Bioaccumulation Results and Decision-Making: The Superfund Program

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I have been following sediment issues with Betsy Southerland and other people at EPA for a number of years. During that time I have been involved with a variety of sediment projects, including the Agency's Contaminated Sediment Management Strategy and sediment quality criteria. It has been an interesting experience. What I will try to do for the next several minutes is provide you with a reflection of my experience in working through these issues with the Office of Water and with the EPA Regions.

I am sure that many of you are familiar with the Superfund Program. The Superfund Program is designed to protect both public health and the environment, so we are interested in looking holistically at environmental issues for all media. This means we are concerned with air, water, and soil. In dealing with the environmental issues at Superfund sites, we try to be consistent in our approach to assessment of risks and cleanups. We also seek to be consistent with the activities of other program offices. That is one of the reasons why we look to the Office of Water to provide direction for the type of approaches we should apply for contaminated sediments.

The places where we tend to do some innovative things are generally areas that bridge between different program media. We especially need to consider how to focus between different program media and how to make sure that we are looking at everything in a consistent manner. Coming to the decision about what is actually going to be protective can also be challenging. You have to look at what happens under different programs with different statutes, and it can be difficult to reconcile issues from a technical perspective that have different legislative histories and requirements.

Superfund reauthorization has been a subject of discussion over the last couple of years. One of the most striking points that I have heard expressed at some of the reauthorization meetings is that Superfund is a program that provides significant cleanup leverage for other cleanup programs. We are told that the EPA's efforts complement state efforts and that EPA work is especially useful on some of the larger and more difficult sites.

Superfund reauthorization activities have been going on for several years. Bills have been drafted that did not make it through the political process. We hope to see a reauthorization bill passed in the next year.

What about bioaccumulation data? If we are really seeking to effectively assess risk to public health in the environment, we should be looking at all the available information to assist us in making better decisions. This would include bioaccumulation information, bioavailability data, information on exposure, and information on routes of exposure to either humans or sensitive species. One of the activities that we are encouraged to see moving forward is the work that Mike Kravitz in the Office of Science and Technology is undertaking to assess the different methodologies that exist for measuring bioaccumulation and to build scientific consensus on these methods so they can be used more broadly. Right now, each program is usually faced with having to synthesize that kind of information on a case-by-case basis.

I would like to briefly describe Superfund's hazard ranking system (HRS), which is the primary tool we use to screen sites for placement on the National Priorities List (NPL). The HRS was revised and published as a Federal Register Notice on December 14, 1990. We track the number of sites in the Superfund universe through a database called CERCLIS. Last year, we removed 28,000 sites from CERCLIS, which left about 13,000 sites in the database. As of June, 1997, we have further reduced the number of sites in CERCLIS to 10,735. These steps have helped to identify those sites that need additional assessment and possible cleanup. Within the CERCLIS universe, the NPL represents those sites that are likely to require long-term cleanup efforts. Over 1,200 sites are on the NPL. These sites tend to be complex and costly to clean up and many include sediment contamination. The HRS screening process for these sites relies on readily available information, because we want the process to be cost

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effective in identifying sites that warrant further attention. Sites undergo an in-depth evaluation once they are listed. Bioaccumulation is included in this evalution, but only the surface water exposure pathway is evaluated for humans and other sensitive species.

Under the HRS, three factors are examined for contaminants at a site. We use bioconcentration data to determine whether contaminants accumulate up food chains. We look at water solubility data, particularly the logarithm of the octanol-water partition coefficient K_{ow}, to consider the potential for and consequences of chemical partitioning. We also distinguish between freshwater and saltwater environments and the resulting impacts on the receptors (humans or other sensitive organisms) being evaluated. Since the budget for an HRS evaluation is very limited, the data must be collected over a relatively short period of time.

Risk assessments for Superfund sites involve a longer and more costly process than a HRS evaluation. Depending on the site, a risk assessment can cost a few to several hundred thousand dollars. Human health risk assessments are conducted more frequently than ecological risk assessments. The risk assessment stage involves more extensive data collection and detailed analysis of the data. Results from standard bioassays and other assessment techniques discussed at this conference are used at this stage of analysis. These comprehensive studies are performed at NPL sites and other areas to assess the impact of contaminated materials on humans and other sensitive species.

Finally, I would like to mention a Government Accounting Office (GAO) study that was conducted a couple of years ago. The report included a summary of results that we got on risk information for a number of different pathways. We found it interesting for sediments which drove the cleanup for 14 out of about 200 sites that were evaluated. Traditionally, the Superfund Program has been driven by impacts to ground water. I definitely see some changes that have taken place in scoring sites using the revised HRS, which allows for more equal consideration of risks among all media. We are also trying to be much more comprehensive about evaluating all the potential risks from all the media. Some of the bases for cleanups at Superfund sites include maximum contaminant levels (MCLs), MCL goals, Resource Conservation and Recovery Act (RCRA) risk levels, and state standards. In some instances, state standards are more restrictive than federal criteria. You may end up being more protective in some states than you would be in others because of the differences in state standards. These are all issues that will be debated significantly during reauthorization. The costs and complications of dealing with sediment problems are often significantly more challenging than many of the other media. This is true not only from a risk assessment perspective, but also from the perspective of what to do with the material once you determine that it is a problem.

What is Superfund?

- Protect health and the environment as outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA)
- To be consistent with the legislative direction and the policies of other EPA offices (e.g., the National Air Quality Standard for lead), OSWER lead policy has targeted protection
- Available scientific information to establish protective levels plays a key role in policy formulation
- Superfund complements State cleanup programs and has been reported to provide an incentive for responsible parties to clean up environmental problems
- Superfund is in the process of reauthorization—we hope within the next year

What is Needed to Use Bioaccumulation Data?

- The Superfund Program seeks to effectively assess risks to health and the environment
- Costs and feasibility may preclude some assessments for bioaccumulation or risks
- The expectation is that Superfund will seek to improve risk assessments and the confidence that can be placed in risk assessment results

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How Does the Superfund Program Use Bioaccumulation Data?

- Protect health and the environment as outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA)
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Assessing Bioaccumulation within the Hazard Ranking System

- The Hazard Ranking System (HRS) is a screening tool
- The HRS is the primary tool for supporting the addition of sites to the National Priorities List (NPL)
- The HRS employs readily available information and information that can be collected
- Bioaccumulation is evaluated in the human food chain threat and environmental threats within the Surface Water Pathway

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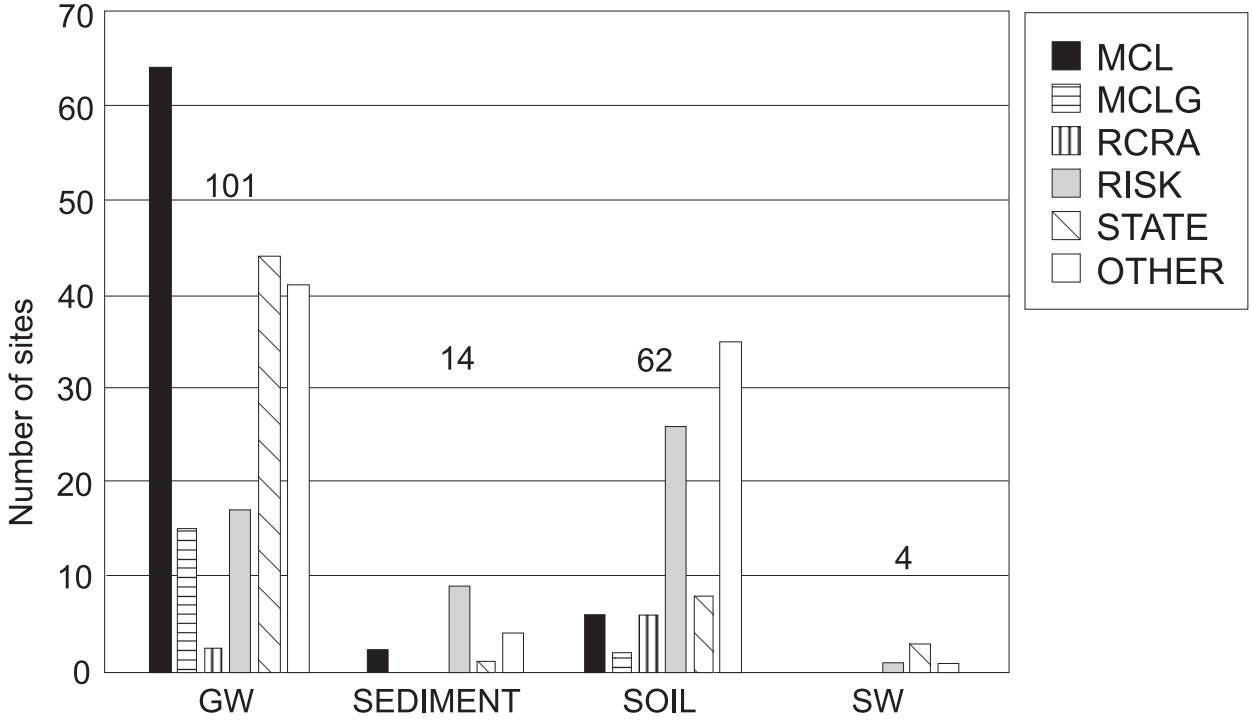
A Tiered System is Used to Determine Bioaccumulation Potential

- Logarithm of the n-octanol-water partition coefficient (log K_{OW})
- Water solubility data
- Direction is provided to distinguish between fresh and salt water

Risk Assessments Provide for a Detailed Examination

- Bioassays and site specific Sediment Quality Criteria are assessed
- The types of standard bioassays employed by others support risk assessments

SUMMARY OF THE BASIS FOR CLEANUP



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