FACT SHEET No. 33

Aluminerie de Bécancour Inc.

5555 Pierre Thibault Street
Bécancour, Quebec
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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 liquid toxic waste and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each of which has been given a specific objective. The ALUMINERIE DE BÉCANCOUR INC. complex, located in Bécancour, is part of Group 4, comprising the 50 plants targeted under the St. Lawrence Action Plan.

The objective set for Group 4 is to pursue cleanup efforts and perform environmental monitoring to achieve a 90% reduction in liquid toxic waste. Between 1988 and 1995, the 50 plants reduced their toxic effluent discharges by 96%.

INDUSTRIAL PLANT

A modern aluminum smelter

The ALUMINERIE DE BÉCANCOUR INC. smelter fabricates aluminum ingots, slabs and billets from alumina and aluminum fluoride. The alumina is smelted by the prebaked-anode process. The released gases undergo dry purification by adsorption on alumina. The complex also comprises a casting centre, a green anode production shop and two anode baking furnaces. In 1995, it operated at its full annual production capacity of 360 000 t of aluminum and employed a work force of 1048.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Alumina
- Aluminum fluoride
- Pitch
- Coke

FINISHED PRODUCTS

- Aluminum (ingots, billets and slabs)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

ss and fluorides

According to company data, in 1988 the complex had an average effluent discharge of 1570 m^3/d, containing:

- 11 kg/d of suspended solids (SS)
- 5.1 kg/d of fluorides
- 2.5 kg/d of oil and grease (O&G)

Between 1990 and 1991, the annual production capacity was boosted 50% to 360 000 t.

RESOURCES AND USES TO PRESERVE

Wildlife habitats between Quebec City and Lake Saint-Pierre

The ALUMINERIE DE BÉCANCOUR INC. complex is located in Bécancour's industrial and port zone on the south shore of the St. Lawrence, 2.5 km east of the village of Bécancour. Not far from the complex, the Gentilly and Bécancour flats provide habitat for a wide diversity of wildlife. Downriver from the main outfall of the smelter, are spawning grounds for yellow perch, brown bullhead, carp and burbot. The extensive local flats are among the four principal waterfowl concentration areas between Lake Saint-Pierre and Quebec City. Several species of ducks and geese congregate there during migration and nesting. The Bécancour-Gentilly section includes two drinking water intakes.

WATER QUALITY BASED OBJECTIVES

Environmental protection

Water quality based 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. The water quality based objectives for ALUMINERIE DE BÉCANCOUR INC. are available on request by 1997.

EFFLUENT TREATMENT

Recirculation system

Water from the cast house hydraulic circuit is filtered and recirculated. Wash water upstream from the filter is treated by dissolved air flotation and circulated to a settling basin. Rainwater and indirect cooling water flow to the same basin. Wash water from the production shops is treated in an ultrafiltration unit and released together with sanitary sewage into the public sewer system in Bécancour's industrial park. That water is then treated in the aeration pond of the industrial park. The authorization certificates were updated in June 1995.

PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

Upgrading along with expansion

A recirculation system for the cast house process water was put in place in 1986 and upgraded in 1990. Measuring devices continuously monitor the effluent from the flotation unit. When the water does not meet prescribed conditions, it undergoes additional treatment before being channeled to the settling basin.

REGULATORY COMPLIANCE - WATER COMPONENT

The best available technology

The Ministère de l'Environnement et de la Faune du Québec (MEF) issued authorization certificates for the construction of the aluminum smelter and the boost in its production capacity. The complex utilizes the best available wastewater treatment technology and is in compliance with the standards prescribed in the certificates.

In 1993, Environment Canada and the MEF commended ALUMINERIE DE BÉCANCOUR INC. for the treatment measures implemented.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mostly oil and grease

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

Table 1 gives the Action Plan characterization data gathered in 1991, as well as the Chimiotox values estimated from those figures, for an effluent flow of 1715 m^3/d. In testing for more than 120 substances, 15 were found. The figures show a predominance of oil and grease in the treated wastewater. Oil and grease make up 82% of the Chimiotox index, followed by nitrites and nitrates (7%), aluminum (4%) and selenium (2%).

Figure 1 is plotted from the 1991 characterization data, which were used together with monthly company data for O&G and aluminum to extrapolate Chimiotox indices for periods 1988-1990 and 1992-1995. Although production rose in 1991, discharges declined by comparison with 1988 levels. Between 1988 and 1995, the Chimiotox index fell by 56%. Chimiotox values for liquid effluent from the ALUMINERIE DE BÉCANCOUR INC. complex are among the lowest derived for all of the Action Plan plants.

Table 1 ***Chimiotox Index (1991) - Aluminerie de Bécancour Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total Oil and Grease	1.687	100	169
Nitrites-Nitrates	3.012	5	15
Aluminium	0.799	11	9
Selenium	0.020	200	4
Dichloromethane	0.040	64	3
1,1-dichloroethylene	0.004	541	2
Xylenes (o, m and p)	0.048	25	1
Total Phosphorus	0.016	50	1
Zinc	0.071	9	1
Benzene	0.016	25	<1
o-Xylene	0.015	25	<1
Ethylbenzene	0.008	33	<1
Toluene	0.017	10	<1
Ammoniac Nitrogen	0.178	0.8	<1
Trichloroethylene	0.003	12	<1
CHIMIOTOX INDEX			**206**

* For effluent discharge of 1715 m^3/d (15 substances detected in testing for more than 120).

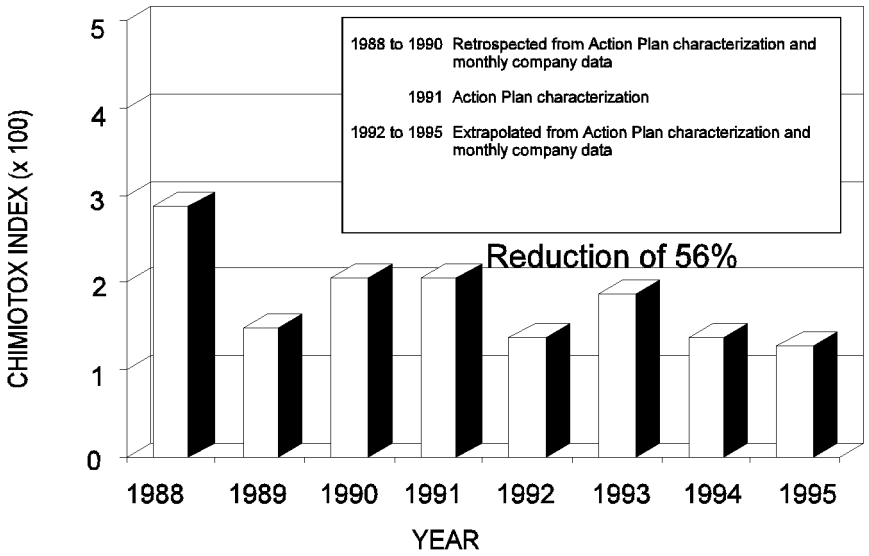

Figure 1 ***Changes in toxic effluent discharges, 1988-1995 - Aluminerie de Bécancour Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

No persistent toxic substances

One long-range objective of SLV 2000 is the virtual elimination of 11 persistent bioaccumulative toxic substances from 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 alkyl, benzo(*a*)pyrene and hexachlorobenzene.

None of the targeted substances was detected during the 1991 Action Plan characterization study.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe, or 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. One series of bioassays was conducted for the ALUMINERIE DE BÉCANCOUR INC. complex. The 1991 PEEP index was estimated at 2.8, among the lowest of the indices found for the 50 Action Plan plants.

REDUCTION IN SUBSTANCES MONITORED

Less oil and grease

According to company data, in 1995 the complex had an average effluent discharge of 1699 m^3/d, containing:

- 38.4 kg/d of chemical oxygen demand (COD)
- 12.2 kg/d of suspended solids (SS)
- 9.8 kg/d of fluorides
- 1.0 kg/d of aluminum
- 0.8 kg/d of oil and grease (O&G)

The data from ALUMINERIE DE BÉCANCOUR INC. for 1988-1995 show a 68% drop in oil and grease. The loads of fluorides and suspended solids did not exhibit this trend, owing chiefly to the 1991 boost in production capacity. The pollutant loads measured in the effluent are well within the standards prescribed in the 1990 authorization certificate.

KEY POINTS

- **In 1993, Environment Canada and the Ministère de l'Environnement et de la Faune du Québec commended ALUMINERIE DE BÉCANCOUR INC. for its treatment measures**
- **56% reduction in the Chimiotox index**
- **50% boost in production capacity in 1991**

Based on December 1995 inventory.
Information reviewed by Gilles Legault, SLV 2000.

ADDITIONAL INFORMATION

Chimiotox index and PEEP:
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Water quality based objectives:
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Published by authority of the Minister of the Environment

Catalogue No. En153-6/33-1996E
ISBN 0-662-23343-3

(Aussi disponible en français sous le titre *Établissements industriels - faits saillants*).