FACT SHEET 71

IBM Canada Ltd.

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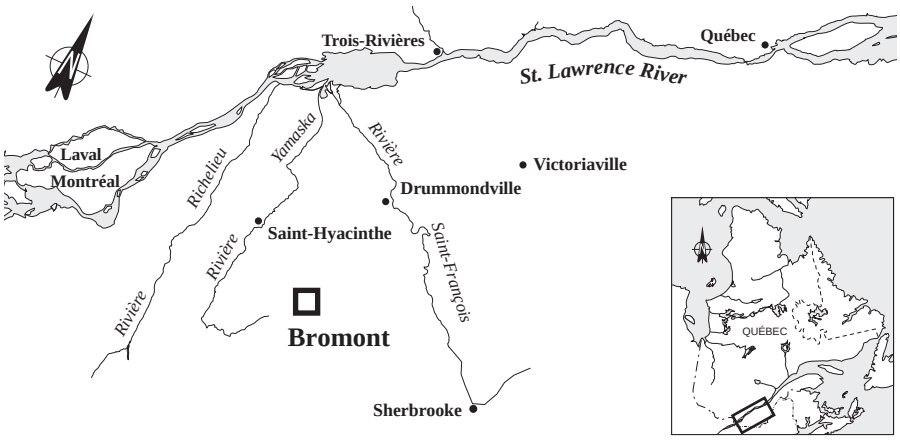

***A** list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce toxic effluent and virtually eliminate discharges of persistent toxic substances.*

The 106 industrial plants designated under SLV 2000 are divided into four groups, each with a specific objective. The IBM CANADA LTD. plant in Bromont is in Group 2, comprising industrial plants whose effluent may contain toxic substances even though treatment programs have already been implemented.

The objective for Group 2 is maximum reduction of toxic effluent of targeted plants.

INDUSTRIAL PLANT

Electronic component manufacturing

The IBM CANADA LTD. plant in Bromont specializes in the packaging and verification of electronic components used in manufacturing the entire range of IBM products and those of other manufacturers. A wide range of technologies are used to produce an extensive range of products. Multilayer ceramic production includes finishing (cleaning and plating), electrical checking and brazing. Assembly of flat-packs (microprocessors and other semi-conductor circuits), memory modules and logic modules requires a number of techniques including the following, depending on the product: chip placement, chip attach, soldering, wire bonding, epoxy dispense, encapsulation, molding, dicing, forming and verification. The chips are then tested. Annual production capacity of the plant is 135 000 000 parts. In 1995, the plant operates at 91.7% design capacity and employs a work force of 2592.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Glass
- Plastic
- Ceramics
- Plating solutions
- Solvents
- Flux (welding)

FINISHED PRODUCTS

- Memory modules
- Logic modules
- Processors
- Multilayer ceramics
- Metal ceramics

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Metals found

Based on company data, in 1993 effluent from the inorganic treatment system and slightly contaminated water discharged into the Yamaska River had a flowrate of 443 m^3/d and contained notably:

- 7.75 kg/d of chemical oxygen demand (COD)
- 1.35 kg/d of suspended solids (SS)
- 1.06 kg/d of biochemical oxygen demand (BOD_5)
- 0.06 kg/d of nickel
- 0.01 kg/d of copper
- 0.004 kg/d of lead
- 0.0004 kg/d of tetrachloroethylene

RESOURCES AND USES TO PRESERVE

Major vacation area

Part of the effluent from IBM CANADA LTD. flows into the Yamaska, while domestic sewage and the remainder of the industrial wastewater are discharged into the Bromont sewage treatment plant. Because the Appalachians and Brome Lake are upstream of the Yamaska, the region is an ideal recreation area. Between Bromont airport and the mouth of the Yamaska Nord downstream from the IBM CANADA LTD. plant, there are a number of vacation spots. Pedal-boat, canoe and sport-fishing enthusiasts use the area. There is a campground at Brigham, a few kilometres from Adamsville. The area between Brome Lake and the Adamsville Basin contains at least 28 fish species. There is a large spawning ground for walleye and smallmouth bass in the Farnham Islands. The first drinking water intake downstream from the plant discharge point is at Farnham.

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 IBM CANADA LTD. will be available by 1997.

EFFLUENT TREATMENT

Physico-chemical treatment

Wastewater containing inorganic matter is treated in a multi-stage physico-chemical treatment system that includes neutralization with lime-milk (mechanical precipitation), flocculation, clarification (lamellar clarifiers) and sand filtration. Effluent pH is adjusted. Sludge is piped to a dewatering system. Since November 1994, slightly contaminated water has been re-used during warm weather (six months a year).

Organic wastewater undergoes physico-chemical pretreatment to reduce metal loads. Since August 1992, this water has been sent to the Bromont sewage treatment plant for treatment. Domestic sewage is also treated at the Bromont treatment plant.

PREVENTION AND CLEANUP MEASURES IMPLEMENTED

Several cleanup projects

IBM CANADA LTD. stopped using CFCs and methylchloroform in September 1992 and April 1993 respectively; these substances are targeted by the new regulation on substances that weaken the ozone layer. Since 1992, the company has conducted water rationalization, separation and cleanup projects. Work aimed at reducing and separating rinse water was carried out in November 1992 and February 1993. In April 1994, modifications were made to the pretreatment system for water loaded with organics and a system for removing metals contained in this water was installed. A rinse water re-use plan was implemented in November 1994. The water rationalization project was continued in 1995.

REGULATORY COMPLIANCE - WATER COMPONENT

Standards met

The IBM CANADA LTD. plant in Bromont is subject to standards set by two certificates of authorization (CA). The first, issued on April 21, 1985, deals with water loaded with treated inorganic material; the second, issued on July 13, 1992, covers industrial effluent loaded with organic material. The company meets the standards of these two CAs.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly total arsenic

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

Table 1 gives data from the August 1995 SLV 2000 characterization along with the Chimiotox values calculated from them assuming an effluent flowrate of 690 m^3/d. Fifteen substances were selected in testing for more than 120. Based on these data, total arsenic accounts for 48% of the Chimiotox index, followed by nitrites-nitrates with 19%.

Figure 1 is plotted from 1995 SLV 2000 characterization data. The Chimiotox index calculated from the 1995 data was applied to the entire 1993 to 1998 period. The influence of improvements made between 1993 and 1995 was impossible to quantify and is not reflected in the figure.

Table 1 ***Chimiotox Index (1995) - IBM Canada Ltd.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total arsenic	0.005	57 143	294
Nitrites-nitrates	23.247	5	116
Total phosphorus	1.320	50	66
Minal oil and grease	0.450	100	45
Total beryllium	0.002**	15 601	35
Total copper	0.059	451	26
Total mercury	6.01×10^{-5}**	166 667	10
Ammoniacal nitrogen	8.782	0.8	7
Total thallium	0.057**	125	7
Total aluminum	0.094**	11	1
Total iron	0.172	3.3	1
Total nickel	0.072	10	1
Total manganese	0.038	10	<1
Total molybdenum	0.021**	1	<1
Total zinc	0.018	9.4	<1
CHIMIOTOX INDEX			**612**

* Assuming an effluent flowrate of 690 m^3/d (15 substances selected in testing for more than 120)

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

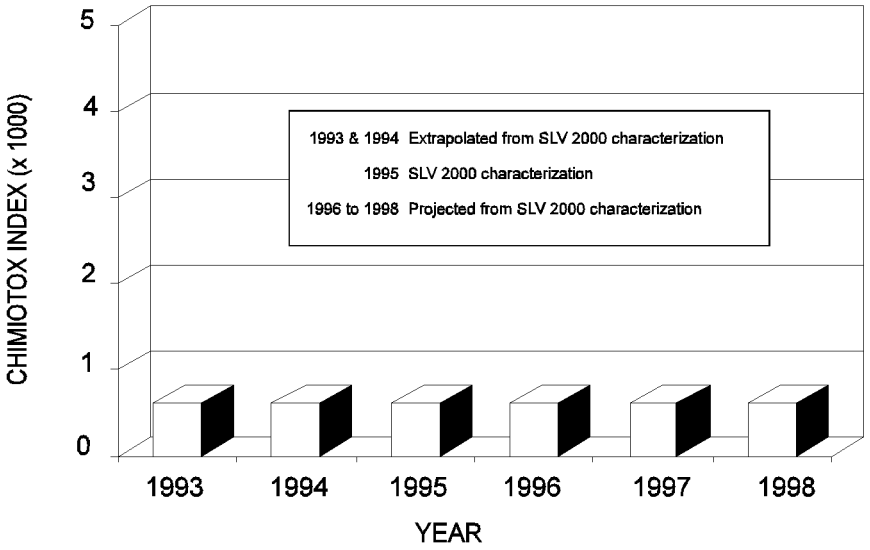

Figure 1 ***Chimiotox Index trends (1993 to 1998) IBM Canada Ltd.***

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 SLV 2000 characterization found one of these persistent toxic substances in effluent from IBM CANADA LTD., mercury, at a concentration near methodological detection limits. The environmental discharge objective for mercury will be available soon.

PEEP TOXICITY REDUCTION

Low toxicity

The Potential Ecotoxic Effects Probe (PEEP) combines the results of six standardized bioassays measuring the toxic effects of effluent. Results are expressed on a logarithmic scale (1 to 10) of increasing toxicity and are used to monitor discharge trends over the years. A series of bioassays of effluent from the IBM CANADA LTD. plant was carried out in 1995; a PEEP value of 1.2 was obtained and only slight toxicity detected.

REDUCTION IN SUBSTANCES MONITORED

Increased production

Based on company data, in 1995 effluent from the inorganic treatment system and slightly contaminated water discharged into the Yamaska River had a flowrate of 395 m^3/d and contained notably:

- 5.23 kg/d of chemical oxygen demand (COD)
- 1.67 kg/d of suspended solids (SS)
- 0.85 kg/d of biochemical oxygen demand (BOD_5)
- 0.21 kg/d of tetrachloroethylene
- 0.087 kg/d of nickel
- 0.026 kg/d of copper
- 0.026 kg/d of lead

From 1993 to 1995, the plant's production rate increased by 56%. Cleanup and rationalization measures reduced effluent flowrate and some parameters despite the increased production.

KEY POINTS

- **A number of water rationalization, separation and cleanup projects were carried out between 1992 and 1995**

Based on December 1995 inventory

ADDITIONAL INFORMATION

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