

# Institutional Controls in RCRA & CERCLA Response Actions

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*United States Department of Energy  
Office of Environmental Policy and Guidance  
RCRA/CERCLA Division (EH-413)*



# Selecting and Implementing Institutional Controls in RCRA and CERCLA Response Actions at Department of Energy Facilities

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Prepared by  
U.S. Department of Energy  
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## Chapter 1 Introduction

The purpose of this document is to provide Department of Energy (DOE) environmental restoration project managers (ERPMS) with the information on institutional controls they will need when making environmental restoration remedy decisions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or the Resource Conservation and Recovery Act (RCRA). *For purposes of this document, institutional controls are defined as any mechanism(s) used to restrict inappropriate uses of land, facilities, and environmental media by limiting exposure to residual contaminants left behind as part of a CERCLA or RCRA remedy.* This definition of institutional controls was selected to encompass all the remediation situations that a DOE ERPMS may face.

Institutional controls can include physical barriers (fences) and legal and communication devices (deed restrictions, zoning, and signs). Institutional controls are sometimes grouped into various categories. These classifications are not used in this document, but are provided in Exhibit 1-1 for reference.

Institutional controls may be appropriate to use when complete remediation is technically or economically infeasible, remediation risks to worker health and safety are too great, or collateral ecological damage associated with remediation would be too extensive. Institutional controls are used to

### Exhibit 1-1 Classifications of Institutional Controls

There are several commonly used terms for describing or classifying institutional controls. These classifications often are not mutually exclusive or only apply to certain types of institutional controls. Since these terms are commonly used, they are defined below for reference purposes only.

**Active / Passive Controls:** The concepts of active and passive controls have long been understood to apply to the long-term management of radioactive waste. These controls are described in 40 CFR Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes. Active controls require clear institutional and human responsibilities and the active performance of responsibilities such as controlling access to a disposal site by means such as guards; performing maintenance operations or remedial actions at a site; controlling or cleaning up releases from a site; or monitoring parameters related to disposal system performance. Passive controls are defined by their dependence on the design of controls and structures such as permanent markers placed at a disposal site; public records and archives; government ownership and regulations regarding land or resource use; and other methods of preserving knowledge about the location, design, and contents of a disposal system.

**Proprietary / Governmental Controls:** This classification of institutional controls is based on the legal authority of land owners to control use of their land. Proprietary controls, such as easements, are based on the rights associated with ownership of an interest in land. Government controls rely on the powers of governments to protect the public health and safety either through zoning, legislation, land ownership, or permit programs.

**Structural / Non-Structural Controls:** Structural controls include physical barriers (e.g., gates, fences, and natural barriers) to keep trespassers away from a site, signs to warn people of dangers, and engineered barriers (e.g. tanks) restricting or containing actual or potential contaminant migration. Non-structural controls are all other limitations on the use of land that do not require physical means of exposure prevention.

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supplement active remediation measures -- very seldom will they be used as the sole remedy. Based on current studies, DOE anticipates that institutional controls will be required following active remediation at approximately 100 of its sites.<sup>1</sup>

Leaving residual contamination on site as part of the remedy involves uncertainty associated with the contaminant's future form and movement and future site use. For example, an ERPM may be very certain that a contaminant will be hazardous for 40 years, reasonably certain of the direction and size of the contaminant plume for the first ten of the next 40 years, and uncertain of future interest in developing the site. Uncertainties like these and their associated varying time horizons are key elements of the remedy and institutional control selection and implementation process.

Selecting institutional controls requires the inclusion of parties not normally associated with the remedy selection process. Remedy selection typically involves DOE restoration and legal personnel, DOE contractors, regulators, and interested community members. When the remedy may include institutional controls, DOE-certified realty specialists will need to be key parties because many institutional controls have a basis in property and real estate law. Additional parties that could have a significant bearing on the selection and success of institutional controls, and therefore must be involved early in the process, can include local governments, tribal governments, state or federal government agencies, conservation or public interest groups, or private parties.

Institutional controls will be a necessity at many DOE sites due to the complexity of contaminants and site features. This guidebook is intended to help ERPMs understand institutional controls and their uses in CERCLA and RCRA remedies and provide insight into several aspects of selecting institutional controls:

- C Identifying possible institutional controls;
- C Evaluating the appropriateness of institutional controls based on site-specific factors;
- C Involving all key parties to the decision;
- C Selecting the best combination of institutional controls;
- C Reducing the uncertainty associated with institutional controls; and
- C Documenting the selected institutional controls.

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<sup>1</sup> U. S. Department of Energy, *Moving from Cleanup to Stewardship: A Companion Report to Paths to Closure*, DOE/EM-0466, October 1999.

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## Additional Reading Materials

“Assuring Institutional Constancy,” Public Administration Review, Todd R. LaPorte, Nov/Dec 1996, Vol 56 No. 6, page 535.

“Institutional Controls: A Reference Manual *DRAFT*,” U. S. Environmental Protection Agency Workgroup on Institutional Controls, Offices of General Council and Emergency and Remedial Response, March 1998.

“Institutional Controls: What They Are and How They Are Used,” U.S. Department of Defense, Office of the Deputy Under Secretary of Defense for Environmental Security, Base Realignment and Closure Program, Spring 1997, [www.dtic.mil/envirodod/brac/index.html](http://www.dtic.mil/envirodod/brac/index.html).

“Land Use and Cleanups: Beyond the Rhetoric,” George Wyeth, The Environmental Law Reporter News and Analysis, July 1996, pg 10358-10363.

“The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.1 & DOE 5400.5” Department of Energy.

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## Chapter 2 Regulatory Framework

In *Accelerating Cleanup: Paths to Closure*, the Department of Energy identified a goal of completing remediation activities at more than 90 percent of its sites by the year 2006.<sup>2</sup> This document also stated that “. . . closure of a site does not end DOE’s responsibility. In most cases, DOE will continue long-term surveillance and monitoring activities to ensure that human health and the environment are protected.” In many cases, these long-term surveillance and maintenance activities will involve the use of institutional controls to some degree to prevent inadvertent exposures to residual contamination. Since institutional controls are generally addressed during the remedy selection or site closure process, it is important to understand the regulatory structure affecting the use of institutional controls before selecting an institutional control as part of a remedy or as the sole remedy for a site or remediation project.

Remediation activities at most DOE sites are conducted under the authority of the Atomic Energy Act (AEA), CERCLA, or RCRA. The AEA gives DOE the authority and responsibility to protect property, the public, and the environment from the activities conducted under its purview. In response, DOE has developed radiation protection standards for protection of workers, the public, and the environment. This protection is achieved through DOE Orders and policies that establish limits on allowable radiation doses and impose controls to ensure that those limits are not exceeded.

Both CERCLA and RCRA require cleanup of releases of hazardous substances to the environment to levels protective of human health and the environment.<sup>3</sup> The U.S. Environmental Protection Agency (EPA) has long advocated a preference for permanent remedies that reduce the mobility, toxicity, or volume of residual contamination. This guidance is not intended to be used to circumvent this preference or to promote the use of institutional controls in situations where complete remediation is both practical and feasible. Rather, DOE hopes this document will enable project managers to better comply with existing regulations and improve the effectiveness of institutional controls where they are used. This chapter

### The Atomic Energy Act

Site ERPMS must also be aware of their responsibilities and requirements under the Atomic Energy Act (AEA). At times, DOE may determine that compliance with applicable environmental standards or procedures may be sufficient to satisfy the Department’s AEA responsibilities. However, DOE must make specific determinations of compliance with AEA requirements because the Department cannot automatically delegate its AEA responsibilities to non-DOE parties. ERPMS should consult the DOE Information Brief, “The Long-Term Control of Property: Overview of Requirements in Orders DOE 5400.1 & DOE 5400.5,” for information on the use of institutional controls under the AEA. This information brief is available online at <http://tis.eh.doe.gov/oepa/>.

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<sup>2</sup> U.S. Department of Energy, *Accelerating Cleanup: Paths to Closure*, DOE/EM-0362, p. ES-1, June 1998.

<sup>3</sup> “Hazardous Substances” are defined in the National Contingency Plan in 40 CFR Part 300.5. RCRA hazardous wastes and hazardous constituents are a subset of CERCLA hazardous substances.



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briefly outlines the regulatory framework guiding the use of institutional controls at DOE facilities. The chapter concludes with a brief introduction to the regulatory framework of federal land laws that may affect future land use decisions and the institutional controls selected.

## **Institutional Controls in CERCLA Remedies**

The procedures for evaluating and selecting remedies conducted under CERCLA authority were promulgated in a regulation known as the National Contingency Plan (NCP), and codified in 40 CFR Part 300. In the NCP, EPA stated that institutional controls should be used primarily to supplement engineering controls, but did not forbid the use of institutional controls as the sole remedy. Specifically, the following language on the use of institutional controls is provided in 40 CFR Part 300.430:

Institutional controls may be used during the conduct of the remedial investigation/feasibility study (RI/FS) and implementation of the remedial action and, where necessary, as a component of the completed remedy. The use of institutional controls shall not substitute for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of [the] remedy. [40 CFR 300.430 (a) (iii) (D)]

## **CERCLA Remedy Selection Criteria**

The EPA has established nine decision criteria that are to be used for balancing trade-offs, evaluating, and selecting remedies. These nine criteria are grouped into three categories:

*Threshold criteria* that must be met to be considered eligible for selection;

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs);

*Primary balancing criteria*;

- Long-term effectiveness and permanence;
- Reductions of toxicity, mobility, or volume through treatment;
- Short-term effectiveness;
- Implementability;
- Cost;

*Modifying criteria*;

- State acceptance; and

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- Community acceptance.

When selecting institutional controls as part of a remedy or as the sole remedy, the NCP prescribes that permanent solutions should be used to the maximum extent practicable and considers the preference for treatment as a principal element of a remedy (40 CFR 300.430 (f)). As with all other remedies, institutional controls need to be evaluated in terms of the nine CERCLA criteria.

### **EPA Guidance**

Although the NCP regulation specifies the conditions under which institutional controls can be incorporated into a remedy, it does not provide specific guidance on *how* to incorporate them into the remedy selection process. To clarify EPA's intent and address reasonable assumptions in the remedy selection process, EPA issued a directive entitled "Land Use in the CERCLA Remedy Selection Process."<sup>4</sup> This directive primarily addresses the role of land use in remedy selection, but also provides insight into EPA's position on the use of institutional controls. In this document, EPA specifies that institutional controls should be evaluated and implemented with the same degree of care as is given to other elements of the remedy. The directive states that in evaluating a remedy that includes an institutional control, EPA should determine:

- The type of institutional control to be used;
- The existence of the authority to implement the institutional control; and
- The appropriate entities' resolve and ability to implement the institutional control.

CERCLA also requires that federal agencies transferring remediated property to non-federal agencies include a covenant in the deed that states "all action necessary to protect human health and the environment has been taken with respect to any hazardous substances remaining on the property."<sup>5</sup> CERCLA requires federal agencies to demonstrate to EPA that a remedy is "operating properly and successfully" before the federal agency can provide the covenant required in the deed.<sup>6</sup> If remedial action is necessary after the property has been transferred, the federal government retains the responsibility for any contamination that occurred before the property transfer. Exhibit 2-1 provides more detail on CERCLA "operating properly and successfully" determinations.

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<sup>4</sup> U.S. Environmental Protection Agency, *Land Use in the CERCLA Remedy Selection Process*, EPA/OSWER Directive No. 9355.7-04, May 25, 1995.

<sup>5</sup> CERCLA Section 120 (h) (3) (A)

<sup>6</sup> U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Guidance for Evaluation of Federal Agency Demonstrations that Remedial Actions are Operating Properly and Successfully Under CERCLA Section 120(h)(3)*, (Interim) August 1996.

EPA has developed additional guidance on the use of institutional controls for federal facilities being transferred under CERCLA 120 (h) (3).<sup>7</sup> This guidance establishes the criteria that a federal facility must demonstrate to EPA in order for EPA to make the determination that a remedy is “operating properly and successfully.” This guidance applies to all federal facilities where institutional controls are part of the selected remedy and the federal agency is planning on transferring that property to a non-federal entity. It **does not** address whether or not an institutional control is an appropriate remedy or remedy component for a particular site; however, it does state that if the institutional control can not meet the criteria set forth in the guidance, then the use of institutional controls should be reconsidered. The criteria set forth in the guidance are summarized in Exhibit 2-2.

### **Institutional Controls in RCRA Remedies**

Less information exists on the use of institutional controls in RCRA corrective actions than is available for CERCLA remedies. The primary insight into EPA’s intent on the use of institutional controls in RCRA corrective actions is found in the Advanced Notice of Proposed Rulemaking (ANPRM) for corrective action for releases from solid waste management units (SWMUs), published in the Federal Register in May of 1996 (61 FR 19448, May 1, 1996). The ANPRM defines and updates information proposed by EPA in the Proposed Subpart S corrective action regulations, which were published in 1990 and have been used in place of guidance since that time (55 FR 30798, July 27, 1990). Although the proposed rule was recently withdrawn, many states have based their RCRA programs on the

**Exhibit 2-1  
CERCLA “Operating Properly and Successfully”  
Determinations**

CERCLA states that, for purposes of the covenant, all necessary remedial action has been taken if (a) the construction and installation of the approved remedial design has been completed and (b) the federal agency demonstrated to EPA that the remedy was “operating properly and successfully.”

A remedy is operating “properly” if it is operating as designed. A remedy is operating “successfully” if its operation will achieve the cleanup goals specified in the record of decision and it will be protective of human health and the environment.\*

In certain circumstances, CERCLA allows the federal agency to transfer property before all necessary remedial action has been taken. This early transfer can take place if the EPA or state governor (depending on the site’s NPL status) makes the following findings:

- the property is suitable for transfer based on the intended use;
- the deed provides for necessary use restrictions and response and remedial actions;
- the public has been informed of the early transfer request; and
- the transfer will not substantially delay response action at the site.\*\*

\* US EPA, Office of Solid Waste and Emergency Response, *Guidance for Evaluation of Federal Agency Demonstrations that Remedial Actions are Operating Properly and Successfully Under CERCLA Section 120(h)(3)*, August 1996 (interim draft).

<sup>7</sup> U. S. Environmental Protection Agency, *Institutional Controls and Transfer of Real Property under CERCLA Section 120 (h)(3)(A), (B), or (C)*, February, 2000.

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withdrawn Subpart S rule and are likely to retain the elements of Subpart S in their state programs.

The 1996 ANPRM states that, “EPA is committed to consistency between the results of the CERCLA and RCRA remedial action programs and thus, any changes to the CERCLA remedy expectations will be incorporated into the corrective action program.”

EPA’s specific expectations for the use of institutional controls in remedy selection under the RCRA corrective action program are described in the ANPRM:

EPA expects to use institutional controls such as water and land use restrictions primarily to supplement engineering controls as appropriate for short- and long-term management to prevent or limit exposure to hazardous wastes and constituents. EPA does not expect that institutional controls will often be the sole remedial action. [61 FR 19448, May 1, 1996]

Furthermore, the ANPRM indicates that EPA has a preference for permanent risk reduction. Institutional controls, however, can be allowed in situations where risk reduction, accomplished through reducing the toxicity, mobility, or volume of the waste, needs to be balanced with preventing exposures through the use of both engineering measures and institutional controls. The decision regarding whether preventing exposure through the use of institutional controls will be allowed at a site will be made on a site-specific basis.

In addition to EPA’s expectations for remedy selection in the corrective action process, EPA also addresses the use of institutional controls through the site closure process. Regardless of the remedy

**Exhibit 2-2**  
**Criteria for Institutional Controls**  
**at Federal Facilities Being Transferred**  
**Under CERCLA 120 (h)**

- A legal description of the real property.
- A description of the anticipated future use(s) for the site.
- Identification of the residual hazard or risk.
- The specific institutional control language in substantially the same form as it will appear in the transfer document and a description of the institutional controls and the legal authority for the implementation of these controls.
- A statement explaining, in the professional opinion of the transferring agency, that the institutional controls have been or will be established in conformance with the legal requirements and how they will be enforceable against future transferees and successors.
- A description of who will be responsible for monitoring and the frequency of monitoring.
- A description of the procedure that will be used to report violations or failures of institutional controls.
- A description of the procedure that will be used to enforce against violations.
- Assurance that the transferring federal agency will verify maintenance of the institutional control on a periodic basis.

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selected at a facility (or waste management unit) EPA mandates that all owners or operators of hazardous waste

- Disposal facilities;
- Waste piles and surface impoundments;
- Tanks systems that are required to meet the requirements for landfills; and
- Containment buildings that are required to meet the requirements for landfills

must permanently place a notice on the deed that the land was used to manage hazardous waste and that the property use is restricted (40 CFR 264.119).<sup>8</sup>

EPA has stated that its goal is to establish RCRA regulations that are consistent with the CERCLA program. Therefore, guidance published for CERCLA remedies should generally be considered applicable to RCRA corrective actions.

### **EPA Region V Guidance**

The applicability of standards developed under the CERCLA program in RCRA remedies is reiterated in EPA Region V guidance on the “Use of Institutional Controls in the RCRA Corrective Action Program,” which specifically states that institutional controls used as part of RCRA remedies should be evaluated against the nine remedy selection criteria in the National Contingency Plan.<sup>9</sup> The Region V guidance also indicates that the long-term risks and costs associated with leaving contamination in place should be compared to the risk reduction and cost of permanent remedies that do not require institutional and engineering controls. This comparison can occur when remedies are evaluated or during the design of interim measures. The Region V guidance also indicates that institutional controls can be evaluated and established as part of the RCRA Facility Investigation, during the design of interim measures, or during the Corrective Measures Study, however EPA recommends that the appropriateness of institutional controls be evaluated early in the process.

For federal facilities, the Final Decision and Response to Comments in orders or modifications to existing RCRA permits are the primary decision documents for implementing the institutional controls that are part of the remedial action. For federal land that will stay in federal ownership and control, alternative ways to institutionalize the restricted uses, such as the Federal Facilities Agreement, should be used.

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<sup>8</sup> Neither the proposed Subpart S Corrective Action Initiative or the site closure requirements are impacted by the recent promulgation of the Hazardous Remediation Waste Management Requirements (HWIR-Media). The preamble to the HWIR-Media rule specifically states “[the rule] does not alter the way that Subpart G or unit specific closure requirements apply to cleanup sites” and that “[HWIR] complements activities being done under the Subpart S Initiative”(63 FR 65874; November 30, 1998).

<sup>9</sup> U. S. Environmental Protection Agency, Region 5 Wastes, Pesticides, and Toxics Division, *Use of Institutional Controls in the RCRA Corrective Action Program*, March 2000.

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## EPA's Region IV Policy for Federal Facilities

EPA's Region IV has released a policy titled "Assuring Land Use Controls at Federal Facilities."<sup>10</sup> This policy is applicable to all federal facilities in Region IV being remediated under either CERCLA or RCRA, where land use controls are being relied upon as part of the remedy. Although only federal facilities located in Region IV states are bound by this policy (see Exhibit 2-3), other regions may use this policy as guidance, or may develop a similar approach.

The EPA Region IV policy uses the term "land use controls" as opposed to institutional controls, but there is no functional difference between the terms.

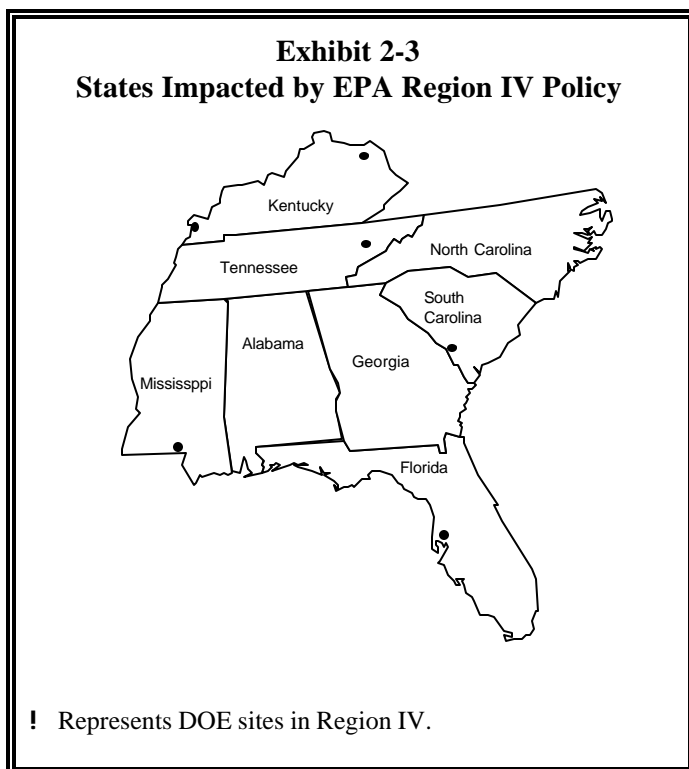
EPA Region IV has defined land use controls as:

. . .any restriction or control, arising from the need to protect human health and the environment, that limits use of and/or exposure to any portion of that property, including water resources.

Region IV's policy requires any federal facility that relies on land use controls as part of the remedy, to develop and implement a detailed Land Use Control Assurance Plan (LUCAP) prior to receiving agency concurrence on the remedy. A LUCAP is a "written, installation-wide plan that sets out the procedure to assure land use controls (LUCs) remain effective over the long-term for all areas at the particular installation where they are required." The nine minimum requirements that must be included as part of the LUCAP are summarized in Exhibit 2-4.

## EPA's Region X Policy for Federal Facilities

EPA's Region X expressed that it has experienced an increased reliance on the use of institutional controls as a component of remedy selection at federal facilities. The Region determined that the



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<sup>10</sup> U.S. Environmental Protection Agency, Region IV Federal Facilities Branch, *Assuring Land Use Controls at Federal Facilities*, Memorandum 4WD-FFB, April 21, 1998.

increased reliance on restricted land use has created the need for a clear and consistent policy on using institutional controls as part of cleanup actions. As a result, EPA Region X issued the “Final Policy on the Use of Institutional Controls at Federal Facilities,” which is applicable to all Region X federal facilities sites undergoing remedial action pursuant to either CERCLA and/or RCRA (see Exhibit 2-5).<sup>11, 12</sup> Although only these sites located in Region X are subject to this policy, other sites may want to review this information in case their EPA Region develops a similar approach. As a result of this policy, EPA Region X will not concur on any remedial and/or corrective action, or RCRA permit that involves institutional controls unless the lead federal agency meets specific institutional control requirements that are detailed in the policy. This policy requires that institutional controls be given the same level of thoroughness of analysis as any other element of a proposed remedial action, and that the analysis be documented in the Feasibility Study or Corrective Measures Study. The Region X guidance has two primary components:

1. Criteria for Region X concurrence on proposed remedial actions, corrective action, and enhancing existing cleanup decisions that include institutional controls as a component; and
2. Guidelines for the efficient and effective oversight of institutional controls.

### **Institutional Control Requirements**

**Exhibit 2-4**  
**Summary of Region IV LUCAP**  
**Requirements**

1. A LUC implementation plan, the objectives for the area, and the particular controls or mechanisms to be implemented.
2. The program and point-of-contact responsible for monitoring, maintenance, and enforcement.
3. A commitment by the facility to request funds for maintaining LUCs.
4. Quarterly onsite monitoring unless another monitoring frequency is approved.
5. Notification when a major change in land use is anticipated.
6. Annual field inspections.
7. Certification of continued compliance in an annual report.
8. Notification upon discovery of unauthorized “major change in land use.”

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<sup>11</sup> U.S. Environmental Protection Agency, Office of Environmental Cleanup Region X, *Region X Final Policy on the Use of Institutional Controls at Federal Facilities*, Memorandum, May 1999.

<sup>12</sup> For the purposes of CERCLA Section 120 (h), EPA will apply this policy to cleanups that include institutional controls until the federal property is transferred to private ownership. If the property is transferred to another federal agency, the policy will continue to apply.

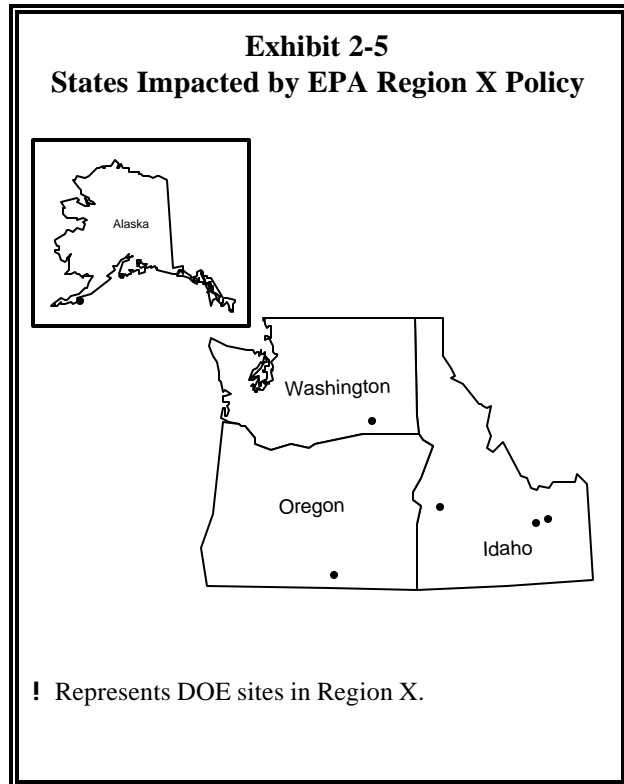
The institutional control requirements detailed in the Region X policy must be incorporated into a decision document, which can include (among other things) CERCLA Action Memoranda, Records of Decision (RODs), ROD amendments, consent decrees, RCRA orders or consent agreements, RCRA permits and permit modifications. All remedies that include institutional controls must provide operating unit-specific as well as facility-wide institutional control requirements. The operating unit-specific requirements must include the geographic location where the institutional control will apply; the objective of the control; and a description of the types of restrictions that need to be in place. The facility-wide institutional control requirements are detailed in seven paragraphs, summarized in Exhibit 2-6.

### **Implementation of Institutional Controls**

Region X also developed guidelines for federal facilities to ensure that the institutional controls established in the decision documents are being implemented adequately. Because the RODs or RCRA permits at many federal facilities have already been issued, EPA outlined two separate processes: one for sites that do not have signed decision documents, and one for sites where the decision documents have been signed.

For sites where the Feasibility Study (FS), Corrective Measures Study, or the Corrective Measures Implementation documents have not been signed or finalized, EPA outlined the following five requirements.

1. The FS will evaluate proposed institutional controls with as much care as is given to other remedy elements. For CERCLA sites, this means that the nine selection criteria should be applied when assessing institutional controls as part of a proposed remedial action. For sites being remediated under RCRA, institutional controls should be considered at the earliest possible stages.
2. The operating unit-specific and facility-wide institutional control requirements described in the policy must be clearly stated in the decision document.





3. The federal facility will monitor compliance with the institutional control requirements stated in the decision document and report results to EPA and the state.
4. Compliance with the institutional control requirements at CERCLA sites will be documented in the Remedial Action Report.
5. EPA will review all aspects of the implementation and effectiveness of the institutional controls in the five-year reviews conducted at CERCLA sites. For sites remediated under RCRA, EPA will conduct reviews of the implementation and effectiveness of the institutional controls at the permit five year re-opener review, the ten year renewal, or whenever information indicates the controls are not effective.

Facilities with signed decision documents will need to meet the unit-specific and facility-wide institutional control requirements outlined in the policy through a modification to the existing document. The modification should be addressed in an Explanation of Significant Difference (ESD) for CERCLA sites. Under RCRA, modifications can be made in the five-year re-opener or ten-year permit renewal or whenever information indicates the controls are not effective. If the decision document designated "no further action" based on a preexisting limitations on the use of land, surface water, or groundwater, the ESD or permit modification should assess the adequacy of the limitations and an evaluation of the effectiveness of the preexisting limitations must be included in the institutional control monitoring report.

### **DOE Orders**

DOE Orders provide detailed and, in some cases, additional requirements for the management of radioactive waste, radioactive

**Exhibit 2-6  
Summary of Region X  
Facility-Wide IC Requirements**

- A. Develop a comprehensive facility-wide approach for establishing, implementing, enforcing, and monitoring ICs at the facility. This approach will frequently include a Base Master Plan or a facility-wide land use plan, installation maps, a comprehensive permitting system, and other installation policies and orders.
- B. Submit to EPA and the state a monitoring report on the status of the ICs within six months of signature on the decision document with an updated monitoring report submitted annually thereafter.
- C. Notify EPA and the state immediately upon discovery of any activity that is inconsistent with the operable unit-specific institutional control objectives for the site, or of any change in the land use or land use designation of a site addressed under item (A).
- D. Identify a point of contact for implementing, maintaining, and monitoring institutional controls.
- E. Request and obtain funding to institute and maintain institutional controls. (This requirement can be dropped if the facility can demonstrate a duplicate or similar requirement in a Federal Facility Agreement or similar document.)
- F. Notify EPA and the state at least six months prior to any transfer, sale, or lease of any property subject to institutional controls required by an EPA decision document.
- G. Restrict the deletion or termination of any institutional control unless EPA and the state have concurred in the deletion or termination.

mixed waste, and other waste types. Some of the more relevant waste management orders are listed in Exhibit 2-7.<sup>13</sup> Currently, no DOE Orders exist that specifically address the selection and implementation of institutional controls as part of a remedy, however, the orders listed in Exhibit 2-7 have implications for how institutional controls should be considered at DOE sites. The most notable of

| <b>Exhibit 2-7<br/>Relevant DOE Orders</b> |                                    |   |
|--|------------------------------------|---|
| <u>DOE Order #</u>                         | <u>Title</u>                       | <u>Objective</u>  |
| 5400.1                                     | General Env. Protection Prog.      | To establish environmental protection program requirements, authorities, and responsibilities for DOE operations for assuring compliance with applicable federal, state, and local environmental protection laws and regulations, executive orders, and internal Department policies.   |
| 5400.5                                     | Rad. Protect. of the Public & Env. | To operate DOE facilities and conduct its activities so that radiation exposures to members of the public are maintained within the limits established in this Order and to control radioactive contamination through the management of real and personal property. It is also a DOE objective that potential exposures to members of the public be as far below the limits as is reasonably achievable (ALARA) and that DOE facilities have the capabilities, consistent with the types of operations conducted, to monitor routine and non-routine releases and to assess doses to members of the public. |
| 4300.1C                                    | Real Property Management           | To establish Department-wide policies and procedures for the acquisition, use inventory, and disposal of real property or interests therein.  |
| 435.1                                      | Radioactive Waste Mgmt.            | To establish policies, guidelines, and minimum requirements by which DOE manages its radioactive and mixed waste, and contaminated facilities. This Order replaced Order 5820.2A.   |
| 430.1A                                     | Life Cycle Asset Management        | To plan, acquire, operate, maintain, and dispose of physical assets as valuable national resources. Stewardship of these assets shall be accomplished in a safe and cost-effective manner to meet the DOE mission, and to ensure protection of workers, the public, and the environment.  |
| 4320.1B                                    | Site Development Planning          | Identifies the analyses that must be conducted in order for DOE property to be considered excess and available for transfer to  |

<sup>13</sup> DOE Orders and Directives can be found at <http://www.explorer.doe.gov:1776/htmls/alldirectives.html>

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these orders is DOE Order 435.1, “Radioactive Waste Management.” This Order includes performance objectives for low-level waste disposal cells that include an objective that the site assure dose levels received by inadvertent intruders do not exceed 100 millirem per exposure after the loss of active institutional controls, which is stated to be 100 years. DOE Order 435.1 also requires performance assessments that demonstrate compliance with the Order’s objectives and include monitoring activities; however, no specific information is provided on how the facility should use institutional controls or ensure their effectiveness for the 100 year period. In addition to the performance assessments, the disposal unit closure section includes a requirement that, upon closure, disposal facilities be managed in conformance with RCRA and/or CERCLA requirements.

DOE Order 5400.5, “Radiation Protection of the Public & the Environment,” includes requirements for cleanup of residual radioactive material, management of the resulting wastes and residues, and release of property. Like other DOE Orders, this Order includes requirements that institutional controls be incorporated into remediation plans, but does not provide specific guidance on how those controls should be selected and implemented.

## **State Regulations**

Many state agencies have policies or regulations on the use of institutional controls in remedies conducted in their state. At the time that this document was developed, 42 states referenced the use of institutional controls in the state’s environmental regulations.<sup>14</sup> These regulations may be more restrictive or specific than the federal regulations that apply at the facility. Before selecting any remedy that will include the use of institutional controls, facility personnel should consult and coordinate with state environmental regulators, local redevelopment authorities, and state real estate attorneys to determine the state’s position on the use of institutional controls. For example, Tennessee has developed a policy on the use of “perpetual institutional controls.”<sup>15</sup> This policy outlines the state’s requirements for RODs that will rely on perpetual institutional controls. This policy originally applied to the remediation of a uranium burial ground at the Oak Ridge Reservation, but was made applicable to all onsite areas through a state policy on “Natural Attenuation and ARAR Waivers for Oak Ridge

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<sup>14</sup> Based on a search of the ENFLEX database of state and federal regulations; February, 1999. The list of 42 states includes : Alabama, Alaska, Arizona, Colorado, Connecticut, Delaware, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nebraska, Nevada, New York, New Jersey, New Mexico, North Dakota, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wyoming.

<sup>15</sup> State of Tennessee, *Guidance Policy on Perpetual Institutional Controls*, September 1, 1997.

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Reservation CERCLA Decisions.”<sup>16</sup> The policy requires that the following three items must be included in any ROD signed by the state:

- Wording that recognizes that the long-term and final remedy is the removal and proper disposition of waste;
- Target date(s) for waste removal; and
- Funds are established that ensure adequate monetary resources are available in the absence of Congressional appropriations to carry out any necessary institutional obligations.

## **Federal Land Use Laws**

Regardless of which regulatory framework results in institutional controls being selected as part of a remedy, federal land use laws will affect the use of institutional controls if the land is going to be re-used by some organization or agency other than DOE, or if the land will be leased, sold, or granted to other parties.

The DOE can allow re-use of land under the AEA, the DOE Organization Act, or the Hall Amendment (an amendment to the DOE Organization Act) but each of these three vehicles imposes certain restrictions. If the area or site that will require institutional controls is being considered for re-use by any organization other than DOE, the DOE-certified realty specialist should be contacted to determine the site’s legal status and to clarify how the use of institutional controls may be affected. An in depth discussion of the impacts of each of these land-transfer vehicles is available in “Resourceful Reuse: A Guide to Planning Future Land Uses of Department of Energy Sites.”

When DOE does sell or grant land, it retains “ultimate responsibility for monitoring, maintaining and enforcing the institutional controls” associated with the land.<sup>17</sup> This on-going liability for the effectiveness of institutional controls makes it imperative for ERPMs to fully understand the institutional controls available to them and the responsibilities inherent in their use if property will be transferred.

## **Legal Status of Land**

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<sup>16</sup> “In the event radioactive decay cannot result in acceptable risk levels within a reasonable and acceptable period of time, then either an alternative action must be chosen that will accomplish that risk reduction, or the ROD must include arrangements for long-term institutional controls” as per the *Tennessee Guidance Policy on Perpetual Institutional Controls*. State of Tennessee, January 21, 1998, *Tennessee Guidance Policy on Natural Attenuation and ARAR Waivers for Oak Ridge Reservation CERCLA Decisions*.

<sup>17</sup> U.S. Environmental Protection Agency, *Institutional Controls and Transfer of Real Property under CERCLA Section 120 (h)(3)(A), (B), or (C)*, February 2000

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The methods available to DOE for re-using land depend on how DOE initially obtained use of the land. Almost all of the land used by DOE can be categorized by its legal status as either acquired or withdrawn land. Acquired land was land originally purchased by DOE from private owners. Withdrawn land is land that is held in the public domain but reserved by the Department of the Interior (DOI) for a federal agency such as DOE.

Under the Federal Land Policy and Management Act, withdrawn land that is excess to DOE is relinquished to the DOI to be returned to the public domain. Withdrawn land that is temporarily not needed by DOE can be leased with DOI approval.

When acquired land is excess to DOE, the Department reports that land use status to the General Services Administration (GSA) for GSA disposition of the land. The procedure for reporting excess acquired land is spelled out in the Federal Property and Administrative Services Act and its accompanying legislation. However, DOE can also dispose of the land under the authority of its enabling legislation. The Department can also lease acquired land if it is temporarily not needed.

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## Additional Reading Materials

“CERCLA Requirements Associated with Real Property Transfers,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413/9808) April 1998.

“Cross-Cut Guidance on Environmental Regulations for DOE Real Property Transfers,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413/9712) October 1997.

“Delay of Closure for RCRA Hazardous Waste Management Facilities,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (EH-231-021/0993) September 1993.

“RCRA Closure and Post-Closure Plans,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (EH-231-009/1291) December 1991.

“RCRA Corrective Action and Closure,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (EH-231-051/0295) February 1995.

“Resourceful Reuse: A Guide to Planning Future Uses of Department of Energy Sites,” U.S. Department of Energy, Office of Environmental Management, (DOE/EM-0285) May 1996.

“Transfer of Environmental Permits After the Sale of Transfer of DOE Property,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413-061/1195) November 1995.

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## Chapter 3 Types of Institutional Controls

The types of institutional controls that an ERPM may consider using in a remedy will depend upon the expected post-remedy land use:

- Will DOE be transferring the land (e.g., selling, or granting)?
- Will DOE retain the land but allow use by non-DOE entities (e.g. a lease arrangement)?  
or
- Will DOE retain the land for future use by DOE?

The following definitions of institutional controls are grouped by those three categories of land control. Fences and signs are unique because they are institutional controls that can be used in any of the three land use situations.

### DOE Transfers Land

**Easements** are legal mechanisms through which the owner of property allows a limitation on the use of the property by granting property rights to another party who then holds the easement. An affirmative easement grants the easement holder usage of or access to the land; a negative easement allows the holder to limit the land owner's use of the land. An easement can be in perpetuity or be for a term of years.

Under an affirmative easement, DOE could retain the right to come onto transferred land to monitor remedy or institutional control performance, or to conduct additional remedial action on the land. A negative easement would allow DOE to preclude the land owner from activities like well drilling or excavation that would disrupt the remedy or allow access to hazardous substances. Many states have laws that permit the use of conservation easements, a form of negative easement. Under a conservation easement, property can only be used for conservation-related purposes.

**Deed Notifications** are descriptions about the property built into the property deed to convey information about the land to future buyers. CERCLA requires deed notifications for any transfer of federal real property on which any hazardous substance was known to have been disposed or released, or stored for one year or more. (40 CFR 373) RCRA also requires deed notifications to explain that the property has been used to manage hazardous or mixed wastes. (40 CFR 264.119(b) and 265.119(b)) Although they are required by CERCLA and RCRA, deed notifications cannot create any enforceable land use restrictions because they do not involve a transfer of property rights.

**Deed Restrictions** are provisions built into a property deed prohibiting certain uses of the property. Although "deed restriction" is the more commonly used term, the mechanism is actually a negative easement because an enforceable deed restriction can only be created when a property right is granted. Deed restrictions may in some cases be enforced through a reversionary clause, which allows the former property owner (in this case the Federal government) to take back ownership of the property if

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the terms of the deed restriction are not followed. An example of a deed restriction would be a 20 year prohibition on the excavation of soils at depths greater than two feet.

**Permits** authorize certain land use activities through approval by the appropriate federal, local, or state government entity. Some jurisdictions will require a permit for activities such as well drilling, excavation, blasting, mining, construction, hunting, or fishing and will have established permit application procedures. Permit programs have the effect of institutional controls when the land owner, wanting to prohibit certain activities, relies on the program to deny permits for the identified activities. However, the permitting authority must have sufficient information to know why a permit for certain activities should be denied. For example, the local government body responsible for issuing construction permits would need to have information on where residual contaminants remain, their nature, the time period they will be harmful, and why construction should not be allowed in the area specified. In many states, permit programs are associated with state-imposed groundwater use restrictions. Permits do not confer or affect property rights.

**Zoning** is the vehicle used by local governments to regulate non-federal land for specific uses. Zoning has the effect of an institutional control if DOE relies on it to ensure that the desired restrictions on land use are upheld. However, DOE cannot enforce zoning of non-federal land directly even if DOE is depending upon zoning as an institutional control to control off site land use. Zoning can only be enforced by a local government through the authority granted to it by a state government. For example, a decision may be made to allow residual contamination to remain onsite with the understanding that neither human nor environmental harm would occur if the land is only used for commercial or industrial purposes. The appropriate local government body could modify zoning for the area around the site to ensure it is not used for residential development. Zoning authority is granted through the state. In addition to zoning, local governments may develop ordinances specifically tailored to restrict the use of or access to particular areas. Anyone relying on the use of zoning or ordinances to protect a restricted land use must determine if the local government has the appropriate zoning or ordinance authority, mechanisms, and the will to maintain the zoning restrictions.

### **DOE Retains the Land and Allows Re-use by Non-DOE Entities**

**Leases** are legal documents that convey an interest in real property and bind the parties to certain land use conditions. The land owner (the federal government) and the land user could enter into lease terms that specify such things as the chemicals that cannot be used on site, site access routes, personnel training requirements, and water usage restrictions. Any violations of lease terms could be dealt with through normal legal channels. The lease terms and conditions might stipulate if DOE or the lessee is responsible for sign and fence maintenance. To supplement the effectiveness of a lease, DOE could combine the use of a lease agreement, with the use of fences and signs.



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## DOE Retains Land for Future Use by DOE

**Fences** are fixed structures functioning as boundaries, barriers, or other means of security. The type of fence selected as an institutional control is highly site specific. Fence design and construction must be commensurate with the required level of access restriction and the likelihood of trespasser interest in the site. Fences are often subject to vandalism and can be easily breached if not adequately maintained. Fences and signs are also appropriate institutional controls when DOE transfers or leases the land to other entities; however, in those cases additional institutional controls may be necessary to supplement the remedy.

**Signs** consist of both the message and the material used to convey information on the land and its use restrictions. The message must be designed to be understood for the length of time it must serve as a warning. The materials used to construct the sign must endure for that same time period. Since a sign is only as good as its capability to convey a message that is understandable, periodic assessment and updating of the message and the material may be necessary. Signs are frequently subject to vandalism and natural processes such as floods and storms. For these reasons, their value as an institutional control is limited unless combined with other measures.

Exhibit 3-1 summarizes each of these institutional controls, lists their advantages and limitations, suggests possible responses to the limitations, and describes the situations when DOE should consider using each of the controls listed. Not all institutional controls will be appropriate for all DOE sites. Determining which institutional controls to use is highly dependent upon site conditions (see Chapter 4) as well as who owns the land and therefore has the authority to impose and enforce land use restrictions. Because the usefulness of institutional controls can vary depending on state laws, ERPMS should consult with DOE-certified realty specialists when considering the most appropriate institutional control(s) to select. The DOE-certified realty specialist can provide information on how the state laws may affect the use of institutional controls at any specific site. In addition, the specialists may be able to suggest how other mechanisms not discussed here such as condemnation, reversionary interests, covenants, equitable servitudes, or state water use restrictions might function as institutional controls at some sites.

If DOE retains the land with appropriate institutional controls in place and decides at some future date to transfer it, different institutional controls may need to be developed and implemented by DOE and/or the new owner. The new owner may need to develop different institutional controls if the land is subsequently transferred to a third party.

**Exhibit 3-1  
Possible Institutional Controls**

| <b>Institutional Control</b>         | <b>Definition</b>  | <b>When Used By DOE</b>  | <b>Purpose</b>  | <b>Advantage</b>  | <b>Limitation</b>  | <b>Possible Response</b>   |
|--------------------------------------|--|--|---|---|--|--|
| Deed Notification                    | Property deed is used to convey information about the land to a future buyer.  | When land is transferred. Required under both RCRA and CERCLA if the property was used to dispose or store hazardous waste/substances, or if releases have occurred. | DOE is required to use deed notifications pursuant to CERCLA and RCRA.  | Easily implemented. Buyers may not be able to use CERCLA innocent land owner defense to preclude liability for any harm that may arise. | Does not create any enforceable use restrictions because there has been no transfer of an interest in the property. Buyers of land can ignore the notification at their own risk and harm could ensue from their actions. Possible risk of notification being dropped from the deed when the property is transferred to a third party.                   | Layer deed notification with an easement and reliance on another institutional control such as a zoning or permit program. |
| Deed Restriction (Negative Easement) | Provisions placed in a deed limiting the use of the property by prohibiting certain activities. A property interest must be conveyed by the owner for a restriction to be enforceable. | When land is transferred.*   | Preclude certain uses (e.g., excavation, residential use, well drilling) of the land for the duration of the risk created by the residual contaminants. | Deed recording procedures are in place in all counties.   | Deed restrictions must be carefully designed to bind all subsequent buyers to observing the restriction (i.e., restriction must "run with the land" rather than cease after the original buyer transfers the property). States govern the use, limits, and duration of deed restrictions, so they may be harder to implement in some states than others. | Determine if a conservation easement is appropriate.   |

| Institutional Control | Definition   | When Used By DOE   | Purpose  | Advantage   | Limitation  | Possible Response   |
|-----------------------|--|--|--|---|---|---|
| Easement              | Property owner allows a limitation on the use of the property by granting property rights to the holder of the easement.   | When land is transferred.**                                    | <p>To retain the right to come onto the land to monitor remedy, institutional control performance, or to conduct additional remedial action (affirmative easement.)</p> <p>To preclude the land owner from activities that would disrupt the remedy or allow access to hazardous substances (e.g., well-drilling) (negative easement.)</p> | Generally well accepted real property concepts and can be easily implemented as long as the prospective owner of the land agrees to the easement. | Can be difficult to enforce because only the easement holder can bring suit against the land owner for easement violation. Can cease to exist if the holder does not take prompt response to a violation. Monitoring costs to ensure easements are appropriately exercised could be high. Easements are subject to state authority and interpretation so their usefulness may vary from state to state. | Determine if the state hosting the site recognizes conservation easements and if they can be used to achieve the required use restrictions. |
| Fences                | Fixed structures functioning as boundaries, barriers, or other means of security. The type selected will depend upon the severity of harm that could result if access occurred, and the likelihood of people or animals trying to get on the land. | When the federal government retains the land.                  | Keep non-approved users off the site or the areas that must be protected.  | Fences would be easily implemented.   | Fences could be expensive to construct, maintain, and repair through time depending on materials used and terrain enclosed. Can be ineffective if used in remote areas attractive for other uses, are breached easily, and subject to vandalism.  | Institute fence monitoring and maintenance program commensurate with harm caused by breaching of fence.                                     |
| Lease                 | Documents that describe the conditions and terms of approved use and convey an interest in property.   | When land retained by DOE is being leased by a different user. | Land can be used for certain beneficial uses despite residual contamination. Leases stipulate terms of use.  | Establishes legal basis for enforcing use restrictions while still allowing beneficial re-use of the land.  | May be costly to monitor user compliance with lease terms.  | Build self-audit, monitoring and reporting requirements into lease.   |

| <b>Institutional Control</b> | <b>Definition</b>   | <b>When Used By DOE</b>   | <b>Purpose</b>   | <b>Advantage</b>  | <b>Limitation</b>  | <b>Possible Response</b>  |
|------------------------------|---|---|--|---|--|---|
| Permit                       | Federal, local, or state government-administered programs established to restrict or control land uses (e.g., excavation, drilling, or construction.) | When land is transferred or when the federal government retains the land but allows limited beneficial reuse. | These programs have the effect of institutional controls when they are relied upon to avoid damaging an in-place remedy or accessing contaminated groundwater or soil. | Permit programs are generally already in effect in most jurisdictions | Permit programs may vary in effectiveness from jurisdiction to jurisdiction.   | Work with permit program officials to strengthen permit processing and monitoring capability. |
| Signs                        | The message and the material used to convey information on residual contaminants and land use restrictions.   | When land is retained, particularly if contamination extends beyond the site boundary.                        | Warn approved users and trespassers of hazards associated with non-approved uses.  | May be easily implemented initially.                                  | May be difficult to construct message and materials that are understandable and durable through time. May be costly to monitor and replace. Possibly ignored and subject to vandalism.                     | Develop and implement a program to monitor sign effectiveness and modify signs as needed.     |
| Zoning                       | Legal authority used by local governments to regulate land use for specified purposes.  | When land is transferred.   | To enforce land use restrictions, often used in conjunction with easements.  | Zoning tools can be effective and are commonly accepted.              | Jurisdictions will vary in their zoning capabilities. Zoning boards can re-zone, or grant variances or special exemptions to existing zoning. Subject to change if political or economic pressures change. | Work early with zoning authorities to develop or enhance their capabilities.                  |

\* Negative easements are not only used when DOE transfers land. Negative easements have been established between DOE and non-federal entities to control potential exposure to environmental contamination that has migrated off site or is anticipated to migrate off site in the future. One example is the agreement that DOE has to provide potable water to certain off site areas adjacent to Brookhaven National Laboratory, and to prohibit use of groundwater in these areas. These land use restrictions are being implemented on privately owned land that has never been owned or controlled by DOE.

\*\*Easements have been established between DOE and non-federal entities to allow DOE to gain access to non-federal lands for the purposes of conducting environmental monitoring. One example is the easement established between DOE and the State of Missouri that allows DOE personnel to travel across state-owned land adjacent to the Weldon Spring site to conduct environmental monitoring of surface water in accordance with a site-specific agreement requiring monitoring of off site areas.

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## Additional Reading Materials

“A Guide to Establishing Institutional Controls at Closing Military Installations”, U.S. Department of Defense, February 1998.

“Institutional Controls: A Reference Manual *DRAFT*”, U. S. Environmental Protection Agency Workgroup on Institutional Controls, Offices of General Council and Emergency and Remedial Response, March 1998.

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## Chapter 4 Selecting Appropriate Institutional Controls

The EPA has expressed a preference for remedies that include permanent solutions to reduce the toxicity, mobility, or volume, of contaminants. Because institutional controls are used to prevent exposure to risks (residual contamination) rather than remove or reduce those risks, institutional controls should primarily be used as a component of other actions unless leaving waste in place proves to be the most favorable risk management decision (i.e., due to technical or economic limitations, concerns regarding worker safety, or to prevent extensive collateral ecological damages.)

When institutional controls will be included in the site remedy, ERPMs need to identify, evaluate, and select the specific institutional controls that will contribute to the long-term effectiveness of the remedy. Making decisions about remedies that include institutional controls requires several considerations.

- Considering the role of institutional controls early in the remediation decision making process;
- Communicating with regulators, the public, and other stakeholders on future use issues;
- Considering site-specific factors that influence the type and extent of controls;
- Defining specific goals and objectives for selecting institutional controls; and
- Evaluating institutional controls with the same degree of rigor used for all types of response actions.

### When to Address Institutional Controls in the Remedy Selection Process

The identification, evaluation, and selection of institutional controls is an iterative process that begins with the conceptualization of the remediation project. Programmatic and technical uncertainties are inherent during closure and post-closure operation of remedies -- including the time frame that institutional controls will remain effective. Uncertainties associated with remedial alternatives may be evaluated through the development of a conceptual site model for remedial alternatives. As soon as the conceptual site model is developed (e.g., during scoping), the expected hazards warranting remediation, and the current and potential exposure scenarios will be identified.<sup>18</sup> As site data are further evaluated and collected (e.g., Remedial Investigation, RCRA Facility Investigation, etc.) the conceptual site model

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<sup>18</sup> The RCRA/CERCLA Division of DOE's Office of Environmental Policy and Guidance (EH-413) has developed a software application for developing and drawing a site conceptual model of hazardous waste sites. Known as the *Site Conceptual Exposure Model Builder* (SCEM Builder), this simple to use interactive program can be accessed via the Internet and used free of charge at [www.eh.doe.gov/oepa](http://www.eh.doe.gov/oepa) (a link to the SCEM Builder and the user's manual is located under the "Tools" button).

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is refined.<sup>19</sup> An ERPM's understanding of the potential residual contamination and resulting need for institutional controls becomes more specific with the development of a more complete conceptual site model.<sup>20</sup> This improved understanding will form the basis for identifying the range of institutional controls that should be evaluated in detail. Considering institutional controls in a detailed evaluation early in the remedy selection process will improve the likelihood that the most effective institutional controls or other remedy will be selected and implemented.

## Obtaining Input from Regulators and Stakeholders

The importance of early stakeholder involvement is amplified for any remediation decision that will result in leaving waste in place. This is especially true when that decision may involve the use of institutional controls since the effectiveness of the remedy may rely on either stakeholders or regulators cooperating or participating in the implementation and enforcement of the controls.

Whether DOE intends to transfer land to non-federal entities or retain land for DOE missions, the ERPM, regulators and stakeholders must develop a fundamental understanding of the institutional control alternatives and their implications for future land uses during the remedy selection process. Different stakeholders and regulatory agencies may have different goals and objectives concerning future land use for a DOE site. For sites or portions of sites that are undergoing site closure, this inherently involves understanding the needs, desires, and expectations of the site stakeholders.<sup>21</sup> The relationship between institutional controls and future site uses could be based on two scenarios:

- Future use expectations *may be driven by* the cleanup decision. This situation occurs when leaving waste in place is the best or only possible decision given the nature of the contamination. In this instance the presence of residual contamination necessitates land use restrictions that will be enforced through the use of institutional controls.

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<sup>19</sup> In Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care when Wastes Will Remain On Site (DOE/EH-413-9910, October 1999), DOE indicated that sites typically prepare conceptual site models during the remedial investigation and remedy selection phases of the site remediation process. In this document, DOE recommended preparation of a matrix of remedy conditions that defines barriers in place and restrictions that are required to maintain the protectiveness of the remedy.

<sup>20</sup> Incorporating institutional controls into the conceptual site model should not be confused with incorporating them into a CERCLA baseline risk assessment. The degree to which institutional controls can be considered in developing a CERCLA baseline risk assessment is discussed in an existing DOE information brief. For more information see, U.S. Department of Energy, *Use of Institutional Controls in a CERCLA Baseline Risk Assessment*, EH-231-014/1292, December 1992.

<sup>21</sup> The Hanford Comprehensive Land Use Plan Environmental Impact Statement (U.S. Department of Energy Richland Operations, DOE EIS-0222, September 1999, (<http://www.hanford.gov/eis/hraeis/hraeis.htm>)) provides an example of how a DOE site with diverse stakeholder and regulatory agency interests coordinated to develop a comprehensive land use plan.

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- Future use expectations *may drive* the type and extent of controls employed. In this scenario, economic, social, legal (e.g. treaties or agreements) or political pressures for land use form the basis for the type or range of institutional controls that are considered. Here, stakeholders' desires or needs for site use will determine whether or not institutional controls are acceptable, or which institutional controls should be considered.

Discussions on future use should not be conducted with the idea that the Department is permanently restricting the choices of future generations. Rather, discussions on future site uses should focus on the potential uses afforded, based on the degree and type of residual contamination that will remain onsite. Future site use discussions should be aimed at ensuring that current and future generations understand the types of uses that are advisable given the residual contamination, with the understanding that uses that would result in different exposure scenarios should only be considered if the selected remedy is revisited.

In addition to the parties typically involved in environmental remediation decisions, other entities such as economic development interests, local reuse authorities, local municipalities, DOE-certified realty specialists, representatives from the Office of Chief Counsel, and appropriate site managers play a significant role in identifying potential site future uses. Because of this role, individuals from these fields of study or organizations need to be included in the remedy selection body. This is particularly true for cases where DOE is considering making the remediated area available for non-DOE use. The types of expertise and knowledge that these individuals will bring to the discussion of remediation alternatives and future land use will encompass (but not be limited to) the following subject areas:

- Community needs;
- Potential land uses;
- Anticipated property owners;
- Local land use authorities and restrictions;
- Legal status of the property and knowledge of the implications of that status; and
- Expected economic, political and demographic conditions.

### **Considering Site-Specific Factors**

It is important to understand the link between the existing site conditions and the functions the institutional controls are intended to serve. When considering incorporating institutional controls as part of a remedy it is necessary to understand several site-specific factors:

- Threats to human health and the environment;
- Potential receptors;
- Routes of exposure;
- Likelihood of exposure; and
- Duration of exposure.



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In a case where subsurface contamination will remain in soils, simply stating that residual contamination will exist is insufficient. The ERPM needs to make sure that the *reason* institutional controls are needed (e.g., to block a particular receptor pathway, to protect workers) is identified to ensure that the proper control is selected and the information necessary to implement the control is well documented. Below is an example description of a condition warranting controls.

*Cesium-137 is present in subsurface soils between 10 and 20 feet below ground surface and has a maximum concentration of 40 pCi/g, which exceeds the current residential cleanup goal for protection against external exposure to humans. The concentration of Cesium-137 will decay to acceptable levels in approximately two half lives (approximately 60 years).*

### **Defining Goals and Objectives**

The institutional control options considered as part of the remedy should be based on the specific site conditions and expected exposure scenarios. The potentially feasible institutional controls will be bounded by :

- Short and long term land-use expectations (e.g., current industrial, future residential, future recreational green space);
- Availability of enforcement mechanisms (e.g., property owner controls, third parties, local government, state government); and
- Community acceptance of the response action.

These social, economic, and political factors should be identified and explored through interaction with decision makers and stakeholders. The ERPMS must communicate with those responsible for future land use planning as well as the general public to determine the range of anticipated future uses desired by the community. Alternatives that are not viable should be excluded from consideration in order to focus resources on the development and evaluation of the feasible institutional control options.<sup>22</sup> With the condition warranting control defined, and the boundaries of the range of viable options determined, the specific goals and objectives for the institutional controls can be formulated. **The goals and objectives represent the desired end state for the site based on the specific condition(s) warranting controls.** Following upon the previous cesium-137 example:

*The current extent of contamination is a threat to human health if dermal exposures occur. The contamination is in an area of the site that has office buildings and is being*

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<sup>22</sup> See, U.S. Department of Energy, *Expediting Cleanup Through Early Identification of Likely Response Actions*, DOE/EH-413-9902. May 1999.

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*sought after for commercial/industrial uses. Since the contamination is sufficiently below grade to ensure that no surface risk exists, no excavation of the area will occur. In order to allow for effective re-use of the area, the property will be leased for commercial re-use with restrictions placed on the lease agreement that no excavation can occur below 4 feet, including landscaping and grading for road development. Before the lessee is allowed to take occupancy of the property, the Department will re-vegetate and re-pave any existing asphalt services. Leases will be established for five-year periods with DOE maintaining responsibility for conducting visual inspections and for taking soil samples prior to renewal of the lease. The Department will maintain ownership of the property until after the cesium-137 has decayed to levels acceptable for unrestricted use. At that time, DOE will dispose of the property through normal DOE procedures.*

By defining the limitations and expectations for the institutional controls early, the decision makers can focus their evaluation on those alternatives that can adequately achieve the goals and objectives.

### **Evaluating and Selecting Institutional Controls**

Selecting the optimum institutional control or combination of controls will depend upon the expected time frame for the residual hazard, the nature and extent of harm arising from breach of the institutional control, the characteristics of the site, and the nature of the surrounding governmental bodies. The rigor of the institutional controls must be commensurate with the hazard associated with the site. A deed restriction against well drilling that cannot be guaranteed to apply to all subsequent buyers of the property would be inappropriate for restricting use of a site at which well drilling would result in exposure to hazardous contaminants for a 100 year period. A three-foot, three-strand barbed wire fence with “No Trespassing” signs might be appropriate for some very remote sites with minimal potential for harm and a very low appeal to potential trespassers, but may be inappropriate for a site with a higher dermal-contact concern and/or that may be very attractive for trespassers.

The ERPMs may find that some institutional controls at some sites can not be implemented. For example, ERPMs can not rely on zoning as an appropriate institutional control if the local jurisdiction does not have zoning authority. Institutional controls that may be easily implemented (putting up signs or a fence) may be prohibitively expensive due to the life-cycle costs associated with the monitoring and replacement program that must be put in place to ensure their effectiveness.

As with all response actions, evaluating institutional controls should be focused on three primary elements: effectiveness, implementability, and cost. Chapter 3 identified potential institutional controls and discussed their individual benefits and limitations. These considerations are the basis for evaluating whether or not specific institutional controls can achieve the goals and objectives identified for the remedy. The three primary evaluation criteria are discussed below in relation to their impact on the institutional controls being selected.

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## Effectiveness

Effectiveness relates to the ability of the institutional control to address the specific conditions warranting control (e.g., exposure to contaminated groundwater) for the duration that the control is to be in place. Effectiveness includes both short- and long-term considerations. Therefore, the controls must be effective for the current contaminants, exposure pathways, and receptors, as well as, those in the future which result from changes in contamination (e.g., decay, migration), exposure pathways (e.g., cross media impacts) and receptors (e.g., change in site use). The chances that institutional controls will be effective increases if the goals and objectives for their use are clearly specified. Key elements such as durability, enforceability, monitoring, and the ability to modify the controls are important to ensuring that the institutional controls are effective over time and in changing conditions.

- Durability — will the physical (e.g., materials used for fences or signs) and the organizational (e.g., local zoning boards, deed recording systems) components of the institutional control exist for the length of time they must be in service?
- Enforcement — who will have the authority and responsibility to bring action if an institutional control is breached? What will constitute breach of an institutional control and what remedies can the enforcing entity seek? Who will pay for the enforcement and how much will that cost?
- Monitoring — how often must the institutional control be assessed to determine if it is functioning properly or if it has been breached? How will it be monitored? Who is responsible for monitoring? Who will pay for monitoring and how much will it cost?
- Modifying — what performance indicators must be developed to indicate that either:
  1. The institutional control is not working effectively and must be modified, or
  2. The institutional control is no longer needed and can be discontinued?

## Implementability

Implementability relates to the ability of the control measure to be instituted, maintained, and enforced. As highlighted in Exhibit 3-1, certain institutional controls require consideration of jurisdictional authorities (e.g., permits) in order for the control to be implemented. Additionally, even if the control can be implemented legally, there needs to be an entity willing to monitor and enforce the control. Early communication with parties responsible for instituting and enforcing control measures (e.g., local municipalities) is imperative to evaluating whether or not the control can be implemented. Unlike many other remedial actions where physical and technological considerations for implementation are paramount, institutional controls require considering legal, political, and socio-economic constraints to implementation. Further, these considerations are subject to change over time. The following questions are among those that need to be answered when determining the implementability of institutional controls:

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### Possible Institutional Controls when DOE Transfers Land

- Easements: Is the party receiving the land willing to agree to an easement held by DOE which could limit the party's land usage? Is the easement legally durable?
- Deed Notifications: Is the relevant information available that must be included in the deed?
- Deed Restriction: Does the state recognize deed restrictions for the length of time they will be required? Can the deed restriction be created to bind all subsequent buyers? Is the prospective land owner willing to agree to the terms of the deed restriction? Can DOE monitor its interest in the land?
- Permits: Is the government body (e.g., state or local government) with jurisdiction over the land willing to maintain the information about the restrictions to determine if permits can or cannot be granted?
- Zoning: Does the local government with jurisdiction over the land have authority or the capability to implement and enforce a zoning program? Is that government body willing to maintain the information it needs to determine if zoning variances can be granted?

### Institutional Control when DOE Leases Land

- Lease: Does DOE have the authority to enter into the lease or contract? Are the terms acceptable to DOE and future land users? Are the terms enforceable if violated?

### Possible Institutional Controls when DOE Retains Land

- Fences: Can a fence be designed, built, and maintained to provide the necessary protection from intrusion for the length of time required?
- Signs: Can signs be designed, built, and maintained to provide the necessary information to protect the site from intrusion for the length of time required?

### **Cost**

Cost is an important factor, not only in implementing institutional controls (e.g., fencing, signage), but also in maintaining and enforcing the institutional controls over time. Unlike permanent solutions, institutional controls require consideration of life cycle costs over a long duration. These costs include general maintenance of physical measures, but also funding for enforcement and monitoring activities. Elements of the life-cycle cost for institutional controls include maintenance of physical control measures (e.g., access controls), and remedy monitoring and enforcement activities. For some types of institutional controls some elements of the life cycle cost may be incurred by entities other than the

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federal government, however such costs must also be considered in the life-cycle cost analysis. Changes in the local economic conditions may impact the ability of a local organization to continue to monitor, maintain and enforce controls. When evaluating costs, it will be necessary to consider these life cycle aspects and the uncertainties associated with securing necessary funding over time. Life cycle costs will be heavily dependent upon three factors:

- Site specifics (e.g., “no fishing” signs may need to be replaced frequently at sites with seasonal floods, inspections to locate any non-approved excavations may need to be more frequently completed at sites that are attractive and prone to such intrusion);
- The type of institutional control used (e.g., a high-security fence versus a simple three-strand fence); and
- The length of time the institutional control must be effective.

### **Contingency Planning**

Institutional controls are only as reliable as the legal and management systems that support them. The uncertainty of performance inherent in these systems will be multiplied by the long time frames they are expected to enforce institutional controls. The uncertainties associated with the use of institutional controls can be managed through the use of contingency planning.

Contingency planning calls for building “triggers” into the remedy that indicate when the remedy has failed or is likely to fail due to changes in the nature of the contaminant, the contaminant plume migration, or site use. These triggers are performance indicators of what constitutes failure or success of the institutional control (e.g., zoning will be successful if land is only used for the purpose for which it is zoned.) Performance indicators could also be created to indicate under what conditions the institutional controls can be modified or terminated.

For example, a site has a contaminated plume moving in the direction of a housing development with private wells. The remedy for this site could include monthly assessment of plume migration and an institutional control restricting well drilling within a predetermined area. If the post-remedy documentation has indicated an expected range for the monitoring results, any results outside of that range may indicate that additional wells have been installed and the institutional control is no longer effective.

Another aspect of developing a contingency is through building a more robust response from the onset that basically incorporates a contingency into the initial remedy. A more robust remedy will reduce the impact of any weaknesses in the remedy and will, overall, be more tolerant of weaknesses over time. With institutional controls, this idea is usually incorporated into the remedy through layering several institutional controls so that a somewhat redundant response is developed. A single institutional control will generally not offer the same degree of protection as several well-chosen institutional controls

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layered over each other. Layering can add beneficial redundancy by combining the strengths of several institutional controls. For example, DOE may hold an affirmative easement to monitor contaminants at land it transferred to a state for use as a wildlife refuge and the state will assume responsibility for maintaining a fence and signs at the refuge.

Layering is also desirable because it can provide different levels of government agencies (town, county, state, tribal, and federal) or private parties with different degrees of responsibility for enforcing institutional controls. Land transferred from DOE to a private party could be subject to zoning by the local government and a deed restriction limiting land usage to industrial purposes for 20 years. The local government would enforce the zoning laws and the Department or a successor agency would rely on the legal system to enforce the deed restriction.

In addition to layering institutional controls, thinking of institutional controls as “rolling” rather than static devices will help enhance their effectiveness. As site conditions change (i.e., residential communities are being developed closer to the site, contaminants decay or result in more hazardous daughter products), institutional controls must also change. A plan should be developed that will document the need and schedule for systematic reassessment of the institutional controls based on changing site conditions, contaminant form and risk, and the availability of new technologies to remediate the site.

### **Documenting Institutional Controls**

The documentation requirements for remedies that include or rely exclusively on institutional controls are no different from the general RCRA or CERCLA remedy documentation requirements. Existing guidance developed by DOE describes the CERCLA and RCRA requirements for documenting closure and post-closure care when wastes will remain on site.<sup>23</sup> These requirements encompass administrative responsibilities (e.g. requesting permit modifications for RCRA corrective action projects or closure of regulated units) as well as the activities associated with managing the wastes left on site. (Refer to Chapter 2 for a description of EPA requirements that may affect the institutional control documentation procedures.)

DOE has recommended in previous guidance that a draft remedy monitoring plan should be developed for each alternative during the remedy selection process.<sup>24</sup> A remedy monitoring plan identifies the objectives, schedules, reporting requirements, sampling strategies, technologies, and personnel necessary to ensure remedy effectiveness and modification, if necessary. It also includes the procedures for modifying the remedy as well as the plan itself. The remedy monitoring plan should be a self-correcting information loop, i.e., information gained through monitoring should be used to appropriately

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<sup>23</sup> U.S. Department of Energy, *Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite*, October 1999, DOE/EH-413-9910.

<sup>24</sup> U.S. Department of Energy, Office of Environmental Policy and Assistance *Using Remedy Monitoring Plans to Ensure Remedy Effectiveness and Appropriate Modifications*, July 1998, DOE/EH-413-9809.

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modify the monitoring strategy as well as the remedy. A remedy monitoring plan must be designed to allow the periodic evaluation of three key components of a remedy: compliance monitoring; performance monitoring; and monitoring current and future land use and exposure assumptions underlying the remedy. Review of the remedy monitoring plan for each alternative will serve as a ‘reality check’ when screening the alternatives for effectiveness, implementability, and cost. A remedy monitoring plan should be designed to detect if any non-protective conditions such as engineered barrier or institutional control failure exist or could develop.

For CERCLA projects, the ERPM will need to develop a final close out report that describes the remedy and the overall technical justification for site completion. Among other things, this report must include information on the institutional controls in place. For more information on the documentation procedures for a CERCLA remedy, see the following two references:

- The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as promulgated in 40 CFR 300.425; and
- Close Out Procedures for National Priorities List Sites, U.S. EPA, January 2000.

For RCRA remedies, a written closure and post-closure plan must be developed that would include a description and documentation of any institutional controls incorporated in the remedy. Additional information on the RCRA documentation procedures is available from:

- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Subpart G- Closure and Post-Closure in 40 CFR 264.110

### **Communicating about Institutional Controls**

After institutional controls are selected and accepted by regulators, the parties crucial to their success, and the public, a plan will need to be developed that communicates the basis for the decision to select institutional controls and the systems that will be put in place to ensure their success. The purpose for creating additional documentation to communicate about the institutional controls selected is twofold:

- First, since institutional controls are often long term remedies, it is important to communicate additional information about the institutional controls to future generations to ensure that they are properly enforced, and
- Second, it is consistent with CERCLA 120(h) guidance and newly emerging EPA regional requirements.

Although there currently is no requirement for this information that applies to all states or regulatory scenarios, it is anticipated that DOE will soon require site specific long-term stewardship plans for most sites. In addition, providing some additional information regarding the implementation procedures for

the institutional controls will help ensure that the institutional controls remain effective as site conditions change (for instance if DOE no longer needs the land, or the contamination decays or attenuates over time and causes a reason for the institutional controls to change). This additional information could describe the uncertainty associated with the contaminant, the site, and future site uses, as well as detail the systems that will be put in place to address those uncertainties.

Post-remedy documents could also include provisions describing when and how the land will be reassessed to determine if risk levels have been reduced to allow less restrictive land uses or if remediation technologies are now available that would allow complete cleanup thereby eliminating the need for institutional controls.

Exhibit 4-1 highlights information that will be useful for the prolonged enforcement and effectiveness of institutional controls. The information provided in Exhibit 4-1 is based on a composite of the guidance that has recently been developed by EPA and is in accordance with policy documents developed by DOE's new Office of Long-Term Stewardship.

**Exhibit 4-1**  
**Information Useful for Ensuring the Long-Term Effectiveness of Institutional Controls**

Site Description

- Legal description of the property
- Site features – facilities, natural resources
- Owner of land
- Lessees / users of land
- Terms of indemnification

Contaminants of Concern

- Types and quantities
- Locations
- Life expectancies
- Decay chains
- Residual risk

Present and Reasonably Anticipated Future Uses

- Present use
- Expected future uses
- Effect of residual contaminants on future uses

Institutional Controls

- Descriptions of institutional controls
- Legal authorities for their use
- Language as it will appear in transfer document
- Legal opinion on enforceability
- Description of recording requirements

Institutional Control Monitoring and Enforcement

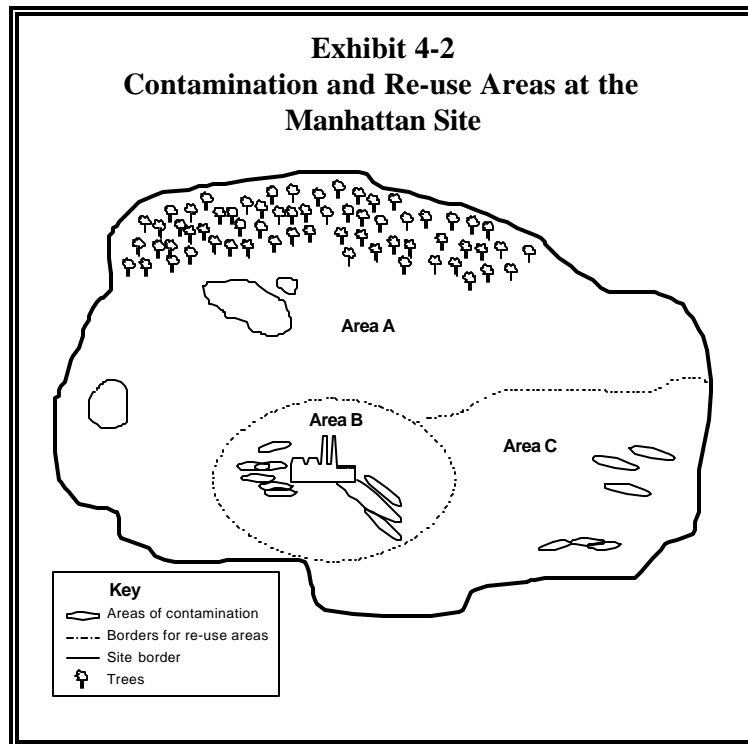
- Parties responsible for monitoring and enforcement
- Monitoring purpose, frequency, and method
- Performance measures
- Procedures for reporting, responding to, and enforcing violations and failures

### **Hypothetical Example of IC Selection**

The Manhattan Site has supported a DOE mission for the past 20 years but operations at the site were shut down in 1999. Currently the only DOE mission remaining at the Manhattan Site is the environmental remediation of legacy contamination. The site has been characterized and is preparing to begin remediation activities and identify the range of possible site future uses.



The local community, state officials, housing developers, and private industry have all indicated interest in using parts of the site. To begin identifying and evaluating the remedial alternatives and potential uses of the site, the ERPM has assembled a planning group to review options and make recommendations. The group consists of the remediation core team, a DOE-certified realty specialist, representatives from the Office of Chief Counsel, the site planner, and representatives from state and local governments, business and community interests, and environmental and other special interest groups.



The planning group has divided the site into three possible re-use areas. The decision was based on an analysis of the areas of contamination, possible contaminant movement, present and future hazards posed by the contaminants, cost and technical feasibility of remediating the site, and desirability of the site for certain purposes. The existing contamination in each of the three areas identified by the planning group is depicted in Exhibit 4-2.

Contamination in the northern part of the site consists of widely dispersed volatile organics (carbon tetrachloride, trichloroethylene) located approximately 4-8 feet below the surface. This area was designated by the planning group as Area A. No surface water exists in this area and an analysis of the hydrology indicates that the contamination would not reach groundwater prior to natural decay of the contamination (approximately 10 years). The risk assessment for Area A indicates that risks are within the acceptable range for recreational uses. The consensus of the planning group is that Area A should be made available for recreational uses with a restriction on camping. To reduce the Department's mortgage costs and accommodate state interest in long-term use of the Area, DOE agrees to transfer Area A to the county park department.

The middle portion of the site, designated as Area B, is the most heavily contaminated with several hot spots containing both radioactive and hazardous constituents. This area also contains soils with high concentrations of trichloroethylene (TCE) and a strontium-90 plume moving in the direction of the aquifer that underlies Areas B and C. In addition, some portions of the building located in Area B are contaminated with radionuclides. The state regulators and local community representatives have expressed concerns about possible exposures in this area. DOE maintains that Area B must remain

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under DOE control until the hazards associated with the site are reduced. The planning group agrees that DOE should retain control of the land and access should be restricted to federal employees, approved visitors, and onsite remediation workers.

The south eastern portion of the site is moderately contaminated with TCE in soil at depths of 6 to 15 feet. This area borders properties currently being used for light industrial/commercial purposes. Because the region is in the midst of encouraging re-industrialization of the area, the state environmental regulators agree that a brownfields cleanup scenario may be appropriate for Area C. To expedite re-use of the area and economic redevelopment, DOE agrees to lease the property for industrial purposes under conditions imposed by and monitored by DOE.

The institutional controls selected to support the desired future uses of each of the three areas on the site are summarized in Exhibit 4-3. In each case several overlapping institutional controls were selected to increase the likelihood that failure of any one control would not result in a negative impact on the community.

**Exhibit 4-3**  
**Institutional Controls Selected for the Manhattan Site**

| Site Area | Planned Use       | IC Goals   | ICs Selected  | Documentation Used  |
|-----------|-------------------|--|---|---|
| Area A    | Recreational      | <p>Limit exposures to within the acceptable risk range</p> <p>Prevent access to subsurface soil contamination</p>  | <p>Easement: DOE retains an easement to periodically assess levels of contamination</p> <p>Deed Restriction: DOE records a provision in the deed that precludes excavation on the property</p> <p>Zoning: Local government agrees to zone the area for recreational use only</p> <p>Fences: DOE installs fences to limit access to Area B and develops a cost sharing agreement with the county for maintenance of fences</p> | <p>Formal letter on natural attenuation approach is signed by regulators and filed in several places, including the local library and on the internet.</p> <p>MOU with the county detailing the specifics of the agreement, as well as the responsibilities of all parties involved. The remediation and monitoring information from the regulatory agreement is incorporated by reference.</p> <p>Deed</p> |
| Area B    | Controlled Access | Restrict access to area  | <p>Federal ownership: continued DOE ownership and control of the land</p> <p>Fences: To restrict access</p> <p>Signs: To notify users/workers of the existing hazards</p>   | Not applicable  |
| Area C    | Industrial        | <p>Limit uses to those compatible with residual contamination</p> <p>Limit exposures</p> <p>Limit liability by controlling materials used onsite</p> <p>Prevent use of groundwater</p> | <p>Federal ownership: continued DOE ownership</p> <p>Lease: Clearly describes the use and access terms including requirement that lessees report semi-annually on use of chemicals onsite as well as restricting well drilling or excavation for any purpose</p>  | Lease with clear documentation of restrictions on use; conditions for cancellation of lease; and compliance reporting requirements and schedule   |

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## Additional Reading Materials

“A Guide to Establishing Institutional Controls at Closing Military Installations,” U.S. Department of Defense, February 1998.

“Assessment of Short-Term and Long-Term Risks for Remedy Selection,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413/9708) August 1997.

“Development of Remediation Goals under CERCLA,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413/9711) August 1997.

“Expediting Cleanup Through the Core Team Approach,” DOE/EH-413, 1997.

“General License for Custody and Long-Term Care of Residual Radioactive Material Disposal Sites,” Title 10 U.S. Code of Federal Regulations Part 40.27.

“General License for Custody and Long-Term Care of Uranium or Thorium Byproduct Materials Disposal Sites,” Title 10 U.S. Code of Federal Regulations Part 40.28.

“Guidance for Evaluation of Federal Agency Demonstrations that Remedial Actions are Operating Properly and Successfully Under CERCLA Section 120(h)(3) (Interim guidance),” U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, August 1996.

“Guidance on the Transfer of Federal Property by Deed Before All Necessary Remedial Action Has Been Taken Pursuant to CERCLA Section 120(h)(3),” U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, June 1998.

“Institutional Controls Case Study: Mound Plant,” Environmental Law Institute, 1998.

“Institutional Controls Case Study: Grand Junction,” Environmental Law Institute, 1998.

“Long-Term Surveillance and Maintenance Operating Procedures for the Monticello Supplemental Standards Properties, Volume II, Revision 2,” U.S. Department of Energy, Grand Junction Office, May 2000.

“Making Institutional Controls Effective,” Report of the Future Land Use Working Group to the Defense Environmental Response Task Force, U S Department of Defense, September 19, 1996, [www.dtic.mil/envirodod/brac/index.html](http://www.dtic.mil/envirodod/brac/index.html).

Mazurek, Jan and Robert Hersh, Resources for the Future, “Land Use Remedy Selection: Experience from the field - The Abex Site,” March 1997.

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“Policy Toward Landowners and Transferees of Federal Facilities,” U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, June 1997.

“Technical Impracticability Decisions for Ground Water at CERCLA Response Action and RCRA Corrective Action Sites,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH-413/9814), August 1998.

“Uncertainty Management: Expediting Cleanup Through Contingency Planning,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (DOE/EH/(CERCLA)-002), February 1997.

“Use of Institutional Controls in a CERCLA Baseline Risk Assessment,” U.S. Department of Energy, Office of Environmental Policy and Assistance, (EH-231-014/1292), December 1992.

Wernstedt, Kris and Katherine N. Probst, Resources for the Future, “Land Use Remedy Selection: Experience from the field - The Industri-Plex Site,” March 1997.

Wernstedt, Kris and Robert Hersh, Resources for the Future, “Land Use Remedy Selection: Experience from the field - The Fort Ord Site,” September 1997.