



# Contaminated Sediments News



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CS News is produced by the EPA Office of Science and Technology (OST) to exchange information on contaminated sediments and to increase communication among interested parties. To obtain copies of this report or to contribute information, contact Charles Kovatch, EPA OST, mail code 4305, 1200 Pennsylvania Ave. NW, Washington, DC 20460 at (202) 260-3754.

To be added to the mailing list or to make changes to your address, please fax your request to Charles Kovatch at (202) 260-9830 or e-mail [kovatch.charles@epa.gov](mailto:kovatch.charles@epa.gov).

## EPA Headquarters

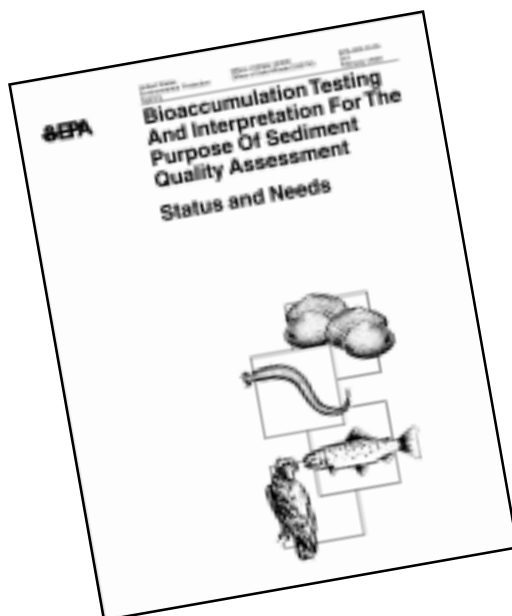
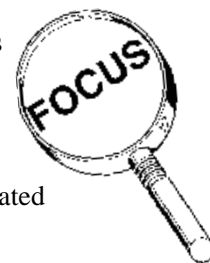
### EPA Releases Two New Documents

Persistent bioaccumulative chemicals are distributed in sediments throughout the United States, with sediments serving as both a sink and a reservoir for these chemicals. The U.S. Environmental Protection Agency (EPA) and other regulatory agencies are frequently required to interpret the environmental significance of laboratory and field studies. EPA has prepared the *Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment* documents to provide a summary of the current status of bioaccumulation testing and data interpretation. The documents are the result of a collaborative effort among the members of the EPA Bioaccumulation Analysis Workgroup (BAW) to (1) summarize and describe existing knowledge on the use of bioaccumulation data as part of sediment quality assessments (2) respond to increased interest in the fate and effects of persistent, bioaccumulative, and

toxic (PBT) pollutants, as evidenced by the development of EPA's multimedia PBT Strategy, and (3) identify how various EPA programs interpret bioaccumulation data for sediment management decisions.

These documents are separated into five sections which:

- Discuss factors that affect the bioavailability of sediment-associated contaminants.
- Discuss methods for assessing bioaccumulative chemicals.
- Provide a compilation of exposure and effects data for persistent, bioaccumulative chemicals.
- Identify issues and research needs for interpreting bioaccumulation data for the purpose of assessing sediment quality.
- Include Agency information on bioaccumulation data collection and interpretation.



Bioaccumulative chemicals of potential concern listed in this document were selected based on input from the BAW and a review of various documents. These chemicals are known to be found in sediment and in animal tissues at levels associated with toxic effects. The document contains information in tabular format for 11 metals, 1 chlorinated phenol, 10 polycyclic aromatic hydrocarbons (PAHs), 13 pesticides, selected dioxins and furans, selected

Aroclors and congeners of the PCB group, and total PCBs. Criteria for selecting an initial set of chemicals to be researched and summarized in this document included the following: (1) information was readily available; (2) the chemical was of immediate concern and known to bioaccumulate; (3) the chemical was representative of a group or class of compounds; and (4) the chemical was considered to be important in one or more EPA programs.

The chemical tables (in the document Appendix) summarize information on chemical characteristics, including water solubilities, half-lives, and partition coefficients ( $\log K_{ow}$  and  $\log K_{oc}$ ); human health concerns; wildlife and aquatic organism

### Agency Information on Bioaccumulation Data Collection and Interpretation

The bioaccumulation documents identify a variety of EPA programs that interpret bioaccumulation data to help assess sediment quality. These programs represent a broad spectrum of approaches which address specific statutory mandates and the goals of EPA's Contaminated Sediment Management Strategy. Several agencies contribute and overlap in their efforts to address the components of the Contaminated Sediment Management Strategy; Research, Assessment, Remediation, Dredged Material Management, Prevention, and Outreach. Information included in the bioaccumulation

### Key Issues and Research Needs Identified by the Bioaccumulation Analysis Workgroup

Better interpretation of bioaccumulation data will require a greater understanding of the relationship between environmental media concentrations, tissue concentrations, and effects on specific organisms or consumers of those organisms. Several issues and research needs have been identified by the BAW. These issues and needs have been grouped according to topic and include the following:

- *Methods—Laboratory and field methods for assessing bioaccumulation*
- *Chemical Identification—Identification of bioaccumulative chemicals*
- *Species Considerations—Species selection for bioaccumulation testing*
- *Toxicology—Dose-response relationships for bioaccumulative contaminants*

partitioning factors; and food chain multipliers. A brief profile of the chemical's toxicity, mode of action, and potential for bioaccumulation is also included. Daily intake levels of concern for the protection of human health were compiled, including estimated values for carcinogenic endpoints (slope factors) and non-carcinogenic endpoints (reference doses) for the oral ingestion exposure pathway, and EPA's carcinogenic classifications are provided. Factors affecting partitioning of the chemical in relation to wildlife and aquatic organisms, food chain multipliers (biomagnification factors), toxic effects and mode of action, and other information were compiled from various sources.

documents will be useful in evaluating existing approaches to collect data and to prioritize research needs related to sediment contamination.

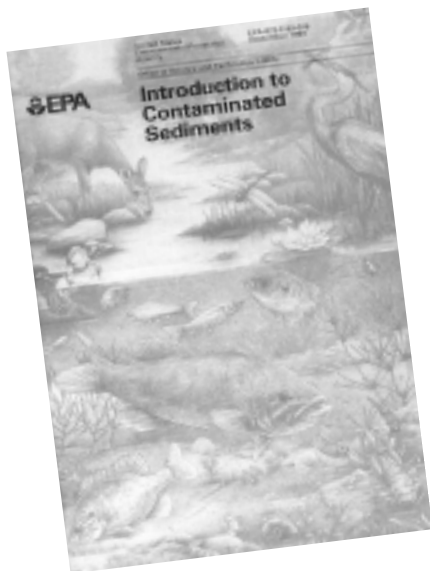
### For More Information

Copies of the documents (EPA-823-R-00-001 and EPA-823-R-00-002) are available at EPA National Service Center for Environmental Publications U.S. EPA/NSCEP, P.O. Box 42419, Cincinnati, OH 45242-2419. Phone: 1-800-490-9198, Fax: 513-489-8695, [www.epa.gov/ncepihom](http://www.epa.gov/ncepihom) or at the Office of Science and Technology by contacting Richard Healy at (202) 260-7812 or visiting [www.epa.gov/ost](http://www.epa.gov/ost).



## Outreach on Contaminated Sediments

The Standards and Applied Sciences Division (SASD) of USEPA is pleased to announce the release of a brochure entitled *Introduction to Contaminated Sediments* (EPA-823-F-99-006) as well as a poster entitled *A Healthy Ecosystem Can Be Damaged by Toxic Contaminants* (EPA-823-H-99-001). These materials were prepared in response to EPA's Contaminated Sediment Management Strategy to inform a variety of audiences about issues and solutions related to sediment contamination. Information provided includes an



overview of: contaminated sediments; major contaminants; source and location of contamination; species affected; and federal laws and management options to address sediment contamination.

EPA submitted to Congress its first survey report on sediment contamination in 1998. The survey found contaminated sediment in all regions and every state of the country. The affected water bodies include streams, lakes, harbors, near-shore areas, and oceans. Some of the most contaminated sediment is found in the Great Lakes and in the harbors of Boston, Los Angeles, Chicago, Detroit, and Puget Sound. All of these water bodies have been affected throughout the years by heavy shipping traffic, contamination

from upstream sources, and local municipal and industrial discharges.

No single government agency is completely responsible for addressing the problem of contaminated sediments. A variety of laws give federal, state, and tribal agencies authority to address sediment quality issues. Private industry and the public also have roles to play in contaminated sediment prevention. Increasing public awareness of the problem is crucial to developing an effective solution. By providing background information on contaminated sediments, the brochure and poster will provide greater public understanding of the problem.

For copies of the brochure and poster, contact the EPA National Service Center for Environmental Publications at (800) 490-9198 or [www.epa.gov/ncepihom](http://www.epa.gov/ncepihom).

## EPA Offices Meet to Discuss Sediment Issues

The Office of Research and Development (ORD), the Office of Solid Waste and Emergency Response (OSWER), and the Office of Water (OW) held a meeting in October 1999 to discuss sediment issues and learn about the sediment activities of the other EPA offices. OSWER and OW provided overviews of their current sediment projects, ORD presented existing and projected contaminated sediment research, and all three offices defined steps to improve inter-office communication and collaboration in sediment work. Some of the existing and anticipated projects discussed during the meeting—and the questions they are addressing—are listed below by office.

### OW/Office of Science and Technology (OST)

***Develop Equilibrium Partitioning Sediment Guidelines (ESG) Implementation Guidance.*** Implementation framework will provide information on the use of ESGs and sediment bioassays in State/Tribal Water Quality Standards programs.

***Develop Sediment Methods Manual.*** Manual will provide field and laboratory procedures for collecting, storing and manipulating sediments.

**Compile new data for National Sediment Inventory 2000** report to Congress. This report will assess aquatic sediment quality throughout the United States and submit findings to Congress.

**Assess with ORD** chronic sublethal sediment toxicity test methods for freshwater and marine organisms.

**OSWER/Office of Emergency and Remedial Response (OERR)**

**Ex-situ sediment removal.** This project addresses short-term vs. long-term effectiveness, what are the impacts and trade-offs of resuspension, over-dredging, increased biota exposure, transportation risks.

**In-situ sediment treatment and natural recovery.** This project addresses short-term vs. long-term effectiveness, impacts and trade-offs of attenuation, isolation of biota vs. understanding release mechanisms, and flooding.

**Performance monitoring for subaqueous caps and natural attenuation remedies.** This work addresses the following questions: How will project managers determine whether natural attenuation or biodegradation is occurring or will occur? What are screening or characterization guidelines and siting criteria for contaminated sediment site remedies?

**Potential benthic macroinvertebrate cap attraction.** This project addresses sediment contaminant flux/benthic bioaccumulation/bioconcentration studies to determine depth and extent of benthic activity on caps. What depth would be protective?

**PCB volatilization to the atmosphere as a result of sediment removal projects.** This project examines the role and rate of contaminant volatilization and escape from sediments stored in Confined Disposal Facilities (CDF). Can CDFs be treated *in-situ* to dechlorinate the sediments so they can be recycled?

**Can dredged or capped sites be engineered to enhance wildlife benefits?** This work addresses the use of sediments for beneficial reuse; building aggregate, manufactured soils, fill and cover for old mine sites, etc.

**ORD/National Health and Environmental Effects Research Lab (NHEERL)**

**Develop new methodology.** This project focuses on a methodology to predict effects of bioaccumulative sediment contaminants and establish link between tissue residues and toxic contaminants.

**Extrapolating across systems.** The focus of this project is on understanding the means to extrapolate across systems and select site-appropriate values for food chain transfer and water-sediments disequilibria.

**Develop fractionation approach for non-ionic organic chemicals.** This project focuses on developing an approach and completing a guidance document for porewater TIE and characterization in solid-phase.

**ORD/National Risk Management Research Lab (NRMRL)**

**Sediment Decision Analysis** - This project addresses selecting cost estimate methods, and metrics to measure benefits.

**Other projects address:**

**Sediment Removal** - dredging effectiveness, SVOC volatilization during removal.

**Ex-situ treatment** - management in CDFs, treatment for controlled disposal and beneficial use.

**In-situ treatment** - capping effectiveness, contaminant destruction and immobilization methods.

**Ecosystems** - ecoeffects of residual contamination, ecotolerance and adaptation.

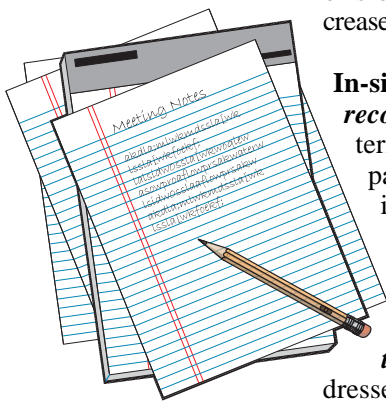
**Source Control** - identification of sources and pathways, overland and erosion flows.

**Pollution Prevention** - clean technology for industrial sources, alternative urban design.

**ORD/National Exposure Research Lab (NERL)**

**Simulate and predict the chemical reactivity of environmental surfaces for organic and inorganic contaminants.** This project focuses on predicting and modeling sorption (Kd) values based on the physical/chemical properties of the contaminant, the environmental matrices (humic, mineral, microbial), and water properties.

**Multimedia Integrated Modeling System (MIMS)** (air, water, soil, sediments). MIMS is an ecological modeling system designed



to help evaluate collective impacts of multiple sites. The work incorporates research on TMDLs (including focus on sediment transport) and SPARC (SPARC Performs Automated Reasoning in Chemistry) to generate parameter input estimates from chemical structure information on chemical reactivities (e.g., redox potential), constants for discrete speciation/sorption/degradation processes and rate/equilibrium constants.

**Develop indicators for stressors in environmental media and mixtures.** This work focuses on developing indicators that can be used to determine toxicity of sediment or water.

**Develop stressor signatures of habitat degradation among metrics from fish, benthic macroinvertebrates, and periphyton assemblages.** This work addresses development and evaluation of biological indicators and preparation of OW/ORD Stressor Identification Evaluation Guidelines that help to identify stressors and sources, including sediments.

**Development of indicators as measures of ecosystem sustainability.** Indicator methods can be used to measure PAH exposure, to determine exposure exceeding natural background, and to evaluate changes in exposure to petroleum and combustion by-product (PAH) waste in dredged streams.

**Sediment toxicity evaluation of the effectiveness of remediation technologies to reduce contamination of sediments.**

This work focuses on development of new methods for determining acute, chronic, or bioaccumulation endpoints. These methods will be used to assess how much each treatment reduces lethal, sublethal, or bioaccumulative levels in sediments.

For more information, contact Paul Zielinski at (202) 564-6772 or e-mail [zielinski.paul@epa.gov](mailto:zielinski.paul@epa.gov) for waste or Bruce Peirano at (513) 569-7540 or e-mail [peirano.bruce@epa.gov](mailto:peirano.bruce@epa.gov) for water related contaminants.

## Regional Activities



### EPA Region 5

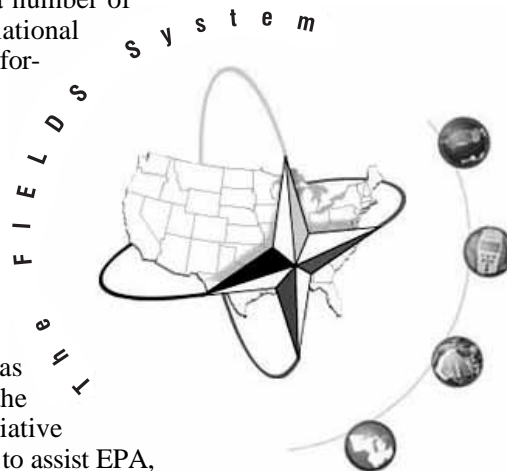
#### Using FIELDS to Support, Enhance, & Communicate Environmental Decisions

EPA Region 5's Fully-Integrated Environmental Location Decision Support (FIELDS) system is a collection of innovative technology tools and applications designed to enhance and expedite environmental decision-making at the site and area of concern (AOC) level. FIELDS was created through a partnership between the Superfund and Water Divisions to effectively support Agency decisions and actions in Region 5 to achieve meaningful and measurable environmental benefits (i.e., sources identified and addressed, mass of contaminant removed, risk reduction).

The focus of FIELDS is to provide in-depth evaluations of current and historical site conditions at some of the Region's most contaminated sites and priority geographic areas to give fast, reliable and affordable decision support to the Agency and public.

The system combines a number of technologies such as relational databases, geographic information systems (GIS), global positioning systems (GPS), statistical applications, and in-field analytical techniques that, when combined, detail a variety of conditions at a micro-level.

The FIELDS system was originally developed in the Southeast Michigan Initiative (SEMI) geographic area to assist EPA, State, and local decision makers with identifying, prioritizing, and remediating contaminated sediment within SEMI's five areas of concern waterways. The system continues to support sediment decisions in the SEMI area, while expanding heavily into support for high priority CERCLA/AOC areas such as the Manistique, Fox, Ashtabula, Saginaw, Sheboygan, Kalamazoo, and Pine Rivers; Neal's Land-



fill; Valentine-Clark; and Tri-State Tank sites. FIELDS has been used by CERCLA and Water Division project managers to determine the spatial distribution of contaminants, volume, mass, human health risk, cleanup goals, and remedial evaluations.

The system is run by the FIELDS Group, made up by staff from both the Superfund and Water Divisions. The Group has developed expertise in a variety of technical and multimedia program areas including sediment assessment/remediation, risk assessment, relational databases, GIS, GPS, statistics, aerial mapping, real time field sampling, computer networking, and Internet communications technologies.

In fiscal year 2000, the Group plans to continue assisting in the cleanup of Superfund sites, especially ones posing risk from fish, sediment, surface or groundwater contamination. The following support activities have been planned:

- Identifying hot spots and pollutant sources.
- Assessing risks and contaminant mass loadings.
- Prioritizing and targeting sites.
- Evaluating remedial alternatives and costs.
- Effectively visualizing and communicating options to decision makers.

For more information on FIELDS, visit the FIELDS website at <http://www.epa.gov/r5water/fields/> or contact Tim Drexler, Water Division, FIELDS Team Manager at [drexler.timothy@epa.gov](mailto:drexler.timothy@epa.gov) or Brian Cooper, Superfund Division, FIELDS Technical Manager at [cooper.brian@epa.gov](mailto:cooper.brian@epa.gov).

## ***EPA Region 10***

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### **Final Programmatic EIS Released by EPA**

The *Final Puget Sound Confined Disposal Site Study Programmatic EIS* was issued in October with the comment period closing on November 22, 1999. This interagency study was led by the Washington Department of Ecology, Washington Department of Natural Resources, and the U.S. Army Corps of Engineers, with the cooperation of EPA

Region 10, the WA Public Ports Association, and the Puget Sound Water Quality Action Team. The study area encompasses the entire upland Puget Sound basin from the Canadian border to 35 miles south of Olympia (about 300 miles), and east to the Cascade range foothills. It also encompasses all of Puget Sound and the waters north to the Canadian border. It is estimated that between 6 to 13 million cubic yards of contaminated dredged material from Puget Sound will require confined disposal or treatment within the next 15 years to eliminate or minimize the risk of short- and long-term contaminant release to the environment. The volume and variety of contaminants indicate, that in all likelihood, more than one location and type of facility will be required.

The EIS addresses the recognized need for environmentally sound solutions to the disposal of contaminated sediment in Puget Sound, and evaluates the environmental impacts of developing multiuser confined disposal or treatment facilities. The EIS lays out environmentally sound, technically feasible and affordable ways to confine or treat contaminated sediments; however, no alternative is preferred at this time. The objective of this study is to provide a broad initial environmental review and cost analysis of major alternatives and establish the basis for site-specific efforts.

With the release of the Final Programmatic EIS, the first of several meetings of agency leaders of the Combined Sediment Management Program was held. They are reviewing the next steps of the process, looking at management options, treatment technologies, siting criteria, the screening process, and public participation. At the October meeting, the study committee presented scopes of work, costs, and tentative calendars to the agency leaders for further discussion. For more information, contact John Malek, EPA Region 10, at (206) 553-1286.



## Gulf Ecology Division

### Using Grass Shrimp as an Indicator of Pore Water Toxicity

To provide insight on the suite of test species that can be used to determine if a near-coastal sediment is toxic, scientists at ORD's Gulf Ecology Division recently completed a baseline study evaluating the usefulness of the grass shrimp, *Palaemonetes pugio*, as an indicator of pore water toxicity.

Grass shrimp are widely distributed abundant benthic organisms in shallow estuaries along the Gulf of Mexico and Atlantic coasts,

but they have been used infrequently in contaminated sediment assessments. In this survey, early life stages of *Palaemonetes pugio* were exposed to pore waters obtained from sediments collected from 37 Florida coastal areas affected by coastal golf courses, urbanization, agriculture, and wastewater discharges.

Scientists conducted a 12-day static bioassay procedure for *Palaemonetes pugio* (see Table). One to three females possessing embryos at the tissue cap stage (2-3 days after oviposition) were selected from a laboratory culture to provide the test organisms. Twenty-four embryos were exposed to each pore water individually in wells of disposable plastic culture plates. Each well contained 2 ml of undiluted (100%) pore water. Filtered natural seawater (10 ppt and 20 ppt salinity) served as controls. The grass shrimp were examined on test days 10, 11, and 12 for mortality and morbidity.

In a few cases, additional sediment bioassays were conducted using duplicate samples of the sediments from which the pore waters were extracted and used in

the shrimp bioassays. Acute bioassays were conducted with the epibenthic invertebrate, *Mysidopsis bahia*, and whole sediments (solid phase) to provide some information on the effect of the test media on the sediment toxicity evaluations. The 7-day bioassays were static; a total of 50 organisms were exposed to three replicate sediment samples collected from each site.

### Results

Most pore waters, regardless of the collection site, were not

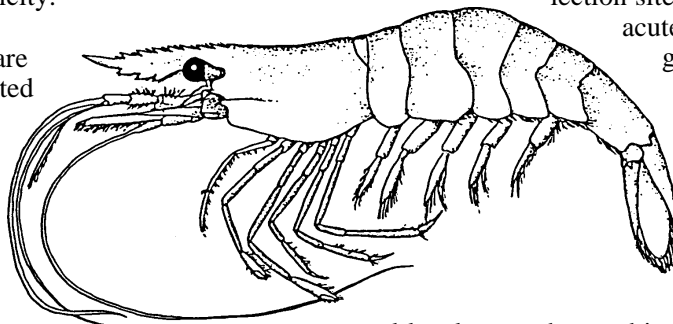
acutely toxic to grass shrimp embryos. Of the 53 bioassays conducted with this species, mortality above control

levels was observed in 15 tests (28% of the total). The average survival in these tests was 27 (1 standard deviation =  $\pm 27$ )% relative to 94( $\pm 7$ )% in the corresponding seawater controls. The embryonic life stage demonstrated the greatest sensitivity to pore waters. The response of different brood stocks were statistically similar ( $P=0.05$ ) when exposed to the same pore waters.

The whole sediments were not acutely toxic to juvenile *Mysidopsis bahia*. Survival ranged between 97 percent and 100 percent. Consequently, the pore water bioassays with grass shrimp embryos were a more sensitive indicator of sediment quality.

### Conclusion

Based on all considerations, it was concluded that the grass shrimp early-life stage test shows promise as being useful to detect pore water toxicity. This is based on the availability of a test methodology that requires minimal space and effort, and the test species geographical distribution and year-round availability. However, the important issue of its sensitivity remains to be determined relative to that for other pore water test species as well as for those used in solid-phase bioassays. For this reason, the



use of grass shrimp is encouraged for contaminated sediment evaluations conducted within its geographic range in order to establish a sufficient background data base on which to more definitively judge its value in contaminated sediment toxicity assessments.

For more information concerning this study, contact Michael Lewis, EPA Gulf Ecology Division, at (850) 934-9382. A complete description of the results will appear in the *Journal of Ecotoxicology*.

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**Experimental conditions for the 12-day grass shrimp (*Palaemonetes pugio*) early life stage toxicity test**

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|   |   |
|---|---|
| Media:                                  | Sediment pore water                           |
| Test duration:                          | 12-day  |
| Temperature:                            | 27±1°C  |
| Light quality and intensity:            | Total darkness                                |
| Photo period:                           | None  |
| Test container size:                    | 14 well culture plates - 2 ml volume per well |
| Test chamber:                           | Temperature controlled incubators             |
| Salinity:                               | 100 ppt to 32 ppt                             |
| Test solution volume:                   | 2 ml  |
| Renewal of test media:                  | None  |
| Age of test species:                    | Tissue cap stage (3 days after oviposition)   |
| Number of organisms per test well:      | 1   |
| Number of replicates per concentration: | 24  |
| Number of organisms per concentration:  | 24  |
| Feeding regime:                         | None  |
| Aeration:                               | None  |

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***National Exposure Research Lab***

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**Update on National Exposure Research Lab (NERL) Information Programs Superfund Tech Support**

EPA ORD's National Exposure Research Lab provides scientific understanding, information, and assessment tools to reduce and quantify the uncertainty in the Agency's exposure and risk assessments for all environmental stressors. Following is an update on NERL's programs providing Superfund tech support.

***Hazardous Waste Identification Rule (HWIR)*** - This multimedia, multi-receptor, multi-stressor, open architectural modeling system is designed for establishing safe exit levels for some waste streams that may now require disposal in Subtitle C facilities. The methodology is site-scale in nature but designed for National application, and includes a variety of exposure

pathways for both human and ecological exposures in air; surface water and ground-water media; and terrestrial, aquatic, and farm-food chain relationships. (Contact: NERL/ERD, Dave Brown at (706) 355-8328).

***CEAM (Center for Exposure Assessment Modeling)*** - CEAM's goals are to develop, maintain, and apply state-of-the-science technical tools including multimedia exposure and ecosystem response simulation models, environmental databases, data analysis packages, tool application strategies, and advanced educational materials in the environmental sciences. (Contact: NERL/ERD, Frank Stancil at (706) 355-8300 or Dave Brown at (706) 355-8328).

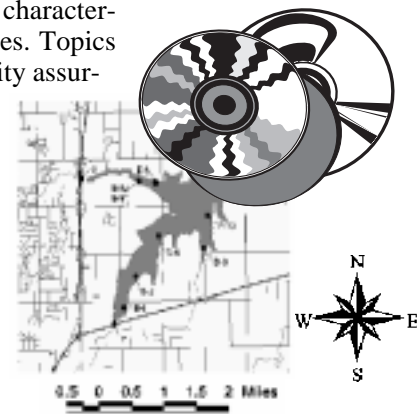
***Monitoring and Site Characterization Tech Support Center*** - This Center provides scientific and technical assistance in the characterization of hazardous waste sites and associated site contaminants. State-of-the-science methods and technologies are identified and applied to identify contaminants, determine their levels and concentrations, and identify their geo-



graphic extent and distribution for site characterization and remediation. (Contact: NERL/ESD, Ken Brown at (702) 798-2270 or Brian Schumacher at (702) 798-2242).

**Environmental Photographic Interpretation Center (EPIC)** - This Center provides site-specific information on the condition and activities occurring at hazardous waste disposal sites at a point in time or over a historical period; documents these conditions and changes; provides guides in the form of reports, maps, and photographs for assisting in the safe cleanup of hazardous waste materials; and assists in emergency response and enforcement efforts when requested by client offices. (Contact: NERL/ESD, Don Garofalo at (703) 648-4285).

**Site Characterization Library** - This CD-ROM library, completed in 1998, includes in one, easily-portable place about 65 documents (20,000 pages) and 20 computer programs related to the characterization of hazardous waste sites. Topics include project planning, quality assurance, RCRA and Superfund site assessment, field operations and SOPs, geophysics, soil sampling, ground-water monitoring, risk assessment, and more. The format allows easy access and navigation across documents. (Contact: NERL/ESD, Jeff van Ee at (702) 798-2367 or Brian Schumacher at (702) 798-2242).



## U.S. Army Corps of Engineers



### Corps to Develop Guidance on Ecological and Human Health Risks Associated with Upland Disposal of Dredged Material

The risk associated with disposal of contaminated sediment in upland environments, e.g., within confined disposal facilities (CDFs), is a function of the likelihood that an organism would be exposed to contaminants within the sediment and the likelihood that those contaminants would cause adverse effects in the exposed organisms. The Corps of Engineers and USEPA have identified a number of contaminant migration pathways by which ecological receptors or humans could potentially be exposed to contaminants from upland sites, including:

- effluent discharged during disposal operation
- surface water runoff from the site
- leaching of contaminants into groundwater
- volatilization of contaminants into the air
- direct contact with in-place sediment

- consumption of food organisms exposed to contaminated sediments

The Corps and EPA also developed a number of assessment tools for evaluating the potential for contaminant releases from upland disposal sites. As more restrictions are placed upon the use of open water disposal and management of dredged material, greater emphasis and use will be made of upland disposal sites. These sites must also be managed in a way that minimizes risks to human health and the environment.

This research and development effort organizes the use of available tools within a tiered framework to evaluate and manage potential ecological and human health risks posed by upland disposal sites. The guidance will be composed of four tiers, similar to the Inland and Ocean testing manuals. Within tiers 1 and 2, screening-levels approaches will be applied to each of the contaminant migration pathways relevant to CDFs. The level-of-evaluation effort will increase in higher tiers where more definitive testing and modeling methods must be applied to resolve the extent and magnitude of potential risks. For each of the pathways of concern, an evaluation will

proceed to a higher tier only when sufficient information is needed to confidently identify the need for risk management.

A risk guidance document produced as a result of this research will be the fundamental tool used by the Corps and EPA to identify contaminants and pathways of concern, to assess the risks posed by these contaminants, and to identify the need for specific management actions to reduce exposure levels.

#### For More Information

Contact Todd S. Bridges, Ph.D., U.S. Army Engineer Research and Development Center, Environmental Laboratory, at (601) 634-3626 or e-mail [bridget@wes.army.mil](mailto:bridget@wes.army.mil). This article may be found at [www.wes.army.mil/el/resbrief/ecohum.html](http://www.wes.army.mil/el/resbrief/ecohum.html).

### Comprehensive Open Water Site Management System

Efficient dredging project management is critical for the U.S. Army Corps of Engineers, which maintains navigation on 25,000 miles of waterways that serve 400 major ports in the United States. Engineers and scientists at the ERDC perform research and develop technologies to support the Corps' Districts in effectively managing dredging projects. As technologies become available to the field, technology transfer in a meaningful, useful, and effective manner impacts adoption of new and innovative management tools in the field.

Currently, ERDC staff is developing integrated software for dredging project management based on a Geographic Information System (GIS) customized for dredged material management. The name of the software system is the Dredged Material Spatial Management Record Tool (DMSMART).

Dredging project management encompasses a wide variety of areas. High priority capabilities for DMSMART as indicated from District input include:

- estimating fate and transport in the far field;
- track contract status
- track environmental compliance status
- view and analyze bathymetric

surveys of dredged channels and disposal sites

- store, access, and display environmental monitoring data
- view and analyze dredging history for dredge cuts

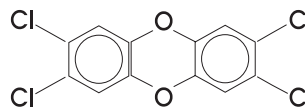
#### For More Information

Contact James E. Clausner, U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory, at (601) 634-2009. This article may be found at [www.wes.army.mil/el/resbrief/openwat.html](http://www.wes.army.mil/el/resbrief/openwat.html).

### Corps Performs Rapid Screens for Chlorinated Hydrocarbons (Dioxins) in Contaminated Sediments

Dioxins (polychlorinated dibenzo-*p*-dioxins and dibenzofurans) are persistent and widespread contaminants in the sediments

of many industrialized waterways. When dioxins are suspected of being present in channel sediments during permit evaluation prior to dredging, chemical analyses are usually required. The cost of high resolution GC/MS analysis of a single sediment sample can be as much as \$2,000. When a large number of samples have to be analyzed, the costs can be a burden to the applicant. Low-cost screening assays allow early identification of sediments that are demonstrably contaminated, thus eliminating them from further costly chemical analysis. Screening assays for dioxins have other applications as well, such as monitoring the progress and effectiveness of remediation efforts.



The Corps is evaluating the use of cultured vertebrate cell bioassays coupled with rapid extraction and sample clean-up techniques to apply as screening tests for dioxins. Bioassays using cultured cells of mammals and fish can be used to detect and quantitate the dioxin-like activity in extracts of environmental samples by taking advantage of this mechanism. By coupling cell-based bioassay methods with accelerated solvent extraction (ASE), which uses high pressure and temperature to extract chemicals from

sediments and soils, a rapid, low-cost screening assay for dioxins can be produced (view slides; 1.12KB). Research will be conducted on several cell lines, comparing them with each other and with chemical analyses of sediments. An optimized method for a cell-based assay will be field-demonstrated.

### For More Information

Contact Victor McFarland, Ph.D., U.S. Army Engineer Research and Development Center, Environmental Laboratory, at (601) 634-3721 or e-mail [mcfarlv@wes.army.mil](mailto:mcfarlv@wes.army.mil). This article may be found at [www.wes.army.mil/el/resbrief/rapidsc.html](http://www.wes.army.mil/el/resbrief/rapidsc.html).

## U.S. Geological Survey



### USGS Puts Terrestrial Vertebrates Database on World Wide Web

USGS's Biomonitoring of Environmental Status and Trends (BEST) program is designed to assess and monitor the effects of environmental contaminants on biological resources, particularly those under the stewardship of the Department of the Interior. As part of this program, the threat of contaminants and other anthropogenic activities to terrestrial vertebrates residing in or near Atlantic, Pacific, and Gulf coasts estuarine ecosystems is being evaluated by data synthesis and field activities. USGS created a "Contaminant Exposure and Effects—Terrestrial Vertebrates" (CEE-TV) database of information obtained by computerized search of published literature, review of existing databases, and solicitation of unpublished reports from conservation agencies, private groups, and universities. Summary information in the database includes species, collection date (1965-present), site coordinates, estuary name, hydrologic unit code, sample matrix, contaminant concentrations, biomarker and bioindicator responses, and reference source. Currently, the CEE-TV database contains approximately 4,300 records with ecotoxicological exposure and effects information on over 150,000 individuals representing 200 species of amphibians, reptiles, birds, and mammals residing in estuaries. The database has a number of potential applications, including focusing biomonitoring efforts to generate critically needed ecotoxicological data in the numerous "gaps" along the coast, reducing uncertainty about contaminant risk, identifying areas for mitigation, restoration or special management, and ranking the eco-

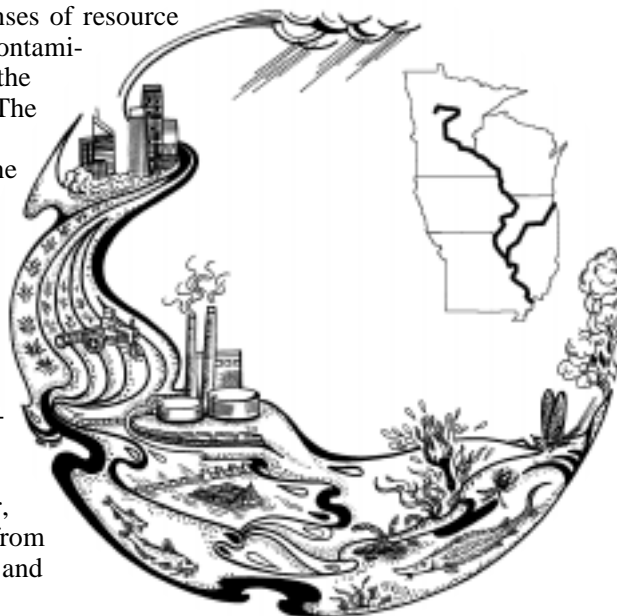
logical conditions of estuaries. The database can easily be queried using taxonomic, chronologic, geographic, and contaminant search categories. To visit the database, go to <http://www.pwrc.usgs.gov/ceetv/>.

### For More Information

Contact Barnett A. Rattner, USGS Patuxent Wildlife Research Center, at [Barnett\\_Rattner@usgs.gov](mailto:Barnett_Rattner@usgs.gov).

### Sediment-contaminant Database for the Upper Mississippi River System Now Available Online

Sediments in the Upper Mississippi River System contain a vast array of organic and inorganic contaminants from agricultural, industrial, municipal, and residential sources. A new sediment-contaminant database is available to facilitate both the assessment of riverine contamination and the responses of resource managers to contaminant issues in the river system. The database was compiled by the U.S. Geological Survey Upper Midwest Environmental Sciences Center and the University of Wisconsin-La Crosse River Studies Center, with funding from EPA Region 5 and USGS.



The current version (*version 1*) of the database contains information from a total of 2627 analyzed sediment samples collected from 1974 through 1995, including 1880 samples from the Upper Mississippi River, 271 from the Illinois River, and 476 from tributary streams. Groups of contaminants represented in the database include metals, metalloids, nutrients, polynuclear aromatic hydrocarbons (PAHs), insecticides, herbicides, fungicides, industrial compounds, sterols, petroleum-related compounds, and polychlorinated biphenyls (PCBs). Considerable care was taken to enhance the reliability of the database, and a quality-assurance index indicates the relative completeness of quality-assurance documentation for each of the 30 discreet data sets entered into the database. The types of sediment samples represented in the database include bed sediment (80.4% of the samples), sediment trap (2.1%), and pore water (17.5%). To facilitate the interpretation of the contaminant data, the database provides information on sampling locations, methods of sediment collection, physical characteristics of the analyzed sediments, and other ancillary variables for each sediment sample represented. The database resides on an Internet server at the Upper Midwest Environmental

Sciences Center and is available to the general public and to all federal, state, and private entities. The database can be downloaded from the Upper Midwest Environmental Sciences Center website in its entirety or by individual data set in any of three readily accessible formats: ASCII text, Excel® 97 spreadsheet, and Lotus® 123 (version 5) spreadsheet. The website address is [http://www.umesc.usgs.gov/data\\_library/sediment\\_contaminants/sediment\\_contaminant\\_page.html](http://www.umesc.usgs.gov/data_library/sediment_contaminants/sediment_contaminant_page.html).

Work on the database will continue for one more year, culminating in the production and release of database *version 2*. Planned areas of expansion or improvement include (1) the entry of additional data for tributary streams, (2) the entry of Universal Transverse Mercator (UTM) coordinates for sediment samples that lack spatial data in *version 1*, and (3) the development of a spatial data query and visualization tool to facilitate viewing and querying of the data.

#### For More Information

Contact the Upper Midwest Environmental Sciences Center at (608) 783-6451 or [www.emtc.usgs.gov/](http://www.emtc.usgs.gov/).

## Contaminated Sediment Webpages



Interested in checking out some contaminated-sediment websites? Here are a few you can browse:

- ***Dredging News Online.*** Dredging News Online (DNO) is a unique publication for all those involved in the international dredging industry, ports and harbors, and marine contracting. Published bi-weekly, DNO addresses every aspect of dredging and related subjects and brings you the latest news from around the world.  
[www.sandandgravel.com](http://www.sandandgravel.com)
- ***The Great Lakes Dredging Team Website: Leading the Way in Providing Regional Dredging Information.*** The Great Lakes Dredging Team's website is emerging as *the* online resource for dredging-related information in the Great Lakes region. Launched in 1998, the Great Lakes Dredging Team

(GLDT) website includes region-specific information developed by the team, as well as links to regional and national information sources that are relevant to Great Lakes dredging.

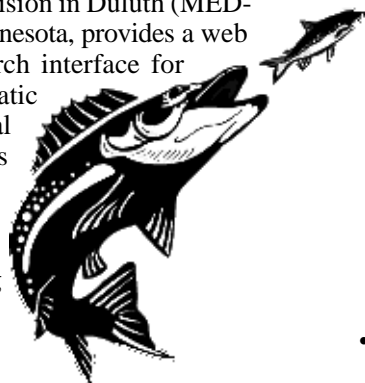
The website includes standard pages such as a site index, an "about GLDT" page where users can learn more about the history, structure and operations of the Great Lakes Dredging Team, and links to other relevant web pages. Importantly, the GLDT website is structured to inform about issues pertaining to Great Lakes Dredging: a contaminated sediments page acknowledges this widespread environmental and dredging-related issue throughout the basin; a research and development and technologies page supports the region's efforts to find new dredged material management methodologies and treat-

ment technologies; and a soil erosion and sedimentation page reflects the intensity of agricultural land use, particularly in the southern portion of the Great Lakes Basin, and the potential to reduce dredging needs by controlling soil erosion and sedimentation at the source.

The GLDT website is hosted by the Great Lakes Commission, an interstate compact agency comprised of the eight Great Lakes states, which is also a member of the GLDT.

[www.glc.org/projects/dredging/](http://www.glc.org/projects/dredging/)

- **ECOTOX (ECOTOXicological Database).** The ECOTOX system, developed by EPA, National Health and Environmental Effects Research Laboratory (NHEERL), Mid-Continent Ecology Division in Duluth (MED-Duluth), Minnesota, provides a web browser search interface for locating aquatic and terrestrial toxicity effects information. This database is useful in developing consistent ecosystem management decisions, and provides a means to cost-effectively collect standardized and critically needed effects data for a wide variety of ecological risk assessments. In support of the ECOTOX database, aquatic and terrestrial environmental toxicology literature is acquired and relevant data on single chemical exposures are abstracted into the database. Users may conduct searches by specifying chemical, species, publication year, recent updates to the database, and/or test variable information such as calculated endpoints, observed effect responses, media type, and study location. The aquatic component of ECOTOX is currently available on the World Wide Web and the terrestrial component is scheduled for release in January 2000. ECOTOX contains more than 259,000 individual test records for over 7,500 chemicals, and 4,600 aquatic and terrestrial organisms. The data have been abstracted from over 15,900 publications. The



web version of ECOTOX is open to the public and may be accessed through a web browser at [www.epa.gov/ecotox/](http://www.epa.gov/ecotox/).

For more information, contact MED-Duluth Scientific Outreach Program at (218) 529-5225, FAX (218) 529-5003, or [www.epa.gov/ecotox](http://www.epa.gov/ecotox).

- **IRIS**-The Integrated Risk Information System (IRIS), prepared and maintained by EPA, is an electronic database containing information on human health effects that may result from exposure to various chemicals in the environment. IRIS was initially developed for EPA staff in response to a growing demand for consistent information on chemical substances for use in risk assessments, decision-making and regulatory activities. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences.

The heart of the IRIS system is its collection of computer files covering individual chemicals. These chemical files contain descriptive and quantitative information in the following categories:

- Oral reference doses and inhalation reference concentrations (RfDs and RfCs, respectively) for chronic noncarcinogenic health effects.
- Hazard identification, oral slope factors, and oral and inhalation unit risks for carcinogenic effects.

The information in IRIS is intended for use in protecting public health through risk assessment and risk management.

For more information on the process for developing information for IRIS, contact the Risk Information Hotline in EPA's National Center for Environmental Assessment, Cincinnati, OH at (513) 569-7254, Fax (513) 569-7159, or e-mail [RIH.IRIS@epamail.epa.gov](mailto:RIH.IRIS@epamail.epa.gov).

- **Great Lakes Contaminated Sediment Program.** This EPA Region 5 site highlights the Great Lakes National Program Office's work with contaminated sediments. [www.epa.gov/glnpo/sediments.html](http://www.epa.gov/glnpo/sediments.html)

- **TOXNET-National Library of Medicine.** TOXNET is a free web-based system of searchable databases containing information on toxicology, hazardous chemicals, and environmental health. TOXNET provides access or links to over 10 databases compiled by the Environmental Protection Agency, National Cancer Institute and National Library of Medicine to help assess the nature and severity of toxic hazards around us. For questions go to [custserv@nlm.nih.gov](mailto:custserv@nlm.nih.gov) or call 1-888-findnlm. <http://sis.nlm.nih/sis1/>
- **U.S. Army Corps of Engineers.** This website contains a large searchable information database on sediments (contaminated and uncontaminated). It includes hot links to related sites that include foreign sites. It includes

the Corps/EPA sediments toxic substances tissue/residue effects bioaccumulation database, Corps/EPA regulatory guidance documents (all downloadable), a current review of the Corps research on contaminated sediments, information on beneficial uses of sediments, sediment management models, sediment management training, and a Center for Contaminated Sediments. [www.wes.army.mil/el/dots](http://www.wes.army.mil/el/dots)

If you would like to share a website with the readers of *CSNews*, send your website address and description to Charles Kovatch, EPA, at [kovatch.charles@epa.gov](mailto:kovatch.charles@epa.gov). Some EPA websites have been temporarily taken offline for security upgrades. EPA expects to have these sites back online when the upgrades are complete.



## Announcements

### ICCE 2000: 27th International Conference on Coastal Engineering

The Institution of Engineers, Australia, and the Coastal Engineering Research Council of the American Society of Civil Engineers has announced details of the 27th ICCE conference on coastal engineering in Sydney, Australia, from July 16-21, 2000.

Original papers will be presented on theory, measurement, analysis, modeling, and

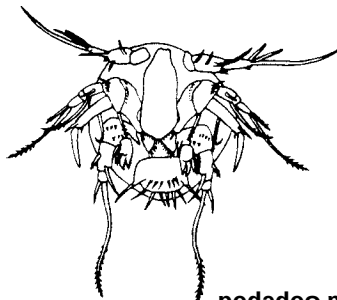
practice for: coastal oceanography and meteorology; wind, waves, currents and water levels; coastal sediment processes; sediment motion, sediment transport, and morphology; shore protection beach nourishment, bypassing, hard structures, natural defenses and hybrid projects; stability, construction techniques, and performance of coastal structures; recreation, water quality, wetlands, dunes and estuaries in the coastal environment; and dredging, navigation channels, harbors and ports.

A technical exhibition will be held at the conference venue to highlight products, services and research activities of interest to coastal engineers. The exhibition area will be the main meeting point outside the technical sessions and morning and afternoon coffee breaks will be held there. Participation in the exhibition is open to all companies and organizations that provide a service in coastal engineering.

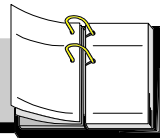
For further information on ICCE 2000, contact Capital Conferences Pty Ltd., PO Box N399, Grosvener Place NSW 1220, Australia. Phone: + 61 (0) 292523388; Fax: + 61 (0) 292415282; e-mail: [capcon@ozemail.com.au](mailto:capcon@ozemail.com.au); website: <http://www.mhl.nsw.gov.au/ICCE2000.html>

## Creature Feature

Having trouble coping? Most of my relatives become fish food when they grow up. Some call me immature, but I prefer to be called . . . *What am I?*



(Answer) Nauplius of a Copepod



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## April 25-27, 2000

*National Water Quality Monitoring Council National Monitoring Conference 2000*, Austin, TX. Contact GWPC at (405) 516-4972; e-mail: [jeff@gwpc.site.net](mailto:jeff@gwpc.site.net); website: [nwqmc.site.net](http://nwqmc.site.net).

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## May 1-3, 2000

*Sixth International Conference on Remote Sensing for Marine and Coastal Environments*, Charleston, SC. Contact ERIM/ Marine Conference, P.O. Box 134008, Ann Arbor, MI 48113-4008. Phone: (734) 994-1200, ext. 3234; fax: (734) 994-5123; e-mail: [wallman@erim-int.com](mailto:wallman@erim-int.com); website: [www.erim-int.com/CONF/marine/MARINE.html](http://www.erim-int.com/CONF/marine/MARINE.html).

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## May 1-5, 2000

*Water Quality Standards Academy*, Chicago, IL. This session will specifically target Indian tribes. The registration cut-off date is March 17, 2000. Two additional sessions of the Water Quality Standards Academy are planned this year. These sessions are open to the public. Both sessions will be held in the Washington, D.C. area. Once training facilities and the dates are determined, registration and other pertinent information will be available at: [www.epa.gov/ost](http://www.epa.gov/ost). For more information about these sessions you may also contact Greg Smith at Great Lakes Environmental Center, EPA's contractor, at (614) 487-1040.

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## May 21-25, 2000

*Third SETAC World Congress: Global Environmental Issues in the 21<sup>st</sup> Century: Problems, Causes and Solutions*. Brighton Center, Brighton, UK. Contact SETAC Europe at 32.2.772.72.81, fax: 32.2.770.53.86, e-mail: [setac@ping.be](mailto:setac@ping.be).

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## May 23-25, 2000

*Sustainability of Wetlands and Water Resources: How Well Can Riverine Wetlands Continue to Support Society into the 21<sup>st</sup> Century?* Center for Water and Wetland Resource, University of Mississippi Field Station. Contact Leslie White at (662) 232-5479 or e-mail: [umfs@olemiss.edu](mailto:umfs@olemiss.edu), [www.olemiss.edu/depts/umbfs](http://www.olemiss.edu/depts/umbfs).

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## June 21-24, 2000

*ASCE Watershed Management 2000 Conference: Science and Technology for the New Millennium*, Fort Collins, CO. Contact: [dfrevert@do.usbr.gov](mailto:dfrevert@do.usbr.gov) [www.siwi.org](http://www.siwi.org).

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## October 14-18, 2000

*WEFTEC 2000*. Water Environment Federation 73<sup>rd</sup> Annual Conference and Exposition, Anaheim Convention Center, Anaheim, CA. Contact: WEF at (800) 666-0206 or (703) 684-2652 or e-mail: [confinfo@wef.org](mailto:confinfo@wef.org).

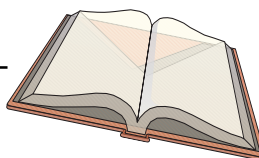
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## Recent Publications

### **Cost-Effective Remediation and Closure of Petroleum-Contaminated Sites**

by Douglas C. Downey, Robert E. Hinchee, and Ross N. Miller  
(ISBN 1-57477-071-3)



This book provides environmental managers and their supporting technical specialists with a comprehensive strategy for cost-effectively cleaning up soils and groundwater contaminated by petroleum releases. It includes the most recent advances in site investigation techniques, low-cost remedial approaches, and technologies. To order this book, contact Batelle Press at (800) 451-3543, Fax (614) 424-3819, or [www.batelle.org/bookstore](http://www.batelle.org/bookstore).

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