Use of Institutional Controls during

An overview of the use of institutional controls (ICs) from evaluation and planning to implementation and enforcement.

The U.S. Environmental Protection Agency (EPA) and state environmental agencies have long recognized the usefulness of institutional controls (ICs) to mitigate risks associated with contaminated sites. Common ICs include property controls such as restrictive covenants, and government controls such as ordinances, which help minimize the potential for exposure to contamination. According to EPA, “ICs typically are designed to work by limiting land and/or resource use or by providing information that helps modify or guide human behavior at a site.”1 By controlling exposures, risks are reduced and human health and the environment are protected.

Combining the principles of risk assessment with ICs allows for an efficient and cost-effective means to manage site risks. More and more states have embraced risk-based cleanup strategies that use risk assessment and various ICs to manage current and future risks. This approach provides long-term solutions to many impacted sites (small and large), which enables responsible parties to achieve closure and promote redevelopment.

This article is meant to serve a basic primer on the use of ICs, and includes a discussion of the evaluation of site risks; the use of ICs in managing those risks; and the new IC guidance published by EPA in 2012, which describes EPA’s expectations regarding the use of ICs, from the evaluation and planning phase through implementation and enforcement.

Evaluation of Site Risks
The evaluation of risks associated with contaminated media has been guided for many years using EPA’s Risk Assessment Guidance for Superfund (RAGS) documents.2-4 RAGS provides the foundation for conducting risk assessments and
calculating cleanup levels that are protective of human health. The key components of a risk assessment include:

1. Measuring the amount of contamination in the various site media (e.g., soil, groundwater, surface water, air, sediment, and building materials);
2. Determining the contaminant toxicity;
3. Identifying the routes by which the contamination can contact human and ecological receptors (e.g., direct contact, inhalation, and ingestion); and
4. Predicting the impact on receptors.

The practical application of risk assessment is to identify the specific exposure pathway(s) that contamination may follow to reach a receptor and, as necessary, develop site-specific cleanup levels that are protective of human health. As part of the risk assessment process, the use of engineering controls or ICs to eliminate potential exposures would also be evaluated. If specific ICs are identified during the risk evaluation process, then these could be used as part of the overall risk management and closure strategy for the site.

The Use of ICs to Mitigate Risks

Once exposure pathways and risks are assessed, remedies are evaluated based on their ability to mitigate or eliminate risk. Exposure pathway restriction or elimination can be used to prevent contamination from adversely affecting human health and the environment. EPA and state agencies recognize that ICs are considered an effective means of exposure pathway restriction or elimination provided they are properly implemented and maintained. ICs create legal and enforceable mechanisms to restrict or eliminate potential or actual exposures.

The most common exposure pathways that can be restricted or eliminated with ICs are direct contact with soils, groundwater, or sediment and ingestion of soil, groundwater, surface water or fish. The most common ICs are proprietary controls, such as restrictive covenants that prohibit certain types of land use (e.g., residential site usage). For example, a responsible party may opt to clean up the soil and groundwater to an industrial standard (generic or site-specific), and use a restrictive covenant prohibiting residential land usage.

Proprietary controls (e.g., restrictive covenants) can also require management and maintenance of any engineering controls (e.g., groundwater control, caps, and fences) that were identified as part of the final remedy. For example, if a portion of a site utilizes fencing to eliminate potential exposures, then the restrictive covenant would require that a fence be maintained by the property owner to ensure that the exposure pathway remains incomplete.

Other common types of ICs include governmental controls, such as zoning restrictions, fishing bans, and bans on groundwater or surface water use. A common government control is the use of a local "groundwater ordinance" to restrict public access to groundwater. These types of controls affect the risk profiles for sites and can substantially reduce the actual risk to human health. In addition to proprietary and government controls, two other common ICs that can be used to reduce risks are enforcement and permitting tools (e.g., consent orders), and informational devices (e.g., contaminated site state registries).

The use of ICs and risk assessments is common and necessary for large and complex sites where it is often too difficult or costly to remove all contamination from a site. A review of large Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation projects indicates that ICs are commonly used as one of the tools to reduce human exposures. However, as states become more accepting of risk-based closures, the potential use of ICs for site closure should be evaluated for all contaminated sites, regardless of size.
Figure 1. Development of soil screening levels.


**EPA’s December 2012 IC Guidance**

EPA’s December 2012 guidance was released to assist site managers and site attorneys in understanding the various ICs and the steps involved in IC creation and maintenance. This document is a follow-up to the previous IC document and focuses on the importance of lifecycle planning of ICs to ensure long-term effectiveness. This planning can be a multi-step process involving IC selection, layering, documentation, and mapping. Considerations must be made of the intended duration of the IC, state/local government cooperation, and who will be responsible for maintaining and enforcing the IC. Often, one IC will not be enough to achieve the cleanup requirements and ICs will be layered on top of each other. As such, it is important that the site manager is familiar with the appropriate state statutes and the government bodies that will oversee the IC for the site.

Implementation of the IC could include recording restrictions or notices in a property deed (i.e., a restrictive covenant) or other legal instrument, securing the enforcement mechanism to ensure the IC remains in place, and establishing financial assurance for IC maintenance functions (e.g., engineering controls). There are also specific implementation and monitoring requirements associated with the regulatory program involved with the cleanup (e.g., CERCLA, RCRA, brownfields, USTs, and voluntary programs). Care must be given to address the specific needs of the regulatory program and the community.

Once ICs have been implemented, they have to be maintained and enforced over their life-cycle. In general, maintenance of ICs is performed by the responsible parties and/or current owners of the property, while enforcement is the responsibility of the government. Meetings with community members, local government, and stakeholders should be part of the IC process to ensure that the need and long-term obligations for the IC are understood by all parties. EPA’s guidance also suggests that an IC Implementation and Assurance Plan (ICIAP) be written to ensure implementation activities are documented, and parties are held accountable. The ICIAP should be a collaborative effort between the responsible parties, government, and community stakeholders. With an effective ICIAP, the implementation and maintenance, and the overall life-cycle stages of the ICs should be well understood.

**Conclusion**

The use of ICs, with or without site-specific risk assessment or engineering controls, should be part of the overall remedial evaluation and risk management strategy for contaminated sites. Although using ICs would necessarily result in some limitation on future site use, it can provide a more rapid and cost-effective solution for site closure, while still being protective of human health and the environment. ICs are commonly utilized and accepted by regulatory agencies for large and complex sites. However, the use of ICs is no longer limited to just larger sites, as many states have embraced the use of ICs for smaller and less complex sites. The new EPA guidance will enable ICs to become more viable for all sites, and provides a framework for ensuring that they are implemented and maintained appropriately. Continued refinement and application of ICs will allow risks posed by contaminated sites to be managed in a cost effective manner, so that sites can be closed-out and redeveloped.

For More Information

**References**