

The Nexus Between Ecological Risk Assessment and Natural Resource Damage Assessment Under CERCLA: Introduction to a Society of Environmental Toxicology and Chemistry Technical Workshop

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EDITOR'S NOTE:

This is 1 of 4 papers reporting on the results of a SETAC technical workshop titled “The Nexus Between Ecological Risk Assessment and Natural Resource Damage Assessment Under CERCLA: Understanding and Improving the Common Scientific Underpinnings,” held 18–22 August 2008 in Montana, USA, to examine approaches to ecological risk assessment and natural resource damage assessment in US contaminated site cleanup legislation known as the Comprehensive Environmental Response, Compensation, and Liability Act.

ABSTRACT

A SETAC Technical Workshop titled “The Nexus Between Ecological Risk Assessment and Natural Resource Damage Assessment Under CERCLA: Understanding and Improving the Common Scientific Underpinnings,” was held 18–22 August 2008 in Gregson, Montana, USA, to examine the linkage, nexus, and overlap between ecological risk assessment (ERA) and natural resource damage assessment (NRDA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Experts from a broad range of relevant scientific, legal, and policy disciplines convened to 1) ascertain the potential for improved scientific harmonization of the processes of ERA and NRDA; 2) identify where statutory, regulatory, or scientific constraints might exist that would constrain or preclude the harmonization of the 2 processes; 3) determine approaches that might overcome these constraints; and 4) recommend research or potential changes in regulatory policies that might serve to improve both processes. This is the introduction to a series of 3 papers that describe the findings and conclusions of this workshop. Although unanimity was not achieved on all technical, legal, or policy questions posed to the participants, some consensus areas did arise. First, there appear to be few if any legal constraints to using the environmental data collected for ERA or NRDA for both processes. Second, although it is important to recognize and preserve the distinctions between ERA and NRDA, opportunities for data sharing exist, particularly for the characterization of environmental exposures and derivation of ecotoxicological information. Thus, effective coordination is not precluded by the underlying science. Where a cooperative, interactive process is involved among the response agencies, the natural resource trustees, and the responsible party(s), technical, legal or regulatory constraints can be minimized. Finally, one approach that might enhance the potential applicability of data collected for the ERA is to consider ecosystem services in the development of assessment endpoints. These points are explained in greater detail in the series of papers published herein.

Keywords: Ecological risk assessment Natural resource damage assessment Workshop SETAC

BACKGROUND

Within the United States, increasing attention has been directed at assessing and remediating legacy contamination at sites under the Comprehensive Environmental Response,

Compensation and Liability Act (CERCLA). The scale of activities at these large, more complex sites has also grown, particularly in the context of ecological risk assessments (ERAs) and natural resource damage assessments (NRDAs). More often than not, these 2 types of assessments (ERA and NRDA) are undertaken over multiple years, involving scientists, engineers, and others from numerous affiliations, and frequently require substantial levels of funding. This, in turn, has highlighted the increased need for scientifically

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sound, cost-effective approaches that maximize the applicability of the diverse physical, chemical, biological, and toxicological data for multiple decision purposes—whether for the ERA or the NRDA.

To some, there is overlap between the collection and use of data for the ERA and NRDA. Yet practitioners of ERA and NRDA continue to detect a real or perceived demarcation between the use of and need for data in the processes of ERA and NRDA at CERCLA sites. The question often becomes whether the physical, chemical, and biological data are applicable for both processes. If the answer is the data are not applicable for both purposes, then one tends to question whether that decision was made on a legal or technical basis.

To our knowledge, this important question has not been addressed in any scientific forum, despite the belief that there are clear linkages and overlaps between the processes of ERA and NRDA at CERCLA sites (Barnhouse and Stahl 2002). The need for such an evaluation has been illustrated recently in a Department of the Interior Federal Advisory Committee (FACA) report that highlighted the issues and potential actions that might be needed to improve the NRDA process nationally (US Department of Interior 2007). It was recognized by the FACA and presented in the final report that coordination and even integration between the ecological risk assessment process (conducted as part of the remedial investigation/feasibility study, and which could provide information on transport and fate of contaminants and exposure information) and NRDA might be desirable. Coordination between the ERA and NRDA would also prevent a situation in which a site clean-up would create more damage than leaving the contamination in place. Our workshop addressed this issue of coordination as part of the Synthesis Work Group charge (Gala et al. 2009), and it was discussed broadly by all participants during opening plenary sessions.

As noted above, it is generally recognized that much of the field and laboratory data collected for ERAs and NRDA at contaminated sites are similar, even though the ultimate interpretation and use of those data might differ (Barnhouse and Stahl 2002). The purpose of an ERA at a CERCLA site is to help estimate potential ecological risks on the basis of exposure to chemical contamination (USEPA 1997). The ERA informs the decision on clean up levels needed to mitigate potentially unacceptable risks. In contrast, the purpose of a natural resource injury assessment is to quantify what effects (e.g., toxicity) and derivative natural resource service losses might be present because of the exposure of ecological resources (receptors) to hazardous substances or oil (US Department of Interior 1987; NOAA 1996).

The Steering Committee for this workshop developed critical questions, such as: Where are the overlaps in the 2 assessment approaches and their respective data needs and use? What are the strengths and limitations relative to the needs of environmental decision making between these two? Is there an opportunity or not to combine some element of the 2 approaches in a way that reduces the time and cost associated with them. Furthermore, we thought it was important to understand whether statutory and regulatory boundaries between these 2 approaches exist and discuss whether these in fact have been one of the root causes of the continued debate about the need for and use of particular types of environmental data.

These issues and the scientific, policy, and legal questions they evoke are timely, and addressing them is important to scientists and decision makers in the public and private sectors. This workshop was designed to help address these issues with the use of the SETAC format for similar technical undertakings. This is the introductory paper to a series of 3 papers that follow that describe the genesis, deliberations, and results of the SETAC workshop on the nexus between ERA and NRDA. In the 1st paper (Gouguet et al. 2009), issues regarding potential legal constraints on the use of common data sets is addressed, whereas the 2nd paper (Gala et al. 2009) addresses the common elements and potential scientific constraints that might exist between ERA and NRDA data collection and utilization. The 3rd paper (Munns et al. 2009) tackles the issue of whether or not a “common currency” exists between ERA and NRDA as it relates to the translation of potential risk into potential ecological service loss.

OBJECTIVE AND RATIONALE

The objective of this workshop was to evaluate critically the scientific underpinnings, overlaps, and boundaries between ERA and NRDA under CERCLA, as they relate to the collection, interpretation, and utilization of environmental data, and the subsequent management actions that are developed using this and other information. In addition, this workshop attempted to evaluate the applicability and technical underpinnings of methodologies used in the translation of natural resource injuries into natural resource service losses, and the relevance of ERA methodologies to these issues. Although it is too early to draw final conclusions, it is hoped that the results of this workshop, as published in the series of papers herein, can be used as a starting point for dialog between practitioners in the public and private sectors on how to improve NRDA as well as ERA. Discussions with policy and decision makers at the state and federal levels may follow these technical discussions between practitioners, but to propose this as an important objective of the workshop was beyond its scope.

With its focus on assessment approaches to improve environmental decision making, this workshop was built on advances made in previous SETAC-sponsored workshops. They helped to stimulate the questions posed to the workshop participants (Table 1).

The steering committee felt that the technical advancement at the nexus of ERA and NRDA continues to suffer from the lack of open, scientific debate among practitioners and decision makers within the regulatory and regulated communities, potentially because of the litigious nature of the process for assessing and managing contaminated sites. Just as important, there appeared to be a limited number of publications that documented approaches for NRDA, in particular where there were overlaps in the collection and use of environmental data for the ERA.

KEY FINDINGS

The detailed findings from each of the 3 workgroups can be found in the papers that follow. Briefly, however, the key findings are as follows: 1) Few, if any, legal impediments exist to using physical, chemical, or biological data for both the ERA and the NRDA. However, there are and may continue to be policies or practices that will determine whether these data are applicable for both purposes at specific contaminated sites. 2) Although it is important to recognize that distinctions can exist in the spatial and temporal domains of the 2

Table 1. Questions addressed by the ERA/NRDA workshop participants^a

- What are the technical, statutory, and regulatory drivers that hinder or foster the common use of environmental data for ERAs and NRDA's under CERCLA and related federal statutes?
- What commonalities and differences exist in the technical information required by decision makers that currently are provided separately by ERAs, NRDA's, and assessments of natural resource injuries and, ultimately, natural resource service losses?
- What are the decisions to be made under ERAs and NRDA's? What are their data quality objectives? Is it feasible or even constructive to find a common currency recognizing that the outputs from an ERA and an NRDA are fundamentally different?
- What are the scientific underpinnings of data collection, interpretation, and utilization that are shared between ERAs and NRDA's?
- What are the uncertainties associated with the scientific underpinnings, and how might they be addressed?
- What are the technical areas in which additional research or tools are needed?
- Is there the potential for a “common” assessment approach that can be applied for contaminated media that is responsive to the needs of decision makers and provides the required estimates of risk and injury? Is there a way to synthesize the approaches into a single methodology that will satisfy the technical requirements of both ERA and NRDA?
- What are the technical issues related to translating, or not, estimates of ecological risks and natural resource injuries into natural resource service losses?
- Is there a “common currency” among ecological risk, natural resource injury, and natural resource service loss that could be useful to assessment practitioners and decision makers?

^a CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; ERA = ecological risk assessment; NRDA = natural resource damage assessment.

analyses, as well as the nature of data needed to make decisions, opportunities for data sharing exist, particularly for the characterization of environmental exposures, as well as the derivation of ecotoxicological information for a number of response measures. In sum, effective coordination is not precluded by the underlying science. 3) Consideration of ecosystem services in the development of assessment endpoints for the ERA could help to enhance the applicability of the data collected for the NRDA.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the deliberations at this workshop we conclude that few legal and scientific constraints exist that would preclude the use of common physical, chemical, and biological data for both the ERA and the NRDA. As described in the 3 papers that follow, caveats to this broad statement are noted accordingly in more detail. In addition, although no one approach is likely that might enhance the utilization of a common data set for both ERA and NRDA, it is possible that considering ecosystem services in developing assessment endpoints for the ERA would be beneficial in this regard. We recommend that this consideration be pursued by those interested in seeking and testing approaches to improve the nexus between ERA and NRDA and, if necessary, undertaking a future workshop or conference to address it.

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