

**FACT SHEET No. 12**  
**PPG CANADA INC.**

Canal Road  
Beauharnois, Quebec  
J6N 3C3



*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 PPG CANADA INC. complex, located in Beauharnois, 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**

*Clean technology*

The chlor-alkali plant of the PPG CANADA INC. complex in Beauharnois has an annual production capacity of 80 000 t of chlorine, 90 000 t of caustic soda and 30 000 t of sodium hypochlorite. In 1990, the plant introduced a membrane cell electrolysis process to replace the mercury cell technology used up to then. In 1995, it operated at 95% of capacity for chlorine and caustic soda and 55% for sodium hypochlorite. The complex also has a sodium chlorate plant with an annual capacity of 46 500 t and a hydrochloric acid plant with an annual capacity of 29 200 t. In 1995, the sodium chlorate plant operated at 84% of capacity and the hydrochloric acid plant at 76%. Both employ continuous processes. The complex has a work force of 130.

**PRODUCTION**

**PRINCIPAL RAW MATERIALS**

- Sodium chloride (common salt)
- Hydrochloric acid

**FINISHED PRODUCTS**

- Liquid chlorine
- Caustic soda at 50% strength
- Crystalline sodium chlorate
- Sodium hypochlorite (bleach) at 15% strength
- Hydrochloric acid in strengths from 28% to 38%

# TREATMENT MEASURES

## INITIAL EFFLUENT VALUES

*Mostly sodium chloride*

Based on monthly and quarterly company data, in 1988 the plant had an effluent discharge of 18 000 m<sup>3</sup>/d, containing:

- 34 279 kg/d of sodium chloride
- 4503 kg/d of sodium sulphate
- 520 kg/d of sodium chlorate
- 36 g/d of mercury
- 9.5 kg/d of chlorine

## RESOURCES AND USES TO PRESERVE

*National wildlife area*

The PPG CANADA INC. complex in Beauharnois discharges its industrial wastewater into the Saint-Louis River, about 700 m from the mouth of Lake Saint-Louis. The river contains a large fish spawning ground used mainly by Walleye and White sucker. They La Paix islands, a national wildlife area, are located in Lake Saint-Louis, less than 2 km below Beauharnois. They encompass marshes and plant communities providing sanctuary for waterfowl and spawning grounds for largemouth bass and Northern pike. The mouth of the Saint-Louis River is a popular spot with water sports enthusiasts. Lake Saint-Louis is also used for commercial and recreational fishing, with Yellow perch, Northern pike and Walleye the principal sport species. There are many public wharfs and access ramps along the south lakeshore, between Beauharnois and Châteauguay. The Châteauguay municipal water intake is 11 km below Beauharnois.

## 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. PPG CANADA INC.'s water quality based objectives are available on request.

## EFFLUENT TREATMENT

*Mercury precipitation and filtration*

Process wastewater and direct cooling water are discharged through the main outfall (18 000 m<sup>3</sup>/d). Wastewater contaminated by mercury (load greater than 20 ppb) is precipitated with sodium disulphide in an acid medium and then filtered. Process effluent from the chlor-alkali plant is neutralized. The two types of effluent are combined and the pH is adjusted before the mixed discharge is released into the Saint-Louis River.

The complex has three storm drains emptying directly into Lake Saint-Louis. Sanitary wastewater from its two sewer systems is directed to the Beauharnois activated-sludge treatment plant.

## PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

*Extensive improvements*

The wastewater treatment program (PAE) PPG entered into in 1990 has provided for extensive improvements. In 1990, the mercury cells used in the electrolysis process were replaced by membrane cells at a cost of \$40 million. In March 1994, the separation of process wastewater and mercury-contaminated water considerably reduced the volume of mercury-polluted water to be treated. In April 1994, a free-chlorine elimination system went on stream to treat wastewater from the bleach production unit. Recycling of drainage water from the salt unloading station was introduced in October 1994. Recovery of brine blowdown from the chlor-alkali plant (1996) and the completion of site rehabilitation work will bring about further improvement in effluent discharges by the end of 1998. Measures to rehabilitate the plant site have cost roughly \$27.5 million to date.

## REGULATORY COMPLIANCE - WATER COMPONENT

*Commitments honoured*

Since the plant has stopped using mercury in its production processes, it is no longer subject to federal regulations on mercury cells in chlor-alkali plants. Currently, it is bound by the commitments made under the water treatment program of 1990 and the related certificate of authorization. It is also under a MENVIQ order with regard to mercury discharges. The complex is in compliance with all applicable standards. In 1993, Environment Canada and the Ministère de l'Environnement du Québec commended the quality of the cleanup measures implemented at the complex.

POLLUTION ABATEMENT

CHIMIOTOX INDEX  
ABATEMENT OF TOXIC  
POLLUTION

Mostly waste chlorine

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 characterization data gathered in 1991 pursuant to Action Plan requirements, as well as the Chimiotox values estimated from those figures, for an effluent flow of 14 001 m<sup>3</sup>/d. In testing for more than 120 substances, 8 were found. The figures show a predominance of total chlorine in the treated wastewater. Total chlorine makes up 62% of the Chimiotox index, followed by mercury (24%).

Figure 1 is plotted from the characterization data for 1991. Chimiotox indices for 1988 and 1992 to 1995 were calculated from the 1991 characterization results, adjusted to account for monthly company data on mercury. The Chimiotox index for 1988 was carried over unchanged to 1989 and 1990.

Company data produced show that substantial reductions have already been achieved owing to the elimination of mercury from the chlor-alkali process and improvements in the treatment systems since 1990. Through implementation of the measures in the wastewater treatment program, it has been possible to lower the 1995 Chimiotox index by 93% compared to the 1988 level.

Table 1 Chimiotox Index (1991) - PPG Canada Inc.\*

Substance	Load kg/d	Toxic Weighting Factor	Chimiotox Units CU
Total Chlorine	18.000	500	9 000
Mercury	0.017	166 667	2 833
Total Phosphorus	0.582	50	29
Trichloroethylene	1.238	12	15
Nitrites-Nitrates	2.769	5	14
Bis-(2-ethylhexyl)phthalate	0.003	1 667	5
Chloroform	0.074	64	5
Ammonia Nitrogen	3.797	0.8	3
CHIMIOTOX INDEX			11 904

\* For effluent discharge of 14 001 m<sup>3</sup>/d (8 substances detected in testing for more than 120).

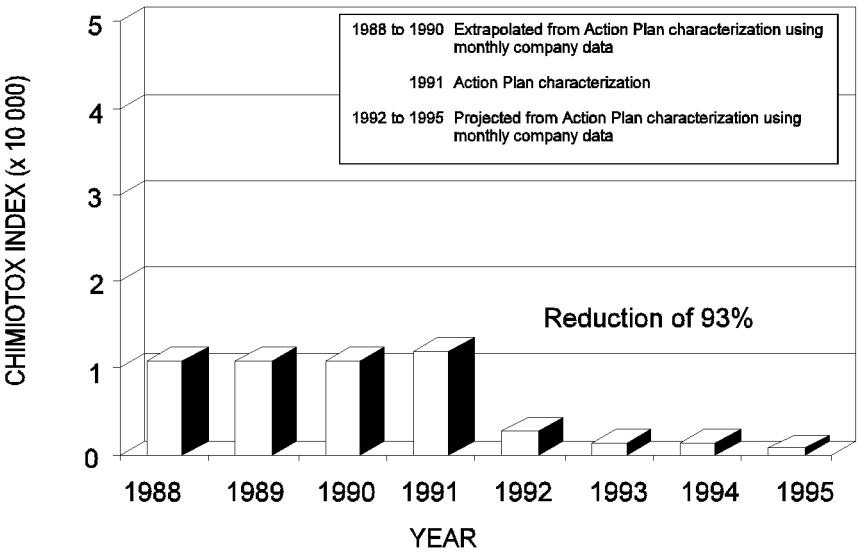


Figure 1 Changes in toxic effluent discharges, 1988-1995 - PPG Canada Inc.

VIRTUAL ELIMINATION OF  
PERSISTENT TOXIC SUBSTANCES

Traces of mercury

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.

Mercury was detected among the 11 targeted persistent toxic substances during the most recent characterization study (1991), when the load was 17 g/d. Discontinuation of the mercury cell process will eliminate effluent mercury from the industrial wastewater. Based on company data for 1995, the mercury load had dropped to 3.8 g/d by that year.

PEEP  
TOXICITY REDUCTION

Average toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines results from 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 PPG CANADA INC. complex in

Beauharnois. The 1991 PEEP index was established at 3.8. It was in the average range of the PEEP indices found for the 50 plants.

REDUCTION IN SUBSTANCES  
MONITORED

Chlorine eliminated from effluent

Based on averaged company data for 1995, the complex had an effluent discharge of 18 000 m<sup>3</sup>/d, containing:

- 27 370 kg/d of sodium chloride
- 5640 kg/d of sodium sulphate
- 530 kg/d of sodium chlorate
- 3.8 g/d of mercury

These data show that between 1988 and 1995, effluent chlorine was cut by 100%, mercury by 89% and sodium chloride by 26%. Following an increase in production in 1995, emissions of sodium sulphate and sodium chlorate rose by 25% and 2%, respectively. A broken underground pipe also contributed to the increased sodium chlorate effluent.

Further reductions are expected in 1996 relative to 1995. Projections for 1996 are predicated on the recovery of brine blowdown and the soil restoration program. The blowdown recovery project should be completed by spring 1996 and the soil restoration program in 1998. Mercury will be reduced by 80%, from 7 g/d to 1.4 g/d. Sodium chloride will be cut by 82%, from 27 340 kg/d to 5000 kg/d, and the

sodium chlorate load will decrease from 360 kg/d to 200 kg/d, for a 44% improvement. The sodium sulphate load will remain unchanged.

TECHNOLOGICAL DEVELOPMENT

Chlorate and salt recycling; treatment of mercury-contaminated soil

The two projects carried out under Environment Canada's Technology Development and Demonstration Program examined the removal of chlorates and salts from the brine blowdown. (Brine is used in producing chlorine and caustic soda in the chlor-alkali plant.) The first project, completed in March 1994, studied the design of a process for chlorate elimination in an acid medium and the setup of preliminary installations. But the high cost of those installations prompted PPG CANADA INC. to review its remedial program and opt for a more cost-effective solution. That second project consists of recycling blowdown chlorates and salts. Savings on raw material (salt) could amount to \$300 000 a year. This project should be completed by the spring of 1996.

PPG CANADA INC. also designed, built and finalized a pilot unit for removing visible metallic mercury from contaminated soil around the chlor-alkali plant. A test run was conducted in summer 1992 to demonstrate and optimize the efficiency of the unit. That particular project was completed in December 1992.

KEY POINTS

- 93% reduction in the Chimiotox index
- Introduction of membrane cells to replace the mercury cells in the chloralkali plant
- Extensive cleanup measures and comprehensive soil remediation program
- Elimination of effluent chlorine and 89% reduction in mercury load between 1988 and 1995
- In 1993, commendation for the quality of cleanup measures carried out under Action Plan since 1988

ADDITIONAL INFORMATION

**Chimiotox index and PEEP:** Gilles Legault, Environment Canada (514) 283-3452.

**Water quality based objectives:** Francine Richard, MEF (418) 644-3574.

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Information reviewed by Gilles Legault, SLV 2000.