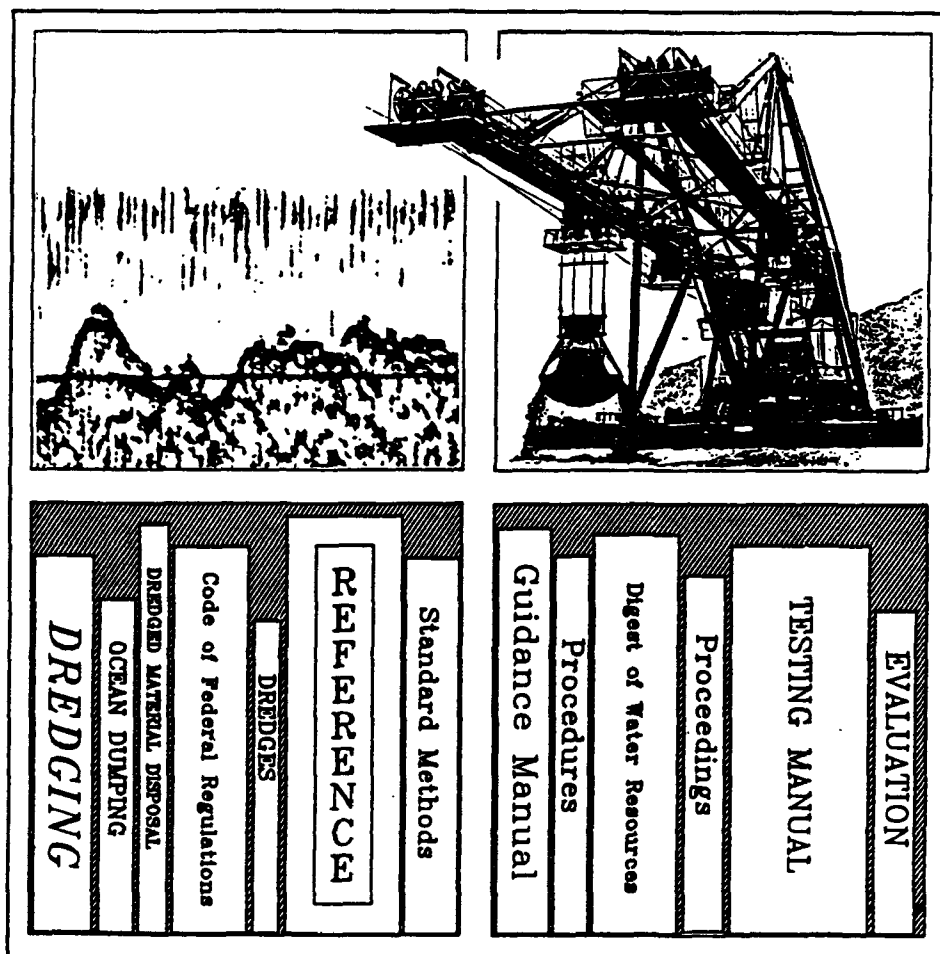


United States
Environmental Protection
Agency

Office of Water
(WH-556F)

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Dredged Material Ocean Dumping Reference Document



U.S. Environmental Protection Agency



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EXECUTIVE SUMMARY

This document provides a useful, easy-to-access, annotated bibliography of essential and secondary policy and technical documents relating to dredged material disposal. A statutory and regulatory overview is presented for background information on dredged material disposal.

The essential policy documents that are annotated in this document include *EPA and U.S. Army Corps of Engineers (USACE) ocean disposal-related regulations located at Title 40 Code of Federal Regulations, Parts 220-229 (40 CFR 220-229) and 33 CFR 320-330 & 335-338, respectively; Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual (EPA/USACE, 1991).*

The essential technical documents that are annotated in this document include *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites (Pequegnat et al., 1990); Guidance for Performing Tests on Dredged Material To Be Disposed in Ocean Waters (USACE/EPA, 1984); Characteristics and Effects of Dredged Material Disposal in the Marine Environment (EPA, 1989).*

This reference document, including one copy of each essential document, will be distributed to the EPA Headquarters (Headquarters will also receive one copy of each secondary document) and EPA Regional Ocean Dumping Coordinators. Copies of secondary documents must be requested. Requests for copies should be directed to Ms. Susan Hitch [Mail Stop WH-556F, Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; (202) 260-9178.]

PURPOSE AND DISTRIBUTION OF THE REFERENCE DOCUMENT

The purpose of this document is to compile an annotated bibliography of essential and secondary policy and technical dredged material reference documents that can be cited by EPA Headquarters and Regional personnel. This document is not a formal bibliography of documents, but a quick reference guide to documents that may be of interest. Therefore documents are referenced by title or subject and not by author.

Classification of the documents into essential and secondary categories will allow EPA personnel to quickly identify documents that may contain general (essential) or site-/case-specific (secondary) policy and technical issues. EPA Regional Ocean Dumping Coordinators were interviewed by telephone to determine which policy and technical documents they considered as essential and secondary references to dredged material disposal. The classification of documents herein was recommended by those interviewed. Some documents appear as both policy and technical documents because they were classified as both by interviewees.

The reference document will be distributed to

- EPA Headquarters — One copy each of the reference document and the complete associated reference library (essential and secondary documents)
- EPA Regional Ocean Dumping Coordinators — One copy each of the reference document and the associated reference library of essential documents
- EPA Regional Ocean Dumping Coordinators, upon request — One copy of the associated reference library of secondary documents

EPA Regional personnel may contact Ms. Susan Hitch [Mail Stop WH-556F, Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460; (202) 260-9178] to request one copy of the reference document and one copy of the secondary documents of the associated reference library.

STATUTORY AND REGULATORY OVERVIEW

PRINCIPAL STATUTES GOVERNING DREDGED MATERIAL DISPOSAL

Ocean disposal of dredged material is regulated primarily by two statutes [Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA) and the National Environmental Policy Act (NEPA)] and an international agreement [Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention)]. For a discussion of the relevant statutes impacting ocean dumping, see Section 1 of the *Ocean Dumping Site Delegation Handbook for Dredged Material* (see page E6). The MPRSA (particularly Section 103), which is the primary statute, governs dredged material disposal in coastal waters. The MPRSA regulates transportation and dumping of wastes in the ocean waters (Title I), establishes requirements for monitoring and research (Title II), and establishes the Marine Sanctuary Program (Title III, administered by the National Oceanic and Atmospheric Administration). The review and issuance of permits is included under Title I.

NEPA requires the preparation of an environmental impact statement (EIS) for major Federal actions (e.g., Civil Works projects, legislation, and permits to private entities) that significantly affect the quality of the human environment. Although generally not required to prepare EISs for its environmentally protective actions, EPA has instituted a voluntary policy under which it prepares EISs for ocean dumping site designations. The United States Army Corps of Engineers (USACE) is subject to NEPA's EIS provisions when conducting Federal navigation projects or issuing permits.

The London Dumping Convention (LDC), to which the United States is a signatory, is the global agreement that regulates ocean dumping. The United States implements the LDC through the MPRSA. The ultimate objective of the LDC is to protect the oceanic environment from harmful effects of dumping activities. The LDC requires that available disposal options be evaluated prior to issuing permits for ocean disposal. The LDC regulates ocean disposal by means of several Annexes: Annex I lists certain substances whose disposal in the ocean is generally forbidden; Annex II lists substances that require special care for ocean disposal; Annex III lays out factors and criteria to be addressed in making permit decisions for ocean disposal.

REGULATION OF DREDGED MATERIAL DISPOSAL

Several Federal agencies are responsible for the various statutory requirements of Title I of the MPRSA, including the Environmental Protection Agency (EPA), the United States Army Corps of Engineers (USACE), and the United States Coast Guard (USCG). Each agency has specific responsibilities.

- **EPA develops Ocean Dumping Criteria**

Section 102 of the MPRSA requires EPA to develop criteria for use in reviewing permit applications for proposed ocean disposal activities. These criteria have been promulgated as regulations in 40 CFR 220-228 and are referred to as the Ocean Dumping Criteria. EPA is the permit-issuing authority for all material, except dredged material.

- **USACE issues permits for dredged material ocean disposal, subject to EPA review**

Section 103 of the MPRSA assigns to the USACE the responsibility for authorizing the ocean disposal of dredged material. In evaluating proposed ocean disposal activities, the USACE is required to apply the criteria developed by EPA relating to the effects of the disposal activity. In addition, in reviewing proposed disposal, the USACE is required to consider navigational, economic, and industrial development, and foreign and domestic commerce, as well as the availability of alternatives to ocean disposal. EPA has a major environmental oversight role in reviewing the USACE determination of compliance with the ocean disposal criteria relating to the effects of proposed disposal. If EPA determines that the ocean disposal criteria have not been met, disposal may not occur without a waiver of the criteria by EPA.

- **EPA designates ocean disposal sites**

The designation of ocean disposal sites for all materials is the responsibility of EPA. In the case of dredged material disposal sites, EPA designates sites in consultation with the USACE. Sites are designated by promulgation of a rule in 40 CFR Part 228. The USACE can specify the use of a site under MPRSA Section 103, if no feasible EPA-designated sites are available.

- **EPA assesses civil administration penalties for violations of the MPRSA**

The MPRSA Section 105 assigns EPA the responsibility for assessing civil administrative penalties for violation of MPRSA. The USCG is directed to conduct surveillance. As the dredged material permitting authority, the USACE regulation also provides (33 CFR 326) that the District Engineers will inspect activities conducted under their permits.

ANNOTATED BIBLIOGRAPHY OF ESSENTIAL AND SECONDARY DOCUMENTS

DOCUMENT DIRECTORY

E: Essential Documents section. S: Secondary Documents section.

A

- E10 *Annual Book of ASTM Standards. Section 11: Water and Environmental Technology*
S8 *Aquatic Dredged Material Disposal Impacts*

B

- S8 *Beneficial Uses of Dredged Material. Proceedings of the Gulf Coast Regional Workshop, 26-28 April 1988, Galveston, TX*

C

- E11, S1 *Characteristics and Effects of Dredged Material Disposal in the Marine Environment*
S2 *Coastal Zone Management Act Consistency Provisions and Designation of Ocean Dumping Sites under Section 102(c) of Ocean Dumping Act*
S9 *Contaminated Marine Sediments — Assessment and Remediation*

D

- E1 *Digest of Water Resource Policies and Authorities*

E

- E2, E12 *Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual (The "Green Book")*
S11 *Environmental Effects of Dredging Technical Notes*
E1 *Environmental Impact Statements — Procedure for the Voluntary Preparation*

G

- S23 S11 *General Approach to Designation Studies for Ocean Dredged Material Disposal Sites*
E14 *Guidance for Performing Tests on Dredged Material To Be Disposed of in Ocean Waters*
S12 *Guidelines for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites*

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I

- S13** *Inland Waterways: Proceedings of a National Workshop on the Beneficial Uses of Dredged Material*
- E14** *Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants*

M

- S15** *Managing Troubled Waters: The Role of Marine Environmental Monitoring*
- S3-S6** MOU
- S6** MOU on Management of Ocean Dredged Material Disposal Sites

N

- E3** Navigation
- E4** NEPA Regulations

O

- E5** Ocean Dumping
- E6** *Ocean Dumping Site Designation Delegation Handbook for Dredged Material*
- E7** Operations, Maintenance, and Project Management
- E7** Operation and Maintenance of Civil Works Projects

P

- E15** *Procedures for Handling and Chemical Analysis of Sediment and Water Samples*
- S15** Puget Sound Dredged Disposal Analysis (PSDDA) Reports

Q

- E16** *Quality Assurance/Quality Control (QA/QC) for 301(h) Monitoring Programs: Guidance on Field and Laboratory Methods*
- S17** *Quality Criteria for Water*

R

- E8** Regulatory Programs — Permitting
- E17, S6** *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites*
- S17** *Revised Section 301(h) Technical Support Document*

S

- S20** Specifications of a Model Ocean Disposal Site for Dredged Material
- E18** *Standard Methods for the Examination of Water and Waste Water*
- S18** *Selected Tools and Techniques for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites*

W

S20 *Workbook/Users Manual for Prediction of Instantaneously Dumped Dredged Material*

Y

S21 Yaquina Bay Interim Ocean Dredged Material Disposal Site Evaluation Study

Part 1

ESSENTIAL DOCUMENTS

The following documents have been categorized as the most comprehensive references for policy and technical issues. Italicized titles denote documents classified as "published."

ESSENTIAL DOCUMENTS — POLICY

01. *Digest of Water Resource Policies and Authorities*

1989 U.S. Army Corps of Engineers. Washington, DC. EP 1165-2-1. 261 pp. + appendices.

Keywords Dredged material; dredged material disposal

This document is a digest of the existing administrative and legislative water- resources policies and authorities pertinent to the civil works activities of the U.S. Army Corps of Engineers (USACE). The policies and authorities apply to all USACE Headquarters elements and all field operating activities with civil-works responsibilities. This document was developed as a quick reference to policies distributed throughout numerous engineering regulations, manuals, technical letters, and memoranda. These documents are cited in each chapter and should be consulted for specific application in individual cases. In addition, this document will be of value in orienting and familiarizing newly assigned personnel, military and civilian, with essential policies regarding the USACE civil-works activities.

02. Environmental Impact Statements

Procedure for the Voluntary Preparation

1974 *Federal Register*, National Archives and Records Administration. Vol. 39, No. 204, October 21, 1974. Office of the Federal Register, Washington, DC. 4 pp.

Keywords Regulatory action; Environmental Impact Statement (EIS)

This notice states EPA's policy of preparing an Environmental Impact Statement for all ocean dumping site designations. It requires that an EIS be prepared concurrently with required documentation for the rulemaking actions. EPA believes that the preparation of an EIS will benefit the proposed rulemaking actions. The appropriate content for an EIS is given.

03. *Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual*
(The “Green Book”)

- 1991 U.S. Environmental Protection Agency/U.S. Army Corps of Engineers. Environmental Protection Agency, Office of Marine and Estuarine Protection, and Department of the Army, United States Army Corps of Engineers. Washington, DC. 216 pp. + appendices.

Keywords Dredged material; dredged material disposal

Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), Public Law (Pub.L.) 92-532, specifies that all proposed operations involving the transportation and dumping of dredged material into ocean waters must be evaluated to determine the potential environmental impact of such activities.

The primary intent of the MPRSA Section 103 of Pub.L. 92-532 (33 U.S.C. 1401 *et seq.*) is to regulate and prevent any significant adverse ecological effects of ocean dumping. Consequently, the regulations emphasize evaluative techniques, such as bioassays, physical and chemical tests, and bioaccumulation tests, that provide estimates of the potential for environmental impact.

Section 103 regulations specify that a technical implementation manual for the criteria applicable to dredged material be developed jointly by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE). In response to this regulation, this manual was developed jointly by the EPA and USACE in 1977 and was revised in 1991. The manual attempts to provide a balance between technical state-of-the-art and routinely implemented guidance for using the evaluative procedures specified in the regulations. Guidance is included on the appropriate uses and limitations of the various procedures and on sound interpretation of the results. Its structure follows the general order of test application and general priority of importance of testing and evaluation procedures presented in the regulations.

This manual contains summaries and discussions of the procedures for ecological evaluation of dredged material required by the regulations, tests to implement them, definitions, sample collection and preservation procedures, evaluative procedures, calculations, interpretative guidance, and supporting references required for the evaluation of permit applications in accordance with the regulations. It is imperative that the supporting references cited in each appendix be consulted for detailed or more comprehensive guidance whenever indicated. Before any evaluations are begun, the regulations and this manual should be read in their entirety, and citations and references listed with the appendices should be consulted to obtain a complete understanding of the guidance that the manual provides. The technical procedures in this manual were designed only for dredged material disposal and should not be utilized for any other materials unless definitive research demonstrates their applicability.

Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual
(The “Green Book”) (continued)

This version of the implementation manual contains evaluative procedures that are considered to be acceptable regulatory tools for most situations, although more sophisticated and complex biological evaluations may be warranted under special circumstances. However, variations in these procedures should be allowed only when the EPA Regional Administrator and the USACE District Engineer are able to justify and defend the technical validity of such variations. The field of ecological evaluation is a dynamic one, with new regulatory procedures continually being developed. As new procedures are developed, this manual will be revised periodically.

Although, this manual provides the most complete available technical guidance on implementing the criteria, technical evaluations represent only a portion of the input to the decision-making process. Many of the criteria do not concern subjects amenable to quantitative evaluation. In such cases objective, qualitative decisions must be made. The criteria do not prohibit environmental change but rather “unacceptable environmental impact.” Consequently, for each permit application, the EPA Regional Administrator and the USACE District Engineer must decide how much potential impact is acceptable under the environmental, economic, social, and political conditions related to the operation in question. This manual is applicable to all activities involving the transportation of dredged material for the purpose of ocean disposal outside the baseline from which the territorial sea is measured.

04. Navigation

1989 Chapter 12 in *Digest of Water Resource Policies and Authorities*. U.S. Army Corps of Engineers. Washington, DC. EP 1165-2-1. 23 pp.

Keywords Navigation; navigable waters

Topics discussed in Chapter 12 include

- Federal interest in navigation
- Definition of “navigable waters of the United States”
- Benefit evaluation procedures relevant to navigation projects
- Evaluation of inland waterway systems
- Evaluation of other waterways and harbors
- Cost-sharing and local cooperation for navigation
- Navigation project for general versus restricted interest
- Transfer and lighter facilities, barge staging areas
- Ownership of lands created for port facilities
- Development of public port or industrial facilities

Navigation (*continued*)

- Aids to navigation
- Waterway user charges
- Waterborne commerce data
- Navigation regulations
- Wreck removal
- Drift and debris removal
- Danger zones
- Charts, publications, and notices
- Channel condition surveys
- Project dimensions
- Dredged material disposal
- Disposal of materials on beaches
- Advanced maintenance dredging
- Lock and dam replacements
- Correction of Federal navigation project-induced shore damage
- Federal project development by others

05. NEPA Regulations

1990 *NEPA Regulations*, National Archives and Records Administration. Chapter 5: Council on Environmental Quality. 40 CFR: Parts 1500-1508. Office of the Federal Register, Washington, DC. Pp. 655-685.

Keywords CEQ; NEPA; EIS

This chapter from the *Code of Federal Regulations* describes principles and criteria for the National Environmental Policy Act (NEPA). This chapter includes

- Part 1500 — Purpose, Policy, and Mandate
- Part 1501 — NEPA and Agency Planning
- Part 1502 — Environmental Impact Statement
- Part 1503 — Commenting
- Part 1504 — Predecision Referrals to the Council of Proposed Federal Actions Determined To Be Environmentally Unsatisfactory
- Part 1505 — NEPA and Agency Decision Making
- Part 1506 — Other Requirements of NEPA
- Part 1507 — Agency Compliance
- Part 1508 — Terminology and Index

06. Ocean Dumping

- 1990 *Code of Federal Regulations*, National Archives and Records Administration. Subchapter H in Chapter 1: Environmental Protection Agency (cont.). 40 CFR: Parts 220-229. Office of the Federal Register, Washington, DC. Pp. 145-196.

Keywords Regulations; ocean dumping; EPA Ocean Dumping Regulations

This subchapter from the *Code of Federal Regulations* describes principles and criteria for the issuance of permits by the U.S. Environmental Protection Agency for ocean disposal under Section 102 of the Marine Protection, Research, and Sanctuaries Act of 1972. It describes criteria to be applied by the U.S. Army Corps of Engineers in their review of activities involving transporting dredged material to the ocean for the sole purpose of disposal.

Contents of Title 40 CFR Parts 220-229 — Ocean Dumping

- Part 220 **General**
Purpose and scope; definitions; categories of permits; authority to issue permits.
- Part 221 **Application for Ocean Dumping Permits Under Section 102 of the Act**
Application for permits; adequacy of information; fees; *not applicable to dredged material disposal*.
- Part 222 **Action on Ocean Dumping Permit Applications Under Section 102 of the Act**
Tentative determinations; notice of applications; hearings; recommendations; issuance of permits; appeals; *not applicable to dredged material disposal*.
- Part 223 **Contents of Permits; Revision, Revocation, or Limitation of Ocean Dumping Permits Under Section 104d of the Act**
Content of various permits; revising, revoking, or limiting permits, hearings; *not applicable to dredged material disposal*.
- Part 224 **Records and Reports Required of Ocean Dumping Permittees Under Section 102 of the Act**
Records to maintain; reports to file; *not applicable to dredged material disposal*.
- Part 225 **Corps of Engineers Dredged Material Permits**
Review of dredged material permits; procedure for economic impact; waivers.
- Part 227 **Criteria for Evaluation of Permit Applications for Ocean Dumping of Materials**
Criteria for evaluating environmental impacts; criteria for evaluating the need for ocean dumping and alternatives; impacts on aesthetics, recreation, and economics; impact on other ocean uses; requirement for interim permits; *Only subparts A, B (§§ 227.4, 227.5, 227.6, 227.9, 227.10, and 227.13), C, D, E, and G apply to dredged material disposal*.

Contents of Title 40 CFR Parts 220-229 - Ocean Dumping (continued)

- Part 228 Criteria for the Management of Disposal Site for Ocean Dumping**
Site-management responsibilities; procedures for designating site; criteria for selection of sites; times and rates of disposal; monitoring; evaluating impacts; modification of site use; delegation of authority for interim sites; baseline and trend assessment surveys; *applicable to dredged material only as specified in § 228.4(e), 228.9, 228.12. Sections 228.5 and 228.6(a) applicable by reference.*
- Part 229 General Permits**
Burial at sea; transportation of vessels and disposal of vessels; *not applicable to dredged material disposal.*

07. *Ocean Dumping Site Designation Delegation Handbook for Dredged Material*

- 1986** Prepared by Science Applications International Corporation under contract to Battelle Ocean Sciences and Technology Department for U.S. Environmental Protection Agency Office of Marine and Estuarine Protection. Washington, DC. 199 pp.

Keywords Site designation; dredged material; disposal-site management

The purpose of this handbook is to assist EPA and the U.S. Army Corps of Engineers (USACE) in their joint responsibilities relative to dredged material ocean disposal site designation. The handbook presents statutes and regulations relative to ocean dumping, including the Marine Protection, Research, and Sanctuaries Act of 1972 and other Federal laws. It is suggested that this handbook be used as a guide to related documents because it summarizes current literature, documents, and agency policies pertinent to dredged material site designation and management. The administration of the site-designation process includes a sequence of 12 steps, commencing with a request for designation of a site and terminating with the dedesignation of a site. The sequence of all but two steps is fixed. An overview of the technical aspects of the site-designation process is given, including ocean disposal processes and aspects and sources of information and guidance for developing environmental impact statements. The development of a dredged material disposal-site management strategy should include several factors that consider the character of the dredged material and the disposal site (i.e., size, location, and biological, chemical, and physical conditions.). The applicability of this handbook, and any document referenced within, should be determined for each individual dredging project.

08. Operations, Maintenance, and Project Management

- 1989 Chapter 11 in *Digest of Water Resource Policies and Authorities*. U.S. Army Corps of Engineers. Washington, DC. EP 1165-2-1. 12 pp.

Keywords Dredged material; dredged material disposal; project management

Topics discussed in Chapter 11 include

- Resource management of project lands and facilities
- Responsibility for operation, maintenance replacement and rehabilitation (OMRR)
- Major rehabilitation
- Correction of design or construction deficiencies
- Dam operations management
- Dam safety assurance
- Changes in water-control plans
- Mitigation of damages resulting from construction and operation of project
- Granting use of civil works project real estate
- Disposal of civil works project real estate
- Pest management programs
- Acceptance of donations of materials
- Discontinuation of maintenance of projects
- Monitoring coastal projects
- Energy conservation

09. Operation and Maintenance of Civil Works Projects

- 1988 *Code of Federal Regulations*, National Archives and Records Administration. 33 CFR: Parts 335-338. Office of the Federal Register, Washington, DC. 18 pp.

Keywords Regulations; dredged material; dredged material disposal; dredging; USACE Regulations

These parts of the *Code of Federal Regulations* (CFR) focus on four topics relative to the U.S. Army Corps of Engineers (USACE) and dredged material.

- “Operation and maintenance of [USACE] civil works projects involving the discharge of dredged or fill material into waters of the United States or ocean waters” (Part 335)
- “Factors to be considered in the evaluation of [USACE] dredging projects involving discharge of dredged material into waters of the United States and ocean waters” (Part 336)
- “Practice and procedure,” which applies to all operation and maintenance activities (Part 337)

Operation and Maintenance of Civil Works Projects (*continued*)

- “Other [USACE] activities involving the discharge of dredged material or fill into waters of the United States” (Part 338)

10. Regulatory Programs — Permitting

1986 *Code of Federal Regulations*, National Archives and Records Administration. 33 CFR: Parts 320-330. Office of the Federal Register, Washington DC. Pp 41206-41260.

Keywords Regulations; dredged material; dredged material disposal; permits

Parts 320-330 of the *Code of Federal Regulations* (CFR) describe the U.S. Army Corps of Engineers general regulatory policies relevant to dredged material disposal in the waters of the United States. The following topics are described.

- Issuing permits
- Evaluating other laws [e.g., Coastal Zone Management Act (Section 307), Clean Water Act (Section 401)]
- Evaluating permit applications

Contents of Title 33 CFR Parts 320-330 — Regulatory Programs of the United States Army Corps of Engineers, Final Rule

Part 320 General Regulatory Policies

Purpose and scope; authorities to issue permits; related laws; general policies for evaluating permit applications.

Part 321 Permits for Dams and Dikes in Navigable Waters of the United States

General provisions, definitions, special policies and procedures; *not applicable to ocean disposal of dredged material.*

Part 322 Permits for Structures or Work in or Affecting Navigable Waters of the United States

General provisions, definitions; activities requiring permits; activities not requiring permits; special policies; *not applicable to ocean disposal of dredged material.*

Part 323 Permits for Discharges of Dredged or Fill Material into Waters of the United States

General provisions; definitions; discharges requiring permits; discharges not requiring permits; program transfer to States; special policies and procedures.

Regulatory Programs — Permitting (*continued*)

- Part 324 Permits for Ocean Dumping of Dredged Material**
General provisions; definitions; activities requiring permits; special procedures.
- Part 325 Processing of Department of the Army Permits**
Applications for permits; processing of applications; public notice; conditioning of permits; forms of permits; duration of permits; modification, suspension, or revocation of permits; authority to issue or deny permits; authority to determine jurisdiction; publicity.
- Part 326 Enforcement**
Purpose; policy; unauthorized activities; supervision of authorized activities; legal action.
- Part 327 Public Hearings**
Purpose; applicability; definitions; general policies; presiding officer; legal advisor; representation; conduct of hearings; filing of transcript of the public hearing; authority of the presiding officer; public notice.
- Part 328 Definition of Waters of the United States**
Purpose; general scope; definitions; limits of jurisdiction; changes in limits of waters of the United States; *not applicable to ocean disposal of dredged material.*
- Part 329 Definition of Navigable Waters of the United States**
Purpose; applicability; general policies; general definitions; general scope of determination; interstate or foreign commerce; intrastate or interstate nature of waterway; improved or natural conditions of the waterbody; time at which commerce exists or determination is made; existence of obstructions; *not applicable to ocean disposal of dredged material.*
- Part 330 Nationwide Permits**
General provisions; definitions; activities occurring before certain dates; public notice; nationwide permits; management practices; notification procedures; discretionary authority; State water quality certification; Coastal zone management consistency determination; nationwide permit verification; expiration of nationwide permits.

ESSENTIAL DOCUMENTS — TECHNICAL

01. *Annual Book of ASTM Standards. Section 11: Water and Environmental Technology*

1992 Volumes 1 and 2: *Water*. American Society for Testing and Materials, Philadelphia, PA. Vol. 1: 714 pp. Vol. 2: 1022 pp.

Keywords Water; standards procedure; standard technique; test methods

These volumes, which are published annually, contain standard procedures for assessing water. Volume 1 contains 94 standards and is divided into four sections.

1. Terminology, reagents, and reporting of results
2. Sampling and flow measurements
3. General properties of water
4. Inorganic constituents

Volume 2 contains 146 standards and is divided into six sections

1. Organic constituents
2. Radioactivity
3. Saline and brackish waters, seawaters, and brines
4. Microbiological examination
5. Water-formed deposits
6. Water-treatment materials

Listed within Volume 1 are approved ASTM standards for sediment toxicology (i.e., bioassays)

- Guide for Conducting 10-Day Static Sediment Toxicity Tests with Estuarine and Marine Amphipods (E 1367-90)
- Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates (E 1383-90)
- Guide for Collection, Storage, Characterization, and Manipulation of Sediment for Toxicological Testing (E 1391-90)

The following are documents that are currently being balloted by ASTM (i.e., Guides) or drafted. They will be listed within the volume if published.

- Guide for Designing Biological Tests with Sediments
- Guide for Determination of the Bioaccumulation of Sediment-Associated Contaminants by Fish
- Guide for Determination of the Bioaccumulation of Sediment-Associated Contaminants by Benthic Invertebrates
- Guide for Conducting Sediment Toxicity Tests with Polychaetes
- Sediment Resuspension Testing Methods
- Use of Oysters and Echinoderm Larvae in Sediment Toxicity Testing

02. *Characteristics and Effects of Dredged Material Disposal in the Marine Environment*

1989 Prepared by Science Applications International Corporation for U.S. Environmental Protection Agency, Science-Policy Integration Branch, Office of Policy, Planning, and Evaluation. 74 pp.

Keywords Dredged material; dredged material disposal; marine environment

This document is a synopsis of relevant background information on dredged- material disposal to support the U.S. Environmental Protection Agency (EPA) efforts in pursuing the development of National and international ocean dumping policies. Current information from scientific literature, reports by the U.S. Army Corps of Engineers (USACE) and EPA, and other documents are compiled and summarized in three sections.

Section I contains data on the amounts and characteristics of dredged material and their predictability, important research programs on dredged material disposal, and the international aspects of dredging and disposing. At present, 250 to 450 million cubic yards of dredged material is disposed annually at more than 150 sites along the U.S. coasts; these sites are either aquatic or upland. The impact on benthic communities can be predicted, based on existing successional patterns, and the impact on fisheries can be addressed by using the Benthic Resource Assessment Technique (BRAT). Long-term, farfield assessments are much more difficult to make because the physicochemical and biological processes are very complex.

Major research programs associated with dredged material disposal are conducted by the USACE, the National Oceanic and Atmospheric Administration (NOAA), and the EPA Office of Wetlands, Oceans, and Watersheds [formerly the Office of Marine and Estuarine Protection, (OMEP)].

International data on dredging are available only on the 63 signatories (member countries) to the London Dumping Convention. The volume of dredged material in these countries comprises only a small portion of the annual worldwide estimate of 1.3 billion tons. Most of this material is disposed in nearshore waters.

Section II provides an overview of the regulatory framework. Important legislation includes the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), the Clean Water Act (CWA) of 1972, and Federal laws concerning wetlands protection.

Section III addresses a number of management and regulatory issues related to dredged material disposal, including the selection of new disposal sites, human health issues, and management aspects of monitoring programs. The tiered monitoring approach is presented as a tool for better linkage between monitoring and decision-making, and some cost estimates are provided. It was suggested that dredged material disposal should be addressed in a more integrated way than is current practice. A lack of communication was identified among agencies and institutions and between institutions and the public, which caused duplication of efforts and political conflicts.

03. *Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual*
(The “Green Book”)

- 1990 U.S. Environmental Protection Agency/U.S. Army Corps of Engineers. Environmental Protection Agency, Office of Marine and Estuarine Protection, and Department of the Army, United States Army Corps of Engineers. Washington, DC. 208 pp. + appendices.

Keywords Dredged material; dredged material disposal

Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), Public Law (Pub.L.) 92-532, specifies that all proposed operations involving the transportation and dumping of dredged material into ocean waters must be evaluated to determine the potential environmental impact of such activities.

The primary intent of the MPRSA Section 103 of Pub.L. 92-532 (33 U.S.C. 1401 *et seq.*) is to regulate and prevent any significant adverse ecological effects of ocean dumping. Consequently, the regulations emphasize evaluative techniques, such as bioassays, physical and chemical tests, and bioaccumulation tests, that provide estimates of the potential for environmental impact.

Section 103 regulations specify that a technical implementation manual for the criteria applicable to dredged material be developed jointly by the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE). In response to this regulation, this manual was developed jointly by the EPA and USACE in 1977 and was revised in 1991. The manual attempts to provide a balance between technical state-of-the-art and routinely implemented guidance for using the evaluative procedures specified in the regulations. Guidance is included on the appropriate uses and limitations of the various procedures and on sound interpretation of the results. Its structure follows the general order of test application and general priority of importance of testing and evaluation procedures presented in the regulations.

This manual contains summaries and discussions of the procedures for ecological evaluation of dredged material required by the regulations, tests to implement them, definitions, sample collection and preservation procedures, evaluative procedures, calculations, interpretative guidance, and supporting references required for the evaluation of permit applications in accordance with the regulations. It is imperative that the supporting references cited in each appendix be consulted for detailed or more comprehensive guidance whenever indicated. Before any evaluations are begun, the regulations and this manual should be read in their entirety, and citations and references listed with the appendices should be consulted to obtain a complete understanding of the guidance that the manual provides. The technical procedures in this manual were designed only for dredged material disposal and should not be utilized for any other materials unless definitive research demonstrates their applicability.

Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual
(The “Green Book”) (continued)

This version of the implementation manual contains evaluative procedures that are considered to be acceptable regulatory tools for most situations, although more sophisticated and complex biological evaluations may be warranted under special circumstances. However, variations in these procedures should be allowed only when the EPA Regional Administrator and the USACE District Engineer are able to justify and defend the technical validity of such variations. The field of ecological evaluation is a dynamic one, with new regulatory procedures continually being developed. As new procedures are developed, this manual will be revised periodically.

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Although, this manual provides the most complete available technical guidance on implementing the criteria, technical evaluations represent only a portion of the input to the decision-making process. Many of the criteria do not concern subjects amenable to quantitative evaluation. In such cases objective, qualitative decisions must be made. The criteria do not prohibit environmental change but rather “unacceptable environmental impact.” Consequently, for each permit application, the EPA Regional Administrator and the USACE District Engineer must decide how much potential impact is acceptable under the environmental, economic, social, and political conditions related to the operation in question. This manual is applicable to all activities involving the transportation of dredged material for the purpose of ocean disposal outside the baseline from which the territorial sea is measured.

04. *Guidance for Performing Tests on Dredged Material To Be Disposed of in Ocean Waters*

- 1984 U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. Prepared by U.S. Army Corps of Engineers Regulatory Branch Water Quality Compliance Section, New York, NY, in conjunction with U.S. Environmental Protection Agency Region II, New York, NY. 15 pp. + appendices.

Keywords Sediment; sediment testing; dredged material

Guidance for Performing Tests on Dredged Material To Be Disposed of in Ocean Waters (continued)

This document provides sediment-testing guidelines for permit applicants who wish to dispose of dredged material in the Atlantic Ocean, in general, or Long Island Sound, NY, in particular. Also, it includes additional administrative requirements (a series of five steps) for processing an application to be approved by the U.S. Department of the Army.

Criteria for the selection of sampling sites for reference and control sediments are given: reference sediments are located near the site, but are not influenced by the disposal activity, whereas the control sediments must be collected from a predetermined location within the site.

The physical, biological, and chemical tests that must be performed on the dredged material are described. Physical testing requires grain-size and water- content analyses. Biological testing requires two-phase bioassay tests utilizing the suspended particulate and solid phases of sediment samples, including controls and replicates, to determine the effect of these phases on appropriate marine species. Chemical analysis of the elutriate and site water is required. Bioaccumulation tests and bulk sediment analyses are also described. Specific testing of dredged material to be disposed in Long Island Sound is required. The U.S. Army Corps of Engineers New York District in conjunction with the U.S. Environmental Protection Agency developed a laboratory quality assurance program to be used for all sampling and testing.

It is intended that this document be periodically updated to incorporate modifications in the testing requirements. The current document is an update and any changes made since the 1982 revisions are indicated in capital letters.

05. *Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants*

- 1988 U.S. Environmental Protection Agency Office of Water Regulations and Standards, Criteria and Standards Division, Washington, DC. SDC No. 17. 34 pp.

Keywords Sediment criteria; sediment quality criteria (SQC); equilibrium partitioning (E_p); carbon normalized partition coefficient (K_{oc}); octanol-water partition coefficient (K_{ow}); interstitial water concentration (C_w); contaminant concentration in the sediment (C_{sed}); chronic water quality criteria (WQC); criteria maximum concentration (CMC); criteria continuous concentration (CCC); final chronic value (FCV); final residual value (FRV)

While water-column contaminant concentrations may comply with established water-quality criteria, existing bottom-sediment contaminant concentrations are indicating long-term adverse environmental effects on aquatic life. Since 1985, the U.S. Environmental Protection Agency (EPA) Criteria and Standards Division has been pursuing the equilibrium partition (E_p) approach

Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants (continued)

for estimating sediment quality criteria for nonpolar and metal contaminants. Interim sediment criteria values were developed for selected nonpolar and hydrophobic organic compounds. These values will enable the establishment of final criteria values. This report describes the development and evaluation of interim criteria values. Evaluation of these interim numbers can aid in understanding the degree of sediment contamination.

The E_p approach is described by using terms such as *carbon normalized partition coefficient* (K_{oc}), *interstitial water concentration* (C_w), *contaminant concentration in the sediment* (C_{sed}), and *sediment quality criteria* (SQC). The chronic water quality criteria (WQC) consist of the criteria maximum concentration (CMC) and the criteria continuous concentration (CCC). Criteria formulas and special cases due to bioaccumulation of certain organic contaminants are described. The relationship of values between the CCC and both the final chronic value (FCV) and final residual value (FRV) are identified. The interim numbers depend on known organic carbon contaminant concentrations.

06. *Procedures for Handling and Chemical Analysis of Sediment and Water Samples*

- 1981 Plumb, R.H., Jr. Prepared by Great Lakes Laboratory, State University College at Buffalo, Buffalo, NY, for the U.S. Environmental Protection Agency/U.S. Army Corps of Engineers Technical Committee on Criteria for Dredged and Fill Material. Published by the U. S. Army Engineer Waterways Experiment Station, Corps of Engineers, Vicksburg, MS. Tech. Rep. EPA/CE-81-1. 493 pp.

Keywords Sediment; dredged material; fill material; chemical analysis

This document provides regulatory guidance on sampling, preservation, and analysis of dredged and fill material. Because procedure development, refinement, and evaluation is a continuing process, the guidance provided in this handbook should be considered as second-generation interim guidance. The information presented in this handbook was obtained by taking three approaches: (1) literature review of sediment sampling and analysis, (2) personal contacts with individuals at several laboratories that are active in sediment studies, and (3) personal contacts with individuals involved in the regulatory process. The obtained information is presented in three major sections.

Section 1, which describes the rationale for project managers, emphasizes the alternatives that must be considered when developing an acceptable sampling program. *Section 2*, which describes the step-by-step protocol for sample handling and each test procedure, provides guidance for laboratory and field personnel who will implement the sampling program, and includes a discussion on the types and use of sampling equipment, required methods for sample handling, and general quality control for the sampling program. *Section 3*, which lists analytical

Procedures for Handling and Chemical Analysis of Sediment and Water Samples (continued)

techniques (including sample pretreatment procedures) is directed toward laboratory personnel. *Section 3* also presents a series of analytical techniques for 44 parameters. Generally, the analytical techniques used are described in *Standard Methods*, ASTM and EPA manuals.

**07. *Quality Assurance/Quality Control (QA/QC) for 301(h) Monitoring Programs:
Guidance on Field and Laboratory Methods***

1987 U.S. Environmental Protection Agency Office of Marine and Estuarine Protection, Washington, DC. EPA 430/9-86-004. 267 pp + appendices.

Keywords Quality assurance; quality control; monitoring

This document was prepared to ensure that high-quality data are collected and analyzed as part of the 301(h) monitoring programs, which are designed to measure environmental variables in effluent, receiving water, sediment, and organisms tissues. QA/QC procedures for sample collection, field sample handling, and laboratory processing are included in this document for each of the above-mentioned variables. This manual is a compilation of several years of experience and effort by the members of the 301(h) Task Force.

The document is presented in two major sections — (1) Effluent Monitoring and (2) Monitoring of the Receiving Environment — because these two types of monitoring are typically conducted by different organizations. General guidance is given for the following activities

- Preparation for sampling
- Sample collection
- Sample processing
- Sample size
- Sample containers
- Sample preservation
- Sample holding times
- Sample shipping
- Logkeeping
- Labeling
- Custody procedures
- Analytical methods
- Calibration and preventative maintenance
- Quality control checks
- Corrective action
- Data reporting requirements

***Quality Assurance/Quality Control (QA/QC) for 301(h) Monitoring Programs:
Guidance on Field and Laboratory Methods (continued)***

In addition, field collection, field processing, analytical methods, calibration and preventative maintenance, quality control checks, corrective action, and data quality and reporting are given for specific environmental variables. The analytical methods recommended take precedence over previously identified methods. A glossary is included to provide definitions of specialized words and phrases. -

08. *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites*

- 1990 Pequegnat, W., B.J. Gallaway, and T.D. Wright. Prepared by LGL Ecological Research Associates, Inc., and U.S. Army Corps of Engineers Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, for the Department of the Army, Washington, DC. Tech. Rep. D-90-8. 181 pp.

Keywords Dredged material; dredged material disposal; dredged material disposal sites; marine environment; ocean waste disposal; sampling; site surveys

This procedural guide, which is a revision of the 1981 version, has been prepared to address the needs of the U.S. Army Corps of Engineers (USACE) when conducting surveys for the designation of ocean disposal sites for dredged material. The basic objectives of the guide are to provide detailed information on (1) evaluation of oceanographic parameters, (2) collection of field samples, and (3) performance of laboratory analyses. An additional objective is to clarify the role of the monitoring program that may be instituted at each site pursuant to final site designation. A substantial portion of the guide is devoted to the selection of variables to be measured in the field and the rationale for the selection of sampling stations, and of appropriate gear for sampling under various conditions at sampling stations.

Detailed guidance is given on the preferred methods for sample analysis, including biological, physical, chemical, and geological methodologies. Whenever possible, the methods are compatible with those used for the evaluation of material proposed for disposal. Even though site designation, evaluation of material for disposal, and monitoring are separate activities, they are part of a continuum and should incorporate compatible techniques to be cost-effective and technically valid.

Following an extensive listing of pertinent references, six technical appendices are presented. These include a basic discussion of the nature of dredged material, factors reducing potential adverse effects of toxic substances in dredged material, and various specific analytical techniques. There is also a guide for at-sea operations, a basis for estimating survey costs, and a brief list of equipment suppliers. The guide has been prepared in loose-leaf format to facilitate

*Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites
(continued)*

incorporation of revisions and changes as a result of regulatory modifications, development of new techniques, and changes in site status.

09. *Standard Methods for the Examination of Water and Waste Water*

1989 APHA. 17th edition. American Public Health Association, American Water Works Association, Water Pollution Control Federation, Washington, DC. 1510 pp.

Keywords Wastewater examination; radioactivity; water quality; toxicity; quality assurance; laboratory analysis

This document represents the best current practice of water and wastewater analysis applicable to water purification, water pollution control, sewage disposal, sanitary investigations, dredged material disposal, etc. To develop a permanent numbering system, new numbers (e.g., 1000) have been assigned to all the parts; however the parts have retained their identity from the previous edition (fourteen). This edition includes 10 sections.

- **Part 1000 Introduction**
This part contains information on the correct application of procedures. Most of the methods presented have been endorsed by regulatory agencies. This section should be studied by every user of the manual. This part includes also a newly expanded discussion of statistical analysis, data quality, and methods development.
- **Part 2000 Physical and Aggregate Properties**
This part refers to the physical properties of the sample, such as color, electrical conductivity, odor, taste, and turbidity. There is also a discussion of solids and tests on sludges.
- **Part 3000 Determination of Metals**
This part discusses the analysis of a sample to determine metal content. The analysis of dissolved metals, suspended metals, total metals, and acid-extractable metals are discussed. A description and methods for analysis are presented for 39 metals, alphabetically by metal.
- **Part 4000 Determination of Inorganic Nonmetallic Constituents**
This part contains wet-chemical analytical techniques and variations thereof. The procedures are intended for use in the assessment and control of receiving water quality, treatment and supply of potable water, measurement

Standard Methods for the Examination of Water and Waste Water (continued)

of operation and process efficiency in wastewater treatment, and evaluation of environmental water-quality concerns.

- **Part 5000 Determination of Organic Constituents**
This part contains analytical procedures for measuring organic constituents of organic matter with a common characteristic. Four categories of analyses for organic matter are discussed: (1) oxygen-demanding substances; (2) organically bound elements; (3) classes of compounds; (4) formation potentials.
- **Part 6000 Automated Laboratory Analyses**
This part contains analytical procedures for measuring individual organic constituents in organic matter. Most of the methods presented are highly sophisticated instrumental methods for determining very low concentrations of organic constituents. Guidance for selecting a method is also given.
- **Part 7000 Examination of Water and Wastewater for Radioactivity**
This part includes methods for sample collection and preservation as well as analytical procedures for measuring radioactivity.
- **Part 8000 Toxicity Test Methods for Aquatic Organisms**
This part contains analytical methods to measure biological responses to known and unknown concentrations of materials in fresh and saline waters. Quality assurance practices for toxicity test methods are discussed. Definitions of several toxicity terms are given. A discussion on data analysis and interpretation is given for several methods.
- **Part 9000 Microbiological Examination of Water**
This part contains procedures for examining the microbiological component of water samples to determine the sanitary quality (i.e., degree of contamination). The techniques presented are the best techniques that are currently available. Included are tests/methods for
 - Detection and enumeration of indicator organisms (e.g., coliform bacteria)
 - Differentiation of the coliform group
 - Isolation of certain pathogenic bacteria and protozoa
 - Examination of swimming pool waters and other bathing places

Standard Methods for the Examination of Water and Waste Water (continued)

- **Part 10000 Biological Examination of Water**

This part contains biological methods for assessing water quality, including collection, identification of aquatic organisms, and measurements of metabolic activity. Six communities of organism are considered in separate sections: (1) plankton, (2) periphyton, (3) macrophyton, (4) macroinvertebrates, (5) fish, and (6) amphibians. Emphasis is on methods and equipment, rather than on an interpretation or application of results.

Part 2

SECONDARY DOCUMENTS

The following documents have been categorized as secondary. They may be cited occasionally in addition to the essential documents or may be used only in specific situations. Italicized titles denote documents classified as "published."

SECONDARY DOCUMENTS — POLICY

01. *Characteristics and Effects of Dredged Material Disposal in the Marine Environment*

1989 Prepared by Science Applications International Corporation for U.S. Environmental Protection Agency, Science-Policy Integration Branch, Office of Policy, Planning, and Evaluation. 74 pp.

Keywords Dredged material; dredged material disposal; marine environment

This document is a synopsis of relevant background information on dredged material disposal to support the U.S. Environmental Protection Agency's (EPA) efforts in pursuing the development of National and international ocean dumping policies. Current information from scientific literature, reports by the U.S. Army Corps of Engineers (USACE) and EPA, and other documents are compiled and summarized in three sections.

Section I contains data on the amounts and characteristics of dredged material and their predictability; important research programs on dredged material disposal; and the international aspects of dredging and disposing. At present, 250 to 450 million cubic yards of dredged material is disposed annually at more than 150 sites along the U.S. coasts; these sites are either aquatic or upland. The fate of dredged material at the disposal site is well understood; the sediments are either dispersed or contained in defined structures such as disposal mounds. Physical and chemical impacts are well-known in the nearfield for the short term and quite predictable. The impact on benthic communities can be predicted, based on existing successional patterns, and impact on fisheries can be addressed by using the Benthic Resource Assessment Technique (BRAT). Long-term, farfield assessments are much more difficult to make because the physicochemical and biological processes are very complex.

Major research programs associated with dredged material disposal are conducted by the USACE, the National Oceanic and Atmospheric Administration (NOAA), and the EPA Office of Wetlands, Oceans, and Watersheds [formerly the Office of Marine and Estuarine Protection (OMEP)].

International data on dredging is available only on the 63 signatories (member countries) to the London Dumping Convention. The volume of dredged material in these countries comprises only a small portion of the annual worldwide estimate of 1.3 billion tons. Most of this material is disposed in nearshore waters.

Characteristics and Effects of Dredged Material Disposal in the Marine Environment (continued)

Section II provides an overview of the regulatory framework. Important legislation includes the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, the Clean Water Act (CWA) of 1972, and Federal laws concerning wetlands protection.

Section III addresses a number of management and regulatory issues related to dredged material disposal, including the selection of new disposal sites, human health issues, and management aspects of monitoring programs. The tiered monitoring approach is presented as a tool for better linkage between monitoring and decision-making, and some cost estimates are provided. It was suggested that dredged material disposal should be addressed in a more integrated way than is current practice. A lack of communication was identified among agencies and institutions and between institutions and the public, which caused duplication of efforts and political conflicts.

02. Coastal Zone Management Act Consistency Provisions and Designation of Ocean Dumping Sites under Section 102(c) of Ocean Dumping Act

- 1989 Hanmer, R.W. Memorandum dated October 23, 1989, to U.S. Environmental Protection Agency Water Management Division Directors, Regions I, II, III, IV, VI, IX, and X. 3 pp. + appendix.

Keywords CZM; site designation

This memorandum provides policy guidance to the U.S. Environmental Protection Agency (EPA) Regional personnel on the provisions of the Coastal Zone Management Act (CZMA) applicable to the designation of ocean disposal sites by EPA.

03. General Approach to Designation Studies for Ocean Dredged Material Disposal Sites

- 1984 U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. U.S. Army Corps of Engineers Water Resources Support Center. 28 pp.

Keywords Dredged material; dredged material disposal site; site designation

This document provides general procedural guidance to the U.S. Environmental Protection Agency (EPA) field offices for the identification, evaluation, selection, and final designation of environmentally acceptable and operationally efficient ocean dredged material disposal sites. This document complements the *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites* (which see).

General Approach to Designation Studies for Ocean Dredged Material Disposal Sites *(continued)*

The general process of site designation comprises three phases.

- **Phase I** (1) Delineate a general area under consideration for location of the disposal site. This area is called a zone of siting feasibility (ZSF). Several factors must be considered when delineating a ZSF. (2) Characterize (physical, biological, and chemical) the site. Data obtained from the characterization will determine where, within the ZSF, the disposal site(s) should be placed.
- **Phase II** Identify candidate sites within the area, based on the data collected during the characterization in Phase I. In addition, preliminary decisions on the candidate sites can be made. These decisions may include determining (1) if the site should be depositional or dispersive, (2) the optimal distance from a resource that must be protected, and (3) if baseline studies are necessary to quantify concentrations of contaminants of concern at the site.
- **Phase III** Evaluate the candidate sites, select a recommended site or sites for designation in an EIS, and develop a site-management plan. The candidate sites must be evaluated by using the 11 specific factors of the Ocean Dumping Regulations and Criteria (Section 228.6). Based on these evaluations, the selection of a site or sites for designation should be based on the requirements of the general criteria (Section 228.5). The following should be considered under Phase III: marine environment; water quality; unsuitable sites; size, shape, and orientation of sites; sites off the continental shelf; cumulative impacts; and site management.

04. MOU

- 1987 Memorandum of Understanding [MOU] between the [U.S.] Department of the Army and [U.S.] Environmental Protection Agency. (Signed by U.S. Environmental Protection Agency July 27, 1987; signed by U.S. Army Corps of Engineers July 27, 1987.) 4 pp + attachments.

Keywords Final site designation; management

This National MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by establishing the basis for cooperative effort and funding between the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) for the final designation and management of ocean dredged material disposal sites in three categories. This MOU directs regional EPA and the USACE field offices to develop and implement regional MOUs.

05. MOU

- 1988 Memorandum of Understanding [MOU] between the U.S. Environmental Protection Agency Region I and U.S. Army Corps of Engineers, New England Division. (Signed by U.S. Environmental Protection Agency May 5, 1989; signed by U.S. Army Corps of Engineers August 2, 1989.) 4 pp. + attachments.

Keywords Final site designation; management; New England

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by providing a cooperative agreement between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for the final designation and management of ocean dredged material disposal sites in New England.

06. MOU

- 1988 Memorandum of Understanding [MOU] between U.S. Army Corps of Engineers, Galveston District, and U.S. Environmental Protection Agency Region VI on Management of Ocean Dredged Material Disposal Sites. (Signed by U.S. Army Corps of Engineers January 29, 1988; signed by U.S. Environmental Protection Agency March 15, 1988.) 4 pp. + appendices.

Keywords Management

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by providing a cooperative agreement between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for the management of ocean dredged material disposal sites. This MOU was prepared in concert with and in response to the National MOU.

07. MOU

- 1988 Memorandum of Understanding [MOU] between U.S. Army Corps of Engineers, New Orleans District, and U.S. Environmental Protection Agency Region VI on Management of Ocean Dredged Material Disposal Sites. (Signed by U.S. Army Corps of Engineers February 29, 1988; signed by U.S. Environmental Protection Agency March 15, 1988.) 4 pp. + appendices.

Keywords Management

MOU (continued)
1988

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by providing a cooperative agreement between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for the management of ocean dredged material disposal sites. This MOU was prepared in concert with and in response to the National MOU.

08. MOU

- 1988** Memorandum of Understanding [MOU] between the Regional Administrator of the U.S. Environmental Protection Agency Region II and the New York District Engineer of the U.S. Army Corps of Engineers. (Signed by U.S. Environmental Protection Agency May 4, 1988; signed by U.S. Army Corps of Engineers April 13, 1988.) 5 pp.

Keywords Site designation; management; monitoring; New York Bight

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by providing a cooperative agreement between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for dredged material site designation, management, and monitoring of the New York Bight Dredged Material Disposal Site.

09. MOU

- 1988** Regional Memorandum of Understanding [MOU] between the [U.S.] Department of the Army, North Pacific Division, and [U.S.] Environmental Protection Agency Region X. (Signed by U.S. Army Corps of Engineers October 1988; signed by U.S. Environmental Protection Agency November 1, 1988.) 10 pp.

Keywords Final site designation; management

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by establishing the basis for cooperative effort and funding between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for the final designation and management of ocean dredged material disposal sites. This regional MOU implements the National MOU.

10. MOU

- 1989 Memorandum of Understanding [MOU] between U.S. Environmental Protection Agency Region I and U.S. Army Corps of Engineers, New England Division. (Signed by U.S. Environmental Protection Agency May 12, 1989; signed by U.S. Army Corps of Engineers August 8, 1989.) 5 pp. + attachments.

Keywords Final site designation; management; New England

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by establishing the basis for cooperative effort between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. This effort is directed towards the final designation and management of the Portland, Cape Arundel, Massachusetts Bay, and western Long Island Sound ocean disposal sites in New England. This MOU supersedes the previous MOU dated February 2, 1988.

11. MOU

- 1988 Memorandum of Understanding [MOU] between U.S. Army Corps of Engineers, South Atlantic Division, and U.S. Environmental Protection Agency Region IV. (Signed by U.S. Environmental Protection Agency July 19, 1990; signed by U.S. Army Corps of Engineers July 19, 1990.) 6 pp. + appendix.

Keywords Management

This MOU facilitates the implementation of Title I of the Marine Protection, Research, and Sanctuaries Act of 1972 by providing a cooperative agreement between the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers for the management of ocean dredged material disposal sites. This MOU was prepared in concert with and in response to the National MOU.

12. *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites*

- 1990 Pequegnat, W., B.J. Gallaway, and T.D. Wright. Prepared by LGL Ecological Research Associates, Inc. and U.S. Army Corps of Engineers Environmental Effects Laboratory, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, for the Department of the Army, Washington, DC. Tech. Rep. D-90-8. 181 pp.

Keywords Dredged material; dredged material disposal; dredged material disposal sites; marine environment; ocean waste disposal; sampling; site surveys

***Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites
(continued)***

This procedural guide, which is a revision of the 1981 version, has been prepared to address the needs of the U.S. Army Corps of Engineers (USACE) when conducting surveys for the designation of ocean disposal sites for dredged material. The basic objectives of the guide are to provide detailed information on (1) evaluation of oceanographic parameters, (2) collection of field samples, and (3) performance of laboratory analyses. An additional objective is to clarify the role of the monitoring program that may be instituted at each site pursuant to final site designation. A substantial portion of the guide is devoted to the selection of variables to be measured in the field and the rationale for the selection of sampling stations, and of appropriate gear for sampling under various conditions at sampling stations. Detailed guidance is given on the preferred methods for sample analysis, including biological, physical, chemical, and geological methodologies. Whenever possible, the methods are compatible with those used for the evaluation of material proposed for disposal. Even though site designation, evaluation of material for disposal, and monitoring are separate activities, they are part of a continuum and should incorporate compatible techniques to be cost-effective and technically valid.

Following an extensive listing of pertinent references, six technical appendices are presented. These include a basic discussion of the nature of dredged material, factors reducing potential adverse effects of toxic substances in dredged material, and various specific analytical techniques. There is also a guide for at-sea operations, a basis for estimating survey costs, and a brief list of equipment suppliers. The guide has been prepared in loose-leaf format to facilitate incorporation of revisions and changes as a result of regulatory modifications, development of new techniques, and changes in site status.

SECONDARY DOCUMENTS — TECHNICAL

01. *Aquatic Dredged Material Disposal Impacts*

- 1978 Wright, T.D. Dredged Material Research Program. U.S. Army Engineer Waterways Experiment Station Environmental Laboratory, Vicksburg, MS. Tech. Rep. DS-78-1. 57 pp.

Keywords Dredged material disposal; environmental effects; open-water disposal, sediment

The findings of the Aquatic Disposal Field Investigation (ADFI; Task 1A) study on dredging and disposal operations conducted at five locations across the United States are described in this synthesis report. The five study locations were Eatons Neck, NY (an Atlantic Ocean estuary), Ashtabula River, OH (Great Lakes), Galveston, TX (Gulf of Mexico), Columbia River, OR (an open area in the Pacific Ocean), Duwamish Waterway, Puget Sound, WA (a Pacific Ocean estuary). The investigation was not completed at Eatons Neck, however, because disposal operations were terminated after baseline studies. The primary variables studied at each location were physical (e.g., currents, waves), chemical (e.g., water quality), and biological (e.g., fish, shellfish) parameters.

The findings of the ADFI indicate the following: (1) Eatons Neck — Minimal chemical and biological effects were apparent 4 years after the cessation of 75 years of disposal; (2) Columbia River — Minor, if any, impacts were apparent on the sediments and water column; however, the benthic invertebrates and demersal finfish were impacted. Some impacts may not have been apparent due to natural sedimentation of the Columbia River; (3) Ashtabula River — There were few noteworthy impacts: chemical parameter changes and benthic species replacement; (4) Galveston — Few impacts were observed as a result of disposal operations, including minor changes in the concentrations of manganese and ammonium-nitrogen; (5) Duwamish Waterway — Minimal impacts were observed as a result of disposal operations, including the creation of a disposal mound and minor changes in the chemical concentrations in the water column. Body burdens of polychlorinated biphenyls (PCBs) and metals in organisms inhabiting the area were not significantly changed. These findings are consistent with results obtained from laboratory studies and other investigations of dredging and disposal operations at similar sites.

02. *Beneficial Uses of Dredged Material.*

Proceedings of the Gulf Coast Regional Workshop, 26-28 April 1988, Galveston, TX

- 1990 U.S. Army Corps of Engineers (R.L. Lazor and R. Medina, Eds.). U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS, and U.S. Army Engineer District, Galveston, TX. Tech. Rep. D-90-3. 293 pp.

Beneficial Uses of Dredged Material.

Proceedings of the Gulf Coast Regional Workshop, 26-28 April 1988, Galveston, TX (continued)

Keywords Dredged material; dredging; dredged material management

The Gulf Coast Regional Workshop on the Beneficial Uses of Dredged Material was sponsored by the U.S. Army Engineer District, Galveston, in cooperation with U.S. Environmental Protection Agency; U.S. Fish and Wildlife Service; National Marine Fisheries Service; U.S. Department of Agriculture; and State, local, and private interests. The objective of the workshop was to focus attention on the wide range of beneficial uses of dredged material along the Gulf Coast, placing special emphasis on agency viewpoints, beach nourishment, land stabilization, habitat-development case studies, and innovative uses and concepts. Increased cooperation among the diverse number of Federal, State, local, university, and private interests involved with dredged material management was a high-priority goal.

Conclusions and observations of the workshop focused on the need for communication and cooperation among all those involved in public interest determinations concerning dredged material placement; the wide variety of beneficial uses of dredged material available for consideration; and the rapidly developing technical status of beach nourishment, land stabilization, habitat development, and innovative concepts. Renewed efforts should be undertaken to identify feasible, cost-effective, and environmentally sound beneficial options in cooperation with all interests involved.

03. Contaminated Marine Sediments — Assessment and Remediation

1989 Committee on Contaminated Marine Sediments of the Marine Board of the National Research Council. National Academy Press, Washington, DC. 493 pp.

Keywords Marine sediments; contamination; remediation; cleanup

Contamination of marine sediments poses a threat to marine resources and human health (through consumption of seafood) in numerous locations throughout the country — particularly near metropolitan areas. Improving the Nation's capacity to assess, manage, and remediate these contaminated sediments is critical to the health of the marine environment as well as to its use for navigation, commerce, fishing, and recreation. Although sediment contamination appears to be a widespread problem, very little is known about the geographic extent and ecological significance of the problem. In addition, management and remediation of contaminated marine sediments requires extensive knowledge about the dynamic aquatic environments in which contaminant mobilization can result from remediation or from natural resuspension, transport, and deposition of the bottom sediments.

Contaminated Marine Sediments — Assessment and Remediation (continued)

This report, prepared by the Committee on Contaminated Marine Sediments of the Marine Board of the National Research Council, examines the extent and significance of marine sediment contamination in the United States; reviews the state of the art of contaminated sediment cleanup and remediation technology; identifies and appraises alternative sediment management strategies; and identifies research and development needs and issues for subsequent technical assessment. The report contains the results of a symposium and workshop, with a supplementary discussion and recommendations by the conveners.

The committee reached several conclusions on

- Sediment contamination
- Determining the extent of sediment contamination
- Transfer of contaminants from marine sediments to humans
- Remedial actions for excavation and treatment
- Required equipment for state-of-the-art cleanup and remediation technology
- Time required for the U.S. Environmental Protection Agency or its contractors to make a cleanup decision
- Limiting the spread of contamination
- No action as the alternative of choice
- Greater use of benefit/cost comparisons
- Review and evaluation of newly developed sediment assessment and cleanup technologies and procedures.

The committee recommended that future research and development focus on

- Establishing better biological and chemical techniques for rapidly and reliably assessing the presence and severity of bottom-sediment contamination
- Delineating the practical limits of capping as an efficacious remediation technology
- Identifying interim measures to limit the spread of contaminated sediments while long-term remedies are assessed
- Formulating procedures and guidelines that adequately evaluate and prioritize health and environmental risks associated with sediment contamination, and against which effectiveness and cleanup needs can be measured.

04. *Environmental Effects of Dredging Technical Notes*

U.S. Army Corps of Engineers. U.S. Army Engineer Waterways Experiment Station Environmental Laboratory, Vicksburg, MS. [average fewer than 30 pp.]

The technical notes, which are published monthly, cover a wide range of topics on dredging and dredged material disposal. There are a number of technical reports published by the USACE. The three main publications are Technical Reports and miscellaneous papers, Dredging Research Bulletin, and the notes listed herein. Some of the technical reports are listed in this reference document.

05. *General Approach to Designation Studies for Ocean Dredged Material Disposal Sites*

- 1984 U.S. Environmental Protection Agency and U.S. Army Corps of Engineers. U.S. Army Corps of Engineers Water Resources Support Center. 28 pp.

Keywords Dredged material; dredged material disposal site; site designation

This document provides general procedural guidance to the U.S. Environmental Protection Agency (EPA) field offices for the identification, evaluation, selection, and final designation of environmentally acceptable and operationally efficient ocean dredged material disposal sites. This document complements the *Revised Procedural Guide for Designation Surveys of Ocean Dredged Material Disposal Sites* (see page S6.)

The general process of site designation comprises three phases.

- **Phase I** (1) Delineate a general area under consideration for location of the disposal site. This area is called a zone of siting feasibility (ZSF). Several factors must be considered when delineating a ZSF. (2) Characterize (physical, biological, and chemical) the site. Data obtained from the characterization will determine where, within the ZSF, the disposal site(s) should be placed.
- **Phase II** Identify candidate sites within the area, based on the data collected during the characterization in Phase I. In addition, preliminary decisions on the candidate sites can be made. These decisions may include determining (1) if the site should be depositional or dispersive, (2) the optimal distance from a resource that must be protected, and (3) if baseline studies are necessary to quantify concentrations of contaminants of concern at the site.
- **Phase III** Evaluate the candidate sites, select a recommended site or sites for designation, and develop a site-management plan. The candidate sites must

General Approach to Designation Studies for Ocean Dredged Material Disposal Sites (continued)

be evaluated by using the 11 specific factors of the Ocean Dumping Regulations and Criteria (Section 228.6). Based on these evaluations, the selection of a site or sites for designation in an EIS should be based on the requirements of the general criteria (Section 228.5). The following should be considered under Phase III: marine environment; water quality; unsuitable sites; size, shape, and orientation of sites; sites off the continental shelf; cumulative impacts; and site management.

06. *Guidelines for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites*

1990 Fredette, T.J., D.A. Nelson, J.E. Clausner, and F.J. Anders. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. Tech. Rep. D-90-12. 29 pp. + appendices.

Keywords Aquatic disposal; monitoring; dredged material; biomonitoring

This is a companion report to *Selected Tools and Techniques for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites* (see page S18.)

The report recommends an approach to designing a monitoring program for aquatic dredged material disposal that (1) is applicable to either dispersive or nondispersive sites and (2) addresses management objectives. Only monitoring of uncontaminated dredged material is considered. Monitoring the disposal of dredged material that may result in lethal or sublethal effects of toxic substances is not considered; therefore, chemical monitoring is not discussed. The draft guidelines discussed in this report are the product of a task sponsored by the Water Resources Support Center, through the Dredging Operations Technical Support Program.

It is suggested that monitoring could be reduced if

- Final designation yields a site that has limited potential for impact
- Monitoring of a selected site is operationally and technically feasible
- Data to assist in assessing long-term impacts can be collected during the site- evaluation field studies
- Sediments to be disposed are tested during the project evaluation process to determine if they are contaminated.

Tiered approaches/hypotheses testing of a management-response prospective monitoring program is discussed. A prospective monitoring program is preferred because it defines specific desirable or undesirable conditions before sampling is begun. Examples of tiered and nontiered monitoring programs are given.

***Guidelines for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites
(continued)***

It is suggested that a multidisciplinary committee be established and charged with designing the monitoring program and interacting on a regular basis with the dredged material site project managers to provide feasible economic and technical advice. The report suggests areas of expertise for the committee members.

Also included are approaches to meeting the goals of each step in planning a monitoring program.

- Step 1 Designating site-specific objectives
- Step 2 Identifying components of the monitoring plan
- Step 3 Predicting biological responses and developing testable hypotheses
- Step 4 Designating sampling designs and methods

Examples of tiered monitoring plans (with only three tiers each) are presented. Monitoring strategies and management options are listed for each example.

A summary of physical and biological monitoring tools and techniques is presented.

07. *Inland Waterways: Proceedings of a National Workshop on the Beneficial Uses of Dredged Material*

- 1987 U.S. Army Corps of Engineers (M.C. Landin, Ed.). U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. Tech. Rep. D-88-8. 291 pp.

Keywords Dredged material; dredging; dredged material management; inland waterways; lakes; rivers

A National workshop featuring beneficial uses of dredged material in inland- waterway systems of the United States was held in St. Paul, MN, October 27-30, 1987. Participating agencies included the U.S. Army Corps of Engineers (USACE), the U.S. Fish and Wildlife Service, the U.S. Department of Agriculture (USDA) Soil Conservation Service, Environment Canada, and numerous other State regulatory, resource, and transportation agencies. Attendees from North and Central America met for 3 days to present technical papers and conduct panel discussions. The workshop was introduced by a day-long field trip down the Mississippi River from St. Paul to Weaver Bottoms in the Upper Mississippi River National Wildlife and Fish Refuge at Winona, MN, to observe numerous noteworthy beneficial-use sites.

Agency and industry overviews were given on the first day of papers. Technical sessions were held on aquatic habitats; habitat development case studies; innovative uses and concepts; recreation, commercial, and industrial applications; and the Great Lakes and their unique opportunities for beneficial-use applications. Attendees also met in informal breakout sessions

***Inland Waterways: Proceedings of a National Workshop on the Beneficial Uses of Dredged Material
(continued)***

to discuss the direction for each technical area and to make recommendations for developing each topic within inland waterways.

The overall workshop recommendations were to

- Continue to hold in various parts of the United States timely, informative workshops on beneficial uses of dredged material — hold the next workshop on the west coast and feature coastal and marine environments
- Strive for maximum cooperation and communication between agencies and groups, including the formation of interagency working groups at the USACE District level
- Work more closely with cost-sharing project sponsors to assist them in finding means to solve their erosion or stabilization and material placement problems cost-effectively
- Encourage the development of long-term management strategies for dredging that incorporate both engineering and environmental solutions
- Work harder to inform the general public on the positive aspects of using disposal sites productively
- Develop formal and informal working agreements among agencies and concerned groups to better accomplish the USACE dredging mission
- Continue to seek better means of dredging and placement and innovative uses of dredged material in inland waterways systems

08. *Managing Troubled Waters: The Role of Marine Environmental Monitoring*

1989 Committee on a Systems Assessment of Marine Environmental Monitoring of the Marine Board of the Commission on Engineering and Technical Systems of the National Research Council. National Academy Press, Washington, DC. 125 pp.

Keywords Monitoring; management; conceptual model

This report examines two issues: (1) the design of monitoring programs and the application of technology and (2) presentation of information to be used in developing broad public policy or evaluating specific control strategies. The report proposes (1) specific design criteria and (2) a coherent system of regional monitoring upon which control strategies can be based and their

Managing Troubled Waters: The Role of Marine Environmental Monitoring (continued)

effectiveness measured. The term *monitoring* is used in the broadest sense to include all activities that determine if the environmental management goals are met.

To address these issues, the committee provides advice on marine environmental monitoring, such as the design of a monitoring program that is directed toward legislators at all levels. The objective of the report is to make the best advice more accessible and to place its recommendations in the broad framework of environmental management and policy. A conceptual model was developed for conducting case-study assessments of monitoring programs.

The committee recommends

- Strengthening the role of monitoring in marine environmental management
- Conducting comprehensive regional and National status and trends monitoring programs
- Improving monitoring program design and developing more useful information products

The committee provides advice on

- Expected results of monitoring programs
- Design of monitoring programs
- Providing useful information to decision-makers

09. Puget Sound Dredged Disposal Analysis (PSDDA) Reports

1988 *Management Plan Report — Unconfined Open-Water Disposal of Dredged Material, Phase I (Central Puget Sound)*. 98 pp. + appendices.

1989 *Management Plan Report — Unconfined Open-Water Disposal of Dredged Material, Phase II (North and South Puget Sound)*. 130 pp. + appendices.

U.S. Army Corps of Engineers, Seattle District. U.S. Environmental Protection Agency Region X. Washington State Department of Natural Resources. Washington State Department of Ecology, Olympia, WA.

Keywords Dredged material; dredged material disposal; Puget Sound

The Puget Sound Dredged Disposal Analysis (PSDDA), a comprehensive study of open-water, unconfined dredged material disposal in Puget Sound, is being undertaken as a cooperative effort by the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA), and the State of Washington Departments of Natural Resources and Ecology. The study objectives were to (1) identify acceptable public multiuser unconfined, open-water disposal sites; (2) define consistent and objective evaluation procedures for dredged material to be placed at

Puget Sound Dredged Disposal Analysis (PSDDA) Reports *(continued)*

those sites; and (3) formulate site-use management plans that will ensure adequate site-use controls and program accountability.

Until 1984, Puget Sound dredged material sampling, testing, and test interpretation requirements were established project by project. These case-by-case evaluations did not provide local authorities with sufficient assurance that aquatic resources at the disposal sites were being adequately protected. The Puget Sound area is unique relative to other regions of the Nation because local governments also play a key role in dredged material disposal through their shoreline master programs under the State shoreline permit process. Local jurisdictions can condition or restrict dredging and dredged material disposal.

The PSDDA study has recognized the requirement for dealing with contaminated sediments. However, the study's focus has been primarily on disposal of most dredged material, which is expected to be found "clean" or uncontaminated, and therefore acceptable for unconfined, open-water disposal at designated public multiuser sites. These are locations where any dredger can dispose of dredged material provided that the material has been evaluated and the disposal has been approved by the appropriate regulatory agencies.

Environmental and economic considerations are major factors supporting the need for long-range regional planning as a lasting, effective solution for dredged material disposal problems. Disposal alternatives can no longer be planned independently for multiple projects in a given area. Regional dredged material disposal-management programs offer greater opportunities for environmental protection, reasonable project costs, and greater public acceptance. A proposed dredged material disposal-management plan for unconfined, open-water disposal has been developed through the PSDDA study. This plan is unique to the Puget Sound area because the data supporting many elements of the plan are specific to Puget Sound. Also, the plan reflects the social values of this region and is responsive to the unique role, from a National perspective, of local government in the management of open-water dredged material disposal sites.

The USACE, EPA, and the Departments of Natural Resources and Ecology began the PSDDA study in April 1985. The study is a 4-year effort that is being conducted in two overlapping phases, each lasting about 3 years. Phase I covers central Puget Sound and Phase II, initiated in April 1986, covers the north and south Sound areas.

The goal of PSDDA is to provide publicly acceptable guidelines governing environmentally safe unconfined, open-water disposal of dredged material, thereby improving consistency and predictability in the decision-making process. Public acceptability involves consideration of a wide range of factors. Among these are technically sound evaluation procedures and practicability, which includes cost effectiveness.

10. *Quality Criteria for Water*

- 1986 U.S. Environmental Protection Agency. U.S. Environmental Protection Agency Criteria and Standards Division, Washington, DC. EPA/440/5-86-001. 256 pp.

Keywords Water quality; water-quality criteria

The Federal Water Pollution Control Act Amendments of 1972 require that the Administrator of the U.S. Environmental Protection Agency (EPA) publish water-quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all identifiable effects on health and welfare that might be expected from the presence of pollutants in any body of water, including ground water. The proposed water-quality criteria were developed and a notice of their availability was published on October 26, 1973 (38 Federal Register 29646). This present volume represents a revision of the proposed water-quality criteria based upon a consideration of comments received from other Federal agencies, State agencies, special interest groups, and individual scientists.

The emphasis of this volume is to recommend criteria levels for a water quality that will provide for the protection and propagation of fish and other aquatic life and for recreation in and on the water in accord with the 1983 goals of Pub. L. 92-500. Criteria also are presented for the domestic water-supply use. Generally, these water uses are the highest achievable beneficial uses and water quality that will also be suitable for agricultural and industrial uses.

Guidelines to implement the criteria presented in this volume for the development of water-quality standards and for other water-related EPA programs will be available for use by the States, other agencies, and interested parties.

11. *Revised Section 301(h) Technical Support Document*

- 1982 U.S. Environmental Protection Agency. Prepared under Contract No. 68-01-5906 for the U.S. Environmental Protection Agency Office of Water Program Operations and the Office of Research and Development. 192 pp. + appendix

Keywords Clean Water Act of 1977; Section 301(h); regulations

Section 301(h) of the Clean Water Act of 1977 provides publicly owned wastewater treatment works (POTW) an opportunity to apply for variances from secondary-treatment requirements for discharges to marine waters. These provisions allow POTWs to apply for a modified National Pollutant Discharge Elimination System (NPDES) permit to discharge effluent receiving less-than-secondary treatment to marine waters. Section 301(h) provides that the Administrator of the U.S. Environmental Protection Agency (EPA), with the concurrence of the State, may issue to a POTW an NPDES permit that modifies the Federal secondary-treatment requirements for

Revised Section 301(h) Technical Support Document (continued)

POTW discharges into certain ocean or estuarine waters if the POTW adequately demonstrates that the modification would not impair the integrity of the marine receiving waters and biota.

This Technical Support Document supplements the Section 301(h) regulations as amended in November 1982 (40 CFR Part 125, Subpart G). This document provides information that establishes a technical basis for understanding the major differences between the original Section 301(h) regulations promulgated in 1979 and the 1982 amended regulations. This document also provides a technical explanation of assessments required for obtaining Section 301(h) modified discharge permits and guidance for both small and large POTWs to use in completing the appropriate application questionnaire. The guidance provided in this document is recommended only; it is not required. However, EPA believes that Section 301(h) applicants will benefit substantially by following the guidance and procedures to demonstrate that they have satisfied requirements of Section 301(h) and 40 CFR Part 125, Subpart G. This document supersedes the original 1979 Technical Support Document. However, the technical information provided by that document is still relevant and useful.

12. *Selected Tools and Techniques for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites*

- 1990 Fredette, T.J., D.A. Nelson, T. Miller-Way, J.A. Adair, V.A. Sotler, J.E. Clausner, E.B. Hands, F.J. Anders. U.S. Army Waterways Experiment Station, Vicksburg, MS. Tech. Rep. D-90-11. 65 pp. + appendices.

Keywords Aquatic sampling; benthic sampling; monitoring; acoustic instruments; oceanographic tools; nekton sampling

This is a companion report to *Guidelines for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites* (see page S12.)

The report provides a detailed discussion of the tools and techniques used for biological and physical monitoring of aquatic dredged material disposal sites that do not contain chemically unstable material. Physical tools are presented for the following physical monitoring activities.

- Navigation and positioning
Two basic forms commonly used in coastal waters are Loran-C and short-range microwave. Alternate systems include radar positioning, total stations, Navstar GPS, and acoustic positioning systems.

Selected Tools and Techniques for Physical and Biological Monitoring of Aquatic Dredged Material Disposal Sites (continued)

- **Bathymetry**
This is the primary tool for determining where the material is placed and how much remains on site. Computer-integrated sounding systems (i.e., swath surveying systems) that permit the collection of continuous bathymetry data are also discussed.
- **Side-scan sonar**
Side-scan sonar is used to map surface characteristics of the sea floor. The report discusses the appropriate application of 100- and 500-kHz frequencies that are used to measure the grain size at the disposal site.
- **Sediment Sampling**
Sediment samples are needed to assist in distinguishing between the native seafloor material and the disposed material. Guidance for developing sampling plans is given. Tools (e.g., sediment traps and cores) for collecting sediment samples are discussed.
- **Remote Sensing**
A brief discussion of the capabilities of the sediment-profiling cameras are included. The report suggests that remote sensing for bathymetry measurement offers the greatest potential for improving monitoring techniques.
- **Current Velocity and Direction Measurements**
The discussion of these monitoring tools is centered on the types, cost, and capabilities of current meters.

The report discusses biological monitoring tools that may be used to sample benthic epi- and infauna and nekton. These tools include (1) qualitative, semiquantitative, and quantitative samplers for benthos and (2) nets, traps, and cages for nekton. It is suggested that a site reconnaissance be conducted prior to biological monitoring to reduce costs of a monitoring program. The steps of the Benthic Resource Assessment Technique (BRAT), which was developed by the USACE Waterways Experiment Station, are briefly discussed. The BRAT is based on an optimal foraging theory.

Statistical considerations for monitoring programs are also covered. The following topics are discussed.

- **Sample-site selection**
- **Number of samples and sample frequency**
- **Statistical design, including alternative statistical approaches and multivariate exploratory techniques**

13. Specifications of a Model Ocean Disposal Site for Dredged Material

- 1982 Pequegnat, W.E. Presented at the Eighth US/Japan Meeting on the Management of Contaminated Bottom Sediments, October 1982, Tokyo, Japan. 18 pp.

Keywords Dredged material; dredged material disposal; ocean disposal

A dredged material disposal project is planned so that the bulk of the dredged material will remain within the site boundaries for substantial periods of time. However, as is well known, waves and currents of various types are capable of transporting the material for considerable distances, possibly back into the estuary from which it was dredged, unless the site has certain oceanographic conditions (e.g., a depressed area) that cause the deposited dredged material to be retained at the original disposal site. The concept of an ideal site requires that the size and placement of a site be evaluated to determine if there will be mass transport of sediment away from the site.

This paper discusses the oceanographic parameters that must be considered to define and locate an ideal or model ocean disposal site for dredged material. This is a precursor to the zone of siting feasibility study. The paper also describes a technique for site selection, referred to as the "sieve technique". Specifications of existing United States ocean disposal sites are summarized, including factors such as geographic, size, and depth distribution and distance from shore. Oceanographic criteria for size, configuration, and location of an ideal site are discussed, with particular emphasis put on the possible resuspension and transport of deposited sediment. The impact of waves and currents on the resuspension and transport of sediment is described in some detail. Finally, the sieve technique for locating an ocean dumpsite and constraints involved in applying the technique are discussed.

14. Workbook/Users Manual for Prediction of Instantaneously Dumped Dredged Material

- 1980 Davis, L.R., and G.W. Bowers. Corvallis Environmental Research Laboratory Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, OR. 217 pp.

Keywords Dredged material; dredged material disposal

This manual describes the operation and use of a computer model developed by Koh and Chang, modified in 1976 for the U.S. Army Corps of Engineers and further updated by JBF Scientific Corp., that predicts the physical fate of dredged material instantaneously released into a water column. The model predicts the spatial distribution of various components of the dumped material as a function of time. Output includes material concentration and position while in the water column and material mound height and concentration after bottom impact.

Workbook/Users Manual for Prediction of Instantaneously Dumped Dredged Material (continued)

Included in this report are a description of the model's structure and a complete explanation of its input/output formats. In addition, the model was applied to a matrix of input conditions. Both the input and output data for these runs are presented as tables. The tables can be used to approximate the fate of dredged material for a wide variety of input conditions without requiring the user to actually run the model. There are several examples showing how these tables can be used.

The first phase of this work was done by JBF Scientific under the sponsorship of the U.S. Environmental Protection Agency (EPA) through Grant R-804994. The workbook portion of this report was done inhouse at the EPA Corvallis Environmental Research Laboratory. The report covers the period from August 1976 to July 1979.

15. Yaquina Bay Interim Ocean Dredged Material Disposal Site Evaluation Study

1985 U.S. Army Corps of Engineers Portland District, Portland, OR. 16 pp. + appendices.

Keywords Dredged material; dredged material disposal; dredged material disposal site; site surveys

This report was prepared for compliance with the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, and subsequent rules put forth in 40 CFR, Parts 200-229. Parts 228.5 and 228.6 list general and specific requirements for designating ocean disposal sites to receive materials approved for ocean disposal under Part 227 of the rules. This report addresses these requirements for designating a disposal site to receive dredged materials from either the U.S. Department of Army permit activities or Federally authorized actions.

A joint task force of U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE) personnel was established to prepare a procedural manual for evaluating disposal sites. The manual was to be based on the above rules and experience to date of field offices from both agencies. A draft workbook, "Technical Guidance for the Designation of Ocean Dredged Material Disposal Sites," was prepared in October 1983. Prior to preparation of the final version, the task force wanted to try the procedures in the field. The Yaquina Bay interim ocean disposal site was selected as a pilot study for this purpose. The Portland District USACE used the draft workbook along with experience gained from designating a site at Coos Bay, OR, to prepare the ocean dredged material disposal-site evaluation study. The evaluation studies documented in the report will be appended to the final version of the workbook. The report will also be submitted to the EPA with a request that they utilize it in their formal rulemaking process for final designation of the Yaquina Bay interim ocean disposal site.

Appendix A

ALPHABETICAL LISTING OF REFERENCE DOCUMENTS

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