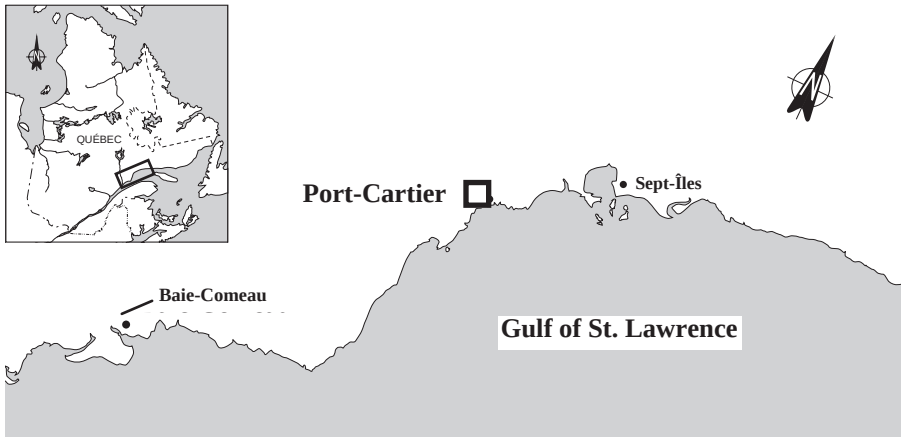
FACT SHEET 52

Quebec Cartier Mining

Highway 138

Port Cartier, Quebec

G5B 2H3



***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 QUEBEC CARTIER MINING works in Port Cartier is in Group 1, comprising industrial plants that discharge inadequately treated effluent.

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

INDUSTRIAL PLANT

Pellet plant and port facilities

QUEBEC CARTIER MINING operates an iron mine at Mount Wright, 400 km north of Port Cartier. Concentrate produced in the concentrator is transported by train to the port facilities at Port Cartier. There the concentrate is unloaded and carried to storage areas, loaded onto ships or taken to the pellet plant. About half of the concentrate from Mount Wright (8 000 000 t/yr) is made into pellets in the plant before shipping. The concentrate, to which water and coal has been added, is ground to a fine powder in ball mills. Bentonite and dolomite are added to the slurry to form a damp paste and the mixture is formed into pellets in balling discs. The low-silicon pellets are enriched before being formed into pellets. Once formed, the pellets are dried, cooked and cooled in two indurating machines then sent to storage areas or ship-loading docks. In 1997, the port facilities handled close to 16 000 000 t of concentrate and pellets, and the plant operated at 91% design capacity. The company employs a total work force of 2100.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Iron concentrate
- Dolomite
- Coal (coke)
- Limestone
- Bentonite
- Oil

FINISHED PRODUCTS

- Blast furnace pellets
- Self-melting pellets
- Low-silicon pellets
- Self-melting low-silicon pellets

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Iron present

Based on company data, in 1993 QUEBEC CARTIER MINING discharged about 28 400 m^3/d of effluent, containing notably:

- 3697 kg/d of suspended solids (SS)
- 1495 kg/d of iron
- 3.8 kg/d of mineral oil and grease (O&G)

RESOURCES AND USES TO PRESERVE

Characteristics of Port Cartier area

Effluent from QUEBEC CARTIER MINING flows into the Gulf of St. Lawrence. There is commercial fishing around Port Cartier. Snow crab, herring, turbot, whelk, Stimpson's surf clam, smelt, cod, sole, lumpfish and lobster are fished. An underharvested species, capelin, is abundant in Cayes Noires Bay. Marine mammals found in the area include harbour porpoise, minke whale, finback whale, grey seal and harp seal. Sport fishing for Atlantic salmon is mainly confined to the Rochers River. There is one beach southeast of McCormick Island and another to the east; there is also swimming in Grande Baie. Commercial and pleasure boats sail on the gulf off Port Cartier. Riverside parks in the area feature lookouts, trails, a public beach and a viewpoint at the foot of the falls. There is a campground on the east bank at the mouth of the Dominique River.

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 QUEBEC CARTIER MINING have been calculated and are available on request.

EFFLUENT TREATMENT

Raw material recovery

Industrial wastewater from the pellet plant flows through three thickeners. Raw materials are recovered and re-introduced into the process. Domestic sewage from the pellet plant is treated by aerobic digestion followed by addition of chlorine. Wastewater from the port facilities are allowed to settle out before it is discharged.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Water management plan

In 1990, the company hired a firm of consultants to develop a Master Plan for managing of red water in the Port Cartier area; the goal was to draw up a wastewater inventory and propose alternate solutions that would allow compliance with environmental requirements. An action plan was implemented beginning in 1994 to reduce wastewater discharges into the Gulf of St. Lawrence. This included enlarging the tailings area, which would have the effect of sending thickening water to a polishing lagoon. This work was completed in 1995. Measures are currently being taken to allow water recirculation, and ditches and piping will be installed to collect runoff, which will be treated and then recirculated. The program calls for the company to monitor cleanup measures, and acquire more effluent treatment know-how. The cost of activities under the Master Plan will total about $5.5 million.

The company has also arranged a storage area for raw materials. This facility includes dividing walls, a rotary conveyor and a drainage ditch linked to a settling tank which recovers and treats runoff containing raw materials. The cost of the installation was $2.2 million.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The QUEBEC CARTIER MINING works in Port Cartier is not subject to any specific regulations governing 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 19 157 m^3/d. Fourteen substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 36% of the Chimiotox index, followed by total iron with 35%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the 1995 data was reported unchanged for 1996 to 1998. For 1993 and 1994, the Chimiotox index was modified to take into account the concentration of iron in the effluent. A number of changes were made in 1994 and 1995 to reduce pollutant discharges from the industrial complex.

Table 1 ***Chimiotox Index (1995) - Quebec Cartier Mining****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0.045	57 143	2 545
Total iron	748.317	3.3	2 469
Total sulphides	1.565	500	783
Total copper	1.227	451	553
Mineral oil and grease	3.653	100	365
Total chromium	0.166	500	83
Total aluminum	6.408	11	70
Total phosphorus	1.050	50	53
Nitrites-nitrates	9.033	5	45
Total cyanides	0.095 **	200	19
Total manganese	1.807	10	18
Total zinc	1.728	9.4	16
Total selenium	0.040	200	8
Ammonia nitrogen	3.062	0.8	2
CHIMIOTOX INDEX			**7 029**

* Assuming an effluent flowrate of 19 157 m^3/d (14 substances selected in testing for more than 120).

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

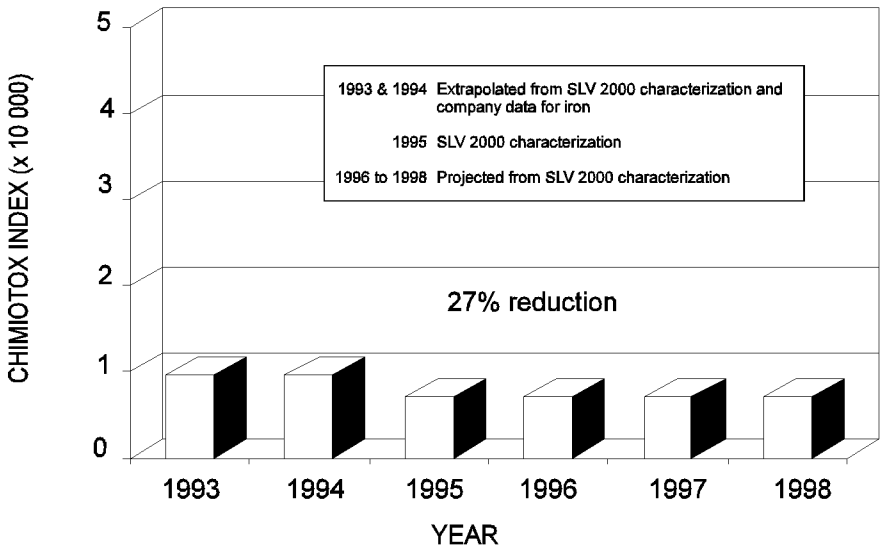


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Quebec Cartier Mining***

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 106 priority 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.

Based on 1995 SLV 2000 characterization data, none of these eleven persistent and bioaccumulative toxic substances was detected in the company's effluent.

PEEP TOXICITY REDUCTION

Non-toxic effluent

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 of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of the QUEBEC CARTIER MINING facilities, a series of bioassays was carried out in 1995; yielding a PEEP value of less than 1.7, and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Decrease in iron load

According to company data, in 1995 QUEBEC CARTIER MINING discharged 19 157 m^3/d of effluent, containing notably:

- 3999 kg/d of suspended solids (SS)
- 754 kg/d of iron
- 3.7 kg/d of mineral oil and grease (O&G)

From 1993 to 1995, the effluent flowrate decreased by 33% and the iron load by 50%; suspended solids and oil and grease loads remained stable. The reductions were due to cleanup measures implemented in 1994 and 1995.

KEY POINTS

- **Preparation of a wastewater management plan and implementation of a five-year action plan at a cost of $5.5 million**
- **Raw material storage area created at a cost of $2.2 million**
- **Non-toxic effluent and 27% Chimiotox reduction**

Information revised January 1998

ADDITIONAL INFORMATION

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