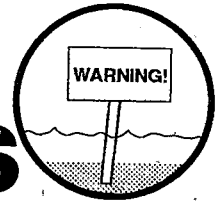




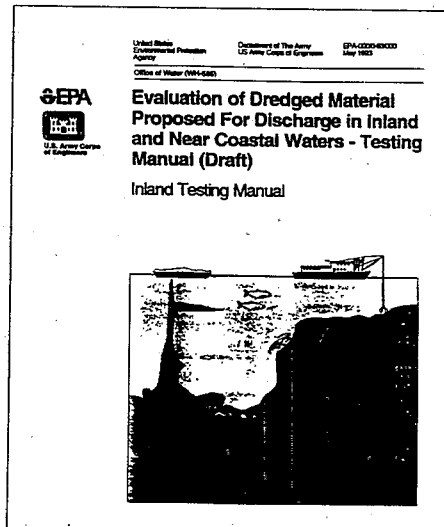
Contaminated Sediments News



Science Advisory Board Reviews Inland Testing Manual

On July 7-8, 1993, EPA's Science Advisory Board (SAB) met in Washington, DC, to review the draft document, *Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters - Testing Manual* (Inland Testing Manual). The Inland Testing Manual is a joint U.S. Army Corps of Engineers-EPA document that will provide national guidance on evaluating potential contaminant-related environmental impacts of proposed discharges of dredged material into waters of the U.S.

The charge to the SAB requested that the review should focus on the adequacy of the technical methods and their organization in the Inland



Testing Manual. The SAB's report is expected to be transmitted to the EPA Administrator in October. The workgroup of 20 Corps and EPA headquarters, field, and research staff who generated the current draft will reconvene to address both field and SAB comments this fall.

Issues discussed by SAB during the review included: phytotoxicity testing, the "reference sediment" approach used in the document for comparing test results, testing for microbial pathogens, "Tier IV" chronic and field studies, bioaccumulation tests, sampling guidance, and the STFATE mixing zone model. For more information contact Mike Kravitz at (202) 260-8085.

Contaminated Sediment Activities Timeline

July 20-22. *Assessment and Management Seminar.* Sponsored by USACE and USEPA. Holiday Inn, Ann Arbor, MI. Contact Larry Bird at (601) 634-4148.

September 12-17. *9th International Conference on Heavy Metals in the Environment,* Toronto, Canada. Contact Heavy Metals Secretariat, CEP Consultants Ltd., 26-28 Albany St., Edinburgh EH1 3QH, U.K.

September 19-24. *1st International IAWPRC Conference on Diffuse (NPS) Pollution: Sources, Prevention, Impact and Abatement,* Chicago, IL. Contact Dr. Vladimir Novotny, IAWPRC Conference, Marquette University, at (414) 288-3524.

October 2-7. *Water Environment Federation Annual Conference,* Anaheim, CA. Contact Maureen Novotne, WEF, at (703) 684-2400.

October 4-7. *QA Challenges: Bridging Science and Compliance,* San Francisco, CA. 9th Annual Meeting of the Society of Quality Assurance. Contact SQA Headquarters at (703) 914-0835.

October 17-20. *20th Annual Aquatic Toxicity Workshop,* Quebec City, Quebec. Contact Peter Campbell, FAX: (418) 654-2562.

November 13-14. *ASTM. Sediment Toxicology Subcommittee meeting.* Westin Galleria, Houston, TX. Contact Chris Ingersoll at (314) 875-5399.

November 14-18. *14th Annual Meeting. Society of Environmental Toxicology and Chemistry.* Westin Galleria, Houston, TX. Contact Philip Dorn, Shell Development Company, at (713) 493-7213.

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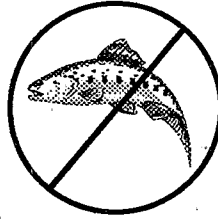
National Sediment Contaminant Source Inventory

EPA's Contaminated Sediment Management Strategy calls for the development of an inventory of point and non-point source discharges of contaminants which lead to the formation of contaminated sediments. The Office of Science and Technology initiated work on the National Sediment Contaminant Source Inventory (NSCSI) almost a year ago and is now preparing a report that will identify and rank chemicals, geographic areas, and industries of concern which contribute to the formation of contaminated sediments, as well as demonstrate the usefulness of this information in selected applications to characterize the potential extent and management of contaminated sediments.

Selected uses of the NSCSI include:

- 1) incorporation of the data in the National Sediment Inventory to identify relationships and data gaps between pollutant discharges and sediment quality information;
- 2) in effluent guidelines development to aid in the selection of industries and pollutants for regulation;
- 3) in permitting, to aid in the identification of areas and chemicals of concern for the development of permits to protect sediment quality; and
- 4) in enforcement to identify

sources potentially responsible for sediment contamination and/or fish advisories.



A draft report detailing the methodology and applications of the NSCSI, specifically point source discharges, will be available this fall. Investigation of non-point source discharges (urban, agricultural and atmospheric) will take place this fall and winter. Both reports will be peer reviewed before release to the general public.

For more information contact Catherine Fox at (202) 260-1327.

Office of Wastewater Enforcement and Compliance

Sediment Quality-Based NPDES Permit Limits

One component of EPA's Draft Contaminated Sediment Management Strategy addresses prevention of sediment contamination. EPA believes that one way to prevent sediment contamination through the implementation of NPDES permit limits. Sediment quality at a given site can be specified by establishing chemical-specific sediment quality criteria. EPA is currently developing the capability to derive chemical-specific effluent limitations that will protect sediment quality.

Sediment Quality-Based Modeling

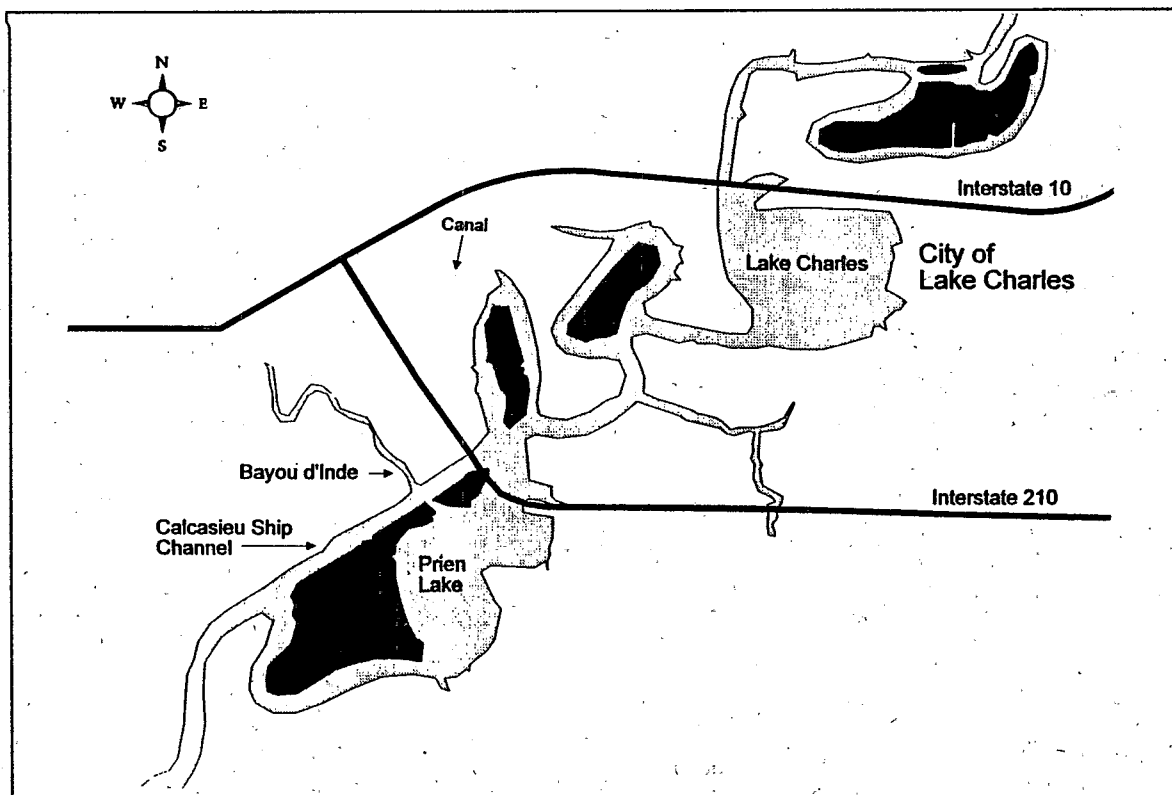
The ability to identify point sources of sediment contamination and to determine what decreases in pollutant loadings are needed to protect sedi-

ment quality is essential to meet water quality standards through effluent limitations. A number of existing water quality models are quite helpful in understanding sediment dynamics in specific waterbodies, but they may be too complex for routine use by regulatory authorities for deriving sediment quality-based effluent limits. To meet the need for a sediment quality-based modeling procedure that is sophisticated enough to be scientifically sound, yet simple enough for routine regulatory use, the Office of Wastewater Enforcement and Compliance (OWEC) is supporting test applications and modifications of EPA's SMPTOX3E model. SMPTOX3E is a one-dimensional, steady-state mass balance model that predicts particulate and dissolved-phase toxic chemical concentrations in the water column and bedded sediments based on loadings data.

Lake Charles, Louisiana, Test Application

The SMPTOX3E model was applied at an industrial site near Lake Charles, Louisiana. An industrial plant at the site discharged four hydrophobic organic chemicals-hexachlorobenzene (HCB), hexachlorobutadiene (HCBd), hexachloroethane (HCE), and 1,2,4-

CS News is produced by EPA-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 Beverly Baker, EPA HQ, at (202)260-7037.



Study Site at Lake Charles, Louisiana

trichloroethane (1,2,4-T)-through an effluent/cooling water canal into Bayou d'Inde, a tributary to the Calcasieu River Estuary. The purpose of the field application was to test the ability of the SMPTOX3E model to describe chemical concentrations in the water column and bedded sediments resulting from effluent discharges. The model required site-specific information including flow and loading input, physical transport parameters, and information on kinetic processes. Field data were available for effluent and ambient toxic chemical concentrations, including tissue residues in selected resident biota. These field data were not acquired for the purpose of supporting the model test application, but to support validation of a proposed EPA protocol for assessment, criteria development, and control of bioconcentratable contaminants in surface waters.

Given data uncertainties and assumptions in the modeling framework, modeling results were reasonably consistent with both water column and sediment observed concentrations in Bayou d'Inde and with water column observed concentrations in the canal. There were large inconsistencies between model results and observations of toxic chemical concentrations in the canal sediments.

Two hypotheses, based on anecdotal data, may explain the discrepancy between the model results and observed concentrations in the canal sediments. The first hypothesis is that there may be an undocumented ground-water source of chemicals to the canal. Anecdotal reports indicate that historically large quantities of wastes were landfilled near the canal. Given that large amounts of water are flushed through the relatively small canal, a significant ground water

loading could elevate sediment concentrations substantially without noticeably affecting water column concentrations. An analysis of the model components showed that water column concentrations in the canal would be quite insensitive to chemical concentrations in the bedded sediments.

The second hypothesis for explaining the disequilibrium in the canal is that the observed

sediment concentrations in the canal have not had sufficient time to recover from historical wastewater loadings, which reportedly were orders of magnitude higher than present levels. This hypothesis could not be confirmed because no historical loadings data were available.

Conclusions from the Test Application

Two of the major conclusions drawn from the SMPTOX3E test application at the Lake Charles site are as follows:

First, any future test site applications, and accompanying data collection, should focus on attempting to validate the model process mechanisms. For example, emphasis should be placed on validating that the model correctly reflects the controlling sediment partitioning mechanisms and provides reasonable representation of water column responses to a

range of hydraulic conditions. The characteristics of the site and the available data should determine whether steady-state and/or time variable models would be most appropriate for this validation. A time-variable model is appropriate when temporal disequilibrium exists between external loadings and sediment concentrations.

Second, in the Lake Charles test application, steady-state model results were consistent with observed data for areas where chemical concentrations were assumed to be in equilibrium with present loads. Consequently, steady-state models, such as SMPTOX3E, are well suited for effluent permitting purposes where the objective is to determine the *long-term average* effluent loading re-

quired to maintain sediment quality criteria. Any steady-state model used for permitting purposes should be based on the same scientific principles and should contain the same process mechanisms as those models field-validated in more extensive test site applications.

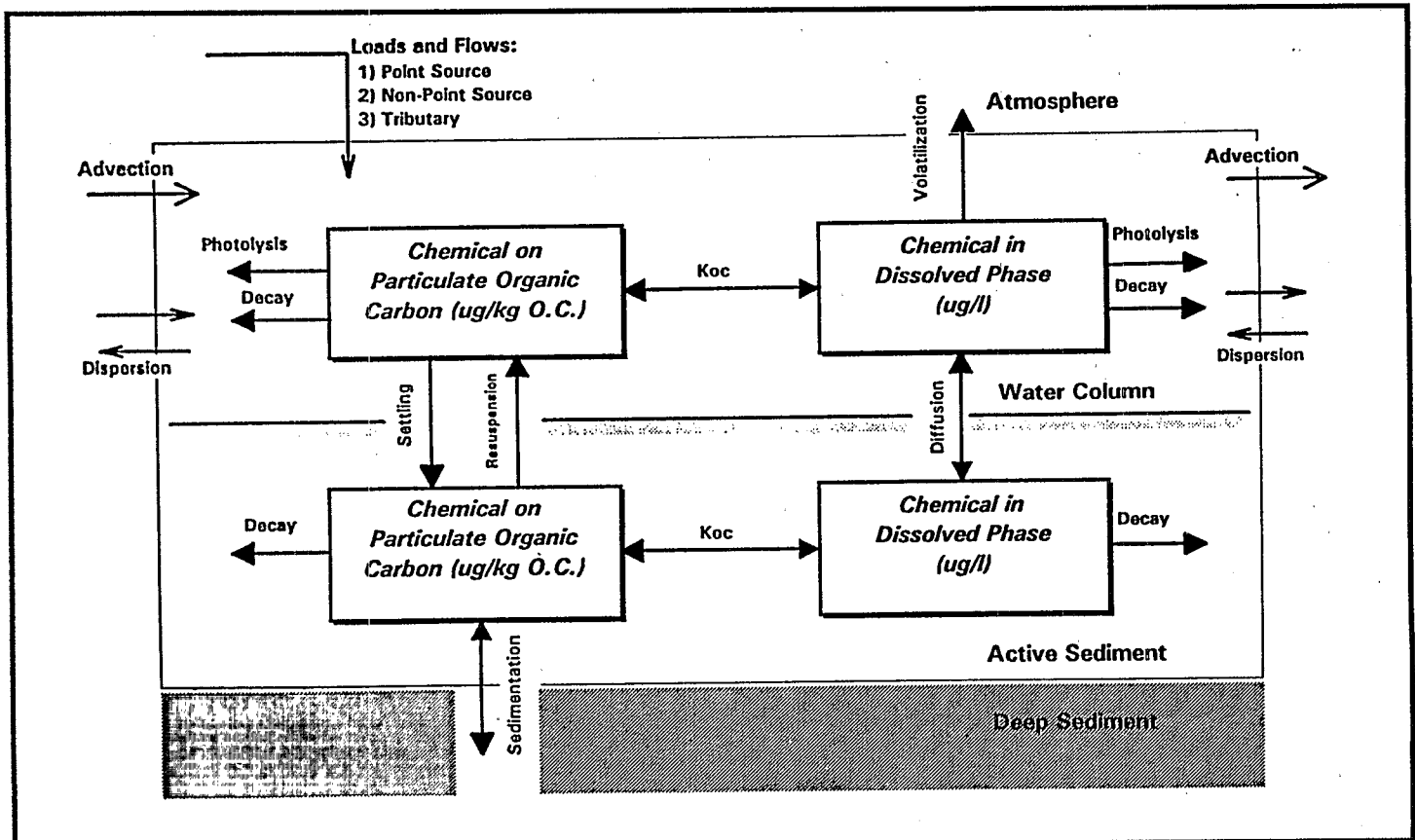
Future Actions

OWEC is planning to support a second model test application on the Blackstone River, which runs through Massachusetts and Rhode Island. The Blackstone River receives discharges from a number of industrial and municipal sources and has documented problems with metals contamination of sediments. The test application will include both time-variable and steady-state

(SMPTOX3E) models. It will focus on validating that the model correctly characterizes the controlling metals-partitioning mechanisms and reasonably predicts water column responses to loadings from effluent discharges.

In the future, OWEC plans to make the SMPTOX3E model and accompanying sediment quality-based permitting guidance available to permit writers and the general public. This package will provide permit writers with the tools they need to address the prevention of sediment contamination and protection of sediment quality through the NPDES program.

For more information on sediment quality-based NPDES permitting, call Greg Currey, OWEC, at (202) 260-1718.



SYMPTOX3E Conceptual Framework

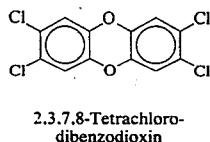
Regional Activities

REGION 6

The Region is overseeing a project to assess ambient water and sediment quality for the Houston Ship Channel System, focusing primarily on its tributaries. This supplementary environmental project (SEP) is being conducted by the City of Houston as required by a Consent Decree between the City and EPA for past discharge permit violations. The project will include sediment sampling for priority pollutants, TOC, AVS, and grain size at approximately 35 sites. Toxicity testing using *Ampelisca* and mysids will be conducted to assess cumulative toxic impacts of

sediments. Dioxin will also be analyzed at several of these sites. The

results will be used to determine the contaminants of greatest risk to aquatic life and human health. For more information contact Philip Crocker at (214) 655-6644.



REGION 9

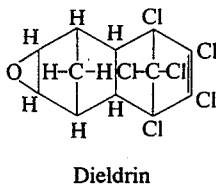
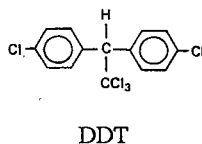
Region 9 and EPA's Environmental Research Laboratory (ERL) in Newport, Oregon, are now in the process of completing an Ecological Assessment of pesticide-contaminated sediments in Richmond Harbor (United Heckathorn Superfund Site) located in San Francisco Bay. At this site, the California State "Mussel

Watch" Program has measured the highest bioaccumulated levels of DDTs and dieldrin ever recorded since the program started.

The Ecological Assessment included: (1) bulk sediment toxicity testing; (2) benthic infauna community analyses; (3) bioaccumulation testing; and (4) chemical analyses of surface waters, sediments, and tissues of benthic organisms, fish, and shellfish collected by trawls. A major goal of this study was to determine the predictive relationships between sediment contaminant concentrations and concentrations in other media.

This relationship will allow the determination of a sediment clean-up concentration that will result in the attainment of protective contaminant levels in fish and shellfish tissues. Results to date include the finding that the DDT sediment concentrations necessary to achieve criteria for protecting human health and fish-eating birds were about 10-fold lower than those required to protect the benthos in this relatively shallow and enclosed harbor. For additional information, contact Andrew Lincoff (Region 9) at (415) 744-2245, Dr. Henry Lee (ERL) at (503) 867-4042, or Dr. Brian Melzian (Region 9) at (415) 744-1161.

Recently, Region 9 worked with the U.S. Army Corps of Engineers (Corps), South Pacific Division, Los Angeles District and San Francisco

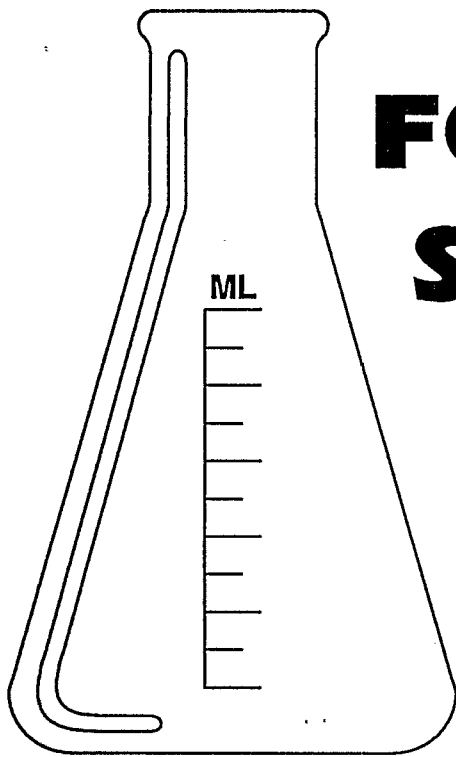


District to publish Regional Implementation Agreements for the Ocean Dumping Program. The agreements provide specific guidance on sediment sampling, testing, and reporting for ocean dumping projects in California. Comments were due to the Los Angeles District by June 30, 1993, and comments were due to the San Francisco District by July 12, 1993. To receive copies of these agreements, contact Tiffany Welch (Corps Los Angeles District) at (805) 641-1127, Wade Eakle (Corps San Francisco District) at (415) 744-3036, or Patrick Cotter (EPA Region 9) at (415) 744-1163.

In the future the U.S. Navy plans to home-port many ships at its San Diego Bay facilities because of base



closures along the west coast. Rear Admiral F.K. Holian (Commander Naval Base) holds quarterly meetings with federal and state regulatory and resource agencies to discuss the Navy's projects. Region 9 and the Corps's Los Angeles District participate in these meetings to coordinate on the Navy's dredging projects. The quarterly meetings provide the Navy with early comments on its proposed dredging projects. This successful strategy also keeps the resource and regulatory agencies advised of the Navy's priority projects to meet their base realignment schedule. For additional information, contact Dan Muslin (Navy San Diego) at (619) 532-3403, Patrick Cotter (EPA Region 9) at (415) 744-1163, or David Zoutendyk (Corps Los Angeles District) at (619) 455-9414.

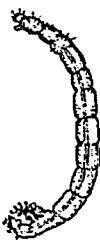


FOCUS: Sediment Toxicity Bioassays



Summary of Round Robin Testing of Draft USEPA National Sediment Toxicity Test Methods

EPA's Office of Science and Technology is developing test procedures for measuring the toxicity and bioaccumulation of contaminated sediment with freshwater, estuarine, and marine invertebrates. As part of this development process, the draft methods are being evaluated, in part, via round robin testing. The freshwater acute toxicity test methods for the amphipod *Hyaella azteca* and the midge *Chironomus tentans* were tested in a round robin design with up to 11 government research laboratories, environmental consultants, and universities partici-



Chironomus tentans

pating. The assays were evaluated in two phases, including a water-only reference toxicant (KCl) exposure for 4 days and a whole sediment 10 d exposure using reference and contaminated field sediments. The preliminary evaluation of inter-laboratory variance showed the draft methods to be very promising. Measured coefficients of variation were similar or better than those reported for other effluent toxicity or chemical methods. The results will be presented in the national methods document and presented at the Annual Meeting of the Society of Environmental Toxicology and Chemistry, Houston, Texas, in November 1993. For more information on the results of the round robin testing, contact Dr. Allen Burton at (513) 873-2201.

U.S. Army Corps of Engineers Host Workshop: "A Developmental Paradigm for Sediment Toxicity Bioassays"

On June 16-17, the U.S. Army Corps of Engineers held a workshop to discuss a paradigm for developing sediment toxicity bioassays. Workshop participants included scientists and program staff from EPA and Corps research laboratories, Regional and District offices, and Headquarters offices. Scientists associated with contract laboratories, universities, and Environment Canada also attended the workshop. Workshop participants discussed various phases in the process of bioassay development for regulatory program use. Phases included such activities as initial scoping by test proponents, laboratory research, evaluation by multiple laboratories, final test protocol development, and protocol evaluation by regulating agencies. A Corps of Engineers Technical note is being developed on this process. For more information contact Tom Dillon at (601) 634-3922.

Meeting Held to Discuss Statistical Issues Related to Use of Whole Sediment Bioassays

On June 2, a meeting was held in Washington, DC, to discuss statistical guidance for the standard toxicity and bioaccumulation tests that are being developed for the Agency. Individuals writing the freshwater and marine manuals met with EPA program office staff to discuss how the tests will be used in the various programs. Specific program office testing needs addressed at the meeting included: (1) Office of Wetlands, Oceans and Watersheds (sediment toxicity and bioaccumulation), (2) Office of Pollution Prevention and Toxic Substances (sediment spiking), (3) Office of Pesticide Programs (bioaccumulation, sediment spiking), (4) Office of Emergency and Remedial Response (Superfund; toxicity and bioaccumulation, spiked sediment-bioaccumulation), (5) Office of Solid Waste (toxicity and bioaccumulation), and (6) Office of Wastewater Enforcement and Compliance (toxicity and bioaccumulation, sediment spiking-bioaccumulation). Three case studies were discussed:

- 1) comparison of a contaminated sediment to a reference or control sediment,
- 2) spiked-sediment toxicity tests, and
- 3) bioaccumulation tests.

Statistical guidance in the manuals will include (1) power of the test and number of replicates, (2) minimum detectable differences, (3) hypothesis testing, (e.g., ANOVA), (4) point estimates (e.g., LC50), and (5) kinetics for bioaccumulation tests. The statistical guidance for interpretation of test results is currently being incorporated into the freshwater and marine manuals scheduled for completion in October.

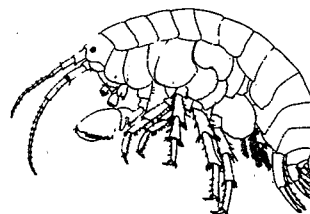
For more information, contact Tom Armitage at (202) 260-5388.

EPA/Corps of Engineers Technical Panel Convened to Evaluate Use of Amphipod Bioassays for Evaluation of Sediment Toxicity

On June 18, a technical panel of experts selected by EPA and the U.S. Army Corps of Engineers met in Denver, Colorado to discuss the use of amphipod bioassays for evaluating the toxicity of dredged material. The panel included scientists from a number of different laboratories who have worked on the development of amphipod bioassay protocols, contractors who conduct amphipod bioassays, and program managers and staff from several EPA and Corps offices. The panel was convened to discuss potential interfering effects such as ammonia and hydrogen sulfide toxicity, and sensitivity to grain size in amphipod bioassays. Panel members supported the continued use of the amphipod bioassays for evaluation of sediment toxicity, and data were presented to show that amphipod laboratory toxicity test results correlate well with environmental effects observed in the field. However, it was noted that the amphipod laboratory tests are probably not sufficiently sensitive to predict some unacceptably adverse effects in the field. It was determined that adequate data describing potential interfering effects are available to provide acceptable ranges of test application conditions for a number of amphipod species. Standard amphipod toxicity test method protocols to be completed by EPA this year will include this information. For more information, contact Tom Armitage at (202) 260-5388.

Standardization of National USEPA Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates

A draft USEPA manual describing procedures will be completed in October for testing freshwater organisms to evaluate the toxicity or bioaccumulation of contaminants associated with whole sediment. Toxicity methods are outlined in the manual for two organisms, the amphipod *Hyaella azteca* and the midge *Chironomus tentans*. Toxicity tests are: (1) conducted for 10 d in 300-mL chambers containing 100 mL of sediment and 175 mL of overlying water, (2) overlying water is renewed daily, (3) organisms are fed during the tests, and (4) endpoints monitored are survival and growth. Bioaccumulation methods are outlined in the manual for the oligochaete *Lumbriculus variegatus*. Bioaccumulation tests are: (1) conducted for 28 d, (2) overlying water is renewed daily, (3) test organisms are not fed, and (4) methods are described for determining bioaccumulation kinetics during 28-day exposures. Performance-based criteria are used to determine acceptability of a test. Performance criteria include: (1) survival of control organisms at the end of a test, (2) response of test organisms to reference toxicants, (3) size of the test organisms at the start and end of a test, (2) maintenance of sediment and water quality characteristics during a test. For more information, contact Tom Armitage at (202) 260-5388.



ORD Activities

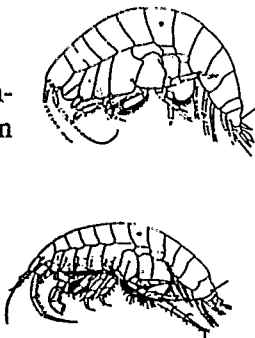
ERL-Narragansett/Newport

ERL Narragansett/Newport is currently working on the following sediment research issues:

Extrapolation from Laboratory to Field Effects: Case Studies with Contaminated Sediments

Sediment toxicity to the amphipod *Eohaustorius estuarius* and the abundance of benthic amphipods were examined along a sediment contamination gradient on the Lauritzen Channel, Santa Fe Channel, and Richmond Inner Harbor area of San Francisco.

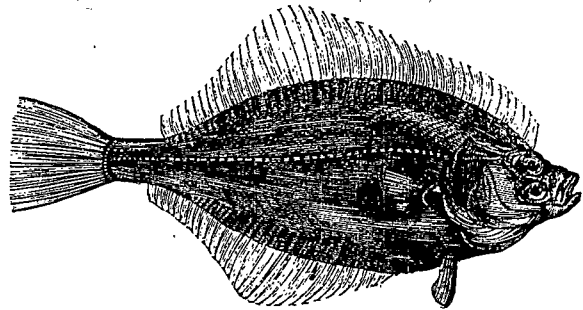
Toxicity and the abundance of amphipods, except *Grandidierella japonica*, were inversely related to sediment contamination by dieldrin and the sum of DDT metabolites (Σ DDT). The maximum concentrations of dieldrin and Σ DDT in toxic units were 0.018 and 9.43, respectively, indicating that Σ DDT was the dominant ecotoxicological factor. For more information contact Faith Cole at (503) 867-4023.



Fish Reproduction

Investigators are determining the reproductive effects of sediment toxicants on winter flounder (*Pleuronectes americanus*) and killifish (*Fundulus heteroclitus*). The approach includes:

- The effects of coplanar PCBs on reproduction (field and laboratory studies);
- Dioxin dietary uptake and reproductive effects;
- Incorporation of reproductive data into demographic models to predict population effects;
- Other biomarker responses-immune suppression, DNA adducts, calcium cycling, and cell-to-cell communication and their relation to reproductive failure.



Results to date include the following:

- Coplanar PCBs reduce egg reproduction in killifish, and
- Decreased gonadotrophin (a pituitary hormone that controls oocyte growth and maturation) has been observed.

For more information call Diane Black at (401) 782-3096.

Accumulation and Trophic Transfer of Sediment-Associated Contaminants

Investigators are elucidating the relationships between chemical contaminants in sediments and organisms at various trophic levels. These studies have included:

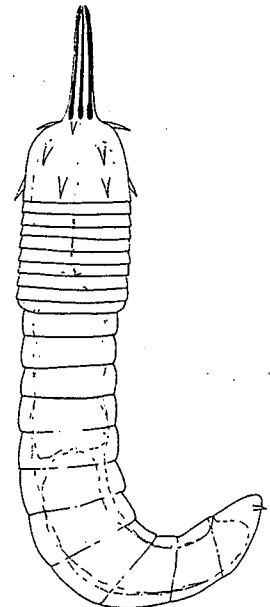
- Laboratory food-chain studies with field-collected sediments that investigate the relationships between sediments, polychaetes, and lobsters with respect to dibenzo-p-dioxins, dibenzofurans, and PCBs (including the coplanar congeners);

- The relative importance of sediment versus food exposures;
- BSAF measurements;
- Changes in contaminant ratios with food chain level; and
- TEF calculations.

For more information call Richard Pruell at (401) 782-3091.

Creature Feature

This creature spends part of its life inside grasshoppers and beetles (sometimes humans if you're unlucky) before settling down in a nice freshwater puddle or stream. Answer on p. 11.



EMAP at ERL-Narragansett

EMAP activities through ERL-Narragansett include:

- Virginian Province monitoring since 1990,
- NY/NJ Harbor R-EMAP Project,
- DE/MD Inland Bays Project,
- New Bedford Superfund remediation monitoring design,
- Interaction in design of National Estuary Program monitoring, and
- Joint assessment with Chesapeake Bay Program.

Results from 1990 Virginian Province are available (95 percent confidence intervals)

Benthic community

- 16-30 percent of province area degraded

Sediment toxicity

- 3-13 percent of area with survival $\leq 80\%$
- 24-40 percent of area small systems ($< 260 \text{ km}^2$) with survival $\leq 80\%$

Sediments contaminants

- 27-45 percent of area with at least one metal $\geq \text{ER-L}$
- 2-12 percent of area with at least one metal $\geq \text{ER-M}$
- 8-16 percent of area with at least one pesticide $\geq \text{ER-L}$
- 0-2 percent of area with at least one pesticide $\geq \text{ER-M}$

The 1991 data will be available shortly. For more information call John Paul, ERL-Narragansett, at (401) 782-3037.



ASTM UPDATE

The ASTM Subcommittee E47.03 on Sediment Toxicology met Tuesday, April 27, and Wednesday, April 28, 1993, in Atlanta, Georgia, during the 3rd Annual ASTM Symposium on Environmental Toxicology and Risk Assessment. Ballot results on standards were discussed during the Subcommittee meeting for:

- (1) Terminology (control sediment, water, pore water);
- (2) Revisions to E1383 (freshwater invertebrate toxicity); Annex 4 on *Daphnia* and *Ceriodaphnia* on *Diporeia*;
- (3) Polychaete testing;
- (4) Earthworm testing;
- (5) E1525-93 (Sediment design); and
- (6) Statistical guidance.

Subcommittee ballots are pending for (1) Invertebrate bioaccumulation (not rebaloted since spring 1991) and (2) Fish bioaccumulation (not rebaloted since spring 1992). The activities of the following Task Groups were also discussed: (1) E1391-90 (Sediment collection, manipulation), (2) Sediment resuspension, (3) Reference toxicants, (4) Echinoderm and oyster testing, and (5) Bacteria testing.

Betsy Southerland of the USEPA Office of Science and Technology is interested in balloting proposed USEPA methods for freshwater and marine toxicity and bioaccumulation sediment testing. These USEPA manuals should be balloted after the next Subcommittee meeting.

The next Subcommittee meeting will be Saturday, November 13 (AM/PM) and Sunday, November 14 (AM, if necessary), 1993, before the 14th annual meeting of SETAC at the Westin Galleria in Houston, Texas. Contact Chris Ingersoll at (314) 875-5399, FAX (314) 876-1896, if you would like more information concerning the Subcommittee meeting or the activities of the Subcommittee.

Hazardous Substance Research Center/South and Southwest

The Hazardous Substance Research Center/South and Southwest held its semi-annual meeting of the Scientific Advisory and Training and Technology Transfer Committees at Georgia Institute of Technology on February 1-3, 1993. The Center, which is a consortium composed of Louisiana State University (LSU), Georgia Institute of Technology (GIT), and Rice University (Rice), focuses its research efforts on contaminated sediments and dredged materials, as well as hazardous materials problems unique to EPA Regions 4 and 6. Research results generated by the nine basic research projects and one technology transfer project during the first year of funding were presented.

The currently funded research projects, by university, are:

- *Mobility and Transport of Radium in Sediment and Waste Pits*, LSU
- *An Investigation of Chemical Transport from Porous Contaminated Sediment through Porous Containment Structures*, LSU
- *Pollutant Fluxes to Aquatic Systems via Coupled Biological and Physicochemical Bed-Sediment Processes*, LSU
- *Contaminant Transport Across Cohesive Sediment Interfaces*, GIT
- *Investigation on the Fate and Biotransformation of Hexachlorobutadiene and Chlorobenzenes in a Sediment-Water Estuarine System*, GIT
- *Development of an Integrated-Optic Interferometer for InSitu Monitoring of Volatile Hydrocarbons*, GIT
- *Bioremediation of Contaminated Sediments and Dredged Material*, Rice
- *Role of Particles in Mobilizing Hazardous Chemicals in Urban Runoff*, Rice, and
- *Effect of Natural Dynamic Changes on Pollutant-Sediment Interactions*, Rice.

The technology transfer project, *Fostering Pollution Prevention in Mid-Sized Firms: Strategies for More Effective Technology Transfers*, is being conducted by researchers at Georgia Tech.

The Center receives its funding primarily from USEPA's Office of Research and Development. The Project Officer is Dr. Dale Manty. For more information about the Center and its projects, contact Rosalind Segesta in care of the Hazardous Substance Research Center, College of Engineering, Louisiana State University, Baton Rouge, LA 70803; phone (504) 388-6770, FAX (504) 388-5990.

Relevant Publications

Remediation Document is Available

This document, *Selecting Remediation Techniques for Contaminated Sediment*, June 1993, (EPA-823-B93-001), was developed by the USEPA Sediment Oversight Technical Committee with assistance from the Office of Research and Development's Risk Reduction Engineering Laboratory. It is intended to assist federal and state remedial managers, local agencies, private clean-up companies, and supporting contractors in the remedial decision-making process at contaminated sediment sites.

The Remediation document contains an appendix with a summary of Superfund RoDs from 1982-1989. An updated and comprehensive listing of RoDs for sites with contaminated sediment from 1989-1992 is available through EPA Regional hazardous waste libraries or the national RoDs database. For more information, contact Bev Baker at (202) 260-7037.

Recent Products from the Corps of Engineers' Environmental Effects of Dredging Technical Notes

- EEDP-01-27. A Computer-Assisted Expert System for Interpreting the Consequences of Bioaccumulation in Aquatic Animals (COBIAA) (Nov. 1992)
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For information on the *Technical Notes*, including additions to the distribution list, contact Dr. Robert M. Engler, Manager, Environmental Effects of Dredging Programs, at (601) 634-3624.

Creation Feature Answer: Typical gortian larva with protruded proboscis.

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Environmental Protection
Agency (WH-585)
Washington, DC 20460

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