



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

January 20, 2012

OFFICE OF SCIENCE ADVISOR
Risk Assessment Forum

MEMORANDUM

SUBJECT: Transmittal of RAF Ecological Action Plan and Charge to the SAB EPEC

FROM: Edward Ohanian, Chair
EPA Risk Assessment Forum

TO: Thomas Armitage
EPA Science Advisory Board Staff Office

The RAF Ecological Action Plan, prepared following deliberation on SAB recommendations, is attached for transmittal to the SAB EPEC for their review and comment. Also attached is a charge to the EPEC offering guidance for their review scheduled for February 22 and 23, 2012. We are looking forward to the outcome of this timely meeting regarding SAB/EPEC's feedback on the Action Plan.

Thank you for your assistance in this endeavor.

Attachment

Charge to the SAB Ecological Processes and Effects Committee for the Advisory on the EPA Risk Assessment Forum's Ecological Assessment Action Plan

February 22 - 23, 2012

The Risk Assessment Forum (RAF) in the EPA Office of the Science Advisor has developed an Ecological Assessment Action Plan identifying six high priority overarching science policy initiatives and seven specific technical practice initiatives to improve the quality, scope, and application of EPA's ecological assessments. The initiatives in the Ecological Assessment Action Plan address high priority recommendations in the report of the EPA colloquium, [*Integrating Ecological Assessment and Decision-Making at EPA: A Path Forward*](#). The EPA colloquium, which included ecologists from across the Agency, was held in response to the 2007 SAB report titled, [*Advice to EPA on Advancing the Science and Application of Ecological Risk Assessment in Environmental Decision-Making*](#) and the National Research Council (NRC) report *Science and Decisions: Advancing Risk Assessment* (National Research Council, 2009).

Summary of RAF Ecological Assessment Action Plan

The following science policy initiatives are proposed by the RAF in the Ecological Assessment Action Plan to transform and improve the Agency's Ecological Risk Assessments:

- ***Develop Guidelines for Application of Systems Approaches to Ecological Assessments and Integration of Different Types of Assessments to Solve Broad Environmental Problems***

The design and conduct of complex large-scale assessments currently facing EPA (e.g., global change, sustainability, estuarine and coastal hypoxia, integrated nitrogen control, hydraulic fracturing of deep geologic formations for methane extraction, mountain top mining, and deep sea oil spills) requires a broad assessment framework. The RAF recommends that EPA develop a systems approach to ecological assessments that includes multiple media and endpoints as well as integration of different types of assessments described in Cormier and Suter (2008)¹ and in chapter 3 of the EPA colloquium report [*Integrating Ecological Assessment and Decision-Making at EPA: A Path Forward*](#). The framework focuses on resolving environmental problems by integrating different types of assessments: (1) condition assessments to detect chemical, physical, and biological impairments; (2) causal pathway assessments to determine causes and identify their sources; (3) predictive assessments to estimate environmental, economic, and societal risks, and benefits associated with different possible management actions; and (4) outcome assessments to evaluate the results of the decisions of an integrative assessment.

¹ Cormier, S.M., and G. Suter. 2008. [A Framework for Fully Integrating Environmental Assessment](#). *Environmental Management* 42:543–556.

- ***Improve Communication of Ecological Assessment Issues and Results***

The RAF Action Plan calls for the development of methods for better communication of ecological assessment issues and results to decision-makers and stakeholders. This applies to communicating ecological assessment issues during both planning of assessments and presentation of results. In part, this is a matter of the inability of assessors to communicate the significance of the loss of species, changes in community structure, and other endpoints. In addition, it involves the lack of standards for acceptability like those in human health assessment, the plethora of assessment methods employed, and difficulties in conveying variability and uncertainty. Currently there is no EPA guidance for communicating ecological risks. A Risk Assessment Forum panel is studying this issue.

- ***Incorporate Ecosystem Services and Benefits in Ecological Risk Assessments***

The outcomes of research into ecosystem services and benefits are potentially transformational for environmental science and decision-making. Ecosystem services can be used to describe potential outcomes of environmental management decisions in terms that can be more effectively communicated to decision-makers and the public. A Risk Assessment Forum panel is addressing this issue and expects to produce case studies and guidance on how to relate ecological risk assessment endpoints to ecosystem services. This information will be used to update the EPA guidance document [Generic Ecological Assessment Endpoints \(GEAEs\) for Ecological Risk Assessment](#) (U.S. EPA, 2003).

- ***Strengthen Science Policies that Promote Agency-wide Ecological Protection Goals***

There is little consensus in the Agency about goals for protection of ecological systems or the importance of ecological effects. In addition, important and well-developed ecological science principles (e.g., systems analysis, landscape ecology, ecosystem services, and adaptive management) are unfamiliar and have not been systematically integrated into the Agency's science policy framework. If the Agency is to successfully incorporate ecology, it must consider ways to elevate representation and influence of ecological scientists in its programs, regions, and Intra-Agency science policy development and coordinating bodies.

- ***Incorporate Adaptive Management as a Formal Science Policy for EPA***

Adaptive management is a process that determines the outcomes of actions, and uses that information to improve assessments that inform decisions, thereby improving the efficacy of those decisions. Adaptive management has not been adopted as a policy at EPA. However, it is conceptually well developed and has been widely adopted in numerous federal and state agencies charged with ecological, fisheries, and wildlife management. The RAF recommends the development of adaptive management for testing and revising risk management actions.

- ***Develop Weight-of-Evidence as an Option for Inference in Ecological Assessments***

Although ecological assessments often involve multiple lines of evidence, there is no guidance on how to weigh those lines of evidence to make inferences. The SAB identified a need for guidance, case studies, and standards of practice for weighing multiple lines of evidence to support decision-making. The weight-of-evidence should be used and fully documented during problem formulation, data analysis and interpretation, and risk characterization. The RAF recommends development of guidance on the use of weight-of-evidence.

The following specific technical practice initiatives are also proposed by the RAF in the Ecological Assessment Action Plan:

- ***Training and Improved Access to Information for Ecological Assessment*** - Risk assessor and manager training and increased access to information will lead to improved quality of risk assessments.
- ***Quality Assurance and Data Quality Objectives for Ecological Assessment*** - Quality assurance and data quality objectives for ecological risk assessment will formalize ecological assessment standards.
- ***Assessing the Risks of Multiple Stressors*** – Development of guidance is proposed for assessing the risks of multiple stressors.
- ***Receptor-specific and Stressor-specific Guidance*** - Development of guidance is proposed for common receptor and stressor-specific assessments.
- ***Life Cycle Analysis for Product Safety Evaluations*** - Development of guidance is proposed for assessing new chemicals and other products using a life cycle approach. This will improve the quality of assessments and decisions.
- ***Uncertainty Characterization and Communication*** - Guidance is proposed for characterizing uncertainty and preparing risk communication information.
- ***State-of-the Science, Best Practices Reports, Exemplary Case Studies, and Success Stories*** - This initiative will provide timely information on best practices to risk assessors.

Overarching Charge Question

Charge Question 1. Overall technical merit of the proposed science policy and technical practice initiatives.

The RAF Ecological Assessment Action Plan proposes six high priority overarching science policy initiatives and seven specific technical practice initiatives to improve the

quality, scope, and application of EPA's ecological assessments. Please comment on whether the initiatives proposed in the Plan are a) responsive to SAB and NRC recommendations; and b) reflect the most important set of activities needed to address the key scientific and technical challenges for advancing the application of ecological risk assessment in environmental decision-making. Please also consider whether there are other key science policy or technical practice initiatives that should be considered for inclusion in the Plan.

Specific Charge Questions

Charge Question 2. Importance of developing an integrated assessment approach.

The RAF Action Plan proposes that EPA develop a systems approach to ecological assessments that includes multiple media and endpoints as well as integration of different types of assessments as described by Cormier and Suter in [A Framework for Fully Integrating Environmental Assessment](#), *Environmental Management* 42:543–556, and in chapter 3 of the EPA colloquium report [Integrating Ecological Assessment and Decision-Making at EPA: A Path Forward](#). The framework focuses on resolving environmental problems by integrating different types of assessments: (1) condition assessments to detect chemical, physical, and biological impairments; (2) causal pathway assessments to determine causes and identify their sources; (3) predictive assessments to estimate environmental, economic, and societal risks, and benefits associated with different possible management actions; and (4) outcome assessments to evaluate the results of the decisions of an integrative assessment. Please comment on how guidance for an approach to assessment that integrates different media and endpoints and different types of assessments might contribute to better decision making (e.g., assessment of complex issues, cumulative risk assessment and sustainability analysis).

Charge Question 3. Use of the weight-of-evidence approach in ecological risk assessments.

Although ecological assessments often involve multiple lines of evidence, no guidance exists on how to weigh those lines of evidence to make inferences. The RAF Action Plan proposes that EPA develop such guidance. Please comment on the scientific merit and limitations of using a weight of evidence approach in decision making and offer any guidance on weighing ecological risk assessment (ERA) lines of evidence.

Charge Question 4. Communication of ecological assessment issues and results to decision-makers and stakeholders.

The RAF Action Plan calls for the development of methods for better communication of ecological assessment issues and results to decision-makers and stakeholders. This applies to communicating ecological assessment issues during both planning of assessments and presentation of results. In part, this may be a matter of the inability of assessors to communicate the significance of the loss of species, changes in community structure, and other endpoints. The RAF has developed a communication technical panel

project description. Please comment on whether the RAF's planned project is an appropriate way to proceed, and what obstacles might exist to either interpreting or utilizing ecological information in risk assessment. Please include any observations on why ERA has or has not been well incorporated into decision making in general.

Charge Question 5. Incorporation of ecosystem services into ecological risk assessment methods.

Ecosystem services can be used to describe potential outcomes of environmental management decisions in terms that can be more effectively communicated to decision-makers and the public. RAF expects to produce guidance on how to relate ecological risk assessment endpoints to ecosystem services. This information will be used to update the EPA guidance document [Generic Ecological Assessment Endpoints \(GEAEs\) for Ecological Risk Assessment](#) (U.S. EPA, 2003). Please consider Appendix B (page 52) of the generic ecological assessment endpoints guidance document and the project description of the RAF Technical Panel on Ecological Services Assessment Endpoints and comment on whether they capture the full range of opportunities to incorporate ecosystem services into EPA's ecological risk assessment methods.

Charge Question 6. Use of adaptive management for testing and revising risk management actions.

In its 2007 report, [Advice to EPA on Advancing the Science and Application of Ecological Risk Assessment in Environmental Decision-Making](#), the SAB recommended that EPA use adaptive management to address uncertainties in decision-making. The application of adaptive management in risk assessment and risk management is discussed in section 6.3 of the EPA colloquium report [Integrating Ecological Assessment and Decision-Making at EPA: A Path Forward](#), and the RAF Action Plan proposes the development of adaptive management as a tool to methodically improve risk management decisions. Please comment on how adaptive management approaches can be developed to provide optimal value for EPA programs.

Charge Question 7. Strengthening EPA's ecological protection goals.

The RAF Action Plan indicates that there is little consensus in EPA about goals for the protection of ecological systems, and that important and well-developed ecological science principles (e.g., systems analysis, landscape ecology, ecosystem services, and adaptive management) have not been systematically integrated into the Agency's science policy framework. Are there aspects of ERA science that make the information difficult to communicate, use and process by decision makers? What recommendations does the committee have to strengthen EPA's ecological protection goals? Please comment on how ecological assessment science can be used to strengthen EPA's ecological protection goals.