

## FACT SHEET No. 4

### Petromont and Company Limited Partnership

10555 Metropolitan Blvd. East  
Montreal East, 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. PETROMONT COMPANY LIMITED PARTNERSHIP in Montreal East 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 perform environmental monitoring to achieve a 90% reduction in liquid toxic waste. Between 1988 and 1995, the fifty industrial plants reduced their toxic effluent discharges by 96%.*

## INDUSTRIAL PLANT

*A petrochemical company*

PETROMONT COMPANY LIMITED PARTNERSHIP uses the Unipol process for the polymerization of ethylene. The main steps of the process include supplying raw materials, starting the polymerization reaction, degassing the resin, putting additives into it and proceeding to granulation. Annual production capacity is 280 000 t of high density polyethylene. In 1995, the plant operated at 70% of capacity and employed a work force of 248.

## PRODUCTION

### PRINCIPAL RAW MATERIALS

- Ethylene
- Refinery gas

### FINISHED PRODUCTS

- High density polyethylene

# TREATMENT MEASURES

## INITIAL EFFLUENT VALUES

### *COD and BOD<sub>5</sub>*

According to company data for 1988, the effluent discharge was 4730 m<sup>3</sup>/d, containing:

- 2.348 kg/d of chemical oxygen demand (COD)
- 1.625 kg/d of biochemical oxygen demand (BOD<sub>5</sub>)
- 173 kg/d of suspended solids (ss)
- 26 kg/d of oil and grease (O&G)
- 1.8 kg/d of chromium
- 1.4 kg/d of phenols
- 1.2 kg/d of zinc

## RESOURCES AND USES TO PRESERVE

### *Industrial and residential uses*

Wastewater from the PETROMONT COMPANY LIMITED PARTNERSHIP plant in Montreal East is emptied into the sewer system of the Montreal Urban Community (MUC) and reaches the Aux Vaches Island outlet after treatment. A great many recreational activities take place downstream from the MUC effluent discharge point. Water sports are particularly important here because there are many cottages, campgrounds, marinas and wharves. Furthermore, the string of islands downstream from Aux Vaches Island comprise interesting wildlife habitats. Some highly diversified spawning grounds are used by pike, bass and suckers. Waterfowl nesting sites and habitats for semi-aquatic mammals attract hunters, trappers and fishermen. Lavaltrie, which is the first municipality downstream from the MUC effluent discharge point, uses the river for its water supply.

## 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. In the case of PETROMONT COMPANY LIMITED PARTNERSHIP, there are no water quality based objectives as the company's effluent is discharged into the municipal sewer system.

## EFFLUENT TREATMENT

### *Physical and chemical treatment*

Blow-down from the indirect cooling systems and from the boilers, industrial wastewater and rainwater all receive physical and chemical treatment. The treatment system, which has an 8176 m<sup>3</sup>/d capacity, includes a wastewater collection basin, a rapid mixing tank, two flocculation basins and two settling tanks. The pH of the effluent and its content of total organic compounds (TOCs) are monitored before the water is emptied into the municipal sewer system through the Durocher collector. During 1994, the collector was connected to the MUC wastewater treatment plant.

## PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

### *Introduction of new treatment measures*

From 1988 to 1992, several new treatment measures were introduced. The concentration of oil and grease (O&G) in the effluent was greatly reduced through the installation of oil recovery units, an emergency basin, a continuous TOC analyser and embankments around the tanks. Furthermore, replacing zinc chromate with phosphate-based products in the cooling towers reduced the concentrations of chromium and zinc in the cooling water. Lastly, the use of FeCl<sub>3</sub>/polyelectrolyte for physicochemical wastewater treatment was discontinued in August 1990, thus reducing ss in the effluent discharge.

The introduction of a new polyethylene manufacturing process (Unipol unit) in 1992, and the closure of the ethylene oxide and ethylene-glycol production units in 1993 during a general reorganization, also lowered the concentrations of pollutants.

On January 24, 1994, the company received a certificate of authorization allowing it to increase annual polyethylene production capacity from 225 000 t to 280 000 t. This operation entailed an investment on the order of \$20 million. The changes do not affect the volume or the quality of the effluents.

## REGULATORY COMPLIANCE-WATER COMPONENT

### *Full compliance*

PETROMONT AND COMPANY LIMITED PARTNERSHIP of Montreal East is subject to Montreal Urban Community (MUC) by-law 87 concerning effluent discharge in sewers. The plant complies with the established standards.

# POLLUTION ABATEMENT

## CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

### *o&G and dioxins and furans*

The Chimiotox index gauges the load of all the toxic substances 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 1990 characterization data as well as the Chimiotox values calculated from them for an effluent discharge of 5181 m<sup>3</sup>/d. Twenty-three substances were detected in testing for more than 120. The data show that oil and grease (o&G) are preponderant in the treated wastewater, representing 38% of the Chimiotox index. Dioxins and furans follow with 36%, then arsenic (7%) and chromium (6%).

Figure 1 is plotted from the data of the 1990 characterization study. The Chimiotox indices for 1988, 1993, 1994 and 1995 are based on the data from the 1990 characterization and adjusted using monthly company data. The Chimiotox index calculated from the 1990 characterization data was left unchanged for 1989, 1991 and 1992. The 83% reduction in the Chimiotox index between 1988 and 1994 is due to a certain number of factors. First, several cleanup measures were introduced in order to reduce the o&G concentration in the effluent. Furthermore, replacing zinc chromate with phosphate-based products in the cooling towers made it possible to reduce the load of chromium and zinc. Lastly, the new process for polyethylene production (Unipol unit) and the closure of the ethylene oxide and ethylene-glycol units reduced the concentrations of pollutants.

Table 1 *Chimiotox Index (1990) - Petromont and Company Limited Partnership \**

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Oil and Grease	31 440	100	3 144
2,3,7,8-T <sub>4</sub> CDD equivalent	4.18x10 <sup>-08</sup>	71 428 571 429	2 986
Arsenic	0.010	57 143	571
Chromium	1.010	500	505
Sulphides	0.640	500	320
Silver	0.030	10 000	300
Mercury	0.001	166 667	167
Bis-(2-chloroethyl)ether	0.087	735	64
Iron	16.780	3	56
Total Phosphorus	0.920	50	46
Copper	0.040	424	17
Acetone	3.095	2	6
Zinc	0.570	9	5
1,3-dichlorobenzene	0.010	400	4
Acenaphthene	0.010	333	3
Ammonia nitrogen	2.620	0,8	2
Benzene	0.074	25	2
Antimony	0.600	2	1
Nickel	0.090	10	1
Ethylbenzene	0.019	33	1
Toluene	0.054	10	1
Xylenes (o, m and p)	0.018	25	<1
Nitrites-Nitrates	0.030	5	<1

### CHIMIOTOX INDEX

8 202

\* For effluent discharge of 5181 m<sup>3</sup>/d (23 substances detected in testing for more than 120).

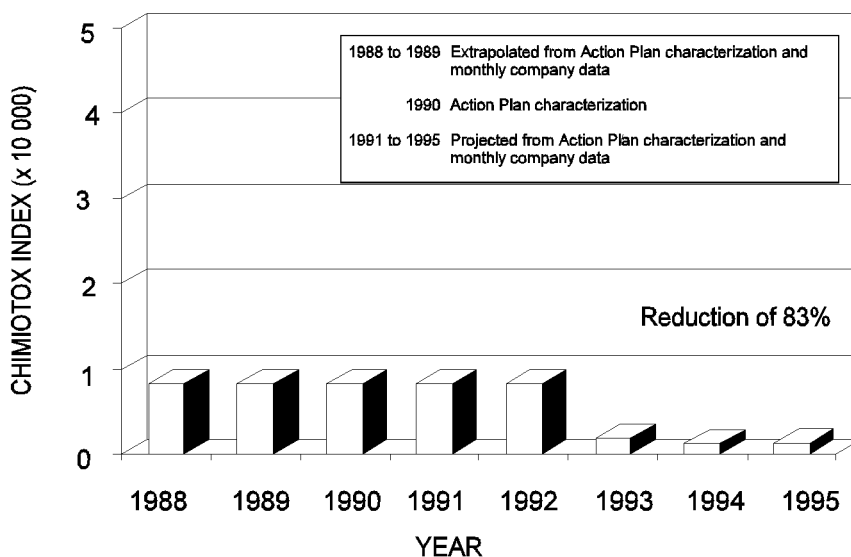


Figure 1 *Changes in toxic effluent discharges, 1988 - 1995 - Petromont and Company Limited Partnership*

## VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

### *Presence of dioxins and furans*

One long-range objective of SLV 2000 is the virtual elimination of 11 persistent and 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.

In 1990, at the time of the characterization study, dioxins and furans were detected among the eleven persistent toxic substances that were being sought. The load was 41.8 µg/d at that time.

## PEEP TOXICITY REDUCTION

### *Moderate toxicity*

The Potential Ecotoxic Effects Probe, or PEEP, combines the 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. In the case of the PETROMONT AND COMPANY LIMITED PARTNERSHIP plant in Montreal East, one series of bioassays was carried out. The PEEP value was 4.5, which was an average value for results among the 50 Action Plan plants.

## REDUCTION IN SUBSTANCES MONITORED

### *Several reductions*

According to company data for 1995, the effluent flow was 3058 m<sup>3</sup>/d and contained:

- 136 kg/d of chemical oxygen demand (COD)
- 45 kg/d of suspended solids (ss)
- 38.3 kg/d of total organic carbon (TOC)
- 4.3 kg/d of oil and grease (O&G)
- 0.29 kg/d of zinc
- 0.09 kg/d of phenols
- 0.06 kg/d of chromium

For the period 1988 to 1995, company data indicate a 94% reduction in chemical oxygen demand (COD), an 83% reduction in oil and grease (O&G), and a 74% reduction in suspended solids (ss). Phenol concentration fell by 94%. Furthermore, zinc and chromium concentrations decreased by 76% and 96% respectively. These reductions can be attributed to changes in the production process and to cleanup measures implemented between 1988 and 1993.

## KEY POINTS

- 83% reduction in the Chimiotox index
- Adoption of a less polluting production process (Unipol) in 1992
- Introduction of pollution abatement measures between 1988 and 1993

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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