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## **State Trends in Ecological Risk Assessment and Standard Setting**

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ASSESSMENT AND STANDARD SETTING

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## SUMMARY

The purposes of this paper are 1) to identify key states' activities and plans related to setting cleanup standards using the ecological risk assessment process, and 2) to discuss the impacts these actions may have on the U.S. Department of Energy's (DOE's) environmental restoration program. This report is prepared as part of a larger task, the purpose of which is to identify and assess state regulatory trends and legal developments that may impact DOE's environmental restoration program. Results of this task are intended to provide DOE with advance notice of potentially significant regulatory developments so as to enhance DOE's ability to influence these developments and to incorporate possible regulatory and policy changes into its planning process.

The development of state ecologically based cleanup standards will likely have a significant impact on DOE's environmental restoration program because state standards may, in some cases, be stricter than the human health-based standards that are now employed at either the state or the federal level. In many cases, state ecologically based cleanup standards may be considered applicable or relevant and appropriate requirements (ARARs) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the federal facility agreement at each site. Therefore, they will be applied at many DOE environmental restoration sites.

Washington State, acknowledged to be one of the leaders in this area, has promulgated regulations under its new Model Toxics Control Act to set procedures for establishing site-specific cleanup levels. In addition, the Washington State Department of Ecology on October 30, 1991, issued a draft guidance document that describes proposed methods for setting ecologically based standards for site-specific cleanups. California, Minnesota, and New Jersey are also in the process of establishing procedures for conducting ecological risk assessments and setting standards and are actively monitoring progress in Washington for possible application in their states.

Several states indicated they will simply adopt any ecological risk program that may be developed by the U.S. Environmental Protection Agency (EPA). EPA presently is in the very early stages of developing procedures and

guidelines for conducting ecological risk assessments. These risk assessment procedures that will be developed by EPA will be simply guidelines, intended primarily to build consensus among the various federal programs that include assessment of ecological risk. Therefore, the appropriateness of directly applying the EPA guidance to individual states will be questionable. In addition, there is no guarantee that state ecological risk procedures and guidelines will be consistent with what EPA eventually develops, thereby potentially creating multiple risk assessment processes and confusion for DOE as to how to conduct ecological risk activities. Accordingly, there will be a need to integrate the ecological risk requirements of various state and federal environmental statutes.

Even though most states are not presently establishing procedures for carrying out ecological risk assessments and setting cleanup standards based upon ecological risk, DOE should still actively monitor and/or participate in the development of the procedures by the trend-setting states, such as Washington. DOE clearly will be required to carry out ecological risk assessments for many of its sites according to relevant state guidelines. Early involvement by DOE with states will help ensure that the ecological risk assessment and standard setting procedures that are most relevant to DOE sites will be developed and implemented. For example, DOE will want to ensure that state requirements treat past and present DOE industrial sites appropriately with respect to setting ecologically based cleanup standards. It is probable that many states over the next 5 to 10 years will become more active in the ecological risk area.

Finally, it will be strategically important for DOE, to the extent possible, to be able to approach the issue of ecological risk in a uniform manner for all of its environmental restoration sites. DOE, therefore, should work with states and the EPA to help ensure consistency in ecological risk assumptions and approach.

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## 1.0 INTRODUCTION

A number of states are now considering the development of site-specific cleanup standards based upon risk to natural resources and the environment, or ecological risk. These standards, in many cases, may be stricter than standards based upon risk to human health. For example, environmental contamination at many U.S. Department of Energy (DOE) sites may not pose significant threats to human health because of the remote location of these sites. Nevertheless, the same contamination could pose a substantial risk to ecological resources at the site, thereby necessitating a more stringent cleanup than would otherwise be required if human health were the sole concern. These standards are likely to be applied by individual states to DOE environmental restoration activities. If this were to occur on a large scale, the DOE cleanup program could be dramatically impacted.

When remediating hazardous waste sites under its environmental restoration program, DOE is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to comply with applicable or relevant federal or state standards. These standards are known as applicable or relevant and appropriate requirements (ARARs). Traditionally, these standards have been based upon risk to human health and/or technology feasibility. It is possible that state ecological risk assessment and standard setting requirements would be applied as ARARs at many DOE environmental restoration sites that fall under CERCLA jurisdiction.

Because of the potential impact that state ecological risk requirements could have on DOE environmental restoration activities, DOE's Office of Environmental Restoration (EM-43) requested that Pacific Northwest Laboratory (PNL)<sup>(a)</sup> identify activities by individual states to establish procedures for conducting ecological risk assessments and for setting ecologically based cleanup standards. The information gathered as part of this study will be used by DOE to assist states in developing ecological risk standards.

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(a) PNL is operated for the U.S. Department of Energy by Battelle Memorial Institute.

Representatives from the environmental regulatory agencies for 11 states were interviewed regarding activities in their states related to developing ecological risk assessment procedures and ecologically based cleanup standards. The states were selected either because they are recognized to be "trend-setters" in this area or because they contain major DOE environmental restoration sites. Representatives of the U.S. Environmental Protection Agency (EPA) were also interviewed. However, the activity of EPA related to establishing ecological risk assessment recommendations and procedures is reviewed only insofar as it impacts the work of various states in this area.

Considerable attention is given in this report to the activities of Washington State in establishing an ecological risk assessment and standard setting process, since its program is one of the most developed at this time. In addition, the role of Hanford personnel is discussed in order to provide other DOE field offices with an example of DOE interaction with a state environmental regulatory agency in developing the ecological risk assessment and standard setting program.

The focus of this paper is state ecological risk assessment activities that will serve as the basis for setting ecologically based cleanup standards. However, given that ecological risk assessments can be used for a number of other purposes, including corrective actions under the Resource Conservation and Recovery Act (RCRA) and determining damages to natural resources, it is important to understand the degree to which states' activities in this area could affect DOE efforts. Although these other activities are all related to ecological risk assessment and will be reviewed briefly, they are not the primary focus of this paper. In addition, because only 11 states were surveyed, this report is not a comprehensive picture of all activity nationwide related to developing ecologically based cleanup standards.

Section 2.0 of this report contains a brief overview of ecological risk assessment activity at the federal level, particularly by EPA. Section 3.0 presents the findings of the survey of state activities related to ecological

risk assessment and standard setting. Section 4.0 is a discussion of the findings and how they may impact DOE's environmental restoration program. Section 5.0 contains general conclusions and recommendations.



## 2.0 PRESENT STATUS OF ECOLOGICAL RISK ASSESSMENT METHODS AT THE FEDERAL LEVEL

The EPA is in the very early stages of developing procedures and guidelines for conducting ecological risk assessments. Present plans are to produce four guidance documents over the next 5 years: 1) a summary report on issues in ecological risk assessment, 2) an ecological risk framework document (presently in draft form), 3) a strategic planning document for developing ecological risk guidelines, and 4) a case studies report. Together, these four documents will provide very generic EPA guidance on the conduct of ecological risk assessments, accompanied by case studies.

The risk assessment procedures that will be the product of this process will be simply guidelines. These guidelines will not be directly enforceable by law. Their primary purpose will be to build consensus among the various implementing programs within EPA, such as CERCLA, RCRA corrective actions, the Clean Water Act, and the Safe Drinking Water Act. Accordingly, these EPA guidelines, by themselves, may not be appropriate for direct application by states or by EPA on a CERCLA site-specific basis.



### 3.0 ECOLOGICAL RISK ACTIVITIES IN KEY STATES

The state officials contacted as part of this study are listed in Appendix A. Although many states have the general authority under state law to set standards to prevent or minimize harm to human health and the environment, only a handful are now actively involved in developing processes for conducting ecological risk assessment and standard setting. Most states still rely strictly on human health-based standards, developed either by the state or by EPA. Many states are informally monitoring the ecological risk programs being developed in other states, such as Washington, and may consider similar actions in the future.

In addition, many state environmental officials said they will simply adopt any ecological risk program that is developed by the EPA. At the present time, however, it appears that EPA may formulate only very generic ecological risk assessment guidance that, by itself, might not be sufficient for these states. This may prove to be significant for DOE because by the time many of these states establish specific ecological risk procedures, DOE will already be many years into its environmental restoration program.

#### 3.1 WASHINGTON STATE

Washington State is viewed as one of the leaders in pursuing a program to establish procedures for evaluating risks to the environment from hazardous waste sites and for developing a methodology for setting site-specific standards. This is especially relevant to DOE because the Hanford Site is located in Washington.

##### 3.1.1 Statutory Basis for Standards Development

In March 1989, the Model Toxics Control Act (MTCA, RCW 1989) went into effect in Washington. This citizen-approved initiative established a comprehensive hazardous waste cleanup program that is similar to the federal CERCLA program. The MTCA mandates that site cleanups protect human health and the environment. Regulations established pursuant to the MTCA (WAC 1991) define

minimum standards for cleanup levels, including those established under state and federal law, but they also set narrative requirements for more stringent levels that may be necessary to protect the environment.

The regulations establish a two-step approach for cleaning up individual sites containing hazardous substances. The first step is to set cleanup levels for individual sites. The regulations provide a uniform statewide approach for establishing these cleanup levels and for determining an appropriate point of compliance. The second step is to select specific cleanup actions.

### 3.1.2 Existing State-Approved Methodologies for Setting Risk-Based Standards

Current MTCA regulations establish a methodology for setting cleanup standards based upon risk to human health, but contain only narrative language regarding ecological risk standards. In October 1991, the Washington State Department of Ecology (Ecology) issued Project-level Guidance Document for Addressing Environmental Protection under the Model Toxics Control Act Cleanup Regulation.<sup>(a)</sup> This document is intended to describe proposed methods for translating narrative ecological standards in the cleanup regulation into site-specific cleanup levels. The methods contained in this document incorporate recommendations from the Ecological Advisory Subcommittee of the Washington's MTCA Science Advisory Board.

Ecology proposed to apply the methodologies contained in the document to a limited number of sites on a project-level basis as part of a phased approach to full implementation. Based on its experiences in implementing this guidance at a number of sites and on a review by the Ecological Advisory Subcommittee, Ecology eventually plans to finalize this document and incorporate its methodology into the MTCA cleanup regulations.

Ecology stated in the guidance document that its objective is to develop an approach that is practical, scientifically defensible, consistent with the requirements of the MTCA regulation, and flexible. By flexible, the agency means that the level of effort in addressing ecological concerns should be

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(a) Draft report prepared by the Washington State Department of Ecology in 1991.



appropriate for the site. In addition, site managers should be able to exercise their professional judgment in applying many aspects of the guidance to site-specific conditions.

The procedures set forth in the guidance document are intended to supplement the methods for establishing site-specific cleanup standards to protect human health. The guidance document states that it is anticipated that human health-based cleanup levels will generally protect ecological receptors, but that this would not be true in all cases. Accordingly, it is expected that in some instances the ecologically based standards for specific sites may be more stringent than the human health-based standards for the same sites.

The MTCA regulation provides three options for establishing site-specific cleanup levels. These methods focus primarily on setting quantitative levels based upon risk to human health, such as cancer risk. The various methods do, however, contain qualitative goals based upon ecological risk. Method A, intended to be used for the least complex sites, utilizes levels set forth in specified tables for contaminants in ground water and soils. These values are derived primarily from human health-based concentrations included in other applicable state and federal laws.

Method B, which will be applied to most sites, utilizes site risk assessments to set cleanup levels so that individual carcinogens will not cause an estimated lifetime cancer risk in excess of 1 in 1,000,000. For non-carcinogens, the cleanup levels are set at concentrations anticipated to result in no acute or chronic toxic effects on human health and the environment. With respect to ecological risk, cleanup levels established under Method B must be no higher than concentrations that are estimated to result in no adverse effects on the protection and propagation of aquatic and terrestrial life.

Method C cleanup levels are similar to those under Method B except that the human health risk attributable to individual carcinogens is reduced to 1 in 100,000. Method C would be used 1) when Method A or B levels are below background concentrations, 2) when the attainment of Method A or B levels would create a greater overall threat to human health and the environment, 3) where it is technically impossible to obtain Method A or B levels, or

4) where the site is defined as an industrial site. Because of these factors, it is expected that Method C will be utilized at many complex sites in Washington, including many of the Hanford Site operable units. Among other factors, the cleanup levels established under Method C must be no higher than concentrations that are estimated to result in no significant adverse effects on the protection and propagation of aquatic and terrestrial life.

Certain sites defined as "Class 1 sites" may be excluded from the requirement that ecologically based standards be established. Class 1 sites generally are those that are currently used, and expected to continue to be used, as industrial or commercial sites where contamination is not carried offsite, and where the site is not used by wildlife for feeding or breeding or during seasonal migrations. The regulations and draft guidance document do not discuss other classes of sites.

The guidance document requires that an ecological evaluation be carried out for a site as part of the remedial investigation/feasibility study (RI/FS). The ecological evaluation will identify 1) the ecological resources that are present at the site and in the surrounding area, 2) the existing or potential exposure pathways to ecological receptors, and 3) the magnitude of the risk to ecological receptors. The results of the ecological evaluation will be used to develop a sampling and analysis work plan.

The guidance document prescribes a series of tests to screen soil, surface water, and ground water for biotoxicity. In addition, the guidance document sets forth procedures to assess the extent to which a site is contaminated with substances that may bioaccumulate. Detailed procedures for establishing cleanup levels for various contaminated media under Methods A, B, and C are described in the guidance document.

The results of all these evaluations will be included in an ecological assessment report. Although the guidance document does not directly address this point, it is presumed that the ecological assessment report will be incorporated into the final RI/FS for the site. The guidance document suggests that this report include 1) an explanation of why a site was classified as a Class 1 site (if relevant), 2) information from the ecological evaluation, 3) results and analyses of screening-level studies and any studies

conducted to establish environmentally protective cleanup levels, 4) a comparison of these cleanup levels to other relevant criteria, and 5) an analysis of potential cleanup standards established for environmental protection.

### 3.1.3 Implications of Proposed Washington Guidance on Hanford

The guidance document poses several problems for the Hanford Site and for other DOE sites if adopted. First, the guidance document does not have a clear definition of a site. Although it seems clear that Washington does not intend to define the 560-square-mile Hanford Site as one "site" under the guidance, it is not certain whether a site will be an operable unit (73 at Hanford), an individual waste site (approximately 1100 at Hanford), or a new classification.

The guidance document proposes using an earthworm bioassay, daphnia (water flea) biotoxicity, and the FETAX test for amphibians as the basis for the ecological risk assessments of sites containing hazardous substances. These tests may not be appropriate for an arid site like Hanford because they are for organisms that are not natural inhabitants of the Hanford environment. However, the test organisms all have well-documented biotoxicity tests that can be easily performed in the laboratory. The guidance document also allows for in situ bioassays to be carried out at a site at the discretion of the Ecology site manager, but does not contain any criteria or methodology for determining the appropriate site-specific tests.

A major question relevant to the proposed Washington process of ecological risk assessment is what ecological resources the regulations are intended to protect. For example, is the process intended to protect all ecological resources equally (i.e., keystone species of each affected habitat, functional attributes of the potentially affected ecosystem, or threatened and endangered species)? Furthermore, as presently conceptualized, is the process sufficiently robust to protect those resources? For example, will the results of an ecological risk assessment that considers bald eagles (an endangered species) be accurate and credible given the fact that bald eagles cannot be used as test organisms? (These questions will likely be applicable to most or all of the state and federal ecological risk assessment processes developed.)

#### 3.1.4 Hanford Involvement in Ecological Risk Assessment Process Development

The purpose of this subsection is to describe the interaction between Ecology and Hanford representatives regarding the development of Washington's ecological risk assessment process. These activities may provide examples of how other DOE sites could interact with their state environmental regulatory agencies in order to develop effective and meaningful risk assessment processes.

In June 1991, Ecology issued its first draft of Project-level Guidance Document for Addressing Environmental Protection under the Model Toxics Control Act Cleanup Regulation. When this initial document was distributed, several Hanford scientists were concerned about its possible ramifications for Hanford. These individuals felt the document was not sufficiently flexible and was oriented toward the wetter Western Washington climate and to relatively simple hazardous waste sites. To address these concerns, Ecology employees working on the guidance document were invited for a tour of the Hanford Site in July 1991. PNL and Westinghouse Hanford Company employees provided a tour and held a meeting to discuss their concerns with the document. The following are some of the concerns that were raised:

- How will the guidance document account for the difference in the Eastern Washington and the Western Washington climates?
- How would the guidance document adjust for different ecosystems that may naturally react to tests differently?
- Are the bioassays an appropriate means of assessing the ecological risk at all sites?
- Why are there no individuals on the subcommittee from east of the Cascades?

The site visit facilitated further communication between the Ecology and Hanford staff. The communication routes were somewhat informal and were often related to the professional expertise of Hanford staff rather than the fact that they worked at Hanford.

The second draft of the guidance document, issued in October 1991, was significantly more flexible than the first draft. Provisions allowed for site-specific risk assessments when the site ecologist determined that the

recommended bioassays were not appropriate for the ecosystem. There appeared to be a conscious effort by Ecology to consider some of the challenges involved with developing all-encompassing guidance for the different climates and ecosystems across the state. The document allowed for more flexibility, but still suggested specific bioassays for ecological risk site assessment.

In December 1991, a PNL staff member was invited to join the Ecological Advisory Subcommittee of the Washington's MTCA Science Advisory Board. This invitation appeared to address another request made in July by the Hanford representatives. The scientist that was selected was not a participant in the earlier communications with the state. It is believed that the selection was made solely because of his expertise in bioassays, not his connection with the Hanford Site.

During 1992, the Ecological Advisory Subcommittee had two meetings on revising different aspects of the guidance document. The discussions at the subcommittee meetings were not specific to the Hanford Site because the subcommittee's declared focus was how to address the more typical and less complicated hazardous waste sites across all of Washington.

Currently, there are no specific bioassays for arid regions in the guidance document. The goal of some Hanford Site representatives is to be proactive in the development of this guidance document. They would like to propose bioassays that would be appropriate for arid lands.

Ecological risk assessment standards in Washington are still being developed, but the actions taken by the Hanford representatives influenced the process. Early involvement, both formal and informal, by site representatives is important to influence the development of the risk assessment processes in a way that is most relevant for DOE sites. Concerns regarding the management of large and complicated waste sites, such as DOE sites, need to be conveyed early in the process and with as much scientific basis as is available.

## 3.2 OTHER STATES

A summary follows of current and planned activities in other key states related to setting waste cleanup standards based on ecological risk. This information was gathered primarily through interviews with environmental officials in each state.

### 3.2.1 Minnesota

Minnesota is currently developing its first "comprehensive" state risk assessment guidance document. One goal for this guidance document is to establish a framework for directing ecological risk assessments under all of the state's environmental programs. It appears that the state will set acceptable quantitative ecological goals for cleanup of hazardous waste sites, but will retain the flexibility of site managers to set alternative site-specific goals. However, the main focus of the Minnesota guidance document apparently will be to assist in the evaluation of all sites for habitat alteration rather than for setting ecological risk cleanup standards. Minnesota officials say they are closely monitoring developments with Washington's ecological risk program and may incorporate some of Washington's procedures and methodologies into Minnesota's program. The Minnesota guidance document should be completed in draft form by February 1993.

Minnesota officials state that the guidance document will contain three parts. The first part will include guidelines for developing procedures for the type of assessment to be used at specific sites (e.g., quantitative or qualitative). The second part will include technical background information and directions for quantitative ecological risk assessments. The third part will describe the interrelationship between the ecological risk assessment process and the natural resource damage assessment process. Minnesota plans to have an expert panel consisting of state employees and individuals from the public and private sectors review the completed draft guidance for technical adequacy.

### 3.2.2 California

California is in the process of drafting a regulation regarding risk assessment, both human health and ecological, at hazardous waste sites. The

ecological risk assessment section of the regulation will have three main parts: Pathway Assessment, Predictive Risk Assessment, and Ecological Impact Analysis. Pathway Assessment, a qualitative approach, and Predictive Risk Assessment, a quantitative approach, are currently very similar to the human health risk assessments. The state plans to write guidance for these two sections of the regulation first, because it wants to make them more specific to ecological risk.

The third section, Ecological Impact Analysis, may include field tests to validate the predictive risk assessment conclusion, specific toxicity studies, or any other necessary site-specific testing needed to validate the ecological risk assessment. The intention of this section is to "ground truth" the predicted ecological risk. The Ecological Impact Analysis section of the regulation is expected to consist almost completely of site-specific requirements; therefore, specific guidance will probably not be written. There is no firm schedule for action on the draft regulation or the writing of the subsequent guidance documents, but they will be subject to public review and comment when initial drafts are completed.

### 3.2.3 New Jersey

New Jersey is currently working to formulate procedures for developing site-specific ecological risk standards, relying in part on the documents developed by Washington. These standards will be established under the New Jersey Spill Act and will apply to hazardous waste sites if they are more stringent than existing standards. These standards were formally proposed in February 1992. The New Jersey Spill Act has been criticized by environmentalists because it sets two separate levels of cleanup for residential and industrial sites.

### 3.2.4 Nevada, Ohio, South Carolina, Tennessee, New Mexico, Idaho, Colorado

These states do not have specific plans to set cleanup levels for hazardous waste sites based upon ecological risk. Of the environmental officials interviewed, only those in Nevada thought their state might consider doing so in the near future. Most of the state officials cited lack of resources and expertise as the principal barriers to developing and

implementing ecological risk assessment procedures and standard setting. Several of these states also said they may consider adopting whatever procedures and processes the EPA proposes.



#### 4.0 IMPACT ON DOE'S ENVIRONMENTAL RESTORATION PROGRAM

The adoption of requirements for conducting ecological risk assessments and setting ecologically based site-specific standards by states containing major DOE environmental restoration sites is likely to impact substantially DOE's environmental restoration activities. Because ecologically based cleanup standards may in some cases be stricter than standards based strictly on human health risk, the use of ecological standards will, in many instances, increase the cost and time needed for cleaning up specific sites.

##### 4.1 COMPLIANCE IMPACTS

In many cases, state ecological risk assessment requirements and standards may apply to DOE environmental restoration sites primarily indirectly as ARARs under CERCLA. Federal facility agreements clearly anticipate that state standards, such as those pertaining to ecological risk assessment, will be used as ARARs. For example, the Hanford Tri-Party Agreement specifically lists Washington's MTCA as a potential ARAR. In addition, state ecological risk requirements could play a role in decisionmaking regarding RCRA corrective action sites, especially where the state has been delegated authority for this program by EPA.

The EPA is considering the development of ecological risk assessment guidelines. When developed, these guidelines may be applied in states that have not developed their own ecological risk standards or guidelines. For states that have developed their own ecological risk and standard setting process, the issue of which set of guidance to apply to a CERCLA site will likely be the subject of negotiations.

There is no guarantee that state ecological risk procedures and standards will be consistent with those promulgated at the federal level, yet both sets of procedures may be applied at DOE sites. In some cases, potential differences between state and EPA ecological risk requirements could be problematic for DOE. For example, inconsistent requirements could be imposed on

DOE in instances where a RCRA unit, under state RCRA jurisdiction, is physically located within a CERCLA operable unit, under EPA's CERCLA jurisdiction.

#### 4.2 MANAGEMENT IMPACTS

At the present time, Washington is the only state with a major DOE environmental restoration site that is actively developing a process for carrying out ecological risk assessments for the purpose of setting site-specific cleanup goals. The fact that most other states are not engaged in a similar activity should not be interpreted to mean that this issue will not have a significant impact on DOE environmental restoration programs. It is expected that many states will take a more active role over the next 5 years to incorporate the ecological risk assessment guidance that is developed by either EPA or other states into procedures to be applied in their own states. If, in fact, many states do delay developing their own state-specific guidance until after EPA acts in the area, DOE's environmental restoration program may be affected midstream by evolving state regulatory expectations regarding ecological risk procedures.

Because most of the states with major DOE environmental restoration sites either have not yet developed ecological risk assessment guidelines or are just beginning to develop such standards, it is difficult to precisely determine the specific impacts this activity will have on DOE. It is possible, however, to make several general conclusions based upon the MTCA guidance document and other anticipated developments in the area.

First, there will clearly be a need in the near future for DOE to conduct ecological risk assessments according to state guidelines for its environmental restoration sites. This will be an added task to be carried out as part of the RI/FS for these sites. This activity will certainly involve increased expenditures to conduct the RI/FS and may require additional time to complete the RI/FS.

Second, in some cases the standards derived as a result of the ecological risk assessment will be stricter than the human health-based standards. In these instances, the cost of cleanup and the time required for site remediation will likely increase.

Third, many of the specific DOE operable units probably will be exempt from specific state ecological risk assessment requirements because they are industrial sites. These sites would likely be classified as Class 1 sites in Washington, or a similar classification in other states, thereby obviating the need for any intensive ecological assessment. In addition, because of their complexity, many DOE operable units may be subject to the less stringent Washington Method C cleanup levels, or levels derived using similar methods in other states. The use of these classifications may facilitate the use of the most realistic cleanup strategies and save time and money when cleaning up specific sites.



## 5.0 CONCLUSIONS AND RECOMMENDATIONS

DOE should not view the current relative inactivity by most states regarding ecological risk assessment as an indication that the issue will be unimportant to its environmental restoration program. Quite to the contrary, while most states have not yet taken concrete steps to formulate policies and procedures, there is an undeniable interest in pursuing this issue in the future. It appears that most of the states are now in a "wait and see" position. State action will become much more likely in the event that the current EPA guidance being considered either is delayed or is too generic to meet the needs of individual states.

DOE should actively monitor developments in relevant states regarding ecological risk assessment and standard setting. Early involvement by DOE with the states will help ensure that ecological risk assessment procedures that are most relevant to DOE sites will be developed and implemented. Among other things, DOE should attempt to ensure that any state requirements contain an equivalent of Washington's Class 1 classification and Method C procedures to guarantee maximum flexibility when addressing cleanups at industrial sites.

Especially for large complex DOE sites such as Hanford, DOE will need to recognize that specific areas of ecological concern do not necessarily conform to previously defined operable unit boundaries. For example, at Hanford, certain riparian habitats are likely to include the entire bank of the Columbia River, extending from the 100 Areas in the north to the 300 Area at the southern boundary. DOE will need to ensure that state ecological risk procedures recognize this type of complexity at many of its sites.

There will be a need to integrate the ecological risk requirements of various state and federal environmental statutes. For example, it makes little sense to utilize one ecological risk assessment and standard setting process for a RCRA corrective unit and a different process for an adjacent CERCLA operable unit. This could be a potential problem because RCRA corrective actions will fall largely under the jurisdiction of individual states, thereby directly subject to state ecological risk requirements, while CERCLA sites will be under the direct control of EPA. It is likely that the

procedures to be used at DOE CERCLA sites will be highly site-specific, probably a negotiated mixture of EPA guidelines and state procedures applied as ARARs.

To be most effective and efficient at conducting ecological risk assessments at sites, DOE field offices will need to develop programs that integrate ecological risk into environmental restoration and management activities in a coordinated manner. Program design, data collection and analysis, and interpretation should fall under one program designed to satisfy the requirements of CERCLA, RCRA, and other environmental statutes. Field offices will also need management structure and organization that will be able to use and coordinate this information because it cannot be used effectively when management is fragmented.

It will be strategically important for DOE, to the extent possible, to be able to approach the issue of ecological risk and standard setting in a consistent manner for all of its sites, regardless of their location and regardless of the specific regulatory programs that are applied to specific sites. DOE environmental restoration sites are located in a wide range of natural environments; therefore, one would not expect that identical methodologies would be applied to all DOE sites. The environmental restoration program would be aided, however, if states and EPA employed consistent assumptions and methods in evaluating ecological risk and standard setting. DOE should endeavor to work with states and EPA to ensure this type of national consistency.

## 6.0 REFERENCES

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Cleanup Regulation." WAC-173-340, Olympia, Washington.





APPENDIX A

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