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EPA BTAG Forum

Office of Emergency and Remedial Response
Hazardous Site Evaluation Division (5204G)

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Highlights of the 9th Annual RRAC/ 6th Annual SEEW

During the week of April 25, EPA Region 1 hosted concurrent sessions of the Regional Risk Assessors Conference (RRAC) and the Superfund Environmental Evaluation Workshop (SEEW). An estimated 180 persons attended the event, featuring speakers from the regions and headquarters as well as from USFWS, NOAA, DOE, and DOD. Below are highlights from both sessions compiled by Bruce Duncan, Region 10 BTAG Coordinator.

The first half of the week was devoted to RRAC, including joint sessions as well as separate ecological risk and human health sessions. Watershed Protection provided the focus for the first ecological session, consisting of three case studies and followed by a presentation of Region 1's resource protection strategy. The case studies (Waquoit Bay Estuary, MA; Big Darby Creek, OH; and Snake River, ID) will be interesting to follow, especially in regard to how watershed evaluation and protection methods are developed. Key points raised were how to determine assessment and measurement endpoints, whether studies should be keyed to research or decision-making, and how goals are set and how to determine whether goals have been met.

The "Technical Issues" session provided a "grab bag" of several timely issues. Topics included the effect of compounds with estrogenic properties on reptiles, guidance on evaluating sediment bioaccumulation, the use of GIS in evaluating wetlands (it was clear from this talk that GIS is a useful tool, but requires more wetland-specific data such as on-site rating of wetland function, rather than inferential data such as proximity to industry), and a discussion on lead toxicity to loons. The latter presentation serves as a reminder that "classic" issues of wildlife exposure and effects are still with us. Derivation of wildlife toxicity values is a concern for most eco-risk assessors and many of the issues raised will be discussed for some time to come (e.g., LOAELs versus extrapolation from the dose-response curve). An oft-repeated request is the need for a toxicity-based method for evaluating tissue residues. It was announced that the new *Wildlife Exposure Factors Handbook* is now available.

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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 Susan Roddy, BTAG Forum, USEPA Region 6 (6H-SR), First Interstate Tower, 1445 Ross Avenue, Dallas, TX 75202-2733 or telefaxed to (214) 665-6762.

Deadline for next issue:

24 SEPTEMBER 1994

Highlights of the 9th Annual RRAC/6th Annual SEEW

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A session entitled "Update on Guidance, Criteria, and Training" presented the latest developments from EPA. ERT's Dave Charters spoke of the ecological risk assessment process guidance currently being prepared within the Emergency Response Division of OERR in cooperation with the Hazardous Site Evaluation Division. The guidance is slated to be finished by the end of FY94. Following a presentation of "What's New in Ecological Risk," Anne Sergeant of EPA's ORD asked what folks in the regions would like from headquarters. Responses ranged from guidance on what is ecologically significant to development of future ecological use scenarios. During the joint wrap-up session, much discussion focused on what RRAC should have as a constituency and what groups it should try to meet with; these issues, however, remain unresolved.

The SEEW portion of the week consisted of three major sessions, "Range of Methodologies and Tricks of the Trade," "Ecological Risk Assessment at Federal Facilities," and "What to Protect?" The first session, "Range of Methodologies," began with a review of the upcoming Superfund guidance manual. Key points include the screening step (can a site be screened out?) and the required decision points where scientists and managers meet and document their decisions. Some issues raised were (1) What does a LOAEL represent if used during the screening step? and (2) How will the guidance fit with the Superfund Accelerated Clean-up Model (SACM)?

One of the more important points in the discussion of hazard indices concerned the issue of additivity or considering contaminants simultaneously. Monte Carlo analysis, while totally dependent on the quality of assumptions and data that are used, has the potential to compare the importance of each parameter (sensitivity analysis), incorporate uncertainty and variability, and provide output in terms of a distribution versus a single value. It was stressed that uncertainty and variability must be distinguished to allow for proper interpretation of the simulation results.

The ongoing headquarters effort at developing screening benchmark/threshold ecotoxicity levels will be based on a wide variety of possible approaches. For example, in producing threshold values for water column contaminants, approaches could range from using AWQC to lowest chronic values. A contaminant list has been developed based on feedback and prioritization by regional BTAGs. Open issues include what constitutes sufficient data (e.g., for a lowest chronic value) and which terrestrial species should be evaluated. Method selection is slated for late July.

Many issues were raised during the presentation entitled "Why Are We Doing Ecological Risk Assessments?" including the connectedness of human health and ecological health, place-based approaches versus programs, why things are valuable, renewable resources, what should be protected, trade-offs, uncertainty, and communication.

In the case study (a plating facility), evaluation of soil contamination involved bioaccumulation studies of metal uptake by earthworms in lab and field tests and by vegetation in the lab. Additional food web pathways into small mammals and frogs were investigated.

A panel discussion on ecological risk assessment concluded the day's sessions. The panel, which included representatives from state environmental agencies, EPA regions and headquarters, and NOAA, discussed issues such as improving the consistency of ERAs through early BTAG involvement and how quantitative an ERA

needs to be if remediation is occurring based on human health.

Region 3's approach to developing ERAs relies on media and habitat. Since it is generally known which chemicals are of concern and where they are in the ecosystem, the focus is on species susceptibility in determining what is significant in selecting assessment endpoints.

An introduction to the base closure process (policy, fast-track, land use, restrictions, etc.) kicked off the session on "ERAs at Federal Facilities." Other issues focused on comparisons between base closure and non-base closure sites (with a plea to develop a list of issues raised by EPA and federal facilities). Use of a watershed approach to evaluate cumulative impacts from sub-units was discussed. Speakers acknowledged that (1) a site-wide integration would be necessary for terrestrial species that "integrate" above the watershed level, and (2) the watershed approach should affect the selection of assessment and measurement endpoints. A case study approach was discussed regarding the development of background reference and concentration estimates. Background concentrations were considered to be on base, but outside the area of concern. Also discussed were the use of detection limits, screening against threshold benchmark values, developing distributions, identifying outliers, and influence of soil types. Case studies of DOE and DOD sites at Hanford, WA and Rocky Mountain Arsenal, CO were presented.

The follow-up panel discussion provided suggestions, the first of which involves the role of research at federal facilities. Currently, DOD is required to conduct some research, but resistance is high to conduct more in-depth research. Ordnance removal is a widespread issue and removal techniques need further development. The second suggestion concerns timelines. The phasing of ERAs becomes problematic when there is no money or time for more than one phase. In general, document review periods are too short.

For the session on "What to Protect," Larry Reed, Director of EPA/OERR's Hazardous Site Evaluation Division, presented the keynote. He explained how ERAs have changed recently with increased visibility, the "Edgewater consensus" (moving to place-specific versus program-specific ERA), ecosystem protection across programs, and movement beyond human health (e.g., HRS rankings). He also acknowledged resource issues (burden on BTAGs, rapid-track base closures, increased ERAs for RCRA, etc.), and gave the latest news on Superfund reauthorization including issues about what should be included in the *Federal Register*.

Other presentations in the session discussed what to protect and the process of determining assessment endpoints. Included were two "straw" suggestions for determining endpoints. The first was that the objective of "what to protect" is to have self-sustaining ecosystems; the second was that an adverse level is a >20% reduction in a population of concern. The suggestions provoked strong discussion about endpoints, whether we can select them and whether we can make the measurements we want or need. Differing opinions were expressed including (a) that although we have the tools, they must be applied on a site-specific basis; and (b) that species life history strategies determine significance. Other topic presentations in this session included a summary of different habitat evaluation methods, an introduction to wetland issues, endangered species issues, and a case study of the Eagle Harbor (WA) site. The wetland presentation discussed the availability of EPA guidance on wetlands at Superfund sites. The general difficulty in trying to restore wetland function also was discussed. The issue was raised whether there is policy to mitigate for ditches that have become "wetlands" but will be remediated. The endangered species discussion focused on the role of EPA and BTAGs in regards to the Endangered Species Coordinating Committee. Also discussed were such questions as: "What is enough protection?," "How do you protect endangered species?," and "Are semiqualitative or qualitative assessments adequate?". The session ended with a presentation of a the Eagle Harbor case study. This is a subtidal site contaminated with creosote. NOAA has been able to link PAH exposure to biomarkers and to reproductive disfunction as well as to tumors and lesions. NOAA also has estimated a half-life for these effects upon removal of the exposure and is evaluating changes in biomarkers and other effects in bottom fish following the capping of contaminated sediments. A key point is the linkage between biomarkers and population-level endpoints.

The panel discussion at the end of the session discussed wetland remediation and balancing loss of wetland function and values due to contamination with recovery following remediation. Also discussed was the balancing of a wetland as an attractive nuisance versus remediation that is worse than leaving the contamination in place. Some things to consider are the uniqueness of the wetland, cleaning up to the future use (i.e., is the wetland scheduled to be developed?), whether it is appropriate to classify a contaminated wetland as high quality if that is the justification for no removal/capping, and recovery rates. There remains a great need for guidance on what is significant with respect to wetlands.

The week ended with a meeting of the regional BTAGs, HQ, and other EPA personnel. The meeting served a three-fold purpose: it provided a forum to raise issues, allowed discussion to determine what participants want from future workshops, and brought a collaborative focus to the question "What is significant?" □

Agency Updates — NOAA

Aquatic Ecological Risk at the Metal Bank

The Metal Bank of America site, located on the Delaware River in Philadelphia, PA, is the site of a former transformer salvage operation. Transformer activities occurred at the site from 1968 to 1973 and PCB-contaminated oil was stored in an underground storage tank. It is estimated that between 44,000 and 175,000 liters of PCB-contaminated oil infiltrated ground water beneath the site. Approximately 16,000 liters have since been retrieved from ground water. The Delaware River is a freshwater tidal system providing year round and seasonal habitat for numerous species of anadromous, catadromous, estuarine, and freshwater fish as well as migratory water fowl and shore birds. NOAA has recently completed an aquatic ecological risk assessment report for the Metal Bank site in support of EPA Region 3. This report utilized data collected mostly for other purposes by the Metal Bank/Cottman Avenue PRP group.

Aquatic receptors considered in the assessment include the shortnose sturgeon (a Federal and state listed endangered species), channel catfish, silvery minnow, white perch, and Asiatic clam (as a representative benthic invertebrate). PCBs are the primary contaminant of concern at the site. Other contaminants—PAHs, phthalates, cadmium, and DDT compounds, were detected primarily in sediment. The exposure pathways considered included exposure to surface water and sediments. Exposure point concentrations for surface waters were estimated using concentrations in ground-water seeps and from dilution factors calculated using a 15-meter dilution zone and river flow volumes for average and low-flow conditions. Concentrations in non-aqueous phase layer seeps were estimated from concentrations of PCBs, PAHs, and phthalates from one recent monitoring well sample and historic concentrations of PCBs from wells at the site. Sediment concentrations of PCBs, PAHs, and bis(2-ethylhexyl) phthalate decreased with distance from the site, and three exposure zones were delineated for risk characterization. PCB concentrations were determined in tissues of clams, silvery minnow, and channel catfish sampled from areas adjacent to the site.

Toxicity reference values were selected from the available literature for exposure to surface water and sediment. A safety factor of 100 was applied to water toxicity reference values for sturgeon due to its endangered status (and the resulting need to protect individual fish and not just the population) and the limited availability of chronic toxicity data. Toxicity reference values were derived from the literature showing associations between tissue residue concentrations of PCBs and adverse effects in fish. Toxicity reference values for tissue residues included the tenth percentile of the lowest observed effects levels (0.2 mg/kg wet weight) and the median effects level (7 mg/kg wet weight). The median effects were selected in order to maintain consistency with the use of ER-M, and because of the incredible range in high and low data values.

The risk characterizations were based on the toxicity quotient approach, using exposure point concentrations for each medium and toxicity reference values. For surface water, only PCBs were considered a contaminant of concern. It was considered unlikely that individual shortnose sturgeon would remain in the exposure area long enough to receive chronic exposure. However, tissue residues in channel catfish and silvery minnows from the Delaware River adjacent to the site suggest the possibility of reproductive effects in these species. Channel catfish was used as a surrogate for estimating tissue residues in shortnose sturgeon as it, too, is a benthic feeder. The potential risk to sturgeon resulting from PCB accumulation from all exposure pathways near the site may be greater than for other fish species because of life history differences (sturgeon remain in river systems for the first seven years of life and, on average, live longer than other fish). The primary routes for benthic invertebrates' exposure to contaminants are through sediments and interstitial water. Hazard quotients for PCBs and benthic invertebrates exceeded 1 (range 5-400) in all three risk characterization zones. No spatial pattern was observed for DDT (HQ range 15-131), DDD (HQ range 7-84), DDE (HQ range 5-76) and cadmium (HQ range 7.6-144) based on limited sampling. Samples with detectable concentrations in sediments exceeded probable effects levels (ER-M or high AET values by about an order of magnitude). Questions about NOAA's risk assessment of the Metal Bank site can be addressed to Don MacDonald in Seattle (206)526-6271. □

EPA Regions

Region 6

Winter and spring have proven to be busy for Region 6 as numerous sites are in process. An Administrative Order on Consent for the RI/FS was negotiated (with trustee input) and signed with PRPs for a Superfund site at a Texas Bay site contaminated with mercury. The AOC allows the PRPs to conduct an ecological risk assessment (with EPA oversight). A workplan for

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EPA's Wildlife Exposure Factors Handbook

The *Wildlife Exposure Factors Handbook* is a compendium of data and references for conducting exposure and risk assessments for wildlife species exposed to toxic chemicals in their environment. The *Handbook* will (1) promote the application of risk assessment methods to wildlife species, (2) foster a consistent approach to wildlife risk assessments, and (3) increase the accessibility of the literature applicable to these assessments.

The purpose of the *Handbook* is to provide a convenient source of information and an analytic framework to facilitate screening-level risk assessments for common wildlife species. These screening-level risk assessments may be used to (1) support site-specific decisions (e.g., for hazardous waste sites), (2) support the development of water quality or other media-specific criteria for limiting environmental levels of toxic substances to protect wildlife species, or (3) focus research and monitoring efforts.

The *Handbook* primarily summarizes values for parameters useful for the exposure assessment component of risk assessment. In addition, data provided in the *Handbook* on population parameters (e.g., birth and death rates) may be useful for placing estimates of risks in a broader ecological context. Values and extrapolation methods required for the toxicity assessment component are not covered in this *Handbook.* In addition, no chemical-specific parameters (e.g., bioavailability factors) are provided.

This *Handbook* focuses on a selected group of mammals, birds, amphibians, and reptiles. Fish and aquatic or terrestrial invertebrates were not included in the current effort. There is no intention to imply that risk assessments for wildlife should be restricted to the species described in the *Handbook*, or that risk assessments for wildlife should always be conducted for these species. In addition, the species included in the *Handbook* have broad geographic ranges, and the parameter values presented may not be representative for all parts of their ranges.

The *Handbook* includes five sections. Section 1 provides an overview of the *Handbook.* Section 2 presents values for the exposure factors for the selected species and brief descriptions of relevant aspects of their natural history.

Species Included In EPA's Wildlife Exposure Factors *Handbook*

Birds	Mammals	Reptiles and Amphibians
Great Blue Heron	Short-tailed shrew	Snapping Turtle
Canada Goose	Red Fox	Painted Turtle
Mallard	Raccoon	Eastern Box Turtle
Lesser Scaup	Mink	Racer Snake
Osprey	River Otter	Water Snake
Red-tailed Hawk	Harbor Seal	Eastern Newt
Bald Eagle	Deer Mouse	Green Frog
American Kestrel	Prairie Vole	Bullfrog
Northern Bobwhite	Meadow Vole	
American Woodcock	Muskrat	
Spotted Sandpiper	Eastern Cottontail	
Herring Gull		
Belted Kingfisher		
Marsh Wren		
American Robin		

Contents of Section 2: Species Profiles

For 34 Selected Species:

- Description of natural history
- List of similar species
- Table of exposure factor values
- Selected bibliography

The summary for each species includes an introduction to the general taxonomic group, a qualitative description of the species, tabulated values for the exposure factors, a list of similar species, and a selected bibliography for that species. Section 3 provides allometric models that may be used to estimate various exposure factors on the basis of body size. Section 3 also provides equations for estimating food ingestion rates on the basis of metabolic rate and diet.

Contents of Section 3: Allometric Equations

- Food ingestion rates
- Water intake rates
- Inhalation rates
- Surface areas
- Metabolic rates

Section 4 provides recommendations on how to estimate exposure of wildlife species. Section 4 also discusses available information on soil and sediment ingestion by wildlife species.

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Contents of Section 4: Exposure Equations

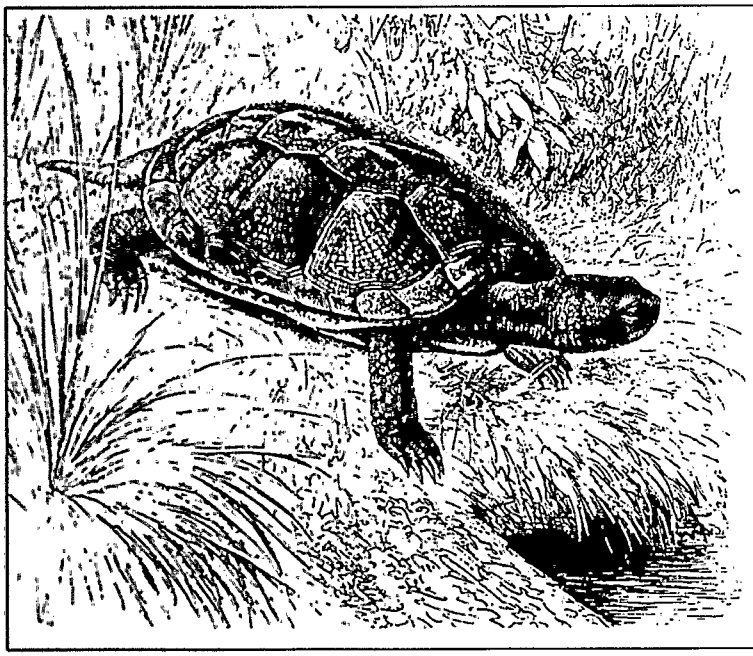
- General exposure equations
  - Drinking water
  - Diet
  - Soil and sediment ingestion
  - Air
  - Dermal exposure
- Caloric and water content of various diets
- Analysis of uncertainty

The *Handbook* includes an appendix that presents all of the parameter values identified in the literature survey, with more details concerning sample size, methods, and qualifying information than listed in the main *Handbook*.

For further information on the *Handbook*, contact Susan Braen Norton, Project Manager, EPA/ORD/OHEA (202)260-6955. The *Handbook* was prepared for EPA by Dr. Margaret E. McVay of ICF Incorporated, Fairfax, VA (703)934-3136. The two volume *Handbook* is available from the Center for Environmental Research Information in Cincinnati at (513) 569-7562, publication numbers EPA/600/R-93/187a and EPA/600/R-93/187b. □

Exposure Factors Included In The Handbook

Normalizing & Contact Rate Factors	Dietary Composition	Population Dynamics e.g.,	Timing of Seasonal Activities e.g.,
body weight	by season:	home range size	mating
metabolic rate	spring	population density	nesting/egglaying
surface area	summer	litter/clutch size	parturition/hatching
water ingestion rate	fall	litters/clutches/yr	hibernation
inhalation rate	winter	growth rates	dispersal
food ingestion rate	by habitat/location	annual mortality	migration



Information & Inquiries

Do you have any suggestions for articles, book reviews, or a need for general information? The Forum staff welcomes your suggestions and submissions of articles and book or journal article reviews. If you've come across a noteworthy piece and feel other readers would find it of interest, please contact Susan Roddy, Forum Editor, EPA Region 6 (6H-SR), 1445 Ross Avenue, Dallas, TX 75202-2733 or call 214-655-8518.

Reviews

Ecological Assessment of Hazardous Waste Sites, James T. Maughan. Van Nostrand Reinhold, 1993. 352 p.

The major focus of this text is the need to integrate ecological investigations, concerns, and input into every stage of the hazardous waste cleanup process. Maughan begins with a preface and brief introductory chapter in which he presents the key terms and concepts regarding hazardous waste sites and ecological assessment. The two main ecological issues Maughan wishes to address are attention to critical ecological resources and regulations during site investigations, and the integration of ecology as a science into the remediation of site contamination.

Following the introduction is a chapter on ecological assessment needs and objectives. Presented here are the potential impacts associated with a hazardous waste site and remediation activities and the real need of ecological assessments as required by law and enforced by regulators. A significant section is devoted to the regulatory perspective covering TSCA, FIFRA, and RCRA as well as CERCLA and its 1988 SARA amendments. Also discussed is the role of ARARs such as the Clean Water Act and Endangered Species Act.

One chapter details the elements of an ecological assessment including preliminary site description, selection of endpoints, establishment of work plan, planning of field investigations, bioassay work, identification of hazards, exposure and toxicity assessments, risk and ecological effects levels, evaluating remedial alternatives, site restoration plans, etc. A single chapter is devoted to the role of human health risk assessments and includes discussion of regulatory authority and guidance as well as a summary of the elements involved in a baseline human risk assessment.

Attention is paid to the biological transfer of contaminants in terrestrial ecosystems including discussion of transfer dynamics, transfer pathway analysis, and sample calculations of effects levels. Other chapters focus on the evaluation of contaminants in sediments and ecotoxicology and the role it plays in ecological assessments at hazardous waste sites.

Maughan closes by presenting two case studies, Pine Street Canal and Middle Marsh. These Region 1 sites focus on the ecological assessment of hazardous waste impacts on freshwater habitats. Both studies are adequately detailed and complement the preceding chapters. The selection of a case study from a terrestrial or estuarine/marine site located in another region would have provided a broader perspective of how ERAs are conducted at hazardous waste sites.

The text's strength includes (1) its excellent discussion of why eco-assessments should be conducted including overall assessment needs and objectives, (2) its firm grasp of Superfund and how ERAs fit into CERCLA guidelines, and (3) its thorough coverage of ARARs.

On the other hand, the author does not seem to understand the relationship between EPA and natural resource trustees (NRTs), nor the difference between ecological risk assessments (ERAs) and natural resource damage assessments (NRDAs). He incorrectly implies that consultation with BTAGs is equivalent to coordination with NRTs. CERCLA and the National Contingency Plan have specific requirements concerning notification of, and coordination with, NRTs. Notification and coordination can be *facilitated* by BTAG consultation, but they are separate activities needing their own documentation. Similarly, Maughan implies too strong a link between ERAs and NRDAs. While much of the data collected for an ERA can be useful in conducting the NRDA, the two are entirely separate functions with very different objectives. He further confuses the two by using the term "damage" rather than "injury" to describe adverse effects. In the NRDA context, "damage" specifically refers to the monetary value of an injured resource. While it may be unfortunate for the uninitiated reader that such nuances exist, they can be important in communicating among knowledgeable participants in the CERCLA process.

This reviewer noted many typographical, grammatical, and usage errors throughout the text, indicative of a hurried editorial job. Their presence somewhat diminishes the professionalism of the book.

The text includes numerous tables, figures, formulas, and equations as well as extensive bibliographic references. An appendix of scientific names of the flora and fauna is included in the text as is an index. Maughan is joined by six contributing authors, who collectively are responsible for five of the book's ten chapters, including the two case studies. This collaboration strengthens the text as ecological risk experts present topics within their area of expertise.

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Framework for Ecological Risk Assessment: Upper Clark Fork River Basin. Prepared by ARCO (Anaconda, MT) with the assistance of environmental contractors, September 1992.

The Upper Clark Fork River Basin (UCFRB) in southwestern Montana contains a complex of Superfund sites covering approximately 500 square miles and comprising 26 operable units. As part of the process of preparing RI/FSs for these sites, ARCO and a team of contractors prepared a framework document outlining how ERAs should be conducted and how these risk assessments fit into the overall remedial decision-making process. Al-

though the document is intended specifically to guide studies for the UCFRB sites (primarily mining sites with metals contamination), it also has value as a generic description of ERA in the Superfund context.

The UCFRB Framework uses some of the same thinking as the EPA Risk Assessment Forum's *Framework for Ecological Risk Assessment*, and draws on guidance and other documents from Superfund. At the same time, it is more focused than those sources in that it lays out a clear process for conducting real-world ERAs. In particular, the UCFRB Framework emphasizes the development of preliminary remedial action objectives (PRAOs) and preliminary remedial action goals (PRAGs) as part of the process of planning ERAs. PRAOs are "general descriptions of what remedial actions should accomplish" (for example, "protection of important natural resources"). PRAGs are "medium-specific chemical concentrations that are protective of human health and the environment." As the ERA proceeds and more information is available, these objectives and goals are refined from preliminary to final RAOs and RAGs that become part of a risk management plan.

The document also discusses use of conceptual models in ERA planning, selection of ecological assessment techniques (e.g., chemical analysis, toxicity testing, community analysis, exposure models, and ecological models), and a tiered approach to ERA. It offers clear descriptions of approaches to assess exposure and toxicity, and an excellent explanation of the use of joint probability analysis for risk characterization. Especially useful is a chapter on use of ERA results in remedial action decision making. This chapter focuses on development of PRAOs and PRAGs, development and screening of remedial alternatives, and comparative risk analysis.

The final chapter presents a very simplified example ERA of a hypothetical site with metals contamination and potential exposure to a few terrestrial species. The example is almost too simplified, especially since there are no surface-water or riparian habitats on the site. Nonetheless, it does a good job of illustrating some of the basic principles and approaches so that a novice reader can begin to see how the various pieces of the ERA fit together.

In only 61 pages of text (plus bibliography and glossary), the UCFRB Framework provides a brief, but clear and concise description of the ERA process and, most important, of the decision-making context in which ERA takes place.

ARCO has a limited supply of this document; copies can be requested from:

Gene Mancini
ARCO
515 South Flower Street
Los Angeles, CA 90071

Book Announcements

Bacci, E. 1993. *Ecotoxicology of Organic Contaminants*. 176 p. CRC Press.

Davis, S.M. and J.C. Ogden. 1994. *Everglades: The Ecosystem and its Restoration*. 848 p. St. Lucie Press.

Fossi, M.C. and C. Leonzio. 1993. *Nondestructive Biomarkers in Vertebrates*. 368 p. Lewis Publishers.

Landis, W.G. and M.H. Yu. 1993. *Introduction to Environmental Toxicology: Impacts of Chemicals upon Ecological Systems*. 400 p. Lewis Publishers.

Woodley, S., G. Francis, and J. Kay. 1993. *Ecological Integrity and the Management of Ecosystems*. 224 p. St. Lucie Press.

Articles of Interest

Archives of Environmental Contamination and Toxicology

Nebeker, A.V., K.D. Dunn, W.L. Griffis, and G.S. Schuytema. 1994. Effects of dieldrin in food on growth and bioaccumulation in mallard ducklings. 26(1):29-32.

Weis, J.S. and P. Weis. 1994. Effects of contaminants from chromated copper arsenate-treated lumber on benthos. 26(1):103-109.

Postma, J.F., M.C. Buckertdejong, N. Staats, and C. Davids. 1994. Chronic toxicity of cadmium to *Chironomus riparius* (Diptera, Chrionomidae) at different food levels. 26(2):143-148.

Visviki, I. and J.W. Rachlin. 1994. Acute and chronic exposure of *Dunaliella salina* and *Chlamydomonas bullosa* to copper and cadmium — Effects on growth. 1994. 26(2):149-153.

Bulletin of Environmental Contamination and Toxicology

Constable, M. and P. Orr. 1994. Lethal and sub-lethal toxicity of lindane to *Pimephales promelas*. 52(2):298-304.

Keller, A.E. 1993. Acute toxicity of several pesticides, organic compounds, and a wastewater effluent to the freshwater mussel, *Anodonta imbecillis*, *Ceriodaphnia dubia*, and *Pimephales promelas*. 51(5):696-702.

RESOURCES

Chemosphere

Read, H.J. and M.H. Martin. 1993. The effect of heavy metals on populations of small mammals from woodlands in Avon (England); with particular emphasis on metal concentrations in *Sorex araneus* L. and *Sorex minutus* L. 27(11):2197-2211.

Environmental Review

Outridge, P.M. and A.M. Scheuhammer. 1993. Bioaccumulation and toxicology of nickel: implications for wild mammals and birds [Review]. 1(2):172-197.

Environmental Toxicology and Chemistry

Catallo, W.J. 1993. Ecotoxicology and wetland ecosystems: Current understanding and future needs [Review]. 12(12):2209-2224.

DiPinto, L.M., B.C. Coull, and G.T. Chandler. 1993. Lethal and sublethal effects of the sediment-associated PCB Aroclor 1254 on a meiobenthic copepod. 12(10):1909-1918.

Huber, W. 1993. Ecotoxicological relevance of atrazine in aquatic systems. 12(10):1865-1881.

Norberg-King, T. and S. Schmidt. 1993. Comparison of effluent toxicity results using *Ceriodaphnia dubia* cultured on several diets. 12(10)1945-1955.

Paine, J.M., M.J. McKee, and M.E. Ryan. 1993. Toxicity of bioaccumulation of soil PCBs in crickets: comparison of laboratory and field studies. 12(11):2097-2103.

Pascoe, G.A. 1993. Wetland risk assessment [Review]. 12(12):2293-2307.

Water South Africa (Pretoria)

Roux, D.J., P.L. Kempster, L. van der Merwe. 1993. Effect of cadmium and copper on survival and reproduction of *Daphnia pulex.*

Journal of Hazardous Materials

White, R.K., A. Redfearn, R. Shaw, and A.D. King. 1993. Impacts of the use of institutional controls on risk assessments for U.S. Department of Energy Facilities. 35(3):403-412. □

EPA Regions

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an ERA for a Department of Defense facility received review and comment, as did responses to the comments. This Superfund site's ROD called for an ERA to be conducted in the future. Draft ERAs received review and comment for two other federal facilities. A workplan and sampling/analysis plan for a smelter site underwent review and comment. Although the site is not on the NPL, the PRPs will conduct the ERA and the RI/FS under state supervision. Technical memoranda for a field sampling plan and exposure assessment in support of an ERA received review and comment for a Superfund smelter site that is an environmental justice site. Region 6 is providing technical assistance to state staff for scoping an ERA for a wood-treating site proposed on the NPL. The state will conduct the ERA, but the PRPs will collect the field data. The Superfund program is providing technical assistance to the RCRA program for scoping an ERA for a RCRA facility. Probabilistic modeling was proposed for the assessment. A workplan and field sampling plan for the ERA is being evaluated for inclusion on the NPL. For this site, removal and the RI/FS are being coordinated to expedite action. □

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 Carole Rose, BTAG Forum, USEPA, 303 Methodist Building, 11th and Chapline Streets, Wheeling, WV 26003.

Correction ☐ New ☐

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_____

_____

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