TABLE: Primary chemicals and petroleum products that are transported on the St. Lawrence and that pose potential risks to drinking water supply

SOLIDS	LIQUIDS	GASES
Bitumen	Sulphuric acid	Chlorine (may be liquefied)
Sodium cyanide	Benzene	
Sodium dithionite	o-Dichlorobenzene	
Ferrosilicon	Ethanol	
Uranium hexafluoride	Kerozene	
Sodium hydroxide	Molten naphthalene	
Ammonium nitrate	Molten phenol	
Calcium silicide	Toluene	
Uranium (concentrate)	Xylenes	

Source : Guerrier and Paul (2000)

Did you know that...?

Annual navigation on the St. Lawrence

- About 15,000 ships.
- More than 30 million tonnes (Mt) of cargo shipped annually (in 2000).
- Main chemical substances shipped in 2000: petroleum products (7.6 Mt), ore (8.4 Mt) and chemicals (1.7 Mt) (according to SLV 2000).

Spills on the St. Lawrence

- From 150 to 200 spills each year (with 56% occurring in the ports of Montreal and Quebec City).
- Most recent major spill: 49-t oil spill from *Gordon C. Leitch* in Havre Saint-Pierre (1999).
- Largest spill: 400-t crude oil spill from *Czantoria* in Saint-Romuald (1988).

In the event of a spill

Environment Canada's emergency response team and technical and scientific services are accessible at all times, by calling toll free 1 866 283-2333, or 514 283-2333 from the Montreal region.

Fisheries and Oceans Canada. The Canadian Coast Guard. Maritime Pollution. Alert and Warning Network accessible at all times, by calling toll free 1 800 363-4735. http://www.marinfo.gc.ca

If ever you come across an oil-soaked bird: Never touch the bird or try to catch it if it is still alive. Note the location as accurately as possible and report it to Canadian Wildlife Services at 1 800 463-4311 (toll free).
Email: quebec.scf@ec.gc.ca

To learn more

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Government of Canada Gouvernement du Canada

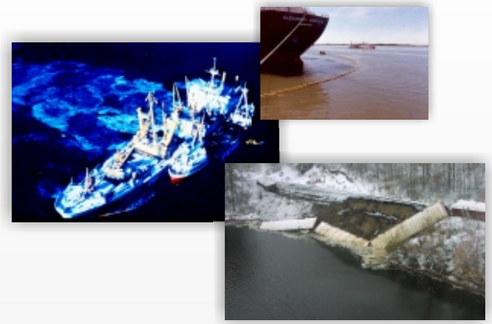
KEYS TO UNDERSTANDING AND COMMUNICATING ENVIRONMENTAL HEALTH ISSUES

Accidental discharge of chemical substances into the aquatic environment

Preventive measures have reduced the frequency of major spills in the St. Lawrence River, but the risk of spills remains.

Sources of spills

Marine transportation on the St. Lawrence, rail or road transportation and certain agricultural and industrial activities increase the risk of accidental spills.



Potential effects on human health

Since the St. Lawrence and other rivers in Quebec are significant sources of drinking water, protecting this resource is a major public health issue.

Riverside inhabitants could also be affected over the long term by contaminated soil, wildlife, flora (food) and ambient air.

In the case of certain persistent and bioaccumulating substances, the contamination of molluscs and fish could persist for several months, even years.

Other than potential physical health effects associated with the exposure to toxic substances, spills could well have adverse effects on psychosocial health.

Canada

ACCIDENTAL DISCHARGE OF CHEMICAL SUBSTANCES INTO THE AQUATIC ENVIRONMENT

ENVIRONMENT

Aquatic environment
- Drinking water supply affected?
- Persistence (e.g., organochlorines, metals, hydrocarbons)?
- Transfer within food chain?
  - Bioconcentration, bioamplification (predators such as fish, birds and marine mammals).

Distribution of substances in aquatic environment
- Dissolution (e.g., phenols) → dilution effect.
- Emulsion (e.g., hydrocarbon droplets).
- Adsorption onto sediments.
- Formation of surface slick (e.g., hydrocarbons).
- Settling to bottom of water (e.g., sulphuric acid).

Soils
- Possible contamination, primarily on shoreline.

Air
- Contamination through evaporation of spilled substances (only in the case of volatile substances, e.g., xylene).

Visual alteration of landscape
e.g., Hydrocarbon slick, or dead fish and birds.

Nuisances
e.g., odours?

Potential effects on ecosystems
- Massive mortality of aquatic fauna.
- Medium- to long-term toxic effects.
- Disturbance/destruction of habitats or reproduction sites (e.g., spawning grounds).

HUMAN HEALTH

How could human beings be exposed?
- By ingestion of water, food (e.g., molluscs).
- By dermal contact with water or spilled substances (e.g., contact with oil-soaked birds).
- By inhalation of indoor or outdoor air.
- Through mother-child transfer during pregnancy (*in utero* exposure of foetus) and nursing (e.g., organochlorines).

What are the potential effects?
- Acute poisoning.
- Disease caused by substances with longer term effects (e.g., carcinogenic hydrocarbons).
- Stress-induced anxiety or insomnia.

COMMUNITY

What are the socio-economic effects?
- Decrease in revenues (resulting from damage to industrial or agricultural facilities and job losses).
- Property damage (e.g., to boats or other property).
- Changes to commercial, tourism or industrial activities (e.g., navigation, swimming or water sports).
- Restricted access to local resources (e.g., subsistence fishing or shellfish harvesting).

What are the socio-cultural effects?
- Restricted use or access to environment.
- Short-, medium- or long-term lifestyle changes (e.g., restrictions on consumption of local fish resources).

What are the psychological effects?
- Stress before, during and after event.
- Property damage.

What are the most vulnerable groups?
- Riverside inhabitants whose water supply comes from impacted waters.
- People who consume fish or shellfish.
- Children.
- People involved in clean-up activities (without appropriate protection).
- Members of emergency response team.

COMMUNICATING RISKS

Sending out a clear message
- Clearly explain the type of spill.
- Present the facts (extent of the damage, potential risks and duration of disturbance, etc.).
- Ensure advisories are issued by responsible authorities. Determine level of perceived risk?

Inform and reassure
- How can people protect themselves? What lifestyle changes are needed?
- What mitigation measures are required (e.g., containment booms or pumping).
- Ensure the general public is kept well informed (join forces with established organizations) and provide straightforward answers to questions/concerns.
- Track information conveyed by the media.

"We're taking care of you."
- Ensure public safety.
- Verify whether information from community is needed (e.g., water measurements).
- Determine future environmental impact of substance.
- Decide whether medical follow-up program for exposed population is needed.