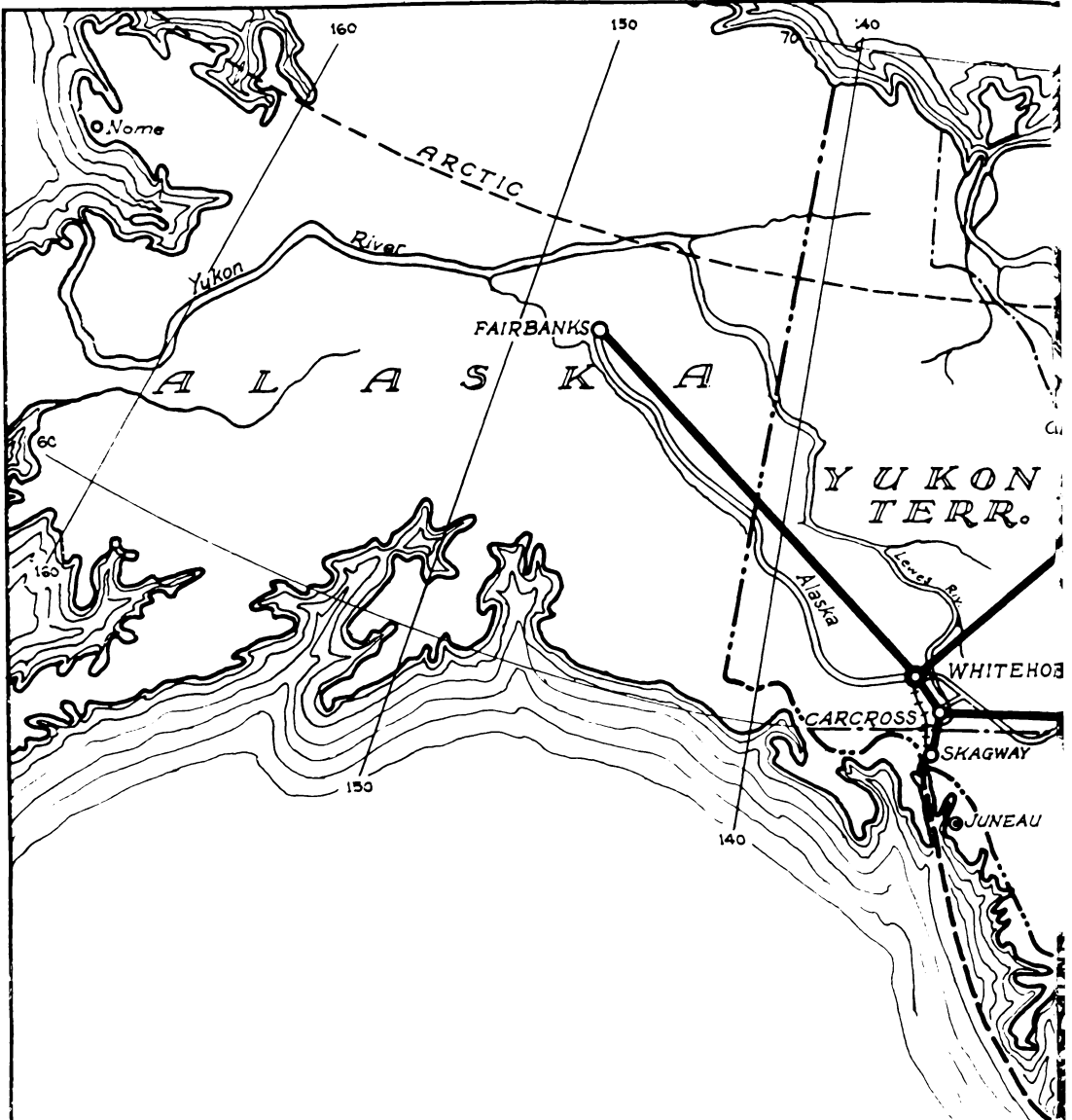
"Maybe they are going to make this town into a big city."

"Plumb crazy if they try it." The hotel man stooped to stroke the black cat at his feet, little realizing that within a few days his hotel,

and every other hotel in town would be jammed to capacity, and that business would reach a peak unprecedented, and maintain it for several months to come.

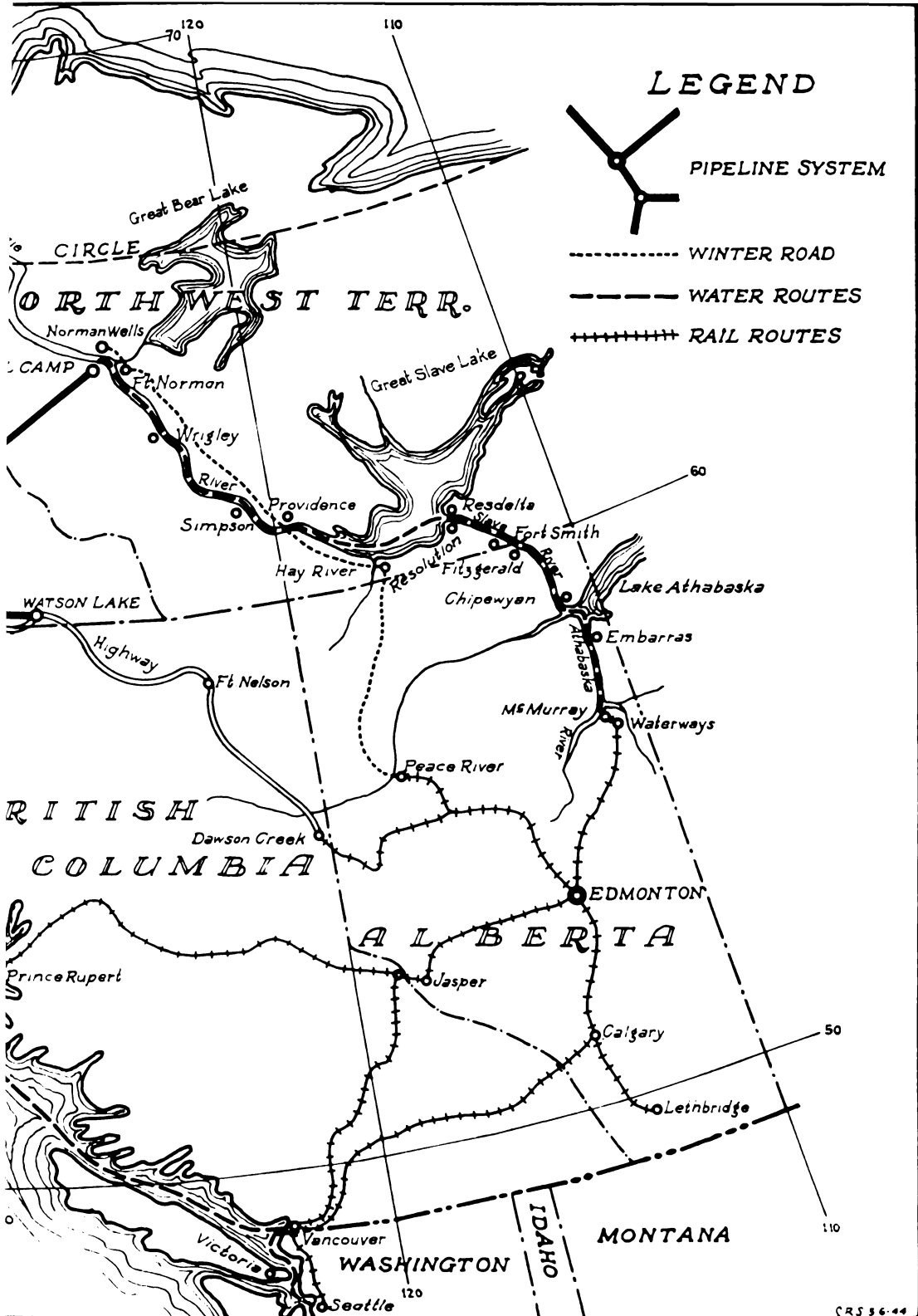
With the failure of ten thousand tons of vital freight to leave Waterways a crisis had developed. It could not be shipped by river, it could not be shipped by rail, road or air. Yet it had to be shipped.

There was only one way out. A road would have to be built. An overland route. A trail would have to be blazed through a thousand miles of bush, frozen muskeg, still, silent rivers and lakes, over ridges and rocks.



THIS IS THE CANOL PROJECT

It covered an undeveloped area one half the size of the United States.
 2,000 miles of road were pioneered—Los Angeles to Detroit.
 1,800 miles of pipeline were laid—Denver to New York.
 An Unknown mountain range was conquered.
 Over 25,000 men worked on it.
 It took 20 months.



In one respect the Constructors were fortunate. The freight had not arrived at Waterways. It was either in Edmonton or on its way up from the States. Within limit the location of the winter road was a matter of free choice.

The route from Waterways north would be impossible. But there was a rail line as far north as Grimshaw, a little town a few miles beyond Peace River. A passable road led north for about eighty miles. Beyond, a sort of tractor trail had already been blazed a distance of almost five hundred miles as far as Hay River Post.

On Oct. 3rd, 1942, Edward V. Lane, Chief Engineer for Bechtel-Price-Callahan, directed Project Manager, J. P. Shirley, Jr., to build the winter road. The order read in part:

"This covers the construction and operation of a winter road from Grimshaw, Alberta, to Hay River, North - West Territories, Providence, Fort Norman, and Norman Wells, with the view of hauling nine thousand tons of freight during the winter season over this road."

The work-order read further: "This work should be handled concurrently with other work on the east end of the project, and since it can be begun at a rail head, it will presumably interfere with none of the existing work."

All materials for the job were immediately requisitioned; a hundred and thirty more caterpillar tractors, six hundred pairs of freight sleds, twenty-three thousand drums of Diesel fuel, and much more.

A representative was dispatched to Washington to clear all priority materials. A second representative went to the manufacturing plants in the States to expedite the

construction and delivery of the sleds.

By October 15th the Peace River base was rolling. Men were hastily transferred from Waterways and met by the outgoing Peace River train ten miles out of Edmonton. This move was to insure against any delay which might result from vacation-minded employes.

But the Peace River project had hardly been undertaken before the immensity of the undertaking became clear. Besides the base at Peace River it would be necessary to have many camps and supply bases to service the forthcoming tractor trains, to serve as centres of refuge in cases of emergency, and as a protection against the severe and unpredictable adversities of the North.

The material for these secondary camps would have to emanate from Peace River, which was itself as yet hardly begun. Electric power would have to be provided at each camp; emergency repair equipment, hospital facilities, fuel to replenish empty tanks, supplies of all kinds, warehouses to hold the supplies, lumber and prefabricated housing material to build the camps. These camps would literally have to be loaded and hauled bodily to their locations.

And all this freight would be in addition to the nine thousand tons.

The camp at Peace River was in itself no simple matter. Bunkhouses would have to be erected. Mess-halls for hundreds of employees. Shops, laundries, a thousand-foot loading dock, huge warehouses to hold freight. An office building, office equipment, ranges, beds, kitchen supplies, and all kinds of materials imaginable. It was like trying to fill up a barrel drained by a hole leading to ten other smaller barrels. The other barrels were the line camps.



A trail would have to be blazed over a lonely uninhabited wilderness, for a thousand miles over frozen muskegs, still, silent, rivers and lakes.

And with the mushroom growth of the base, acute shortages developed. The "Canol Men" had taken over the Peace River Hotel, the Victory Hotel, the Town Hall, the Fire Hall, the Pool Hall, every available nook and corner. Still there was insufficient housing, insufficient heating equipment, and the weather was growing cold.

The superintendent asked urgently for heating equipment. Also for generators. "We should have at least two dozen large floodlights right away, as the days are getting very short," he said.

"Send us commercial laundry equipment, or if you cannot get these, send some domestic washing machines."

He stressed the seriously pressing problem of housing accommodation. "If we could get some of the cabooses this would help solve our housing problem."

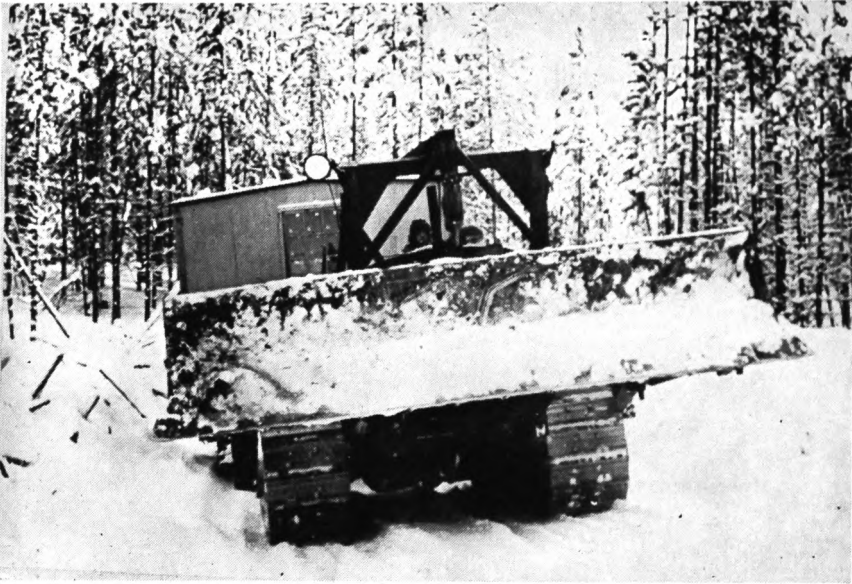
Carpenter shops in Edmonton swung into double shift. A mass production factory was set up inside a large circus tent, with two assembly lines of parallel sets of planks. Materials were piled all

along the way, skids, lumber for the sides, the roof, and the right type of nails at the right spots. Carpenters worked on both sides and on top.

At the end of the line the cabooses were hauled out and fitted with bunks, cupboards and stoves. Carpenters applied last minute finishing touches as the cabooses were being towed to the rail loading docks.

The following night these same cabooses would be in Peace River housing other carpenters from the cold. Within a few weeks their destiny would lead them for a thousand miles over a lonely uninhabited wilderness, across rivers, over lakes and frozen swamps, and finally into the valley and across the Mackenzie to Camp Canol.

The camp was one problem, building the road was another. To complete it in time to move the freight before the spring thaw would require progress at the rate of ten miles per day. Road crew No. 1 was finding it impossible to meet more than half of this objective. Crew after crew was dis-



Bulldozers cleared the trail.



That had been smashed open by other dozers before them.



1. Heavily laden tractor trains moved north.
2. Then came the truck convoys.
3. The men slept on the open road.
4. Journey's end. The first train into Canol.

patched to overtake its predecessor, to assist, and to carry on. On December 18th the thermometer sank to 65 below. On that record day of cold Road Crew No. 5 ventured forth beneath a cloud of steam and smoke. Not one tractor train had yet left Peace River.

The dozers pushed relentlessly forward. The crews progressed ever further afield. Winter grew bitterly cold. Supplies began to run low.

Lack of communication was an ever-present handicap. Messages serviced by the short-wave radio telegraph of the U. S. Army depended upon weather conditions, and were sometimes delayed as much as three or four days.

And food could no longer be supplied by truck. Eggs, milk, vegetables, liquids, or fruit of any kind, froze almost instantly. A new method had to be devised, to supply the men who were making the road, over which would move the freight, to supply the men at Canol.

A new type of truck was developed. The steel exhaust pipe, encased in another pipe, was brought into the body of the truck under a wooden platform, passing out the rear end of the body on both sides. Ventilators with adjustable shutters, which could be controlled by the driver, were placed near the top. By their regulation any desired temperature could be maintained for hours.

But the problem of supply, and the problem of building the road, were both only incidental to the problem of moving nine thousand tons of freight.

Nature was blocking the attacks upon her stronghold with every method at her disposal. She had not only come down with the severest winter ever known to the pioneers of the North, but she had denied the only asset she had to offer—snow! Huge caterpillars strained over the bare earth in places, almost pulling the runners from beneath the sleds.

The freight simply could not move.

On December 23rd when the first freight tractor train left Peace River, it had become apparent that tractor trains could never do the job. Snow had already delayed too long. It might delay longer.

The prospect was disturbing, frightening. Was the whole Peace River venture to develop into one colossal blunder? The realization that it was tottering on the brink of failure brought a sinking feeling, a touch of desperation, such as might be felt by a General when he sees his forces reel back, and watches them waver in the balance between victory and ignominious defeat.

There was only one possible way out—trucks. But the road as constructed had been built with the thought of tractors only. Could trucks carrying anywhere from two to ten tons take the beating such a trail would inflict?

Road crews went to work with redoubled effort to improve the road. Every available truck was secured. Private carriers volunteered.

Convoys began moving out of Peace River, and slowly the tide of battle turned. The trucks were

getting through. In the severest winter on record, in temperatures of 50 and 60 below zero the convoys crawled along the earth like ancient caravans; — unloaded, and returned for more. Huge stacks of freight piled in the yards at Peace River began gradually to dwindle and disappear.

The trucks moved only as far as Mills Lake. But that was half the distance. Part of the freight could be taken the rest of the way by tractor train, and the remainder could be moved down the Mackenzie fully six weeks before the ice would honeycomb and rot on the surface of Great Slave.

In the meantime the tractor trains trudged on, some of them twenty-four hours a day. Cooks prepared meals inside the moving cabooses.

One cook said: "Five times I had baked beans ready for dinner, but we did not have baked beans that day." In some places the road was very rough.

The bulldozers would clear the trees and all before them as they went. Another cook said: "I quit for the eleventh time when the butt end of a tree came smashing up through the floor of the caboose, hit the stove smack in the middle and went through the rear wall."

And then there were the long bare stretches of mud when the Chinooks plagued the tractor trains.

In spite of the difficulties operations were pushed through. The leading road crew from Peace River made junction with the men working down from Canol, near Blackwater Lake. But it was no joyous occasion. The leading bulldozers toppling the last trees that separated them, perhaps in the desire to hasten the junction, perhaps because neither wanted to be first

to give in, collided their monster machines solidly, head on.

Instantly both operators jumped to the ground, each blaming the other. Only swift intervention prevented what should have been a joyous junction from developing into a good old-fashioned slugging match on the spot.

But now the road was open, and now the trains moved through.

A great exodus of men from Peace River poured into Canol, as winter rapidly gave way to spring.

The last freight left the great winter base on April 4th. Ten mil-

lion ton-miles had been accomplished! The operation had cost in trucks and tractors and equipment. But the operation had been a success. The critical situation caused by the failure of freight to leave Waterways had been overcome.

Peace River, which had skyrocketed so amazingly, faded into oblivion in May. But Peace River had served its purpose. It had sustained the infant camp at Canol, struggling for its existence, and had supplied the materials which would facilitate its growth into the large throbbing centre it was soon to become.

Men Against Ice

It was New Year's Day, bright, but fiercely cold, in Edmonton.

"I hear they haven't even got the pipe up there yet," said the restaurant owner to his friend.

"No, they haven't. Fellow I know says there's miles and miles o' pipe at Resolution Delta. Wonder what they been doing, anyway?"

"Search me. They been up here since June, and haven't even got the pipe moved yet."

Eight thousand tons of pipe lay piled at Resolution Delta on Great Slave Lake.

It had been brought up the Slave River on ponton rafts. Pontons are like pontoons used on airplanes, except the ponton is open at the top. The army had a large number of these rafts which could not be used to transport ordinary freight, so it was decided to utilize them in transporting as much of the pipe down river as possible. The pipe was piled at Resdelta to await shipment when all urgently needed materials had been brought forward.

The Mackenzie River breaks up in May, but on Great Slave Lake the ice lingers and rots. So lake navigation does not open until July.

If the pipe could be brought across the lake while the ice was still solid, it could then be taken up the Mackenzie in May, and six weeks' time would be saved.

But the constructors were more than fully occupied with the many other points on the project, and the vitally important job of moving the freight from Peace River north. At the same time the bases at Prince Rupert, Skagway, and Whitehorse were in full swing, involving tremendous construction and strain on resources and equipment available.

An arrangement was made with an Edmonton sub-contractor, Ingraham Bros. They were to undertake to move the eight thousand tons of pipe, but Bechtel-Price-Callahan would assist in every way possible, supplying fuel at cost, parts, and considerable equipment.



8,000 tons of pipe had been brought down river on ponton rafts as far as Great Slave.

A huge lake like Great Slave lake does not present a smooth surface of ice like a skating rink. If you set a glass of water outside in sub-zero weather the water will expand and break the glass. But a lake is contained within its shores, it cannot burst its container. Nevertheless, the water must expand, and there is only one possible direction—upwards.

Consequently numerous pressure ridges are formed. The ice rises in a sharp "V", cracking at the top, often leaving an opening down to the water below. The ridges rise twenty or thirty feet to the height of a two- or three-storey house. As long as the ice is increasing in depth and freezing is continuing, expansion is continuing, so that these ridges may develop at any place and at any time. But ice is very brittle, and the disturbance and increase in surface caused by these ridges results in the development of cracks as well.

A crack, of course, by its very nature comes instantly. It may be wide to begin with, or it may widen to a width of several feet.

If the ice splits suddenly under a tractor, the tractor drops into the lake.

The snow falls on the film of thin ice which forms immediately over the opening, and hides it from sight. To insure against being swallowed up by the lake, a tractor starting out on a new road is always preceded by a man on foot. This may not be easy on the nerves of the man, but ice freezes quickly, and unless the crack is very recent it will be strong enough to support the man.

This constant hazard played on the minds of employees. The thoughts of the possibility of being gulped into the belly of the lake while they slept peacefully in their cabooses turned the nerves of many. They could not sleep, and remained constantly on edge, ready to jump at a moment's notice.

The chance of a crack developing under any particular piece of equipment was slight. The knowledge that it could happen was the greatest hazard of all. Only the experienced Canadian employees of



The ice on Great Slave buckles and forms huge ridges which stopped the tractors dead in their tracks.

Ingraham Bros. were able to rest in complete disregard of the lake and her whimsical tricks.

But cracks do freeze over and become firm again. The ridges are the great barriers of transportation. They are too steep for trucks. Many are too steep for caterpillars. Occasionally a tractor would fall and wedge between the cracks on top. These tractors would have to be rescued by other tractors, and trains would have to detour, perhaps several hundred yards, until they had passed the ridge. Only then could forward progress be resumed.

A train might travel 150 miles across the lake over smooth ice, in record time, only to find itself blocked on its return, by innumerable ridges and impassable drifts.

At first much time was lost by the constant meandering of the trains being forced each trip to take a different route across the ice. Trains of loaded sleighs were forced to travel as far as fifty miles out onto the lake, snaking back and forth in an effort to find a way through.

The weather was cold, bitterly cold. On the great open stretches of the lake, there is nothing to break the wind and the blizzards are as furious as anywhere known on earth.

On January 25th a train far out on the lake was caught in one of these blizzards. Visibility was suddenly reduced to a few feet. The train wandered back and forth in an effort to find a way through, but it was caught in a maze of ridges rising on every hand. After many hours with fuel supply almost exhausted, the freight load was abandoned, and the caterpillar and caboose arrived safely at Hay Lake on the other side, but empty handed. Without the load the tractor had been able to negotiate the lesser ridges and get through.

But a solution for every difficulty so far encountered had been found. And there was a solution for this. The company organized a road and bridge crew to assist and hasten the Ingraham operation.

This crew, having once set on a definite route, undertook to bridge all the ridges, and keep them bridg-

ed. Not across the top — the ice was cut down within the ridge. Planks were laid across the lengthened gap, and an approach built. Water was then poured over the planks and they were frozen solidly within the ridge.

But nothing on ice is permanent. The ridge might heave, displacing the bridge. New ridges might arise. In each case repairs and adjustment would have to be made.

Not even the path through the snow was permanent. A trail cleared of three or four feet of snow, two hours later, might be filled in so completely that there would be no sign any moving thing had ever passed over it.

But with the aid of a snow plow at the head of every train or group of trains, and with the maintenance of one definite road, freighting progressed rapidly through March and April.

Then came an unprecedented thaw. On April 20th loads were travelling in nearly two feet of water on the surface of the ice, which, although it was still thick well out on the lake, was getting extremely dangerous near the shore.

During the last days there was some anxiety in getting both men and equipment safely ashore, but convenient land points were found, and all pipe and equipment safely stored until it could be moved by water later on.

Over five thousand tons of pipe had been freighted across the ice towards Mills Lake, where in Mid-May it could be loaded onto barges and taken up the Mackenzie.

Thus the danger of an early summer shortage was averted.

During all the operations not one life was lost on Great Slave Lake.



Ingraham Bros. world record load—420 tons over natural ice by one caterpillar D.8 tractor making its own road.

Pipe Across the Mountains

At last the man had moved the last stick of furniture away from the bookcase.

He now no longer stood out at arm's length, pressing with his finger tips. He was bent forward with his shoulder to the ledge, ready to apply every ounce of strength that he possessed.

The process of "getting there" was finally over.

With the influx of hundreds of men and machines from Peace River, in addition to hundreds of men flown in by air, Canol in the spring and summer of 1943 became a huge thriving centre. Then in May river traffic opened up, and the base began to mushroom as amazingly as Peace River.

The camp-site was moved from the river's edge to a level location further up on the thirty-mile flat that sloped toward the mountains.

A large office building to take care of payrolls and the administration of a 2,000 man camp was put up, an 800 man mess-hall capable of two or more sittings at each meal, warehouses for supplies of food, cigarettes, clothing, and all the requirements of a civilization of 2,000 people. Besides this, all the repair services, stock rooms, and material necessary for the tremendous amount of equipment used in pushing a road and pipe-line through a piece of the most rugged territory found anywhere on earth.

Female office help was flown in during May. Igloos to house 70 or more girls were put up, laundry igloos, recreational igloos. Central heating systems were installed

electric power, moving picture facilities.

Igloos are half oval shaped structures which avoid the necessity of studding. They also provided the housing for the men at the new camp. All igloos were pre-fabricated at the factories or in Edmonton, and shipped up the river in the spring.

Under the direction of Everett Seabury, Project Manager for the Contractor, the road and pipe-line pushed forward during the spring and fall, and in spite of swamps, muskegs, mosquitoes, and the flies.

Many stories instantly sprang up about the size of the mosquitoes. Some claimed to have shot them down on the wing with twenty-two rifles. Others said that roast mosquito breast was a delicacy unequalled. One employe swore that he had a pet mosquito, who of an evening would alight on his shoulder and veritably sing like a bird.

The method of making the road was to use giant bulldozers to scrape off the surface of eighteen inches of moss and scrubby timber growing upon it, and push it all together into a pile to form a roadbed roughly twenty-two feet wide. The insulating moss prevented the bottom from thawing, and so guaranteed a permanently frozen solid foundation.

After this primary grade was built, loads of sand and gravel were packed upon it to make a firm all-weather road. Sometimes when making a side-hill cut, the whole side-hill of moss and trees would slide upon the slippery ice-like base



Mushy sidehills slid down over the new road.

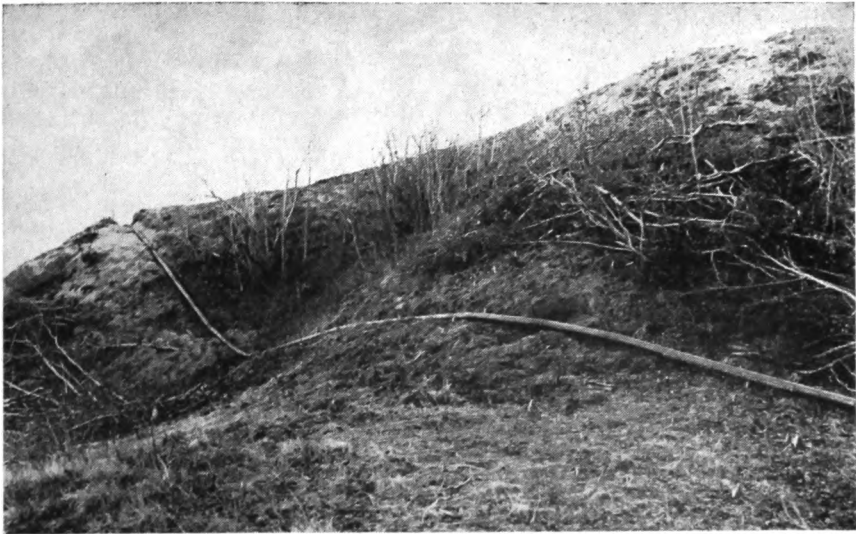
on which it lay, and come hurtling down upon the newly-built grade.

But the constructors were there in force, and every obstacle fell before the relentless pressure. The road snaked on up through the mountains. Porters' abandoned winter equipment 106 miles out of Canol was overhauled and retrieved in September.

Behind the clearing crews moved the trucks with gravel. Behind the the finishing crews came the trucks with pipe, laying it along the road. Behind them the welding crews. Behind the welding crews came the telephone crews, digging holes, sometimes in rock, sometimes in swamp where special supports were necessary, and sometimes in frozen ground. Behind the pole crews came the wire stringers, and all groups forged forward to make the anticipated junction with the men working towards them out of Whitehorse from the west.



But the pipeline forged ahead.



And snaked on over the mountains.

Pipe Across the Mackenzie

At Canol the Mackenzie is four miles wide and from fifty to seventy feet deep, depending on the season. Norman Wells is on the east side of the river. There the pipeline begins. The Mackenzie is the first formidable barrier to be overcome.

The problem was to lay a length of thirty thousand feet of pipe on the river bed below.

Pipe was welded together in single lengths of about a fifth of a mile. Out in the river between Camp Canol and Norman Wells lie two small islands, Bear and Goose Islands. A cable was hooked to the first length of pipe, and the other end to a tractor on Goose Island. The tractor then backed up on the island, hauling the pipe down into the river until its far end rested on the shore. Here the next end was welded to the first. Again the tractors moved west. By taking new

holds, length after length was welded on until the entire four miles of pipe lay on the bed of the river, its ends extending up on either shore. On both shores deep trenches were dug in the banks of the river, and the pipe was let down into the trenches and covered.

In the spring the Mackenzie becomes a grizzly monster on the rampage, with thousands upon thousands of tons of ice, creaking and smashing, over-riding, in a mad effort to get down to the sea. Any exposed pipe would be instantly ripped out of the sides of the river unless it were protectively buried in its banks.

But the action of the current kept the unanchored pipe constantly rubbing against the rocks. Breaks developed continually. Boats with huge grappling hooks had to go out into the river and lift the entire four-mile length

bodily out of the river, find the break, repair the line, and lower it again.

The solution came with the employment of a deep-sea diver who walked the line on the river floor,

reported the spots where the pipe rested against the rocks. Once these spots were known anchors could be put down to hold the pipe in place and render it thus relatively secure from current action of the stream.

Pipe Across the Yukon

Robert W. Service made the Yukon famous; wild, rugged, and rebellious, the land of the intense cold.

The Canol Project has laid the Yukon low. The Canol Project and the Alaska Highway have tied the Yukon down with a net of pipelines and a road. At last it has been tamed, made docile, and now it bows to the will of man.

The Alaska Highway really broke the Yukon first.

To begin with, there was a road from Edmonton to Dawson Creek. The U.S. Army moved in, put its shoulder forward, and in a few months pushed the road through for 1,600 miles to Fairbanks. In this respect the Highway differed from the Canol Project, but it was of immeasurable assistance.

It connected Edmonton with Whitehorse. After it had been completed, Canol freight could move north without obstruction the year round.

But until it was completed as far north as Whitehorse, supplies and freight went by rail to Prince Rupert, then to Skagway by boat, then by rail to Whitehorse. So Prince Rupert became an important base early in the project, and Skagway, and considerable construction was necessary in the establishment of each, a construction comparable to the establishment of Waterways.

With the completion of the Highway, Dawson Creek became the most important intermediate base for Whitehorse. Prince Rupert and Skagway gradually dwindled. Their facilities as trans-shipment points had already been constructed. One or two hundred men could handle all the freight that came by rail, and by boat up the B.C. coast.

At first Whitehorse's only purpose was to work east to meet Canol.

Then came the contract extensions. The constructors were ordered to put the pipeline through to Fairbanks, to Skagway, to Watson Lake, several hundred miles of pipeline, more than double the mileage on the No. 1 Job between Canol and Whitehorse.

But the great difference lay in the fact that the Alaska Highway had already been built. To lay the pipe along an established road or through well-developed country is no job at all. The extensions to the original project were pushed through in a few weeks, long before the main line between Canol and Whitehorse could hope to join.

So the immensity of the undertaking never did lay in the building of a pipeline. The job was "getting there", clearing the decks, exploring the country, building the road. The pipeline then was simple.



Each truck is carrying half a mile of pipe. With the completion of the Alaska Highway, freight moved smoothly to Whitehorse.



At Canol it was different.



Through the luxuriant growth of a Yukon forest.

That is not to minimize efforts of the men who worked on the West side, or the organization of those efforts over such a vast network of rivers and lakes and mountains. The men who were forging east to meet Canol had essentially the same type of job. The cold was severe. After they had left Whitehorse, they too were isolated in camps 100 or 200 miles from any centre. They, too, lived and slept in cabooses, and worked twelve to twenty hours a day. Their story is essentially the same as the story of the East Side, except that they had a well-established base behind them, and the country was not as rugged, and it was not unknown.

The difference between the East Side, and the West Side, was that

Whitehorse was accessible. Canol was not. Whitehorse handled the several projects simultaneously, built the refinery, employed thousands of men. Canol handled only one.

And while all this was going on, it would have all come to naught except for the valiant work done by the Imperial Oil Company of Canada and Noble Drilling in uncovering the great oil reservoir on the east side of the Mackenzie, the life-blood of the Great Northwest.

And the consummation of the efforts of all these tremendous undertakings could only be realized by that one instantaneous but all important event that would take place in the flickering of an eye—Road Junction!

Road Junction

The deadline set by the U.S. Engineers for the junction of the road between Whitehorse and Canol, was December 31st, 1943.

Near the last crews from both sides were working night and day. They were favored by one of the warmest winters on record. It seemed as if Nature, having spent all her spite and strength during the first months of furious resistance, had now little fight left in her, and had resigned herself at last to the domination of man.

During the day of December 30th the Canol crew broke down. Seven miles still separated the two outfits. Knowing that this distance could easily be cleared the next day, the Whitehorse crew did not work that night. They had brought up their photographers to record the historic junction in grand and fitting style, to preserve forever the historic moment when the last tree should fall, and the leading Whitehorse bulldozer break dramatically into the Canol clearing.

But fate had decided against such a moment.

For Everett Seabury, in charge of Canol, learning that his lead crews were ingloriously out of ac-

tion as the great moment drew near, sent back a hundred miles down the line for two more of the big bulldozers at top speed. The caterpillars hustled on in their fast double high through the darkness of the night. They passed the slumbering Canol crew, charged on into the forest.

They toppled the trees in the moonlight, smashing through to the honor of Canol.

Suddenly they burst through into a clearing, into the midst of a sleeping camp.

The cook got wearily from his bunk and made them a pot of coffee. It was three o'clock in the morning.

"And how is the road from Whitehorse?" the cook yawned.

The two operators glanced at each other.

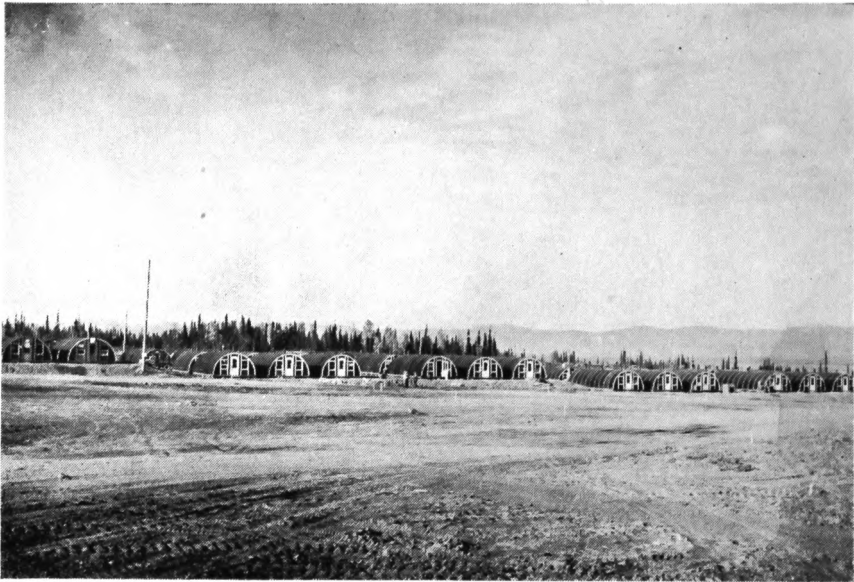
"From Whitehorse?" said the one. "Hell's fire, we're from Canol!"

The next morning the disappointed photographers returned to Whitehorse. It was the second great junction that had gone wrong. A couple of unsuspecting bulldozer operators had spoiled it all.

Fort Norman Oil

Seepages of oil along the Mackenzie were first noticed by Alexander Mackenzie when he sailed down the river to its Arctic mouth in 1789. The possibilities of an oilfield were discussed from time to time, but it was an inaccessible region, and not until 1920 was any serious investigation undertaken.

In that year the Imperial Oil Company brought equipment up the river to a spot some fifty miles north of Fort Norman and sank the first well. At a depth of only 783 feet a flow of oil amounting to 100 barrels per day capacity was uncovered. The well was later deepened to a thousand feet.



They lived in igloos.

To-day the great majority of the wells produce oil at this shallow depth, ranging between one and two thousand feet. A ten barrel a day flow was in one case discovered at a depth of only a hundred feet. Oil at a level so near the surface is remarkable considering that many fields, Turner Valley included, require drilling to eight or ten thousand feet. The expense of sinking wells in the Norman region is naturally considerably less than in the deeper fields.

In 1942 when the sudden desperate call for Northwestern oil arose, the Norman field was the only field whose possibilities had been even partially investigated. Even so, only four wells were in operation. Five had been drilled. One turned out to be a dry hole and had been abandoned.

No one could say just how good the field would reveal itself to be, but indications were favorable, and geologists were hopeful that the

required quota of 3,000 barrels per day could be met.

Norman Wells has surpassed all expectations. Already production of 20,000 barrels daily is in sight, and more may be discovered. Geology has been kind to the Canol project.

To-day's history was made many millions of years ago, during what geologists call the Paleozoic era—the age of life.

The oil-rich cavities one or two thousand feet below the surface are sandwiched between layers of sediment laid down during this era. It was the first time that life had become really abundant upon the earth. The sea literally swarmed with billions upon billions of swimming organisms. As these organisms died they sank to the bottom, and additional billions settled down upon them. Layers of sediment covered them over and preserved them. Later great pressure and heat were applied, and the oil from

these organisms was squeezed out, and found cavities or caverns between the layers of rock. Such is the source of the fuel which to-day drives our automobiles and ships, and sends our planes skimming through the skies at the rate of five hundred miles per hour. Geology has been kind to the Canol Project.

The oil at Norman Wells is of

remarkably good quality. Paraffin base oil, it will not freeze down to 80 degrees below zero, and such a temperature has never been recorded even at Canol.

At Whitehorse the crude can be received the year round and refined into first class aviation gasoline. It is available in quantity. It leaves little to be desired.



The two lines nosed together for the final weld on February 16th.

Oil to Alaska

In one of his early reports, Dr. Hume, Canadian Government Geologist, expressed the belief that the greatest possibilities would develop on the west side of the Mackenzie River. So far this area has not even been touched.

The extent of the Norman field is as yet unpredictable. No one can say what great quantities of oil may be available to Alaska. No one can say what far-reaching results this oil may have on the development of Alaska. But Alaska, situated as it is, on the roof of the world, bids fair to become one of the world's greatest strategic locations, both in time of war for its offensive capacity, and in time of peace as a cross-roads for global air traffic.

One thing is certain. The back of the Northwest has been broken. The sting has been removed. It has been tamed and made manageable

at last. If at any time in the future it seems advisable to build a larger line from Canol to handle the increased oil available, this can be accomplished without difficulty. Already the freight which formerly depended on the water transportation system, now flows regularly up the Alaska Highway to Whitehorse, and then across the mountains to Canol.

On February 16th the two lines nosed together and the final weld was made.

Now the pumping stations have begun to hum, and the precious liquid is being lifted five thousand feet over the divide, down the other side to Whitehorse and the refineries, and throughout the pipeline system.

One of the greatest engineering feats in the history of mankind has been completed.

Pictures through the courtesy of:

Number 4, page 25, P. A. Harris;
Top picture, page 32, Garland Gray;
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