FACT SHEET No. 36

Daishowa Inc.

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Quebec City, Quebec
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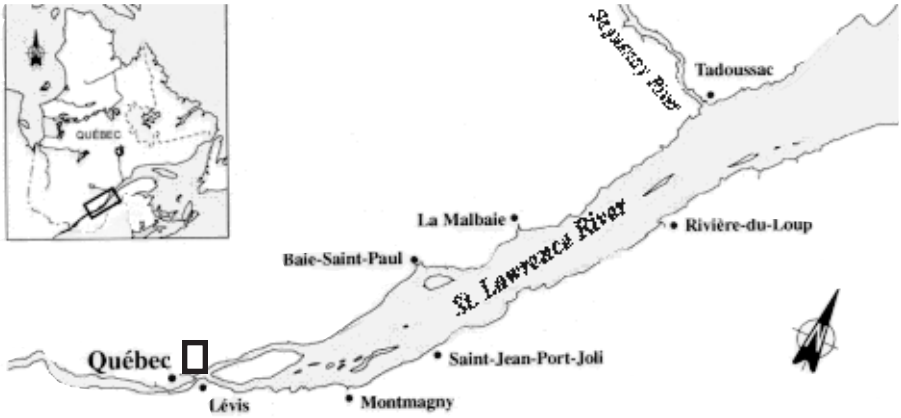

A list of 106 industrial plants has been established under St. Lawrence Vision 2000 (SLV 2000), the second phase of the St. Lawrence Action Plan, launched in 1988. The overall objective is to reduce liquid toxic waste and virtually eliminate discharges of persistent toxic substances.

The 106 industrial plants designated under SLV 2000 are divided into four groups, each of which has been given a specific objective. The DAISHOWA INC. mill, located in Quebec City, 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

Diversified output

The DAISHOWA INC. pulp and paper mill in Quebec City manufactures newsprint, directory paper and cardboard from thermomechanical, mechanical and de-inked pulps and minor fibres (waste paper and board). Some kraft pulp is also used as raw material depending on customer requirements. The mill employs refiners to transform wood chips into thermomechanical pulp, then screens and cleans the by-product. Mechanical pulp is made from logs ground with abrasive wheels. The thermomechanical and mechanical pulps are bleached with sodium hydrosulphite. In the de-inking shop, commissioned in March 1992, the pulp is screened, cleaned and bleached, and recyclable paper undergoes flotation and washing to facilitate the removal of ink particles. The intermediate product is pulped, screened, cleaned and bleached with peroxide. De-inking process waste (biomass) is thickened and used to make compost, which the company sells. Paperboard is made from repulped waste paper and board. End products include paperboard for packing and food boxes and lottery tickets. Four paper machines and one board machine are used to make different qualities of finished product. Some machines have a closed white-water system to prevent any risk of contamination among the machines and thus reduce wastage. The mill has an annual production capacity of 657 100 t of paper and 50 000 t of paperboard. In 1995, it operated at 75% of capacity and employed a work force of 1073.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Wood chips
- Wood billets
- Waste paper and paperboard
- Kraft pulp (0.4%)
- Chemicals

FINISHED PRODUCTS

- Newsprint
- Directory paper
- Paperboard
- Biomass

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

BOD_5 and SS

According to company data, in 1988 the mill had an average effluent discharge of 136 544 m^3/d, containing:

- 90 379 kg/d of biochemical oxygen demand (BOD_5)
- 14 755 kg/d of suspended solids (SS)

The bisulphite pulp and lignosulphonate production shop was in operation at the time the company gathered these figures. The 1991 shutdown of these processes substantially cut effluent flow and improved the quality of the discharge.

RESOURCES AND USES TO PRESERVE

Partly swampland

The DAISHOWA INC. mill in Quebec City discharges its wastewater into the St. Lawrence shipping channel through the eastern diffuser of the Quebec Urban Community (QUC) treatment system. There are several marinas near the port of Quebec. Upriver from Quebec City to Sainte-Foy, swampy areas provide spring and fall habitat for a few hundred migratory birds. Downriver from the diffuser, the bay of Beauport is among the ten principal shorebird gathering areas along the St. Lawrence, judging by observed population size and density. It is a spring and fall staging area for hundreds of Canada Geese and Greater Snow Geese and for thousands of dabbling ducks, diving ducks and gulls. The bay of Beauport is also favoured by water sports enthusiasts and boaters; however, fecal coliform pollution has driven away bathers.

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. Water quality based objectives for DAISHOWA INC. will be available by 1997.

EFFLUENT TREATMENT

Primary and secondary treatment

Process wastewaters flow together to a screening and pumping station. The mixed effluent circulates to a 60 m diameter primary settling basin, where suspended solids precipitate to the bottom and form a fibrous mass called primary biomass. The biomass undergoes pressurized dewatering and is burned together with bark to produce process steam. Since 1995, the process wastewater has been directed into a secondary treatment system using sludge activated by pure oxygen. The treated effluent then flows through an underground pipe to a plenum chamber about 1 km downriver from the DAISHOWA INC. mill. The mill effluent mixes with the QUC effluent in the eastern diffuser of that facility. Between Beauport and Lévis, the diffuser empties into the St. Lawrence at a depth of 55 m, where strong currents help to dissipate the effluent. Eighty-five per cent of the sanitary wastewater empties into the Quebec City sewerage system. The remainder is treated together with the process wastewater. Storm water is discharged into the St. Lawrence estuary.

PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

$25 million invested

In 1989, the installation of a new lignosol evaporation unit and modifications in the papermaking process (start-up of a thermomechanical pulping shop) cut effluent SS and BOD_5 loads. A number of treatment projects to reduce wastewater volume and contamination have been completed. Modifications include the separation of sanitary sewage and process wastewater, the recirculation of some wastewater to the process stream (30% reduction in summer discharge) and the introduction of a secondary biological treatment system. The total cost of cleanup measures related to the implementation of secondary treatment is estimated at $25 million.

REGULATORY COMPLIANCE - WATER COMPONENT

A successful treatment program

The company is subject to the Quebec Regulations respecting Pulp and Paper Mills and the federal Pulp and Paper Effluent Regulations. In December 1988, the Quebec City mill committed to a wastewater treatment program (PAE) and met the objectives to the satisfaction of the Ministère de l'Environnement et de la Faune du Québec. The treatment measures implemented at the mill will bring DAISHOWA INC. in line with Quebec's new regulatory standards, which came into effect September 30, 1995.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

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 and determine the proportion of each pollutant.

Table 1 presents the data supplied by the company in accordance with provincial regulations governing pulp and paper mills for the months of October to December 1995, as well as the Chimiotox values calculated therefrom, for an effluent discharge rate of 74 446 m^3/d. The data show that mineral oil and grease and copper are the dominant pollutants in the treated water. Mineral oil and grease account for 93% of the Chimiotox index.

Figure 1 is based on the characterizations done in 1990 and 1994. The Chimiotox values for 1988-1993 were obtained by extrapolation of the characterization data for 1990. The 1995 Chimiotox value was computed using monthly company data for October to December 1995. The upshot is that the Chimiotox index fell by 96% between 1988 and 1995.

Table 1 ***Chimiotox Index (1995) - Daishowa Inc., Quebec City****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Mineral Oil and Grease	140.134	100	14 013
Total Aluminium	27.752	11	305
Total Zinc	26.103	9.4	245
Dehydroabietic Acid	2.995	77	231
Stearic Acid	5.611	19	107
Abietic Acid	5.327	19	101
Isopimaric Acid	0.719	19	14
Palustric Acid	0.565	19	11
CHIMIOTOX INDEX**			**15 027**

* For effluent discharge of 74 446 m^3/d.
** October to December 1995.

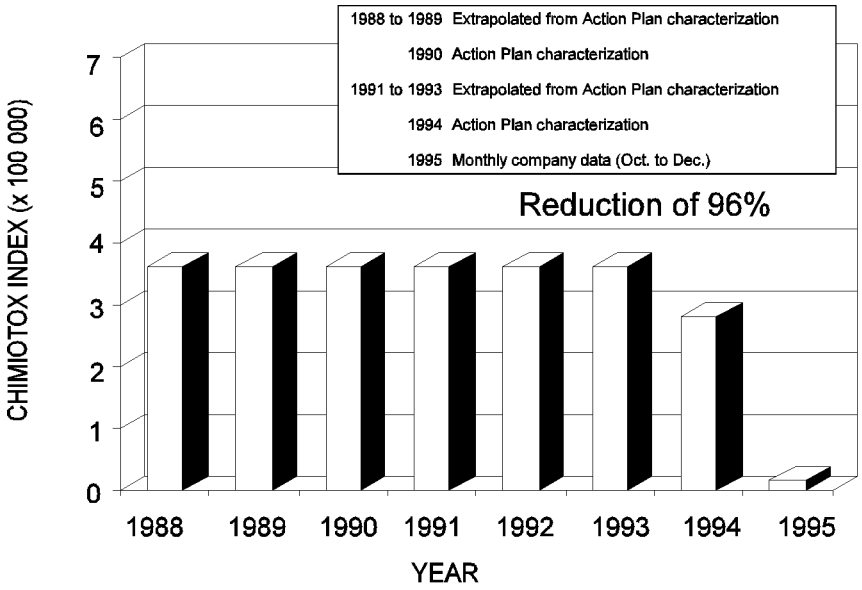

Figure 1 ***Changes in toxic effluent discharges, 1988 - 1995 - Daishowa Inc., Quebec City***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

No persistent toxic substances

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.

Monthly data for October to December 1995 show that no persistent toxic substances were detected.

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. Two series of bioassays were conducted for the DAISHOWA INC. mill in Quebec City. The 1990 PEEP index of 6.1 was among the highest of the PEEP indices found for the 50 Action Plan plants. The PEEP index for 1994 was estimated at 6.3.

Since September 30, 1995, it has been prohibited under provincial Regulations respecting Pulp and Paper Mills to discharge a final effluent whose toxicity has reached an acute lethality level (as demonstrated by bioassays with rainbow trout) into a storm sewer or elsewhere in the environment. Compliance with the new standards should lower the PEEP value by the time of the next evaluation. The implementation of new cleanup measures at the DAISHOWA INC. mill has helped reduce the toxicity of the effluent. Since secondary treatment came on stream the final effluent has been non-toxic.

REDUCTION IN SUBSTANCES MONITORED

Large drop in SS and BOD_5

According to statutory follow-up data, from October to December 1995 the mill had an average effluent discharge of 73 450 m^3/d, containing:

- 2934 kg/d of biochemical oxygen demand (BOD_5)
- 3121 kg/d of suspended solids (SS)

Statutory follow-up data for 1988-1995 show SS reduced by 79%, BOD_5 by 97% and effluent flow by 45%. That performance is explained by the treatment measures introduced since 1988, the shutdown of the chemical pulping shop in 1991, and the new secondary treatment system.

TECHNOLOGICAL DEVELOPMENT

Marketable biomass

DAISHOWA INC. and Laval University carried out a six-year $7 million collaborative research project for enhancing the agricultural and horticultural value of biomass from the de-inking process and from the treatment of effluent. Thus a composting process was developed and is now being optimized. All de-inking residues (1700 m^3 per week) are now used in making a compost that is marketed in Quebec for horticultural use. Moreover, agricultural compost-spreading experiments are under way at the Laval University Experimental Farm. They have shown that it is feasible and economically advantageous to spread composted de-inking and primary and secondary treatment residues on farmland. Many other uses are now under study for these residues.

KEY POINTS

- **Treatment measures in progress: separation of sanitary sewage, reduction in water use, implementation of secondary treatment system in August 1995**
- **96% reduction in the Chimiotox index**
- **Closing of the bisulphite and lignosulphonate chemical pulping shop in June 1991**
- **Start-up of a de-inking shop in March 1992**

Based on December 1995 inventory.
Information reviewed by Gilles Legault, SLV 2000.

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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