CONTENTS

DREDGING RESEARCH PROGRAM OVERVIEW
Chair: William E. Roper

Technical Area 5: Dredging Research Program
Thomas R. Richardson .......................................................... 1
Material Properties Related to Navigation and Dredging
Don Banks .......................................................... 1554
The Dredging Research Program: Technical Area 3
William D. Martin .......................................................... 11
Analysis of Dredged Material Placed in Open Water
Billy H. Johnson, Norman W. Scheffner, Allen M. Teeter, Edward B. Hands,
and Hans R. Moritz .......................................................... 18
Vessel Positioning, Survey Controls, and Dredge Monitoring Systems
George P. Bonner, Cary B. Cox, Barry W. McCleave, and Monroe B. Savage ....... 28

SPECIAL DREDGING PROJECTS B
Chair: Jan de Koning

Coordinating the Feasibility of a Dredged Material Separation System Using
Hydrocyclones for the Maintenance Dredging Operation at Canaveral Harbor, Florida
Deborah R. Heible, Mitch A. Granat, and Mark Wolff ................................ 38
Unexploded Ordnance (UXO) and Dredging
Timothy Welp, James Clausner, Joan Pope, Richard Lewis, and Raymond Pilon ...... 48
Innovative Design of a Multiport Diffuser
Mindy L. Roberts and Bernadette H. Kolb ......................................................... 56
LADS System, Inc. Thermal Remediation Treatment for Contaminated Sediment
Vladimir Shepsis, Nancy L. Case, and Gregory L. Hartman ...................... 66
Agitation Dredging Environmental Study
Larry M. Stuber and Elizabeth A. Day .......................................................... 76

DEEP OCEAN DISPOSAL OF DREDGED MATERIAL
Chair: Sherman Seelinger

Deep-Water Dredged-Material Disposal Monitoring Offshore of San Francisco using the
PLUme MEasurement System (PLUMES)
Michael Tubman, Paul Puckette, and Blair Brumley ........................................ 86
Dredged Material Dispersion and Accumulation at a Deep Ocean Disposal Site:
Comparison of Monitoring Study Results and Model Predictions
Catherine A. Courtney, Albert Mills Soldate, Jr., Jeff Cox, and James A. Blake ...... 96
Sediment Dispersion and Footprint Modeling Initial Characterization at a Deep
Disposal Site
Albert Mills Soldate, Jr. and Kim A. Brown .................................................. 103
Biological and Physical Characterization of a Deep-Ocean Disposal Site off
Northern California
James A. Blake, Catherine A. Courtney, Brigitte Hilbig, Donald C. Rhoads,
Jo Ann Muramoto, and Barbara Hecker .................................................. 111
DEVELOPMENT AND DIRECTION OF ENVIRONMENTAL REGULATIONS
Chair: Craig Vogt

Contaminated Dredged Sediment Disposal Criteria
G. Fred Lee and Anne Jones-Lee ........................................ 121

State Regulation of Upland Disposal of Dredged Material in Michigan
Frank Snitz, Douglas Zande, and M. Pamela Horner .................. 131

A Framework for the Environmental Risk Assessment of Contaminated Sediments
Tom M. Dillon ................................................................ 141

Dioxin Contamination in Sediments of the Port of New York and New Jersey:
The Search for Criteria
John F. Tavolaro and Joseph Olha ........................................ 150

TECHNOLOGY TRANSFER AND PUBLIC AWARENESS IN DREDGING
Chair: Tony MacDonald

Environmental Mediation and Open-Water Disposal
Joseph D. Germano ............................................................ 160

Dredging Desk Reference: Accomplishments and Future Developments
Thomas M. Verna and Lyle J. Maciejewski ............................. 170

FATE OF DREDGED MATERIAL
Chair: James R. Houston

Verification of Numerical Modeling of the Fate of Disposed Dredged Material
Michelle M. Thevenot and Billy H. Johnson ............................ 180

The Generation and Use of Site Specific Wave and Current Databases for Dredged Material Fate Predictions
Norman W. Scheffner ......................................................... 190

DREDGMAP: A PC Based System to Predict the Fate of Dredged Material
J. Craig Swanson, Malcolm L. Spaulding, and Tatussaburo Isaji ...... 200

Turbidity and Contaminant Release During Dredging of Contaminated Sediments
Ronald W. van Oostrum and Ir. Peter Vroege .......................... 210

Empirical Guidance for Siting Berms to Promote Stability or Nourishment Benefits
Edward B. Hands, and Donald T. Resio ................................ 220

GEOTECHNICAL ASPECTS OF DREDGING A
Chair: S. Joseph Spigolon

A Method for Rock Dredging Performance Forecasting
Jorge E. Abramian and R. Bruce Taylor ................................. 229

A Piezoelectric Sediment Density Probe
I.R. McDermott, A.D. King, and S.J. Smyth .............................. 239

Acoustic Impedance for Assessing Subbottom Conditions
Robert F. Ballard and Richard G. McGee ................................ 249

New Approaches for Determination of Rock and Rock Mass Properties at Dredging Sites
Hardy J. Smith .................................................................. 259

Knowledge-Based Expert Systems for Geotechnical Factors in Dredging
S. Joseph Spigolon, Reda M. Bakeer, and Jack Fowler ............... 269

Collecting Sediment Environmental and Geotechnical Data Using an Impact Core Sampler
James M. Schmidt ............................................................. 279
SURVEYING AND POSITIONING

Chairs: William A. Bergen and Wade L. Jumonville

OTF Kinematic GPS Positioning for Vertical Reference Datum
Dean Pottle, Al Rougheau, and Larry Rosenbalm ........................................... 288

Integrated Acoustic Seafloor Characterization
Peggy M. Murray, Ed Deangelo, Jeff Parker and Thomas J. Fredette ................. 295

Intrusive Channel Surveying for Dredging Volume Computation
Michael P. Alexander, Allen M. Teeter and Glynn E. Banks .......................... 304

Shoals System Capabilities for Hydrographic Surveying
Jennifer L. Irish, W. Jeff Lillycrop, Larry E. Parson, and Mark W. Brooks ........ 314

Site Investigation Surveys for Dredging Projects
S.J. Plasman, Jr., and Ing. J. Peuchen ...................................................... 322

EVALUATION AND SELECTION OF PLACEMENT ALTERNATIVES

Chair: Kees d'Angremond

Management of San Diego Bay Dredged Material Disposal
Dan Muslin ...................................................... 332

Preliminary Screening Studies for Dredge Disposal Options
Howard L. Cumberland, Barry J. Snyder, and William C. Lester .................. 342

Application of Studies on the Overboard Placement of Dredged Sediments to the
Management of Disposal Sites
William Panageotou and Jeffrey Halka ............................................... 349

The Port of Yuzhny Dredging & Dredged Material Strategy
E.O. Moldavanova, I.A. Grishchenko, Yu.I. Blank, and R.A. Podmogilnaya .......... *

Development of a Long-Term Dredged Material Management Plan, Chincoteague,
Virginia
Tom B. Langley .................................................. 359

ENVIRONMENTAL RESTORATION, ENHANCEMENT
AND MANAGEMENT A

Chair: Mary C. Landin

Restoring and Protecting Marine Habitat
Thomas A. Sands and Wayne Young .............................................. 368

Formulation of the Interagency Coordination Team for the Houston-Galveston Navigation
Channels, Texas Project
Dalton H. Krueger .................................................. 378

Environmental Restoration and Enhancement using Dredged Material in Chesapeake
Bay, Maryland
Steve D. Garbarino and Robert N. Blama, Mary C. Landin, T.R. Patin, and
Stephen R. Maynord .............................................. 384

The Management of Dredged Material Placement for the Development of Oyster Rock
on the Eastern Shore of Virginia
Walter I. Priest .................................................. 394

Site Selection For Beneficial Uses of Dredged Material in Galveston Bay, Texas, USA
Russell Swafford and Richard F. Gorini .............................................. 399

*Manuscript not available at time of printing.
GEOTECHNICAL ASPECTS OF DREDGING B
Chair: Don C. Banks

Geotechnical Analysis of Capped Dredged Material Mounds
Armand J. Silva, Horst G. Brandes, George E. Veyera, Carl J. Uchytil, Thomas J. Fredette, and Drew Carey .......................... 410

Strip Drains in Dredged Material Placement Areas
Timothy D. Stark and Jack Fowler ....................................... 420

Research on the Consolidation of Mud
Erik Toorman and Marc Sas .................................................. 430

Development of a Technique to Acoustically Detect and Study Fluid Mud and its use in Dredging Management
Shawn Hanrahan and Anthony Depasquale .................................. 440

Factors Affecting Degradation of Clay Masses
Paul A. Gilbert .................................................................. 449

REMEDIATION OF CONTAMINATED SEDIMENTS A
Chair: Norman I. Rubinstein

Recent Assessment and Decontamination Studies of Contaminated Sediments in the New York/New Jersey Harbor
Eric A. Stern, Joseph Olha, Bryce Wisemiller, and Audrey A. Massa ................. 458

In-Situ Treatment of Hazardous Sediment
Lyman Wible, Stacy McAnulty, Robert Stanforth, Ajit Chowdhury and
Mick Warner .................................................................. 468

Pilot-Scale Demonstrations of Thermal Desorption for the Treatment of Contaminated River Sediment
David J. Conboy, B. Thomas Kenna, Judith Leithner, Stephen Yaksich, and Daniel Averett .................................................. 474

DREDGING MANAGEMENT A
Chair: Robert H. Campbell

Management of Dredged Material Disposal for San Francisco Bay Projects
Thomas H. Wakeman and Jacob Harari ..................................... 484

The Navigation Data Center and Its Role in Dredging Management
Virginia R. Pankow ................................................................ 490

Maintenance Dredging in the River Scheldt, an Environmental Approach
J. Smits, L. Meyvis, and F. Wens ............................................. 499

Dredging Equipment, Methods, and Contracts
Gregory E. Breerwood .......................................................... 509

The National Spatial Data Infrastructure and Its Usefulness to the Dredging Community
Millington Lockwood ......................................................... 516

BENEFICIAL USES OF DREDGED MATERIAL A
Chair: Jesse A. Pfeiffer, Jr.

New Applications and Practices for Beneficial Uses of Dredged Material
Mary C. Landin, Jack Fowler, and Hollis H. Allen .......................... 526

Dredged Material Used in Sand-Filled Containers for Scour and Erosion Control
Lee E. Harris .................................................................. 537

Constructing Beneficial Use Dredged Material Projects
Robert M. Parry ................................................................. 547

vi
EVALUATING ENVIRONMENTAL IMPACTS C
Chair: Michael L. Davis
Tongue Point Monitoring Program 1989–1992
Mark D. Siipola ................................................................. *

REMEDIATION OF CONTAMINATED SEDIMENTS B
Chair: David B Mathis
Evaluation of Remedial Options for the Sitcum Waterway Sediments: A Case Study
John R. Verduin, III, Garry E. Horvitz, and Richard C. Gilmur .......................... 555
Laboratory and Field Demonstrations of Sediment Treatment Technologies by the
USEPA’s Assessment and Remediation of Contaminated Sediments (ARCS) Program
Stephen Garbaciak, Jr. .............................................................................. 567
New Bedford Harbor, Massachusetts, Dredging/Disposal of PCB Contaminated Sediments
Mark J. Otis ......................................................................................... 579
"So You Want to RemEDIATE Contaminated Mud! These are Your Five Choices."
Louis J. Thibodeaux, Danny D. Reible, and Kalliat T. Valsaraj ......................... 588
Sediment Remediation: An International Review
Daniel E. Averett and Norman R. Francingues, Jr. ........................................ 596

LONG-TERM PLANNING FOR DREDGED MATERIAL PLACEMENT
Chair: Barry W. Holliday
Disposal of Contaminated Sediments in NY/NJ Harbor
Joel A. Pecchioli .................................................................................. 606
Technical Guidelines for Dredged Material
Norman R. Francingues, Jr. and Michael R. Palermo .................................. 616

BENEFICIAL USES OF DREDGED MATERIAL B
Chair: Thomas R. Patin
Beneficial Uses of Dredged Material: Part of the Solution to Restoration of Louisiana’s
Coastal Wetlands
Linda Glenboski Mathies ........................................................................... 626
Beneficial Uses of Dredged Material Principles and Practice
T. Neville Burt and Michael P. Dearnaley .................................................. 631
Progress in England and Wales on the Development of Beneficial Uses of
Dredged Material
Lindsay Murray ..................................................................................... 644
Beneficial Uses of Dredged Material on the Upper Great Lakes
Douglas J. Zande and M. Pamela Horner .................................................. 654
Coal Ash and Dredged Material in Reef Construction
William B. Baker, Jr. and Richard F. Gorini .............................................. 664

TRENDS IN DREDGING EQUIPMENT A
Chair: Robert J. Hopman
Tonnes Dry Solids Reviewed
Robert C. Rullens, Kees d’Angremon, and Gerald Ottevanger .................... 673
One Man’s View of Dredging Equipment in 2020
Gerald E. Greener .................................................................................. 683
Developments in Dredges during the Last Decade
Ruud Ouwerkerk and Hans Greve ......................................................... 690
The Stump—A New Dimension in Dredging
George W. Batchelder ............................................................................ 701

*Manuscript not available at time of printing.
A Modern Electric Step-gauge for Accurate Wave and Tide Measurement
Harmen C. Botma and John B. Leenhouts ........................................... 708

TESTING AND DISPOSAL OF CONTAMINATED SEDIMENTS
Chair: Robert M. Engler

TBP Revisited: A Ten Year Perspective on a Screening Test for Dredged Sediment
Bioaccumulation Potential
Victor A. McFarland and Paul W. Ferguson ........................................ 718
Quality Assurance and Quality Control in Laboratory Bioassays of Dredged Material
David W. Moore .................................................................................. 728
Leachate Testing and Evaluation for Freshwater Sediments
James M. Brannon and Tommy E. Myers ............................................ 737
Evaluating Methods for Statistical Analysis of Less Than Detection Limit Data Using Simulated Small Samples 2. General Results
Joan U. Clarke ..................................................................................... 747

DREDGING AUTOMATION AND MONITORING
Chair: Ancil Taylor

Silent Inspector System—An Aid to Dredge Inspection
James Rosati, III and Timothy L. Welp ............................................... 756
An Update on Dredge Instrumentation and Automation
Arie Korevaar .................................................................................... 764
Application of Dredge Monitoring Systems to Dredge Contract Administration
Quality Assurance
Stephen E. Scott and Jeffrey D. Jorgeson ........................................... 776
The December 1992 Storm at the New York Mud Dump Site
Scott McDowell, Brian May, and Douglas Pabst .................................. 786

BENEFICIAL USES OF DREDGED MATERIAL C
Chair: Richard F. Gorini

Do We Need More Waterbird Nesting Islands in Galveston Bay, Texas? (and if so, how and where do we build them?)
Phil Glass ........................................................................................... 796
Developing Design Parameters for Constructing Ecologically Functional Marshes Using Dredged Material in Galveston Bay, Texas
Lawrence P. Rozas and Roger J. Zimmerman ....................................... 810
Habitat Considerations: Galveston Bay Demonstration Marsh
Andrew V. Sipocz .............................................................................. 823
Planting of Large-Scale Marsh Projects
Eddie Seidensticker ............................................................................ 828
Plans, Design, and Construction of a 100-hectare Intertidal Demonstration Marsh using Large-Scale Cutter Head Dredging Equipment in Galveston Bay, Texas
Keith P. Kindle .................................................................................. 833
Evolution of Beneficial Uses of Dredged Materials for over 200 Million Cubic Yards of Dredged Material in Galveston Bay, Texas: Part II—Framework and Approach
Michael P. Jansky ............................................................................... 843

TRENDS IN DREDGING EQUIPMENT B
Chair: Bill Pagendarm

Water Injection Dredging in the United States
David Knox, Daniel J. Krumholz, and James E. Clausner ...................... 847
A Sea Turtle Deflecting Hopper Dredge Draghead
Michael P. Alexander and Glynn E. Banks ......................................... 857
On the Snow-Plough Effect when Cutting Water Saturated Sand with Inclined Straight Blades
S.A. Miedema ................................................................. 865

Comparison of Two Eductors for Sand Bypassing
Gregory L. Williams and James E. Clausner .............................. 875

DREDGING EQUIPMENT FOR CONTAMINATED SEDIMENT REMOVAL
Chair: Hannon Harriston

Demonstration of Equipment for Dredging Contaminated Sediments at Buffalo River, Buffalo, New York
B. Thomas Kenna, Stephen M. Yaksich, Daniel E. Averett, and Paul A. Zappi ...... 885

Monitoring of Water Injection Dredging, Dredging Polluted Sediment
William G. Borst, Joh. G.S. Pennekamp, H. Goossens, A. Mullié, P. Verpalen,
T. Arts, P.F. Van Dreumel, and W.D. Rokosch .................................. 896

Harbor Spill Cleanup Using Specialized Dredging
Robert G. Hornsby, Rick Martinek, and Steve Marwitz ........................ 896

CASE STUDIES A
Chair: Peter A. J. Hamburger

History of Entrance Channel Dredging and Disposal Operations: St. Marys,
Georgia/Florida
Joan Pope, J. Bailey Smith and Laurel T. Gorman ........................... 906

Dredged Material Dispersion from the Vicinity of a Pipeline Discharge,
Tylers Beach, Virginia
Allen Teeter ............................................................................. 918

ENVIRONMENTAL RESTORATION, ENHANCEMENT AND MANAGEMENT B
Chair: William L. Klesch

Habitat Restoration Using Dredged Material: The Sonoma Baylands Wetland
Demonstration Project
Scott P. Miner ........................................................................... 928

Habitat Value of Offshore Dredged Material Berms for Fishery Resources
Douglas Clarke and Richard Kasul .................................................. 938

Construction of Intertidal Mudflats as a Beneficial Use of Dredged Material
Gary L. Ray, Douglas G. Clarke, T. Pace Wilber, and Thomas J. Fredette ........ 946

Guidance for Wetland Restoration Using Dredged Material
Michael R. Palermo and Elba A. Dardeau, Jr. .................................... 956

SPECIAL DREDGING PROJECTS A
Chair: Robert E. Randall

Underwater Cleanup of a Pool of Liquid Creosote
Bruce G. Bennett and I. K. Hillb .................................................. 961

Port Authority’s Role in Inlet Management and Beneficial Use of Dredged Material
Malcolm E. McLouth and Joseph Lapolla and Kevin Bodge ...................... 971

Pilot-Scale Demonstration of Sediment Washing
Jim E. Galloway and Frank L. Snitz ............................................. 981

Cleanup of a Coal Tar Deposit Using a Vacuum Clam
Bruce G. Bennett, I.K. Hill, and A.Z. Erzinclioglu .............................. 991

*Manuscript not available at time of printing.
EFFECTIVENESS OF CAPPING FOR CONTAMINANT ISOLATION

Chair: Louis J. Thibodeaux

Capping Contaminated Sediments—The Theoretical Basis and Laboratory Experimental Evidence for Chemical Containment

Louis J. Thibodeaux, Kalliat T. Valsaraj, and Danny D. Reible .......................... 1001

Chemical Flux of Pore Water Through Sediment Caps

Peggy Murray, Drew Carey, and Thomas J. Fredette ........................................... 1008

Restoration and Capping of Contaminated Sediments

Carl E. Stivers and Robert Sullivan ................................................................. 1017

Dioxin Capping Management and Monitoring Program: Design and Implementation

Brian May, Douglas Pabst, and Scott McDowell .............................................. 1027

DREDGING MANAGEMENT B

Chair: Charles W. Hummer

Basic Considerations on Reconstruction of Volga-Caspian Canal

L.M. Dobrov and V.P. Kudlaenko ................................................................. *

Five Year Implementation Retrospective on the Puget Sound Dredged Disposal Analysis Program (PSDDA)

David R. Kendall, David F. Fox, Stephanie Stirling, Maria Peeler, Gene Revelas,
Phillip Hertzog, Justine Barton, and John Malek .................................................. 1527

Dredging of Fishing Harbour, Walvis Bay

Keith Mackie ........................................................................................................... 1037

CANADIAN EXPERIENCE WITH CONTAMINATED SEDIMENTS

Chair: Ian Orchard

Demonstration of Pheuma Dredging Technology

Giovanni Faldi and Timothy L. Gahring ................................................................. 1047

Evolution of Cable Arm Clamshell Bucket

Jean-Pierre Pelletier, Roger Santiago, and John Lajeunesse .................................. 1050

The Welland River Dredging Demonstration

Philip Miles and Donald Marr .................................................................................. 1061

In Situ Sediment Treatment of Dofasco Boatslip, Hamilton Harbour

Tom Murphy, Henry Brouwer, and Jay Babin ....................................................... 1071

PROJECT DESIGN CONSIDERATIONS

Chair: John M. Pisani

Navigation Channel Design Using Real-Time Marine Simulator

Dennis W. Webb ........................................................................................................ 1081

Study for Deepening of the Martin Garcia Channels at Rio De Le Plata, Uruguay

David W. Yang and J. Bonasia ................................................................................ 1091

Use of Abandoned Pipeline to Transport Sediment to Marshes

Charles H. Coates, Jr. ............................................................................................ 1101

OPERATIONAL ASPECTS OF CAPPING

Chair: James E. Clausner

Placement Techniques for Capping Contaminated Sediments

Michael R. Palermo .................................................................................................. 1111

Eagle Harbor Superfund Project

Eric E. Nelson, Amy L. Vanderheiden and A. David Schuldt .................................. 1122

Physical Design Aspects of Capping Projects

James E. Clausner ...................................................................................................... 1132

*Manuscript not available at time of printing.
Disposal Site Capping Management: New Haven Harbor
Thomas J. Fredette .......................................................... 1142

Numerical Modeling of Salt Transport at a Solid Waste Disposal Site Capped with Coastal Dredged Material
Ram Krishnamohan, John B. Herbich, and Fred S. Williams ......................... 1152

DREDGED MATERIAL MOVEMENT IN AQUATIC SYSTEMS
Chair: Gregory L. Hartman

Assessing the Fate of Dredged Sediments Placed in Open-Water Sites, Northern Chesapeake Bay
Jeffrey Halka, William Panageotou, Lawrence Sanford, and Shenn-Yu Chou ........ 1162

Dredged Material Accumulation at a Dispersive Disposal Site
Mary Baker Wiley, Drew Carey, Thomas J. Fredette, and W.F. Bohlen ............... 1172

Performance of Nearshore Berm Disposal at Port Canaveral, FL
Kevin R. Bridge ............................................................. 1182

New Techniques for Experimental Studies of Dredged Material Dispersion
Philip J.W. Roberts, Adrian Ferrier, and Billy H. Johnson ......................... 1192

CONTAMINATED SEDIMENTS: MARATHON BATTERY CASE STUDY
Chair: Norman R. Francingues

Preparation of Bid Document for Dredging/Excavating Contaminated Sediments, Soils and Marsh Deposits at the Marathon Battery Superfund Site, Cold Spring, NY
Thomas M. Simmons, Gregory P. Matthews, and Nick Multari ......................... 1201

Marathon Battery Superfund Project—A Review of Design, Construction and Lessons Learned
Michael P. Taylor, Pamela N. Tames, and Alan R. Elia .................................. 1210

Development of an Excavation Plan for Heavy Metal Contaminated Marsh Deposits
John J. Nocera and Thomas M. Simmons ................................................ 1220

Design of Dredge Containment and Dewatering Facilities
John M. Logigian, Edward A. Dudek, Jr., and Michael R. Palermo .................. 1230

Delineating Limits of Remediation for Heavy Metal Contaminated Sediments in River and Cove Areas
Gregory P. Matthews, and Thomas M. Simmons ........................................... 1240

CONFINED DISPOSAL FACILITIES: PLANNING AND DESIGN
Chair: Jan Miller

Design/Construction of a CFD Over Dredged Sludge
Jeffrey D. Horsfall and Katherine E. Martin ............................................ 1250

Nearshore Confined Disposal in a Tidally-Influenced Environment—Design and Operation Experience in Puget Sound
Douglas A. Hotchkiss and Charles D. Boatman ........................................... 1260

Kerch Straight Waterway Dredging and Environmental Issues
Ya M. Lang, V.A. Alekseev, and A.P. Tyurin ............................................ *

NEW YORK DISTRICT CAPPING CASE STUDIES
Chair: Monte Greges

Dioxin Capping Project at the NY Mud Dump Site
Scott McDowell, Brian May, and Douglas Pabst ....................................... 1270

Ocean Disposal with Capping of Dioxin Contaminated Sediment: New York Case History #1
Monte Greges ................................................................. 1278

*Manuscript not available at time of printing.
Subbottom Profiling of a Sand Capped Disposal Mound
   Peggy Murray, Mary Wiley, Douglas Pabst, and Brian May ...................... 1285
Modeling of Cap Placement at the New York Mud Dump Site
   Robert E. Randall, James E. Clausner, and Billy H. Johnson .................. 1295

ECONOMICS OF DREDGING PROJECTS
   Chair: Mark Sickles

Dredging in 3D—Delays, Damages and Disputes
   Frank McDonough, Patrick A. McGeehin, and Steven Kmieciak .................. 1305
Monitoring Performance Indicators on Leased Hydraulic Cutterhead Dredges
   William R. Chapman, III ......................................................... 1315
Comparing Dredging Costs Across Projects
   Gerald E. Greener and Gregory L. Hartman ...................................... 1325
Dredging Research Program Economic Benefits Study
   Fletcher H. Griffis, Sotiris Pagdadis, Charles E. Jettmar, and Russell K. Tillman ... 1335

EVALUATING ENVIRONMENTAL IMPACTS A
   Chair: Kenneth S. Kamlett

SCREENER—An Expert System Tool for Environmental Impacts Evaluation
and Mitigation
   P. Nathan Daniel ................................................................. 1355
Monitoring and Environmental Impact Assessment of Dredging Operations
Including Water Monitoring of a Dredging Operation Using Innovative Sediment
Tracing Techniques
   Jonathan Marsh ................................................................. 1360
Integrated Environmental Monitoring Dredging Projects in the Netherlands
   Thomas Arts, and Andre Kok ................................................... 1370

CONFINED DISPOSAL FACILITIES: MANAGEMENT
   Chair: R. David Curfman

Dredged Material Disposal and Migratory Birds
   Les E. Weigum ........................................................................... 1380
Port of Tacoma Milwaukee Waterway Nearshore Fill Design
   John R. Verduin, III, Garry E. Horvitz, and Doug Saathoff .................... 1388
Dewatering and Crust Management of Confined Disposal Areas in Galveston Bay, TX
   Richard F. Thomas ................................................................. 1400

CASE STUDIES B
   Chair: Duwayne A. Koch

Poplar Island Reclamation and Beneficial Uses of Dredged Material
   Edward T. Fulford ................................................................. 1406
Wando Terminal Ground Improvement Program
   James Drew Hussin and Forrest Foshee ............................................. 1416
Dredging in the Bering Sea, St. George Island 1993–94 Harbor Dredging Project
   William J. Gerken and Jeffrey F. Gilman ....................................... 1426
Phased and Layered Sampling for Navy Dredging
   Sherry L. Ashbaugh ................................................................. 1436

ENVIRONMENTAL RESTORATION, ENHANCEMENT AND MANAGEMENT C
   Chair: Douglas G. Clarke

Pink Sand Verbena Recovery Efforts
   Eric P. Braun and Thomas Kaye ................................................... 1441
Pot-Nets, Delaware Wetland Habitat and Beneficial Uses of Dredged Material Project
   Edward T. Fulford and Robert E. Tunnell, Jr. ...................................... 1451
Enhancing Habitat Values at an Onshore Dredge Disposal Site
Gary W. Oates, William J. Silva, and Gregory P. Mailho .......................... 1461

EVALUATING ENVIRONMENTAL IMPACTS B
Chair: John D. Lunz

Environmental Monitoring and Mitigation: Harbor Tunnel Dredging and Disposal Operations, Boston, Massachusetts
Curtis A. Meininger and Alan D. Randall ............................................. 1471

Effects from Thin-Layer Disposal of Dredged Material on Water Quality in Mississippi Sound
Susan Ivester Rees and Pace Wilber .................................................. 1481

CONFINED DISPOSAL FACILITIES: MODELING
Chair: Joseph R. Wilson

Seepage Through Dike Walls of the Chicago Confined Disposal Facility
Danny D. Reible, S.A. Savant-Malhiet, Louis J. Thibodeaux, K.T. Valsaraj, and Tommy E. Myers ..................................................... 1490

Flocculation Techniques Used for Dredging Operations
Ronald H. Church, Carl W. Smith and Bernard J. Scheiner ....................... 1497

A Predictive Hydrologic Model for Contaminant Leaching and Liner Effectiveness at Dredged Material Confined Disposal Facilities
Nadim M. Aziz, Paul R. Schroeder, and Tommy E. Myers .......................... 1507

Groundwater Model Simulation of Chemical Transport from a Nearshore Confined Sediment Disposal Facility
Michael Riley, Charles Boatman, Gopal Biswas, Robert Brockhaus, Mark Utting, and Doug Hotchkiss ............................................. 1517

Subject Index ........................................................................... 1563

Author Index ........................................................................... 1569