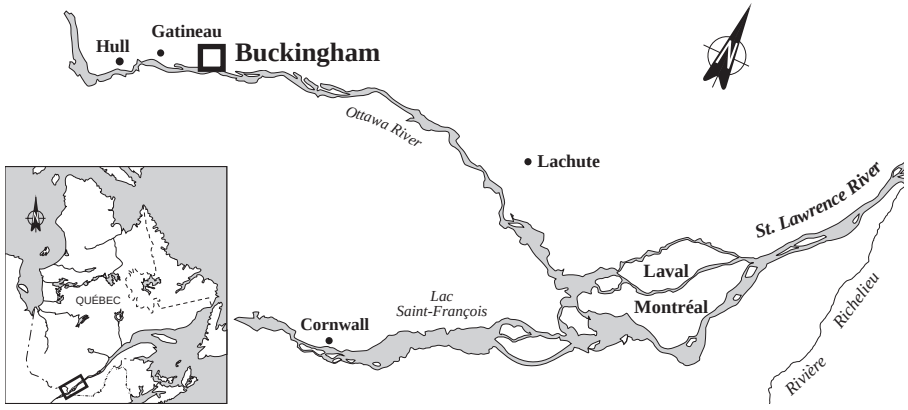
FACT SHEET 83

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 in 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 has also produced 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 quantities. Disodium phosphate duohydrate 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. Annual production capacity of the plant is 35 000 t. In 1997, the plant worked at 97% capacity and employed a work force of 123.

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/A)
- Disodium phosphate duohydrate (DSP-2)
- Trisodium phosphate dodecahydrate (TSP-12)
- 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 discharged 3081 m^3/d of effluent, containing notably:

- 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. Environnmental discharge 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

Phosphates discharge reduced

Since 1981, the plant has reduced phosphate discharges 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 not subject to any specific regulations regarding industrial wastewater.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly 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 intesting for more than 120. Based on these data, total mercury accounts for 54% of the Chimiotox index.

Figure 1 is based on August 1995 SLV 2000 characterization data and, for mercury, on September 1996 company data. The Chimiotox index based on 1995 SLV 2000 characterization data was reported unchanged for 1993 to 1995. The Chimiotox index was adjusted in 1996 to reflect the repeated characterization for mercury. These data were reported for 1997 and 1998.

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
Total hydrocarbons (Mineral oil and grease)	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**

* Assuming an effluent flowrate of 3184 m^3/d (7 substances selected in testing for more than 120).

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

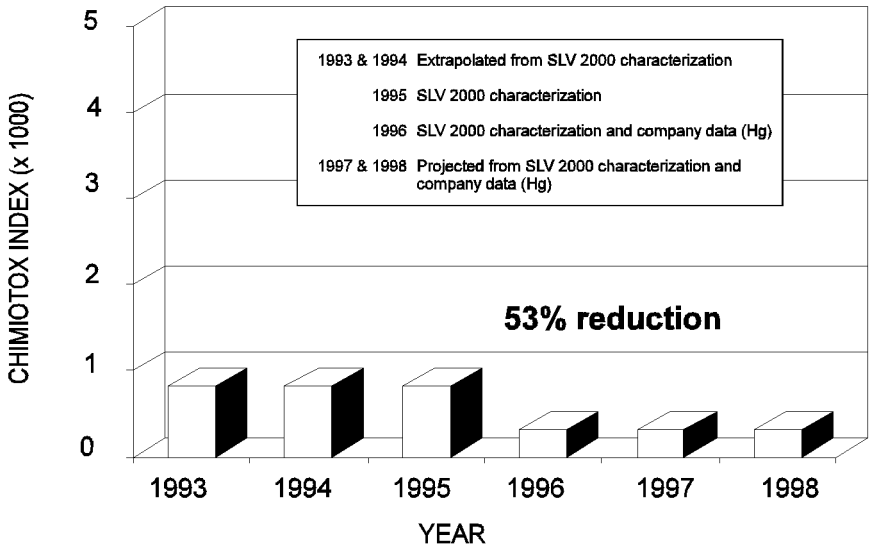


Figure 1 ***Chimiotox Index Trends (1993 to 1998) Albright & Wilson Americas Limited***

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 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 characterization for SLV 2000 showed the presence of mercury. However, a new characterization for this parameter carried out in September 1996 showed that mercury is present but in a concentration near methodological detection limits which correspond to the environmental discharge objective.

PEEP TOXICITY REDUCTION

Non-toxic effluent

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 plant, a series of bioassays was carried out in 1995, yielding a PEEP of less than 1.3 and showing no toxicity for the organisms tested.

REDUCTION IN SUBSTANCES MONITORED

Effluent stable

Based on company data, in 1997 the plant discharged of 2436 m^3/d of effluent, containing notably:

- 236.5 kg/d of dissolved solids
- 53.1 kg/d of sodium chloride
- 29.8 kg/d of chemical oxygen demand (COD)
- 26.2 kg/d of biochemical oxygen demand (BOD_5)
- 8.5 kg/d of total phosphorus
- 2.1 kg/d of sodium chlorate
- 2.6 kg/d of suspended solids (SS)
- <0.001 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 1997, despite a 30% increase in production.

KEY POINTS

- **Negotiations with the municipality of Buckingham to discharge domestic sewage to the future municipal sewage treatment plant**
- **A 53% decrease of the Chimiotox index**
- **Non-toxic effluent**

Information updated January 1998

ADDITIONAL INFORMATION

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