IN the mysterious distance of Ungava a railroad 357 miles long was built in the 1950's. It was given C.T.C., diesels, and ore cars and told to move iron ore. The Quebec North Shore & Labrador does this job in 16,000-ton trains and delivers up to 15 million tons of the red earth from tundra to quayside in a year. The names of vacant romance — Sept Iles and Knob Lake — now echo to the thunder of General Motors Diesel exhaust that incessantly moves 125 ore cars mounted upon the silent ease of roller-bearings. The gray diesels speak of the new land, and their intense power foams a new tradition on QNS&L's length controlled by C.T.C.

TRAINS is proud to publish the railroad whose story so eloquently proves what the magazine has stood for

E. N. SMITH AND F. M. GREENWOOD

IN the far northern reaches of Quebec and Labrador a streamlined iron ore hauler moves ore south to dockside seven months a year. The Quebec North Shore & Labrador Railway was built in a manner to contradict any claim of the obsolescence of railroads. Her gray Geeps haul identical rows of dark ore cars across a land of incredible loneliness, for in her length there is no permanent civilization except for the mines at her end of track. North of her terminus the Arctic tundra screams away relentlessly to the shores of Ungava Bay; even her southern terminus touches only a land of the isolated fisherman.

But Sept. Iles has now changed its cloak. The bleakness of the old fishers' church countenances new department stores, and new split-levels house the personnel of the QNS&L and of the parent Iron Ore Company of Canada. In the distant northwest of Pennsylvania there is another ore road of equivalent size, the well-known Bessemer & Lake Erie. In comparison the QNS&L shows the efficiency inherent in the railroading of today when modernity is exploited for its advantages. The new road rolls 16,000-ton trains, and with 2979 cars rolls approximately the same tonnage 357 miles that keeps 9035 ore cars utilized on the 208-mile U.S. road. Each rolls up to 15 million tons of ore per year, but the Quebec road does it at a fantastic 40 per cent operating ratio (1958) against 67 per cent (1957) for her Pennsylvania sister.

"Ore by '54" was the cry. Mesabi had limits and America needed more iron. Ungava had it — Ungava and the "Labrador Trough." The reports coming in were that geologists could not delimit the vastness of the reserve. But how was iron ore to be fed to the voracious steel plants from a land that the Indian does not fully know?

In 1950 the solution to the riddle became imminent as the big spreads met: Hanna Corporation, Republic Steel, National Steel, Armco Steel, Youngstown, Wheeling Steel, and Hollinger-Consolidated. From the multilateral marriage the child emerged: Iron Ore Company of Canada. Its purpose: ore by '54. Plans were formulated and they included a loading dock capable of serving the largest ore carriers afloat, mines to be opened on the heart of Ungava, increased pressure on governments for the St. Lawrence Seaway, and a railroad — Quebec North Shore & Labrador.

Decades had passed since the last railroad had been commenced. Perhaps the art and the men who build railroads had passed from the North American scene. No university gives degrees in railroad construction as they do in aeronautical, electrical, even pipeline engineering. But the railroader — and his aura of romance — lived on, quietly confident of the ability of his craft. Unwatched by the public he had modernized and streamlined his century-old beast of burden, and now he was turned loose again and told that he could still do the best job of all. He was told to move as much as 15 million tons of iron ore in seven months and told to do it in the manner that would perpetuate his craft in these times of efficiently bleak economics.

Private enterprise went to work, pouring 260 million dollars into the ore project. This railroad was built from the air, and the operation remains the largest civilian airlift to date.

The mines are the guts; the steel plants the waiting hands; the railway the life stream nourishing both. To a first-rater there seems little use in constructing the traditional development railway as cheaply as possible, upgrading as traffic increases. The iron was there, consumption guaranteed, and there was money in the coffers. With such backing, the first-rater thinks on the grand scale. Let loose in northern Quebec and Labrador he has produced a first-class railway, constructed in record time through hard country — an engineering masterpiece well able to operate at full capacity for many years to come and to be financially secure.

The construction history of the Quebec North Shore & Labrador Railway reads like an object lesson in man's control over nature. Think back a few years to the war-wealthy world of 1945. The place was Sept Iles, a small French fishing community on the north shore of the St. Lawrence River. For centuries the inhabitants had gathered the small bounty which was their lot as isolated mariners, and had remained indifferent to the outside world. The outside world, in turn, had long remained apathetic to
The reconnoissances men set out in canoes; when summer passed dogsleds were made ready for the hard winter months. As they went, the parties saw the Pre-Cambrian rock, mountainous, resistant. They saw the muskeg wastes, unwanted, uninviting. They could hardly help but wonder: at the immensity of it all. Through here — along the valley floor — the railway was to run, following the water to find the best route. Man was to move more than 15 million tons of iron ore a year over this 360-mile stretch, which could be navigated only by canoe. This was a land, but after all the work was over the railway would dominate its desolation. Rock slides and washouts would threaten man's invention, but the QNSL would face these problems with a determination which would make them insignificant headaches causing but short delay. Mile-long ore trains — sparkling new, steady of foot — would demonstrate man's power, was with aristocratic bearing they headed to the shore and the booming city of Sept Iles, 10 of them each day.

With the surveys complete and the contract awarded in September 1950, there began the amazing story of the construction of a mid-20th century railway, complete with all the mid-century trappings. To build quickly in the isolation of the eastern north, 13 airstrips and a series of tote roads were constructed along the right of way. In winter the heavy snowfall made haulage by tractor-train uneconomical, and 18 airplanes, mostly DC-3's, were called upon to shoulder the heavy load. Supplies could be brought to Sept Isles by ship from April 15 to December 15, and this period was used for the transportation of heavy equipment. Less bulky materials (170,343,000 pounds of them from 1951-1952) traveled the winter route to Mont Joli on the south shore by rail, then 145 miles by air from Mont Joli to Sept Isles, which at the time was inaccessible by road.

Rock, clay, and muskeg confronted the builders along the chosen route. Between Miles 12 and 17, 600 tons of dynamite was required to remove over a million cubic yards of solid rock. In the first 100 miles, about the crystalline shield, sat several thick patches of clays and silts deposited eons ago by glaciation and marine invasion. This material, which becomes unstable in the presence of water, had to be excavated at considerable loss, for it was unsuitable for fill. It was also the cause of the major constructional setback when the southern portion of the roof of the tunnel at Mile 12 gave way and 60,000 cubic yards of silt flowed out the south portal. An additional 40,000 cubic yards was removed by means of a hydraulic jetting, which cleared the south opening well enough to cap it with concrete. Muskeg sinkholes in Labrador, although not overly deep, are many. It took a total of 68 tons of dynamite to blast open 90,000 feet of ditch. The work in the muskeg section was greatly aided by aerial photography which allowed speedy differentiation of various types of coverage. A muskeg hole has many layers. The top part consists of mossy covering over a rooty, woody layer. This lies over 3 feet or so of black muck. Under this, more solid material, mainly sand or gravel and sand, makes a tightly packed glacial till matrix. The two top layers were dynamited and then bulldozers and scrapers went to work piling up material from the till base. In this way a solid enough base for the grade was established.

If the removal of rock, clay, and muskeg was carried out with impressive speed, the operation really moved into high gear as the way was cleared and built up, ready for track-laying. On a good day over 10,000 feet of track was laid using a method immensely more efficient than the top-heavy devices so often employed in the past. At the last siding behind the end of steel, skeleton cars made up of a pair of trucks joined by a low steel frame were loaded with rail and the day's supply was pushed out to be laid on a skeleton crib of ties by a crane. As each rail car was unloaded the crane speedily set first the frame, then the
trucks off in the ditch, and proceeded to work on the next car. When the day's operations were over the cars were reassembled and pulled back to the siding.

All in all, 58 shovels, 52 scrapers, 180 tractors, 200 trucks, 33 dumpers, a fleet of airplanes, cranes, and sundry other equipment did the job which included the building of 19 bridges, 5 of them steel, excavating of two tunnels, the laying of 440 miles of rail, and the spreading of over 2 million cubic yards of ballast.

Unaccustomed as the QNS&L is to ritual, the railway did not neglect the hallowed hammering of the last golden spike. Mineral magnate Jules Timmins drove it home on February 13, 1954, to make "Ore by 54" a reality. The proof of the pudding is of course in the eating, and the proof of this pudding was the year of 1955, which it was hoped would give 7½ million tons of ore. The QNS&L began its existence by moving almost 9 million tons, after moving over 2 million in 1954.

---

The railroad that hibernates

An unaccustomed accountant would balk and blurt out, "I've heard of traffic peaks, but this is ridiculous!" The reason for this astonishment is the most intriguing feature of the QNS&L. The blatant child of capital enterprise that rolls up to 9000 loads a week in the summertime becomes in winter's depths a slender battling subsistence route to an isolated town, hauling a scant hundred cars weekly. This tremendous ore traffic is seasonal, governed by ice formations in the bay, the necessity of stripping in the mines for headlong summer production, and the controlling factor of the freezing of ore in the cars due to unrelenting sub-zero weather along the tortured length of the railway. The mines are on the barrens, in the relentless grasp of the Arctic cold; hence this single-commodity railroad rolls her long, identical ore trains only 7 months out of 12, and in this time peurs up to the 1957 record of 15,500,000 short tons of ore into Sept Iles. To do this the QNS&L delivers over 1000 loads of ore each day to the Gulf of St. Lawrence port which is beautifully protected by the several small islands that Jacques Cartier named the Round Islands as he touched there in 1535. This ore arrives in up to 10 16,000-ton trains a day, a consistently monstrous weight rivaled by few railroads in the world. Venezuelan ore carriages are the only steady rival. The ore is mined at five mines that straddle the Labrador-Quebec border in the Knob Lake region of the Ungava district. The single mining town is Schefferville, sired by Iron Ore Company of Canada. Silver Yard, the QNS&L's end of track, is at Mile 337. From the yard spurs radiate a few miles to the tightly bunched mines and 4 miles to Schefferville, perhaps the only model town in America lying north of the tree line. The ore, crushed to 5-inch maximum, is fed into cuts of hoppers, 40 cars long, as they pass beneath the chutes at the pitheads of the open pit mines.

A new development 60 miles west of Mile 224, on Wabush Lake, is now being exploited. Track-laying began last winter on Wabush Lake Railway (owned 59-50 by Iron Ore Company of Canada and Wabush Iron Company), which will undoubtedly be operated by QNS&L. By 1961 this line will swell QNS&L's iron ore total by 6 million tons a year of 66 per cent concentrate ore. Soon after this Canada is expected to jump to the No. 3 position among the world's iron ore producers; she currently is in fourth place.

The iron ore now accounts for 93.5 per cent of the QNS&L's ton-miles, and this percentage is expected to increase with Wabush. The ore is dumped from the welded ore cars in a rotary dumper at Sept Iles. Sixty-inch conveyor belts can either stockpile the ore or load it into vessels tied up at the 800-foot loading dock. With the opening of the St. Lawrence Sea-way the largest lakes can now reach Sept Iles, and approximately 20,000 to 25,000 tons of ore rides each vessel. The twin loading boom of the ore dock can deposit 8000 tons per hour in a vessel; in 1958 33,160 tons were dumped into the Ore Chief in 7 hours. The speedy loading of the boom method brings heavy traffic to the remote and desolate port; usually a fleet of ore carriers ride silently at anchor in the bay — to depart laden before the following dawn.

The rich redness of Ungava's heartland is now rolling across the sweep of the hollow barrens, and the density of traffic on the slim string of man's creation is expected to vary inversely with the slow exhausting of Mesabi. One of the greatest deposits of high percentage ore in the world, Ungava can substantiate the industry's expansion for centuries. The frequent passage of the hushed ore trains piloted by their gay Geeps may be only a forerunner of the ore to be moved south to St. Lawrence river ports. At the moment less than 30 miles west of Sept Iles American steel interests are pushing another ore road 250 miles into the interior.

How much does the QNS&L cut back in the wintertime? Ninety-nine per cent of her traffic rolls over her line in less than eight months, the remainder solemnly shuffling along the high iron in the bleak darkness of the moonlit winter. The line waits in anticipation during the winter for the hectic summer rush, when the QNS&L changes her status from that of a lightly trafficked bush line (albeit one with C.T.C.) to that of a heavy-duty, frighteningly efficient iron ore hauler. In this seven-month period the QNS&L piles up enough mileage to rank as Canada's No. 3 traffic hauler behind the two transcontinentals, while the northern ore hauler more than doubles the average train-length of the giants.

In winter many yard tracks and sidings are allowed to drift over and to lose their identity to the swift slash of sweeping snow. As a common carrier, however, QNS&L's line is kept open to carry the remainder of her traffic which is a constant proposition. These are supplies for the mines, the Knob Lake district, and for new developments being opened along the line. Approximately 60 cars are rolled north in the weekly freight train; and express and perishables go north twice a week on the "express," a pseudo-passenger train with a few box cars in her consist, which makes the run from Sept Iles to Schefferville in 10 hours.

If such a variation in traffic density is unusual so too is the fact that QNS&L is a railway without interchange. Her tracks begin at quayside and end at pithead, crossing no other rails in their lonesome length — indeed crossing only one public highway, the road to the airport at Sept Iles. The nearest rails to the iron ore road are across the Gulf of St. Lawrence in Gaspe, or over 250 miles downriver near Quebec City. To leave Sept Iles is to go "outside."
How to build a railroad from scratch

The Quebec North Shore & Labrador built ab initio in the 1950’s is a railroad completely under plan. Constructed in a modern era, QNS&L is not the result of long years of upgrading but is a railroad in a test tube, a new design drawn from experience and placed in operation. Everything was planned to do the job demanded and to be ready to accept normal expansion without alteration of the main line. Every tie plate was laid to carry the potential load.

The mines are beyond the mountains; therefore the railroad had to run through the Laurentide Plateau. By using the valleys of three rivers, the Moise, the Nipissis, and the Waconia, the maximum gradient north is 1.32 per cent compensated for curvature. The 1 per cent grade is limited to 40 miles northbound, and there is none southbound. Although the grade is not impressive as a percentage, it is long, wrapped around a canyon wall, and frequently curved as much as 8 degrees. Out of the canyon the line crests 2066 feet at Milepost 150 and drops only 300 feet to the end of track. On the plateau 3-degree curves are the maximum. The empties are lifted over the mountains, and the loaded ore trains fight a ruling grade of only 0.4 per cent as they head to tidewater. For level running on the plateau, the line frequently is laid beside lakes, such as 70-mile-long Menihek Lakes and 30-mile-long Ashuanipi Lake. However, the line is inclined to a rolling profile and the train crews must be alert for slack action lest the trains shove themselves over the speed limit.

The rail is 132-pound steel — as heavy as any in Canada — set on 24 creosote-treated ties to each rail length. The ballast at construction was 18 inches of 6-inch maximum pit run and 18 inches of 2½-inch maximum pit run. Permafrost lies a scant few feet below the surface on the northern end of the line, and the middle section has long sloughs of muskeg. It was considered wise in this country of extreme frost to allow the roadbed a few years to consolidate and seek its own level before the rock ballast — with its excellent drainage, hence few frost boils — was applied. This has held the ore trains to a limit of 30 mph loaded and 40 mph empty. The rock ballast program was initiated in 1958, and by the end of 1960 the track will have a foot of crushed stone underneath it and so lift the speed limits 5 to 10 mph on the ore.
Owing to the great temperature variations and the danger of rails shelling, the decision was made to experiment with welded rail and frozen joints before installation. Despite the inherent contraction problems, failures have not been extreme in the low temperatures; but no decision has been finalized to switch to the continuous rail for the trackage total of 453 miles.

Rail lubricators were installed after construction and have cut drastically both track and wheel wear. After the first year of operations QNS&L decided to increase the thickness of wheel flanges to compensate for wear on the frequent curves.

The line from terminal to terminal is under "modified" C.T.C. This means that the blocks extend from passing track to passing track, with no intermediate signal. There are 28 sidings on the 357-mile length of C.T.C. A majority of these are set for 170 cars. Originally there were dual-control (automatic) switches on only the south ends of the sidings; all but a few north-end switches have now been converted from spring to automatic. Each passing track, 7000 feet in length, is also a block in itself; so blocks total 59 on the main. The C.T.C. board is at Sept Iles, and covers the full length of the road from the Sept Iles terminal to Silver Yard. The "modified" C.T.C. is assisted by warning signals situated 10,000 feet before the end of each block, giving easy control over the long, heavy ore trains. Each engine and each van is equipped with train radio for cab-to-van communication. With the warning signals and a fair range for the radio, many meets can be made on the fly by judicious use of

GP9'S IN UNISON breach the first barrier of the Laurentide Plateau as they gun north.

ALMOST 3000 of these 34-foot, 97-ton-capacity, roller-bearing, welded ore cars with tightlock couplers do the job for QNS&L.

"ON A GOOD DAY 10,000 feet of track was laid"—but the pace was slower where rails left a tunnel to hit a bridge.

SEPT ILES HUMP feeds a 12-track classification yard, whence solid-bottom ore cars are fed into a two-car rotary dumper.
controls and radio calls of, “Hello, the Northbound!” All yards—Sept Iles, Oreway, and Silver—are equipped with radio on a separate channel, facilitating train movements and positioning of trains in the yard. Only five rivers were crossed by courtesy of steel and concrete; the remainder were given wooden trestles. However, the latter were replaced as soon as possible with multiple corrugated iron pipes and covered with fill. These are the largest such crossings anywhere, one of them consisting of 15 pipes 108 inches in diameter and 6 additional 66-inch runoff pipes, all of which were covered with 30 feet of fill. With this type of crossing, tracks can be raised as desired, eliminating the characteristic dips into bridging.

The rolling stock is mainly of two types: 74 London-built GP9’s and 2997 bathtub-type ore cars. Many of the Geeps were upgraded from GP7’s by QNS&L men at their Sept Iles shop. All are 1750 h.p. hood units equipped for multiple operation, with dynamic braking that has an antiswirling device, and a pressure-maintaining feature on the air-brake system. The road also operates a pair of 1500 h.p. Alco road-switchers in Sept Iles yard service and two small 650 h.p. MLW switchers. The Geeps are painted gray with black running gear; a light yellow stripe stretches along the side, bearing in its trip the name of the railroad and the locomotive number. The four other units, Alco and MLW, have an orange color scheme. The most surprising feature of QNS&L power is the two steam engines—all the road ever owned—on the roster: an ex-CNR Ten-Wheeler and an ex-ONR Pacific. These engines still bear the original roads’ numbers, 1112 and 702 respectively; but the Ten-Wheeler: whose flues just gave out, is due for scrapping. These engines steam ice out of culverts in spring.

The ore cars are masterpieces. Thirty-four feet long, they are of welded construction with a solid bottom since they are unloaded in a rotary dumper. The low-silhouette hoppers have a capacity of 97 short tons, weigh 27 tons empty, and loaded have an axleload of 63,000 pounds. The journals are all Timken and Hyatt roller-bearings which have failed only twice in 430 million car-miles. To QNS&L men it is inconceivable that friction-bearings could ever be tolerated on the ore.

Type F tightlock couplers have cut down much slack action, but were troublesome until a rubber draft gear was installed. The tightlocks give a much easier train control, but they have proved susceptible to drawing many cars on the ground in case of a derailment, and to slight cracking. A magnalumpling technique has led to early detection and easy repair of the tiny cracks. The lack of bottom dump doors has allowed the ore cars to be built with a much lower center of gravity than is usual in customary high, stubby ore cars. In turn, this has allowed higher train speeds: the ore road averages 25 miles per train-hour. The ore cars have specially designed trucks for heavy loads and two brake shoes per wheel to ensure availability and safety.

Besides the ore cars and the usual run-of-service stock, little other equipment is on QNS&L’s roster; fewer than 90 box cars (25 with roller-bearings), and some secondhand express and passenger cars, many of these on rollers. Aside from the secondhand freight cars; the specialized equipment such as shipper-owned reefers; ballast cars; and some passenger equipment, QNS&L’s rolling stock is mounted entirely on rollers.

All shops are located in Sept Iles, the headquarters of the railroad. The entire servicing is done under one huge roof, which incorporates a four-track diesel shop with two dropables, a fully equipped machine shop, a diesel engine rebuild bay, a four-track car shop, an electrical shop, an air-brake shop, a tool-cutting shop, and even a shop to repair QNS&L cars, trucks, and Caterpillar equipment. Owing perhaps in part to the isolation, the railway is fully self-sufficient; the only repair it is not yet equipped to handle is the rewinding of engine traction motors. But when this repair becomes necessary the hope is that even this can be done in the cavernous den. The diesels, kept in fanatically good shape in the standard triple-valve diesel shop, are overhauled each winter, as are the ore cars. The shop men have experimentally cleaned up an initial trouble of the tightlock. In a train separation due to coupler failure, the failed shank or gear could operate the rotary uncoupling device at the bottom of the coupler head permitting the coupler to open and if sheared off to fall to the ground and to vault the train from the tracks. A small cup was installed to prevent damaged coupler separations, and it has served its purpose well.

The yards are of simple but ingenious design. At the north end, Silver Yard, an empty train pulls into one of the seven tracks that serve as re-
receiving, classification, and marshaling yards. The diesels are cut off, placed on the power track, and usually go south within a few hours. The cars are hauled down in cuts and spurred off to pitheads until the incoming empty is used up. The van, which stayed on the train, is now at the north end of the yard. It is simply snatched up and put on the end of a line of ore cars ready to leave for the south. These cars are hauled back from the mines in cuts, stopped at the sampling dock where a switch list is prepared of car numbers with the type and percentage of ore, and hustled into Silver. With the transfer of a van to the tail of a series of united cuts of ore cars the train is ready to run south.

At Sept Iles the train is rolled into a four-track receiving yard and shoved over the hump to a 12-track classification yard, which requires only steel to double its number of tracks. The cars are pushed to the dumper house by sidearm pushers, small narrow-gauge diesels that run between the standard-gauge tracks. Cars are shoved into the dumper house two at a time by a Barney (cable-powered) engine. This push edges out the two preceding cars, which have just been grabbed by hydraulic arms, flipped on their backs to spill the ore, and returned upright. The little kick starts the cars rolling by gravity around a sloped horseshoe curve, over another hump, and into a four-track marshaling yard. This yard is inclined just enough for the cars to roll to the end and stop; a brake is set, and others pile up behind. When a trainload has accumulated, it is dispatched north behind the perpetual four Geeps. Vans are rolled to and from the train movements by gravity, making the sorting of the loads over the initial hump the only powered activity in the yard.

All equipment on QNS&L is slanted to the movement of ore most economically. No expense was spared in constructing and equipping the railway, but conversely QNS&L saw no reason to overequip since good quality initial investment and efficient operation would render surplus any such extra equipment. This is the reason 3000 cars can deliver 1000 carloads a day.

And for instance, QNS&L operates with diesel because the constant wide-open running of gas-turbines would render them uneconomical on the relatively flat railroad that, apart from the hill, demands full power from its units only infrequently; and because to electrify the railway would necessitate contracting for power for 12 months while the railway actually operates only 7. Electrification is pondered approximately once a year by the QNS&L brass. Their position on electrification would be subject to change, despite the high initial cost, should diesel fuel start to climb in price or electricity be offered at prices that vary as the railway partially closes down.

Therefore, with welded rail, frozen joints, and electrification under consideration, QNS&L, even though recently built, is not stereotyped and is ready to make even more economical an already efficient operation.

Dispatching is programed

Dispatching practice on QNS&L is simple but efficient. Ore trains are moved north on no set schedule or set time interval but are ordered out as the cars collect in the empty yard. The orderly time sequence of dumping usually keeps the turnaround steady. Ore trains move north in standard trains of 130 cars behind four GP9's. These same Geeps will haul 125 loads south from Silver Yard. The Geep quads are rated at 130 empties over the 1.32 per cent ruling grade northbound and 125 loads south across the 0.4 per cent ruling grades. Consequently no helper districts are necessary on this mountainous ore road.

All other trains move uphill loaded and drop down empty; this includes the biweekly freight and the biweekly express, as well as other stray trains. As a result, extra power is needed to move this equipment north. At Silver the units are cut off and consolidated to move ore south, the accumulated five-car differentials between the north and southbound ore trains. This system, however, is not foolproof, and eight Geeps have been sent north on a single empty train to handle the surplus cars.

The practice on QNS&L is to have the loaded trains hold the high iron...
at meets and to put the empties in the hole, regardless of which arrives at the meet first. This is varied for the express, a train which leaves at constant times but whose progress over the road is as any other extra. There is no train movement listed on operating timetables; all lead engines carry white flags.

On the southbound ore movement, the individual cars have their retainers set at the “slow direct-exhaust” position. This feature requires 90 seconds for the brakes to fully release after the brake-valve release. To date this has held to none the number of runaways on “the hill.” Retainers are set up at Silver and returned to normal at Sept Iles, rendering it unnecessary to stop the ore to set them up. Add to this the pressure-maintaining feature on the air-brake consoles and 16 brake shoes per car, and it can be seen that the big trains have superlative braking.

The railroad company itself operates only the shops and the main lines; all yard operations are handled by Iron Ore Company crews with QNS&L diesels. The yard facilities are owned by the parent company, the high iron by the subsidiary railroad. Iron Ore men sample each car before departure at Silver, and a switch list so prepared is telegraphed to Sept Iles. At the terminus the hump places the cars in lines of varying grades so that the strict 522 to 52.6 per cent ore required in the holds can be concocted by astute juggling of grades dumped at the dumper house. The Ungava ore comes as high as 70 per cent and at times pilgrimages to the stockpiles are necessary to adulterate the ore to the requisite percentage.

QNS&L has 28 crews in service at the moment. They all operate out of Sept Iles and make the round trip to Silver in four legs, resting for a few hours at Oreway, Silver, and Oreway. The usual trip occupies 56 hours; in this manner crews average over 6000 miles a month, which compares to the CNR limit of 4300 miles. Many of the crew members, laid off in the winter, work on their old roads during the white months. This “winter rush” on the CNR and CPR occurs when the St. Lawrence freezes and Halifax and St. John become Canada’s winter ports.

On the QNS&L ore cars have a turnaround of 70 hours, the power units less than 40 hours. Hence cars average 250 miles per day, engines 440 miles. A most impressive statistic is the 225,000 gross ton-miles per freight train-hour the railway averages. And average miles per freight train-hour is 25.

QNS&L’s manner of operation is as modern, as economically efficient, and at times as revolutionary, as is her physical plant. Equipment is scheduled for airlineline utilization; maintenance facilities are geared to keep the equipment at such a peak; and her crews have been given the opportunity to work a more intense shift with longer layoffs. The crews like the intensified working season and the dynamic sense of necessity in their productive labor. They give no indication of wanting to work less. Perhaps men desire more than the opportunity to do as little as possible for as long as possible.

### Implications of automation

A railway which commenced operation in 1954 is perhaps to be considered less than a whole being, for it has never known the joys and beauties of the steamer, it cannot claim a romantic youth, smoky and turbulent. But neither did such a railway suffer the pangs of dieselization maturation, for automation did not overtake the human hand but existed as an irrefutable fact at the outset.

QNS&L has never employed diesel firemen. For six years now the empty front seat on the left side of the lead unit has been proof that safety in numbers does not necessarily follow when applied to the head-end crew of a diesel operating on an up-to-date plant. When the CPR Brotherhood fireman dispute reached an angry climax in 1959, the Royal Commission appointed to investigate the matter heard witnesses from the operating department of this precious youngster of Canadian roads. The impression gleaned by the Commission from the evidence (an important part of it given by QNS&L) was that whatever the human or moral problem involved for the older roads, the hard fact of the diesel fireman’s dispensability had been clearly established. The QNS&L, by its very nature a sort of test-tube railway, can hardly avoid attracting the attention of the other roads seeking a no-fireman contract. It is destined moreover to increasingly close scrutiny in labor relations, for developments in Sept Iles recently point to the gradual elimination of rear-end brakemen on all ore trains.

The replacement of manpower by machine has in most cases seemed brutal, for the painful immediacy of human dislocation tends to obscure the long-term benefits of automation. Fortunately in the case of the brake-men on the QNS&L, the problem of human dislocation is minimal, and an agreement has been reached with the Brotherhood which is both moderate in its application and happily lacking in anything which smacks of dogmatic finality. The contract calls for 19 men to be displaced as rear-end brake-men on ore trains. None of these 19 men were employed by the company before June 15, 1959. The remaining rear-end brakemen will continue to ride the van on the main line until the new road into Wabush is put into operation. Thereupon they will work as head-end brakemen on the additional crew pools which will be required. The safety and efficiency of the three-man crews will be assessed by management and labor for the balance of the period of the intended contract which terminates in September 1961, with both parties retaining the right to appeal on this question to a conciliation board upon the expiry of the contract. The additional right of the union (in the event of serious failure or accident that might occur because of the absence of a rear-end brakeman) to bring the matter to such a board at an earlier date is guaranteed.

### Preceding pages

WHERE once the sounds of nature held solitary sway, now the chant of man-made GPs’ dominates as three General Motors Diesel hoods lift 129 empties away from tidewater and up a relentless 1.32 per cent into the Ungava, canting to the curves, drumming across bridges, occasionally plunging into tunnels.

Smith and Greenwood.
HOPES ADVANCE BAY

I. THE QNS&L, the first railroad into the Ungava, does not serve a petite locale, for this district occupies the eastern quarter of the vastness of the Launcottian Shield. This plateau is the oldest rock in the world. Worn and hewn, it is perhaps the richest mineral deposit in the realm of man. Stretching from the mouth of the Mackenzie in the west to the Atlantic on the east, with fingers in Minnesota and New York, it is two-thirds the size of the continental United States. The endless rock of Ungava alone is twice the size of Texas; and one-third of this interminable barren is water. But in this expanse there is no limit to potential.

Consider such as the Hamilton River Falls scheme, a project less than 100 miles to the east; which will be serviced by QNS&L. The 100-yard-wide river has a 26-foot head of water and vaults over a 300-foot precipice. Development will produce 8 million horsepower. The scheme involves a transatlantic power cable to export the energy to Europe.

The present railroad now hauling ore has recently announced that a new mine is to be opened at Winhart Lake — 6 miles beyond the present end of track of QNS&L — to which a spur is to be built this year. This new mine is expected to ship another 2 million long tons of iron ore south each year.

Now to the north, on the vacant shores of Ungava Bay, the rock dammed of even the Arctic tundra basks in the prospect of development for iron ore. Cyrus Eaton, the steel and rail magnate, in conjunction with Alfred Krupp and the Krupp industries, plans the development through the medium of Ungava Iron Ores Limited to serve West Germany's steel mills which lost much of their source of iron ore to the Communist development of eastern Europe.

At Hopes Advance Bay a $500-million-dollar development will include yet another high-density railroad to move ore from mine to dock, to be loaded into ore vessels larger than the Queen's.

This agreement resulted from extensive negotiations during which many conflicting arguments crystallized into one fundamental question: Does the rear-end brakeman do anything that cannot be competently handled by the conductor in conjunction with the latter's other duties? Management pointed out that the rear-end brakeman has no switches to handle or cars to couple and uncouple except in rare cases. He is not required as a flagman to protect the rear-end of the train because the conductor is available if that service should be needed. The union countered that if the conductor had to attend to flagging as well as his normal duties of supervision, the chances of a rear-end collision would be increased. The answer to this assertion was that C.T.C. protected a stopped train, and therefore the exceptional case of a work train's having orders to disregard a red block provided the only instance in which flagging would be required. A rear-end brakeman on the QNS&L management continued, is not required to service vans, since this is done in the mechanical department. Nor is he needed to adjust air-brake retainers or appliances, or even to clean and fill oil lamps, for the trains are equipped with electric lights. The brakemen have no preparatory or final work, nor do they have to worry about overheated journals since only two have appeared in the first 430 million car-miles. Finally, management concluded, there are no specific inspection points and most loaded ore trains move over an entire subdivision without stopping.

The Hon. A. W. Roebuck, Q. C., La-bor's nominee to the conciliation board established to arbitrate the dispute, vigorously disagreed with the contention that the rear-end brakeman had nothing to do or that his duties could be performed properly by the conductor. There was ample work, he thought, to occupy both men in the van. Signals called by phone from the engine must be answered; a lookout from the cupola must be kept so that the full reach of the train can be observed and the track to the rear inspected for dragging undergear. There are walking and roll-by inspections to be made. Finally, in an emergency, caused by one of a thousand mischances which could occur, flagging and supervision of repairs, a pair of strange bedfellows indeed, could not be done properly by a single trainman.

The rarity of the need for flagging has been mentioned, but it may be pointed out that with new equipment, finely nurtured by high-grade maintenance, the number of trains stopping on the main line is negligible, and work trains passing a red block are required to proceed at a speed which enables them to stop within seeable track. QNS&L's position is also strengthened by the fact that its conductors do not have many of the traditional duties of the train captain. They are not required to check or list ore trains; clerical duties are limited merely to time returns and delay reports. Nor do they have any preparatory or final work.

Management seemed to have the better of the clash on the rear-end brakeman's productivity, at the same time having to recognize the validity of the union's concern for the safety of the crew. This concern manifested itself in arguments other than those pertaining to flagging. For instance, it was advanced that injury to a solitary trainman in the van caused by slack action could go undetected. Management felt that tightlock couplers eliminated excessive slack, and in the unlikely case of injury, train radio — never very long in disuse — would minimize the danger.

The conciliation board favored by two votes to one the railway's policy of displacement but made it clear that their decision could not be applied to any other railroad but QNS&L with its C.T.C., power switches, and rollerbearings. Notwithstanding this emphasis on the QNS&L's uniqueness, the Brotherhood expressed a fear that the decision would have ramifications on other roads and that locally the thin edge of the wedge was being thrust upon them. The savings, they say, are disproportionately small considering management's determined stand on the issue, although the conciliation board thought a saving of 20 per cent per train crew far from negligible. They also contend that the railway's original demand for complete freedom to determine the consist of a crew is ominously significant.

The expression "thin edge of the wedge" suggests a certain Machiavelism, which is far from the case in a company where good business implies fair dealing with and good care of employees. The dispute in Sept Iles may nevertheless be a hint to the future, for the country's test-tube railway is even now experimenting with trains controlled remotely.
Round trip over the QNS&L

This was one of the bastard ore trains, short of cars and power units. There were only 120 cars in E-490 as the trio of GM&O's eased the empties clear of the threat of the empty yard, then paused for the conductor to roll the van onto the train from the gravity caboose track. Fresh, stinging air blew across the coal-tipped pineland and brushed the pastel hues of the identical engines. At 12:05 p.m., Atlantic Standard Time, the Geeps tossed a light cloud to the sparkling sea-sky and pulled the train into C.T.C. territory. The V-16's tugged the ore cars to 32 mph, then eased off at Mile 12 while the train lolled into a tunnel and stepped easily across a bridge 200 feet above the Moose River. Here the mountain country began with a shock. The green-shrouded gentle mountains of eastern America were not here; instead slab-sided walls of rock sheared upward to sharp points and crowding overhanging rocks glowered over the mile of empty bathtub ore cars. The wheels screamed around the curves despite the track lubricators, and the uniform black snake could never straighten itself. Superintendent Arden Bybee had remarked that mines are usually put in the mountains, and he had not used the term loosely. An extra was sitting in the hole as E-490 paled past the siding at Nipisso and headed into the block which ran 10 miles to the next passing track. The three Geeps were wide open now as they chanted slowly up the wall of the canyon, seeking the plateau country. The hill, a ruling grade of 1.32 per cent, started at Mile 56. The throbbing whine held its can-

To, but the speed dropped to 13 mph. The engineer, a quiet French Canadian, "Butch" Boucher, remarked that the lack of one unit cut 5 miles an hour from his train on the 17-mile hill.

"Restricted signal for the 126 North!" was barked into the train radio, and the echo crackled back in static a few seconds later. QNS&L operating men refer to a train when it is on the road by the number of the lead unit rather than by the official designation. Regrettfully Geep 126 bent across the points and inched the ore cars onto the passing track until the radio announced that the van was in the siding. The northbound was in the hole for the "express," a train of express and passenger cars put on when construction was under way and which QNS&L hasn't taken off since. The three GP9's waited beside the 200-foot cataract of Tonkas Falls until with a flash of light and burst of unaccustomed speed the express swept by, dashed down from the summit. A few seconds later with a quiet whir and click, the protecting dwarf signal blinked from red to green and the points were lined up for 126 North.

The three reverberating diesels were still on position, and with the throttle in No. 8 position the ore train began to crawl up the mountainside, out of Wacouna Valley, the third in the series of three valleys.

"Clear signal for the 126 North!" The ore train, accelerating now, swept past a huge gravel pit at Mile 84. This is where the QNS&L gets the rock with which it is presently cushioning its roadway. A Geep was marshalling bottom-dump ore cars, and a little 650 h.p. MLW switcher was trundling cars along a dump track with no one visibly at the controls. The "engineer" sat in a tower 1/4 mile away as the remote-controlled unit pattered about.

At Mile 90 the grinding Geeps took the passing track, but found the four units of L-498 easing down the main. Throttled back, the 126 and her sisters stepped slowly along the long 170-car siding; the southbound van passed, the dwarf ahead paused, then flicked green, and the meet had been made on the fly. The remark about too little power had now grown to a rumble, but the mountains began to level off and the absolute emptiness of the land, not so noticeable among the cranny crags, began to be oppressive. Speed spiraled as the empty loped across the deadly still plateau. The mountains which had been reminiscent of the Bitterroots now lay into rolling high country.

With a restricted signal at Eric, Mile 138, the three Geeps slipped into the passing track and found two trains, back to back, on the high iron. The double brakeshocks on the empty crimped her to a stop, then the southbound ore train moved slowly, and a ballast train backed into her vacated shoes. This cleared the block, and the lonely h.p. units, sensing fast track, bolted north and talked quickly past the highest point on the QNS&L—2066 feet at Mile 150. After one more meet the northbound drummed into Orewa to find another empty train already standing there. Irregular loading at the pitheads had created a choke in the marshaling yards at Silver, so the empties would be delayed a few hours at the lonely bunkhouses and cookshack that mark Orewa the midpoint of the run and the place the crews rest.

One brakeman stepped across the rail with two 5-pound ouananiche (land-locked salmon). As many crewmen do, he always carries fishing tackle to reap the harvest in this wa-
tery land of endless lakes. Two and a half hours later the glut at Silver had dissolved enough to order E-490 out. It was northern night now; 11 p.m., as 126 North talked her way out of Oreway. Vast sheets of jagged green light blazed coldly, irregularly in the sky. Northern lights overruled the dark.

For repetitive miles the boards were green. The Geeps had no trouble on the flat palm of land and easily hit the 40 mph limit with empties and crept toward the 45 mph tolerance. Seventy miles and 110 minutes later the 126 North was pushed into the hole by a blatant yellow glare. Twenty minutes later four Geeps slammed south rolling the 125 loads that were “all black.”

At 2:30 a.m. the throttle was closed to No. 3 position to slow E-490 for the Menihek dam, a power plant that supplies the Knob Lake mines. A few fingers of a grayish-pink dawn began to light the extremities of a stunted forest that is classified as “Northern Boreal Transitional, non-commercial.” Muskeg stretches had given way to Arctic tundra far to the south, and the 10-foot trees that may be 200 years old and fully grown held life by the tenuous hold of one who is beyond his limit. The 126 North waited for a few minutes at the last siding before the end of track as a loaded train roared south, dragging the standard 125 cars behind four trumpeting Geeps. The yard now had a clear track, and the three units hissed to a halt in Silver Yard at 4:09 a.m., 16 hours 4 minutes after the air had been kicked off in Sept Iles.

The 509th ore train to leave the mines in 1959, L-509, was ordered at
6:20 p.m. Dying sunlight glimmered across the treeless tundra as the four Geeps pumped up the train line. The lead unit, No. 107, had classification and number lights glowing against the sandy sky as she eased the 125 loads of red, brown, and purple ore slowly onto the main. Crew members glanced at each car on the roll-by-inspection. Roller bearings would necessitate no further inspection before Sept Iles, but by custom the railroad- ers would search constantly for glowing red or showers of sparks.

"Clear signal for the 107 South!" L-509, her four lossing GMD diesels humming easily, moved the 16,000-ton train south, through the cherry pink of Iron Ore Cut. These loaded trains total 15,500 to 16,500 tons when they are weighed on the bump scale in Sept Iles, but the London quadruplets are never very strained. Each car holds within a ton or two of 100 short tons of ore, considerably more than bottom-dump varieties.

At 7:45 107 South went into the passing track at Faden beside Minihiek Lakes. On the right an airstrip was marred by gaunt broken wings lying on either side of the burnt fuselage of a four-engined aircraft that crashed on landing during construction of the road. The head-end brakeman contemplated dropping his omnipresent line on the waters, but D-501 came into radio range and 15 minutes later drumming diesels moving at the speed limit ripped her past with a blast of wind and the hollow rattle of empties.

No. 107's engineer, an ex-CPR man, was pleased with the rolling qualities of his train. The ore was evenly loaded, not dry at one end of the train and humid at the other. The hood units had the loads at the 30 limit.

An approach signal glowed green and the voice of 127 North on the radio disrupted the interlude. The northbound was taking the passing track at the end of the next siding, so the loads were throttled back to attempt the meet on the fly. The harsh yellow restricting signal appeared a mile up the track, and the loads eased to 17 mph as the ore canted slowly to a curve. The block was still yellow as the northbound was declared "all in," and the headlight dimmed while 107 South steadily ate up the track to the block. The throttle was shoved into the eighth notch and flying sparks raced to the stars from the roaring engines, but the block held yellow. "He's not on the bit tonight," was the comment, and hands were reaching for throttle and brake when the light flicked an affirmative green. The throttle stayed where it was.

Two more meets came in the foot- lights of Aurora before 1:40 a.m., when the L-509 rolled to a stop on
the iron at Oreway, the relief point. The crews changed quickly and 15 minutes after the Geeps had halted beside the office the train paused again to allow the van crews to change at the same spot, then a cascade of sparks and a thundering tempo told of L-509's departure from the lonesome yard. The last hole held the throttle for a long spell in the night, and the durable GMD engines whirred at the maximum revolutions for 25 miles as the ore train was rolled over the plateau summit at a steady 25 mph.

Two meets before dawn and with a clear board, the chanting units slowed from 33 to 17 mph as the diesels slid over the brow of "the hill." Gone now was the Arctic tundra and muskeg swamps of the plateau, here was the gaping canyon, a maw into which the diesels crept holding their train with dynamic braking and 6 or 7 pounds of air on the air brakes. A pressurized maintaining device eliminates setting, resetting, and again setting brakes on such a hill. Automatically the brake line is kept at an even pressure despite leakage from hoses. The train held at close to 15 mph as the whine of dynamic brakes protested to the slabs of rock.

At the bottom of the grade the triumphant quartet clattered into the hole and paused 3 minutes for a northbound ore train to grumble past. The Geeps raced for 20 miles underneath the canyon walls, then braked into Nicman to meet the northbound express. Twin gray units whirled past with 10 express cars, 4 passenger cars, and the business car.

One more meet came before the L-509 plunged into Mile 12 tunnel and emerged in the delicate breath of salt air. At 11:53 a.m. on a gleaming morning the white flags came out of their sockets on 107 as the bantering Geeps rolled their train into the receiving yard, impatiently parked the ore, and fled home to the diesel house. The van came down by gravity onto the elevated van track and an MLW road-switcher started urging the ore over the hump to fan out on the classification tracks and pause in front of the dumper house and the twin 60-inch conveyor belts leading to the loading dock.

Yet another incessant round trip was over, but yet another four horses were easing yet another mile of gaping ore cars out of the empty yard. Ore. Ore is the QNS&L; ore is 98.5 percent of her traffic and 100 percent of her life. 

---

12 NORTH, one Geep and five cars short of the customary ore train consist, waits on the hill for a meet with southbound ore.