## **DECISION TREE 1: EARLY ACTION, FREE PRODUCT REMOVAL, AND SAMPLING**



## **GREENER CLEANUP STRATEGIES**

### 1. EARLY ACTION

Early Action provides many opportunities to implement green approaches, such as:

- Imposing idling restrictions on construction
  equipment
- Using low-sulfur diesel fuel
- Using alternate fuels, such as E85 or biodiesel
- Using construction equipment with enhanced emissions controls
- Sequencing work to minimize doublehandling of materials
- Covering stockpiles with tarps
- Collecting rain-water for on-site use, such as dust control
- Using recycled materials for fill

### 2. FREE PRODUCT REMOVAL

Some free product recovery systems can be powered by renewable energy sources, such as solar panels. Depending on the quantity and quality of the free product being recovered, in some cases it may be recyclable or suitable for use as an alternative energy source.

#### 3. SAMPLE LOCATIONS

Sample locations should be carefully selected to efficiently identify the extents of contamination. In some cases, phasing sampling events could help reduce costs by eliminating unnecessary samples.

#### 4. SITE-SPECIFIC PARAMETERS

Site-specific parameters are needed to determine sitespecific remediation objectives under a Tier 2 analysis. A Tier 2 analysis could help reduce the amount of contaminated soil requiring removal and disposal, thereby saving time, money, and the environmental impacts associated with excavating and transporting the contaminated soil. Site-specific parameters include hydraulic conductivity, soil bulk density, soil particle density, moisture content, and organic carbon content.

## 5. TIER 1 COMPARISON

The Illinois EPA requires that the results of sampling performed to delineate the extents of contamination be compared to the most stringent Tier 1 remediation objectives. This does not limit the use of a Tier 2 or Tier 3 analysis to set remediation objectives after the contamination has been fully delineated, however. In fact, failure to use site-specific remediation objectives may result in certain corrective action costs being ineligible for

reimbursement from the Fund.

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## **DECISION TREE 2: SOIL REMEDIATION**



## **GREENER CLEANUP STRATEGIES**

## 6. TIER 2 ANALYSIS - UNRESTRICTED

A Tier 2 Analysis determines site-specific remediation objectives based on site-specific parameters, described in more detail in Decision Tree 1. In some cases a Tier 2 Analysis under an unrestricted, residential scenario could produce remediation objectives that minimize the amount of contaminated soil requiring cleanup.

## 7. LAND USE RESTRICTIONS

If the future use of a site is industrial or commercial, a land use restriction allows Tier 1 remediation objectives for industrial/commercial properties to be referenced. These remediation objectives may be less stringent than the Tier 1 residential objectives, thereby reducing the amount of contaminated soil requiring cleanup.

## 8. TIER 2 ANALYSIS - RESTRICTED

A restricted Tier 2 Analysis determines site-specific remediation objectives for industrial/commercial and construction worker scenarios. These remediation objectives may be less stringent than the Tier 2 residential objectives, thereby reducing the amount of contaminated soil requiring cleanup.

## 9. ENGINEERED BARRIERS

In certain cases an engineered barrier can be placed over contaminated soil to prevent users of the site from being exposed to the contamination. Engineered barriers can include asphalt, concrete, buildings, and three feet of clean fill. Placing an engineered barrier will likely reduce the amount of contaminated soil requiring cleanup. Engineered barriers can help save time and money, especially if they are coordinated with the redevelopment of the site, such as placing a planned parking lot over contaminated soil.

## 10. ALTERNATE CLEANUP TECHNOLOGIES

While excavation and off-site disposal is often the quickest cleanup strategy, it is also often the most expensive. If a cleanup doesn't have to be completed right away, an alternate cleanup technology could save money while reducing the environmental impacts of excavating and transporting contaminated soil. Alternate cleanup technologies include in-place oxidation, in-place reduction, bioremediation, and dual-phase vapor extraction.

## 11. STANDARD CLEANUP TECHNOLOGIES

If standard cleanup technologies are planned for a site, specifically excavation and off-site disposal, then the green approaches under "Early Action" on Decision Tree 1 should be considered. In addition, cleanup work should be sequenced to integrate with redevelopment activities. This will minimize the need to fill excavations that may not need to be filled if cleanup is coordinated with the redevelopment activities.

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# **DECISION TREE 3: GROUNDWATER REMEDIATION AND OFF-SITE IMPACTS**



## **GREENER CLEANUP STRATEGIES**

#### 12. GROUNDWATER ORDINANCES

Many municipalities have ordinances in place restricting the use of groundwater for potable purposes. If a municipality has such an ordinance in place, the amount of cleanup required for a contaminated groundwater plume could be reduced. The Illinois EPA must approve an ordinance before it can be applied to a cleanup.

#### 13. TIER 2 ANALYSIS

A Tier 2 Analysis for groundwater sets site-specific conditions that may reduce the size of the contaminant plume requiring cleanup.

#### 14. ALTERNATE CLEANUP TECHNOLOGIES

Many of the alternate cleanup technologies applicable to soil contamination can also be considered for groundwater contamination, depending on the nature and extents of the contamination. These alternate cleanup technologies may take more time but can reduce cleanup costs.

#### 15. STANDARD CLEANUP TECHNOLOGIES

If a standard groundwater cleanup technology is applied, the process should be carefully optimized to meet the remediation objectives using the least amount of electricity, reagents, and other supplies. In some cases renewable energy systems, such as solar panels, can be incorporated into standard cleanup systems.

#### 16. HIGHWAY AUTHORITY AGREEMENTS

In many cases contamination extending off-site and onto a public right-of-way can be addressed using a Highway Authority Agreement. Under a Highway Authority Agreement, the public entity that owns the right-of-way agrees that the contamination can remain in place providing the person responsible for the contamination remains responsible for the cleanup at some point in the future if the public entity needs to access the right-of-way. Highway Authority Agreements can limit the amount of off-site cleanup required.

#### 17. ENVIRONMENTAL LAND USE CONTROLS

Environmental Land Use Controls allow contamination that has migrated off-site to stay in place under certain conditions. Environmental Land Use Controls are similar in purpose to Highway Authority Agreements but they are entered into by the person responsible for the cleanup and the private property owner whose land has been impacted by the release.

