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Contaminated Sediments

Relevant Statutes And EPA Program Activities

code of federal regulations

Protection of Environment

Chemical structures: ClC1=CC=C(Cl)C(Cl)=C1Cl, C1=CC=C2C=CC=CC2=C1, ClC1=CC=C(Cl)C=C1, ClC1=CC=C(Cl)C=C1, ClC1=CC=C(Cl)C=C1

Chromatogram and flask

Map of the United States with regions numbered 1 through 10.

CONTAMINATED SEDIMENTS:
RELEVANT STATUTES AND EPA PROGRAM ACTIVITIES

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Sediment Oversight Technical Committee

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INTRODUCTION

Sediment management issues are of importance to many programs within the U.S. Environmental Protection Agency (EPA). In the summer of 1988, U.S. Environmental Protection Agency's (EPA) Office of Water Regulations and Standards (OWRS) formed two committees to identify, coordinate, and provide guidance on activities relating to the assessment and management of sediments contaminated with toxic chemicals: a Sediment Oversight Technical Committee and a Sediment Oversight Steering Committee. The goal of these committees is to facilitate technically defensible, publicly acceptable decisions at various stages in the management process (e.g., decisions concerning chemical/biological assessment of contaminated sediment, need for and type of source control action warranted, and evaluation of sediment remedial action alternatives). In order to achieve this goal, it is necessary to have an understanding of Program Office activities and needs relating to contaminated sediment issues, and the specific statutes under which these activities fall. This baseline information is the subject matter of the present document. The report also summarizes the interrelationship between U.S. EPA Program Offices, relevant environmental statutes, and the applications of sediment quality measures in implementing these statutes. Measures of sediment quality may be either chemical-specific or non chemical-specific (descriptive).

STATUTES

Many federal statutes enable the various U.S. EPA program offices to address existing or potential sediment quality issues. The sections of these statutes pertaining to sediment quality issues are summarized in Table 1.

EXISTING AND POTENTIAL APPLICATIONS OF STATUTES

Existing and potential applications of sediment quality measures in implementing relevant statutes, as compiled from U.S. EPA program summaries (at back of this report), were divided into three major categories, as defined below. These descriptions are not definitive, and are intended to indicate the general scope and nature of approaches for assessing and managing sediment quality. A matrix cross-referencing these activities to statutes and U.S. EPA programs is also provided.

Site Characterization

Site characterization includes activities to identify areas that have been affected by chemical contamination and to characterize the extent of contamination effects. There are two general classes of activities:

- Problem Area Identification - Surveys to identify problem areas, and to characterize the extent and severity of contamination within those areas.

- National Environmental Policy Act (NEPA) or Clean Water Act Section 404 Permit Review or Document Preparation - Surveys or reviews of existing sediment conditions to evaluate baseline conditions and predict potential impacts associated with a proposed activity and its alternatives. Mitigation and monitoring programs are evaluated for need and possible inclusion in project authorization or permit conditions. NEPA documents include Environmental Assessments and Environmental Impact Statements.

Contaminant Source Control

The contaminant source control category includes activities to deter sediment contamination by restricting or eliminating pollutant discharges or the disposal (dumping) of dredged materials or other wastes to the aquatic environment. The definition of discharge is restricted for the purposes of this document to mean the introduction of pollutants through fixed devices such as conduits, pipes, drainage ditches, outfalls, or other structures. Dumping is defined as the transportation and disposition of dredged materials or other wastes at aquatic sites by other means. There are six classes of activities:

- Discharge Siting - Information concerning the nature of a proposed discharge, how it would affect sediment quality in the proposed receiving environment, and appropriateness of its proposed location.
- Discharge Permit Decisions - Information used to limit sediment contamination in the vicinity of existing discharges that are regulated through NPDES or other permits.
- Discharge Monitoring - Site-specific measurements of sediment quality to identify sources of sediment contamination, determine compliance with discharge permits, and substantiate decisions to modify or restrict reissuance of such permits.
- Dump Site Designation - Evaluation of sediment conditions at the proposed disposal site, and acceptability of the site as the environmentally preferable location for disposal of sediments.

- Dump Site Monitoring - Determination of compliance with sediment quality and water quality criteria or objectives at an existing disposal site, and evaluation of the containment/spread of disposal impacts (physical, chemical, and biological).
- Dredged Material Evaluation - Evaluation of the acceptability of dredged material for various disposal options (e.g., upland, in-lake confined, or open-water disposal) or for a specific site.

Remediation

Activities to restore contaminated sediments to environmentally acceptable levels fall into three classes:

- Cleanup Area Selection - Identification of the extent or area of sediment contamination that is associated with toxic biological effects, or other impacts, that warrant remediation
- Selection of Cleanup Goals - Identification of acceptable residual levels of contamination that are not associated with toxic biological effects or other adverse impacts
- Site Restoration - Implementation of remedial action and verification that objectives, as defined by the selected cleanup area and cleanup goals, are achieved. Verification could include monitoring to determine short-term and/or long-term impacts of the remedial activity itself, and documenting site recovery.

SUMMARY OF TRENDS IN STATUTES, PROGRAMS, AND ACTIVITIES

Many U.S. EPA regional and headquarters offices have programs to implement the nation's environmental laws (Table 1) that address issues of sediment quality. A representative sampling of U.S. EPA Program Offices that are involved with assessment and management of (potentially) contaminated sediments is listed in Table 2. The interrelationship between these Program Offices, the environmental statutes listed in Table 1, and the applications of sediment quality measures in implementing the statutes is presented in Table 3. The boxes in Table 3 represent either current or potential applications. The tables begin on page 7.

Table 3 indicates that the broadest use of sediment quality measures, in terms of type of application and number of Program Offices involved, is found under the Clean Water Act. Taken as a group, the 17 Program Offices represented here currently or potentially employ sediment quality measures for all applications within the three major categories of site characterization, contaminant source control, and remediation. Under the Resource Conservation and Recovery Act (RCRA), the Office of Solid Waste and regional RCRA offices (e.g., Region V) may apply sediment quality measures for contaminant source control and remediation. The use of sediment quality measures under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Superfund Amendments and Reauthorization Act (SARA), by the Office of Emergency and Remedial Response and relevant regional offices, applies mainly to site characterization and remediation. Sediment quality measures could be applied to all three major application categories by all regions and the Office of Federal Activities under NEPA, and by the Great Lakes National Program Office and Region V under the Great Lakes Water Quality Agreement. The London Dumping Convention (LDC) sets forth constraints for the dumping of wastes and other matter in the ocean. Under the LDC, the Office of Radiation Programs uses geophysical and sediment quality measures for assessing the suitability of sites for disposal of low-level radioactive wastes; the Office of Marine and Estuarine Protection has final site designation authority. Under the Toxic Substances Control Act (TSCA), Marine Protection, Research, and Sanctu-

aries Act (MPRSA), and Clean Air Act, sediment quality measures apply mainly to site characterization and source control. More limited applications exist under the Rivers and Harbors Act and the U.S.-Japan Fishery Agreement Approval Act.

The activities of each Program Office relevant to sediment quality issues are discussed in greater detail in the individual program summaries which follow.

TABLE 1. SOME MAJOR LAWS OR AGREEMENTS
RELEVANT TO SEDIMENT QUALITY ISSUES

| Law/Section | Purpose |
|--|--|
| <u>Clean Water Act of 1977, as amended</u> | Establishes authority to protect the chemical, physical, and biological integrity of the nation's waters. |
| Section 101(a)(3) | Prohibits discharges of toxic pollutants in quantities that are toxic. All states have adopted narrative water quality standards based on this authority. As part of their narrative water quality standards, many states have adopted prohibitions against objectionable sediment deposits. |
| Section 104 ^a | Establishes national programs for the prevention, reduction, and elimination of pollution through research, experiments, and demonstrations. |
| 104(n)(1) ^a | Authorizes a study on effects of sedimentation on estuarine aquatic life. |
| Section 105 ^a | Establishes a grant system for research and development projects on contaminant sources. |
| Section 115 | Provides authority to identify the location of in-place pollutants with emphasis on toxic pollutants in harbors and navigable waterways. |
| Section 117(a)(3) and (4) | Establishes Chesapeake Bay Program Office within U.S. EPA to determine the impact of sediment deposition in the bay and identify the sources, rates, routes, and distribution patterns of such sediment deposition. |
| Section 118 ^a | Establishes the Great Lakes National Program Office within U.S. EPA. Requires a 5-yr study and demonstration program to assess the significance of contaminated bottom sediment problems and possible remedial technologies that can be used to address these problems. |
| Section 118(c)(3) ^a | Requires the Great Lakes National Program Office to conduct a 5-year study and demonstration projects relating to the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediments. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|-----------------------------|---|
| Section 301 | Establishes effluent limitations. |
| 301(b) | Provides for effluent limitations for priority pollutants from point sources, other than publicly owned treatment works. |
| 301(b)(1)(C) | Requires additional stringent limitations deemed necessary, such as those to meet any other water quality standards, treatment standards, or compliance schedules. |
| 301(h) | Allows modifications of NPDES permits for publicly owned treatment works that discharge to marine waters. Allows less than secondary treatment for their wastewater when specific criteria are met, including the attainment and maintenance of water quality, protection of a balanced indigenous population of fish, shellfish, and wildlife, and allowance of recreational activities. |
| Section 302 | Allows establishment of water quality-based point source effluent limitations. |
| Section 303 ^a | Allows states to adopt sediment standards. |
| 303(d) | Requires states to identify and establish total maximum daily loads (TMDLs) for waters where technology-based effluent limitations are not stringent enough to implement applicable water quality standards. States are required to establish a priority ranking for these water quality-limited segments based on the severity of the pollution and the uses to be made of such waters. Sediment contamination that would cause a violation of water quality standards would be considered under this Section. |
| Section 304(a) ^a | Authorizes development and publication of criteria reflecting the scientific knowledge on the environmental effects of pollutants. |
| 304(l) ^a | Requires states to identify various types of navigable waters not expected to meet water quality standards including those due entirely or substantially to point source discharges of toxic pollutants. For waters impaired by toxics, also requires states to prepare individual control strategies for those point sources responsible for the impairment. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--------------------------|---|
| Section 305(b) | Requires states to assess the quality of their navigable waters in terms of the extent to which they meet the goals of the CWA; requires EPA to prepare a report to Congress analyzing state assessments. In these assessments, the U.S. EPA encourages states to identify areas with sediment contamination, sources of contamination, and contaminants of concern. |
| Section 309 | Grants federal enforcement authority to U.S. EPA over Section 402 or 404 permit violations, if state actions are judged to be insufficient over a specified period. |
| Section 311 | Establishes the National Contingency Plan. Prohibits discharge of oil or hazardous material into or upon navigable waters, adjoining shorelines, or into or upon waters of the contiguous zone. Authorizes determination of quantities of such substances that may be harmful to the environment, removal of such substances at any time by the U.S. government, and establishment of criteria for removal plans. |
| Section 314 ^a | Establishes Clean Lakes Program. Provides funding and technical assistance related to sediment contamination of publicly owned lakes. |
| Section 319 ^a | Requires states to identify sources of nonpoint pollution and the bodies of water affected by such pollution, and to develop nonpoint source management programs. |
| Section 320 ^a | Authorizes implementation of the National Estuary Program, which includes data collection relating to pollutant loadings from in-place sediment and point and nonpoint sources, and development of a management plan. |
| Section 401 | Requires state or interstate agency certification of applicants for a federal license or permit to discharge into navigable waters. |
| Section 402 | Authorizes the NPDES permitting program to regulate the discharge of pollutants from point sources into navigable waters. |
| Section 403(c) | Requires promulgation of guidelines for determining degradation of waters of the territorial seas, the contiguous zone, and the oceans for ocean discharges with Clean Water Act Section 402 permits. Includes the effects of disposal of point source pollutants on human health and the marine ecosystem. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|----------------------------------|--|
| Section 404 | Regulates the discharge of dredged and fill material into waters of the U.S., which includes inland waters, wetlands, and the territorial sea. Under Section 404, U.S. EPA, in conjunction with the Corps of Engineers, has developed the 404(b)(1) guidelines, which are the criteria used in evaluating discharges of dredged or fill material. |
| Section 405 | Prohibits disposal of sewage sludge where pollutants from such sludge could enter navigable waters, except as permitted under Section 402. Requires development of sludge use and disposal guidelines. |
| Section 504 | Authorizes the U.S. EPA Administrator to bring suit on behalf of the United States to restrain any person from discharging pollution that presents an imminent and substantial endangerment to human health or livelihood. |
| Section 509 | Authorizes the U.S. EPA Administrator to issue subpoenas for the production of relevant information for purposes of obtaining information under Sections 305 or 507(e). Describes procedures for review of agency actions, including promulgation of standards and issuance of permits. |
| <u>MPRSA of 1972^b</u> | Provides authority to regulate the transportation for dumping and the dumping of material into ocean waters, including specific regulations and criteria for low-level radioactive wastes. |
| Section 101 | Prohibits the transportation of any materials, subject to regulations pursuant to Section 108, into or out of the U.S. for the purpose of dumping it into ocean waters, unless permits have been issued under sections 102 or 103. |
| Section 102 | Section 102(a) authorizes the U.S. EPA Administrator to issue permits for the transportation of materials other than dredged material for the purpose of dumping into ocean waters, where the Administrator determines that such dumping will not unreasonably degrade or endanger human health, welfare, or amenities; the marine environment ecological systems; or their economic potential. Requires that the Administrator establish and apply criteria for reviewing and evaluating such permit applications. Section 102(b) authorizes the Administrator to establish and issue various categories of permits. Section 102(c) authorizes the Administrator to designate sites for ocean dumping and to set times when dumping can and cannot occur. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|-------------|--|
| Section 103 | Section 103(a) authorizes the Secretary of the Army to issue permits for transportation of dredged material for the purpose of ocean disposal. Section 103(b) requires that the Secretary of the Army apply the criteria developed by U.S. EPA under Section 102 in issuing permits, and utilize sites designated by the Administrator when feasible. Section 103(c) requires the Administrator's approval of Section 102 permits proposed by the Secretary of the Army. Section 103(d) authorizes the Administrator to grant waivers to the Secretary for materials which fail U.S. EPA's criteria. Section 103(e) authorizes the Secretary to issue regulations establishing procedures for the disposal of dredged material from federal projects in lieu of permits. |
| Section 104 | Specifies subject matter of permits. Allows issuance of general permits for transportation for dumping, or dumping, or both, of specified materials that have minimal adverse impact. Allows limitations of, denial of, alterations to, and revocation of permits. Specifies conditions under which low-level radioactive waste may be dumped. Establishes requirement for a Radioactive Material Disposal Impact Assessment and contents thereof. |
| Section 105 | Authorizes the U.S. EPA Administrator to assess civil penalties or criminal fines to any person violating any provision, regulation, or permit issued pursuant to the MPRSA. Dumping actions resulting from emergencies to safeguard life at sea are excluded from fines or penalties. |
| Section 106 | Requires that previous regulatory activities now regulated by MPRSA be treated as void. Exclusions are the Rivers and Harbors Act of 1899, as amended, and the Fish and Wildlife Coordination Act, as amended. Section 106(c) requires the U.S. EPA Administrator to coordinate with the Secretary of the Army prior to permitting dumping material, other than dredged, that may adversely affect navigation, an approach to a harbor, or create an artificial island on the Outer Continental Shelf. Section 106(d) enables state, interstate, regional, federal, or commonwealth territories to propose specific criteria to the U.S. EPA Administrator for potential inclusion in the MPRSA. Section 106(f) restricts dumping of dredged material, not covered in 102(a), into Long Island Sound from several types of activities. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|---------------------------------|--|
| Section 107 | Authorizes the U.S. EPA Administrator or Secretary of the Army to utilize, by agreement, personnel or other resources from other federal or state organizations to carry out responsibilities under MPRSA, on a reimbursable or non-reimbursable basis. Section 107(b) allows for the delegation of permit application review and evaluation to these same entities, by agreement, on a reimbursable or nonreimbursable basis. |
| Section 108 | Authorizes the U.S. EPA Administrator, and the Secretaries of the Army and the department housing the Coast Guard, to issue regulations as deemed appropriate. |
| Section 201 | Requires the heads of the Department of Commerce, U.S. EPA, and the department housing the Coast Guard to initiate a comprehensive research and monitoring program on the effects of dumping dredged material into ocean or coastal waters, including the Great Lakes and its connecting waters. |
| Section 203 | Requires the U.S. EPA Administrator to research or otherwise study ways to minimize, end, or develop alternatives to dumping materials that unreasonably degrade or endanger human health, welfare, marine ecosystems, or potential economic resources. |
| <u>CERCLA/SARA</u> ^b | Establishes a fund and comprehensive program for identifying, investigating, and remediating hazardous waste sites and recovering costs from responsible parties. Guidelines for assessment and cleanup of sediment contaminated sites are being developed. SARA amends CERCLA on a number of programmatic, enforcement, and judicial issues, and establishes new programs and funding levels. |
| Section 102 | Grants authority to designate hazardous substances and to establish reportable quantities. |
| Section 103 | Requires that releases of reportable quantities be reported to the National Response Center, which must notify all appropriate agencies. Establishes penalties for failure to report releases. |
| Section 104(a)(b) | Authorizes the President to investigate and implement remedial action where hazardous substances have been released or where contaminants present an imminent and substantial danger to public health and welfare. |
| 104(i) | Establishes the Agency for Toxic Substances and Disease Registry (ATSDR), with authority to assess exposures to toxic substances and conduct health assessments. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|----------------|---|
| Section 105 | Provides for revision and republication of the National Contingency Plan for the removal of oil and hazardous substances, including the addition of the national hazardous substance response plan to establish procedures and standards for responding to releases of hazardous substances. To the extent feasible, revises the Hazard Ranking System to assure accurate assessment of the relative degree of risk to human health and the environment posed by hazardous sites. Allows for citizen petition for preliminary assessment of hazards to public health and the environment due to actual or threatened release. |
| Section 106 | Authorizes the President to secure relief to abate imminent and substantial danger due to actual or threatened release of hazardous substances. Establishes penalties for failing to respond to such a request, and reimbursement provisions. |
| Section 107 | Establishes liability for removal, remedial action costs, damage to natural resources, and costs of health effects study. |
| 107(d) | Excludes from liability persons who render care, assistance, or advice in accordance with the National Contingency Plan or at direction of the Onscene Coordinator. Does not preclude liability for costs or damages due to negligence. |
| Section 111(c) | Releases monies from the Hazardous Substances Superfund for restoration, rehabilitation, and replacement of lost or damaged natural resources; enforcement and abatement actions; health-related studies by the response equipment; hazardous waste worker health and safety program; RI/FS oversight; research, development, and demonstration costs; and other purposes. |
| Section 111(e) | Makes available funds from the Superfund for the provision of alternative water supplies in any case involving groundwater contamination outside the boundaries of a federally owned facility in which the federally owned facility is not the only PRP. |
| Section 113(b) | Assigns exclusive original jurisdiction over all controversies arising under CERCLA to U.S. district courts. Establishes venue in the district where the release or damages occurred, or where the defendant resides, may be found, or has his principal office. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--------------------------|---|
| Section 121 | Establishes cleanup standards. |
| 121(b) | Establishes preference for remedial actions where treatment permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances. Establishes offsite transport and disposal of untreated contaminated materials as the least desirable alternative. Establishes evaluation criteria for remedial alternatives. |
| 121(c) | Establishes 5-yr review requirement for remedial actions involving keeping hazardous material onsite. |
| 121(d) | Requires that cleanups assure protection of human health and the environment and meet applicable or relevant and appropriate regulations, except as noted. |
| 121(e) | Waives permit requirements for remedial action conducted entirely onsite and in compliance with Section 121, except as noted. |
| 121(f) | Establishes guidelines for state involvement. |
| Section 122 | Establishes authority and mechanisms to enter into settlements with potentially responsible parties and establishes limitations on future liability. |
| Section 313 | Requires owners and operators of certain facilities that manufacture, import, process, or otherwise use one or more of the chemicals listed in Section 131 (about 300) to annually report that facility's release of the chemical to the air, soil, or water, or transport to another site. The Office of Toxic Substances (OTS) is responsible for administering Section 313. |
| <u>RCRA</u> ^b | Authorizes efforts to promote the protection of human health and the environment and to conserve valuable material and energy resources by regulating the treatment, storage, transportation, and disposal of hazardous wastes that may have adverse effects on health and the environment. Includes provisions and guidance for establishing and permitting solid waste disposal facilities. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--------------------------|---|
| Section 1006 | Specifies that RCRA does not apply to activities or substances regulated by the Clean Water Act, Safe Drinking Water Act, Marine Sanctuaries Act, or Atomic Energy Act of 1954, except when not inconsistent with those acts. Provides for integration with other specified major environmental statutes. |
| Section 1008 | Requires development of guidelines for solid waste management, including those for protection of public health. |
| Section 3001(a)(b) | Requires development and promulgation of regulatory criteria for identification and listing of hazardous waste. The listed hazardous wastes, component hazardous constituents, and hazardous waste characteristics are given in 40 CFR 261. |
| Section 3004(c)(d)(e)(g) | Establishes performance standards applicable to owners and operators of hazardous waste treatment, storage, and disposal facilities. Requires review of all hazardous wastes, except those already prohibited from land disposal, and promulgation of regulations prohibiting one or more methods of land disposal of those wastes, except for methods determined to be protective of human health and the environment. Prohibits the disposal of liquids and requires the treatment of RCRA wastes prior to placement in land disposal facilities. Treatment specifics and performance criteria for RCRA waste types are provided in 40 CFR 268. Prior to the land disposal, "RCRA sediments" would need to comply with the performance criteria associated with their waste category. |
| 3004(o) | Provides minimum technology requirements for RCRA land disposal facilities. The design of a land disposal facility for "RCRA sediments" would need to comply with these provisions. |
| 3004(u)(v) | Section 3004(u) authorizes the U.S. EPA to require corrective action for all releases of hazardous waste or constituents from any solid waste management unit at a treatment, storage, or disposal (TSD) facility seeking a permit under 3005(c), regardless of the time at which waste was placed in the unit. Under Section 3004(v), the U.S. EPA is directed to establish standards requiring corrective action for releases from a TSD facility that have migrated beyond the facility boundary. These sections cover releases to all environmental media, including surface water and sediments. However, 40 CFR 261.4(a)(2) specifically exempts wastewater discharges from point sources subject to Section 402 of the Clean Water Act. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--------------------------|--|
| Section 3005 (b)(c) | Requires permits for treatment, storage, or disposal of hazardous waste. Establishes requirements for permit application. |
| Section 3008(h) | Provides for federal assessment of penalties for violations of compliance with disposal permits, including violations of applicable regulations and standards. |
| Section 3019 | Requires that application for Section 3005(c) permits for a landfill or surface impoundment be accompanied by information on potential exposure to hazardous materials if released from the unit, including reasonably foreseeable potential releases, potential pathways of human exposure, and potential magnitude and nature of the human exposure. Authorizes the U.S. EPA Administrator or the State to request the ATSDR [see CERCLA 104(i)] to conduct a health assessment in connection with such facility. |
| Section 7003 | Authorizes the U.S. EPA Administrator to sue any person who has contributed or is contributing to poor disposal practices to restrain such person from such practices and to take other action as may be necessary, in light of imminent and substantial endangerment to human health or the environment. |
| Section 9003 | Requires promulgation of "release detection, prevention, and correction" regulations applicable to all owners and operators of underground storage tanks (UST). Requires promulgation of performance standards for new UST. |
| <u>TSCA</u> ^b | Authorizes regulation of new and existing chemical substances and mixtures that present an unreasonable risk of injury to health and the environment (especially PCBs and dioxin). Implementation of provisions under TSCA for establishment of an inventory of chemicals manufactured in, or imported into, the U.S. created a distinction between "existing" and "new" chemicals. Those substances added to the TSCA inventory are "existing" chemicals, while chemicals not on the inventory are "new" for purposes of regulation under TSCA. |
| Section 4(a) | Authorizes U.S. EPA to require, by rule, that chemical manufacturers or processors conduct tests (toxicity or fate testing) to develop data to determine whether an "existing" chemical presents an unreasonable risk of injury to health or the environment. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--------------|---|
| 4(b) | States the requirements and effects for which testing rules can be developed under Section 4(c). |
| 4(e) | Authorizes development of the ITC priority list for promulgation of rules under Section 4(a). |
| Section 5 | Requires premanufacture notice of new chemicals, review of potential risks by U.S. EPA, and, if warranted, toxicity testing and development of environmental fate data. If U.S. EPA finds that certain activities associated with entry of a new chemical into commerce will present an unreasonable risk of injury to human health or the environment, the agency can prohibit its manufacture or importation, or can impose certain restrictions limiting human exposure to the substance, or its release to the environment. Authorizes U.S. EPA to regulate (e.g., prohibitions, restrictions) those "new" chemicals that U.S. EPA finds may present an unreasonable risk of injury to human health or the environment, until sufficient toxicological or environmental fate data are developed to enable U.S. EPA to determine whether those chemicals will present an unreasonable risk. Section 5(e) permits the U.S. EPA to prohibit or limit the manufacturing, processing, or distribution of a chemical substance when insufficient information about its health and environmental effects are available. Section 5(f) permits the U.S. EPA to regulate the manufacturing, processing, or distribution of a chemical substance to protect against unreasonable risks to health or the environment. |
| Section 6 | Authorizes U.S. EPA to regulate "existing" chemicals that can or will present unreasonable risks to health or environment, including sediments with >50 ppm PCBs if deposited after the effective date of TSCA (1978), or deposited previously and subsequently disturbed or dredged. Authorizes U.S. EPA to take a wide range of regulatory actions if the agency finds that exposure to an "existing" chemical presents, or will present, an unreasonable risk to human health or to the environment. Authorizes comprehensive actions, including bans, to control unreasonable risks at any stage in a chemical substance's life cycle. |
| Section 8(a) | Authorizes U.S. EPA to issue rules to gather information and monitor the activities of chemical manufacturers, importers, and processors of specific chemicals. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|------------------------------------|---|
| <u>FIFRA</u> ^b | Gives authority to protect health and environment against unreasonable adverse effects from application of insecticides, fungicides, and rodenticides. |
| <u>NEPA</u> ^b | NEPA, together with implementing regulations of the Council on Environmental Quality, gives U.S. EPA its general statutory authority to review major federal actions affecting the quality of the human environment. Federal agencies are required to consult with all other agencies having jurisdiction by law or special expertise over such environmental considerations, and thereafter prepare a detailed statement of these environmental effects. [e.g., environmental assessments or environmental impact statements (EIS).] |
| Section 102 | Requires that federal policies, regulations, and laws be administered in accordance with policies set forth in NEPA. Requires development of procedures and methods to consider environmental values and amenities as well as economic and technical factors in decision-making. Requires agencies to provide input, review, or comment on the effects that federal proposals have on areas within the agencies' expertise or jurisdiction. |
| <u>NOPA</u> ^b | Confers authority to coordinate pollution programs among the federal agencies involved in marine research, monitoring, and regulations. |
| <u>Clean Air Act</u> | Authorizes U.S. EPA to set air quality standards and to regulate atmospheric emissions from point sources. |
| Section 309 | Requires U.S. EPA to review and comment in writing on the environmental impact (i.e. not just air impacts) of federal projects, actions, and proposed legislation. |
| <u>River and Har- bors Act</u> | Authorizes U.S. EPA review of operations related to rivers and estuaries. |
| Section 10 | Authorizes review of proposed dredge disposal actions. |

TABLE 1. (Continued)

| Law/Section | Purpose |
|--|--|
| <u>U.S.-Canada Great Lakes Water Quality Agreement</u> | Provides regional and lake-wide plans for improving and maintaining water quality of the Great Lakes. |
| Annex 7 | Requires plan for management of dredged material. |
| Annex 14 | Requires assessment of impacts of contaminated bottom sediments. |
| <u>U.S.-Japan Fish- ery Agreement Approval Act</u> | Provides guidelines for initiation of the New York Bight Restoration Plan. |
| Section 2301 | Requires the U.S. EPA Administrator, in consultation with other federal, state, and interstate agencies, to prepare the New York Bight Restoration Plan. Mandatory plan components are identified. Section 2301(8) requires a comprehensive assessment of alternatives to sewage sludge dumping. |
| <u>London Dumping Convention</u> | Obligates signatory countries to take all practicable steps to prevent the pollution of the sea that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities, or to interfere with other legitimate uses of the sea. |

^a 1987 amendments to the Clean Water Act of 1977.

^b MPRSA = Marine Protection, Research, and Sanctuaries Act.

CERCLA/SARA = Comprehensive Environmental Response, Compensation, and Liability Act/Superfund Amendments and Reauthorization Act.

RCRA = Resource Conservation and Recovery Act.

TSCA = Toxic Substances Control Act.

FIFRA = Federal Insecticide, Fungicide, and Rodenticide Act.

NEPA = National Environmental Policy Act

NOPA = National Ocean Program Act.

TABLE 2. U.S. EPA OFFICES AND SEDIMENT PROGRAMS

| Office | Acronym ^a |
|--|----------------------|
| Office of Emergency and Remedial Response (Superfund) | OERR |
| Office of Federal Activities | OFA |
| Office of Marine and Estuarine Protection | OMEP |
| Office of Radiation Programs | ORP |
| Office of Solid Waste | OSW |
| Office of Toxic Substances | OTS |
| Office of Water Regulations and Standards, Assessment and Watershed Protection Division | AWPD |
| Office of Water Regulations and Standards, Criteria and Standards Division | CSD |
| Office of Water Enforcement and Permits | OWEP |
| Office of Wetlands Protection | OWP |
| Chesapeake Bay Program | CBP |
| Great Lakes National Program Office | GLNPO |
| Water Management Division - Region I | WMD-I |
| Environmental Services Division - Region II | ESD-II |
| Superfund - Region II | SUPFND-II |
| Water Management Division - Region II | WMD-II |
| Environmental Services Division - Region III | ESD-III |
| Superfund - Region IV | SUPFND-IV |
| Environmental Sciences Division - Region V | ESD-V |
| Planning and Management Division - Region V | PMD-V |
| Office of RCRA - Region V | RCRA-V |
| Office of Superfund - Region V | SUPFND-V |
| Water Division - Region V | WD-V |

TABLE 2. (Continued)

| Office | Acronym ^a |
|---|----------------------|
| Water Management Division/Environmental Services Division - Region VI | WMD/ESD-VI |
| Environmental Services Division - Region VII | ESD-VII |
| Water Management Division - Region VII | WMD-VII |
| Water Management Division - Region IX | WMD-IX |
| Water Division - Region X | WD-X |
| Hazardous Waste Division - Region X | HWD-X |
| All regions | AR |
| All coastal regions | ACR |

^a Acronyms used in Table 3.

TABLE 3. REPRESENTATIVE U.S. EPA PROGRAM APPLICATIONS OF SEDIMENT QUALITY MEASURES IN IMPLEMENTING ENVIRONMENTAL LAWS^a

| STATUTE | RELEVANT SECTIONS | PROGRAM OFFICE ^{b,c} | SITE CHARACTERIZATION | | CONTAMINANT SOURCE CONTROL | | | | | | REMEDIATION | | |
|--|-------------------------|-------------------------------|-----------------------------|--|---|-------------------|----------------------|-----------------------------------|---------------------|-----------------------------|------------------------|----------------------|------------------|
| | | | PROBLEM AREA IDENTIFICATION | NEPA SECTION 404 PERMIT REVIEW OR DOCUMENT PREPARATION | DISCHARGE PERMIT DECISIONS ^d | DISCHARGE SETTING | DISCHARGE MONITORING | DUMPSITE DESIGNATION ^e | DUMPSITE MONITORING | DREDGED MATERIAL EVALUATION | CLEANUP AREA SELECTION | CLEANUP GOAL SETTING | SITE RESTORATION |
| CLEAN WATER ACT (CWA) (AMENDED 1987) | 101 (a)(3) | OWEP | | | | | | | | | | | |
| | 104 | CSD | | | | | | | | | | | |
| | | WMD-I | | | | | | | | | | | |
| | | WMD/ESD-VI | | | | | | | | | | | |
| | | ESD-III | | | | | | | | | | | |
| | 115 | ESD-VII | | | | | | | | | | | |
| | 117 (a)(3)(4) | CBP | | | | | | | | | | | |
| | 118 | WMD-II | | | | | | | | | | | |
| | 118 (c)(3) ^f | GLNPO | | | | | | | | | | | |
| | 301 (h) | OWEP | | | | | | | | | | | |
| | 301 (b)(1)(c) | OWEP | | | | | | | | | | | |
| | 303/304 | AWPD | | | | | | | | | | | |
| | | CSD | | | | | | | | | | | |
| | | OWEP | | | | | | | | | | | |
| | | WMD-I | | | | | | | | | | | |
| | | WD-V | | | | | | | | | | | |
| | | WMD/ESD-VI | | | | | | | | | | | |
| | | WMD-VII | | | | | | | | | | | |
| | | HWD-X | | | | | | | | | | | |
| | | WD-X | | | | | | | | | | | |
| | 305 (b) | AWPD | | | | | | | | | | | |
| | 311 | ESD-VII | | | | | | | | | | | |
| | 314 | WD-V | | | | | | | | | | | |
| | | WMD-VII | | | | | | | | | | | |
| | 320 | OWEP | | | | | | | | | | | |
| | | WMD-I | | | | | | | | | | | |
| | | WMD-II | | | | | | | | | | | |
| | | WD-X | | | | | | | | | | | |
| | 402 | OWEP | | | | | | | | | | | |
| | 403 (c) | OWEP | | | | | | | | | | | |
| | ESD-III | | | | | | | | | | | | |
| 404 | OFA | | | | | | | | | | | | |
| | OWP | | | | | | | | | | | | |
| | GLNPO | | | | | | | | | | | | |
| | AR | | | | | | | | | | | | |
| RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) | 3001 (a)(b) | RCRA-V | | | | | | | | | | | |
| | 3004 (c)(d)(e)(g) | RCRA-V | | | | | | | | | | | |
| | 3004(u)(v) | RCRA-V | | | | | | | | | | | |
| | | OSW | | | | | | | | | | | |
| | 3005 (c) | RCRA-V | | | | | | | | | | | |
| | 3008 (h) | RCRA-V | | | | | | | | | | | |
| 7003 | OSW | | | | | | | | | | | | |
| COMPREHENSIVE ENVIRONMENTAL RESPONSE AND LIABILITY ACT (CERCLA) and SUPERFUND AMENDMENT AND REAUTHORIZATION ACT (SARA) | 104 | SUPFND-II | | | | | | | | | | | |
| | | SUPFND-V | | | | | | | | | | | |
| | | HWD-X | | | | | | | | | | | |
| | 105 | OERR | | | | | | | | | | | |
| | 106 | SUPFND-V | | | | | | | | | | | |
| | 107 (d) | SUPFND-II | | | | | | | | | | | |
| | | SUPFND-V | | | | | | | | | | | |
| | | HWD-X | | | | | | | | | | | |
| | 111 (c)(e) | SUPFND-II | | | | | | | | | | | |
| | | SUPFND-V | | | | | | | | | | | |
| | | HWD-X | | | | | | | | | | | |
| | 121 | OERR | | | | | | | | | | | |
| | | SUPFND-II | | | | | | | | | | | |
| | | SUPFND-V | | | | | | | | | | | |
| | | HWD-X | | | | | | | | | | | |
| 122 | SUPFND-IV | | | | | | | | | | | | |
| | SUPFND-II | | | | | | | | | | | | |
| | SUPFND-V | | | | | | | | | | | | |
| | HWD-X | | | | | | | | | | | | |
| 313 | OTS | | | | | | | | | | | | |

TABLE 3 (Continued)

| STATUTE | RELEVANT SECTIONS | PROGRAM OFFICE ^{b,c} | SITE CHARACTERIZATION | | CONTAMINANT SOURCE CONTROL | | | | | REMEDATION | | |
|--|-------------------|-------------------------------|-----------------------------|--|---|------------------|----------------------|-----------------------------------|---------------------|-----------------------------|------------------------|----------------------|
| | | | PROBLEM AREA IDENTIFICATION | NEPA/SECTION 404 PERMIT REVIEW OR DOCUMENT PREPARATION | DISCHARGE PERMIT DECISIONS ^d | DISCHARGE SITING | DISCHARGE MONITORING | DUMPSITE DESIGNATION ^e | DUMPSITE MONITORING | DREDGED MATERIAL EVALUATION | CLEANUP AREA SELECTION | CLEANUP GOAL SETTING |
| TOXIC SUBSTANCES CONTROL ACT (TSCA) | 4 | OTS | ■ | | | ■ | | ■ | | | | |
| | 5 (e)(f) | OTS | | | | ■ | | ■ | | | | |
| | 6 | OTS | ■ | | | ■ | | ■ | | | | |
| | | ESD-V | | | | | | | | | | |
| | 8 (a) | OTS | | | | ■ | | | | | | |
| NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) | 102 | OFA | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | AR | | | | | | | | | | |
| CLEAN AIR ACT | 309 | OFA | | ■ | | | | ■ | | ■ | | |
| | | AR | | | | | | | | | | |
| MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (MPRSA) | 102 | OFA | | ■ | | | | ■ | | | | |
| | | OMEPA | | | | | | | | | | |
| | | ACR | | ■ | | | | ■ | ■ | | | |
| | 103 | OMEPA | | ■ | | | | ■ | | ■ | | |
| | | ACR | | | | | | | | | | |
| | | OFA | | ■ | | | | | | | | |
| | 104 | ORP | | | | | | ■ | ■ | | | |
| | | OMEPA | | | | | | | | | | |
| | | ACR | | ■ | | | | ■ | ■ | ■ | | |
| | 201 | WMD-IX | | | | | | ■ | ■ | | | |
| 203 | WMD-II | | | | | | | | | ■ | | |
| | WMD-IX | | | | | | | | | | | |
| RIVERS AND HARBORS ACT | 10 | OFA | | ■ | | | | | | | | |
| GREAT LAKES WATER QUALITY AGREEMENT OF 1978 (AMENDED 1987) | 7 | GLNPO | | | | | | ■ | ■ | ■ | | |
| | 14 | GLNPO/WD-V | ■ | | | | | ■ | ■ | ■ | ■ | ■ |
| U.S.-JAPAN FISHERY AGREEMENT APPROVAL ACT | 2301 | WMD-II | ■ | | | | | | | | | |
| LONDON DUMPING CONVENTION | | ORP | ■ | | | | | ■ | ■ | ■ | | |
| | | OMEPA | | | | | | | | | | |

^a The boxes in this table represent either current or potential applications of environmental statutes. See Program Summaries chapter for discussion of contaminated sediment-related activities in each Program Office.

^b Program Office acronyms are defined in Table 2.

^c The Program Offices listed here are a representative sampling of U.S. EPA offices involved with contaminated sediments, and does not include all relevant regional offices.

^d Discharge as defined here does not include material (e.g., dredged material) that is disposed of pursuant to MPRSA or CWA Section 404.

^e Dumpsite includes any area where sediment or other material is disposed of, regardless of purpose (e.g., MPRSA Section 103, CWA Section 404).

^f The 118 (c)(3) program is a "study and demonstration" program (see Program Summary No. 12).

PROGRAM SUMMARIES

Descriptions of the activities performed by various U.S. EPA programs that relate to sediment quality are provided in the following section.

PROGRAM SUMMARY 1: OFFICE OF FEDERAL ACTIVITIES
PROGRAM RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency
Office of Federal Activities

CONTACT PERSON

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STATUTORY BASIS

The statutory basis for the involvement of the U.S. EPA Office of Federal Activities with measurements of sediment quality is provided by the National Environmental Policy Act (NEPA), the Clean Air Act, and other federal environmental statutes.

NEPA, together with implementing regulations of the Council on Environmental Quality, gives U.S. EPA its general statutory authority to review major federal actions affecting the quality of the human environment. Federal agencies are required to consult with all other agencies having jurisdiction by law or special expertise over such environmental

considerations, and thereafter prepare a detailed statement of these environmental effects [e.g., environmental assessments or environmental impact statements (EIS)].

U.S. EPA has specific authority and responsibility under Section 309 of the Clean Air Act to review and comment in writing on the environmental impact of any matter relating to the duties and responsibilities granted pursuant to the Act or other provisions of the authority of the U.S. EPA Administrator, contained in any of the following:

- Legislation proposed by a federal department or agency
- Newly authorized federal projects for construction and any major federal action or actions other than a project for construction to which Section 102(2)(c) of NEPA applies
- Proposed regulations published by any department or agency of the federal government.

U.S. EPA's written comments must be made public at the conclusion of the review. In the event such legislation, action, or regulations are determined to be unsatisfactory from the standpoint of environmental quality, or inadequate, the determination on the matter may be referred to the Council on Environmental Quality for resolution.

Federal environmental laws require that, in most circumstances, facilities of the executive branch of the federal government comply with federal, state, and local pollution control requirements promulgated pursuant to, or effective under, relevant statutes. The Office of Federal Activities tracks compliance of these federal facilities with the appropriate environmental statutes.

TASK DESCRIPTION

What Decisions are Made?

The Office of Federal Activities and Regional Environmental Review Coordinators have the following responsibilities:

- Coordinate U.S. EPA review and comment on all federal draft and final EISs, proposed environmental regulations, and other proposed major actions that are considered to have significant environmental effects
- Review proposed federal projects for compliance with environmental statutes
- Ensure that U.S. EPA actions, including Superfund cleanup, comply with NEPA.

The following decisions are made or coordinated by the Office of Federal Activities and Regional Environmental Review Coordinators:

- Was an adequate analysis of alternatives conducted?
- Is the proposed project environmentally acceptable?
- Does the EIS contain sufficient information to determine project impacts?
- Is the action in compliance with Clean Water Act Section 404(b)(1) guidelines?

- Is the action in compliance with other appropriate federal laws (e.g., Clean Water Act, Marine Protection, Research, and Sanctuaries Act, Rivers and Harbors Act) and Executive Orders?

What Sediment Assessment Methods are Used to Make Decisions?

Office of Federal Activities and the Regional Environmental Review Coordinators make no independent decisions regarding identification, handling, or cleanup of contaminated sediment. Judgments about whether the proper sediment assessment method was employed by a federal agency in its impact assessment are based on the expertise of other U.S. EPA offices.

How are Sediment Assessment Methods Used To Make Decisions?

The Office of Federal Activities and the Regional Environmental Review Coordinators assess the environmental acceptability of proposed actions and the adequacy of the NEPA documents supporting these actions. The adequacy of the sediment assessment method can be a critical component supporting the determination of project acceptability and documentation adequacy. If the project or document is determined to be inadequate or environmentally unsatisfactory, EPA may decide to refer it to the President's Council on Environmental Quality.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Federal actions would continue to be reviewed for adequacy of site characterization, alternatives analysis, and impact analysis pursuant to NEPA and Section 309 of the Clean Air Act. A sediment assessment method handbook would be used to ascertain whether an appropriate level of testing was performed to comply with federal environmental protection statutes. Decisions would continue to be made in consultation with other U.S. EPA offices.

Such a manual might help to focus internal review of the adequacy of site characterization and impact assessment.

**PROGRAM SUMMARY 2: OFFICE OF MARINE AND ESTUARINE PROTECTION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Marine and Estuarine Protection

CONTACT PERSON

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Office of Marine and Estuarine Protection is provided by the London Dumping Convention (LDC); Sections 102, 103, 104, and 108 of the Marine Protection, Research, and Sanctuaries Act (MPRSA); by the Ocean Dumping Regulations (40 CFR 227 and 228) that implement the LDC and these sections of MPRSA; and by Sections 301(h), 320, and 403(c) of the Clean Water Act. A synopsis of the relevant sections of the LDC, MPRSA, and the Clean Water Act is provided in Table 1.

The focus of OMEP activities under the MPRSA is on the evaluation of in-place sediments and dredged materials that are proposed for ocean disposal. However, other materials that are proposed for ocean disposal are also evaluated.

OMEP activities under Sections 301(h) and 403(c) of the Clean Water Act focus on the protection of the marine environment from degradation by point source discharges.

Under Section 320 of the Clean Water Act, OMEP implements the National Estuary Program which includes the development of Comprehensive Conservation Management Plans for "Designated Estuaries." These plans may include suggestions for the remediation of contaminated sediments where applicable.

TASK DESCRIPTION

What Decisions are Made?

The acceptability of materials for ocean dumping must be determined under the Ocean Dumping Regulations. Decisions concerning the acceptability of dredged material proposed for ocean disposal include consideration of its grain size composition; proximity to known sources of pollution; concentrations of chemical contaminants in the liquid, suspended particulate, and solid phases of the material; toxicity of contaminants in each of these phases; and the bioaccumulation potential of chemical contaminants. Also, dredged materials proposed for ocean disposal under Section 103 of the Act must be evaluated using the criteria set forth in the Ocean Dumping Regulations to ensure compliance with Section 102 of the Act.

Decisions for granting modifications under Section 301(h) are determined according to the Section 301(h) regulations and require comprehensive information regarding the nature of the influent, level of treatment and nature of the effluent, design of the outfall, and environmental characterization of receiving waters. U.S. EPA has published a Section 301(h) Technical Support Document which provides a technical explanation of assessments required for

obtaining Section 301(h) modified discharge permits, as well as several other guidance documents for determining the impacts of sewage discharges on the marine environment.

Environmental assessments under the Section 403(c) regulations determine the degradation of marine receiving waters from point source discharges. These assessments require information characterizing the effluent, design of the pipe or outfall, and receiving waters. The Section 403(C) regulations provide for conditions to be placed on discharges receiving NPDES permits. The regulations provide criteria by which to determine whether a discharge will unreasonably degrade the marine environment. If there is insufficient information to make a determination of no unreasonable degradation, a permit may still be issued if there is a finding that no irreparable harm will occur under the terms and conditions of the permit. These terms and conditions must include a monitoring program designed to assure no irreparable harm and provide the information to make a finding regarding unreasonable degradation.

What Sediment Assessment Methods are Used to Make Decisions?

Methods for evaluation of dredged materials are described in the U.S. EPA and U.S. Army Corps of Engineers (1977) implementation manual for Section 103 of MPRSA, *Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters*, which is commonly known as the "Green Book." This manual provides guidance for the following:

- Collection and preparation of dredged material samples
- Chemical analyses of a number of metals and organic substances in the liquid phase
- A variety of bioassays to assess the potential toxicity of the various phases of dredged material

- Field and laboratory determinations of the bioaccumulation potential of chemical contaminants in dredged material

- Evaluation of mixing zone characteristics and determination of compliance with water quality criteria.

The Green Book guidance is currently being revised to incorporate research that has been completed since its publication in 1977, and to address requirements of proposed revisions to the Ocean Dumping Regulations.

If a 301(h) waiver is granted, the permittee must establish a monitoring program, including ambient monitoring, to assure the maintenance of marine environmental quality, including a balanced indigenous population of organisms. Section 301(h) monitoring programs measure biological, sediment, and water quality variables. Monitoring programs place an emphasis on determining the health and bioaccumulation of pollutants in biota and presence of pollutants in marine and estuarine sediments. Several guidance documents have been published to support the 301(h) program, including a *Summary of U.S. EPA-Approved Methods, Standard Methods, and Other Guidance for 301(h) Monitoring Variables* (Tetra Tech 1985), *Analytical Methods for EPA Priority Pollutants and 301(h) Pesticides in Estuarine and Marine Sediments* (Tetra Tech 1986), and *Quality Assurance/Quality Control for 301(h) Monitoring Programs* (Tetra Tech 1986).

The Section 403(c) program has made Ocean Discharge Criteria evaluations and determinations on a case-by-case basis. The program has been evolving and OMEP is in the process of developing a short- and long-term strategy for implementing the program. The marine environmental assessment guidance prepared for the Section 301(h) program can provide some of the tools for assessing the impact to the marine environment from point source discharges to ocean waters.

How are Sediment Assessment Methods Used to Make Decisions?

Under the proposed revisions to the guidance, dredged materials will be assessed using a tiered approach that is currently being developed by U.S. EPA in support of proposed revisions to the Ocean Dumping Regulations. This approach takes into account the chemical constituents in the material, the toxicity of the material to sensitive marine organisms, and the propensity of the substances in the material to bioaccumulate. A testing manual describing this approach and test methods is being developed. When it is complete, and revised regulations are promulgated, the U.S. EPA regions and U.S. Army Corps of Engineers Divisions will be required to follow the manual when determining the suitability of dredged materials for ocean dumping.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

When new peer-reviewed methods become available, they could be used within their inherent limitations and capabilities to determine the suitability of dredged materials for ocean disposal as well as degradation of marine waters from marine point source discharges.

PROGRAM SUMMARY 3: OFFICE OF RADIATION PROGRAMS
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency
Office of Radiation Programs

CONTACT PERSON

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Office of Radiation Programs is provided by Section 104 of the Marine Protection, Research, and Sanctuaries Act, pertinent sections of the Ocean Dumping Regulations (40 CFR 228) that implement MPRSA, and the London Dumping Convention. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972 and Section 424 of Public Law 97-424, the U.S. EPA has developed internal drafts of regulations and criteria that would control the ocean disposal of low-level radioactive wastes. These criteria conform to the recommendations developed under the London Dumping Convention for The Prevention of Marine Pollution by Dumping of Wastes and Other Matter, to which the United States is a signatory. Under these regulations and criteria, the critical decision that must be made is whether a site is acceptable for the disposal of containerized low level radioactive wastes.

What Sediment Methods are Used to Make Decisions?

Section 228 of the agency's draft revised Ocean Dumping Regulations contains guidance developed by the Office of Radiation Programs for sediment surveys to characterize or designate deep ocean sites for disposal of low-level radioactive wastes. The required components of these sediment surveys are listed in the revision to Part 228 of the existing Ocean Dumping Regulations (42 CFR 2462 of 11 January 1977). The draft revision also includes the following special variables to monitor deep ocean disposal sites (i.e., <4,000 m) for site stability and sediment retention potential in the event of waste package failure:

- Detailed mineral composition of sediment
- The sorptive distribution coefficient (Kd) of radionuclides
- Sediment redox potential by the nitrate method and other supporting techniques

- pH
- Geotechnical variables
- The composition of sediment core samples by the x-radiograph technique.

These additional variables also provide data for predicting the capability of sediments to retain heavy metals. Technical guidance documents to support the revised regulations were published by the Office of Radiation Programs in 1988.

How are Sediment Assessment Methods Used to Make Decisions?

There are no numerical criteria for determining the acceptability of deep ocean sites for the disposal of low level radioactive wastes. The range of technical information provided by the various sediment assessment methods described above is evaluated using a weight-of-evidence approach. Important considerations in this approach are site characteristics that may affect container failure, and the subsequent environmental mobility of low level radioactive wastes. These considerations include the following determinations:

- The proposed site is geologically stable
- The mineralogical and geochemical characteristics of the proposed site can act as a natural barrier to the transport and mobility of low level radioactive wastes
- The proposed site is in a depositional environment with low dispersive potential

- The abundances of infaunal organisms in the vicinity of the proposed site are relatively low.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

The Office of Radiation Programs has developed methods for determining sublethal effects from low level radioactive wastes in the coastal benthic marine polychaete *Neanthes arenaceodentata*. These methods are currently being published in three research reports describing genotoxic and reproductive effects associated with acute and chronic exposure of *Neanthes arenaceodentata* to sublethal concentrations of low level radioactive wastes. Based on this research, a guidance document that describes appropriate methods for the characterization of toxic effects of low level radioactive wastes to marine benthic biota is being prepared for peer review and publication. The bioassay protocols that are recommended in this guidance document may be appropriate for consideration of lowest observable effects levels in infaunal marine invertebrates.

**PROGRAM SUMMARY 4: OFFICE OF SOLID WASTE
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Solid Waste/Characterization Assessment Division/Technical Assessment
Branch

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STATUTORY BASIS

The statutory basis for activities performed by the Office of Solid Waste is provided by Sections 3004(u) and (v) and Section 7003 of the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Under Sections 3004(u) and (v), the U.S. EPA has authority to enforce cleanup of contaminated sediments under two conditions: 1) if the sediment is dredged and exhibits a hazardous waste characteristic as defined under RCRA (e.g., EP toxicity) or if the sediment is mixed with a RCRA-listed hazardous waste, or 2) if the sediment contamination can be shown to have resulted from a release from a specified solid waste management unit at a RCRA-permitted or interim status hazardous waste facility. In addition, if the sediment contamination is within a waste management facility and there is evidence of imminent and substantial endangerment to human health and the environment, according to Section 7003 of RCRA, U.S. EPA may sue the past or present owner and (after notifying the affected state) may take any other action necessary to protect human health and the environment. In addition, sediments dredged by the U.S. Army Corps of Engineers are subject to the solid waste standards of the state in which they are disposed. In this case, the U.S. EPA's role is one of guidance, technical assistance, and the establishment of minimum national standards for municipal landfills.

What Sediment Assessment Methods are Used to Make Decisions?

Sediments are assessed based on the RCRA definitions of hazardous waste, including exhibition of a hazardous waste characteristic such as EP toxicity, or the presence of a RCRA-listed hazardous waste. Cleanup evaluations are health-based. Risk specific doses (RSD) for carcinogens or reference doses (RfDs) for noncarcinogens should be used.

How are Sediment Assessment Methods Used to Make Decisions?

The methods described above are used in determining if contaminated sediments are hazardous wastes and thereby subject to U.S. EPA authority under RCRA Sections 3004(u),

(v), and 3008(h). These methods may also be used in evaluating danger to human health and the environment, determining the need for corrective action, and establishing cleanup standards.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

If new sediment quality assessment methods receive adequate scientific review, the Office of Solid Waste would incorporate them in making permit decisions and in evaluation of remedial site restoration plans. Sediment quality criteria would be used as reference points, as water quality criteria are consulted now.

**PROGRAM SUMMARY 5: OFFICE OF TOXIC SUBSTANCES
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Toxic Substances

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STATUTORY BASIS

The statutory basis for activities performed by the Office of Toxic Substances is provided by:

- Sections 4, 5, 6, and 8 of the Toxic Substances and Control Act (TSCA)
- Section 313 of the Superfund Amendments and Reauthorization Act (SARA).

A synopsis of the relevant sections of TSCA and SARA is provided in Table 1.

What Decisions are Made?

TSCA is a multimedia, broad scope law. U.S. EPA must determine for a chemical substance whether its manufacture, distribution in commerce, processing, use, or disposal (or combination of these activities) presents an unreasonable risk of injury to human health or the environment. Thus, OTS must routinely assess worker risks, consumer risks and human and environmental risks resulting from releases to air, water, and land of both existing and new chemicals. Existing chemicals are those that are listed on the TSCA Chemical Substance Inventory [required by TSCA Section 8(b)]. New chemicals are those that are not listed on the TSCA inventory.

The most common triggering mechanisms for review of a chemical substance under these sections are the Interagency Testing Committee's priority list for existing chemicals under Section 4, the results of toxicity studies submitted under TSCA (e.g., TSCA Section 8 submissions and National Toxicity Program reports), and the receipt of a premanufacturing notice for TSCA new chemicals under Section 5. If during the review period, U.S. EPA finds that there is a reasonable basis to conclude that the chemical presents or will present an unreasonable risk of injury, then U.S. EPA can regulate the manufacture, distribution in commerce, processing, use, or disposal of the substance under TSCA Section 5(f) or Section 6. For example, under Section 6(a)(6), U.S. EPA may promulgate a requirement prohibiting or otherwise regulating any manner or method of disposal of a given substance or mixture, or of any article containing such substance or mixture.

As authorized under Section 4 and Section 5(e) (new chemicals), U.S. EPA can require chemical testing under the following conditions:

- There are insufficient data available with which to perform a reasonable risk assessment

- The chemical may present an unreasonable risk of injury or is produced in substantial quantities and may either be released to the environment in substantial quantities or may result in substantial human exposure
- Testing is necessary to develop the data.

The testing usually follows a tiered approach and can address the toxicity or exposure of the chemical. If sediment contamination is the source of concern (e.g., chronic toxicity to benthic organisms), then the testing would address this issue. If testing results confirm the "may present" finding (i.e., a finding of "presents or will present an unreasonable risk" can be made), then an appropriate regulatory action can be taken (e.g., ban the production or import of the chemical, prohibit releases to water) under TSCA Section 6 (new or existing chemicals) or Section 5(f) (new chemicals only).

Under the provisions of Section 313 of SARA, it is expected that analysis of the reported releases to the environment could help in estimating the magnitude and geographical distribution of possible sediment contamination problems. OTS plans to do some of these types of analyses, but funds are extremely limited.

If release data were needed on chemicals not covered by SARA Section 313 or if more detailed release data were needed on chemicals covered by Section 313, then Section 8(a) of TSCA could be used to obtain those data. It should be noted however, that Section 8(a) of TSCA addresses the reporting of information by manufacturers and processors only.

What Sediment Assessment Methods are Used to Make Decisions?

Not applicable.

How are Sediment Assessment Methods Used to Make Decisions?

Not applicable.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Potential applications of new peer-reviewed methods include discharge monitoring under provisions of Section 313 of SARA and problem area identification and dumpsite designation under Sections 4-6 of TSCA.

**PROGRAM SUMMARY 6: OFFICE OF WATER REGULATIONS AND STANDARDS,
ASSESSMENT AND WATERSHED PROTECTION DIVISION,
MONITORING BRANCH
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Water Regulations and Standards
Assessment and Watershed Protection Division
Monitoring Branch

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STATUTORY BASIS

The statutory basis for activities performed by the Assessment and Watershed Protection Division (AWPD) of U.S. EPA's Office of Water Regulations and Standards is provided by Sections 303(d) and 305(b) of the Clean Water Act, as amended. Section 303(d) requires the states to establish the total maximum daily loads (TMDLs) of pollutants identified under Section 304(a)(2) for waters where technology-based effluent limits are not stringent enough to implement applicable water quality standards. Section 305(b) requires states to report on the quality of their navigable waters, in terms meeting the goals of the Clean Water Act. The AWPD provides guidance to states on their biennial assessments, and prepares a national summary report to Congress. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

In its guidance to the states for reporting under Sections 303(d) and 305(b), AWPD asks states to identify waters with sediment contamination, sources of that contamination, and contaminants of concern.

What Sediment Assessment Methods are Used to Make Decisions?

TMDLs that need to consider sediment contamination will be developed based on the sediment criteria that the Office of Water Regulations and Standards' Criteria and Standards Division are preparing (see Program Summary 7).

The AWPD does not require states to use any particular sediment assessment method for Section 305(b) reporting.

How are Sediment Assessment Methods Used to Make Decisions?

See previous question.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in this Program?

New and widely-accepted sediment assessment methods would help ensure consistency in the identification of areas with sediment contamination, in addition to providing valuable assistance to those states that are not currently assessing sediment quality. Other potential applications of new methods include providing assistance in issues of contaminant source control of discharged materials, and cleanup area and cleanup goal selection for remediation decisions.

**PROGRAM SUMMARY 7: OFFICE OF WATER REGULATIONS AND STANDARDS,
CRITERIA AND STANDARDS DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Water Regulations and Standards
Criteria and Standards Division

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STATUTORY BASIS

The statutory basis for activities performed by the Criteria and Standards Division of U.S. EPA's Office of Water Regulations and Standards is provided by Sections 104, 304(a), and 303 of the Clean Water Act (CWA). A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

The method for generating sediment criteria for non-ionic contaminants is under review by the U.S. EPA Science Advisory Board. The method for generating sediment criteria for metals is under development. When final criteria are available, they are expected to play a significant role in the identification, monitoring, and cleanup of contaminated sediment sites, in the assessment of risks, and in the protection of uncontaminated sites. Sediment criteria would be used to assess risk to aquatic life and their uses in near-coastal, estuarine, and freshwater sediments, including the sediment of lakes, stream, ponds, rivers, and other aquatic systems. Regulatory frameworks for specific applications of sediment criteria are under development. Regulatory applications of sediment quality criteria would include determining whether accumulation of contaminant concentrations in sediments were approaching or had exceeded unacceptable levels. Sediment concentrations in the vicinity of a discharge could be monitored and compared with sediment criteria to determine the likelihood of impact associated with that discharge. Sediment criteria would be particularly valuable in monitoring sites where sediment contaminant concentrations might gradually approach the criteria over time. At such sites, comparisons of contaminant concentrations with sediment criteria could provide an early warning of potential problems, which could be corrected before adverse impacts occur.

Sediment criteria will be helpful in evaluating the potential environmental risk posed by in-place pollutants. For example, under Section 303 of the CWA, sediment criteria could be used for the following:

- Determine the need for cleanup
- Set goals for cleanup, thereby helping to determine the size of the area to be addressed and the cost of the cleanup effort
- Assess the benefits of cleaning up an area to criterion levels.

Evaluation of in-place pollutants in aquatic sediment could be one of the most appropriate and immediate applications of sediment criteria.

What Sediment Assessment Methods are Used to Make Decisions?

A variety of methods may prove to be useful in making decisions concerning contaminated sediments. The Equilibrium Partitioning approach has been sufficiently developed to demonstrate its utility in a variety of applications. Other methods such as bioassay approaches are needed, and, once developed and verified, would be incorporated into decision-making activities.

How are Sediment Assessment Methods Used to Make Decisions?

Sediment assessment methods will provide decision makers with information on the biological effects associated with a particular sediment. Such biological effects could include contaminant bioaccumulation, which may be indicative of potential human health effects associated with consumption of edible species of aquatic organisms. This information could be used in the decision making process or in formal regulatory frameworks to evaluate the severity and extent of sediment contamination, and to determine appropriate strategies for the management of problem areas.

How Could New Peer-Reviewed Methods be Used in this Program?

New peer-reviewed methods could be incorporated into the regulatory framework, and used within their inherent capabilities and limitations to identify, remediate, and manage chemically contaminated sediments. Such methods could be implemented in a fashion that is comparable to those used to assess water quality. Potential applications of new methods include problem area identification, permit decisions, discharge siting, discharge monitoring, cleanup area selection, cleanup goal setting, site restoration, and dumpsite designation.

**PROGRAM SUMMARY 8: OFFICE OF WATER ENFORCEMENT AND PERMITS
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency
Office of Water Enforcement and Permits
Permits Division**

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STATUTORY BASIS

The statutory basis for NPDES permitting activities performed by the Permits Division of the U.S. EPA Office of Water Enforcement and Permits is provided by Sections 101(a)(3), 301(b)(1)(C), 402, and 304(l) of the Clean Water Act (CWA). A synopsis of these sections is provided in Table 1.

What Decisions are Made?

Sections 101(a), 301(b)(1)(C), 402, and 304(l) of the Clean Water Act provide wide-ranging statutory authority to regulate point source discharges. However, most permit decisions are made on the basis of effluent and receiving water characteristics. Few, if any, NPDES permits have been issued that explicitly protect against sediment contamination. In the case of federally permitted discharges, such decisions are awaiting development of the scientific and technical approach where sediment quality criteria can be applied with confidence. Some states have adopted narrative prohibitions against objectionable sediment deposits, and are developing the regulatory decision-making framework to issue permits based on sediment contamination. However, to date, the Permits Division is unaware of any permits that have been written on the basis of state narrative prohibition against objectionable sediments, sediment quality criteria, or generally on the basis of sediment contamination.

What Sediment Assessment Methods are Used to Make Decisions?

As indicated above, there are no sediment assessment methods used routinely in the NPDES program to make such decisions on a national basis. However, some water quality models that relate NPDES discharges to levels of sediment contamination are currently being implemented on a pilot basis within some U.S. EPA regions. For states that prohibit objectionable sediment deposits, sediment assessment methods, if any, that are used to make permit decisions may vary on a state-by-state and case-by-case basis.

How are Sediment Assessment Methods Used to Make Decisions?

The water quality-based approach to development of effluent limits is not currently designed to limit the discharge of pollutants to preserve a specified level of sediment quality. A water quality-based effluent limit is designed to protect a specified level of water quality in the receiving stream. At present, water quality-based effluent limits protect against sediment contamination only to the extent that such contamination would cause violations of water

quality criteria. In short, effluent limits in NPDES permits are not developed to directly protect sediments or the beneficial uses associated with uncontaminated sediment.

In a few instances, states have identified waters under Section 304(1) of the Clean Water Act that are impaired by contaminated sediments. EPA's regulations that interpret Section 304(1) require that dischargers causing such contamination shall receive more stringent effluent limits in their NPDES permits to prevent continued contamination. It is important to emphasize, however, that impaired waters are identified and addressed under Section 304(1), not impaired sediments. Sediments could be contaminated where water quality is not.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Although no permitting to date has been based on sediment contamination, once U.S. EPA develops and adopts sediment criteria, the NPDES-permitting program could, with modifications to the existing water quality-based approach (e.g., enhanced models, policy, and guidance), use such criteria in the NPDES-permitting process in much the same way that existing water quality criteria are used to establish effluent limitations. Other potential uses of sediment criteria are problem identification, permit decisions, discharge monitoring, cleanup area selection, cleanup goal setting, site restoration, and dumpsite designation.

The Permits Division supports the development and subsequent use of sediment criteria. However, implementation problems are anticipated, as some permittees are currently unable to meet water column criteria, which are probably less stringent than sediment criteria would be. Permittees may therefore have difficulty complying with permit limitations based on sediment criteria.

**PROGRAM SUMMARY 9: OFFICE OF WETLANDS PROTECTION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency
Office of Water/Office of Wetlands Protection

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Office of Wetlands Protection is provided under Section 404 of the Clean Water Act (see Table 1).

TASK DESCRIPTION

The Office of Wetlands Protection is the U.S. EPA Headquarters program office for oversight activities pursuant to Section 404 of the Clean Water Act. Section 404 of the Clean Water Act establishes a permit program for regulating discharges of dredged or fill material

into all waters of the United States, including wetlands, inland waters, and the territorial sea, which is measured 3 mi seaward of the baseline (however, by administrative agreement, dredged material disposal in the territorial sea is regulated only under the Marine Protection, Research, and Sanctuaries Act). Discharges regulated under Section 404 are commonly associated with channel construction and maintenance, water resources projects like dam and levee construction and maintenance, port development, and fills to create fast land for development sites. Other kinds of activities such as channelization and land clearing are regulated as Section 404 discharges if they involve more than a *de minimis* discharge of soil or other materials into waters.

What Decisions are Made?

Under Section 404(b)(1) of the Clean Water Act, U.S. EPA, in conjunction with the U.S. Army Corps of Engineers (COE), has developed substantive environmental criteria used in evaluating discharges of dredged or fill material. These criteria are known as the 404(b)(1) Guidelines. Under the Guidelines, a discharge may not take place if the permitting authority finds, among other things, that the discharge will cause significant degradation of the aquatic ecosystem. These Guidelines are applied by the COE in the review of all Section 404 permit applications. In addition, although the COE does not issue permits for its own activities, the COE reviews its own proposed discharges by applying 404(b)(1) Guidelines, among other requirements.

What Sediment Assessment Methods are Used to Make Decisions?

The 404(b)(1) Guidelines provide general guidance on the evaluation of the dredged or fill material. However, there are no national requirements on sediment testing and evaluation, and no formal sediment assessment method has been adopted by the Office of Wetlands Protection. Specific evaluation procedures, including chemical and biological tests, are conducted on a case-by-case basis by COE districts and U.S. EPA regions. Much of this effort has addressed the physical impacts of the placement of materials, particularly in

wetlands, and whether or not the proposed activity should be permitted at all. Recently, however, various regional offices have begun to develop guidelines under Section 404 for chemical evaluation of dredged and fill material.

In 1977, U.S. EPA and the COE developed a joint testing manual *Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters*. Although this manual was geared for disposal into the ocean environment under Section 103 of the Marine Protection, Research, and Sanctuaries Act, and not Section 404 waters, some COE coastal district offices have used this manual in their 404(b)(1) evaluations of disposal activities in coastal, nearshore, and estuarine waters. The 1977 manual, commonly referred to as the "Green Book," involves a tiered approach employing chemical analyses of bulk sediments, testing for biological effects on the water column and/or benthos, and testing for bioaccumulation, depending on the concern for the potential for adverse impact.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

The Office of Wetlands Protection is working with the COE to develop a comprehensive testing manual for waters regulated under Section 404 of the Clean Water Act. This manual will parallel the Green Book (see Program Summary 2) in terms of its tiered approach, in an effort to have consistent testing to the maximum extent possible and appropriate. Certain sediment quality assessment methods, if proven to be scientifically sound, could be incorporated in the testing requirements for dredged material disposal.

**PROGRAM SUMMARY 10: OFFICE OF EMERGENCY AND
REMEDIAL RESPONSE (SUPERFUND) ACTIVITIES
RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency
Office of Emergency and Remedial Response
Hazardous Site Control Division**

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Superfund program is provided by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). Particular sections are described in Table 1.

TASK DESCRIPTION

CERCLA as amended by the SARA, Section 121, mandates the cleanup of abandoned hazardous waste sites to protect human health and the environment. The National Contingency Plan (NCP) details approaches to site assessment and presents specific criteria for evaluation of alternative remedies. In addition to being protective of human health and the environment, remedies must address applicable or relevant and appropriate requirements, utilize permanent solutions and alternative treatment or recovery technologies to the maximum extent practicable, and be cost-effective. The remedy should also satisfy the statutory preference for remedies using treatments that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances as their principal element.

What Decisions are Made?

The NCP mandated by CERCLA outlines the following criteria which are to be used as remedy selection and evaluation factors:

- Protection of human health and the environment
- Attainment of applicable or relevant and appropriate requirements (federal standards and state standards)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume
- Short-term effectiveness
- Implementability

- Cost

- State acceptance.

Using these valuation criteria, existing and developing sediment assessment methods are identified and applied both for site assessments and remedy selection. The final assessment and determination of standards for contaminated sediments is determined on a site-specific basis.

What Sediment Assessment Methods are Used to Make Decisions?

Both chemical and biological sediment assessment methods have been used at CERCLA sites to assess the severity of sediment contamination and establish performance criteria. Once contaminants are identified, existing state and federal standards are evaluated for applicability to actual site conditions and planned actions. If these standards directly apply to the site circumstances, they are assessed to determine the risk-reduction and the degree of effectiveness. Alternatively, if existing standards are not available for a contaminated medium, other evaluation methods (i.e., developing methods, leachate procedures, health- or environmental-based standards) are used as performance criteria. The decision-making process includes assessing risks, setting response objectives, and establishing performance standards. This process ensures all relevant hazardous substances, pollutants, or contaminants will be effectively controlled and potential threats eliminated.

How are Sediment Assessment Methods Used to Make Decisions?

Existing and developing sediment assessment methods are identified and applied in gathering data in support of site assessment, evaluation, and remedy selection options.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Sediment methods will be used as a standard part of initial sampling during the preliminary site assessment and the more in-depth remedial assessment/feasibility study for Superfund sites where sediment contamination may be present. The available and developing methods will allow for a more definitive site-specific evaluation of sediment contamination and the potential threat due to contaminated sediments.

**PROGRAM SUMMARY 11: CHESAPEAKE BAY PROGRAM
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency
Chesapeake Bay Program**

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Chesapeake Bay Program is provided by Sections 117(a)(3) and (4) of the Clean Water Act (see Table 1).

TASK DESCRIPTION

What Decisions are Made?

Under Sections 117(a)(3) and (4) of the Clean Water Act, the Chesapeake Bay Program is directed to determine the impact of sediment deposition in the bay and to determine the impact of environmental changes due to pollutant loadings of nutrients and toxics. Accordingly, the Chesapeake Bay Program has two goals in sediment data collection. The first is to obtain data on the nutrient releases of sediments during the critical conditions of summer anoxia. The second goal of the Chesapeake Bay Program is aimed at nonpoint source toxic pollutant assessment and at using sediment criteria to determine the need for remedial action.

What Sediment Assessment Methods are Used to Make Decisions?

Sediments in the bay are the dominant source of nutrients during the summer anoxic period. They act as a reservoir of phosphorus, nitrogen, and organic carbon, and are fluxed back into the water column during a short period of time because of anoxic conditions. Information will be obtained primarily by incubating sediment cores under ambient bottom conditions and quantifying the nutrient release and sediment oxygen uptake. Sediment incubations will be correlated with simultaneous measurements in the water column and characterization of the diagenetic potential of the organic portion of the sediments. Collected sediment data will be used to formulate, calibrate, and verify a sediment program within a three dimensional, time variable model. This model will be used to perform a nutrient waste load allocation for the bay and to examine the efficacy of abatement and control management strategies to achieve the waste load allocation.

Determinations of remedial actions for toxic "hotspots" will be made for locations such as Norfolk and Baltimore Harbors. The use of sediment data in assessing nonpoint source toxics stems from the fact that ambient water column monitoring usually uses biweekly

discrete grab samples. Because nonpoint source loads occur during short periods of time associated with storm water runoff, grab sample data tends to not include nonpoint source loads. Sediment data showing the nonpoint source toxic pollutant residual buildup in the sediment can be used instead to assess the presence of a nonpoint toxic pollutant source.

How are Sediment Assessment Methods Used to Make Decisions?

Guidance and criteria are being drafted that will likely include chemical analysis, benthic community structure, acute and chronic bioassay tests, and bioaccumulation bioassays. Contaminated sediments that do not meet toxics criteria will be subject to remedial actions.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New sediment assessment methods would be used to identify problem areas during site characterization, and in discharge siting to ensure contaminant source control.

**PROGRAM SUMMARY 12: GREAT LAKES NATIONAL PROGRAM OFFICE
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency
Great Lakes National Program Office**

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STATUTORY BASIS

The statutory basis for activities performed by the Great Lakes National Program Office (GLNPO) is provided by Sections 404(b) and 118(c)(3) of the Clean Water Act and Annexes 7 and 14 of the Great Lakes Water Quality Agreement (GLWQA) of 1978, as amended by protocol, 1987, between the United States and Canada. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Under Section 404(b) of the Clean Water Act and Annex 7 of the GLWQA, recommendations are made to the regional Offices of Water in Regions II, III, and V or the Office of Federal Activities on the acceptability of proposed dredge or fill projects affecting the Great Lakes. Potential pollution impacts on the Great Lakes and U.S. obligations under the GLWQA are considered. The types of decisions made typically involve the acceptability of the proposed type of disposal (e.g., open-water, confined, upland). Under Annex 14 of the GLWQA, recommendations are also made on the acceptability of allowing contaminated sediments to remain in place. Impacts considered include water quality degradation; degradation of benthic biological communities and organisms; and impacts resulting from the bioaccumulation of contaminants in fish, such as may occur in waterfowl, wildlife, or humans.

Under Section 118(c)(3) of the Clean Water Act, the GLNPO has initiated the Assessment and Remediation of Contaminated Sediments (ARCS) Program. This program is a 5-yr study and demonstration project addressing the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediments. The overall objectives of the ARCS Program are as follows:

1. To assess the nature and extent of bottom sediment contamination at selected U.S. Great Lakes Areas of Concern (as defined by the International Joint Commission)
2. To evaluate and demonstrate remedial options, including removal, immobilization, and advanced treatment technologies, as well as "no-action" alternatives

3. To provide guidance to the various levels of government in the U.S. and Canada in their implementation of Remedial Action Plans for the Areas of Concern in their jurisdictions, as well as direction for future evaluations in other areas: how to assess the need for action and the options available, and how to select the appropriate remedial measures.

Five locations were specified in the Clean Water Act as requiring priority consideration in locating and conducting demonstration projects: Saginaw Bay, Michigan; Sheboygan Harbor, Wisconsin; Grand Calumet River, Indiana; Ashtabula River, Ohio; and Buffalo River, New York. Administration of the ARCS Program is being performed by GLNPO. However, the program overall is a multigovernment agency endeavor, including participation by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, U.S. EPA National Offices, U.S. EPA Regions with Great Lakes coastlines (Regions II, III, and V), the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin), and public interest groups.

Activities of the overall ARCS Program will be reviewed by a management committee, with representation by the organizations noted above. Three technical work groups have been formed to identify and prioritize tasks to be accomplished in each area of activity. These include a Toxicity/Chemistry Work Group, a Risk Assessment/Modeling Work Group, and an Engineering/Technology Work Group. In addition, a Communication Liaison Work Group has been established to facilitate the flow of information among work groups and the interested public. An Activity Integration Committee has also been established to integrate technical aspects of the work groups' activities. Program activities are currently underway and will continue until the conclusion of the program in 1992.

What Sediment Assessment Methods are Used to Make Decisions?

Proposed dredge and fill projects are evaluated based on the *1977 EPA Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments* and the 1982 International Joint Commission (IJC) *Guidelines and Register for Evaluation of Great Lakes Dredging Projects*. The sediment criteria approach in both these guidelines includes comparison of sediment chemical data against reference values. The 1977 guidelines also include consideration of the benthic community structure, while the 1982 IJC guidelines include the use of laboratory bioassays for toxicity determination and bioaccumulation measurements. Other data and any site-specific factors are also taken into account, as required by Section 404(b)(1) of the Clean Water Act. In addition, guidance used to evaluate the feasibility of allowing contaminated sediments to remain in place is based on the 1988 IJC *Procedures for the Assessment of Contaminated Sediment Problems in the Great Lakes*. This guidance takes an integrated approach, and considers, in a tiered fashion, physical and chemical characteristics of the sediments, their effects upon benthic and pelagic community structure, acute and chronic impacts upon a variety of aquatic organisms, bioaccumulation, and mutagenicity.

The approach taken in the ARCS Program is also holistic in nature. A variety of methods for assessing the hazards of sediments will be applied, following much of the guidance provided in the 1988 IJC procedures, but also going further. Assessments will be site-specific, and will incorporate a variety of field, laboratory, and modeled expressions of existing or potential impacts upon all receptors of concern--aquatic, wildlife, and human.

How are Sediment Assessment Methods Used to Make Decisions?

Decisions regarding disposal options are made on a case-by-case basis and may include consideration of sediment characteristics based on the above-mentioned guidelines. Comparisons of sediment chemical data with reference values are used to classify sediments according to pollutant levels. This information and other physical and biological data are

considered in evaluating the various disposal options, as well as factors related to the proposed disposal site (upland unconfined, upland confined, in-lake confined, open-water).

Decisions regarding recommendations and guidance development resulting from the ARCS Program will be based on a number of factors. Foremost will be the determination of the toxicity of the sediments, based on the above-mentioned approaches for making such an assessment. However, technical and economic considerations will also be an integral part of the decision-making process.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New peer-reviewed methods, within their inherent capabilities and limitations, have potential for being used in both the dredging evaluation program and the ARCS Program. However, ultimately, it is envisioned that site-specific factors will drive the ultimate decision-making process.

**PROGRAM SUMMARY 13: REGION I WATER MANAGEMENT DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENTS**

AGENCY

**U.S. Environmental Protection Agency Region I
Water Management Division
Water Quality Branch**

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STATUTORY BASIS

The statutory basis for activities performed by the Region I Water Management Division is provided by sections 104, 304, 320, and 404 of the Clean Water Act, as amended, and Section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA), as amended. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Presently, the U.S. EPA Region I does not have a specific sediment program. However, there are three areas that involve evaluation and monitoring of sediment quality:

- State monitoring programs - Four of six states in Region I (Connecticut, Massachusetts, Maine and Rhode Island) have conducted sediment quality assessments in conjunction with estuarine studies, including sediment chemical analyses and benthic community analyses. Additionally, Vermont has conducted extensive freshwater community analyses. Two other areas of considerable regional attention include habitat contamination and alteration of shellfish beds due to sediment accumulation, and transport of contaminated sediment across state boundaries.
- Dredge and fill activities under Section 404 of the Clean Water Act and Section 103 of the MPRSA - Staff from the Marine and Estuary Protection Section review dredge and fill activities including permits for ocean disposal.
- Special Projects - Sediment assessment is a primary component of several major studies in the Region. These projects include various sediment studies of Narragansett Bay, Quincy Bay, Long Island Sound, Massachusetts Bay, Boston Harbor, and Buzzards Bay.

The special projects in Region I are performed for several purposes, and involve a variety of sediment quality issues. An overview of each of these projects is provided below.

The Narragansett Bay Project is a major study under the National Estuary Program which includes characterization of the sediments of Narragansett Bay and several tributary rivers in terms of sediment geomorphology, contaminant levels and distribution, and contaminant levels in tissues of benthic infauna. Sediment data will be used in evaluating pollution abatement strategies for Narragansett Bay.

The Quincy Bay Study is a special project to assess contamination of Quincy Bay (part of Boston Harbor) by monitoring contaminant levels in sediments and fish tissue, determining impacts to the environment, and assessing the risk to human consumers of Quincy Bay seafood.

The Long Island Sound Study is another major study under the National Estuary Program, which includes a demonstration project in Black Rock Harbor, Bridgeport, Connecticut. The goal of this project is to reduce the input of toxic contaminants into the harbor, thereby reducing the risk of contaminant bioaccumulation or toxicity to the valuable oyster fishery nearby. Numerous sediment studies have been conducted by the U.S. EPA and U.S. Army Corps of Engineers to determine potential sediment contribution to toxicity.

Recently designated in the National Estuary Program, the Massachusetts Bay/Boston Harbor Project is funding two studies which will assess methods used to monitor and measure transport of contaminants to sediments. The first concerns the survival and deposition of fecal indicator bacteria in harbor sediments, and the second is an evaluation of elemental tracers for monitoring the transport of sewage sludge. Another study on the bioavailability and transformation of PAHs in benthic environments of Boston Harbor and Massachusetts Bay is also being funded by the project.

Under a grant from EPA, the city of Boston is funding two studies in Massachusetts Bay. The first of these is a study to define processes (transport and retention) and variables controlling the release of organic and metal contaminants from Boston Harbor sediments once existing inputs are removed (including an estimate of transfer of contaminants through the

food chain). The second study is designed to determine transport of contaminated sediments in Boston CSOs, effluent, and sludge discharges within Boston Harbor and to estimate exchanges of these components within Massachusetts Bay.

The Buzzards Bay study, which is also under the National Estuary Program, has recently completed its Comprehensive Conservation Management Plan. The project did not include work being done in New Bedford Harbor. Sediment work was limited to nutrient analyses in small embayments to determine nitrogen loading from various sources.

What Sediment Assessment Methods are Used to Make Decisions?

Until recently, the primary sediment assessment method has been benthic community structure, particularly in freshwater. Now, in conjunction with research being conducted on several estuaries and bays in the region, more emphasis has been placed on sediment chemistry and sediment bioassay (particularly amphipod toxicity bioassay).

How are Sediment Assessment Methods Used to Make Decisions?

In conjunction with the New England Division of the U.S. Army Corps of Engineers, a regional *Guidance for Performing Tests on Dredged Materials to be Disposed of in Open Waters* has been developed in cooperation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. This document supercedes the National Implementation Manual entitled *Ecological Evaluation of proposed Discharge of Dredged Material into Ocean Waters* by specifying procedural items such as selection of appropriate bioassay organisms and chemical constituents required to be analyzed in bioaccumulation tests. Staff from the Office of Marine and Estuarine Protection review all permits and data from this effort.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

There is a definite need for standardized sediment assessment methods, particularly for determining sediment toxicity. New peer-reviewed methods could be incorporated into state monitoring programs and in assessing long term impacts of combined sewer overflows and stormwater discharges. Other potential applications include problem area identification, permit decisions, discharge siting and monitoring, cleanup area selection and cleanup goal setting.

**PROGRAM SUMMARY 14: REGION II ENVIRONMENTAL SERVICES DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency, Region II
Environmental Services Division

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STATUTORY BASIS

The statutory basis for activities performed by the Region II Environmental Services Division (ESD) is provided by Sections 102 and 103 of the Marine Protection, Research and Sanctuaries Act of 1972, as amended. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

Sewage sludge dumping at the New York Bight 12-mile Site ceased as of 31 December 1987. U.S. EPA is in the process of monitoring the recovery of that portion of the New York Bight formerly affected by the dumping. The U.S. EPA project consists of collecting

sediment samples from three areas of a somewhat homogeneous nature based upon sediment chemistry and grain size analysis (highly, moderately, and lightly contaminated areas). Sediments are tested for heavy metals content, *Clostridium perfringens* spores, and when extramural funding is available, pesticides, PAHs, and grain size. A reduction in contaminants is presumed evidence of recovery.

What Decisions are Made?

Since the dumping has ceased, the main decision is determining when the sediment concentration is back to predumping "ambient" levels. A second decision is when to cease monitoring if no change is detected with time but ambient levels have not been reached. A third decision may be to modify the monitoring program because the existing program is not adequately providing the required information.

What Sediment Assessment Methods are Used to Make Decisions?

Replicate sediment samples are analyzed and the mean contaminant concentrations are statistically compared to the previous means to determine if there is a statistically significant decrease in contaminant concentrations. If so, recovery of the New York Bight sediments is presumed (based on bulk sediment dry weight).

How Could New Peer-Reviewed Sediment Assessment Methods Be Used In this Program?

None of the new sediment assessment methods could be used in this program. The existing monitoring program is already high priced and labor intensive because of the numerous replicate samples needed and because of the high natural variability of the sediments of concern. It is felt that use of any new sediment assessment methods would add additional expense without providing more reliable information than we are currently obtaining.

**PROGRAM SUMMARY 15: REGION II SUPERFUND
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region II
Environmental Services Division
Surveillance and Monitoring Branch
Ambient Monitoring Section

CONTACT PERSON

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STATUTORY BASIS

The basis for Region II Superfund decisions on sediment testing and criteria is provided by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendment and Reauthorization Act (SARA) sections 104, 107(d), 111(c) and (e), 113(b), 121, and 122. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

The Ambient Monitoring Section receives Remedial Investigations/Feasibility Studies from U.S. EPA Site Project Managers for peer review. This review includes the evaluation of sediment data collected at the hazardous waste site. These sediment data are reviewed to determine if they adequately address contamination, the extent of contamination, and the availability of the contaminants to the environment. After review of these documents, the need for additional sediment data, clean-up levels based on these data, and environmental and human health impacts are determined. Based on sediment contaminant levels, recommendations are made to U.S. EPA Project Managers on how to proceed with additional sampling or clean-up activities that will protect the environment.

What Sediment Assessment Methods are Used to Make Decisions?

Bulk sediment chemistry and sediment toxicity tests, both solid phase and pore water tests, are used to make specific decisions concerning a site. Total organic carbon (TOC) and grain size analysis are used in conjunction with the chemistry results to provide relevant information on the availability of contaminants at a site, both to the environment and to biota.

How are Sediment Assessment Methods Used to Make Decisions?

These sediment assessment methods are used in conjunction with other environmental data to make decisions on the status of a site. Concurrent surface water data, fish bioaccumulation data, and benthic macroinvertebrate community data are used to provide an overall evaluation of effects of a site to the surrounding environment.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in this Program?

Peer-reviewed sediment assessment tests would provide alternative methods for use in conjunction with other environmental data. A concise evaluation of the contaminants and their effect on the environment could then be formulated. Recommendations could be made to project managers on the use and the application of these methods, especially on a site specific basis.

**PROGRAM SUMMARY 16: REGION II WATER MANAGEMENT DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region II
Water Management Division
Marine and Wetland Protection Branch

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STATUTORY BASIS

The statutory basis for activities performed by the Marine and Wetland Protection Branch of Region II's Water Management Division is provided by sections 102, 103, 104, 107 and 203 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, as amended; by the Ocean Dumping Regulations (40 CFR 220.4, 225, 227 and 228) that implement these sections of MPRSA; by Section 2301 of the United States-Japan Fishery Agreement Approval Act of 1987 (FAAA); by Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended; and by sections 118, 320 and 404 of the Clean Water Act of 1977, as amended. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

The Marine and Wetland Protection Branch (MWP) receives testing studies and public notices for dredging projects that include disposal in the ocean (Section 103), in other waters of the United States (Section 104), and on the upland. Decisions made under these activities include evaluation of the acceptability of testing procedures and analysis for proposed open water and ocean disposal of dredged material, and evaluation of the need to place conditions on permits authorizing these activities.

Remediation plans for Superfund sites are reviewed by MWP if contaminated sediment issues are involved. MWP then issues recommendations regarding these plans.

Under Section 320 of the Clean Water Act, MWP implements the National Estuary Program, which includes development of Comprehensive Conservation Management Plans for the "Designated Estuaries" in its jurisdiction: Long Island Sound, New York Harbor and Delaware Bay. These plans may include recommendations for the remediation of contaminated sediments where applicable.

Under Section 2301 of the FAAA, MWP implements the New York Bight Restoration Plan, which also may include suggestions concerning remediation of contaminated sediments when applicable.

Under Section 118 of the Clean Water Act, MWP cooperates with the U.S. EPA's Great Lakes National Program Office and other Great Lakes environmental agencies and entities in the Assessment and Remediation of Contaminated Sediments (ARCS) Program. This program carries out studies and the development of demonstration projects concerning the removal of toxic pollutants from sediments. Decisions that are made in conference with other workgroup members include evaluating and prioritizing treatment technologies for

additional study and upscaling, developing appropriate methods for assessing toxicity, and calculating risk of different treatment/removal methods or in-place risks.

What Sediment Assessment Methods are Used to Make Decisions?

Decisions regarding the recommendation of issuance or denial of a permit under MPRSA are made using the guidelines and criteria of the Ocean Dumping Regulations and the national dredged material testing guidance, *Ecological Evaluation of Proposed Discharge of Dredged Materials into Ocean Waters*. In other waters of the U.S. (not including the Great Lakes), the 404 (b)(1) Guidelines, implemented in 40 CFR 230, are used to determine suitability of proposed discharges based on information provided in individual cases. In the Great Lakes, suitability for open water disposal of dredged sediments is reviewed under the 1977 EPA Guidelines for Pollutional Classification of the Great Lakes Harbor Sediments, the International Joint Commission's (IJC) 1982 Guidelines and Register for Evaluation of Great Lakes Dredging Projects, and the previously cited national testing guidance.

Decisions regarding recommendations for remedial assessment and action are made with appropriate and relevant reference to all of the aforementioned methods and regional experience in past related activities.

How are Sediment Assessment Methods Used to Make Decisions?

Evaluation principles and criteria developed in the national dredge material ocean testing guidance are used in interpreting test analytical results for proposed disposal projects under MPRSA. The lack of a uniform, comprehensive testing and evaluation guidance for dredge material disposal in 404 waters requires case-by-case decisions on proposed projects, with an inherent wide scope for interpretation of the information submitted to address the 404 (b)(1) Guidelines. The same is true for projects presently reviewed in the Great Lakes, despite the additional attention given this area in the last decade. Neither the 1977 or 1982 guidelines previously cited provide specific guidance on testing or evaluation procedures. The

1977 guidelines use a comparative reference approach that characterizes proposed dredge sediment by contaminant levels. There is no uniform, well-defined evaluation procedure included to determine the suitability or ecological effects of varying levels of sediment contamination. It is generally agreed that determination of bulk contaminant levels is not sufficient to assess the environmental impact of disposal of contaminated sediments that may affect the terrestrial or aquatic ecosystem. Appropriate bioassay testing is generally considered to be required to determine ecological effects. Although the 1982 guidelines generally describe the type of testing that should be done, there are no specific procedures included. MWP therefore uses both the 1977 and 1982 guidelines in addition to the more specific principles for testing and evaluation that have been developed for the national ocean disposal program. The applicability of specific aspects of the national ocean disposal guidelines to lake ecosystems needs to be considered; however, this does not preclude the application of procedures that have withstood long-term program review and experience.

How Could New Peer Reviewed Sediments Assessment Methods be Used in this Program?

New peer reviewed sediment assessment methods could be useful in several aspects of the program. In the evaluation of MPRSA projects, new sediment assessment methods could be worked into a revised Regional/District implementation manual of the national guidelines, which are currently being revised. Regional/District manuals implement the principles of the national guidance with regard to the local environment and concerns, and new peer-reviewed assessment methods may be relevant to specific local needs. For 404 waters including the Great Lakes, new peer reviewed assessment methods could be especially useful in updating and refining the incomplete methods now existing for this area. New methods would also benefit reviews and plans for remediation projects, where assessment of contamination and the effects of remediation options are a major element of the decision making process.

**PROGRAM SUMMARY 17: REGION III ENVIRONMENTAL SERVICES DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency, Region III
Environmental Services Division

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Region III Environmental Services Division is provided by the following:

- Section 10 of the Rivers and Harbors Appropriation Act (RHAA) of 1899, as amended

- Sections 102 and 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA) of 1972, as amended

- Section 104 of the Clean Water Act of 1977, as amended
- Section 403(c) of the Clean Water Act of 1977, as amended
- Section 404 of the Clean Water Act of 1977, as amended
- Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended.

A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Currently, the ESD has no official monitoring program for sediment quality. Occasionally, there are special studies conducted, and sediment data are collected. Examples of such studies include:

- An investigation of potential environmental hazards at Tinicum National Environmental Center (1986)
- U.S. EPA Region III Surface Water Toxics Studies (1987 - 1989)
- The Lehigh and Delaware Rivers Fish Tissue and Sediment Study (1988).

The main purpose of these studies is to determine correlations between contaminant levels and their sources. Also, the effects of contamination levels on the aquatic community are determined.

All dredge and fill projects are evaluated for potential environmental impacts. Under Section 404 provisions of the Clean Water Act, the effect of these dredge material disposal operations on water quality, living resources, and benthic systems are reviewed, with comments forwarded to the lead agency and U.S. Army Corps of Engineers (COE). Involvement in preliminary scoping and design phases is considered to be most critical. When ocean sediments are contributing to beach nourishment or dune enlargements, these activities are reviewed for environmental acceptability under Section 102 of NEPA.

The effects of ocean discharges on sediment quality are performed in support of Section 403(c) of the Clean Water Act. The acceptability of discharge limits in NPDES permits are determined by several criteria:

- The presence of fecal coliform bacteria
- The presence of potentially pathogenic amoeba
- The general condition of sediment around ocean outfalls.

The U.S. EPA Water Management Division is kept informed of findings from sediment sampling.

Under provisions of sections 102 and 103 of the MPRSA, yearly sampling activities are conducted at and around permitted ocean dredge material disposal sites. Benthic samples are evaluated for grain size, heavy metals, TOC, and macrobenthic invertebrates to determine containment of disposed material within a dump site, and the effect of disposal activities on benthic communities in and around the dump site. Preliminary meetings are conducted with

COE on future dumping activities to promote cooperation and set directions for disposal options. Scoping activities and other related actions are underway as part of the EIS procedure for designation of new disposal sites.

What Sediment Assessment Methods are Used to Make Decisions?

Sediment data are collected and compared to background site levels and "sediment threshold concentrations" (as defined in the U.S. EPA's *National Perspective on Sediment Quality*, July 1985), which are based on the Equilibrium Partitioning approach. Also, benthic macroinvertebrate and fish tissue data are collected to determine effects on aquatic life.

Sediment assessments in conjunction with dredging and disposal operations inside the baseline are conducted using the Extraction Procedure (EP) toxicity test as outlined in 40 CFR 261.10 through 261.33 including Appendix I-X. EPA Region III regards these as minimal assessment criteria and both recommends and requires additional testing for disposal options that include any reasonable concerns for environmental degradation. In addition, all disposal activities must comply with the EPA guideline in 40 CFR 230 promulgated pursuant to Section 404(b) of the Clean Water Act.

All ocean dumping activities are assessed under Section 102 and 103 of the MPRSA in accordance with the EPA Ocean Dumping Regulations outlined in 40 CFR 220.4, 225, 227, and 228, and the 1977 "Green Book" entitled *Ecological Evaluation of Proposed Discharge of Dredged Materials into Ocean Waters*. This book provides guidance on bioassay techniques and data analysis.

The Food and Drug Administration analyzes the sediment collected around the ocean sewage discharges using a modification of its shellfish testing procedure. The resulting bacteriological data indicates the presence and concentration of a variety of fecal coliform bacteria as well as the antibiotic resistances of enterococci isolates. The analysis of sediment

for the presence of potentially pathogenic amoeba is performed using a modified version of the standard culturing technique. The results are qualitative and not quantitative in nature.

How are Sediment Assessment Methods Used to Make Decisions?

Sediment assessment methods are used to evaluate possible impacts of dredge material discharges on environmental quality. The results of the EP toxicity and bioassay tests determine the acceptability of the proposed disposal option.

The biological evaluation of sediment around ocean sewage outfalls is used to map the impacts of this discharge as it relates to distance from the outfall and time of year.

The assessment activities conducted at the one active ocean disposal site are used to evaluate the effectiveness of the disposal activity. Specifically, the evaluation is performed to determine whether the material being disposed is remaining within the boundaries of the dump site. A related function of this assessment is the determination of any impact on the macrobenthic invertebrate community surrounding the activity area.

How Could New Peer-Reviewed Sediment Assessment Methods be used in this Program?

A standardized assessment method would simplify the process of evaluating sediment data. However, the greatest effect would be on the state monitoring programs. At this time, all of the states in Region III perform limited sediment sampling because of the lack of criteria. Development of definitive criteria would enable the states to perform additional monitoring. The new "Green Book" should be approved and distributed as soon as possible to update the sediment assessment process. In addition, all sediment assessment processes should be standardized in order to make 404 activities meet the same criteria as ocean dumping of sediment.

A standardized procedure should also be developed for evaluating the impact of ocean sewage discharges on benthic environments, including the ecological and public health implications of these impacts.

**PROGRAM SUMMARY 18: REGION IV SUPERFUND ACTIVITIES
RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency Region IV
Water Management Division
Ground-Water Protection Branch**

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STATUTORY BASIS

The statutory basis for recommendations regarding contaminated sediments at Region IV Superfund sites is provided by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and by the use of the Clean Water Act as Applicable or Relevant and Appropriate Requirement (ARAR) as defined in SARA Section 121 and in the National Contingency Plan (NCP).

TASK DESCRIPTION

What Decisions are Made?

The Ground-Water Protection Branch, serving as the point of contact for coordination with Region IV's Water Management Division, provides recommendations regarding the potential ecological effects of contaminated sediments at or near Superfund sites. In addition, remedial goals for contaminated sediments are derived from site-specific or literature data regarding the behavior of contaminants in sediments. These recommendations have served as the basis for remedial actions at several Superfund sites where contamination of sediments has occurred (e.g., the Schuylkill Metals site in Plant City, FL; the Kassouf-Kimerling site in Tampa, FL; and the Wamohem site in Beaufort, SC).

In some cases, where relatively low levels of ecosystem impairment have been identified, the remedial action taken has been to provide mitigation for that impairment at another location. This course of action leaves some sediment contamination in place, but avoids destruction of habitat that may still have significant value, even though somewhat impaired in function. More serious levels of contamination have resulted in remedial actions where contaminated sediments have been removed from the affected water body.

What Sediment Assessment Methods are Used to Make Decisions?

Within the Ground-Water Protection Branch, the equilibrium partitioning method has been used as the basis for recommendations. This approach is used in conjunction with site-specific bioassays performed by Region IV's Environmental Services Division in order to derive an appropriate overall remediation goal.

How are Sediment Assessment Methods Used to Make Decisions?

When the partitioning approach and/or site-specific bioassay data identify levels of sediment contamination that are likely to be toxic to aquatic life, remedial actions that address the unacceptable contamination levels are recommended. Using the same data, sediment contaminant levels that are fully protective of aquatic life are determined as clean-up goals. These recommendations are used in the decision-making process, along with the other criteria inherent in the Superfund process, to arrive at an acceptable remedial action.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in this Program?

Well-designed, realistic methods that are cost effective and do not entail large expenditures of time and resources would be very helpful. Also, any new method should adopt a phased implementation to determine which screening techniques would warrant additional investigation. Such techniques could be applied to problem area identification, cleanup area selection, cleanup goal setting, and site restoration.

PROGRAM SUMMARY 19: REGION V ENVIRONMENTAL SCIENCES DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency Region V
Environmental Sciences Division
Pesticides & Toxic Substances Branch, PCB Control Section

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STATUTORY BASIS

The statutory basis for activities performed by the Pesticides and Toxic Substances Branch of Region V's Environmental Sciences Division is provided by Section 6(e) of the Toxic Substances Control Act (TSCA).

Under Section 6(e), the U.S. EPA can promulgate rules to prescribe methods for disposal, marking, manufacture, processing, distribution in commerce, use and storage of

polychlorinated biphenyls (PCBs). The resulting rules are compiled in 40 CFR Part 761 (1987).

According to 40 CFR, Subpart D, Section 761.60(a)(5), all sediments containing more than 50 ppm PCBs [if deposited after the effective date of TSCA (1978), or deposited before 1978 and subsequently disturbed or dredged] must be disposed of using the following alternatives:

- In an incinerator that complies with Section 761.70
- In a chemical waste landfill that complies with Section 761.75
- By an alternative disposal method subject to written application and approval by the Regional Administrator.

As specified in the general regulations governing PCBs, 40 CFR 761, Subpart A, no provision specifying a PCB concentration may be avoided as a result of any dilution, unless otherwise specifically provided.

TASK DESCRIPTION

What Decisions are Made?

The PCB Control Section is responsible for permitting the disposal of regulated PCB materials, and is thereby involved in evaluating disposal options. These options include upland unconfined, upland confined, in-lake confined, and open-water disposal. Disposal decisions are made on a case-by-case basis after physical and chemical data for the dredged material have been collected and analyzed.

What Sediment Assessment Methods are Used to Make Decisions? How are Sediment Assessment Methods Used to Make Decisions?

Decisions regarding approval of designs for confined disposal facilities are made based on sediment characteristics, site geology and hydrogeology, technical requirements for bottom liners, leachate collection systems, underdrains, bottom and cap clay thickness and permeability, groundwater monitoring, subcell construction, and other factors. Site-specific variations from the chemical waste landfill guidelines set forth in 40 CFR 761.75 are necessary for confined disposal facilities in most cases, but in general, efforts are made by the PCB Control Section to follow the technical requirements of the 761.75 regulations whenever possible.

Federal regulations under TSCA specify that dredged sediments be assessed simply on the basis of PCB concentration. Dredged sediments having a concentration of less than 50 ppm PCBs are not regulated under TSCA. At present the PCB Control Section's guidance regarding contaminated sediment disposal is limited to the 50 ppm action level, TSCA landfill and incinerator design specifications, and the provision prohibiting any dilution (intentional or natural).

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Standardized methods for sediment quality assessment will be used by the PCB Control Section to provide a sound scientific basis for evaluation of sediment disposal options. With nationwide guidelines governing sampling plans, cleanup levels, and benefit/risk analysis available, the task of evaluating disposal procedures will become more certain. For example, the advisability of permitting an alternative disposal method as opposed to a strict TSCA landfill could be considered with regard to an established target cleanup level of 1 ppm PCBs. If this cleanup level can be achieved by both alternatives, then other criteria such as cost, lifespan, or proximity can be taken into account based on ordered priorities. Standardized

sampling methods are essential and would provide consistent data sets for use in confined disposal facilities design and dredge program planning.

**PROGRAM SUMMARY 20: REGION V PLANNING AND MANAGEMENT DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency Region V
Planning and Management Division
Environmental Review Branch**

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STATUTORY BASIS

The statutory basis for activities performed by the Environmental Review Branch of Region V's Planning and Management Division is provided by the National Environmental Policy Act (NEPA) and Section 309 of Clean Air Act. These statutes are described in Table 1.

TASK DESCRIPTION

What Decisions are Made?

In accordance with Section 309 of the Clean Air Act and NEPA, the Environmental Review Branch reviews U.S. Army Corps of Engineers proposals for dredging and disposal of sediments from harbors and navigation channels. The suitability of dredged material for various disposal options (upland unconfined, upland confined, in-lake confined, and open-water disposal) is determined. The Environmental Review Branch also participates in site selection and in developing construction plans for disposal facilities.

What Sediment Assessment Methods are Used to Make Decisions?

Sediments are assessed using a number of methods including the *1977 U.S. EPA Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments* and the 1982 International Joint Commission *Guidelines and Register for Evaluation of Great Lakes Dredging Projects*. These guidelines include comparisons of sediment chemical concentrations with reference values. Site-specific characteristics (e.g., grain-size distributions) are also considered.

Interim guidelines for sediment sampling and testing are being developed. Testing protocols may include grain size, bulk chemical analyses, elutriate analyses, benthic invertebrates, toxicity bioassays, and bioaccumulation.

How are Sediment Assessment Methods Used to Make Decisions?

There are currently no standard requirements for sediment sampling and testing. Therefore, disposal decisions are made on a case-by-case basis. Physical, chemical, and biological data for the material to be dredged and for the material at the disposal site are evaluated in determining the preferred disposal alternative.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New peer-reviewed methods, particularly an integrated approach including both chemical and biological assessment, would be considered for incorporation into the regulatory framework. Potential applications include problem area identification, NEPA document preparation, cleanup area selection, site restoration, and dumpsite designation.

**PROGRAM SUMMARY 21: REGION V OFFICE OF RCRA
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region V
Waste Management Division, Office of RCRA

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STATUTORY BASIS

The statutory basis for activities performed by Region V's Office of RCRA is provided by the following sections of the Resource Conservation and Recovery Act (RCRA) and the subsequent Hazardous and Solid Waste Amendments (HSWA) of 1984: 3001(a), (b); 3004(c), (d), (e), (g), (o), (u), (v); 3005; and 3008(h). A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Decisions are made regarding the identification, treatment, disposal, and associated corrective action for hazardous wastes, as described in the statutes listed above. RCRA authority over contaminated sediments is in part dependent on the source of contamination. Sediment contamination resulting from wastewater discharges regulated under the Clean Water Act are not subject to RCRA. Sediments would be regulated under RCRA only if they are dredged and if they exhibit one or more hazardous waste characteristics (40 CFR 261, Subpart C). In addition, sediment contamination resulting from releases of hazardous wastes or hazardous constituents (in a manner not regulated by the Clean Water Act) at a RCRA treatment, storage, or disposal facility would be subject to corrective action under Sections 3004(u)(v) and 3008(h) of RCRA.

What Sediment Assessment Methods are Used to Make Decisions? How are Sediment Assessment Methods Used to Make Decisions?

Contaminated sediments are evaluated to determine if they meet the criteria for RCRA hazardous waste. Both the source of contamination and chemical characteristics of the sediments are considered. Sediments may be assessed to determine whether or not they contain RCRA-listed compounds or possess hazardous waste characteristics as defined in 40 CFR 261 (e.g., EP toxicity). The Toxicity Characteristic Leaching Procedure (TCLP) may be used in the future.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Potential applications of new sediment assessment methods under the statutes cited herein include permit application reviews, the determination of cleanup standards, site restoration, and the review of site characterization and monitoring data.

**PROGRAM SUMMARY 22: REGION V SUPERFUND
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region V
Waste Management Division
Office of Superfund

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STATUTORY BASIS

The statutory basis for activities performed by the Region V Office of Superfund, Waste Management Division, is provided by the Comprehensive Environmental Response and Liability Act (CERCLA) and Superfund Amendment and Reauthorization Act (SARA) Sections 104, 106, 107(d), 111(c) and (e), 113(b), 121, and 122. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

In accordance with CERCLA and SARA, the Office of Superfund is responsible for various decisions concerning sediment contamination. Contaminated sites are scored based on Preliminary Assessment/Site Investigations (PA/SI). Sites may be listed on the National Priorities List (NPL) and searches for potentially responsible parties (PRPs) performed. Remedial and enforcement actions include remedial investigation/feasibility studies (RI/FS), records of decision, remedial action, remedial design, and cost recovery. Currently, there are four known NPL sites in U.S. EPA Region V where remedial action for contaminated sediments has been implemented.

What Sediment Assessment Methods are Used to Make Decisions?

Sediments are assessed based on cleanup and environmental and health risk assessment guidelines. The primary guidance documents are *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual* (EPA/640/1-89/002) and *Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation Manual* (EPA/540/1-89/001). Other important documents useful in estimating environmental and human health risks are *Guidance for Conducting RI/FS Under CERCLA* (EPA/540/G-89/004), *Superfund Exposure Assessment Manual* (EPA/540/1-88/001), and *Ecological Assessments at Hazardous Sites: A Field and Laboratory Reference* (EPA/600/3-89/013). Risks can be estimated based on contaminant exposure, uptake, and toxicity to target organisms. Sediment cleanup decisions (e.g. whether or not the site is of concern) are based on these risk determinations.

In some cases, chemical concentrations in unaffected reference areas will be compared to those at the site to determine the extent of the contaminated area and to select treatment and disposal methods. However, sediment assessment is only one of the criteria, and cost, potential impacts, and other factors are also considered.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

The Office of Superfund reports a definite need for sediment and soils standards. Peer-reviewed sediment assessment methods would be considered for incorporation into existing programs. Potential applications of new methods include problem area identification, NEPA document preparation, cleanup area selection, cleanup goal setting, and site restoration.

PROGRAM SUMMARY 23: REGION V WATER DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency Region V
Water Division

CONTACT PERSON

| | |
|-------------------------------|---------------------------------------|
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STATUTORY BASIS

The statutory basis for activities performed by Region V's Water Division is provided by sections 303, 304, 314, and 404(b) of the Clean Water Act and Annex 14 of the Great Lakes Water Quality Agreement. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Dredging projects proposed by the U.S. Army Corps of Engineers and Section 404(b) public notices are reviewed by the Water Division to determine the suitability of dredged

material for various disposal options (including upland unconfined, upland confined, in-lake confined, and open-water disposal). The disposal option must comply with the guidelines established under Section 404(b)(1) of the Clean Water Act.

In addition to assessing dredged sediments for disposal, the Water Division has a variety of other ongoing sediment programs:

- **Confined Disposal Facilities -** Biomonitoring studies are being conducted at the Saginaw Bay confined disposal facility (CDF) to determine if biota inhabiting the outside dike walls are accumulating contaminants as the result of leakage through the dike wall. Modeling efforts are also being undertaken to quantify PCB losses from CDFs.
- **Water Division In-Place Pollutant Control Initiative -** This is a regional/state effort to develop an inventory of contaminated sediments, consistent assessment and prioritization protocols, and site-specific remedial options for sites with contaminated sediments.
- **Under Annex 14 of the Great Lakes Water Quality Agreement,** a framework for the management of contaminated sediments in the Great Lakes basin is being developed.

What Sediment Assessment Methods are Used to Make Decisions?

Because specific testing requirements for dredged material have not been established, a variety of sediment data are evaluated. Typically, bulk chemical measurements and grain size analyses are provided for all U.S. Army Corps of Engineers dredging projects. Toxicity bioassay data and benthic community structure information are provided on occasion. Because of this overall lack of consistency, guidelines for standardized sampling and testing of dredged materials are being developed. These guidelines will consider an integrated

approach to assessing sediments which encompasses analyzing the chemical, physical, and biological (bioassay and benthic community structure) components at a site. The specific tests required will be based on a preliminary characterization of the site based on historical information.

How are Sediment Assessment Methods Used to Make Decisions?

Currently, three "devices" are used to make decisions as to the suitability of materials for open-water disposal:

- The 1977 U.S. EPA *Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments*
- The 1982 International Joint Commission *Guidelines and Register for Evaluation of Great Lakes Dredging Projects*
- Site-specific, case-by-case approach.

The first two documents mentioned above provide guidance on the suitability of material for open-water disposal based on background levels found in the Great Lakes. When a decision is made, these guidelines, along with the biological and physical characteristics specific to a site, are taken into consideration. The overall objective of any decision to undertake open-water disposal of sediments is to ensure that the integrity of a site will not be degraded by the placement of dredged materials.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New peer-reviewed methods would be considered for incorporation into the regulatory framework and decision-making process. Potential application include NEPA document preparation for proposed dredging projects, permit decisions, discharge siting, dumpsite

designation, dumpsite monitoring, and dredged materials evaluation. An integrated approach incorporating both chemical and biological assessment methods is of particular interest.

**PROGRAM SUMMARY 24: REGION VI WATER MANAGEMENT DIVISION/
ENVIRONMENTAL SERVICES DIVISION ACTIVITIES
RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region VI
Water Management Division (Water Quality Management Branch) and Environmental
Services Division (Environmental Analysis Section)

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STATUTORY BASIS

The statutory basis for activities performed by the Region VI Water Management Division/Environmental Services Division is provided by Sections 104, 304, and 404 of the Clean Water Act. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Presently, the U.S. EPA Region VI does not have a specific sediment program. However, there are three areas that involve evaluation and monitoring of sediment quality:

- State monitoring programs - All the states in Region VI (Arizona, Louisiana, New Mexico, Oklahoma, and Texas) maintain an ambient water quality monitoring network which includes toxics monitoring of sediments at some sites. State intensive surveys and special projects also include such monitoring. Reviewed in-house on an as-needed basis, these data may be used in management decisions and to determine if action is warranted.
- Dredge and fill activities under Section 404 - Regional staff review dredge and fill activities. These include areas known to have sediment contamination. In many cases, chemical data are considered and incorporated into the review process.
- Special projects - Sediment data are being used to assess possible impacts of discharges on water quality. These projects include a special study on the effects of the Corpus Christi Naval Air Station (Texas) discharge on Corpus Christi Bay in the vicinity of the discharge, the Houston Ship Channel/Tidal San Jacinto River (Texas), and the Calcasieu Ship Channel and tributaries (Louisiana).

What Sediment Assessment Methods are Used to Make Decisions? How are Sediment Assessment Methods Used to Make Decisions?

The primary sediment assessment method used in the state monitoring programs is measurement of chemical concentrations. The U.S. EPA Interim Sediment Quality Criteria based upon the Equilibrium Partitioning approach are beginning to be used to evaluate the degree of contamination and determine if further action is warranted.

There are no set standards for evaluation of dredged sediments. Region VI reviews dredging and disposal activities on a small-scale and case-by-case basis. Chemical concentration data and results of amphipod toxicity bioassays are sometimes included in the review process and may be considered in the evaluation of disposal alternatives.

Sediment assessment methods have been used to assess possible impacts of discharges on water quality. Region VI, with assistance from the states, and particularly the Environmental Research Laboratory-Narragansett, has collected sediment samples for chemical analysis and amphipod toxicity bioassays. These data have been used to assess the extent and degree of possible discharge impacts.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

There is a definite need for standardized sediment assessment methods, particularly in determination of sediment toxicity. New peer-reviewed methods would be considered for incorporation into the programs described above. Potential applications of new methods include problem area identification, NEPA document preparation, permit decisions, discharge siting, discharge monitoring, cleanup area selection, cleanup goal setting, dumpsite designation, dumpsite monitoring, and dredged materials evaluation.

PROGRAM SUMMARY 25: REGION VII ENVIRONMENTAL SERVICES DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency Region VII
Environmental Services Division

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Region VII Environmental Services Division is provided by sections 115, 309, 311, 404, and 504 of the Clean Water Act, as amended. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Sediment monitoring is conducted in conjunction with water and fish monitoring as a part of special studies designed to determine the presence, extent, and intensity of contamina-

tion in the environment. Where contamination is found, sediment sampling is used to identify the source of that contaminant. Typical analytes include metals, PCBs, pesticides, and dioxin.

What Sediment Assessment Methods are Used to Make Decisions? How are Sediment Assessment Methods Used to Make Decisions?

The sediment analytical methods follow the procedures in *Methods for the Chemical Analysis of Water and Waste* (EPA 600/4-79-020). Where action levels for sediment contamination have been established, the data are used for decisions on remedial actions (e.g., removal of contaminated sediment).

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

A significant issue in the assessment process is the lack of data evaluation criteria (action levels) for pollutants of concern. Peer-reviewed sediment criteria are needed for a large number of contaminants, including metals, PCBs, and pesticides.

**PROGRAM SUMMARY 26: REGION VII WATER MANAGEMENT DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency, Region VII
Water Management Division
Water Compliance Branch**

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STATUTORY BASIS

The statutory basis for activities performed by Region VII's Water Management Division is provided by sections 303 and 314 of the Clean Water Act, as amended. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

What Decisions are Made?

Decisions are made regarding safe levels for sediment cleanup and the potential for point source discharges to contribute to sediment contamination.

What Sediment Assessment Methods are Used to Make Decisions?

Methods are determined on a case-by-case basis.

How are Sediment Assessment Methods Used to Make Decisions?

The primary problem of contaminated sediment has been the apparent transfer, through a bioaccumulation process, of the contaminant to bottom-feeding fish species such as carp and catfish. Sediment sampling has been conducted as part of an urban clean lakes project to determine the magnitude and extent of chlordane contaminated sediment in the lake and the watershed. A major technical problem has been the inability to relate sediment levels to fish tissue levels and to determine how "clean" the sediments should be to prevent fish tissue contamination. Dredging and sediment traps are the planned remedial measures, but transport mechanisms for possible additional contamination from nonpoint source runoff are not well understood.

In addition, the potential for NPDES-permitted discharges that contain heavy metals to contribute to sediment contamination has also developed as an issue. However, no assessment or predictive mechanisms are readily available for this area.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in this Program?

A procedure comparing fish flesh to the concentration of a contaminant in the sediment would help the Division assess the degree of contamination and aid in developing "safe" clean-up levels.

PROGRAM SUMMARY 27: REGION IX WATER MANAGEMENT DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT

AGENCY

U.S. Environmental Protection Agency, Region IX
Water Management Division: Wetlands, Oceans, and Estuaries Branch (W-7)

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Region IX Water Management Division is provided by the following:

- Title I of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended. In particular, all requirements pertaining to Sections 2, 3, and 101-108 of the MPRSA. In addition, the following federal regulations also apply: 40 C.F.R. Parts 220-228, 230-231, and 233

- Title II of the MPRSA: Sections 201 and 203

- Section 404 of the Clean Water Act of 1977, as amended

- Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended

- Section 10 of the Rivers and Harbors Appropriation Act (RHAA) of 1899, as amended.

A synopsis of the above sections, excluding MPRSA sections 2 and 3, is provided in Table 1. MPRSA sections 2 and 3 are simply the general policy and definitions section of the Act.

TASK DESCRIPTION

What Decisions are Made?

Under Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, and the federal *Guidelines for the Specifications of Disposal Sites for Dredged or Fill Material*

(40 CFR 230), the Water Management Division provides comments to the U.S. Army Corps of Engineers (COE) on Sections 10 and 404 permit applications.

Under Sections 102 and 103 of the MPRSA, the Water Management Division provides comments to the COE on the acceptability of proposed ocean dumping of dredged materials into waters beyond the territorial limit. The Division also enforces the MPRSA under Sections 105 and 107, and complies with other federal laws under Section 106. Federal regulations are issued under Section 108. Finally, Title II of the MPRSA mandates that the U.S. EPA conduct monitoring and research regarding the effects of dumping materials in ocean waters or other coastal waters.

The Office of Federal Activities (OFA) solicits scientific and technical comments from the Water Management Division on the environmental impacts of major federal dredge and fill actions that are described in the required environmental impact statements. The OFA provides these comments to the sponsoring federal agency in accordance with Section 102 of NEPA and the NEPA implementation regulations.

What Sediment Assessment Methods are Used to Make Decisions?

The decision to recommend that a permit be issued or denied under Sections 10 (RHAA) and 404 (Clean Water Act) is based on compliance with the requirements of U.S. EPA's Guidelines (40 CFR 230) promulgated pursuant to Section 404(b)(1) of the Clean Water Act. The types of decisions made are often based upon an evaluation of the applicant's information regarding the suitability of different types of dredged materials for the proposed or alternative types of dredging techniques and disposal (e.g., open-water, confined, aquatic, or upland).

The decision to recommend that a permit be issued or denied under Sections 102 and 103 of the MPRSA is based on U.S. EPA's Ocean Dumping Regulations (i.e., 40 CFR 220.4, 225, 227, and 228) and the 1977 "Green Book" entitled *Ecological Evaluation of*

Proposed Discharge of Dredged Materials into Ocean Waters. In particular, the "Green Book" is utilized in providing guidance as to how the required bioassays are conducted, and the resultant data analyzed.

How are Sediment Assessment Methods Used to Make Decisions?

The U.S. EPA Region IX Ocean and Estuaries Section has produced a draft guidance document entitled *EPA Region 9 General Requirements for Sediment Testing of Dredged Material Proposed for Ocean Dumping*. This document contains guidance in the following areas:

- Collection of sediment samples
- Reporting requirements and comparison procedures for the data generated from the sediment chemistry, bioassay, and bioaccumulation tests
- Required sediment physical characterization and sediment chemistry analyses
- Recommended test species for the suspended particulate and solid phase bioassay tests
- Recommended species for the bioaccumulation tests and a list of chemicals that should be measured in the tissue samples
- Predredging and post dredging bathymetric survey requirements
- Calibration of navigation equipment and ocean dumping procedures.

In addition to the above, Region IX also reviews pre-dredge, post-dredge, and overall dredging plans for each project. Final concurrence will be on the resulting permits that are produced for each project.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

Potential applications of new peer-reviewed methods include problem area identification, NEPA document preparation, permit decisions, discharge siting, cleanup area selection, site restoration, dumpsite designation, dumpsite monitoring, and dredged material evaluation.

**PROGRAM SUMMARY 28: REGION X CRITERIA
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

**U.S. Environmental Protection Agency Region X
Water Division, Office of Puget Sound**

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STATUTORY BASIS

The statutory basis for sediment evaluation activities performed by the U.S. EPA Office of Puget Sound is provided by Sections 304 and 320 of the Clean Water Act. A synopsis of these sections is provided in Table 1.

TASK DESCRIPTION

U.S. EPA Region X is currently developing and validating the Apparent Effects Threshold (AET) approach, a method to identify chemical concentrations in sediment above which adverse biological effects are always expected. To date, AET values have been developed for four biological indicators (i.e., amphipod mortality, oyster larvae abnormality, Microtox bioassays, and depression in benthic infaunal abundances) representing a range of environmental endpoints. AET values are currently available for 70 chemicals, including metal and organic contaminants. Field verification studies indicate that AET values have an overall reliability of 85-96 percent in terms of their ability to predict impacts in the field where impacts are actually observed, and not to predict impacts where they do not occur.

A database (i.e., SEDQUAL) has been developed by U.S. EPA Region X and is currently being used to calculate AET values and to evaluate the predictive reliability of AET and other sediment quality values generated using other methods (e.g., equilibrium partitioning). SEDQUAL includes the following capabilities specific to the computation and comparison of sediment quality values:

- Stores sediment chemistry and biological effects data
- Stores sediment quality standards and criteria based on any sediment criteria development method
- Calculates AET values
- Manipulates sediment quality standards and criteria in a variety of ways (i.e., applying safety factors, omitting certain chemicals, combining sediment quality standards and criteria from different methods)

- Compares sediment quality values to sediment chemistry concentrations stored in the database or entered from the keyboard to identify potential problem areas
- Estimates predictive reliability of sediment quality standards and criteria by comparing stations where biological effects were predicted with stations where effects were actually observed.

SEDQUAL operates on a personal computer and is available upon request.

What Decisions are Made?

AET values are currently being used in a variety of regulatory programs in Puget Sound to make decisions concerning the management and remediation of existing contaminated sediments (CERCLA), the prevention of future contamination (CWA Section 320), and the identification of dredged material which is acceptable for open-water disposal (CWA Section 404) (see Program Summaries 29, 30, and 31). The AET approach is currently being considered by the Washington Department of Ecology as the technical basis for the development of state ambient sediment quality standards (see Program Summary 32).

How are Sediment Assessment Methods Used to Make Decisions?

In each of these programs, AET values are compared to sediment chemistry concentrations as a means of differentiating between sediments with low levels of contamination and sediments with contamination that would be expected to result in adverse biological impacts. As appropriate, site-specific biological tests are performed to verify AET predictions prior to implementation of specific regulatory actions.

Potential uses of AET values include are as follows:

- Screening levels for additional biological testing
- Tools for identifying potential problem chemicals in sediment
- Concern levels to focus source identification and enhanced source control
- Trigger levels for remedial action
- Guidelines for identifying suitable/unsuitable sediments for open-water dredged material disposal.

AET values can also be used to monitor the effectiveness of source controls and prioritize laboratory studies for establishing chemical-specific cause and effect relationships.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

As new biological tests are developed, AET values can be developed for these additional indicators. As new sediment assessment methods emerge, U.S. EPA will consider using them in combination with or as substitutes for the AET approach.

**PROGRAM SUMMARY 29: REGION X URBAN BAY TOXICS ACTION PROGRAM
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region X
Water Division, Office of Puget Sound

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STATUTORY BASIS

The statutory basis for Urban Bay Toxics Action Programs performed by the Office of Puget Sound is provided by Section 320 of the Clean Water Act. This section is described in Table 1.

TASK DESCRIPTION

In an effort to halt degradation of Puget Sound and to improve the quality of water and sediments, U.S. EPA Region X and the Washington Department of Ecology have joined

with other agencies and organizations to develop and implement toxics control programs in Puget Sound's urban industrial embayments. This work was initiated primarily in response to indications of widespread sediment contamination and associated adverse impacts to biota. Urban Bay Toxics Action Programs to date have focused on Elliott Bay, Everett Harbor, Budd Inlet, Bellingham Bay, and Sinclair Inlet, adjacent to the cities of Seattle, Everett, Olympia, Bellingham, and Bremerton, respectively.

What Decisions are Made?

The toxics control programs are designed to meet the following objectives:

- Identify and prioritize existing problem areas (based predominantly on sediment contamination and biological effects)
- Identify known and suspected sources of pollution and likely chemicals contributing to biological degradation
- Detail procedures to eliminate existing contaminant problems and control sources
- Identify agencies responsible for implementing corrective actions.

"Action teams" of enforcement and compliance personnel are assigned to each bay to provide the links among problem identification, source control, and sediment remedial action. Although action teams emphasize industry and public education, regulatory actions are taken as necessary, including permitting, negotiation with responsible parties, and enforcement actions. Priority problem areas have been identified and source control actions are well underway, but sediment remedial action has not yet begun at any of the sites.

What Sediment Assessment Methods are Used to Make Decisions?

The approach to identification and ranking of problem areas relies on empirical measurements of the environmental hazard of contaminated areas. The primary information used in the decision process includes sediment contaminant concentrations, bioaccumulation, sediment toxicity, benthic infauna abundance, and fish pathology.

Environmental quality indices were developed to rank areas based on observed contamination and biological effects. The indices have the general form of a ratio between the value of a variable at a site in an urban bay and the value of the same variable at a reference site (i.e., a site with similar physical characteristics and no known source of past or present contamination). Therefore, the ratios increase as the deviation from reference conditions increase. Thus, each ratio is termed an Elevation Above Reference (EAR) index.

Apparent Effects Threshold (AET) (see Program Summary 28) values are used to relate sediment contamination and predicted biological effects at stations where chemical data were available but biological data were not. Sediment contaminants present at concentrations above AET values are identified as problem chemicals.

How are Sediment Assessment Methods Used to Make Decisions?

Sediment contamination and biological effects data are used to identify and prioritize problem areas. Sites are designated as problem areas based on elevated scores for at least one indicator. Problem areas are then prioritized on the basis of EAR values for various indicators (e.g., chemical concentrations, biological effects).

How Could New Peer-Reviewed Assessment Methods be Used in This Program?

A useful application of new sediment assessment methods would be in verification of site restoration efforts at locations that require remedial actions. For urban bays in the initial

stages of the program (e.g., Bellingham Bay), new sediment assessment methods could be used for the various decisions cited above under "What Decisions are Made?".

**PROGRAM SUMMARY 30: REGION X HAZARDOUS WASTE DIVISION
ACTIVITIES RELATED TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Environmental Protection Agency Region X
Hazardous Waste Division

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. EPA Region X Hazardous Waste Division is provided by the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendment and Reauthorization Act (SARA) sections 104(a), 104(b), 107 (d), 111(c)(e), 121, and 122; and Clean Water Act sections 303 and 304. These statutes are described in Table 1.

TASK DESCRIPTION

This description focuses on the Commencement Bay Nearshore/Tideflats Remedial Investigation/Feasibility Study. Similar approaches are being taken at other estuarine Superfund sites in Puget Sound (i.e., Harbor Island and Eagle Harbor). The Commencement Bay Nearshore/Tideflats area was listed in 1983 on the first National Priorities List of hazardous waste sites. A remedial investigation was initiated in 1984, and the results published in 1985. Twenty-five major sources were found to contribute to sediment contamination in the study area. The magnitude and severity of sediment contamination were characterized using chemical analyses and biological effects indicators. Problem areas were ranked on the basis of comparisons between chemical concentrations in the bay and those in relatively unpolluted areas, and the presence of measurable biological effects.

Following the completion of the remedial investigation, the Commencement Bay feasibility study was initiated. This effort included the identification, evaluation, and proposed selection of corrective measures for each of the nine high priority problem areas in Commencement Bay.

What Decisions are Being Made?

Under CERCLA, a variety of sediment management regulatory decisions must be made. For the Commencement Bay Superfund site, the regulatory agencies made the following decisions:

- Predicted where biological impacts were likely occurring based on sediment chemical concentration
- Identified and prioritized problem areas
- Identified potential problem chemicals and likely sources

- Identified a trigger concentration for sediment remedial action
- Developed an ecological basis for designated cleanup goals.

What Sediment Assessment Methods are Used to Make Decisions?

The Apparent Effects Threshold (AET) approach (see Program Summary 28) was selected as the primary method for developing sediment quality goals in Commencement Bay. This was supplemented by the Equilibrium Partitioning approach to develop sediment cleanup goals for PCBs based on risks to human health and is currently undergoing public review.

How are Sediment Assessment Methods Used to Make Decisions?

AET values were used in the feasibility study to identify high priority problem areas and to define the estimated volume of sediment requiring remediation. AET were also used in combination with site-specific biological effects data to determine remedial action cleanup goals. Final decisions concerning sediment remedial action will also be based on effectiveness, feasibility and cost criteria, as well as public comment. The feasibility study was completed in March 1989 and is currently undergoing public review.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

With the Feasibility Study report under public review, many of the decisions based on sediment quality (e.g., problem area identification, cleanup area selection, cleanup goals) have already been made. New sediment methods could be used, however, to monitor the success of remediation.

**PROGRAM SUMMARY 31: PUGET SOUND DREDGED DISPOSAL
ANALYSIS (PSDDA) ACTIVITIES RELATED
TO CONTAMINATED SEDIMENT**

AGENCY

U.S. Army Corps of Engineers
North Pacific Division, Seattle District

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STATUTORY BASIS

The statutory basis for activities performed by the U.S. Army Corps of Engineers-North Pacific Division is provided by Section 404 of the Clean Water Act. This section is described in Table 1.

TASK DESCRIPTION

The Puget Sound Dredged Disposal Analysis (PSDDA) is a comprehensive interagency effort to develop a process for making decisions regarding the unconfined, open-water

disposal of dredged material in Puget Sound. Sponsoring agencies are the U.S. Army Corps of Engineers (Seattle District), U.S. EPA (Region X), and the Washington Departments of Ecology and Natural Resources. As part of the PSDDA effort, multiuser sites have been identified, site monitoring plans have been developed, and evaluation procedures have been established for assessing the acceptability of sediments for unconfined, open-water disposal in Puget Sound. PSDDA Phase I (central Puget Sound) has been completed, and Phase II (north and south Puget Sound) is in progress.

What Decisions are Made?

The PSDDA dredged-material evaluation procedures are specifically designed to assist managers in the following:

- Evaluating potential impacts to biological resources and human health associated with dredged material disposal
- Identifying sediments requiring biological testing
- Identifying suitable sediments for open-water, unconfined disposal.

PSDDA evaluation procedures consist of a tiered process incorporating initial chemical screening followed, if necessary, by site-specific biological testing.

What Sediment Assessment Methods are Used to Make Decisions?

The Apparent Effects Threshold (AET) approach formed the basis for defining sediment quality under PSDDA. An AET value is defined as the sediment concentration of a given chemical above which statistically significant ($P < 0.05$) biological effects are always expected (see Program Summary 28).

How are Sediment Assessment Methods Used to Make Decisions?

Screening level (SL) and maximum level (ML) values have been established for 58 chemicals. If concentrations of chemicals in the dredged material are below SL concentrations, the material is considered acceptable for disposal without confirming biological tests. Site-specific SL values are typically established as 10 percent of the highest AET for a range of biological indicators. Sediment bioassays and bioaccumulation testing are used to determine the acceptability of sediment with chemical concentrations between the SL and ML concentrations. ML concentrations for each chemical of concern are based primarily on the highest AET for a range of biological indicators. Sediments exceeding ML concentrations are generally considered unacceptable for unconfined, open-water disposal. However, comprehensive biological testing is optional.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New peer-reviewed methods could be incorporated into the decision-making framework used to assist in evaluating the acceptability of dredged materials for unconfined, open-water disposal in Puget Sound.

**PROGRAM SUMMARY 32: STATE OF WASHINGTON REGULATIONS
FOR CONTAMINATED SEDIMENT**

AGENCY

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STATUTORY BASIS

The statutory basis for activities performed by the Washington Department of Ecology (Ecology) Sediment Management Division is provided by Section 304 of the Clean Water Act and Chapter 90.48 of the Revised Code of Washington. Section 304 is described in Table 1.

TASK DESCRIPTION

Ecology is currently developing sediment quality standards to establish acceptable levels of sediment contamination throughout Puget Sound over the long term. The promulgation of final regulations is currently anticipated by January 1991.

The regulations under development affect only marine sediment in Puget Sound, although the adopted regulations may be broadened to include marine and freshwater sediment throughout the state.

What Decisions are Made?

The state standards will be used by Ecology to identify and designate sediments in Puget Sound with contaminant concentrations that are predicted to result in adverse effects to biological resources or that correspond to significant health risks to humans. More specifically, the standards will be used in combination with other information in the following ways:

- To identify sediments requiring priority attention and chemicals likely contributing to observed biological impacts
- As a component of source monitoring (i.e., monitoring concentrations and toxicity of ambient sediment off discharge pipes)
- As a tool for evaluating the effectiveness of source control limits
- As the technical basis for requiring toxicity reduction evaluations of industrial and municipal discharges that cause sediment contamination in violation of the standards.

The standards will be an integral part of Ecology's toxicants control program, representing a long-term goal for sediment quality in Puget Sound and a "yardstick" for acceptable levels of toxic contaminants in receiving water sediments.

Separate regulations and guidelines are also being developed specifically for use in limiting particulate discharges from point and nonpoint sources, prioritizing and conducting

sediment remedial actions, and identifying sediments acceptable for disposal in water or on land.

What Sediment Assessment Methods are Used to Make Decisions?

Several methods, including the Apparent Effects Threshold (AET) approach (see Program Summary 28) and the Equilibrium Partitioning approach, are being considered as the technical basis for establishing these standards.

How are Sediment Assessment Methods Used to Make Decisions?

Implementation guidelines are being developed by Ecology concurrently with the sediment quality standards.

How Could New Peer-Reviewed Sediment Assessment Methods be Used in This Program?

New peer-reviewed methods could be incorporated into the regulatory framework to identify, remediate, and manage chemically contaminated sediments, as described above under "What Decisions Are Made?".



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