

## FACT SHEET No. 32

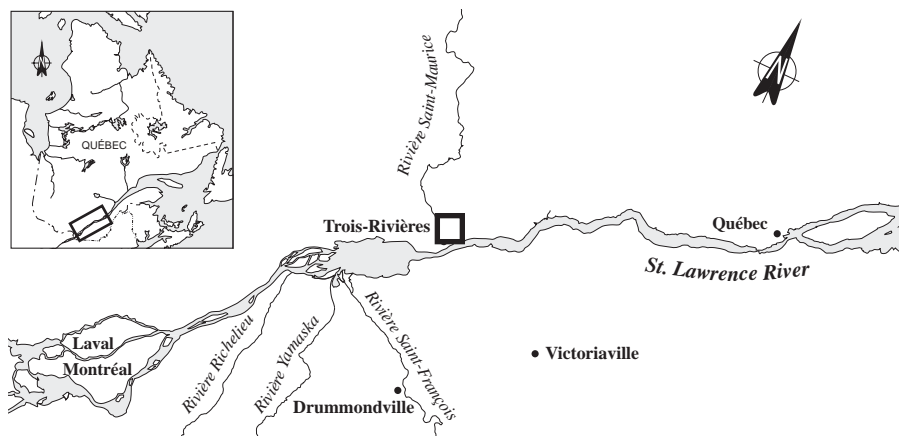
### Kruger Inc. Trois-Rivières, Newsprint and Coated Paper Division

3735 Royal Boulevard  
Trois-Rivières, Quebec  
G9A 5P6

*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 KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION, located in Trois-Rivières, 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

### Three classes of paper

The plant operated in Trois-Rivières by KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION uses four kinds of pulp to make newsprint, supercalendered specialty papers and coated paper. Two kinds, mechanical and thermomechanical pulps, are made at the mill. Mechanical pulp is made from defibred logs which are ground with abrasive wheels and may be bleached with hydrogen peroxide or sodium hydrosulphite. Thermomechanical pulp is made by grinding wood chips steam-heated in refiners; it may also be bleached with hydrogen peroxide or sodium hydrosulphite. The other two kinds, kraft and de-inked pulps, are purchased from suppliers. The mill has an annual production capacity of 583 100 t. In 1995, it operated at 95% of capacity and employed a work force of 1100.

## PRODUCTION

### PRINCIPAL RAW MATERIALS

- Logs and pulpwood bolts (fir and spruce)
- Wood chips (fir and spruce)
- Bleached kraft pulp
- De-inked pulp

### FINISHED PRODUCTS

- Newsprint
- Supercalendered specialty papers
- Supercalendered coated paper

# TREATMENT MEASURES

## INITIAL EFFLUENT VALUES

*BOD<sub>5</sub> and ss*

Based on company data, in 1988 the mill had an average effluent discharge of 82 565 m<sup>3</sup>/d, containing:

- 22 406 kg/d of biochemical oxygen demand (BOD<sub>5</sub>)
- 7672 kg/d of suspended solids (ss)

In 1990 and 1991, paper production increased 25% after the division commissioned three new thermomechanical pulping units. In 1994, it started up a new hydrogen peroxide bleaching unit to improve the quality of its thermomechanical product. A BOD<sub>5</sub> increase of 25 kg per tonne of bleached pulp was subsequently observed.

## RESOURCES AND USES TO PRESERVE

*An urbanized area*

The KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION mill is located on the north shore of the St. Lawrence, about 3 km upriver from the port of Trois-Rivières. Mill effluent is discharged into the St. Lawrence. Trois-Rivières and Cap-de-la-Madeleine form a heavily urbanized area. Saint-Quentin Island, at the confluence of the Saint-Maurice and St. Lawrence rivers, has been developed as a public park promoting sports and recreation (marina, cruises, windsurfing, water skiing).

The St. Lawrence at Trois-Rivières has no significant wildlife habitats, although the area is a spring and fall staging area for a few hundred geese and ducks. The Saint-Maurice is the gateway to a vast drainage basin used for spawning by several fish species (northern pike, yellow pike, burbot). There are also a few spawning grounds (Saint-Quentin Island) and a small commercial fishery (shad, catfish, tomcod) around the islands at the mouth of the Saint-Maurice.

## 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 KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION will be available on request by 1997.

## EFFLUENT TREATMENT

*Primary and secondary settling tanks*

The plant's wastewater system collects all process water, including blow-down from the fresh water clarifier from which the plant draws its water. Wastewater goes first to a collector, then to a wet well; it is screened, then pumped into a 45.6 m primary clarifier holding 10 000 m<sup>3</sup>. The water is retained here for about four hours. Sludge is raked and pumped to a mixing tank.

The system has an emergency basin 50 m in diameter (10 700 m<sup>3</sup>). The water is subsequently cooled in four cooling towers and split between two parallel and independent treatment streams.

The treatment process uses a conventional piston-flow activated sludge (aerobic) system. Each treatment stream consists of an equalizing pond followed by two successive selectors and an aeration pond. Each aeration pond is followed by a secondary clarifier 50 m in diameter.

The processed water from the two treatment streams is routed to the St. Lawrence River.

## PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

*\$40 million invested*

The freshwater reduction program introduced in 1993 and 1994 consists in separating the industrial wastewater, returning the relatively uncontaminated portion to the process stream and treating part of the remainder in a Poseidon flotation cell. In July 1994, the KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION undertook construction of a secondary treatment system expected to come on stream in September 1995. The cost of the treatment systems is estimated at \$40 million.

## REGULATORY COMPLIANCE - WATER COMPONENT

*Compliance with standards*

The KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION in Trois-Rivières is subject to the Quebec Regulations respecting Pulp and Paper Mills and the federal Pulp and Paper Effluent Regulations. The treatment measures and the new secondary treatment system (September 1995) enable the company to meet the new standards that went into effect on 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 (see Figure 1) and determine the proportion of each pollutant (see Table 1).

Table 1 gives the data supplied by the company for the months of October to December 1995 in accordance with the Quebec Regulations respecting Pulp and Paper Mills, as well as the Chimiotox values calculated therefrom, for an effluent flow of 64 242 m<sup>3</sup>/d. The figures show a predominance of copper and aluminum in the treated wastewater. Copper accounted for 51% of the Chimiotox index, followed by aluminum (36%), zinc (6%) and dehydroabietic acid (5%).

Figure 1 is plotted from the characterization results for 1989 and 1994 as well as the company's 1995 data. The Chimiotox indices for 1988-1993 were extrapolated from the 1990 characterization data. The 1995 index is based on the company data. The 1994 characterization follow-up results show a 63% drop in the Chimiotox index as compared with 1989, despite a 25% production gain in 1991. The freshwater reduction program accounts for the drop in effluent toxicity. Start-up of the activated-sludge secondary treatment system helped to lower the Chimiotox index by 99% between 1988 and 1995.

Table 1 *Chimiotox Index (1995) - Kruger Inc. Trois-Rivières, Newsprint and Coated Paper Division\**

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Total Copper	1.759	451	793
Total Aluminium	50.557	11	556
Total Zinc	9.232	9.4	87
Dehydroabietic Acid	1.114	77	86
Isopimaric Acid	0.300	19	6
Abietic Acid	0.257	19	5
Total Nickel	0.440	10	4
Stearic Acid	0.150	19	3
Linoleic Acid	0.085	19	2
Pimaric Acid	0.128	19	2
Sandaracopimaric Acid	0.128	19	2
<b>CHIMIOTOX INDEX **</b>			<b>1546</b>

\* For effluent discharge of 64 242 m<sup>3</sup>/d.

\*\* October to December 1995.

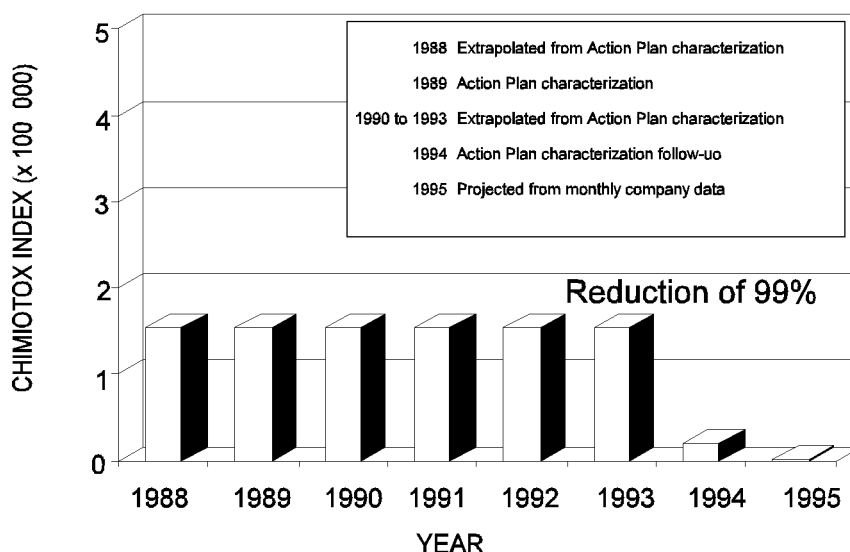


Figure 1 *Changes in toxic effluent discharges, 1988-1995 - Kruger Inc. Trois-Rivières, Newsprint and Coated Paper Division*

## 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.

According to the monthly figures for October to December 1995, no persistent toxic substance was 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 KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION in Trois-Rivières. The PEEP index was estimated at 5.8 for 1989 and 6.0 for 1994.

Since September 30, 1995, it is prohibited under the 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. The implementation of new treatment measures at the KRUGER INC. TROIS-RIVIÈRES, NEWSPRINT AND COATED PAPER DIVISION has helped reduce the toxicity of the effluent. According to the figures for October to December 1995, the effluent is non-toxic.

## REDUCTION IN SUBSTANCES MONITORED

### *Reduction in BOD<sub>5</sub> and effluent flow*

According to company data for October, November and December 1995, the mill had an average effluent discharge of 65 216 m<sup>3</sup>/d, containing:

- 1652 kg/d of suspended solids (ss)
- 400 kg/d of biochemical oxygen demand (BOD<sub>5</sub>)

Company data for 1988-1995 show BOD<sub>5</sub> reduced by 98%, ss by 78% and effluent flow by 21%, a performance explained by implementation of the freshwater reduction program. Effluent ss fell by 79% following implementation of the new secondary treatment system.

## KEY POINTS

- Start-up of an activated-sludge secondary treatment system in September 1995 (a \$35 million investment)
- 99% reduction in the Chimiotox index
- Freshwater reduction program (\$5 million investment)

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:**

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### **Records officer at the Ministère de l'Environnement et de la Faune du Québec (MEF):**

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