



# St. Lawrence TECHNOLOGIES

## ABSTRACT

The presence and the management of contaminated sediment in water bodies like the St. Lawrence River raise major technological, economic and environmental challenges for a number of countries. Promoters can choose from a variety of scenarios, from non-intervention to disposing, in whole or in part, of contaminants found in the sediment. By describing both the advantages and the limitations of existing technologies and those under demonstration, this Guide aims to encourage new technological development, leading to facilitated decision-making and project completion. The Guide points out the remarkable progress recently made in the field of sediment treatment technologies.



## CONTAMINATED SEDIMENT GUIDE TO ASSESSING AND SELECTING TREATMENT TECHNOLOGIES FOR CONTAMINATED SEDIMENT



## MAIN FEATURES

- **Pretreatment technologies**
  - Aimed at reducing both the sediment volume and the costs.
- **Treatment technologies**
  - Aimed at extracting, destroying, neutralizing or fixing sediment contaminants on-site or off-site
  - The Dutch experience foresees an additional two to ten years of research is needed to develop more effective and more competitive technologies.
- **Effluent and leachate treatment technologies**
  - Aimed at treating the water that results from dredging or sediment treatment activities.



ST. LAWRENCE ACTION PLAN



Environment  
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## PROJECT OBJECTIVES

The St. Lawrence Centre of Environment Canada has issued the Guide to *Assessing and Selecting Treatment Technologies for Contaminated Sediment* in order to help project promoters and managers plan, design, assess and realize cleanup projects for contaminated sediment.

The guide's objectives are:

- To evaluate the various possible scenarios, along with their advantages and limitations, for treating contaminated sediment.
- To define the main components of a given treatment scenario.
- To determine the various possible options for pretreating and treating sediment and for treating effluent generated during sediment dredging, pretreatment or treatment operations.
- To indicate the stages of development, the fields of application, the limitations and the costs of sediment treatment technologies.
- To present a list of assessment factors and criteria for conducting restoration projects and selecting sediment treatment technologies.

## BACKGROUND

A number of sediment treatment technologies are either under study or under demonstration; as such, it is difficult to obtain a true and complete picture of all the work carried out in the field. In order to promote and support these demonstration projects, it is important to review those that have been or are being demonstrated, as well as those under development, in Europe as in the U.S. or Canada, and to assemble this information in a synthesis document.

## CONTENTS OF THE GUIDE

The Guide covers the various stages of a contaminated sediment cleanup project. Its main sections focus on assessing and selecting:

- A cleanup scenario
- Pretreatment technologies
- A process or a chain of treatment
- Processes for the entire project.

The Guide contains over 200 pages of information on biological, physico-chemical and thermal sediment treatment methods, along with information on treatment by immobilization or secure landfill. Each group of technologies is described, schematically illustrated and accompanied by summary tables.

Information is also offered on treatment principles; on the technologies available, demonstrated or currently under demonstration; their fields of application; and the demonstrated advantages, limitations and applications of each technology.

The Guide also presents the economic and environmental aspects to consider in selecting a treatment technology, in addition to the social implications and considerations relative to protecting public health. Lastly, the Guide lists references on promoters of treatment technologies.

TECHNOLOGY OPTIONS AVAILABLE FOR THE TREATMENT OF CONTAMINATED SEDIMENT		
Sediment pretreatment	Sediment treatment	Effluent and leachate treatment
• Dewatering	• Biological treatment	• Suspended solids removal
• Injection of products into dredged sludge	• Physico-chemical extraction	• Metals removal
• Separation of particles	• Chemical treatment	• Organic matter removal
	• Conventional thermal treatment	
	• Nonconventional thermal treatment	
	• Contaminant immobilization	
	• Secure landfill	
• Chain of treatment	• Chain of treatment	• Chain of treatment



# RECOMMENDATIONS

The Guide recommends:

- That authorized regional centres or sites should be instituted for the treatment or disposal of contaminated sediment.
- That any decision regarding the restoration of contaminated sediment should be

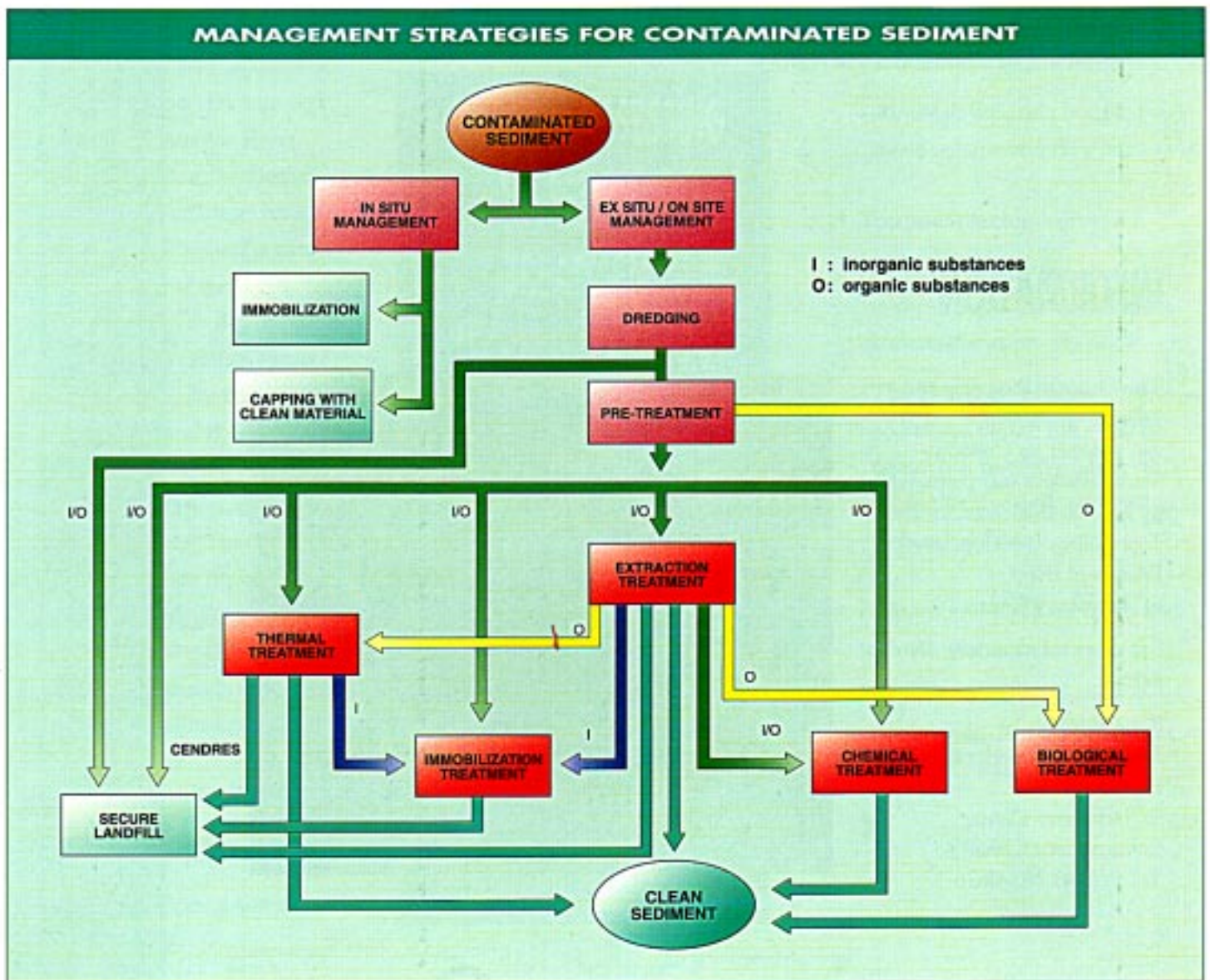
made on the basis of a case-by-case analysis.

- That sediment treatability tests should be conducted to assess the technical, economic and environmental feasibility of these technologies.
- That controls and rigorous environmental

monitoring, including analyses of the risks and the impacts on the environment and on public health, should be carried out.

- Efficient technologies have already been developed and are currently available. The realization

of actual-scale demonstration projects will help to improve these technologies and to develop new ones, thereby ensuring solutions that are increasingly economical and effective in the treatment of contaminated sediment.





## IMPORTANCE OF THE GUIDE

The Guide will be useful to interested parties working in the fields of dredging and treating contaminated sediment, at both the private and public sector levels, for the following reasons:

- It reviews technologies with a demonstrated effectiveness.
- It describes technologies currently under demonstration.
- It provides the names and addresses of technology promoters and developers in North America and Europe.
- It contains a glossary of the main terms used in the treatment of contaminated sediment.
- It lists criteria for assessing and selecting treatment scenarios and technologies in consideration of technical, economic and environmental factors.
- It facilitates the decision-making processes of managers responsible for restoration operations by identifying for them the treatment processes with a demonstrated effectiveness.

## INFORMATION

The *Guide to Assessing and Selecting Treatment Technologies for Contaminated Sediment* was prepared by Jean-René Michaud for the Technology Development Branch of the St. Lawrence Centre.

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St. Lawrence Technologies data sheets are intended for all companies, industries, organizations and individuals interested in new environmental technologies. They are produced by the Technology Development Branch of the St. Lawrence Centre, Environment Canada, as part of the St. Lawrence Action Plan. They serve to disseminate the results of technology development and demonstration projects conducted in the following four sectors: industrial wastewater; contaminated soil; hazardous wastes; contaminated sediment.

Data sheets may be obtained free of charge from:

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Marcel Champagne  
Communications Le Sceau Inc.

Printed at:

Boulangier Inc.

Published by authority of the  
Minister of the Environment  
© Minister of Supply and  
Services Canada, 1993

September 1993

Cette fiche est également disponible en français sous le titre :

*Guide pour l'évaluation et le choix de technologies de traitement des sédiments contaminés.*