

BROWNFIELDS PROPERTY CLEANUP: HOW CLEAN IS CLEAN ENOUGH?

RISK-BASED DECISION MAKING FOR PROPERTY CLEANUP

Tailoring Site Cleanup:

- *Identify and delineate environmental contamination on a property*
- *Determine protective cleanup levels*
- *Use the property redevelopment design for cleanup*
- *Implement risk-based decision making for site cleanup*



Risk-based cleanup strategies can be utilized to help implement cost-effective brownfield remediation projects

IDENTIFYING ENVIRONMENTAL CONTAMINATION

A Phase I Environmental Site Assessment (ESA) identifies Recognized Environmental Conditions (RECs) based on property history. If RECs are identified, a Phase II ESA will likely be necessary, depending on State specific requirements and the property reuse plan. A Phase II ESA may include the collection and analysis of soil, groundwater and soil vapor samples to determine if contamination is present. RECs identified in the Phase I ESA are used to determine which contaminants to search for. The extent of contamination identified in the Phase II ESA will provide further information on whether additional sampling/characterization or cleanup is warranted to protect human health and the environment for the chosen redevelopment of the property.

Determining protective cleanup levels.

The proposed end use of the property will determine the cleanup levels needed to protect human health and the environment. Contamination identified on the property can be compared to State or federal cleanup standards to decide if the property poses an unacceptable health or environmental risk for potential future uses of the property.

Using property redevelopment design for cleanup.

Property redevelopment design can aid in cleanup to eliminate or reduce risks to human health and the environment. For example, contamination can be managed in place to help reduce cleanup costs. Selective location of parking lots, building designs, passive ventilation systems, and locations of green spaces are ways to use redevelopment design to manage risk and reduce cleanup costs.

RISK-BASED DECISION MAKING FOR SITE CLEANUP

How to know when a property needs to be cleaned up.

When samples analyzed from a Phase II ESA exceed your State's cleanup levels or a risk assessment indicates that a potential risk to human health or the environment exists, it is likely that some form of cleanup or remedial action will be necessary.

Who to consult to get help with cleaning up the site.

Hiring an environmental consultant to evaluate, develop, and implement a plan to address the contamination at the property is necessary. It is also important to contact your State environmental agency to ensure that any cleanup work being planned will fulfill State requirements.



How much will the cleanup cost?

Cleanup costs can vary significantly, depending on the extent of contamination and the proposed reuse. Having a complete site characterization through sampling analysis provides a clear picture of the contamination that needs to be addressed, and will help estimate the cleanup costs. In addition, the future intended use for the property can be used to tailor the cleanup and reduce costs. Incorporating cleanup activities into the general construction process or using innovative architectural designs can also help reduce costs. For example, it may be possible to reduce the amount of contaminated soil that needs to be excavated for disposal by constructing buildings over less-contaminated areas, and/or paving areas of higher contamination to reduce exposure. Cost-effective remediation techniques designed to address contamination under buildings and in groundwater have been developed, and may be appropriate for the project.

What types of cleanup might be necessary at a contaminated property?

Soil, sediment, groundwater, and indoor air may need to be cleaned up at a contaminated property. Techniques have been developed to address contamination in each of these media. The type of cleanup selected is based on situation-specific considerations such as the planned property end use, the type and amount of contamination, depth to groundwater, and the extent of risk to human health or the environment.

Using Institutional and Engineering Controls in Cleanup Strategies

Institutional Controls (ICs) and Engineering Controls (ECs) can be proposed for site cleanup to reduce exposure routes (dermal, ingestion, inhalation) to contamination remaining onsite and to protect human health and the environment.

What are engineering controls?

ECs are barriers and caps designed to prevent or reduce exposure to contamination left in-place. An engineering control can be temporary or permanent; an example of a temporary EC is a pump-and-treatment system designed to clean up the site groundwater. Such cleanup efforts can take years, and site development may continue while the treatment system continues to operate. Once ground water contamination is remediated to an applicable cleanup level, the wells to the system can be abandoned and the treatment system removed.

A permanent EC might be something like a soil cap. A clean soil cap of a specified thickness and permeability may be placed on the property to prevent contact with residual contamination below. In this case, because the contamination was left behind at some concentration that may potentially affect human health or the environment, the cap is constructed with the intent that it never be disturbed. If it becomes necessary to breach or disrupt the soil cap, it is important for the effectiveness of the remedy that it be repaired and returned to the original design specifications as soon as possible.

What are institutional controls?

ICs are administrative tools that document land use restrictions and ECs, and are used as part of the cleanup remedy to minimize potential exposure to contamination. ICs document site-specific land use restrictions. These are often used in cases where the property was not cleaned-up to a standard protective for residential or unrestricted use, or when a remedy involves the use of ECs, which often require continued operation and maintenance to remain effective. Generally, ICs are legally enforceable restrictions, conditions, or controls that limit or prevent the use of the property, ground water, or surface water so that future exposure to contamination can be prevented or minimized.

ICs are recorded on the property chain of title and are designed to provide notice to a potential subsequent property owner of the contamination left in place and the obligations to maintain the requirements defined in the IC. Through the use of ICs, a less stringent cleanup option that is more economical and just as protective of public health and the environment may be implemented. Some examples of ICs include easements, activity and use limitations, restrictive covenants, well drilling prohibitions, deed restrictions, zoning restrictions, and special building permit requirements.