FACT SHEET 77

Alcan Smelters and Chemicals Ltd, Laterrière Works

6301 Talbot Blvd.

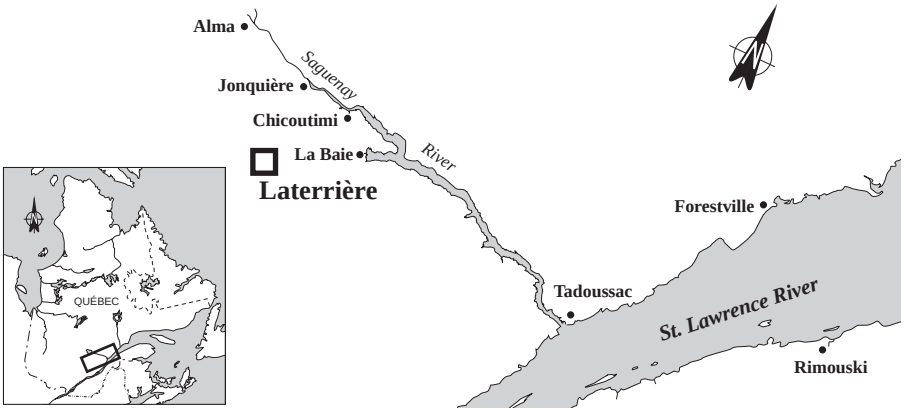
Laterrière, Quebec

G0V 1K0

***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 ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS is part of Group 2, comprising plants that have already implemented treatment programs but whose effluent may contain toxic substances.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.



INDUSTRIAL PLANT

Modern plant

The ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS facility has been in operation since November 1989. The smelter manufactures aluminum in two series of prebaked anode electrolytic pots, consisting of 216 tanks each. The aluminum thus produced is either shipped in liquid form to other divisions of ALCAN or cast into ingots at the plant. The LATERRIÈRE WORKS facility can cast up to 4810 tonnes per week. ALCAN's Grande-Baie plant manufactures the prebaked anodes for Laterrière and removes cathode pot linings. Annual production capacity of the Laterrière smelter is 215 000 tonnes of aluminum. In 1997, the plant operated at 97% capacity and employed a work force of 607.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Alumina
- Aluminum fluoride
- Cryolite
- Cathode blocks
- Prebaked anodes

FINISHED PRODUCTS

- Laminated aluminum ingots
- Liquid aluminum (for neighbouring plants)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Fluorides and aluminum

Based on company data, in 1993 the plant discharged an average of 667 m^3/d of effluent, containing notably:

- 193 kg/d of dissolved solids (DS)
- 45 kg/d of chemical oxygen demand (COD)
- 8.2 kg/d of fluorides
- 1.1 kg/d of aluminum
- 0.16 kg/d of mineral oil and grease (O&G)

RESOURCES AND USES TO PRESERVE

A sport fishing area

The ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS plant is about 15 km south of downtown Chicoutimi. It is located on a site near Dalle and Saint-Gelais lakes. Plant effluents are discharged into the Moulin River. Rainwater and effluent are collected in a pond with an outfall in the middle of the river, about 2.5 kilometres upstream from Laterrière. There are sharp differences in elevation along the upper portion of the Moulin River, punctuated by many rapids; however, flow along the section on which the plant is located is relatively light. Sport fishing is practised on all parts of the river, with the main species caught being brook trout, lake whitefish, mullet and three-spine stickleback. Summer resorts are found mainly around Laterrière. The main centre of interest is Moulin town park, an area that includes several hiking paths. In populated areas, swimming, canoeing and kayaking are quite popular.

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 ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS are available on request.

EFFLUENT TREATMENT

Modern treatment system with water recirculation

Direct cooling water from the casting unit is treated in a forced-air flotation cell, then returned to the casting unit. About 90 m^3/d of drained cooling water is processed through a pecan filter and sent to a holding pond. Compressor and air-conditioner cooling water (230 m^3/d) is recycled as make-up water in the casting centre. All rainwater is collected and channelled to the holding pond.

Particles are removed from garage and vehicle washwater, which is channelled to an oil separator, and then to the plant sewage treatment facility. Domestic sewage goes through an activated-sludge treatment process at the plant sewage treatment facility and is then channelled to the holding pond. Effluent from the pond is discharged into the Moulin river through a submerged outfall.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Reduction in fluorides

Changes to storage areas and electrolytic bath cooling areas in June 1993 made it possible to recover fluoride particles released into the atmosphere during handling of electrolytic baths. The investment cost was assessed at $3.7 million. The holding pond was also cleaned in September 1995 and August 1996 to remove fluorinated sediments. A general action plan to minimise fluoride sources was submitted in January 1998.

Concentrated oily water from direct cooling water treatment has been treated and reused in composting since the fall of 1994 by a specialized firm.

REGULATORY COMPLIANCE - WATER COMPONENT

Compliance with most standards

ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS complies with most standards on plant operation in the authorization certificate issued in November 1989 by the Ministère de l'Environnement et de la Faune du Québec (MEF). Standards were based on goals for discharge into the Moulin river and on the best technology available at that time. Standards for fluoride discharge concentrations have not always been met following a reduction in feed process water. Nevertheless, the fluoride discharge load standard has always been met.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly arsenic

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

Table 1 shows October 1996 SLV 2000 characterization data along with the Chimiotox values calculated from them, assuming an effluent flowrate of 566 m^3/d. Eleven substances were selected in testing for more than 120. Based on these data, arsenic was predominant, accounting for 51% of the Chimiotox index.

Figure 1 is plotted from 1996 SLV 2000 characterization data. The Chimiotox index calculated from the 1996 data was reported unchanged for 1993 to 1998. We were unable to quantify improvements made by the company and they were not reported on the figure.

Table 1 ***Chimiotox Index (1996) - Alcan Smelters and Chemicals Ltd, Laterrière Works****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0,001	57 143	77
Total phosphorus	0,718	50	36
Total oil and grease	0,193	100	19
Total aluminum	0,610	11	7
Total thallium	0,047	125	6
Total sulphides	0,010	500	5
Nitrites-nitrates	0,003	5	<1
Total iron	0,013	3,3	<1
Total manganese	0,012	10	<1
Total molybdenum	0,452	1	<1
Total zinc	0,042	9,4	<1
CHIMIOTOX INDEX			**151**

* Assuming an effluent flowrate of 566 m^3/d. Eleven substances were selected in testing for more than 120.

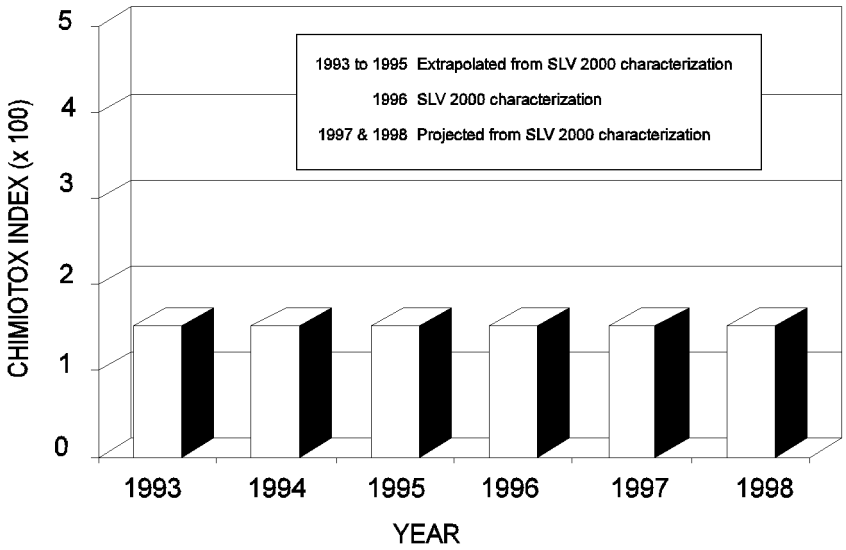


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Alcan Smelters and Chemicals Ltd, Laterrière Works***

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 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 1996 SLV 2000 characterization data, none of the eleven persistent and bioaccumulative toxics were detected in the company's effluent.

PEEP TOXICITY REDUCTION

Low PEEP

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. The 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 ALCAN SMELTERS AND CHEMICALS LTD, LATERRIÈRE WORKS, a series of bioassays was conducted in connection with the SLV 2000 characterization in October 1996, yielding a PEEP of 2.2, and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Load reduction

Based on company data, in 1997 effluent average discharge was 625 m^3/d, containing notably:

- 152 kg/d of dissolved solids (DS)
- 11 kg/d of chemical oxygen demand (COD)
- 6.6 kg/d of fluorides
- 0.95 kg/d of aluminum
- 0.06 kg/d of mineral oil and grease (O&G)

Between 1993 and 1997, the chemical oxygen demand load in the effluent decreased by 75%, dissolved solids by 22%, fluorides by 20%, aluminum by 14% and mineral oil and grease by 62%. The reduction was due to the implementation of cleanup measures and prevention efforts made at contaminant discharge and emission sources.

KEY POINTS

- **Improvement of storage areas and electrolytic baths handling; a $3.7 million investment**
- **Action plans to reduce contaminant sources in August 1997 for $O\&G_{tot}$ and in January 1998 for fluorides; a $2 million investment**

Information updated January1998

ADDITIONAL INFORMATION

Chimiotox Index and PEEP:
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