

# Contaminated Sediments:

Characterization,  
Evaluation,  
Mitigation,  
Restoration, and  
Management  
Strategy  
Performance

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**Editors:**  
Jacques Locat,  
Rosa Galvez-Cloutier,  
Ronald Chaney,  
Kenneth Demars



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*Jacques Locat, Rosa Galvez Cloutier, Ronald Chaney,  
and Kenneth Demars, editors*

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# Foreword

The Second International Symposium on Contaminated Sediments: Characterization, Evaluation, Mitigation/Restoration, and Management Strategy Performance in Quebec City, Canada on 26-28 May 2003 is sponsored by ASTM International Committee D18 on Soil and Rock. The symposium chairs and co-chairs of this publication are Jacques Locat, Laval University (CGS) and Rosa Galvez-Cloutier, Laval University (CSCE, ASTM); and Ronald C. Chaney, Humboldt State University (ASTM) and Kenneth Demars, University of Connecticut (ASTM).

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# Overview

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Recent advances in our understanding of contaminated sediments have been assembled in this Special Technical Publication, which is one of the major scientific contributions to the Second International Symposium on Contaminated Sediments held in Québec City from May 26 to 28, 2003. This volume is part of the overall technical program of ASTM Committee D18 on soil and rocks.

For many decades, waterways have been exposed to a wide variety of contaminants. Even if regulations and a better control of contaminants have been established to reduce their emission, many contaminants are still present in bottom sediments. In fact, some of them are persistent and continue to pose a potential risk to the environment with direct and cumulative toxic impacts on aquatic life, organisms, and eventually on human health.

In recent years, major advances have been made in the study and understanding of contaminated sediments, particularly via major projects in areas such as Los Angeles, California, Saguenay Fjord in Québec, and Singapore.

The symposium covers the areas of sediment characterization, contaminant evaluation, mitigation/restoration methods, and management strategy performance from the geological, geotechnical, biological, and geophysical perspectives. It reviews recent advances in contaminated sediments-management-related research and focuses on engineering aspects of contaminant transport, erosion, stability, monitoring, and modeling. The main goal of the symposium is to identify both established and innovative physico-chemical and biological tests and methods used to characterize and evaluate properties and behavior of contaminated sediments, as well as the potential for contaminant transfer.

The papers gathered in this publication cover the primary goal of the symposium and reflect research activities in many parts of the world. Keynote papers, selected for this volume, reflect recent work carried out on large coastal investigations (e.g., in the Los Angeles area), and on natural and artificial capping of contaminated sediments. Other papers in this volume have been assembled into three groups: (1) sediment characterization, (2) mitigation and restoration methods, and (3) monitoring and performance. Each of these sections begins with the corresponding keynote paper.

Sediment characterization of contaminated sediments has become more and more complex. It involves *ex situ* techniques from standard tests (e.g., physical properties) to biological analyses in addition to all the chemical analyses, but also *in situ* ones like erodability tests. Mitigation and restoration methods assembled herein are diversified and touch on many different environments from river sediments and harbor lagoons to land reclamation. It involves techniques ranging from the use of geotextiles and geocomposites to selective sequential extraction methods. The monitoring and performance aspects of contaminated sediments are largely supported by extensive site investigations, like the Southern California project, but also by the development of modeling tools.

A few papers included in this volume summarize a five-year research effort aimed at evaluating the performance of a catastrophic capping layer resulting from the major 1996 Saguenay flood disaster that proved to be very beneficial to the Saguenay Fjord environment and ecosystem by covering most of the ancient contaminated sediments!

Finally, the editors would like to thank all contributing authors for their effort and timely response. This book represents the achievements of a process strongly supported by various learning societies or agencies, including ASTM International (Committee D-18), the Canadian Geotechnical Society,

the Canadian Society of Civil Engineering, the Society for Environmental Toxicology and Chemistry (St. Lawrence Chapter), and the National Science and Engineering Research Council of Canada. The Editors are very grateful to Mrs. Hélène Tremblay, Secretary of the Symposium, and to Mrs. Crystal Kemp for their dedication towards ensuring the completion of this Special Technical Publication.

*Jacques Locat*  
Laval University (CGS)

*Rosa Galvez-Cloutier*  
Laval University (CSCE, ASTM)



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