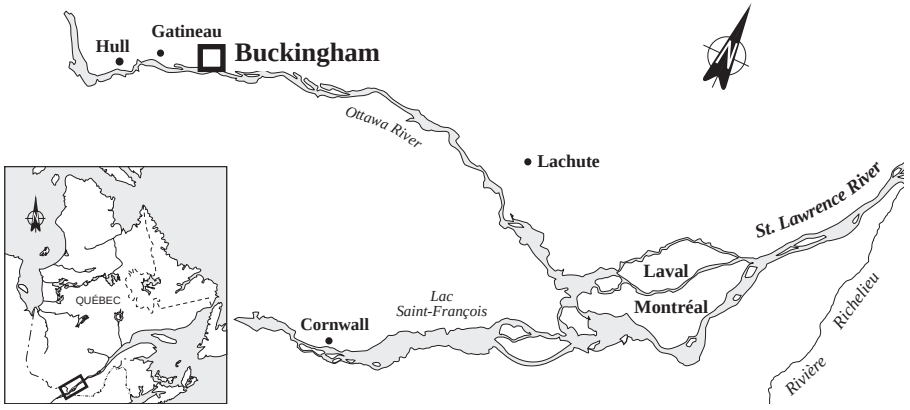
FACT SHEET 83

Albright & Wilson Americas Limited

470 Erco St.

Buckingham, Quebec

J8L 1E1



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 ALBRIGHT & WILSON AMERICAS LIMITED 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

Phosphate production

The ALBRIGHT & WILSON AMERICAS LIMITED plant in Buckingham includes five shops producing complex phosphates, hexametaphosphate, phosphate crystals, monocalcium phosphate and tricalcium phosphate. The plant also produce dicalcium phosphate since 1995. The complex phosphate shop produces monosodium phosphate, disodium phosphate anhydrous, sodium tripolyphosphate and sodium acid pyrophosphate through a reaction of phosphoric acid (H_3PO_4) with sodium carbonate (soda ash or Na_2CO_3). Similarly, sodium hexametaphosphate is obtained through a reaction of phosphoric acid with sodium carbonate in specific dosages. Disodium phosphate disohydrate and trisodium phosphate dodecahydrate are produced in a vacuum process in the form of phosphate crystals, while monocalcium and tricalcium phosphates are obtained by a reaction of phosphoric acid with calcium hydroxide ($Ca(OH)_2$), combined in proportions depending on the product desired. The production capacity of the plant is 30 000 t/yr. In 1995, the plant works at 90% capacity and employs 126 people.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Phosphoric acid
- Sodium carbonate
- Sodium hydroxide
- Calcium oxide (quicklime)
- Aluminum phosphate

FINISHED PRODUCTS

- Sodium acid pyrophosphate (SAPP)
- Sodium tripolyphosphate (STPP)
- Monosodium phosphate (MSP)
- Disodium phosphate anhydrous (DSP-O)
- Disodium phosphate disohydrate (DSP-2)
- Trisodium phosphate dodecahydrate
- Sodium hexametaphosphate (SHMP)
- Monocalcium phosphate (MCP)
- Dicalcium phosphate (DCP)
- Tricalcium phosphate (TCP)

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mainly phosphorus in the form of phosphates

Based on company data, in 1993 the plant had an effluent discharge of 3081 m^3/d, notably containing:

- 260.4 kg/d of dissolved solids
- 52.9 kg/d of sodium chloride
- 48.2 kg/d of chemical oxygen demand (COD)
- 16.6 kg/d of biochemical oxygen demand (BOD_5)
- 9.3 kg/d of suspended solids (SS)
- 7.4 kg/d of total phosphorus
- 3.6 kg/d of sodium chlorate
- 0.013 kg/d of arsenic

RESOURCES AND USES TO PRESERVE

Fish species

The ALBRIGHT & WILSON AMERICAS LIMITED plant in Buckingham is located on the banks of the Lièvre river upstream from the MacLaren and Cascades Énergie Dam. 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. The water quality based objectives for ALBRIGHT & WILSON AMERICAS LIMITED have been calculated and are available on request.

EFFLUENT TREATMENT

Water recirculation

Cooling water is partially recycled, while domestic sewage is discharged into settling tanks before being discharged into the river with industrial wastewater.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Negotiations with the municipality

Since 1981, the plant has reduced phosphate discharge by 94% by modifying or closing various sections.

The company is negotiating with the municipality of Buckingham for authorization to discharge domestic sewage from the plant into the future municipal sewage treatment plant.

REGULATORY COMPLIANCE - WATER COMPONENT

No specific regulations

The ALBRIGHT & WILSON AMERICAS LIMITED plant in Buckingham is subject to no specific regulations regarding industrial wastewater.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total mercury

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 estimated from them, for an effluent flowrate of 3184 m^3/d. Seven substances were selected among over 120 parameters analysed for. Based on the data, total mercury represents 54% of the value of the Chimiotox index. The Ministère de l'Environnement et de la Faune du Québec and the company are engaged in a process aiming to determine the source of mercury and a characterization of the company effluent is planned.

Figure 1 is based on August 1995 SLV 2000 characterization data. The Chimiotox index based on SLV 2000 characterization data was reported unchanged for 1993 to 1998. Effluent has been stable since 1993.

Table 1 ***Chimiotox Index (1995) - Albright & Wilson Americas Limited****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total mercury	2.7×10^{-3}	166 667	445
Total phosphorus	6.60	50	330
Mineral oil and grease (Total hydrocarbons)	0.42**	100	42
Total aluminum	0.48	11	5
Total iron	0.97	3,3	3
Total vanadium	0.02**	71	2
Nitrites-nitrates	0.20	5	1
CHIMIOTOX INDEX			**823**

* For an effluent flowrate of 3184 m^3/d (7 substances selected out of over 120 tested for)

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

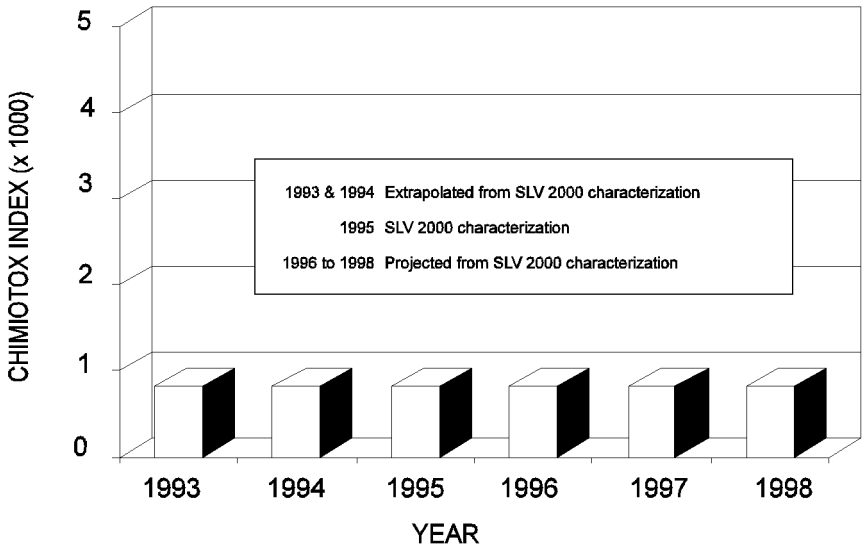


Figure 1 ***Chimiotox Index Trends, 1993 to 1998 Albright & Wilson Americas Limited***

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 characterization for SLV 2000 showed the presence of mercury. Its concentration was 0.85 µg/l. In the case of ALBRIGHT & WILSON AMERICAS LIMITED, the water quality based objective for mercury is 0.3 µg/l. The Ministère de l'Environnement et de la Faune du Québec and the company are engaged in a process aiming to determine the source of mercury, which can be external or internal, and a characterization is planned.

PEEP TOXICITY REDUCTION

No 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. In the case of the ALBRIGHT & WILSON AMERICAS LIMITED, a series of bioassays was carried out in 1995 and yielded a PEEP of less than 1.3 and showed no toxicity.

REDUCTION IN SUBSTANCES MONITORED

Effluent stable

Based on 1995 company data, the plant had an effluent discharge of 2621 m^3/d, containing notably:

- 243.5 kg/d of dissolved solids
- 47.8 kg/d of sodium chloride
- 40.5 kg/d of chemical oxygen demand (COD)
- 20.6 kg/d of biochemical oxygen demand (BOD_5)
- 8.8 kg/d of total phosphorus
- 8.3 kg/d of sodium chlorate
- 2.2 kg/d of suspended solids (SS)
- 0.017 kg/d of arsenic

The stability of effluent loads is due to the fact that there were no major changes in the treatment system and manufacturing operations from 1993 to 1995.

KEY POINTS

- **Negotiations with the municipality of Buckingham to discharge domestic sewage to the future municipal sewage treatment plant**
- **Non-toxic effluent**

Based on December 1995 inventory

ADDITIONAL INFORMATION

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