DOE-HDBK-1240-2021 Institutional Controls Implementation Handbook for Use with DOE P 454.1, Use of Institutional Controls

Introduction

The Department of Energy (DOE) uses Institutional Controls to appropriately limit access to or uses of land, facilities, and other real and personal properties. Institutional Controls protect people, the environment, and cultural and natural resources by helping to maintain the physical safety and security of facilities and preventing or limiting inadvertent human and environmental exposure to residual contaminants and other hazards.

DOE recently revised its Institutional Controls Guide into an Institutional Controls Implementation Handbook to assist DOE programs and field offices in understanding what is necessary and acceptable for implementing the Institutional Controls provisions of DOE Policy (P) 454.1, *Use of Institutional Controls,* DOE Order (O) 458.1 *Radiation Protection of the Public and the Environment,* and DOE O 435.1 *Radioactive Waste Management.* DOE P 454.1 establishes Departmental policy for the use of Institutional Controls in situations where unrestricted use or unrestricted release of property is not desirable, practical, or possible. Its primary purpose is to frame a consistent approach to the use of Institutional Controls throughout DOE and to underscore the Department's commitment to use Institutional Controls as an integrated component of overall site management. DOE O 458.1 establishes requirements to protect the public and the environment against undue risk from radiation associated with radiological activities, conducted under the control of DOE pursuant to the Atomic Energy Act of 1954, as amended. DOE O 435.1 ensures that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety and the environment.

This new Handbook provides additional clarification for the role of Institutional Controls in a DOE site's Integrated Safety Management System (ISMS) and Environmental Management System (EMS), including their use, implementation, periodic review/evaluation, and maintenance. Incorporation of Institutional Controls considerations in a site ISMS/EMS will help facilitate cost-effective planning, implementation, and management review of site-wide protection activities across different programs and activities at sites that will require use restrictions, including radioactive waste disposal and waste management, facility operations, property storage, restoration and closure, land use planning, cultural and natural resources management, and legacy management.

Policy Commitment

DOE P 454.1 documents a commitment to the effective and appropriate use of Institutional Controls and establishes a general framework for their use throughout the Department, including the National Nuclear Security Administration. It establishes a consistent approach to the implementation, delegation, documentation, maintenance, and reevaluation of Institutional Controls as an integral part of missions and operational activities, recognizing that DOE sites need flexibility to tailor Institutional Controls to specific needs, jurisdictions and time periods.

DOE P 454.1 also integrates the use of well-designed effective and reliable tools to manage, monitor, and transfer real and personal property under DOE control. The policy is intended to help DOE sites apply Institutional Controls in a cost-effective way and maximize the use of low-maintenance Institutional Controls to the extent possible.

Institutional controls fit well into a site's ISMS under DOE P 450.4A*, Integrated Safety Management Policy.* This includes the core safety management functions: (1) Define the scope of work; (2) Analyze the hazards; (3) Develop and implement hazard controls; (4) Perform work within controls; and (5) Provide feedback and continuous improvement.

Planning for Institutional Controls

DOE sites commonly need and use Institutional Controls for programs and activities related to:

- radiation protection of workers, the public and the environment,
- radioactive waste management and disposal,
- environmental protection,
- environmental restoration and cleanup,
- cultural resource management and historic preservation,
- operational continuity and security,
- property asset management, and
- long-term surveillance, maintenance and monitoring.

A variety of Institutional Controls are appropriate in the above scenarios. These are summarized in the table below.

Type	**Descriptions**	**Examples**
Government Controls	Federal, State, local authority	Federal ownership, zoning restrictions, building permits, water restrictions
Proprietary Controls	Private property law, restrict or limit use	Easements, covenants, real estate use licenses/permits
Structural Controls	Manmade structures to control access; physical structures to limit access	Fences, gates, signs, monuments to warn of dangers or restrictions
Non-structural Controls	Rely on legal and administrative initiatives	Security, preventative maintenance inspections, employee training
Informational Controls	Inform current and future generations about past site activities, contaminated areas, sensitive areas, restricted areas	State and local registries of restricted properties; health advisories, publications, Visitor Centers
Active Controls	Significant presence of humans to fulfill safeguard and maintenance responsibilities	Security guards to monitor and control site access; environmental sampling to monitor contaminant migration
Passive Controls	Warn and inform future generations about nature and location of site hazard without significant human intervention	Permanent markers and monuments, barriers, public records and archives, Government ownership, land or resource use regulations.

Table 1: Classification of Institutional Controls at DOE

There are several categories of Institutional Controls available to meet DOE's objectives. Table 2 provides a partial list of common categories employed across the Complex. A complete listing is included in Appendix B of the Handbook.

Categories of Institutional Controls	Types of Institutional Controls	Objective	Protects
Warning Notices	Signs, monuments	• Provide visual identification and warning of hazardous or sensitive areas. • Provide information on restrictions, access information, contact information, and emergency information. • Limit or restrict access to the site or portions of the site.	• DOE employees • DOE contractors • Site visitors • Inadvertent intruders • Future generations
Entry and Access Restrictions	Procedural and Security Requirements for Access	• Control human access to hazardous or sensitive areas or property. • Ensure adequate training for those who enter hazardous or sensitive areas. • Avoid disturbance and exposure to hazardous waste. • Provide a basis for the enforcement of access restrictions.	• DOE employees • DOE contractors • Site visitors • Inadvertent intruders
	Fencing	• Restrict or prevent unauthorized access to hazardous or sensitive areas. • Provide protective barriers to standard industrial hazards. • Provide visual warnings.	• DOE employees • DOE contractors • Site visitors • Inadvertent intruders
	Physical Barriers	• Restrict, discourage, or prevent unauthorized access to hazardous or sensitive areas.	• DOE employees • DOE contractors • Site visitors • Inadvertent intruders
Resource- and Land-Use Management	Land-Use and Real Property Controls, Notifications, and Restrictions	• Ensure that use of the land is compatible with any hazards that exist. • Ensure that any changes in use of the land are adequately assessed before being allowed. • Ensure that the record of the property documents restrictions that will apply beyond change in ownership or management of the property. • Assure that any changes in property ownership or control or oversight will be communicated to the appropriate parties and required notifications will be provided.	• DOE employees • DOE contractors • Site visitors • Future generations • Non-DOE entities using DOE land • Environmental receptors

Table 2. Examples of Site-Wide Institutional Controls

DOE sites will consider many factors when identifying and implementing Institutional Controls, including:

- the levels and types of protective measures (e.g., physical, administrative, etc.) appropriate for the associated risks;
- the redundancy (layers of protection) each situation warrants;
- the specific conditions (e.g., prevent exposure to contaminated groundwater) and time period to be addressed;
- potential consequences if an institutional control fails to perform as expected; and
- any unique public interest issues or stakeholder concerns.

In addition, sites will want to consider how the Institutional Controls will survive future changes that may occur in:

- the status of property (e.g., change in property ownership, or transition from operations to disposition in a facility's life cycle);
- contamination (e.g., radioactive decay or changes in contaminant migration patterns);
- exposure pathways (e.g., cross media impacts);
- environmental conditions; or
- receptors (e.g., change in site use or demographics).

A Planning Checklist is a useful tool that DOE sites can develop to identify, evaluate, select, and document appropriate institutional controls for use at their sites. The appropriate types of control for a given site will depend on the nature and extent of the existing conditions that require isolation or use restrictions. A planning checklist will:

- ✓ Document the site-specific risk exposure assumptions.
- ✓ Describe expected future land use, as well as any historic or known prohibited uses that might not be obvious based on anticipated land uses.
- ✓ Describe the current envisioned end state for the property.
- ✓ Describe the need for the Institutional Controls (e.g., physical security, risk to public, site integrity, etc.).
- ✓ State the performance objectives for the Institutional Controls.
- ✓ Describe the Institutional Controls, the rationale for their selection, and a consequence assessment if Institutional Controls are not used.
- ✓ Provide maps and figures with Global Positioning System/Geographic Information System coordinates showing extent of the boundaries of the planned Institutional Controls.
- ✓ Identify the necessary duration of the Institutional Controls.
- ✓ Describe how the Institutional Controls' effectiveness will be determined.
- ✓ Identify monitoring and reporting needs.
- ✓ Identify roles and responsibilities for selection, implementation, maintenance, reporting and termination of Institutional Controls.
- ✓ Provide a comparison of Institutional Controls to be implemented at the site with requirements for Institutional Controls stipulated in the appropriate documentation.

Per DOE P 454.1, Institutional Controls are essential components of a defense-in-depth strategy that uses multiple, relatively independent layers of safety to protect human health and the environment. A DOE site may plan to use multiple Institutional Controls in its defense-in-depth strategy to provide a reasonable expectation that if one control temporarily fails, other controls will remain in place or mitigate the potential consequences of a temporary failure. Examples employed across the Complex include:

- Federal ownership with continued DOE custody and accountability for a disposal cell and surrounding buffer zone. In conjunction, restrictions on soil excavation and alteration of topography or vegetation in the area between the buffer zone and the site boundary.
- Continued Federal ownership, compliance with State well-drilling regulations, notation on the Federal ownership record, historic markers and a visitor center to actively promote memory of activities at the site.

Sites may find it helpful to prioritize Institutional Controls based on their potential effectiveness and consequences of failure in such a way that there is a primary group of controls that provide the primary protection and a second group that provides backup protection should the first set of controls fail. These categories may be helpful in prioritizing maintenance activities and resource allocations.

In evaluating situations where the consequences of loss of Institutional Controls are expected to be small, the need for redundant controls could be minimal. The precision of the Institutional Controls needs to be equivalent to the associated hazards. A defense-in-depth strategy should use a graded approach to attain a level of protection appropriate to the risks involved. A graded approach allows DOE sites to evaluate the appropriateness and consider the benefits associated with available Institutional Controls and to tailor and layer choices from among a variety of Institutional Controls that can be implemented. For example, sites may need to incorporate considerations like the following:

- Local zoning ordinances may not apply to activities on DOE-owned property where the Federal Government has exclusive jurisdiction due to Federal ownership. Therefore, local zoning ordinances may not be used as an effective control in a situation where continued Federal ownership is envisioned.

- A wire fence with "No Trespassing" signs might be appropriate for remote sites with minimal potential for harm and a very low appeal to potential trespassers, but may not be appropriate for a site that could be attractive to trespassers (e.g., for use of off-road vehicles or other recreational purposes). In this example, if consequences of such an intrusion posed a significant risk then additional primary controls should be considered. However, if the hazardous materials were not easily accessible (e.g., waste buried several meters below the surface) fencing may be unnecessary and a combination of signs and markers with use restrictions may be sufficient.

Institutional Controls at DOE sites are associated most often with control of hazards (e.g., contaminated soil), facility security, or protection of resources (e.g., historic sites or wetlands) on real property. However, Institutional Controls may also apply to the management of personal property, such as when used to ensure the safety and security of chemicals, or to limit exposure to them. Institutional Controls at DOE sites contribute to assurances that excess or contaminated items are not released without proper authorization, equipment is not stolen, and valuable cultural artifacts are protected.

DOE sites should have a reliable inventory of all Institutional Controls in use. DOE O 430.1C, *Real Property Asset Management*, states that Facilities Information Management System data must be maintained as complete and current throughout the life cycle of real property assets, including real property related to Institutional Controls. Sites may find it useful to develop or expand a tracking mechanism that identifies all land areas under restrictions or controls. Some DOE sites use existing documents such as land use plans and real property records to track the institutional control areas. Real property asset management, in accordance with DOE O 430.1C, ensures that pertinent real estate and records management activities are conducted consistent with applicable DOE directives, and that access constraints imposed upon DOE's comprehensive land and facility use planning process by current and future needs for Institutional Controls are recognized and clearly understood.

Monitoring, Periodic Assessment and Corrective Actions

Periodic monitoring and assessment of Institutional Controls are essential components of the Plan-Do-Check-Act cycle. Monitoring and assessment enable DOE sites to confirm the effectiveness of the plan and do phases and to act on any necessary changes. Periodic assessments should be completed to ensure compliance with and implementation of applicable legal requirements, including DOE Orders.

Site-wide Institutional Controls need to be considered to ensure that there is a complete program covering all facets of monitoring. To ensure that the adequacy and utility of site-wide monitoring, networks are maintained over time. Each site's monitoring program should include a process for periodic review and evaluation. An integrated program to monitor and periodically assess Institutional Controls can be planned and conducted as part of a site's ISMS/EMS assessment or as

part of existing site inspections. Procedures for monitoring, periodic assessment, and when necessary, corrective actions, related to Institutional Controls should be documented.

Monitoring and periodic assessment provide DOE sites with valuable opportunities to gather additional information for evaluating whether the assumptions made at the time the Institutional Controls were selected are still valid and protective of public health, and to re-evaluate whether 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 Controls will remain intact for the necessary period of time. Through monitoring and periodic assessments, DOE line management can be kept apprised of the conditions of the Institutional Controls; detect conditions that, if left unattended, could promote failure; and respond to problems that may develop over time.

Monitoring and periodic assessment also provide opportunities to observe the impacts of any changes to laws, regulations and directives; re-evaluate stakeholders understanding of the situation; determine the impacts of any changes in resources (e.g., groundwater movement); and recommend cost-effective improvements. Periodic assessments also can identify the need to implement changes, adjustments, or corrective actions to the Institutional Controls based on their performance.

DOE sites should consider establishing performance indicators to facilitate assessments and to delineate under what conditions Institutional Controls should remain in place. DOE sites can then use the performance indicators to determine whether the Institutional Controls are working effectively, identifying when they need to be modified or replaced, or are no longer needed and can be discontinued. Sites may also determine the Institutional Controls are no longer needed for their original purpose, but they should be continued because they are serving other appropriate purposes.

Modification or Termination of Institutional Controls

Periodic assessments may identify the need to modify or terminate the controls due to changes in conditions existing at a site over time, or changes in the Institutional Controls themselves. DOE sites should establish procedures to modify or terminate Institutional Controls when warranted. These documented procedures should clearly delineate criteria to assist DOE sites in determining whether it is appropriate to modify or terminate Institutional Controls. Sites should ensure that Institutional Controls can be terminated without adversely affecting the protection of the site or sensitive resources.

Management Review

Senior Managers or those with the authority to make decisions for the site or facility should review the need for, and the continued use of, Institutional Controls. The primary goal of a management review is to ensure that the Institutional Controls continue to be used and continue to be effective for their intended purpose. The management review process allows senior managers to (1) assess the existing Institutional Controls; (2) evaluate the possible need for changes; (3) provide direction and/or resources for any actions necessary to make the changes and (4) promote continual improvement through their leadership. The reviews also ensure senior managers are aware of needed Institutional Controls. These reviews allow that senior managers have agreed to and bought into any decisions or actions that can impact the effectiveness of the controls. The time frame for these reviews is determined by the Site or Senior Managers and Site offices. The reviews should be documented.

Additional Source of Information

Questions regarding this Information Brief or site requests for technical assistance can be directed to Katharine McLellan at (202) 586-0183 or katharine.mclellan@hq.doe.gov. For more detailed information on the Institutional Controls process, please see DOE-HDBK-1240-2021.