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Ecological Risk Assessment Projects

In FY 92, Region 6 selected four sites as pilot projects for the accelerated remedial investigation program. This article describes the ecological risk assessments completed for two of these pre-SACM (Superfund Accelerlated Cleanup Model) sites: American Creosote, a 32-acre site in Winnfield, Louisiana, and Popile, a 40-acre site in El Dorado, Arkansas. Both are former woodtreating facilities. Ecological contaminants of concern (COCs) were polynuclear aromatic hydrocarbons, (PAHs), pentachlorophenol (PCP), heptachlorinated and octachlorinated dioxins, dibenzofurans (dioxins), and phenol.

Members of the Region 6 Peer Review Risk Assessment Committee conducted site visits during January to scope the ecological field work. It was decided to collect soil, sediment, and water samples at the American Creosote site, and water and sediment samples at the Popile site. Ecological samples were collected in February 1992 in coordination with field work for the Remedial Investigation and the Human Health Risk Assessment.

The EPA-Houston laboratory ran 7-day *Ceriodaphnia dubia* tests and fathead minnow (*Pimephales promelas*) chronic toxicity tests on sediment and water samples from both sites. Earthworm toxicity tests were run on soil samples from the American Creosote site by EPA's ORD/Corvallis laboratory. EPA's Environmental Response Team (ERT) and Region 6 staff conducted a wetland delineation and site evaluation at the American Creosote site in March. Biological tissue data were not collected.

Toxicity test results for sediment and water samples from the Popile site showed no effects in fathead minnows or *C. dubia*. The American Creosote site showed significant effects at some sediment

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INSIDE

About *BTAG Forum*

BTAG Forum is a Bulletin series published by EPA/OERR primarily to foster communication among Biological/Ecological Technical Assistance Groups (BTAGs/ETAGs) in EPA Regional Offices. BTAGs have been established in most Regions to assist EPA site managers in designing, managing, and reviewing ecological assessments of Superfund sites. The *Forum* carries news from the Regions, information on publications and other potentially useful resources, requests for information, and other items of interest to BTAG members. If you would like more information on the BTAG in your area, contact the Regional BTAG coordinator listed inside.

EPA BTAG Forum

BTAG Forum is published by the Toxics Integration Branch, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response.

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CONTRIBUTIONS

BTAG Forum is published to enhance the level of intra- and inter-Regional communication among the Superfund scientific community. To achieve that goal, contributions are needed on a regular basis. Individual contributions need not be lengthy or too detailed; they could take the form of a simple paragraph on a Region's BTAG activities, an announcement of upcoming workshops, or a request for specific information. Both State and Federal contributions are welcome.

Please help us facilitate the communication of news and ideas by taking a few minutes to write a paragraph or two for the next *Forum*.

Inquiries, correspondence and contributions should be sent to Ron Preston, BTAG Forum, USEPA, 303 Methodist Building, 11th and Chapline Streets, Wheeling, WV 26003 or telefaxed to (304) 234-0260. Electronic mail should be sent to EMail ID No. EPA93090.

Deadline for next issue:

23 OCTOBER 1992

News from the Regions

Region 1

July's SEAT meeting provided an opportunity to check the status of the Region's Superfund sites. The five-member team provided status reports for over 60 sites. Topical discussions included background levels, no-action decisions, ACL determination, and clean-up levels.

Also raised were concerns involving NRTs. In some situations, trustee representatives are not involved during the process of determining clean-up levels and selecting preferred alternatives. Their absence seems to be due in part to the issues being beyond their realm of interest. As a result, remediation issues do not get the same level of attention as the assessments themselves do. Please contact Susan Svirsky (617) 573-9649 with any suggestions to address this issue.

Region 3

Region 3 has been grappling with assessing contaminants at the Aberdeen Proving Grounds in Maryland. Due to the unknown nature of the experimental chemical warfare agents produced there and the rigid logistics of handling such substances, sampling becomes a difficult undertaking. Military facilities provide unique problems and situations not encountered at civilian Superfund sites. If other Regions have experience in sampling at weapons facilities, please contact Bob Davis (215) 597-3155.

Region 5

Two sites were reviewed by Region 5 in July. The first site contains PCB-laden river sediments which have caused contamination of the river's floodplain. Region 5's site investigation will be patterned after a food web sampling plan previously developed for another PCB river site. The 8-mile stretch of river under investigation includes a USFWS refuge located below the source of contamination. Plans for the ecological assessment include trapping mink and examining their livers for PCB concentrations.

The second site being reviewed by Region 5 is contaminated by electroplating wastes. Cyanide, nickel, and chromium were identified as the contaminants of concern causing ground water contamination. Please contact Eileen Helmer (312) 886-4828 with questions or comments in regards to these two sites.

Region 6

With the assistance of ERT, Region 6 rewrote two "desktop" ecological risk assessments for two former wood-treatment facilities (See lead article). The Region also reviewed and commented on a well-done "desktop" ecological risk assessment for a federal facility. Metals, munitions, and solvents found on-site were assessed. Assessment of organisms included both terrestrial and aquatic food chains. Aquatic species included watermilfoil, daphnid, chironomid, mosquitofish, and largemouth bass species. Terrestrial species included grass, earthworm, mouse, and red-tailed hawk species.

Other Regional activities involved the review of a PRP-contracted ecological inventory conducted under an Administrati Order of Consent. Region 6 is in need of examples from other Re-

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gions on how to write an acceptable ecological risk assessment when available site data are limited to ecological inventory data and chemistry data from an extent-of-contamination study.

The Region is providing technical assistance to a contractor for collection of ecological data in support of an ecological risk assessment for another site being piloted for accelerated remedial investigation. Region 6 also provided technical oversight and assistance on requirements for an ecological risk assessment to contractors who initially failed to submit ecological risk assessments for one of Region 6's sites.

Proposed Plans for American Creosote, Popile, Cal West, and Double Eagle/Fourth Street were presented in public meetings for addressing human health and ecological risk assessment concerns.

In other news, Region 6 is looking for a toxicologist/risk assessor. For more details, please contact either Susan Roddy (214) 655-8518 or Jon Rauscher (214) 655-8513.

Region 7

Region 7's last BTAG meeting discussed the issue of mine tailing waste contamination from a former mining site. The primary topic of concern was the effect of lead on plants and animals living in and around a stream impacted by former mining operations. A question was posed as to how to remove lead from several miles of rocky stream bed. If other Regions have experience in stream remediation including the removal of lead, please contact Bob Koke (913) 551-7468.

Region 10

Recent BTAG reviews in Region 10 involve two wetland sites, one contaminated by creosote, the other by landfill leachate. Discussion for both sites revolved around the role of existing wetlands in the treatment of site releases.

Region 10 raises the question of how to evaluate urban ecosystems. With a significant number of Superfund sites situated in urban regions, it is critical to establish a means of assessing ecosystems such as parks, rivers, and greenways. Please notify Bruce Duncan (206) 553-8086 with any suggestions or ideas concerning the role of wetlands or urban ecosystems. □

AQUIRE Update

The **AQU**atic toxicity **I**nformation **RE**trival (AQUIRE) database was established in 1981 by the EPA Environmental Research Laboratory in Duluth, MN (ERL-Duluth). AQUIRE provides users quick access to a comprehensive, systematic, compilation of aquatic toxic effects data.

AQUIRE includes data from nationally and internationally published scientific papers on the toxic effects of chemicals to aquatic organisms and plants. Independently compiled laboratory data files include AQUIRE parameters and meet quality assurance criteria. Toxicity test results and related testing information for any individual chemical from laboratory and field aquatic toxicity tests are extracted and added to AQUIRE. Acute, sublethal, and bioconcentration effects are recorded for freshwater and marine organisms.

As of August 1992, AQUIRE comprised over 99,710 individual test results. These tests contain information for 5,500 chemicals and 2,361 organisms, extracted from over 6,650 publications. Data entry for 1991 literature should be completed by September 1992. All AQUIRE data entries are subjected to established quality assurance procedures.

AQUIRE is a VAX-based system located at ERL-Duluth and the National Computer Center. The database can be accessed through the EPA network via the VAX system or through a modem and personal computer. A user-friendly, menu-driven program to extract toxicity information has been developed for use by government offices. A magnetic tape of AQUIRE data and software for the VAX system are available from the National Technical Information Service (NTIS PB92-500453). Several commercial vendors provide AQUIRE access to the private sector.

For further information and inquiries regarding access to the AQUIRE database, please contact Christine Russom, USEPA, Environmental Research Laboratory, 6201 Congdon Boulevard, Duluth, MN 55804 or call (218) 720-5602. □

Ecological Risk Assessment

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sampling locations for fathead minnows and *C. dubia*, but no effects from aquatic toxicity tests. Soil toxicity was indicated for some of the earthworm toxicity test samples at the American Creosote site.

ERT and Region 6 staff wrote the final ecological risk assessment reports for both sites with an intense level of effort in an extremely short period of time. The reports included sections for site description, indicator species, toxicity testing, chemicals of concern and toxicological profiles, exposure assessment, risk characterization and uncertainty analysis, and conclusions.

Literature on toxicological and exposure information was reviewed since site-specific toxicity criteria and tissue residue data were not available. Information obtained from the literature included reference benchmark criteria for each of the COCs and ecological indicator species. The reference benchmark toxicological criteria were measured LOAELs and LC_{50} values which were divided by an uncertainty factor of 10 to calculate LOAELs. Also obtained from the literature were exposure parameter data for each indicator species (body weight, home range size, BCFs, BAFs, dietary ingestion rates, and percent of foods ingested).

Aquatic bioassessment addressed bioconcentration to an alga *(Selenastrum capricornutum)*, fathead minnows *(P. promelas)*, and bluegills *(Lepomis macrochirus)*, and bioaccumulation in fathead minnows and bluegills. Terrestrial assessment involved bioaccumulation in deer mice *(Peromyscus maniculatus)* and the red fox *(Vulpes vulpes)*. These indicator species were selected because of their potential or observed presence on the sites and because of the availability of literature values.

Significant COC migration pathways and exposure routes were the same for both sites. Migration pathways were runoff, erosion to surface or ground water, and infiltration into ground water with subsequent discharge to surface water. Exposure routes evaluated for fathead minnows and bluegills were bioconcentration (direct contact plus inhalation) from surface water, and ingestion of sediment, plant material, and benthic invertebrates. Ingestion of fish also was evaluated for bluegills. Exposure routes evaluated for deer mice were ingestion of insects and vegetation. Ingestion of small mammals was evaluated for the red fox.

The equations in Table 1 were used to estimate exposure.

Reasonable maximum exposure (RME) values (either the 95% upper confidence limit or the maxima detected) were used to calculate exposure for each medium. For dioxin, toxicity equivalence values (TEFs) were used because the literature toxicological reference values used 2,3,7,8-TCDD. TEFs are based on the premise of enzyme induction from animal studies that were assumed to be applicable to ecological risk assessment. Instead of using site-specific data on concentrations of octa- and hepta-congeners, congener concentration data were adjusted to the standard TEF for 2,3,7,8-TCDD to account for the toxicity of other dioxin congeners. 2,3,7,8-TCDD was not detected in any samples for either site.

A hazard quotient was used to characterize risk by calculating the ratio of exposure estimations for each receptor to literature toxicity benchmark criteria for each ecological COC. Quotients greater than one indicated the likelihood of deleterious ecological effects. Table 2 presents the results where hazard quotients exceeded a ratio of 1.0.

All of the hazard quotients exceeding one indicated significant risk except for PAHs in deer mice. This is because the toxicological benchmark criteria selected for PAHs is based on cancer risk in laboratory mice, which is of limited utility for predicting population effects to wild mice.

The only uncertainty factor used was an uncertainty factor of 10 for converting LC_{50}s to LOAELs. Yet, uncertainty is expected to be high due to other sources such as reliance on literature BCF/BAF values (versus site-specific data), cross-species extrapolations for literature toxicological/exposure data, and chemical interactions. Factoring in uncertainty parameters for BCFs/BAFs and other variables would have increased the estimate of risk.

In conclusion, both American Creosote and Popile sites present unacceptable ecological risks. Chemical residues in soil, sediment, and surface water have the potential for eliminating any of the populations of indicator species residing on the site for any significant amount of time. □

Table 1 Exposure Equations for Indicator Species

Algae *(S. capricornutum)*

Algal uptake (total daily contaminant dose)	=	BCF for alga × contaminant concentration in sediment.

Fathead Minnow

Total daily contaminant dose	=	dose + minnow uptake.
Dose (mg/kg/day)	=	contaminant dose × ingestion rate × 1/minnow body weight.
Contaminant dose	=	(contaminant concentration in sediment × % ingested) + (contaminant concentration in plants × % ingested) + (contaminant concentration in benthos × % ingested).
Minnow uptake	=	BCF minnow × contaminant concentration in water.

Bluegill

The equations are similar to those for fathead minnow with the following exceptions:

- Bluegill equation terms are substituted for minnow equation terms.
- Contaminant concentration in minnows × % ingested was added to the equation for contaminant dose.

Deer Mouse

Dose (mg/kg/day)	=	contaminant dose × ingestion rate × 1/deer mouse body weight.
Contaminant dose	=	(contaminant concentration in invertebrates × % ingested) + (contaminant concentration in terrestrial plants × % ingested).

To estimate contaminant concentrations in fish, aquatic and terrestrial plants, and invertebrates, BCFs or BAFs were multiplied by the contaminant concentration in the media (sediment, soil, or water).

Red Fox

Dose (mg/kg/day)	=	contaminant dose in small mammals × ingestion rate × area use factor × 1/fox body weight. *[Area use factor = % of time that the red fox is expected to spend on the site. It is based on comparing home range size to site size.]*
Contaminant dose in small mammals	=	BAF small mammals × contaminant concentration in soil.

Table 2 Hazard Quotients > 1.0

Contaminant	*American Creosote Site*	*Popile Site*
PCP	alga, fathead minnow, bluegill, deer mouse	alga, fathead minnow, bluegill
PAHs	fathead minnow, deer mouse	alga, fathead minnow, bluegill, deer mouse
Dioxins	deer mouse, red fox	deer mouse, red fox

News from NOAA

Concerns for Wetland Habitat

NOAA Coastal Resource Coordinators (CRCs) work with Regional EPA BTAGs and project managers to assess risks to coastal resources from hazardous substance releases and develop cost-effective strategies to minimize those risks. The CRCs represent NOAA's trusteeship during the removal and remedial process for anadromous and catadromous fish, estuarine and marine species, and their supporting habitat.

Waste sites are often located near wetlands that serve as supporting habitat for NOAA trust species. This proximity is of concern for a number of reasons. Unstable physical and chemical conditions in a contaminated wetland may act as a contaminant source to other habitats. The wetland may be the last remnant of an increasingly scarce habitat and serve to attract sensitive species. Contamination in wetland sediment may be biologically available and may cause injury to natural resources. In addition to these concerns, Executive Order #11990 on Protection of Wetlands requires federal agencies to avoid adverse impacts to wetlands during the remediation process and to develop mitigative measures if adverse impacts are unavoidable.

These concerns usually can be addressed through comprehensive ecological assessment as part of the remedial investigation. Wetland delineation and assessment should be focused on determining the use of the wetland by natural resources, the extent of contamination in the wetland, and the indications that the wetland may be a source of contamination through both physical and biological pathways. Factors that influence the potential for contaminant release from wetland sediments include the stability of the wetland as a depositional area and the potential for groundwater recharge and floodwater control. The pattern of contamination within the wetland can indicate possible pathways for contaminant migration via surface water and erosion of sediment. Biological availability and potential impacts can be assessed through appropriate studies in combination with data on the extent-of-contamination. These studies include bioaccumulation, benthic community, biomarker, and other studies directed at the contaminants of concern and the resources at risk.

Finally, injury to wetlands caused by contamination should be mitigated through remedies that can restore an area and protect natural resources from future injury. Mitigation and compensation for past injury can be included in consent decrees as part of the covenant not to sue process. When this occurs, the need for damage claims can be eliminated or substantially reduced. For more information about NOAA's CRC Branch, please contact Alyce Fritz (206) 526-6305 or Mary Matta (206) 526-6315. □

Wetlands Guidance

Staff from the Office of Solid Waste and Emergency Response, the Office of Waste Program Enforcement CERCLA Enforcement Division, and the Office of Water's Office of Wetlands, Oceans, and Watersheds formed *The Core Working Group Considering Wetlands at Hazardous Waste Sites* in January 1992. Headquarters and regional staff from this group assembled to develop a joint cooperative guidance which would address complex issues not well addressed in existing guidance. The group also saw a need for more consistent applications of ARARs and wetlands identification.

Other concerns such as how the remedial process impacts wetlands the ecological significance of wetlands, and the assessment of wetlands at sites will be addressed. This cooperative guidance has six major sections including purpose, background, assessment, steps to be taken when a site contains a wetland, expected impacts and approaches when dealing with contaminated wetlands, and opportunities for information sharing and cooperation, including a list of contacts. The proposed date of completion for this work product is November 30, 1992. Questions can be referred to either of the co-chairs; Sherri Fields (202) 260-1932 or Elaine Suriano (202) 260-7739. □

Strength in Numbers

We're growing by leaps and bounds! In just one year's time, the *BTAG Forum* mailing list has grown from 183 to 637 subscribers. Of this current total, 462 are Federal employees. EPA personnel account for the majority of Federal subscribers. Other Federal agencies represented include the US Fish and Wildlife Service, the Department of Defense, the National Oceanographic and Atmospheric Administration and the US Geological Survey. State agencies account for more than 50 subscribers while those outside government make up more than one-sixth of the list.

Breakdown by Region shows the combined representation of EPA Regional staff and other Federal, State, University, and Private subscribers. Below are the statistics by Agency and Region.

Breakdown by Agency

EPA		*Other Federal*		*State*	54
Headquarters	29	USFWS	137	*Universities*	3
Region 1	23	Other DOI	7		
Region 2	33	DOD	32	*Private*	118
Region 3	28	NOAA	10		
Region 4	29	USGS	4		
Region 5	40	USDA			
Region 6	14	Forest Service	1		
Region 7	10	DOE	1		
Region 8	25	NASA	1		
Region 9	18				
Region 10	20				
Totals	269		193		175

Breakdown by Region

Headquarters	29
Region 1	47
Region 2	66
Region 3	94
Region 4	62
Region 5	87
Region 6	45
Region 7	20
Region 8	66
Region 9	52
Region 10	68
Other (Canada)	1
Grand Total	**637**

Mailing List Additions

Are your name and address correct on your mailing label? Do you have colleagues who want to receive *BTAG Forum*? Please send corrections and new names to Ron Preston, BTAG Forum, USEPA, 303 Methodist Building, 11th and Chapline Streets, Wheeling, WV 26003.

Correction ☐ New ☐

Name _____

Address _____

_____

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Book Selections

Recently announced reference publications.

Peterle, T.J. 1991. *Wildlife Toxicology*. Van Nostrand Reinhold, New York, New York. Available from: Van Nostrand Reinhold, 115 Fifth Avenue, New York, New York 10003. 322 pp.

Wildlife Toxicology is an excellent source of background information on the potential effects of toxic substances on wildlife species and the many factors influencing those effects. The author addresses basic principles of environmental toxicology through the use of examples that examine key chemicals and their environmental implications.

The text begins with helpful background information on the laws, regulations, and agencies that deal with the issues of toxic substances in the environment. In particular, testing and regulation programs under TSCA, CERCLA, FIFRA, and NEPA are discussed. Subsequent chapters cover the main issues of the book: common contaminants and their chemical characteristics, routes of transport, and effects on organisms.

General characteristics of the elements, chemicals, and compounds found in environmental pollutants are discussed, including historical use, toxicity, solubility, and, in some cases, LD_{50} values for several test animals. Attention also is given to potential fate and transport mechanisms, persistence, breakdown, and metabolism of contaminants.

Specific information is provided on exposure scenarios and the metabolic processes for different organisms when exposed to toxic substances. Scenarios encompass many aspects of exposure including routes of intake; storage sites and target organs; excretion and metabolism; influence of species, sex, and age; effects of synergism and antagonism; food chain effects such as bioaccumulation, biomagnification, and bioconcentration; and reproductive, behavioral, and physiological responses.

The author also addresses sampling and monitoring strategies for specific chemicals, media, and organisms. Included are important concerns which should be taken into account in different situations where sampling and testing is required, such as lethal vs. chronic exposures, laboratory vs. field testing, and how to select test organisms.

The book concludes with a discussion of effects on ecosystems and a chapter devoted to classic examples of contamination: DDT, PCB, PBB, and mercury. Historical use, regulations, and effects on wildlife area included for each chemical.

Wildlife Toxicology is not a source of reference data for use in specific ecological assessments. However, the author's coherent and comprehensive synthesis of research performed in the field of wildlife toxicology covers many issues of critical importance to ecological risk assessment.

* * *

McCarthy, J.F., and L.R. Shugai (eds.). 1990. *Biomarkers of Environmental Contamination.* Lewis Publishers, Inc.,' Boca Raton, FL. Available from: CRC Press, Inc., 2000 Corporate Blvd., N.W., Boca Raton, FL 33431. 457 pp.

Biomarkers of Environmental Contamination provides a detailed synthesis of the most current approaches to biological monitoring of environmental contamination. The text comprises specific examples of the use of biomarkers as indicators of exposure or as a means to predict adverse consequences of exposure.

Chapter topics include anatomical and cytological endpoints, detoxification, adaptive and immunological responses, and genotoxic responses. Of greatest applicability to the issue of environmental risk assessment, the text concludes with a series of chapters pertaining to the application of biomarkers in field evaluation. This last section presents research addressing both specific and general aspects of the use of biomarkers in environmental risk assessment. A chapter by W.R. Lower and R.J. Kendall explores the use of sentinel species and sentinel bioassays in assessing environmental risk under a variety of circumstances. Other chapters evaluate biomarkers used to assess the health of fish populations, or the effects of exposure of marine organisms to contaminant stress. In addition, a brief chapter by Glenn W. Suter II examines more genera' issues involved in the use of biomarkers in ecological risk assessment.

In the final chapter, J.F. McCarthy discusses the editor's proposal for the development of a biomarker-based environmental monitoring program. McCarthy emphasizes the need for preliminary research to generate a database to validate biomarkers and expand current scientific understanding such that biomarker responses can be interpreted to their full extent.

Through the compilation of research from many specialists from a wide range of technical fields, the editors present a comprehensive evaluation of the use of biomarkers in assessing and predicting the ecological and health risks of environmental contamination. In many cases the examples provided are too pecific to be directly applicable in particular assessments; however, the book is a useful resource to risk assessors in that it imparts an awareness of the wide array of possibilities and applications involved in the use of biomarkers.

Articles

The following titles were found in recent issues of *Current Advances in Ecological and Environmental Science.*

Aquatic Toxicology

Thompson, P.A. and P. Couture. 1991. Short-term and long-term changes in growth and biochemical composition of *Selenastrum capricornutum* populations exposed to cadmium. 21(2-4):135-1144.

Winner, R.W. and H.A. Owen. 1991. Toxicity of copper to *Chlamydomonas reinhardtii* (Chlorophyceae) and *Ceriodaphnia dubia* (Crustacea) in relation to changes in water chemistry of a freshwater pond. 21(3-4)157-170.

Moore, D.W., T.M. Dillon, and B.C. Suedel. 1991. Chronic toxicity of tributyltin to the marine polychaete worm, *Neanthes arenaceodentata.* 21(3-4):181-198.

Walker, M.K. and R.E. Peterson. 1991. Potencies of polychlorinated dibenzo-para-dioxin, dibenzofuran, and biphenyl congeners, relative to 2,3,7,8-tetrachlorodibenzo-para dioxin, for producing early life stage mortality in rainbow trout *(Oncorhynchus mykiss).* 21(3-4):219-238.

Diamond, J.M., E.L. Winchester, D.G. Mackler, W. J. Rasnake, J.K. Fanelli, and D. Gruber. 1992. Toxicity of cobalt to freshwater indicator species as a function of water hardness. 22(3):163-180.

Hall, L.W., M.C. Ziegenfuss, S.J. Bushong, J.A. Sullivan, and M.A. Unger. 1992. *In situ* striped bass *(Morone saxatilis)* contaminant and water quality studies in the Potomac River and Upper Chesapeake Bay in 1989. 22(3):181-222.

Environmental Pollution

Fitzpatrick, L.C., R. Sassani, B.J. Venabies, and A.J. Goven. 1992. Comparative toxicity of polychlorinated biphenyls to earthworms *Eisenia foetida* and *Lumbricus terrestris.* 77(1):65-69.

Environmental Toxicology and Chemistry

Memmer, M.J., D.P. Middaugh, and V. Comparetta. 1992. Comparative acute sensitivity of larval topsmelt *Atherinops affinis,* and inland silverside, *Menidia beryllina,* to 11 chemicals. 11(3):401-408.

Diamond, J.M.. E.L. Winchester, D.G. Mackler, and D. Gruber. 1992. Use of the mayfly *Stenonema modestum* (Heptageniidae) in subacute toxicity assessments. 11(3):415-425.

Stewart, A.J., G.J. Haynes, and M.I. Martinez. 1992. Fate and biological effects of contaminated vegetation in a Tennessee stream. 11(5):653-664.

Nebeker, A.V., W.L. Griffis, T.W. Stutzman, G.S. Schuytema, L.A. Carey, and S.M. Scherer. 1992. Effects of aqueous and dietary exposure of dieldrin on survival, growth, and bioconcentration in mallard ducklings. 11(5):687-699.

Water Environment Resources

Arbuckle, W.B., and J.E. Alleman. 1992. Effluent toxicity testing using nitrifers and Microtox. 64(3):263-267.

BTAG Forum Questionnaire

In order to better serve our readership, we need to know what you would like to see in upcoming issues of the *Forum*. The *Forum* is intended to generate dialogue among BTAG members, support contractors, and others involved in the ecological assessment process. Without your input, the *Forum* will be limited in serving its intended purpose. Please take a moment to answer the following questions.

1. What feature(s) do you find the most useful? (Circle all that apply)

a) News from the Regions
b) News from ORD
c) Feature articles
d) Announcements of upcoming workshops/seminars
e) Book Reviews
f) Listing of articles from *Current Contents*
g) BTAG Coordinator/Contact Listing

2. What improvement(s) could be made to existing features?

3. What features would you like to see added in future issues?

4. What features would you prefer to see discontinued?

5. Do you subscribe to any publications with articles that may warrant re-printing or summarizing in the *Forum?* Please provide the name of the publication and a brief description of its content.

6. List any recent books (title, author, publisher, year of publication) that you would like to see reviewed.

OPTIONAL — Name: Phone:

Please return questionnaire to: Susan S. Roddy, USEPA Region 6, First Interstate Tower, 1445 Ross Avenue, Dallas, TX, 75202-2733.

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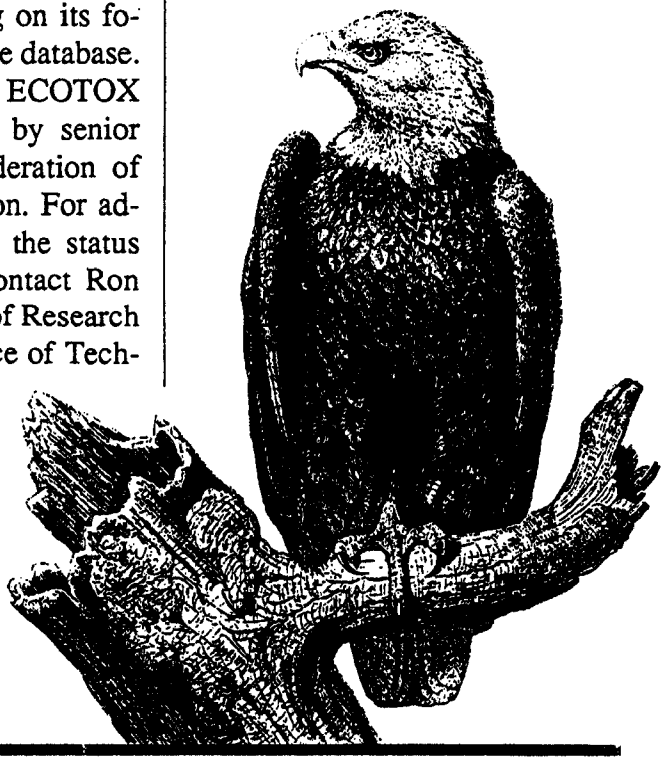
EPA Database Compilation Moves Ahead

An EPA pilot for the ECOTOX database is currently underway as a collaborative effort among ORD, Superfund, RCRA and the Office of Water. ECOTOX, the result of a compilation of ERL's AQUIRE, and ORD's PHYTOTOX and TERRE-TOX databases, is designed to increase the efficiency with which toxicity testing data are obtained. By formatting the three databases into a single compatible system, ECOTOX allows access to these databases simultaneously. Data searches can include all three databases or, depending on its focus, be limited to a single database. Upon completion, the ECOTOX pilot will be reviewed by senior management for consideration of full-scale implementation. For additional information on the status of ECOTOX, please contact Ron Landy, USEPA Office of Research and Development, Office of Technology Transfer and Regulatory Support, (202) 260-7667. □



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