

WABUSH MINES

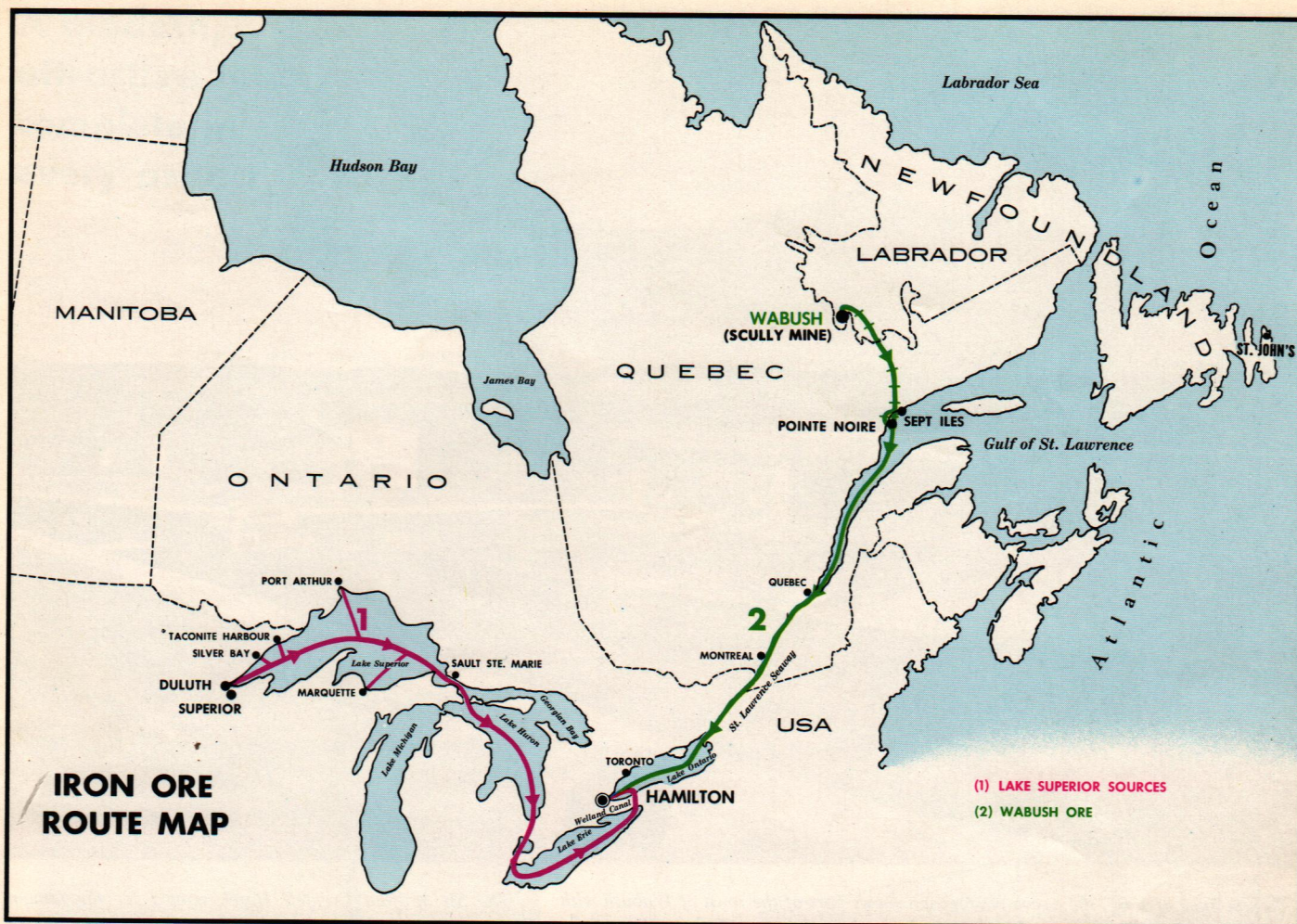
PICKANDS MATHER & CO. — MANAGING AGENT



The History of Wabush

Iron Ore was first reported in the area in 1933, but low grade materials were of little interest to iron ore producers during the period prior to World War II. Pickands Mather & Co., searching for a material that could meet blast furnace standards for high quality and chemistry, became interested in the Wabush deposit in 1956, and commenced a program of exploration drilling culminating in the construction of a pilot plant which began operations in February 1960 to produce sufficient tonnages of high grade concentrates to permit full-scale agglomeration and blast furnace testing, as well as providing test work to select the most suitable flow sheet for the concentration process itself. After the production of 100,000 tons of iron ore concentrates, the pilot plant was shut down, and construction of the Scully Mine commenced in January 1962. Construction of its counterpart, the agglomerating plant at Pointe Noire, commenced in July 1963. The Wabush Project was officially dedicated the summer of 1965.

	<i>Pellet Chemistry</i>		<i>Pellet Quality</i>	
	<i>Dried</i>	<i>Natural</i>	<i>Structure</i>	
Iron	65.90	64.58	+ 5/8"	2.0%
Phosphorus	.016	.016	+ 1/2"	8.0%
Silica	2.61	2.56	+ 3/8"	76.0%
Manganese	1.67	1.64	+ 1/4"	12.0%
Alumina	.34	.33	+6 M	1.5%
Lime	.06	.06	-6 M	0.5%
Magnesia	.06	.06		
Sulphur	.005	.005		
Moisture	—	2.00		



THE WABUSH PROJECT

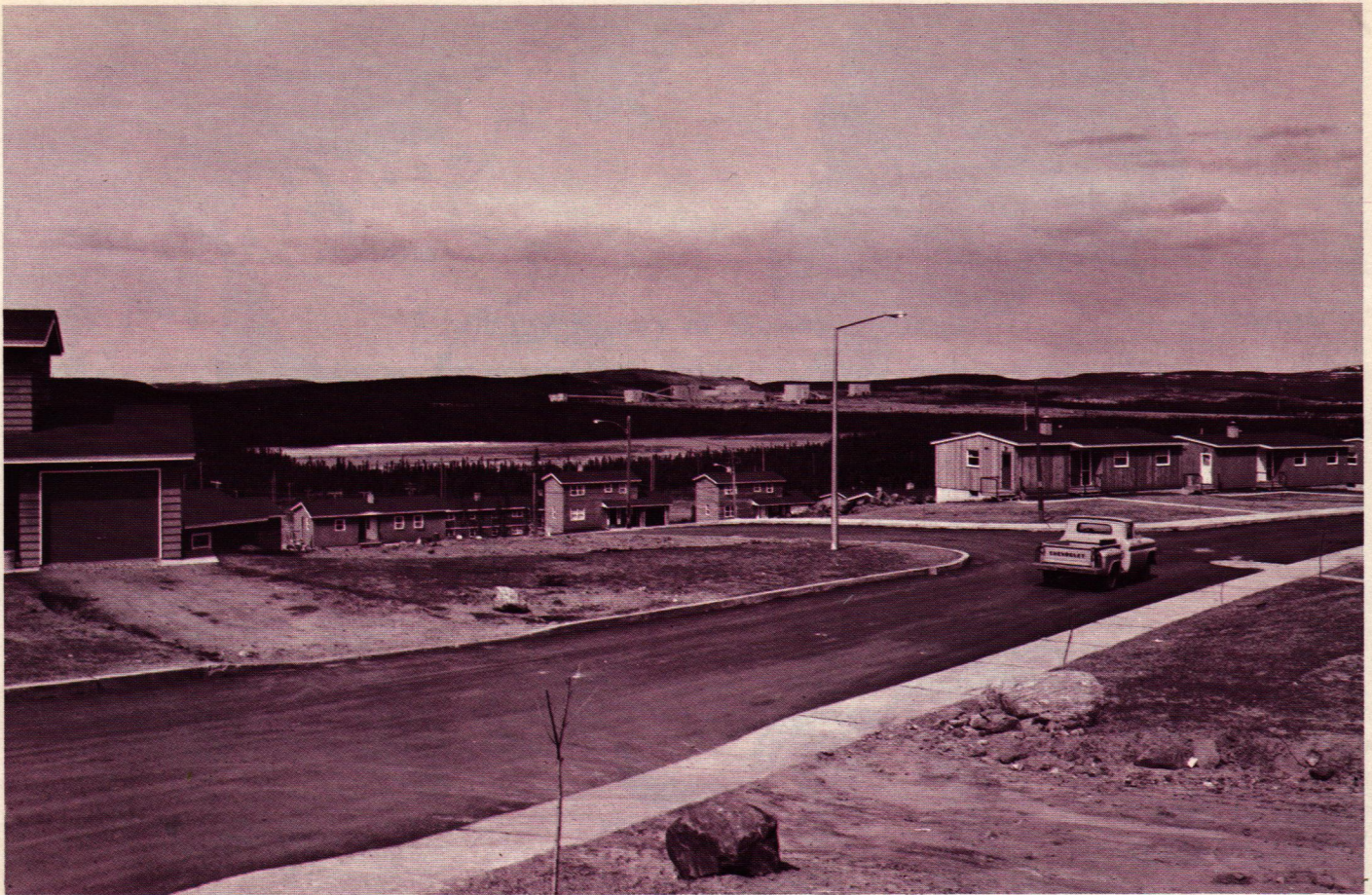
THIS IS A STORY of Man versus the Wilderness; how, in search of future sources of vital raw materials, he has thrown his might and ingenuity into the task of wresting from the forbidding wilderness of Labrador its treasure of iron ore. Dwindling supplies of desirable ores in major operating sources have forced the development of the long-known vast iron deposits in the Labrador Trough.

Begun several years ago with on-the-ground surveys, men worked from a base camp of tents to mark out the site of the Wabush mine. They took sample drillings to confirm earlier assessments of the size of this vast store of iron ore where it appeared right at the earth's surface.

An airfield and a rail line provided the only

facilities for moving the hundreds of men and tons of equipment to the site. A whole town had to be built to house the construction workers and later the mine operating personnel and their families. A school for the workers' children and complete operating mine and concentrating plant had also to be built. The area which, just a short time ago, was inhabited only by ranging herds of caribou was to be transformed into an entire community with complete mining facilities just two miles away.

The story of Wabush is truly a story of determined men and of the very latest of equipment. The rest of this book will show what they accomplished and will serve to explain how iron ore is mined and concentrated at Wabush.



Taken in June of 1965, the above photograph shows part of the town of Wabush with the iron ore mine and concentrating plant in the background. Jean Lake, still partially frozen over, separates the townsite from the mining operations. These pictures look as if they were taken in an average modern suburb, and they were, but the suburb happens to be in Wabush, a thousand miles north-east of Hamilton.

The Sir Wilfred Grenfell Hotel, named for the famous doctor of the Labrador coastline, has fifty rooms for guests, a dining room and full facilities. It commands a fine view, overlooking part of the town and across Jean Lake to the mine complex.



**A modern,
attractive town,
complete in
every aspect**

On a typical spring evening employees walk toward the cafeteria, past the fully-equipped recreation centre on their right.



Nothing is lacking in Wabush. It is a town which could be envied by residents of many communities across Canada. Everything there is but a few years old, of modern design and built to suit modern demands. Several churches are in various stages of construction, movies are regularly available and television is a popular winter evening pastime. The

school is unique in Newfoundland, in that, all religions are taught in the same building, with separate Academic Classrooms but the gymnasiums and specialized teaching rooms are jointly shared.

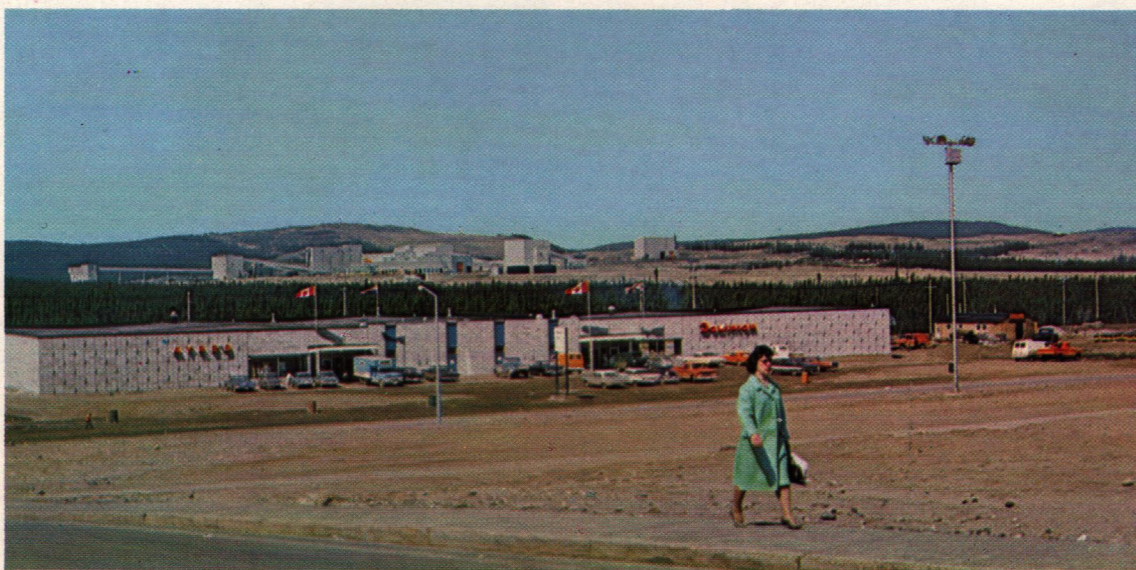
The modernly-styled plaza contains a department store, groceries, drug store, electrical appliance and furniture store, post office, etc.



Partially built Catholic Church.



The School (right) and the Wabush plaza.



Twin Falls — source of hydro electric power.



The reason for Wabush — its vast store of iron ore.



Taken from the mine itself, this photo shows the arrangement of minesite, concentrating plant, Jean Lake and the town of Wabush.

The Mining and Concentrating of the Iron Ore

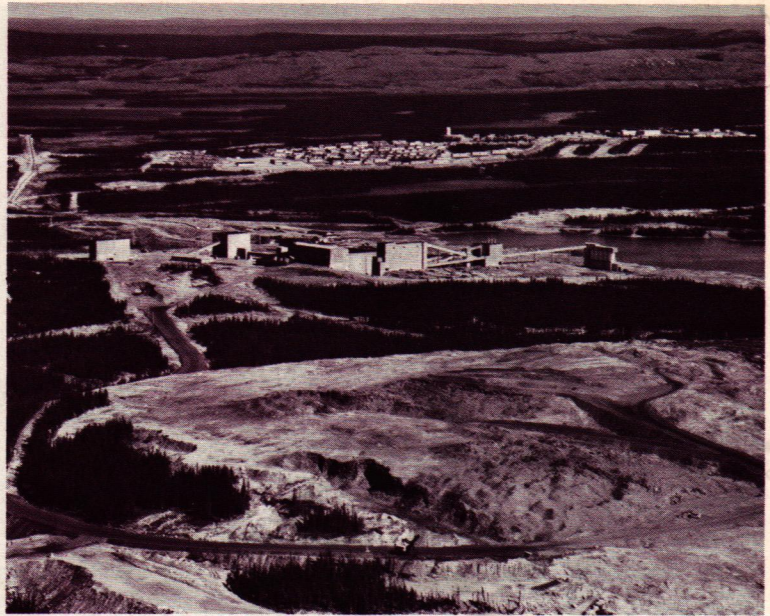
The iron ore body at Wabush lies in a huge pocket which, surveys and tests have proven, extends more than three and a half miles in one direction and is better than a mile wide. The ore is very close to the surface and after stripping operations remove the overburden, composed mainly of pebbles and sand, the huge shovels load the ore, 8 cubic yards at a bite, into the heavy 55-ton capacity trucks which take it to the primary crusher at the concentrating plant.

Dumped into one of the two primary crushers which are constructed below ground and operate like a chemist's mortar and pestle, the ore is broken up and taken by conveyor to the classifier building. Vibrating screens and spiral classifiers separate the coarse from the fine and, again, conveyors take each to separate storage bins. From this point begins the task of separating the iron bearing particles from the unwanted materials.

In the main mill building are six 24' x 8' autogenous grinding mills, each driven by a 1,750 horse power motor. "Autogenous" means that the product grinds itself by a tumbling action without assistance from other materials.

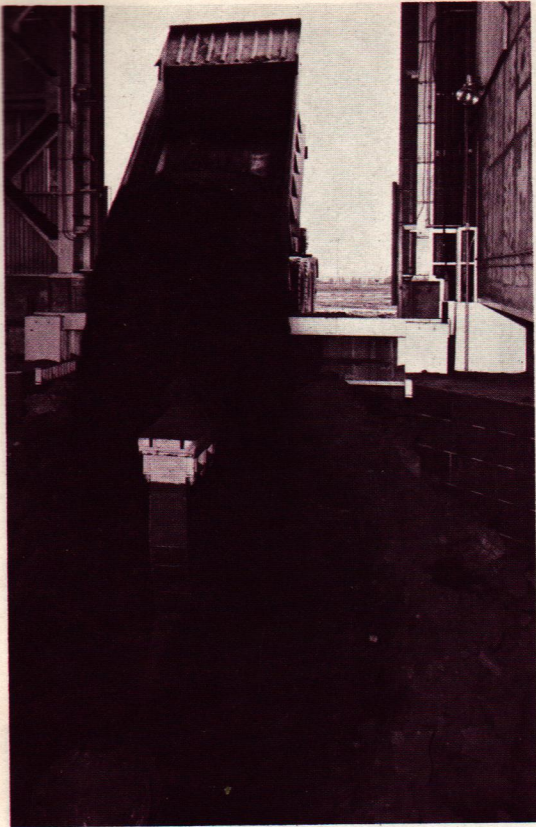
The ground mixture of water and ore (now reduced in size to that of coarse sand) is pumped from the mills into an adjoining building bay where 1,152 rougher and 960 cleaner spiral separators will, by centrifugal flow, take away the water and lighter materials leaving the iron bearing particles.

The ore is now referred to as "concentrate" and it goes next to drum filters and towering oil fired driers which dry the ore at about 250°F. Next station is the high tension separator building where further separation and upgrading is done electrostatically. The iron concentrate, now rich and dry, resembles coarse sparkling coal dust although, due to its high iron content, it is quite heavy. It is now ready for shipment to Pointe Noire and is conveyed to load-out bins which will automatically fill the special ore carrying railroad cars as the train moves through beneath the hoppers.

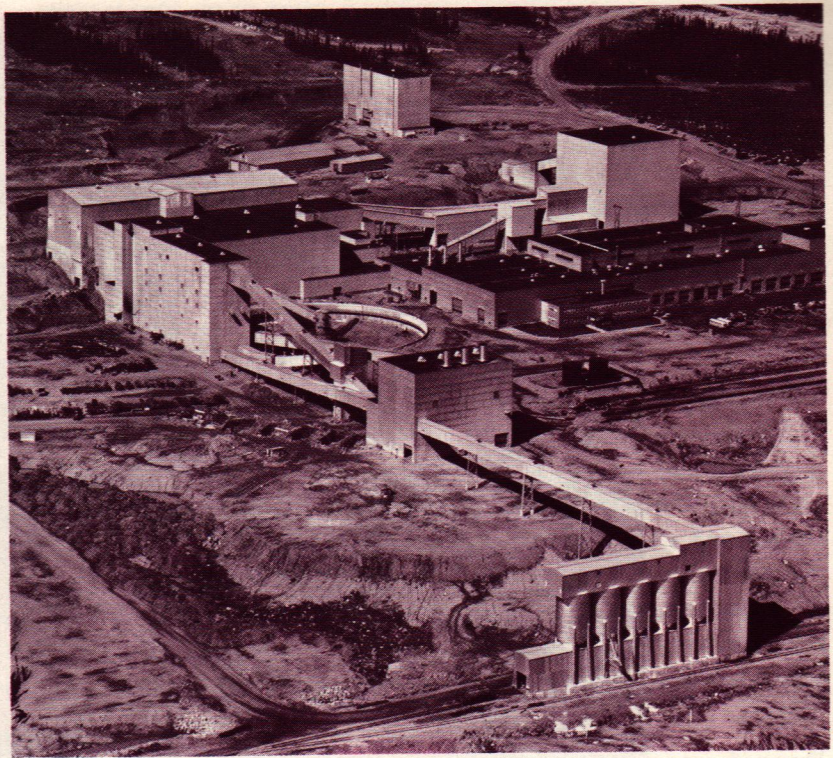


The 8 cubic yard bucket on this mine shovel dwarfs one of the workmen.



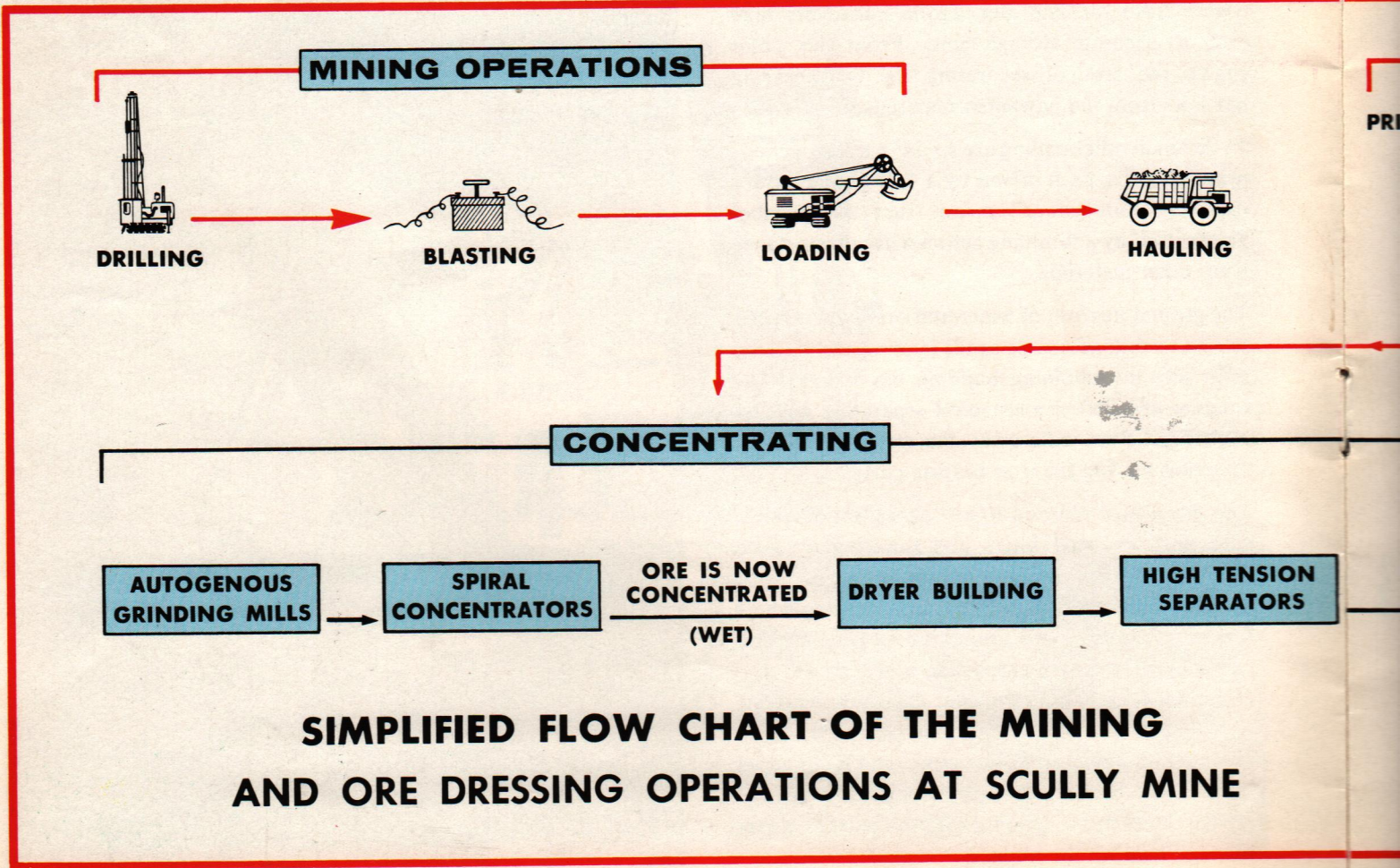


Ore truck dumps 55 tons of crude ore into one of two primary crushers.



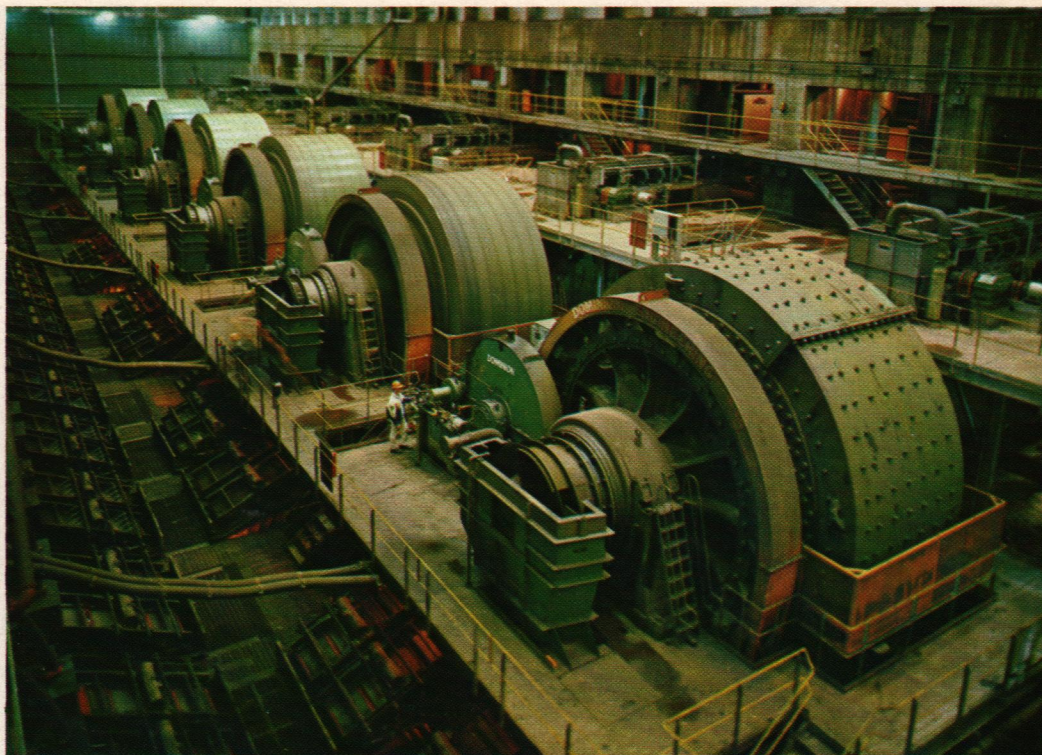
The Scully Mine Concentrating Plant at Wabush.

This flow chart shows the various steps from the mining of the crude ore through to the shipping of the concentrate.



SIMPLIFIED FLOW CHART OF THE MINING AND ORE DRESSING OPERATIONS AT SCULLY MINE

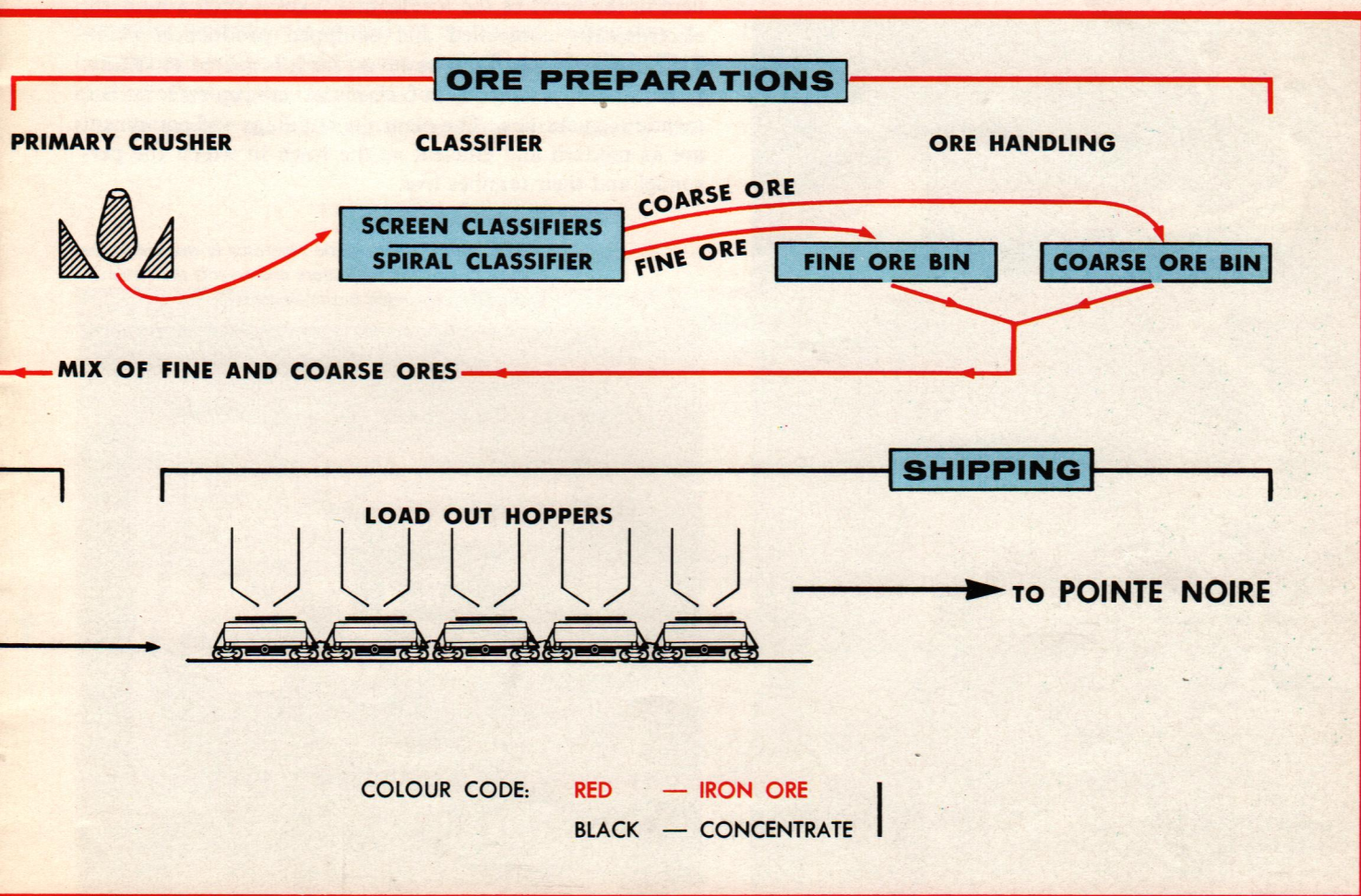
This is the main mill building where the ore is ground by the six huge autogenous mills. Note the operator dwarfed by the mills. The mill in the foreground has stopped revolving.

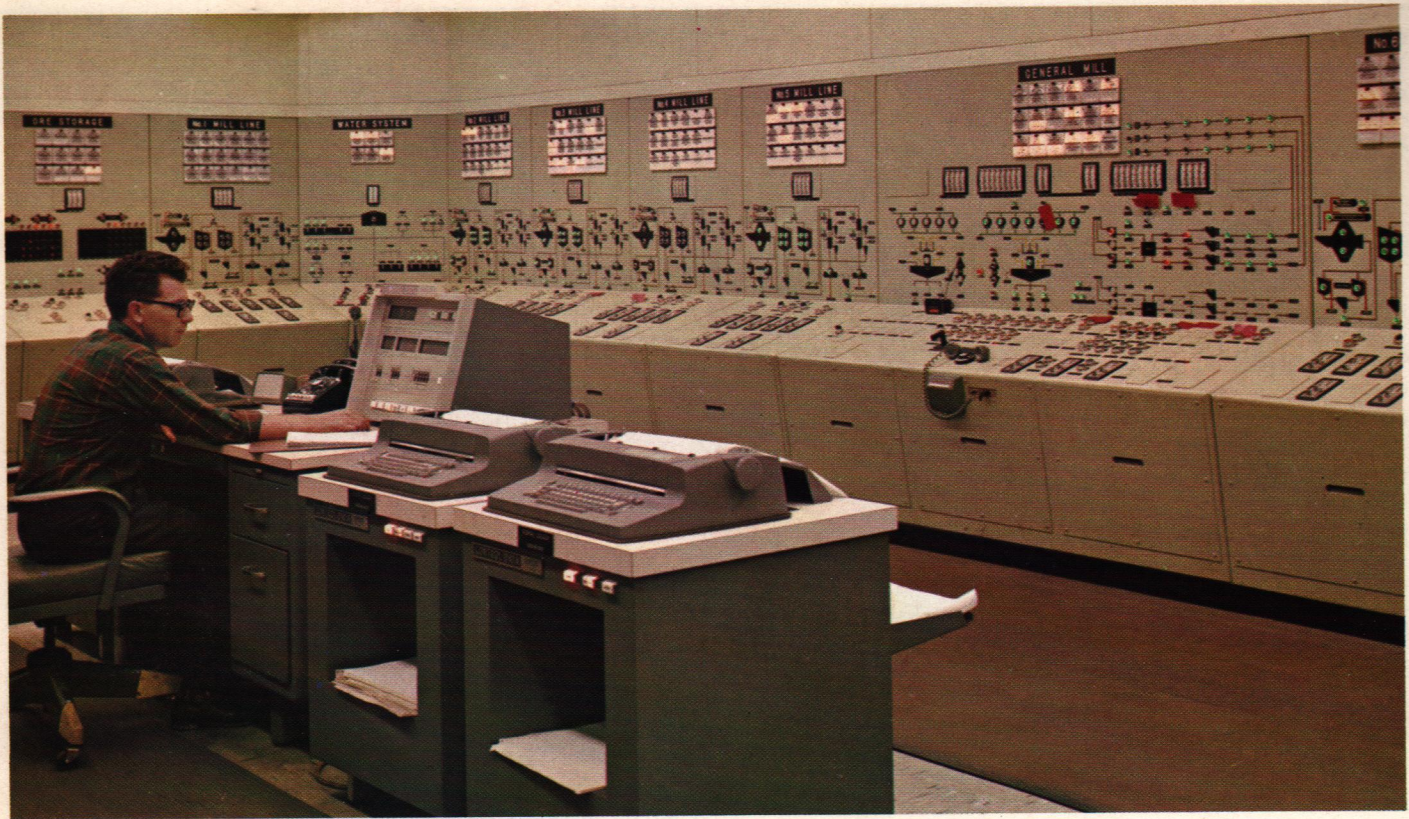


Like the mining operations, those of the concentrating plant continue day and night, year 'round. There is a steady flow of ore coming in and an equally steady flow of concentrate being sent to the load-out bins.

Electricity in tremendous amounts is fed by transmission lines from Twin Falls, one hundred and ten miles to the East of Wabush.

Water for processing the crude ore is obtained from a nearby lake, and is reused many times to keep consumption at a minimum.





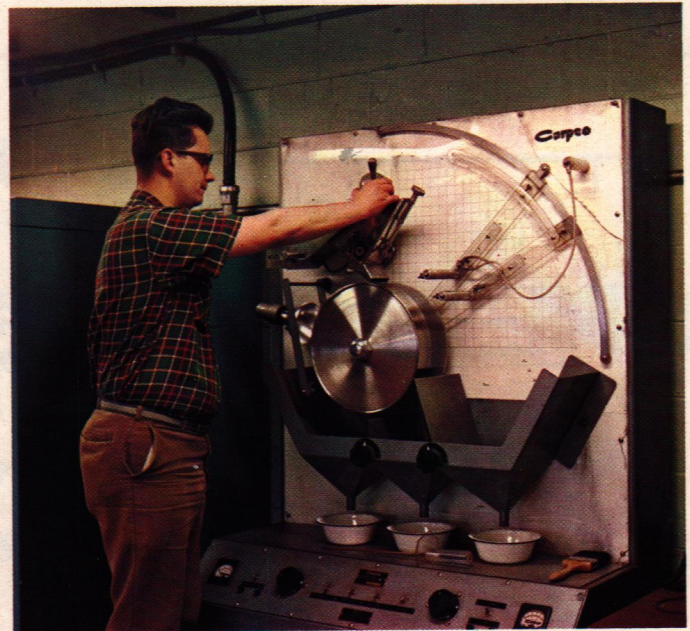
Central Control Room at Concentrating Plant.

Spiral Separators (note sparkling concentrate).



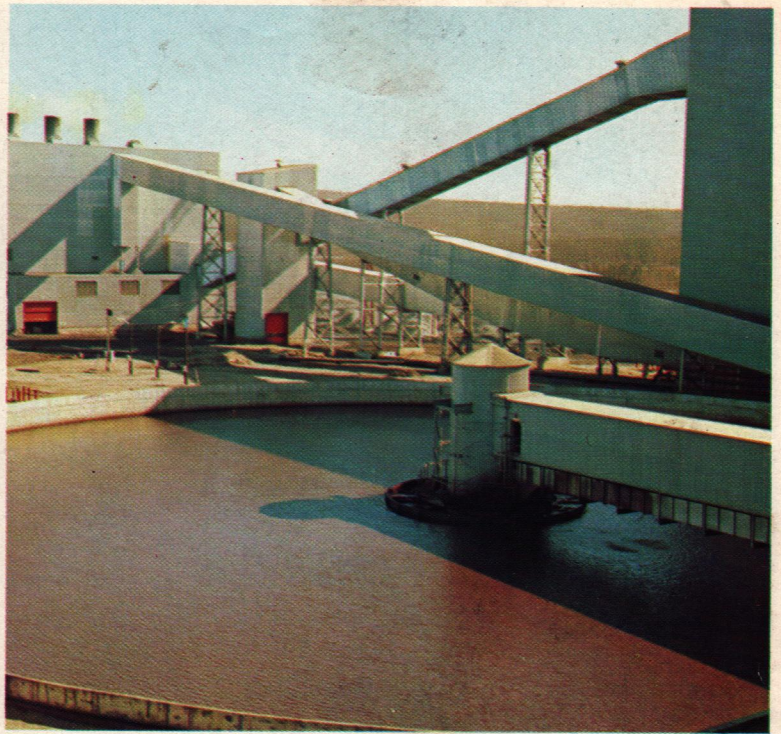
It seems almost unbelievable to a visitor at Wabush, after flying hundreds of miles over the Labrador wilderness, that here in the heart of the forests and lakes is such a modern, electronically controlled and equipped production plant. That is exactly what it is however, for it is geared to steady, year 'round production of iron ore concentrate in tremendous quantities. The plant, its buildings and equipment are as modern and efficient as the town in which the personnel and their families live.

This midget electrostatic separator is coupled to the huge production separators and reveals their operating efficiency right in the laboratory.





Iron ore concentrate from Wabush, known as Specular Hematite is heavy, black and sparkles much like graphite.



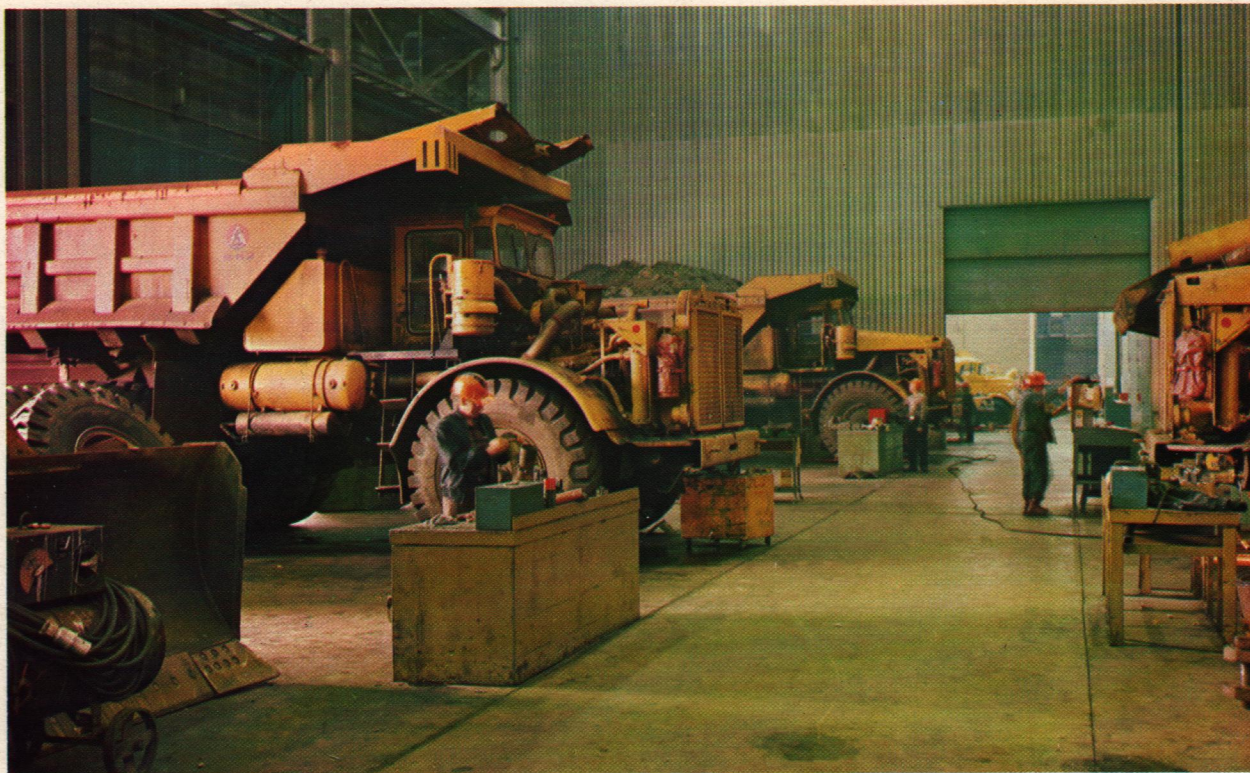
The 280' diameter thickener, adjacent to the concentrating plant, clarifies the process water, and permits it to be reused many times for concentration of the ore.

Strict quality control throughout every phase of the concentrating operation is carried on by trained technicians in laboratories which would be the envy of any hospital. The quality of the product is checked at every step of the operation to ensure the resulting concentrate is of exactly the

right chemical and metallurgical content before it is shipped from Wabush. Likewise the operating efficiency of every piece of equipment is carefully regulated and repairs or adjustments made immediately when required. The whole operation is smooth and highly efficient.

The well-equipped chemical laboratory at Wabush.





Maintenance Shops at Scully Mine

Maintenance is a highly important phase of the entire Scully Mine operations. Due to the location of the town, plant and mine, two hundred and twenty-five miles north of Sept Iles, Quebec, each must rely on the other for maintenance

assistance. The huge repair shops have trained men capable of repairing any type of equipment from a tiny electronic device to one of the twin-diesel engined 55-ton iron ore trucks to the 1,750 horsepower electric mill motors.

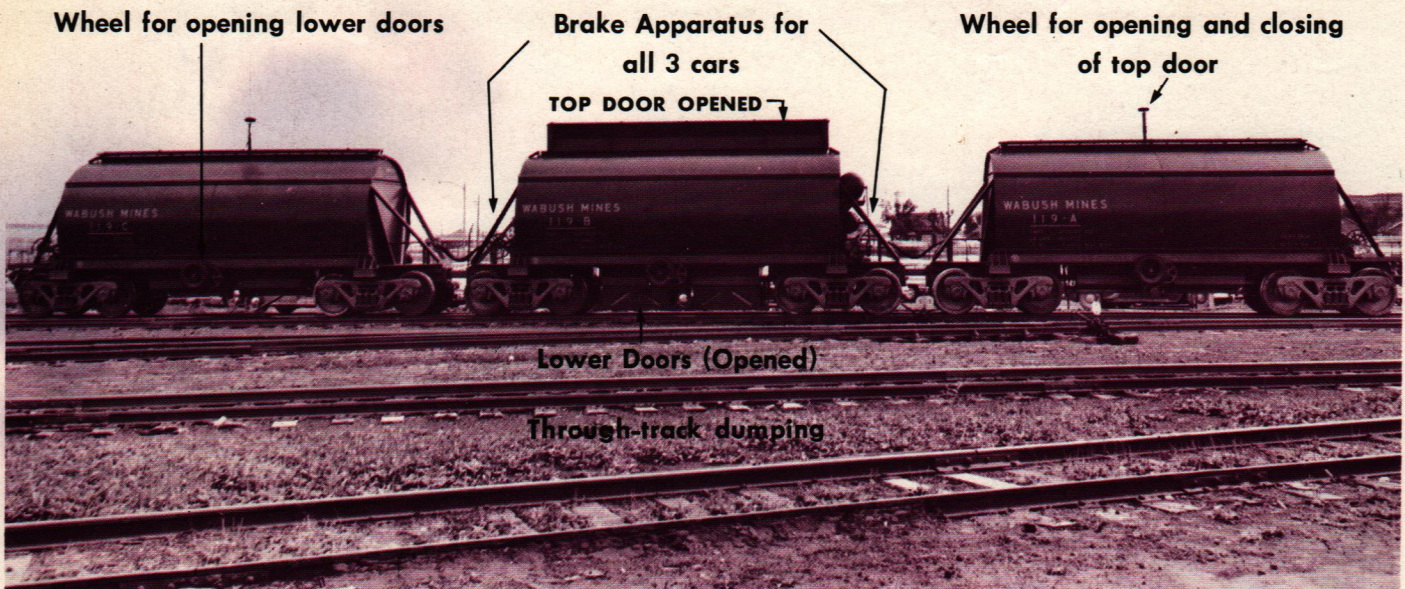


Now mined and concentrated—the ore still is a long way from the blast furnace.

A glance at the map on the left will indicate the long distances the concentrate must go — two hundred and seventy-five miles by rail southward to Pointe Noire, then many more to the eight member companies who together have financed the Wabush project.

The transportation is a story in itself; a story of unique and ingenious equipment, of a tour through the spectacular Labrador wilderness and the product handling and processing at Pointe Noire before it leaves in ships for its final destination.

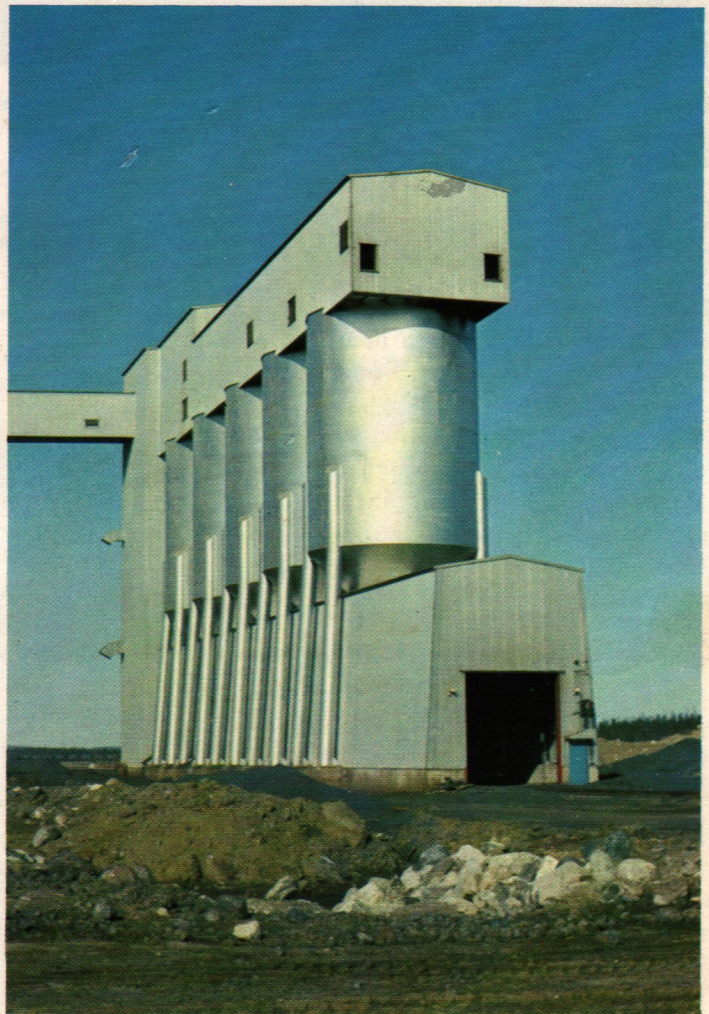
This phase of the story must begin with the railroad trains themselves. Of unique design the 270 ton capacity cars are actually a set of three units or compartments, the middle or "mother" unit containing all the brake control system for the trio. Each unit has a capacity of 90 tons of concentrate. Manufactured by the National Steel Car Corporation, Limited, Hamilton, Ontario — a Dofasco subsidiary — these special cars have automatic devices which open or close the compartment doors upon contact with an operating rail. Hence the train, as it moves through the load-out bin tunnel (at about two miles per hour), is automatically loaded.



One complete car, made up of three coupled units, the centre one containing all the braking equipment for the trio.

The auto wheel clearly shown on the side engages a raised rail to open the bottom doors. An identical wheel on the other side will close the door.

The tunnel beneath the load-out bins through which the empty train moves and has its cars automatically loaded.



Fully loaded trains, hauled by four 1,800 horsepower diesel locomotives of the Wabush Lake Railroad leave daily from Wabush easterly to the junction of the Quebec North Shore and Labrador Railroad. There the Wabush Lake Railroad diesels spot the mile-long train on the Q.N.S. & L. line, pick up an equally long train of empties which have been returned from Pointe Noire and take this train back to Wabush for loading. Four similar diesel locomotives of the Q.N.S. & L., which brought the empties to the junction, take the loaded train south through two hundred and sixteen miles of wilderness to a junction point outside Sept. Iles, Quebec. Here a similar change-over of locomotives and cars takes place and the Arnaud Railroad then delivers the loaded train over the last 18 miles to Pointe Noire.

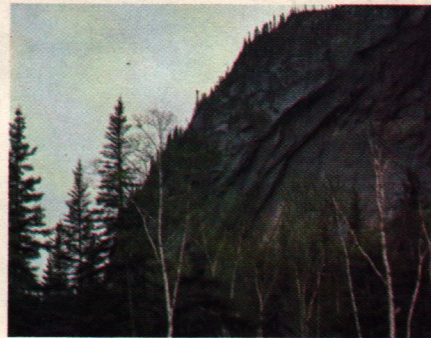
**275-Mile
Journey
through
the
wilderness
of
Labrador
and
Quebec**



Taken from the rear platform of No. 2 locomotive as the train rumbles along at 40 m.p.h., this photograph gives a good idea of the landscape of Labrador as well as the length of the train.

Occasional high granite ridges begin to appear as the train progresses southward. So vast and undeveloped is this territory, inhabited only by caribou and bear, it is possible no one has ever stood atop these hills to marvel at the unspoiled terrain.

(below) Countless rivers and lakes are by-passed as our snake-like train moves steadily southward. Toward the end of the trip the stunted black spruce of the north give way to healthier, larger trees, with magnificent stands of birches. The caribou moss is now replaced by undergrowth.



The breathtaking fourteen hour journey down the Quebec North Shore and Labrador Railway line takes one through a constantly changing landscape. In the Wabush area the low black spruce and pebbly, sandy terrain can support little wildlife other than caribou which feed on the plentiful caribou moss in the tundra, and the occasional bear which survives on grubs he finds in tree trunks. Other animals found in the area are rabbits, foxes, ptarmigan and other small game. The countless unnamed lakes and rivers, crystal clear, abound in game fish of amazing proportions.

Travelling southward the trees become taller and healthier in appearance, and more common varieties of evergreens and birches begin to appear. The caribou moss thins away and ground vegetation begins to show. Every curve of the rails produces new unspoiled scenes which make one marvel at the original task of building the rail line, and also tend to make the amateur photographer go through a dozen rolls of film.



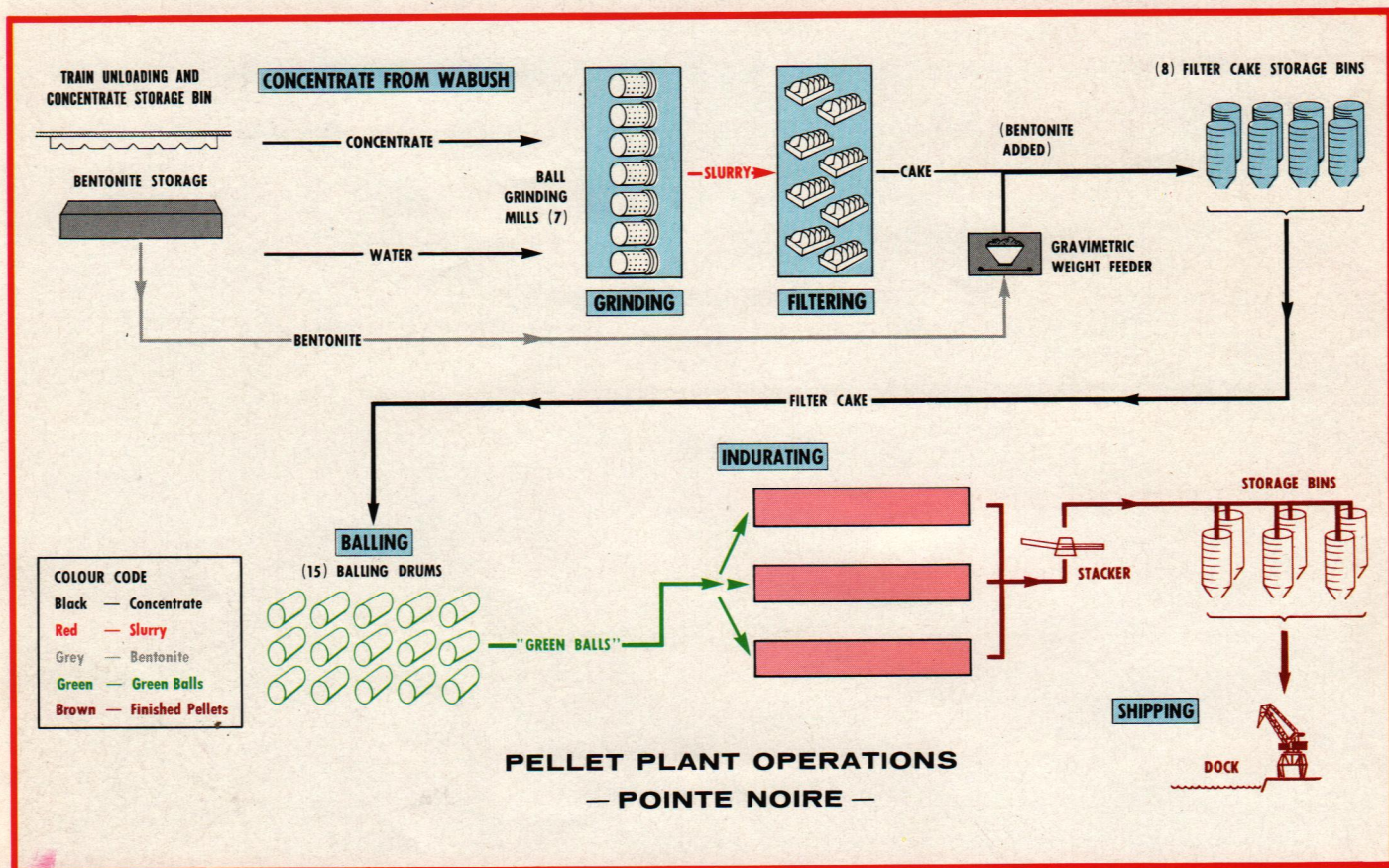


A loaded train crosses the Moisie River and enters a long tunnel as it nears Sept Iles.

End of the journey — the unloading building at Sept Iles.

A fascinating scene is the 250 foot high steel trestle over the boiling Moisie River. The above photo was taken at 6:00 a.m. as a loaded train approached the tunnel entrance over which our photographer was perched. Soon after this crossing the train enters a junction point just at the outskirts of Sept Iles, Quebec. The Arnaud Railroad diesels then take the train to Pointe Noire. This is the site of the pelletizing plant and shipping dock, as well as the headquarters of Wabush Mines and the Pointe Noire maintenance shops. Here the concentrate is processed into pellets before shipping.

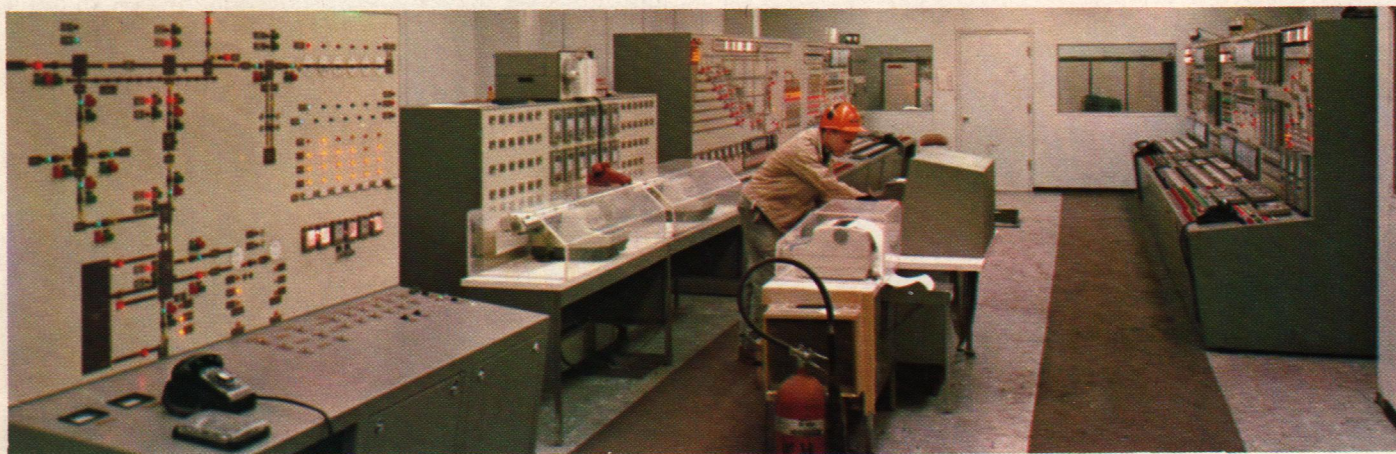


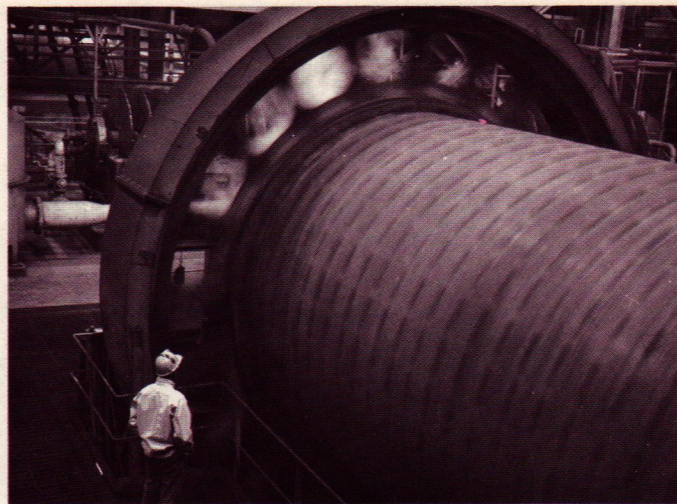
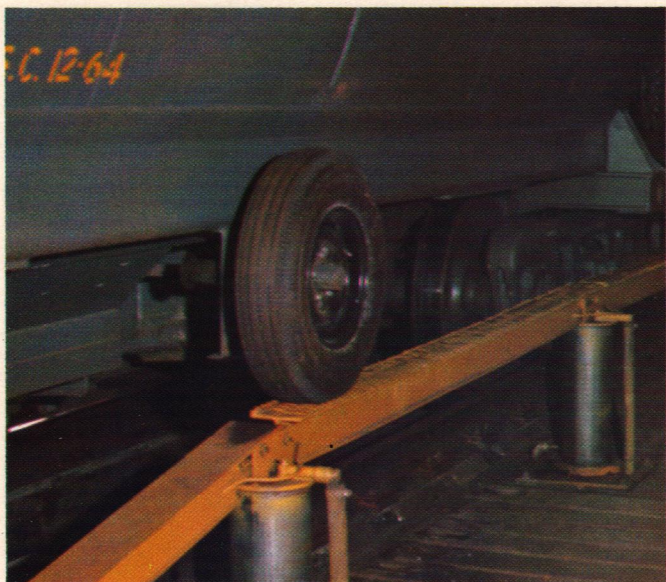


Simplified flow chart of the concentrate handling and pelletizing at Pointe Noire.

These are the pellets: small, heavy, greyish hard balls of iron ore, manufactured from the loose concentrate at Pointe Noire.

Similar to the central control room at Wabush, this is the nerve centre of the Pointe Noire operations, controlling the handling, pelletizing and stockpiling of the product.





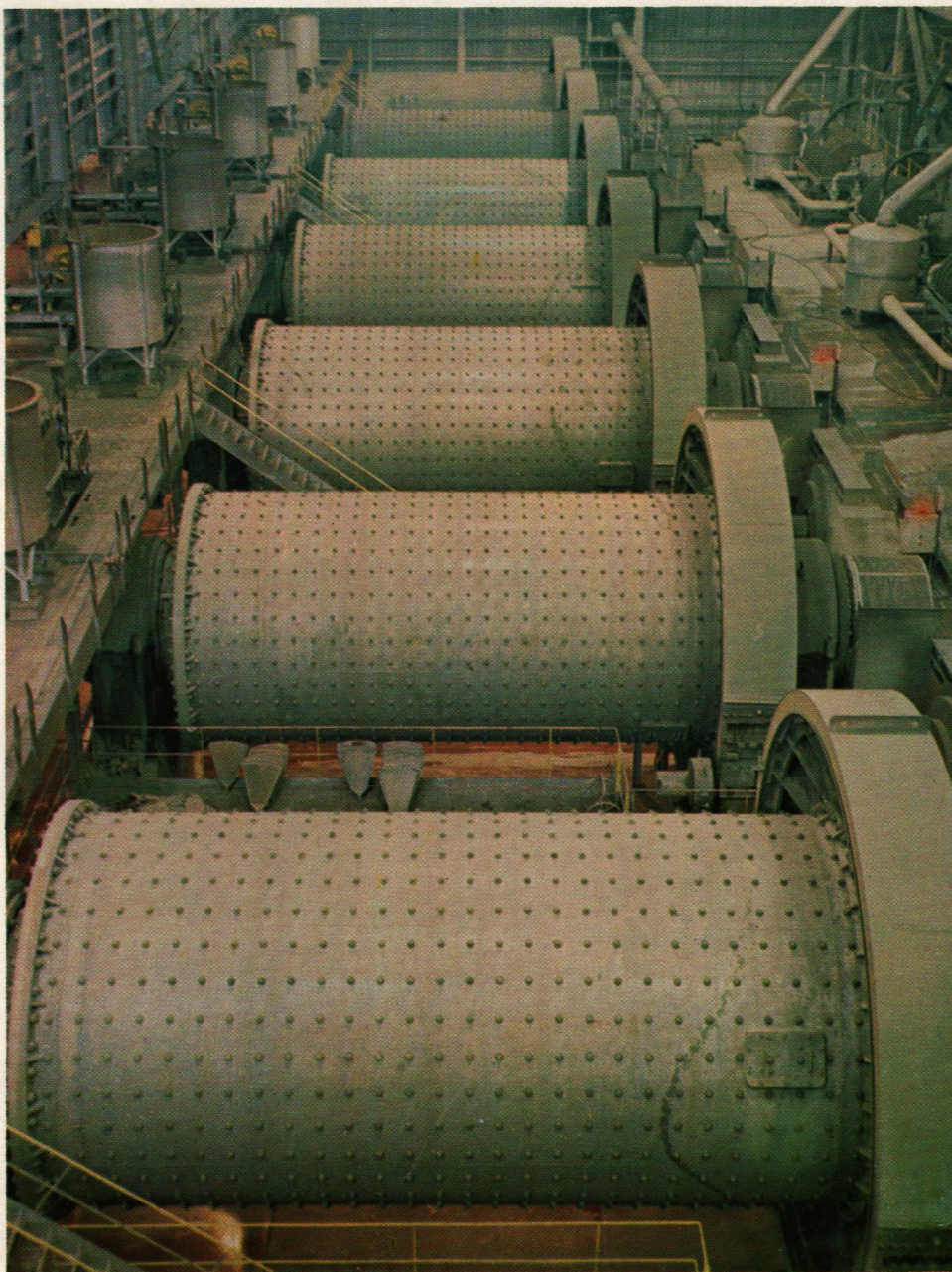
Above and below, the 7 ball mills inside which steel balls further grind the concentrate to the consistency of face powder.

By remote control the rails raise and contact the auto wheels to open the car doors at a specified spot to dump the concentrate through the rails as the train moves along at 4 miles per hour. The concentrate from Wabush is unloaded automatically into hoppers and on to conveyors below the rails. It is then stored for continuous delivery to the pelletizing plant or routed delivery to the pelletizing plant.

The Pellet Plant

The first operation in pelletizing the concentrate is fine grinding in the seven huge revolving ball mills. Steel balls reduce the concentrate which is mixed with water to a consistency of face powder. The slurry (mixture of concentrate and water) is then de-watered by disc filters which leaves the concentrate in a damp state. In this form it is called "cake". The cake is mixed with a fine clay material called Bentonite which will act as a binding agent and taken by conveyor to huge bins. The mixture is then fed directly to the fifteen balling drums.

The balling drums are huge horizontal cylinders which revolve slowly. The cake is scraped from the inside and tumbles down in little balls. These "green" balls (before heating) are then fed into one of three travelling grate indurating lines and as they progress through the oil fired line they are heated at about 2,500°F and baked into hard round balls or pellets. They emerge thoroughly dry and hard. Last step is screening (for size) and stockpiling for shipping.





Half submerged in the slurry, these slowly turning screen-faced disc filters suck the water from the slurry and blow the semi-dry "cake" onto a conveyor.



*Cake tumbles into "green balls" in a balling drum.
One of the three 310' long indurating lines which bake the green balls in 2,500°F temperature converting them into dry, hard pellets.*





This monstrous steel machine is the stacker-reclaimer.

The stacker-reclaimer in the upper photo is capable of handling 2,500 tons per hour. It runs on rails the full length of the storage area and is used to place the ore in two parallel piles and to reclaim and deliver it to the yard's conveyor belt system for return to the pellet plant, send it to the silos or directly to the dock shiploaders.

In the lower photograph are the shiploaders (at the left) and the 6 load-out bins joined by a conveyor system to the docks. These bins, combined, hold 72,000 tons of pellets.

Handling and Shipping

Below — The shipping and storage facilities at Pointe Noire from a hill beside the pelletizing plant. Notice the ships awaiting cargoes of pellets or concentrate, standing in the beautiful natural harbour of Sept Iles Bay in the Gulf of St. Lawrence. Just beyond the ships is the town of Sept Iles, and the railroad runs from right to left bringing the concentrate from Wabush around the harbour to Pointe Noire.





Maintenance and repair shops at Pointe Noire. Head office of Wabush Mines is nearby.

POINTE NOIRE- Maintenance, Administration, Pelletizing and Shipping Complex

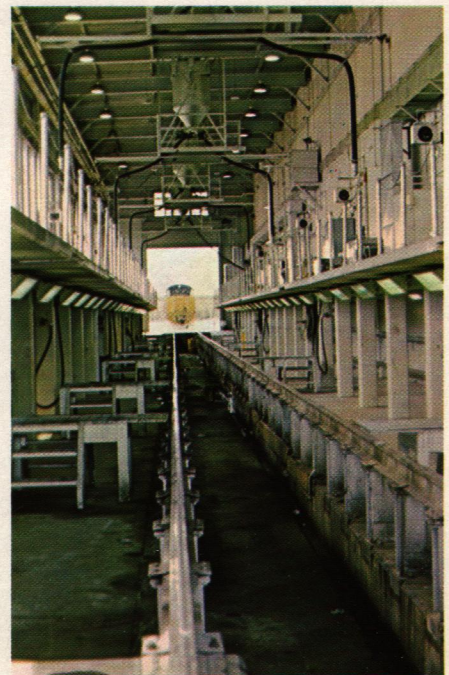
Pointe Noire complex as seen from railroad approaching from Sept Iles.



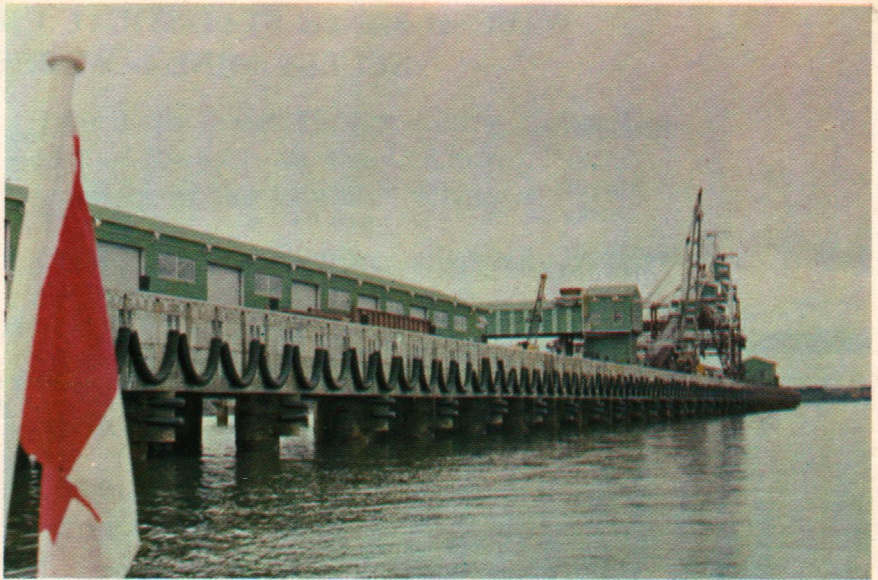
Locomotive service building, Pointe Noire.

Maintenance at Pointe Noire, as at Wabush, is a highly important phase of the operations. Since there are no connecting railroads east or west from this area, all locomotive service has to be accomplished on the site. (Rolling stock and locomotives had to be brought by water to the area). The extensive maintenance shops at Pointe Noire are equipped and staffed with trained personnel who can effect repairs on all the equipment at the site, from the locomotives and heavy machinery to a knob on an office door. A fully equipped machine shop is also available.

On the site is the fine new head office building of Wabush Mines, where all operations at Wabush and Pointe Noire are administered. The entire complex is attractively and effectively laid out, making full use of existing terrain and waterfront. Fresh water, (the Gulf is salt) for plant operations is pumped from a nearby river.



TOP PHOTO — *The 1,600 foot long shipping dock at Pointe Noire.*



CENTRE PHOTO — *Great Lakes ship unloads pellets at Dofasco's dock in Hamilton.*



BOTTOM PHOTO — *Blast Furnaces at Dofasco work 'round the clock smelting iron from iron ore.*



We have now traced the iron ore from its original orebody, through the concentrating plant at Wabush, along the Wabush Railroad line, down the Quebec North Shore and Labrador line and over the Arnaud Railroad line to Pointe Noire. Here the iron ore pellets are shipped to member companies.

Almost three hundred million dollars have been spent by the eight member firms in the construction and outfitting of this tremendous undertaking. Today pellets flow at a steady rate to the far away blast furnaces of the member companies, providing the needed raw material for the expanding steel industry.

Pointe Noire today is becoming one of Canada's leading shipping centres as both ocean-going and fresh water ships arrive and carry away their heavy cargoes.

The result of this vast undertaking has been the birth of a whole new town in the interior of Labrador, the creation of hundreds of good steady jobs for men from both Newfoundland and Quebec. It has also resulted in the establishment of a long-term new source of supply for one of today's most needed raw materials, iron ore.

WABUSH MINES STATISTICAL INFORMATION

SCULLY MINE — WABUSH

MINING

Drills	4	—	12¼" Rotary Bit
Shovels	7	—	8 Cubic Yards
Trucks	24	—	55 tons

MILLING

Gyratory Crushers	2		
Size	54" x 74"	—	450 H.P.
Autogenous Grinding Mills	6		
Size	24' x 8'		
Mill Speed	11.5 RPM	—	1750 H.P.
Rougher Spirals	1152		
Cleaner Spirals	960		
Magnetic Separators	12		
Tailing Tickener Tank	1	—	280' Diameter
Fluosolid Dryers	3	—	14' Diameter
High Tension Separators	58 Machines	—	312 Rotors

PELLETIZING PLANT — POINTE NOIRE

MAJOR EQUIPMENT

Ball Mills	7		
Size	13' 6" x 28'		
Mill Speed	15 RPM	—	3000 H.P.
Balling Drums	15		
Size	10' x 31' 6"		
Drum Speed	11.0 RPM	—	60 H.P.
Indurating Machines	3		
Size	10' x 310'		
	38 Windboxes		
	38 oil burners on each machine		
7 fans connected on each machine —			
1 Combustion air fan	600 H.P.	95,000 CFM	
1 Windbox recup. fan	2750 H.P.	175,000 CFM	
1 Updraft drying fan	2750 H.P.	162,900 CFM	
1 Windbox exhaust fan	2500 H.P.	167,350 CFM	
1 Hood exhaust fan	250 H.P.	172,000 CFM	
1 Cooling air fan	1750 H.P.	270,000 CFM	
1 Tempering air fan	50 H.P.	32,000 CFM	
Conveyors	130		
Total length	5 miles		

YARD AND DOCK

Total capacity of storage yard	2,000,000 tons
6 pellet storage silos — combined capacity	72,000 tons
3 Bunker "C" tanks — combined capacity	12,000,000 gals
1 Bentonite storage shed — capacity	20,000 tons
Total length of dock	1,600 feet
2 Shiploaders — total capacity	8,000 LTH
1 Cargo derrick	75 tons

RAILROAD

Diesel engine locomotives	11	—	1800 H.P.
Ore compartments	534	—	90 LT
Total length of railroads	58.7 miles		

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WABUSH MINES

- Source of Power:* Twin Falls Power Corporation — 110 miles east of Wabush on the Unknown River, a tributary of the Churchill River.
- Mine:* Open Pit, eventually three miles long by one mile wide.
- Reserve estimates:* Over one billion tons of Crude low grade ore.
- Crude Ore Production:* Approximately 16 million tons per year.
- Ore:* Specular hematite, 36% iron and 43% silica before concentrating.
- Annual Production:* 6 million tons of iron ore pellets.
- Market:* The eight owner Companies consume the entire production.

WABUSH MINES PARTICIPANTS

- Canada:* The Steel Company of Canada, Limited
Dominion Foundries and Steel, Limited
- United States:* The Youngstown Sheet and Tube Company
Interlake Steel Corporation
Inland Steel Company
Pittsburg Steel Company
Pickands Mather & Co. (Managing Agent)
- Italy:* Finsider

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