St. Lawrence TECHNOLOGIES

ABSTRACT

Human activities have led to the increased pollution of St. Lawrence River sediment. The dredging required for the construction and maintenance of harbours and shipping channels and the disposal of dredged material are problems that pose a growing environmental hazard. The primary objective of this guide is to indicate to those responsible the methods, techniques, equipment and changes that can make dredging projects more environmentally sound at each stage. The guide provides information on production options and criteria for selecting the appropriate equipment and methods, and contains a series of recommendations specific to each stage of a dredging project.

The environmental repercussions of a project will be minimized as each stage - the planning, design, preparation of technical specifications and environmental monitoring - is considered rigourously.

ST. LAWRENCE ACTION PLAN

Environment Canada
Conservation and Protection
Québec Region

Environnement Canada
Conservation et Protection
Région du Québec

CONTAMINATED SEDIMENT

GUIDE TO SELECTING AND OPERATING DREDGING EQUIPMENT AND RELATED PRACTICES

MAIN FEATURES

The *Guide to Selecting and Operating Dredging Equipment and Related Practices* contains recommendations on:

- **Planning the project**
  - Sediment characterization.
  - Environmental assessment.
- **Designing the project**
  - Choosing the appropriate equipment.
  - Modifying equipment and dredging methods.
  - Operational control methods.
  - Disposal options.
- **Preparing specifications and choosing a contractor**
- **Environmental monitoring**

PROJECT OBJECTIVES

Although this document briefly describes certain related factors - such as sediment characterization or the environmental assessment of dredging projects - its main goal is to indicate to those responsible the methods, techniques, equipment and changes likely to improve the environmental performance of their actions at each stage of the dredging project. Thus, it is mainly a guide to sound environmental practices.

More specifically, the guide's objectives are:

- To help those concerned select and develop equipment that can reduce the impact of dredging work.
- To suggest operating and control methods to significantly decrease the environmental impact of dredging projects.
- To suggest ways of reflecting designers' requirements in the technical specifications given to contractors invited to tender.
- To propose guidelines for developing environmental monitoring programs.

BACKGROUND

The construction and maintenance of harbours and shipping channels by dredging presents an environmental hazard associated both with the presence of pollutants in the sediment, which puts the aquatic environment at risk, and to the existence of disposal areas for dredged material, which may conflict with some uses made of this environment. Generally speaking, the main direct repercussions of sediment excavation, transport and disposal are the resuspension of dredged material and the destruction or alteration of aquatic habitats. Dredging activity can indirectly affect water quality, thereby harming aquatic resources and water use.

The effects of dredging are most often temporary and locally confined. Impact is generally minor and can be further minimized by planning and designing in consideration of the environment and through the implementation of appropriate mitigating measures regarding work periods, equipment selection and operating methods.

CONTENTS OF THE GUIDE

The *Guide to Selecting and Operating Dredging Equipment and Related Practices* consists of four main chapters dealing with the various stages of a dredging project; that is:

- **Planning**
- **Design**
- **Preparing technical specifications**
- **Environmental monitoring.**

The front sections of each chapter contain information on various production options (presented mostly in the form of tables outlining the advantages and inconveniences) and lists selection criteria for equipment and methods. Both general and specific recommendations for each stage of a dredging project are found in the summary tables which follow.

As for **designing** and **conducting** dredging projects, the guide provides instructions and suggests measures to make equipment (conventional mechanical and hydraulic dredges) and methods generally used on the St. Lawrence River more environmentally sound. Among other things, it suggests making relatively minor changes to certain

PHASES OF A DREDGING PROJECT

Planning the project

Designing the project
Excavating and transporting sediment
Pre-treatment (and treatment)
Disposal of dredged material

Preparing technical specifications and choosing tenderers

Technical and environmental monitoring of project

RECOMMENDATIONS

pieces of equipment, and adding control measures and environmentally friendly working methods.

Generally speaking, the guide's main recommendations can be summarized as follows:

- Dredging project proponents must acquire a sound basic understanding of the restrictions associated with dredging sites.
- Dredging project proponents must pay close attention to the environment throughout the planning and design phases. They must also implement environmental monitoring procedures throughout the project.
- Contractors must pay close attention to equipment maintenance. They must ensure that the equipment is suited to the planned work and that their employees are properly trained and informed of the envi-

TYPES OF DREDGES CURRENTLY USED ON THE ST. LAWRENCE RIVER		
Mechanical Dredges	Hydraulic Dredges	Special Dredges
Clamshell dredge Dipper dredge Backhoe dredge	Plain suction dredge Cutterhead dredge Hopper dredge	Auger dredge (Mud Cat) Bucket suction dredge (Watermaster)

DISPOSAL OPTIONS FOR DREDGING PROJECTS ON THE ST. LAWRENCE RIVER		
Disposal in Aquatic Environment	Disposal on River Banks	Disposal on Land
Discharge in open water Confinement in aquatic environment	Disposal on river banks Confinement on river banks	Disposal on land Confinement in secure location on land Disposal at special sites

ronmental ramifications of their work.

- Dredging equipment and methods can be improved by drafting technical specifications that consider the technical, economic and environmental elements of each project. Specific environmental considerations must therefore be included in the documents of tender.
- It would be desirable for dredging companies to modify their existing equipment and manufacture or purchase new equipment, especially for dredging contaminated sediment.

The St. Lawrence Centre plays an important role in the development of more environmentally sound technologies and approaches in the field of dredging and the management of dredged materials.

INFORMATION

The *Guide to Selecting and Operating Dredging Equipment and Related Practices* was developed by Les Consultants Jacques Bérubé Inc. for the St. Lawrence Centre.

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Data sheets may be obtained free of charge from:
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Cette fiche est également disponible en français sous le titre :
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