



Contaminated Sediments News



EPA Continues Development of Sediment Management Strategy

EPA is continuing to develop its national contaminated sediment management strategy. The strategy is currently being revised to incorporate comments received during the past few months. A draft outline of the strategy was widely circulated for review and public comment in March, and many written comments were received prior to the close of the comment period on July 15. Three national fora were also held by EPA to discuss the sediment management strategy and to receive public comments. The forum topics included national extent and severity of sediment contamination; federal and state agency cooperation to address the issue of sediment contamination; and public awareness, education, and outreach related to the issue of sediment contamination. A revised draft of the sediment management strategy is expected to be completed this fall, and will be circulated for internal EPA review before being submitted for Office of Management and Budget Approval and publication in the Federal Register. For more information contact Tom Armitage, EPA HQ, at (202) 260-5388.

Sediment Activities Around the Country

EPA Headquarters

Economic Analysis of SQC on Dredging Program

OPPE, in conjunction with the Office of Water, has initiated a study, "Economic Analysis of the Benefits and Costs of Sediment Quality Criteria: Impacts on the Army Corps of Engineers Dredging Program." This study will analyze existing data of COE dredging projects from 1989 to the present, as well as estimates for projected projects through 2000, to determine what percentage of COE dredging projects would fail the

proposed sediment quality criteria. Three categories of dredged material will be evaluated: (1) dredged material that the COE did not test because it was deemed to be clean sediment, (2) COE-tested dredged material that was considered nontoxic, and (3) dredged material that was tested and failed the COE criteria. OPPE will determine the costs of current dredging and disposal practices under the three scenarios and increased costs due to failure to meet the criteria. This study is scheduled to be completed by the end of November 1992. Contact Brett Snyder, EPA-OPPE, at (202) 260-5610 for more information.

Sediment Criteria

On June 10-11, 1992, presentations were made to the EPA Science
(continued on p. 2)

Contaminated Sediment Activities Timeline

September 1-3, 1992. 3rd National Meeting: Water Quality Standards for the 21st Century. Las Vegas, NV. Contact Patti Morris at (202) 260-2806.

September 16-18, 1992. Tiered Testing Issues for Freshwater and Marine Sediments. Washington, DC. Contact Bev Baker at (202) 260-7037.

September 30-October 2, 1992. International Environmental Dredging Symposium. Buffalo, NY. Contact Environmental Education Institute, Inc., at (716) 858-6370.

November 7-8, 1992. Meeting of ASTM Subcommittee on Sediment Toxicology (E47.03). Cincinnati Convention Center, Cincinnati, OH. Contact Chris Ingersoll at (314) 875-5399.

November 8-12, 1992. 13th Annual SETAC meeting. Cincinnati Convention Center, Cincinnati, OH. Fax (904) 469-9778 or call (904) 469-1500 for more information.

CS News is produced by EPA-OST to exchange relevant information on contaminated sediments and to increase communication among interested parties. To obtain copies of this report or to contribute information, contact Beverly Baker, EPA HQ, at (202)260-7037.

Advisory Board (SAB) as part of its review of the methodology to derive national sediment criteria and the first sediment criteria documents. EPA provided draft sediment criteria documents, field validation studies, the criteria development methodology, supporting documentation, and presentations on likely uses of sediment criteria to the committee. The final report identifying the SAB's findings is expected in the latter part of August. A favorable review is expected, and it is anticipated that the draft sediment criteria documents will be distributed for Red Boarder and public review and comment shortly after the SAB review is completed. For more information contact Chris Zarba, EPA HQ, at (202) 260-1326.

National Inventory for Contaminated Sites

At both the first and second public forums on the Draft Contaminated Sediment Management Strategy, all EPA program and other Federal agency representatives supported the development of a national inventory of contaminated sediment sites. The final planning for this inventory is under way. The completion of a national inventory of contaminated sediment sites is one of the major

EPA Sediment Strategy Forum Proceedings

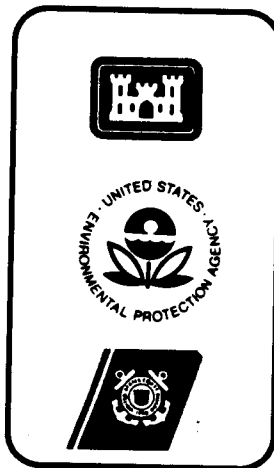
Proceedings from all three Sediment Management Strategy Forums will be available by September 1, 1992. Forum attendees and participants will automatically receive a copy of the proceedings. Others wishing to receive a copy of the proceedings may contact Esther Williams at (202) 260-7049.

assessment elements of EPA's Draft Contaminated Sediment Management Strategy. The purposes of this activity are (1) to obtain the best possible near-term assessment of the national extent and severity of sediment contamination, (2) to identify areas that may be contaminated and in need of further assessment, and (3) to identify areas with sufficient data to be characterized as causing high risks or severe effects so that Agency programs can target those areas for appropriate action. For more information contact Bev Baker, EPA HQ, at (202) 260-7037.

Marine and Coastal Enforcement Training Course

A Marine and Coastal Enforcement Training Course will be held later this year. This pilot training course has been developed primarily to provide EPA Regional personnel in coastal States with a better understanding of the enforcement roles of EPA, the U.S. Army Corps of Engineers, and the U.S. Coast Guard, as well as appropriate procedures for responding to violations under the following statutes:

- The Marine Protection, Research, and Sanctuaries Act (MPRSA) - Title I
- The Clean Water Act (CWA) - §§301(h), 402, and 403 (NPDES permitting of ocean point source discharges); §311 (oil spills); and §312 (marine sanitation devices)
- The Shore Protection Act (SPA)



- The Act to Prevent Pollution from Ships (APPS) as amended by the Marine Plastics Pollution Research and Control Act (MPPRCA).

A fundamental theme of this course is the importance of interagency teamwork in responding to potential violations under the statutes listed above, given the limited enforcement resources available to each Federal agency and the need for effective marine and coastal pollution enforcement programs. For more information contact Catherine Crane, EPA HQ, at (202) 260-9177.

National Estuary Program

Sarasota Bay Estuary Program

Members of the Baywide Monitoring Program, a three-part study conducted by Mote Marine Laboratory, Sarasota, FL, are about to publish a report on the benthic habitat, sediment, and water quality of Sarasota Bay, FL. The report describes the collection and characterization of sediments from 105 stations for heavy metals and organic contaminants. Preliminary results indicate elevated levels of lead, zinc, and copper in sediments deposited at the mouths of large industrial tributaries and elevated levels of pesticides and polynuclear aromatic hydrocarbons in sediments of large, more urbanized tributaries. For more information contact Dean Ullock, Region IV, at (404) 347-1740.

Tampa Bay Estuary Program

An agricultural nonpoint source proposal developed by the Tampa Bay Estuary Program, entitled "Agricultural Runoff Treatment for Sediment Contamination Control in Cockroach Bay, Florida," was selected to receive FY92 section 319(h) set-aside funding in the amount of \$400,000. The *(continued on p. 3)*

money will be awarded to the State of Florida to support final design and construction of a stormwater treatment system for agricultural runoff prior to discharge into Tampa Bay. The constructed system will consist of a sediment sump, a detention basin, and scrubber marshes to remove pesticide-contaminated particulates. Sediment and water quality monitoring is also an important part of the project. For more information contact Catherine Fox, Region IV, at (404) 347-1740.

Regional Activities

Region I

Harbor Tunnel

The Massachusetts Department of Public Works is proposing a \$5 billion project to construct approximately 7 miles of roadways in Boston. Included in the project is the construction of an underground "central artery" to replace an elevated highway that runs through the City of Boston and a third Harbor Tunnel under Boston Harbor to Logan Airport in East Boston.

This project will result in the generation of approximately 12 million yd³ of dredged and excavated material. The disposal of this dredged and excavated material has been an issue under discussion for several years.

The surface sediments from Boston Harbor along the new tunnel alignment were determined to be unsuitable for ocean disposal because of the toxicity in one test sample and significant bioaccumulation of several metals and organics in the other two test samples. The underlying native marine clays were determined to be suitable for ocean disposal. Most of the contaminated surface sediments are being taken to a newly constructed confined disposal facility located at Governor's Island adjacent to Logan

Airport. A portion of the contaminated sediments will be taken to Spectacle Island in Boston Harbor, which is an old landfill historically used by the City of Boston. Contaminated sediments will be deposited in the landfill and then that layer will be capped with clean excavated material from the construction project. Spectacle Island will then be converted into a park, adding to the Boston Harbor Islands State Park. The underlying clean native marine clay is being disposed of in an ocean dump site approximately 22 nm offshore in Massachusetts Bay. For more information contact Kym Keckler, Region I, at (617) 565-4432.

Radioactive Barrel Study

Massachusetts Bay, a largely oceanic coastal embayment east of Boston Harbor, has been a depository for a variety of permitted (and possibly unpermitted) wastes for the better part of this century. In particular, the disposal of industrial/chemical wastes during the mid-1940's through the mid-1970's and low-level radioactive wastes during the 1940's and 1950's took place at a number of sites throughout the Bay. Most noteworthy is the so-called "Industrial Waste Site" (IWS) located 20 miles east of Boston in 300 ft of water. In an EPA-sponsored 1991 study, the International Wildlife Coalition estimated that the most densely distributed area of the IWS contained about 21,000 containers, half of which still may have their contents intact.

Recent concerns have been raised by a number of agencies and environmental groups regarding the status of these wastes and their potential effects on

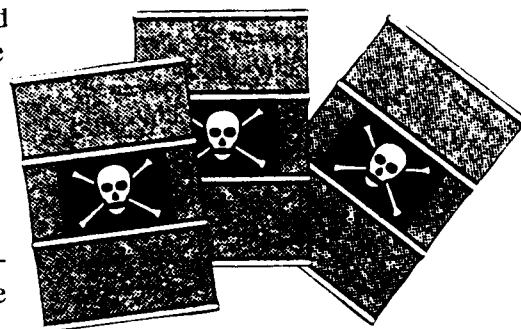
the fisheries of Massachusetts Bay, the ecosystem at large, and public health. A number of fishermen have retrieved and redeposited waste containers during their trawling activities. In one case, toxic fumes generated from retrieved barrels caused a debilitating injury to a fisherman and eventual loss of his boat. U.S. Representative Gerry Studds has asked EPA to evaluate all Bay disposal sites for eligibility under the Superfund program.

In response to these concerns, EPA Region I has formed a task force to address the problem. Its objectives include:

- Perform a records investigation that includes interviews with dumpers and fishermen.
- Develop a study strategy and public outreach program.
- Plan and coordinate field investigations to assess potential risks to public health and the ecosystem.
- Assess potential management options.

Given the lack of records confirming the types and amounts of wastes and the actual location of eventual disposal, the task force identified four broad areas of the Bay (totaling more than 100 mi²) as possible waste depositories that would be candidates for further study over the long term.

To date, a total of about 30 mi² of the Bay's bottom, including the IWS, has been mapped for the distribution of waste containers using side scan sonar
(continued on p. 4)



and remotely operated vehicles. A more recent EPA Region I/ERL-Narragansett study of another more inshore disposal site (Lightship Survey Area) indicated a much lower density of probable waste containers (perhaps as much as three orders of magnitude lower than that of the IWS).

Most recently, a multiagency study collected sediment and animal tissue (lobster and fish) samples for a variety of toxics and radionuclides from the IWS. This cooperative effort included EPA Region I, Narragansett and Environmental Monitoring Systems (Las Vegas) Labs; NOAA; FDA; and the Massachusetts Marine Fisheries, Public Health, and Coastal Zone Management agencies. Preliminary analysis of one sediment sample indicated a higher-than-background presence of Strontium-90, but much below the level for public concern. The remaining samples did not exhibit any radioactivity during safety screening but will be further analyzed. The results should be available this fall. For more information contact Dave Tomey, EPA Region I, at (617) 565-4425.

Region II

Decontamination Technology Demonstration Project

Section 412 of the Water Resources Development Act (WRDA) of 1990 provided for the New York District Corps of Engineers, in consultation with EPA Region II, to implement a decontamination technology demonstration project in New York/New Jersey Harbor. The Corps has been appropriated \$1 million to carry out the project. The intent of the demonstration project is to evaluate a method of disposing of material dredged from the harbor region in an environmentally sound manner other than ocean disposal. The application of decontamination technology will be evaluated for a portion of dredged material

from the harbor that would otherwise be disposed of at the Mud Dump ocean disposal site. Potential sites for future pilot-scale implementation are currently being assessed. Bench-scale tests are planned to be performed using at least three technologies with selected sediments from the harbor. Continued funding for this program is being considered for inclusion in the WRDA of 1992. For more information contact Alex Lechich, Region II, at (212) 264-1302.

Region IV

Region IV's Contaminated Sediments Workgroup is currently developing a Guidance Memorandum on Sediment Quality Assessment in Wetlands for use in both Waste and Water Division Regulatory Programs. The draft memorandum uses the tiered-testing approach for determining sediment quality: sediment chemistry studies (with recommended chemicals of concern, methodologies, and detection limits), followed by acute toxicity and bioaccumulation studies with appropriate species and test conditions.

The use of in situ tissue concentrations of fauna and flora is also discussed. This information, along with other types of information, (e.g., quality of the wetland), will be used to help determine the mode of cleanup to be used, if any, in each specific wetland case.

The Regional Implementation Manual of the 1991 Green Book for the Southeast is nearing completion. Protocols described in this manual are already being applied in the assessment of many harbors, including Wilmington Harbor, NC, and Canaveral and Fort Pierce Harbors, FL. Use of the more stringent testing

approach has revealed sediment quality concerns in Charleston Harbor and Winyah Bay, SC, and Miami River, FL. Sampling and testing plans for both Savannah and Brunswick Harbors, GA, are currently being developed for the first time, with collection scheduled to begin later this year.

Region IV's Coastal Sediment Quality Inventory (more than 40,000 records from NC, SC, GA, FL, AL, and MS) is now complete, with copies available for distribution. Evaluation of the database is currently in progress and scheduled for completion by October 1, 1992. The evaluation, designed to determine the nature and extent of coastal sediment contamination in the Southeast, has recently been expanded to include information on the types and loadings of point source contaminant discharges. A Contaminated Fish/Shellfish Tissue Data Inventory is also under way for use in identifying areas of concern and as an aide to States in issuing fish/shellfish consumption advisories. For more information contact Catherine Fox, Region IV, at (404) 347-1740.

Region VI

Region VI is overseeing a special Supplemental Environmental Project (SEP) called for in a consent decree between the City of Houston and EPA. The consent decree was developed as an enforcement action in response to violations of the City's NPDES permit. A multi-agency oversight committee has been formed to develop a Scope of Work for the project. A draft Scope of Work has been completed and is presently under review. The emphasis of the project will be assessment of toxicity and toxic substances in water and sediments in tidally influenced tributaries to the Houston Ship Channel. The sampling will include wet weather and dry weather (summer and winter) conditions. The project will be *(continued on p. 5)*



carried out over a period of about 18 months.

A nonpoint source proposal entitled, "City of Austin, TX, Proposal for EPA Contaminated Sediment 319(h) Grant, Urban Control Technologies" was selected to receive \$400,000 in FY92 funds. The project will include installation of inlet filters, oil sediment treatment chambers, and a detention pond to control toxic sediment contaminants entering Town Lake in Austin, TX. The use of a new and innovative technology, perforated aluminum inlet filters, will also be demonstrated in this project. For more information on the above projects, contact Phil Crocker, Region VI, at (214) 655-7145.

Region IX

Region IX is conducting the following contaminated sediment-related activities:

- Region IX is working with the Army Corps of Engineers (Corps) San Francisco District and State of California regulatory agencies in San Francisco Bay on draft sediment testing guidance for Clean Water Act Section 404 dredged material disposal. The new draft will include bioassays, sediment chemistry method detection limits and evaluation of a reference area around the Alcatraz disposal site. Agreement by all of the regulatory agencies is a significant and major accomplishment for dredged material management in San Francisco Bay. For more information contact Brian Ross, Region IX, at (415) 744-1979.
- Region IX is working with the Corps San Francisco District to develop a methods manual for sediment and water collection, water, sediment, and tissue testing and bioassay tests. The manual will be useful to other Regions and other sediment-related programs. The

primary contact for this manual is Richard Stradford, Long-Term Management Strategy Coordinator, Corps San Francisco District, (415) 744-3325.

- Comments on draft regional testing agreements for the Ocean Dumping Program are expected from the Corps Los Angeles and San Francisco Districts by the end of August 1992. For more information on these manuals, contact Patrick Cotter, Region IX, at (415) 744-1163.

ORD Activities

ERL-Duluth

Field Verification

ERL-Duluth is continuing field verification efforts for sediment quality criteria. At a heavily DDT-contaminated site in Huntsville, AL, sediment chemistry, laboratory toxicology, and benthic community structure are being evaluated relative to exposure conditions using the Equilibrium Partitioning (EP) approach. A gradient of contamination was discovered showing some changes in benthic community structure. Using Toxicity Identification and Evaluation (TIE) techniques to assess the toxicity at the site, DDD and DDE were also determined to have an impact on the organisms. The Duluth lab will conduct tests to develop toxicity models to determine the interactive properties of these compounds. These toxicity models will be used in conjunction with the EP exposure model to determine the reasonableness of what is being observed in the test sediment.

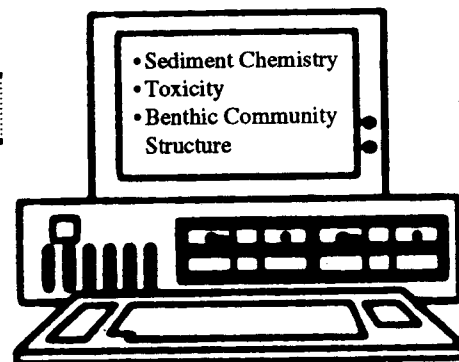
Model Evaluations

ERL-Duluth is continuing to evaluate models to predict bioavailability of

metals in sediments. Research is being conducted on long-term exposures using a sediment-ingesting organism (oligochaete) to examine metal bioaccumulation relative to sediment AVS concentrations or pore-water metal concentrations.

Contaminated Sediment Database

A database has been established at ERL-Duluth to determine the reasonableness of the sediment quality criteria with respect to sediment



chemistry, toxicity, and benthic community structure. Freshwater data sets that include sediment chemistry, toxicity, and/or benthic community structure are still desired.

For more information contact Gary Ankley, ERL-Duluth, at (218)720-5603.

ERL-Athens

Sediment Sorption of Basic Ionizable Chemicals

As the scope of the Sediment Quality Criteria (SQC) Program broadens, the need for the development of SQCs for ionizable compounds will undoubtedly arise. This requires a better understanding of the sorptive processes of these chemicals in sediments because sorption will significantly affect their environmental movement, persistence, and bioavailability. Sorption mechanisms that must be considered for the
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Focus: Great Lakes



Development of Dredged Material Testing Manual

EPA, in conjunction with the Corps, is developing a regional manual to determine the suitability of dredged material for open water disposal. The *Great Lakes Dredging Material Testing Evaluation Manual* will include standardized test methods for all Great Lakes dredging projects. The Region is currently developing five bioassay tests and one bioaccumulation test to be used for effects-based testing in addition to sediment chemistry. The regional effort is interacting closely with the development of a national testing manual for dredged material disposal in inland and near coastal waters. For more information contact Marc Tuchman, EPA Region V, at (312) 886-0239.

Site Summary Inventory

Over the last 10 to 15 years there has been an increase in the amount of sediment data collected, both from routine ambient monitoring and from efforts to better define suspected areas of contamination. To date, no regional effort has been made to compile all this information into one repository. To remedy this situation, Region V has developed a sediment site inventory summary. This summary includes sediment contamination data from the States of Wisconsin and Minnesota, as well as the basins of Lakes Michigan and Superior. Existing data on sediment chemistry and any available biological components (e.g., fish tissue, bioassay) were collected from over 400 sites. Summary information on fish consumption advisories and potential sources of contamination are also included. A draft of this pilot inventory is expected to be out later this month. For more information contact Marc Tuchman, EPA Region V, at (312) 886-0239.

Nonpoint Source Sediment Pilot Projects

EPA has provided funding to three States (Illinois, Indiana and Wisconsin) to conduct a total of five pilot nonpoint source sediment contamination prevention/remediation projects as part of EPA's National Sediment Management Strategy. These grants are managed by the Nonpoint Source Program within Region V. A brief summary of each project is provided below.

Butterfield Creek

Butterfield Creek, located southeast of Chicago, IL, is contaminated with metals and organics due to urban runoff. The Northeastern Illinois Planning Commission received a grant from EPA to conduct the following activities: (1) develop a stormwater ordinance; (2) construct a sediment/stormwater control structure within the Butterfield Creek watershed that will be used to demonstrate to communities and developers that the control measures specified in the ordinance are implementable; and (3) provide technical assistance to the communities within the Butterfield Creek watershed.

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Little Lake Butte des Morts

Little Lake Butte des Morts is located in Neenah-Menasha, Wisconsin, in the Lake Michigan Basin, and its sediments are heavily contaminated with PCBs. Little Lake Butte des Morts is a major source of PCBs to the Lower Fox River and Southern Green Bay, which have fish and waterfowl consumption advisories posted.

The Wisconsin Department of Natural Resources (DNR) has initiated a program called SMART (Sediment Management and Remediation Techniques) to study approaches and conduct demonstration projects for cleaning up contaminated sediments within the State. Little Lake Butte des Morts was selected by the Wisconsin DNR to be one of the first demonstration projects for the SMART program. In addition, EPA gave DNR a grant to develop a remedial investigation and feasibility study (RI/FS) for Little Lake Butte des Morts.

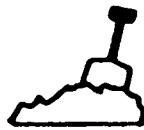
Ruck Pond/Cedar Creek

Ruck Pond is located in the Lake Michigan Basin north of Milwaukee, WI. The pond's sediments are heavily contaminated with PCBs, due in part to discharges from a storm sewer. Ruck Pond is the upstream source of PCBs to Cedar Creek, which flows into the Milwaukee River, a tributary to Lake Michigan.

The Wisconsin DNR received a grant from EPA to develop a PCB transport model to estimate the loading of PCBs to the Milwaukee River. Results from this model will provide a basis for approaching potentially responsible parties (PRPs) for funding an RI/FS and the subsequent remediation. The model will also be used in selecting remediation alternatives, locating remediation sites, and setting clean-up goals for PCBs in the Cedar Creek system.

Starkweather Creek

Starkweather Creek is located in Madison, WI, in the Lake Monona Basin. As a result of urbanization, the creek has received significant pollution from stormwater and industrial discharges. Its sediments contain elevated levels of mercury, zinc, lead, oil, and grease. The Wisconsin DNR received a grant from EPA to conduct a demonstration project for remediating the sediment contamination at Starkweather Creek. The actual dredging of the sediments will be managed by the City of Madison's Engineering Department. Approximately 17,000 yd³ of sediment will be dredged with a backhoe, loaded into lined dump trucks, and hauled to a contained retention site, and used as daily cover at the Dane County Landfill.



Wolf Lake

Wolf Lake is located on the Illinois/Indiana border near Lake Michigan. The lake's sediments are contaminated with metals and other contaminants from nonpoint source runoff from highways and industrial sites.

The Lake County Soil and Water Conservation District (LCSWD) received a grant from EPA for the demonstration of various BMPs for the control of shoreline/bank erosion.

Two methods for controlling shoreline/bank erosion have been selected: (1) installation of a limestone mat designed to capture sediment and (2) installation of limestone blocks along a 1,000-ft stretch of highly erodible beach.

For information on the above pilot demonstration projects, contact Thomas Davenport, EPA Region V, at (312) 886-0209.

Contaminated Sediment Activities Funded Under State Lake Water Quality Assessment Grants

A variety of contaminated sediment activities are being conducted by the six States in Region V which are partially funded through the U.S. EPA Lake Water Quality Assessment grants. These activities range from compilation of existing sediment data to sampling and analysis of sediments for organic and inorganic pollutants, as well as nutrients. Each state received Federal LWQA grants of \$60,000 for FY91-92. One of the requirements was for the States to include an inland lake sediment element valued at \$10,000 to \$20,000 of the total project costs in their LWQA workplans. EPA Region V provided additional guidance which said that the inland lake sediment efforts using LWQA-funded grants should be: 1) consistent with Region V draft Great Lakes sediment monitoring guidance, 2) used to compile existing (*continued on p. 8*)

Sediment Enforcement/Remediation Training

A multimedia training program regarding sediment-related legal authorities and the methods of employing them to obtain remediation is scheduled for August 17-19 at Region V. Discussions will include legal authorities, program and agency strategies, case development approaches, and case examples. For more information contact Rick Nagle, Region V, at (312) 353-8222.

Focus:

Great Lakes



lake sediment data, and 3) used to monitor sediments in lakes where data are inadequate or unavailable or where contaminated sediments are known or expected. For more information contact Linda Holst, Region V, at (312) 886-0215.

History of Confined Disposal Facilities on the Great Lakes

The U.S. Army Corps of Engineers is authorized to maintain some 131 navigation projects around the Great Lakes. These projects include harbors and channels for commercial and recreational navigation users. In order to maintain safe navigation depths at these projects, the Corps dredges between 4-6 million yd³ of sediments annually.

Up until the mid 1960's, dredged material was disposed with economics as the key concern. This meant unconfined, open-water disposal in most cases. In the mid 1960's, environmental concerns were raised about the degradation of water quality in the Great Lakes. These concerns primarily focused on the eutrophication of the lakes, and controls on the pollutional loadings of nutrients such as phosphorus and nitrogen. The practice of open water disposal of dredgings from polluted harbors and waterways was criticized and called into question.

In 1966, the Corps began investigating the feasibility of using alternate disposal areas at a number of harbors. In 1967, the Corps, in cooperation with the Federal Water Pollution Control Administration (the predecessor of US EPA) initiated a 2-yr pilot investiga-

tion on alternate methods for dredged material disposal. This investigation examined the pollutional status of the Great Lakes, provided a detailed look at existing dredging and disposal practices, described its effects of these operations on

water quality, and examined potential modifications and control measures to abate environmental impacts. A variety of disposal alternatives were investigated, including several innovative treatment technologies. Pilot projects conducted included the construction and operation of the first confined disposal facilities (CDFs) on the Great Lakes.

The River and Harbors Act of 1970 (PL 91-611, Section 123) authorized the Corps to construct and operate confined disposal facilities for polluted dredged materials on the Great Lakes. The Act had specific requirements for local sponsors, and provided that CDFs be constructed to hold 10-years worth of maintenance dredgings. It was presumed that after 10 years, the provisions of the Federal Water Pollution Control Act would have produced clean sediments, and future dredgings would no longer need to be confined.

A CDF is an upland or in-water structure constructed solely for the disposal of contaminated dredged materials. The Corps has constructed 42 CDFs around the Great Lakes with 16 constructed at upland sites and 26 constructed in water.

Upland CDFs are typically constructed of earthen dikes or located in existing

pits or depressions. In-water CDFs are generally formed by stone-filled dikes, and are constructed attached to the land, breakwaters, or as detached islands. The size and shape of a CDF are determined by the required storage capacity, local site conditions, and the ultimate use plans of local sponsors. The siting of a new CDF can be a controversial and lengthy process.

The primary objective of a CDF design is to retain as high a percentage of the sediment particles as practical. CDFs basically function as settling basins, with solids retention efficiencies greater than 99.9%. Excess water is discharged through permeable dikes, over adjustable weirs, or through filter cells. As a CDF becomes filled, the dredged materials tend to clog permeable dikes and restrict lateral or vertical movement of water from the facility.

"Over 60 million yd³ of contaminated sediments from the Great Lakes and its tributaries have been disposed in CDFs."

The monitoring and management practices at CDFs are as individual as the sites and designs. Special studies which have been conducted at CDFs include dye tracer tests, biological monitoring with indigenous and caged organisms, plant and animal uptake studies, volatile loss monitoring, and contaminant loss modeling.

The environmental impacts of CDFs on the Great Lakes is the subject of many opinions and theories. An interagency work group of EPA, *(continued on p. 9)*

Corps, and Fish & Wildlife staff examined the long-term significance of CDF releases through modeling and biomonitoring studies between 1985 and 1988. The model studies provided "order-of-magnitude" estimates of PCB losses, although biomonitoring was not able to detect significant PCB losses.

To date, over 60 million yd³ of contaminated sediments from the Great Lakes and its tributaries have been disposed in CDFs. For more information contact Jan Miller, COE-North Central Division, at (312)353-6354.

Public Involvement in the Great Lakes

Along the Grand Calumet River in northwest Indiana, there is standing room only at a meeting to discuss "dredging, treatment and disposal options for contaminated sediment as it affects the Lake Michigan watershed."

Why and how has the public gotten so excited about this issue, not just in the Great Lakes but along marine coasts and, increasingly, along other public waterways as well? Is there a clear "public involvement model" here that we can all follow for other complex environmental issues? The answer is probably almost as complicated as the problem itself.

The success of public involvement in the Great Lakes is due to several factors:

- A ready-made platform or venue exists within the Great Lakes region for detailed discussion of this issue. Those platforms are the public advisory committees assembled to develop Remedial Action Plans (RAP) for the 43 Great Lakes geographic toxic hot spots, called "Areas of Concern."
- There is also already in place a very strong network of citizen groups focusing on environmental protection through a watershed/ecosystem

approach, both in the Great Lakes and along North America's marine coasts. Among the larger groups facilitating this network, through virtually daily contact, are Great Lakes United, the Coast Alliance, Great Lakes office of both the Sierra Club and the National Wildlife Federation, Environmental Defense Fund, Natural Resources Defense Counsel, and the Lake Michigan Federation.

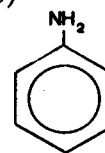
- Working with these groups as "eyes and ears on the scene" are dozens of local groups such as the Grand Calumet Task Force, IN, Clean Ocean Action in Sandy Hook, NJ, and Coastal Advocates in Oakland, CA.

- The U.S. EPA has been willing to take the time to encourage broad public involvement from the beginning and throughout two important processes: 1) the development of national sediment criteria; and 2) a Great Lakes-coordinated program called ARCS (Assessment and Remediation of Contaminated Sediment) to develop guidance on assessment techniques and technology evaluation for contaminated sediment treatment. In both efforts, both formal and informal efforts have been made to include all federal and state agencies as well as public interest groups, university researchers, and the regulated community.

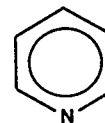
An important starting point for coalescing all of these groups was a binational conference on contaminated sediment, held in December of 1988, by the Lake Michigan Federation and Great Lakes United with support from both the U.S. EPA and Environment Canada. Congressman Henry Nowak (D-NY) was the keynote speaker. Participants included citizen groups nationwide, the Corps of Engineers, state and local governments, the two federal environmental agencies, private engineering consultants and vendors of sediment technology. For more information contact Glenda Daniels, Lake Michigan Federation, at (312) 939-0838.

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basic ionizable chemicals (e.g., aromatic amines and nitrogen-heterocyclic compounds) include partitioning through



Aniline



Pyridine

hydrophobic interactions, cation or ligand exchange reactions, and chemical reactions leading to the formation of covalent bonds through nucleophilic and/or oxidative processes. Differentiation between these processes is necessary, because in general, sorption through the formation of covalent bonds with constituents of the sediment matrix is an irreversible process, as opposed to sorption partitioning or cation exchange that can be described by equilibrium constants.

Studies at ERL-Athens are currently in progress to determine the sorption mechanisms of basic ionizable organic chemicals. Initially, the sorption kinetics of a series of 2- and 4- substituted anilines were measured in a sediment-water system. Removal of the anilines from the aqueous phase was fast over the first 24 hours followed by a much slower rate of removal. Furthermore, a general trend between sorption kinetics and substrate pKa was observed: As the pKa of the aniline increased, there was an increase in both the rate and extent of sorption. Sequential extraction studies of a sediment treated with ¹⁴C-aniline suggested that hydrophobic partitioning and cation exchange processes do not contribute significantly to the aniline sorption and that irreversible sorption through covalent binding to the organic matter of the sediment matrix dominates the sorption process. On the other hand, in similar experiments with ¹⁴C-pyridine, a nitrogen containing heterocycle, the dominant sorption process was determined to be

cation exchange. In other studies, we found that the sorption of aniline and pyridine in a resaturated pond sediment was independent of pH over the pH range of 4 to 8.

To provide direct spectroscopic evidence for covalent binding of the aromatic amines, ^{15}N NMR was used to analyze fulvic acid that had been treated with ^{15}N -aniline. These studies were conducted in conjunction with Dr. Kevin Thorn at the USGS laboratory in Denver, Colorado. INEPT and ACOUSTIC ^{15}N NMR spectra exhibited resonances for imine, anilide, aniline-quinone, and anilino-hydroquinone nitrogens in the ^{15}N -aniline-reacted fulvic acid, providing further evidence for covalent binding through nucleophilic addition to carbonyl moieties. These studies suggest that aromatic amines will be rendered highly immobile in sediment-water systems. For more information contact Eric Weber, ERL-Athens, at (404)546-3198.

ASTM Update

The American Society for Testing Materials (ASTM) Subcommittee E47.03 on Sediment Toxicology met April 28-30, 1992, during the 2nd ASTM Symposium on Environmental Toxicology and Risk Assessment in Pittsburgh, PA. Ballot results were discussed for (1) a revision to E 1383-90 (freshwater invertebrate toxicity) Annex 4 on *Daphnia* and *Ceriodaphnia*, (2) fish bioaccumulation, (3) sediment design, (4) a revision to E 1367-90 (marine and estuarine amphipod toxicity) Annex 5 on *Leptocheirus plumulosus*, (5) a revision to E 1383-90 Annex 5 on *Hexagenia* sp., and (6) terminology.

The subcommittee discussed the status of additional documents, including: (1) invertebrate bioaccumulation; (2) polychaete testing; (3) revisions to E 1383-90 on (a) *Tubifex tubifex*, (b) mollusks, (c) *Dioporeia* sp., and (d) *Lumbriculus* sp.; (4) bacterial testing; (5) earthworm testing; (6) sediment resuspension; and (7) Toxicity Identification and Evaluation (TIE) of sediment.

Rick Scroggins discussed the status of two documents being developed by Environment Canada: *Guidance Document for the Collection, Storage, and Manipulation of Sediments for Chemical Characterization and Biological Testing* and *Guidance Document on the Use of Spiked-Sediments for Reference Toxicity Testing*.

The next meeting of Subcommittee E47.03 will be Saturday, November 7, and Sunday, November 8, 1992, before the 13th Annual SETAC meeting at the Cincinnati Convention Center in Cincinnati, OH. Contact Chris Ingersoll at (314) 875-5399, or FAX (314) 876-1896, if you would like more information concerning the activities of the subcommittee.

New Publication

Recently published, *Sediment Toxicity Assessment* provides information relating to sediment contamination and its effects on aquatic ecosystems. It presents an integrated ecosystem approach by detailing effective assessment methods, considerations, and effects on each major component of marine and freshwater systems, including the benthos, plankton, and fish communities. The approach emphasizes defining habitat conditions (physical and chemical), toxicant bioavailability, factors influencing toxicity (lab and field), biomarkers, acute and chronic toxicity, study design, collection methods, and EPA management strategies. For more information contact Lewis Publishers at (407) 994-0555.



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