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IN THE APPLICATION OF ECOLOGICAL RISK
ASSESSMENT AT DEPARTMENT OF ENERGY
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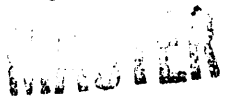
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LEGAL AND INSTITUTIONAL CONSIDERATIONS IN THE APPLICATION OF ECOLOGICAL RISK ASSESSMENT AT DEPARTMENT OF ENERGY FACILITIES

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INTRODUCTION

The U.S. Department of Energy (DOE) owns nearly 100 sites located in 31 states and territories (DOE 1990). These properties have a tremendous diversity of ecological resources, including wetlands, endangered species, and pristine ecosystems. Many DOE facilities are now undergoing restoration and will be required by law to consider ecological health and the ultimate disposition of ecological resources when making environmental management decisions.

The Science Advisory Board of the U.S. Environmental Protection Agency (EPA 1990) has recommended that "EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk". In partial response to this recommendation, EPA published a *Framework for Ecological Risk Assessment* (EPA 1992). It sets forth general concepts and principles for conducting ecological risk assessments.

As defined in EPA's *Framework for Ecological Risk Assessment*, ecological risk assessment is a promising tool that DOE can use to help meet its legal and institutional obligations during remediation and restoration activities. The adoption of ecological risk assessment as a tool for meeting legal and societal obligations, and as a means of providing information for resource management decisions has several implications for DOE, including the need to define a process for using ecological risk assessment to support regulatory compliance and institutionally mandated activities. This paper first identifies regulatory requirements and institutional considerations that could be important to DOE, and that could be supported by ecological risk assessments. Considering this set of regulatory requirements and institutional considerations, the often complex characteristics of DOE sites, and the elements of EPA's ecological risk assessment framework, a process for using ecological risk assessment at DOE sites is then proposed.

THE ECOLOGICAL RISK CONCEPT

Ecological risk assessment addresses "effects on plants, animals, and ecosystems" (SETAC 1987). Because humans are very much a part of the ecosystem, human health risk assessment may be considered to be a subset of ecological risk assessment. However, in this paper, the above distinction between human health risk and ecological risk will be maintained throughout. The EPA (1992) defined ecological risk assessment as the "process that evaluates the likelihood that undesirable ecological effects may occur or are occurring as a result of exposure to one or more stressors." Importantly, the

"likelihood" of undesirable effects may be expressed quantitatively or qualitatively (EPA 1992, 1989). In this paper, the process of "ecological risk assessment" refers specifically to the framework that EPA developed for ecological risk assessment (EPA 1992).

The EPA (1992) ecological risk assessment process consists of three phases: problem formulation, analysis, and risk characterization. Problem formulation is a scoping exercise. In the analysis phase, exposure is characterized and cause-and-effect relationships between stressors and ecological components of concern are also identified and quantified. Finally, risk is characterized by using the results of the exposure and ecological effects characterizations to determine the likelihood of adverse ecological effects associated with one or more stressors.

Importantly, the EPA framework for ecological risk assessment does not provide guidance on how the risk assessment process should be applied to ecological systems. For example, it does not discuss whether the model should be applied to ecosystems in their entirety, parts of ecosystems (e.g., individual habitats, endangered species), or both. It also does not discuss the measurement endpoints that should be targeted during the execution of risk assessments (e.g., changes in numbers of species, changes in abundances, changes in primary productivity, changes in energy flow). Until the time when EPA provides prescriptive guidance on these topics, it will be necessary for individual investigators to "test" the application of the framework to ecological systems and individual biological receptors within those systems to the best of their abilities.

LEGAL AND INSTITUTIONAL CONSIDERATIONS

Ecological risk assessment has the potential to support ecological resource management decisions under a variety of laws, agreements, and management structures. Those important to DOE are identified below.

Major Federal Laws No existing federal law specifically requires that an ecological risk assessment be performed, although several laws hint at the development and use of an ecological risk assessment process. Laws for which ecological risk assessment could be a valuable support tool are identified below.

National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 et seq. - NEPA requires all agencies of the federal government to review proposed actions to determine whether they can have a significant effect on the environment. Most DOE restoration activities will constitute a "major federal action".

Clean Water Act (CWA), 33 USC 1251 et seq. - The CWA describes its purpose as "to restore and maintain the chemical, physical, and biological integrity of the nation's waters". The discharge of "pollutants" from a point source, including "pollutants" associated with effluents from environmental remediation activities, must be in compliance with the CWA.

Clean Air Act (CAA), 40 USC 7401 et seq. - The intent of the CAA is to protect and enhance the quality of the nation's air resources to promote

public health and welfare and the productive capacity of its population. The Act requires EPA to study ecosystems in certain circumstances.

Resource Conservation and Recovery Act (RCRA), 42 USC 6901 et seq. - Congress enacted RCRA to establish a "cradle-to-grave" system to control the treatment, storage, and/or disposal of hazardous waste. Through the provisions of RCRA and subsequent amendments, Congress required the EPA to promulgate an expansive body of regulations that would protect "human health and the environment."

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601 et seq. - The purpose of CERCLA, as amended in 1986 by the Superfund Amendments and Reauthorization Act, is to provide for cleanup and emergency response for hazardous substances released into the environment. Baseline risk assessment requirements are imbedded within the National Contingency Plan (NCP), which is the implementing regulation for CERCLA. Based on the application of a ranking system specified in the NCP, a site may be placed on the National Priorities List, in which case under 40 CFR Sec. 300.430(d)(4):

"the lead agency shall conduct a site-specific baseline risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminants migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bioaccumulating in the food chain. The results of the baseline assessment will help establish acceptable exposure levels for use in developing remedial alternatives..."

The NCP goes on to state the scope of the environmental evaluation (40 CFR 300):

"Environmental evaluations shall be performed to assess threats to the environment, especially sensitive habitats and critical habitats of species protected under the Endangered Species Act."

Endangered Species Act, 16 USC 1531 et seq. - The primary goals of the ESA are to provide for the designation and protection of wildlife, fish, and plant species that are in danger of becoming extinct; conserve the ecosystems that the endangered species depend on; and make it illegal for any person to kill, collect, remove, harass, import, or export an endangered or threatened species without a permit from the Secretary of the Interior. The statute clearly defines the need for ecological assessments, and further states that all federal agencies must use their authorities to carry out programs to conserve endangered and threatened species.

Other Federal Laws Ecological risk assessments could also be used to support DOE activities regulated under a number of other laws, including the Safe Drinking Water Act (42 USC 201 et seq.), Toxic Substances Control Act (42 USC 2601 et seq.), Fish and Wildlife and Coordination Act (16 USC 661 et seq.), Bald and Golden Eagle Protection Act (16 USC 668 et seq.), Wild Free-Roaming Horses and Burros Act (16 USC 1331 et seq.), Marine Mammal Protection Act (16 USC 1361 et seq.), Migratory Bird Treaty Act (16 USC 703 et seq.),

Wild and Scenic Rivers Act (16 USC 1271 et seq.), Anadromous fish Conservation Act (16 USC 757a et seq.), Federal Land Policy Management Act [43 USC 1701(a)(8)], and Coastal Zone Management Act (16 USC 1451 et seq.).

Institutional Considerations Institutional considerations that can affect how DOE manages ecological resources include Executive Orders, DOE Orders, state regulations, federal facility agreements, and Native American treaty rights.

Executive Orders - Ecological risk assessments could be used to support activities conducted under a number of Executive Orders. The most important are likely to include Executive Order 11514, "Environmental Quality"; Executive Order 12088, "Federal Compliance with Pollution Control Standards"; Executive Order 11987, "Exotic Organisms"; Executive Order 11988, "Floodplain Management"; Executive Order 11644, "Off-Road Vehicles on Public Lands"; and Executive Order 11990, "Protection of Wetlands".

DOE Orders - A number of DOE Orders also affect how compliance with environmental laws is achieved. Those Orders include DOE Order 5400.1, "General Environmental Protection Program"; DOE Order 5400.2A, "Environmental Compliance Issue Coordination"; DOE Order 5400.5, "Radiation Protection of the Public and the Environment"; and DOE Order 5480.1B, "Environment, Safety, and Health Program for Department of Energy Operations".

State Laws - A number of the federal environmental statutes provide for a dual federal-state regulatory program where the states are given the opportunity to enact and enforce laws. These laws must meet congressionally mandated minimum criteria, and states are generally not prohibited from enforcing even more stringent environmental requirements.

Federal Facility Agreements - At many of its national facilities, DOE has entered into agreements with interested parties to initiate a plan for waste cleanup. These plans--federal facility agreements--create a "clean-up blueprint" by establishing goals and procedures for accomplishing various tasks. The agreements are usually entered into among DOE, the EPA, and the state in which the site is located. The agreements normally do not set up additional specific clean-up standards that DOE must meet, but may contain general language regarding protection of the environment, and sections on assessing natural resource damage and complying with ARARs.

Native American Treaty Rights - The United States has entered into a number of treaties with individual American Indian nations. These treaties granted Indian lands to the United States while reserving certain rights for the Indian nations. The reserved rights included provisions allowing the tribes to hunt, fish, and gather at traditional or customary areas. Native Americans are also granted access to traditional areas of worship and religious significance through the American Indian Religious Freedom Act of 1978. The Act directs federal agencies to protect and preserve the access of Native Americans to sacred lands, including preserving the physical location of the sites and any resources that are sacred and sometimes required for the practice of Native American religious rites and ceremonies.

PROPOSED APPROACH TO THE USE OF ECOLOGICAL RISK ASSESSMENT BY DOI

As noted above, DOE could use ecological risk assessments to support numerous different legal and institutionally-related activities. The challenge facing DOE is conducting those risk assessments at complex, multi-facility sites where the boundaries of ecosystems and habitats, and the ranges of important species (e.g., endangered species, key species within specific ecosystems) do not coincide with the boundaries of the regulatory units. Under those circumstances, multiple regulatory units may fall within a given habitat or range of a species, such that the cumulative impacts of multiple compliance activities on ecological resources must be considered. In addition, it would be inefficient and impractical to conduct individual ecological risk assessments for every combination of ecological resource and legal or institutional consideration that must be addressed on a site.

To effectively and efficiently conduct ecological risk assessments at DOE sites, it is proposed herein that those assessments be conducted proactively and holistically. Proactively conducting ecological risk assessments would require that an initial set of ecological risk assessments be scoped and conducted during facility and site planning processes. These assessments would be conducted before management decisions have been made, rather than after engineered solutions for environmental restoration, waste management, and decontamination and decommissioning have been selected. Adopting a holistic approach to ecological risk assessment would require ecological risk assessments to be based on ecological entities of interest (e.g., habitat boundaries and territories of endangered species), rather than on regulatory entities such as operable units or facilities.

The key to ensuring that ecological risk assessments are conducted proactively and holistically would be the early execution of a set of "umbrella" risk assessments for the major combinations of ecological resources and stressors. Executing "umbrella" risk assessments would help ensure that environmental management decisions are made not only on discrete risks posed by individual stressors, but on cumulative risks to ecological resources posed by separate, multiple stressors. "Umbrella" risk assessments could also be used to support large-scale planning activities (e.g., site-wide environmental impact statements) and facility-specific activities.

The first step at a DOE site would be to conduct "umbrella" risk assessments based on EPA's framework for ecological risk assessments. The second step would be to identify the steps in the applicable regulatory or institutional processes wherein ecological risk information would be of use. The third step would be to use information in the "umbrella" risk assessments to support regulatory and institutional demonstrations of compliance. If the information contained in the applicable "umbrella" risk assessment is not sufficiently detailed to fully support the demonstration of compliance, the "umbrella" risk assessment could then be supplemented with more facility- or action-specific information (step four), thereby generating a targeted risk assessment that is more responsive to the needs of the compliance demonstration.

Using CERCLA as an example, a DOE site could use the results of "umbrella" risk assessments to support the "Preliminary Assessment Site Investigation" (PSA) at a facility. (The PSA is the initial screening exercise that is conducted to decide whether the site and its potential risks require further investigation.) "Umbrella" risk assessments could also be

used to support determinations as to whether the facility should be listed on the NPL, if it has not already been listed. If results of the PSA indicate that CERCLA actions are warranted and that a Remedial Investigation and Feasibility Study should be performed, the DOE site may supplement the "umbrella" ecological risk assessment with targeted risk assessments that address specific combinations of stressors and resources. Targeted ecological risk assessments could also be used after all remedial activities have been completed to document recovery, assess long-term impacts, and help ensure that ecological resources do not incur additional harm from previously undetected stressors.

In addition to setting standards and establishing a regulatory process for cleanup, CERCLA also provides for the assessment of monetary damages for injuries to natural resources, referred to as Natural Resource Damage Assessments [Section 107(a)(4)(c)]. Although CERCLA does not state how natural resource damages are to be quantified, injuries to resources could be identified and documented in both "umbrella" and targeted ecological risk assessments. Those data would then be used in the damage assessment. Conducting "umbrella" risk assessments during the planning stage could also help minimize or avoid damages from the restoration process itself.

REFERENCES

Society of Environmental Toxicology and Chemistry (SETAC). 1987. *Research Priorities in Environmental Risk Assessment*. Report of a workshop held August 16-21, 1987. Breckenridge, Colorado.

U.S. Department of Energy (DOE). March 1990 (predecisional draft). *Environmental Restoration and Waste Management Five-Year Plan, Annual Update for FY 1992-1996*. Washington, D.C.

U.S. Environmental Protection Agency (EPA). 1989. *Risk Assessment Guidance for Superfund*. Volume II, *Environmental Evaluation Manual, Interim Final*. EPA/540/1-89/001, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 1990. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*. SAB-EC-90-021, Science Advisory Board (A-101), Washington, D.C.

U.S. Environmental Protection Agency (EPA). 1992. *Framework for Ecological Risk Assessment*. Risk Assessment Forum, EPA, Washington, D.C.

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