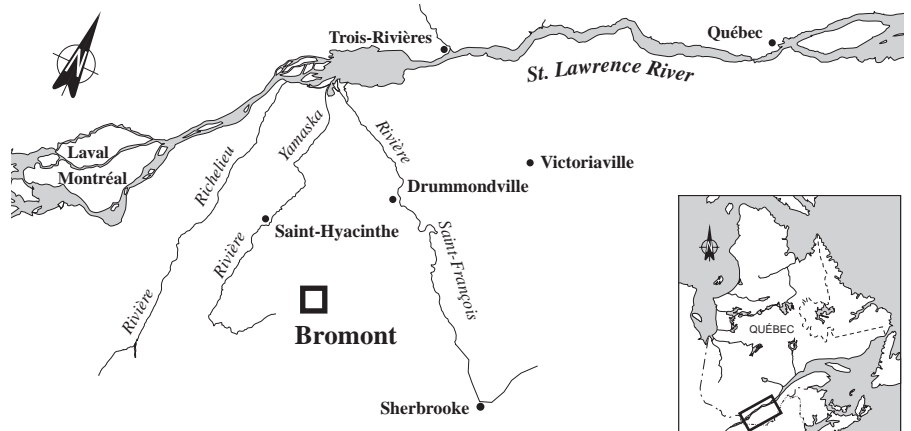


## FACT SHEET 71

### IBM Canada Ltd.

23 de l'Aéroport Boulevard  
Bromont, Quebec  
J0E 1L0



*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 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

### *Electronic component manufacturing*

The IBM CANADA LTD. plant in Bromont specializes in the packaging and testing 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 microsoldering, wire bonding, epoxy dispense, encapsulation, moulding, dicing, burn-in and testing. The chips are then tested. Annual production capacity of the plant is 200 000 000 parts. In 1997, the plant operated at 72.5% design capacity and employed a work force of 2559.

## 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<sup>3</sup>/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<sub>5</sub>)
- 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 small-mouth 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. are available on request.

## EFFLUENT TREATMENT

### *Physico-chemical treatment*

Wastewater containing inorganic matter is treated in a multi-stage physico-chemical treatment system that includes polymer 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 Ozone-depleting Substances Regulations. 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 and continued in 1995 and 1996. The method of precipitating inorganic wastewater was modified in 1996 to improve effluent quality and decrease the amount of sludge produced by more than 50%.

## 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 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 shows August 1995 SLV 2000 characterization along with the Chimiotox values calculated from them, assuming an effluent flowrate of 690 m<sup>3</sup>/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 and data from a complementary characterization carried out by the company in 1997 for some substances. The Chimiotox index calculated from the 1995 data was reported unchanged for 1993 to 1996. The 1997 Chimiotox index was modified in light of the results of the 1997 characterization, which was reported unchanged for 1998.

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
Mineral oil and grease	0.450	100	45
Total beryllium	0.002**	15 601	35
Total copper	0.059	451	26
Total mercury	6.01x10 <sup>-5</sup> **	166 667	10
Ammonia 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
<b>CHIMIOTOX INDEX</b>			<b>612</b>

\* Assuming an effluent flowrate of 690 m<sup>3</sup>/d (15 substances selected in testing for more than 120).

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

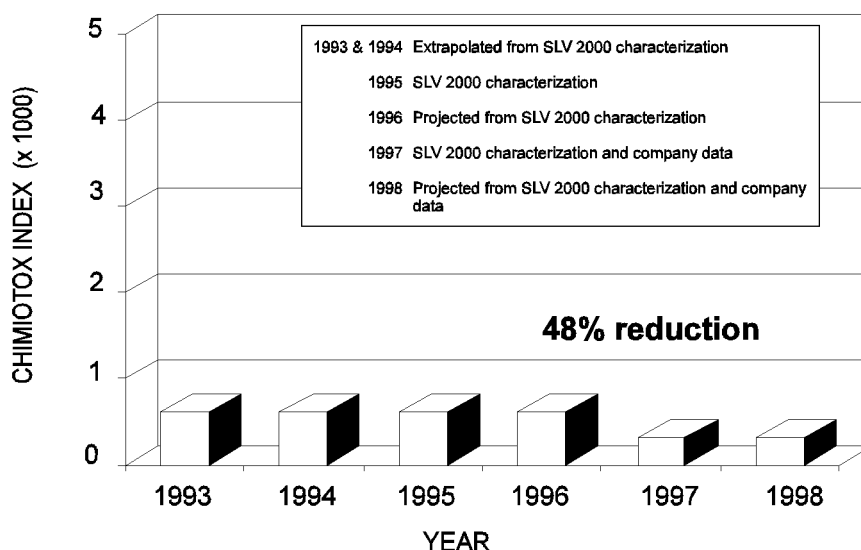


Figure 1 *Chimiotox Index trends (1993 to 1998)*  
*IBM Canada Ltd.*

## 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 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 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 was evaluated at 0.001 mg/L, the same concentration as the methodological detection limit.

During the 1997 complementary characterization, mercury was not present in the

effluent. However, after a systematic search in 1997, the company found traces in a process residue and in two raw materials used as ingredients in wastewater treatment and to regenerate ion exchange resins for the demineralized water production system. It is thus possible that mercury is present in effluent but in concentration below methodological detection limits. The company has implemented management methods to decrease mercury in its effluent and is trying to eliminate their presence in raw materials used in wastewater treatment.

## 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 of increasing toxicity ranging from 1 to 10 and are used to monitor discharge trends over the years. In the case of IBM CANADA LTD. plant, a series of bioassays was carried out in 1995; yielding a PEEP of 1.2, and showing low toxicity for the organisms tested.

## REDUCTION IN SUBSTANCES MONITORED

### *Increased production*

Based on company data, in 1997 effluent from the inorganic treatment system discharged into the Yamaska River had a flowrate of 313 m<sup>3</sup>/d, containing notably:

- 3.92 kg/d of chemical oxygen demand (COD)
- 1.10 kg/d of biochemical oxygen demand (BOD<sub>5</sub>)
- 0.93 kg/d of suspended solids (ss)
- 0.057 kg/d of copper
- 0.049 kg/d of nickel
- 0.003 kg/d of lead

From 1993 to 1997, the plant's production increased by 70%. 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 1997
- A 48% decrease in the Chimiotox index

Information revised January 1998

## ADDITIONAL INFORMATION

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Published by authority of the Minister of the Environment

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Canada 1998 Catalogue No. En153-6/71-1998E

ISBN 0-662-26539-4

(Aussi disponible en français sous le titre

*Établissements industriels : faits saillants*)