

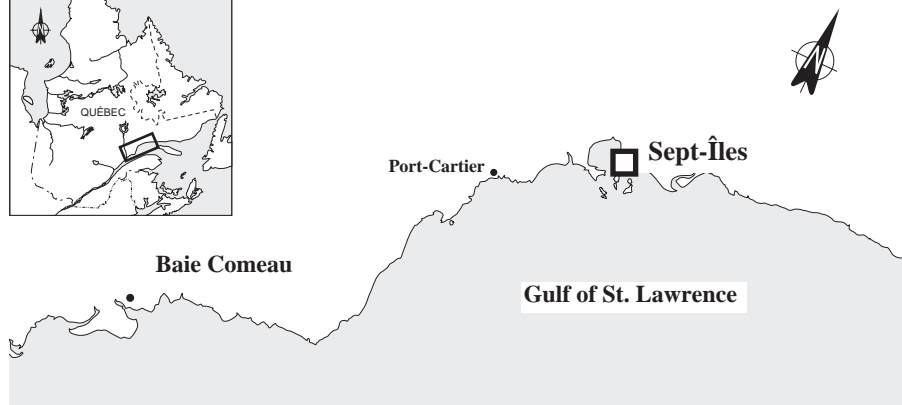
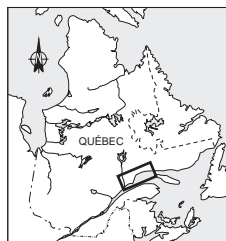
FACT SHEET 56

Wabush Mine

Pointe-Noire (P.O. Box 878)

Sept-Îles, Quebec

G4L 4L4



A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The WABUSH MINE works in Sept-Îles is in Group 1, comprising plants whose effluent may contain toxic substances even though it is treated.

The objective for Group 1 is to reduce toxic effluent of targeted plants by 90%.

INDUSTRIAL PLANT

Iron ore concentrate processing

The WABUSH MINE works in Sept-Îles includes a pellet plant, port facilities, a yard, maintenance shops, storage facilities and an administrative building. Standard and self-melting pellets in two concentrations of manganese are produced from dry iron ore concentrate. Coke dust, bentonite and, since 1993, limestone are added to the concentrate before dry-grinding with steel balls. As the mixture leaves the ball mill, pulp from thickening of wash and cooling water is added. The pellets are formed in balling drums, then screened and passed through three hardening furnaces where they are heated in stages to 1302°C, following which they are cooled to 149°C and screened. The yard can hold 2 540 000 t of pellets and 355 600 t of iron ore concentrate. Annual production capacity of the plant is 6 096 300 t. In 1995, the plant operates at 88% design capacity and employs a work force of 320.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Iron ore concentrate
- Dolomite
- Coke dust
- Bentonite
- Steel pellets
- Limestone

FINISHED PRODUCTS

- Standard pellets
- Self-melting pellets
- Raw iron concentrate

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Iron present

Based on 1991 company data, in 1993 the plant discharged 2060 m³/d of effluent containing notably:

- 6800 kg/d of suspended solids (ss)
- 5500 kg/d of iron

RESOURCES AND USES TO PRESERVE

Commercial fishing

Effluent from the WABUSH MINE works flows into the Gulf of St. Lawrence at the entrance to Sept Îles Bay. Sept-Îles is one of the busiest landing ports for North Shore commercial fishermen, who land snow crab, herring, shrimps, turbot, whelk, Stimpson's surf clam, scallops, and smaller quantities of lobster, cod, sole, lumpfish, capelin and smelts. The capelin, and smelt cross the bay to get to their spawning grounds. The bay entrance contains marine mammals such as harbour porpoise, minke whale, finback whale, grey seal, and harp seal, along with molluscs and crustaceans such as whelk, mussels, clams (softshell and razor), periwinkles, crab, and lobster. Smelt are fished under the ice at the mouth of the Des Rapides river, which flows into the bay. The area contains several beaches, both public and private. In summer, the bay attracts water sports enthusiasts (wind-surfing, kayak and sailing). The bay also contains a marina and several wharves. There is a small cruise industry. The shores of the bay contain parks with walking areas and lookoffs. The Sept Îles archipelago is a regional park. Hiking trails, campsites and picnic areas have been laid out on La Grande Basque Island, and the islands are used by divers.

ENVIRONMENTAL DISCHARGE OBJECTIVES

Environmental protection

Environmental discharge objectives are established to preserve local resources and uses. These guidelines, expressed as maximum permissible loads and concentrations for effluent released into the environment, are used in choosing treatment methods which best promote environmental protection. Environmental discharge objectives for WABUSH MINE have been calculated.

EFFLUENT TREATMENT

Recirculation of raw materials

The process produces no effluent; however, washing of conveyors, platforms and floors produces large quantities of wastewater containing raw materials. Some of the wastewater is piped to thickeners. These devices recover part of the raw materials, which are then re-introduced into the process. The supernatant liquid is discharged into Sept Îles Bay. Domestic sewage from the facilities and the port septic field are treated in septic tanks and then discharged into the bay. The mechanical maintenance shops and administrative offices are linked to a septic tank with a tile field.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Wash water recovery

Since 1990, the company has carried out work to recover wash water and channel it to thickeners. This work was aimed at reducing discharge into the environment by recycling a greater share of raw materials. The last stage of the wash water recovery project will be completed in the spring of 1997. As well, a wash water recirculation program will be implemented in the fall of 1996 to reduce consumption of fresh water drawn from Lake Hall. The surplus water in the thickeners should then be removed. The total cost of the work will be over \$1.5 million.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The WABUSH MINE works in Sept-Îles is subject to no specific regulations on effluent.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total arsenic

The Chimiotox index gauges the load of all toxic substances in industrial effluent using toxicity factors assigned to each contaminant. It is used, among other things, to monitor discharge trends over the years (Figure 1) and determine the toxic contribution of each pollutant (Table 1).

Table 1 gives data from the October 1995 SLV 2000 characterization along with the Chimiotox values calculated from them assuming an effluent flowrate of 4305 m³/d. Nineteen substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 61% of the value of the Chimotox index, followed by total iron with 28%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the 1995 data was applied to the entire period from 1993 to 1998. The influence of improvements made between 1993 and 1997 was impossible to quantify and is not reflected in the figure.

Table 1 *Chimiotox Index (1995) - Wabush Mine**

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0.694	57 143	39 673
Total iron	5548.273	3.3	18 309
Total manganese	301.299	10	3 013
Total oil and grease	16.423	100	1 642
Total sulphides	1.536	500	768
Total aluminum	55.754	11	613
Total mercury	0.002 **	166 667	261
Total chromium	0.377	500	189
Total copper	0.403	451	182
Total thallium	0.917	125	115
Total silver	0.002 **	10 000	18
Total phosphorus	0.193	50	10
Total zinc	0.694	9.4	7
Nitrites-nitrates	1.272	5	6
Ammoniacal nitrogen	5.012	0.8	4
Total nickel	0.346	10	3
Total cyanides	0.011	200	2
Acenaphthene	0.003	333	1
Naphthalene	0.017	34	1

CHIMIOTOX INDEX

64 817

* Assuming an effluent flowrate of 4305 m³/d (19 substances selected in testing for more than 120)

** Load calculation based on analytical data which are near methodological detection limits

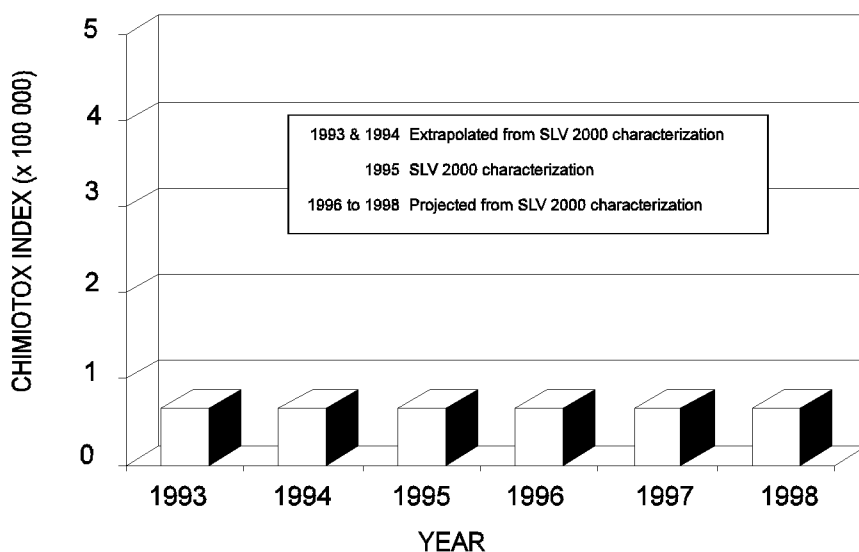


Figure 1 *Chimiotox Index Trends (1993 to 1998)*
Wabush Mine

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

One long-range objective of SLV 2000 is the virtual elimination of eleven persistent and bioaccumulative toxic substances from the effluent of the 106 targeted plants along the St. Lawrence and its tributaries. The targeted substances are those designated by the International Joint Commission in August 1993: PCBs, DDT, dieldrin, toxaphene, dioxins, furans, mirex, mercury, lead alkyls, benzo(a)pyrene and hexachlorobenzene. To reach this objective, Protection has fixed the environmental discharge objectives set for applicable substances as its target by the end of SLV 2000 in 1998, thereby ensuring that all uses of the receiving environment are protected.

The 1995 SLV 2000 characterization showed the presence of one of these persistent toxic substances, mercury. No environmental discharge objective has been calculated for this substance.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale (1 to 10) of increasing toxicity and are used to monitor discharge trends over the years. A series of bioassays of effluent from the WABUSH MINE facilities was carried out in 1995; a PEEP value of 1.3 was obtained and only low toxicity noted.

REDUCTION IN SUBSTANCES MONITORED

Flowrate and charges generally stable

According to SLV 2000 characterization, in 1995 WABUSH MINE discharged 4305 m³/d of effluent containing notably:

- 47 032 kg/d of suspended solids (ss)
- 5548 kg/d of iron

From 1993 to 1995, the effluent flowrate and the charges remained stable except when thickeners overflowed. This situation occurred during SLV 2000 characterization and led to an important increase in suspended solids

KEY POINTS

- From 1990 to 1997, implementation of wash water recovery and recirculation system for an investment of over \$1.5 million

Based on December 1995 inventory

ADDITIONAL INFORMATION

Chimiotox Index and PEEP:

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