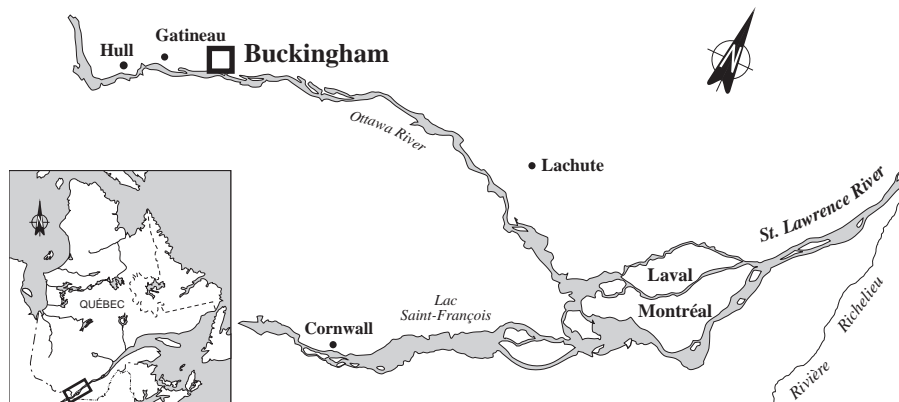


FACT SHEET 82

Sterling Pulp Chemicals

101 Donaldson Rd.
Buckingham, Quebec
J8L 3X3



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 STERLING PULP CHEMICALS plant, in Buckingham 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

Sodium chlorite and chlorate production

The STERLING PULP CHEMICALS plant in Buckingham includes sodium chlorate and sodium chlorite production facilities. The sodium chlorate is produced by electrolysis of a purified solution of sodium chloride. The plant has three electrolysis lines. The sodium chlorate solution is crystallized and then dried to obtain product in crystal form. In the preparation of sodium chlorite, the sodium chlorate reacts with hydrochloric acid to form gaseous chlorine dioxide. The chlorine dioxide reacts with caustic soda and hydrogen peroxide to form a sodium chlorite solution. The finished product is shipped in solution form. The rated production capacity of the sodium chlorate plant is 123 500 t/yr., while the sodium chlorite plant can produce up to 3750 t/yr. In 1997, the first plant worked at 92% capacity and the second at 80.5% capacity. The two plants employed a total work force of 93.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Hydrochloric acid
- Sodium hydroxide (caustic soda)
- Hydrogen peroxide
- Sodium chloride
- Sodium dichromate
- Sodium carbonate
- Calcium chloride
- Filtration aid
- Algicide
- Anti-corrosion treatment
- Sodium metabisulphite

FINISHED PRODUCTS

- Sodium chlorate
- Sodium chlorite

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly sulphates

Based on company data, in 1993 the plant discharged of 125 m³/d of effluent, containing notably:

- 57.6 kg/d of sulphates
- 38.4 kg/d of sodium chloride
- 18.1 kg/d of sodium chlorate
- 1.4 kg/d of sodium chlorite
- 0.07 kg/d of sodium dichromate

RESOURCES AND USES TO PRESERVE

Fish species

The STERLING PULP CHEMICALS plant in Buckingham is located on the right bank of the Lièvre river upstream from the MacLaren and Cascades Énergie dams and the Albright & Wilson Americas Limited plant. Despite the dams downstream of the wastewater discharge point, at least 14 fish species have been identified in the area. Light water sports are popular near the confluence of the Lièvre and Ottawa rivers.

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 STERLING PULP CHEMICALS have been calculated and are available on request.

EFFLUENT TREATMENT

Chemical treatment

Condensation from the sodium chlorite plant contains free chlorine and chlorine dioxide. The water is treated with sodium metabisulphite and then neutralized with sodium carbonate. Free chlorine and chlorine dioxide are then converted into sodium sulphate and sodium chloride. The water is then discharged directly into the Lièvre river with the cooling water. Domestic sewage flows into a tile drainage bed.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Improved control

In August 1994, urea used in the sodium chlorate process was replaced by hydrogen peroxide, thus eliminating urea discharge into the river. In addition, in November 1994, quality control on effluent from the sodium chlorite plant was improved. High-conductivity effluent is now being held pending corrective measures.

REGULATORY COMPLIANCE - WATER COMPONENT

Certificate of authorization

A certificate of authorization (CA) was issued on February 22, 1994 for the installation and operation of two boilers to use hydrogen gas emissions as fuel and for a new domestic sewage treatment system. The company satisfies the CA standards. STERLING PULP CHEMICALS plants are not subject to any specific regulations on liquid industrial waste.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly furans

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 (see Figure 1) and determine the toxic contribution of each pollutant (see Table 1).

Table 1 shows data from the characterization carried out in August 1995 for SLV 2000 as well as the Chimiotox values calculated from them, assuming an effluent flowrate of 352 m³/d. Five substances were selected in testing for more than 120. Based on these data, furans predominated in the treated water; expressed in 2,3,7,8-T₄CDD equivalent, furans represent 95% of the value of the Chimiotox index.

Figure 1 is plotted from August 1995 SLV 2000 characterization data. The Chimiotox index calculated from the SLV 2000 characterization data was reported unchanged for 1993 to 1998. The influence of improvements made by the company was impossible to quantify and is not reflected in the figure.

Table 1 *Chimiotox Index (1995) - Sterling Pulp Chemicals**

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
2,3,7,8-T ₄ CDD equivalent	1.3x10 ⁻⁸	71 428 571 429	940
Total phosphorus	0.71	50	36
Total chromium	0.01	500	6
Total oil and grease	0.04**	100	4
Nitrites-nitrates	0.12	5	1
CHIMIOTOX INDEX			987

* Assuming an effluent flowrate of 352 m³/d (5 substances selected in testing for more than 120).

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

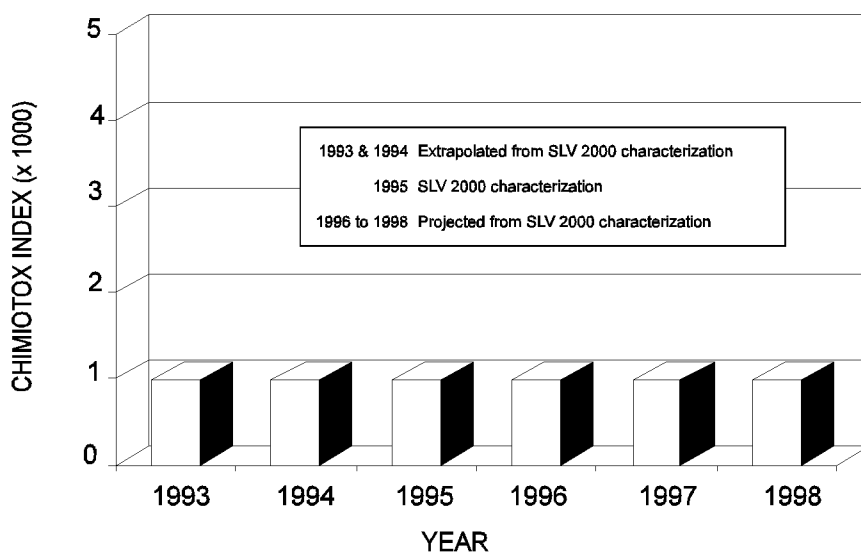


Figure 1 *Chimiotox Index Trends (1993 to 1998)*
Sterling Pulp Chemicals

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.

The 1995 SLV 2000 characterization revealed the presence of furans. The furan concentration was 37.9 pg/L calculated in 2,3,7,8-T₄CDD equivalent. In the case of STERLING PULP CHEMICALS, the environmental discharge objective calculated for furans is 1.4 pg/l in 2,3,7,8-T₄CDD equivalent. An action plan was implemented to identify the source of the problem. A certain number of sampling series carried out identified two probable sources. It seems that one of the inputs comes from certain

raw materials (HCl) while the other results from a slow deterioration of certain glass fibre equipment in the production process sequence. Research is continuing to find solutions in order to reduce or eliminate these sources of furans.

PEEPTOXICITY REDUCTION

Low toxicity

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 the STERLING PULP CHEMICALS plant, a series of bioassays was carried out in 1995, yielding a PEEP value of 2.8, and showing a low toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Increased production

Based on company data, in 1997 the plant had an effluent discharge of 223 m³/d, containing notably:

- 60.6 kg/d of sulphates
- 104.5 kg/d of sodium chloride
- 7.4 kg/d of sodium chlorate
- 0.8 kg/d of sodium chlorite
- 0.006 kg/d of sodium dichromate

From 1993 to 1997, production at the sodium chlorate and sodium chlorite plants increased, causing an increase in sodium chloride load.

KEY POINTS

- Implementation of a new domestic sewage treatment system in 1994
- Urea eliminated from process and effluent quality control improved in 1994
- Research to reduce or eliminate furans

Information updated January 1998

ADDITIONAL INFORMATION

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