FACT SHEET No. 28

QIT-Fer et Titane Inc.

1625 Marie-Victorin Road

Tracy, Quebec

J3R 1M6

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 QIT-FER ET TITANE INC. plant, located in Tracy, 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

Metal processing

The QIT-FER ET TITANE INC. complex in Tracy has three sections: an ore preparation plant, a group of arc furnaces and a steel works.

In the ore preparation plant, titanic iron ore undergoes mechanical treatment to increase the concentration of iron and titanium oxides from 85% to 95%. The ore is then placed in four rotary furnaces for desulfurization, after which it is mixed with coal.

The ore and coal mixture is melted in nine 60-megawatt electric arc furnaces with a maximum temperature of over 1700°C. Carbon monoxide produced during the chemical reactions is reused as a source of energy for the rotary furnaces. The titaniferous slag is removed from the furnaces, cooled and then crushed to fragments smaller than 1.6 cm for sale. On leaving the furnaces, the molten iron is poured into ladles to undergo carburization and desulfurization; after that, it is cast into ingots or sent to the steel works or to the Quebec Metal Powders Ltd. plant. The liquid metal is transformed into steel in a basic oxygen furnace. The molten steel is poured into a ladle, where the necessary alloying elements are added, and then billets are formed.

The QIT-FER ET TITANE INC. complex has an annual production capacity of 1 040 000 t of titaniferous slag and 850 000 t of pig iron; in 1995 it operated at 75% of rated capacity. The complex has a work force of some 1300.

PRODUCTION

PRINCIPAL RAW MATERIALS

- Titanic iron ore
- Coal
- Electricity
- Graphite electrodes

FINISHED PRODUCTS

- Titanium oxide
- Pig iron
- Steel billets

TREATMENT MEASURES

INITIAL EFFLUENT VALUES

Mostly ss

According to data from the characterization study conducted by the Ministère de l'Environnement du Québec (MEQ) in 1986, adjusted for production, in 1988 the effluent discharge was 166 000 m^3/d, containing:

- 425 000 kg/d of suspended solids (SS)
- 51 300 kg/d of chemical oxygen demand (COD)
- 41 200 kg/d of iron
- 200 kg/d of chromium

RESOURCES AND USES TO PRESERVE

Diversity of uses

The effluents of the QIT-FER ET TITANE INC. complex are discharged into the St. Lawrence. There are aquatic plant communities just downstream from the discharge point, and between this point and the confluence with the Richelieu River, the aquatic environment has been degraded by wastewater from local industry. Below this stretch, the river hosts many kinds of activities and facilities: docks and boat-launching ramps (Saint-Joseph-de-Sorel, Sainte-Anne-de-Sorel), public beaches and riverside parks, sport and commercial fishing (Notre-Dame-de-Pierreville), game bird hunting, cottages, campgrounds and cruises. Ile-du-Moine, which lies about ten kilometers downriver, comprises many cottages and homes. Despite poor water quality, this sector of the St. Lawrence contains large spawning grounds and rare vascular plants. Waterfowl (Canada geese, dabbling ducks) nesting sites and staging areas are also found in the vicinity. The QIT-FER ET TITANE INC. effluents mix very little with the water in the shipping channel and so remain south of it.

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. The water quality based objectives for QIT-FER ET TITANE INC. are available on request.

EFFLUENT TREATMENT

Neutralization of effluent

The main effluent of the QIT-FER ET TITANE INC. plant in Tracy consists of industrial wastewater (from the ore preparation plant and reduction furnaces) and part of the sanitary sewage. Since January 1994, the wastewater has been directed to the plant's treatment facility, where the suspended solids load of the main effluent is reduced. The system collects the effluents from the treatment facility and pumps them into a settling tank, where flocculants are added. The residues are pumped into a storage tank and then into filter presses, which express the water and compact the solids.

The secondary effluents include the slag cooling water, wash water from the treatment facility filters, the excess recycle water and wastewater from the pumping station for the furnaces. Particles are removed from the slag cooling water prior to discharge into a ditch that empties into the river. Oily water goes through an oil separator and then into the main effluent stream. Cooling water from the arc furnaces undergoes segregation, after which it is recirculated in a closed system. Sanitary wastewater from the steel works is treated with activated sludge.

PREVENTION AND CLEANUP SYSTEMS IMPLEMENTED

$40 million invested

Under the St. Lawrence Action Plan, the company entered into a wastewater treatment program (PAE) in January 1988. The objectives of the PAE were to cut down on the volume of water used and reduce suspended solids (SS) by 20% at source and 95% overall, through decantation of the wastewater.

A heat exchanger was installed in 1988 to assist in cooling the reduction furnaces, and the volume of water reused in the ore enrichment plant was increased, thus achieving the targeted reduction in water consumption. In 1989, control of suspended solids discharges into the effluent was improved. This first phase required an investment of $30 million. The Ministère de l'Environnement et de la Faune du Québec (MEF) issued a certificate of authorization for a wastewater treatment facility in March 1993, and it came on stream in January 1994.

From 1991 to 1994, the company spent $40 million on wastewater treatment. In addition to investing more than $33 million in a wastewater treatment facility, it built a sludge disposal site in 1994 at a cost of $3.7 million. The company is also participating in research on recycling industrial wastes.

REGULATORY COMPLIANCE - WATER COMPONENT

Commitments met

In accordance with the provisions of the PAE, signed in 1988, the new treatment system has reduced suspended solids by more than 95%. Furthermore, a certificate of authorization was issued under the PAE in November 1994 to change wastewater treatment processing in the ore preparation plant. Future work will help to reduce the quantity of water used and so reduce the quantity of suspended solids.

POLLUTION ABATEMENT

CHIMIOTOX INDEX ABATEMENT OF TOXIC POLLUTION

Mainly heavy metals

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 Action Plan characterization data gathered by the MENVIQ in 1986, adjusted for 1988 production, as well as the Chimiotox values estimated from those figures, for an effluent flow of 154 548 m^3/d. Fourteen substances were detected, including ten metals which together account for 95% of the Chimiotox index. Iron makes up 30% of the Chimiotox value, followed by 17% for copper and 16% for chromium. Aluminum and mercury rank fourth and fifth, with 15% and 8% of the Chimiotox index.

Figure 1 is plotted from the MENVIQ's 1986 characterization data, adjusted for 1988 production. The Chimiotox values for 1989 to 1993 were estimated from the 1988 figure, adjusted based on the efficiency of the company's measures to reduce pollutants at source (20%). The 1994 Chimiotox index has been calculated by adjusting the 1993 data in light of the efficiency of the treatment system. The 1995 value is the same as the 1994 figure. Between 1988 and 1994, the Chimiotox index decreased by 99%.

Table 1 ***Chimiotox index (1988) - QIT-Fer et Titane Inc.****

Substance	Load (kg/d)	Toxic Weighting Factor	Chimiotox Units (CU)
Iron	60 094.330	3	200 314
Copper	262.252	424	111 124
Chromium	218.448	500	109 224
Aluminum	8 471.688	11	97 375
Mercury	0.328	166 667	54 667
Vanadium	541.000	71	38 642
Total Oil and Grease	221.881	100	22 188
Total Phosphorus	256.928	50	12 846
Manganese	963.974	10	9 639
Lead	20.215	314	6 357
Zinc	353.920	9	3 339
Nickel	172.842	10	1 728
Nitrites-Nitrates	40.700	5	203
Ammonia Nitrogen	22.949	0.8	18
CHIMIOTOX INDEX			**667 664**

* For effluent discharge of 154 548 m^3/d.

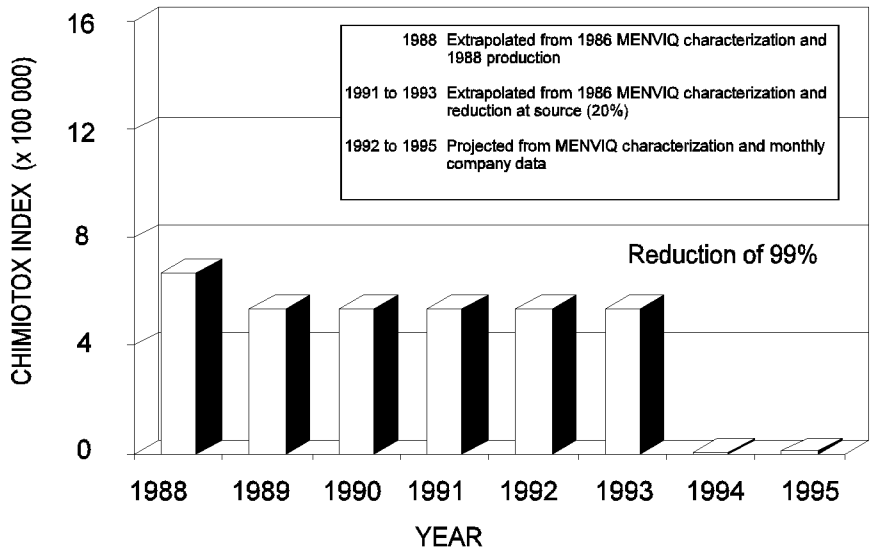

Figure 1 ***Changes in toxic effluent discharges, 1988-1995 - QIT-Fer et Titane Inc.***

VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES

Mercury detected

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 1988 data estimated from the 1986 characterization study by the Ministère de l'Environnement du Québec, taking production into account, the mercury load in the effluent amounted to 0.328 kg/d. The wastewater treatment facility brought on stream in January 1994 should help to reduce this load. As part of the follow-up characterization to be carried out in 1996 under SLV 2000, the mercury level will be checked and any necessary measures will be taken to reduce it.

PEEP TOXICITY REDUCTION

Average toxicity

The Potential Ecotoxic Effects Probe, or PEEP, combines 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 QIT-FER ET TITANE INC. plant in Tracy, one series of bioassays was conducted in 1991. The PEEP value was 3.9, which is in the average range of the indices obtained for the 50 Action Plan plants.

REDUCTION IN SUBSTANCES MONITORED

Major decreases

According to monthly company data, in 1995 the main effluent discharge was 129 391 m^3/d containing:

- 5887 kg/d of suspended solids (SS)
- 699 kg/d of iron
- 621 kg/d of titanium

Between 1988 and 1995, ss and iron each decreased by 99%, owing to the measures implemented under the PAE. The plant achieved the PAE objectives by optimizing water use, controlling ss at source and decanting the wastewater.

KEY POINTS

- **99% reduction in the Chimiotox index**
- **Commitment to a PAE in 1988; $70 million invested in wastewater treatment**
- **99% reduction in SS and iron between 1988 and 1995**

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.

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