

Module 2

Restoration Process Overview



Life Cycle Site Decision-Making is Based on Data

- Are contaminants present in environmental media at levels above background at a site? (*Background and screening levels*)
- Does the site present ongoing and immediate health and safety issues? (*OSHA and other promulgated standards*)
- Do those contaminants pose unacceptable dose or risk concerns? (*Cleanup Levels*)
- Which portions of a site require remediation? (*Cleanup Levels*)
- Are remedial actions performing as expected? (*Various Performance Measures*)
- Where can we dispose of waste streams? (*Waste Acceptance Criteria and DOT Limits*)
- When can remediation stop, and are we confident that residual risks/doses are at acceptable levels? (*Cleanup Levels*)

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Decision Criteria Depend on the Decision to be Made

- Different criteria come into play at different points in the cleanup process
- Example: uranium in soils at Fernald
 - Background in soils ~ 5 ppm
 - NRC soil screening level ~ 42 ppm
 - Cleanup level – 82 ppm
 - Waste Acceptance Criterion for OSDF – 1,000 ppm

For Every Step of the Process, Data Inputs are Key

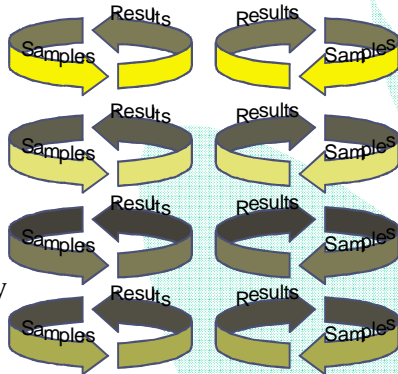
CERCLA (*Comprehensive Environmental Response, Compensation and Liability Act*)

RCRA (*Resource Conservation and Recovery Act*)

Discovery

Cleanup

- Discovery; Preliminary Assessment (PA)
- Site Investigation (SI)
 - Extended Site Investigation (ESI)
 - Remedial Investigation/Feasibility Study (RI/FS)
- Remedial Action
- Closure



- Discovery
- RCRA Facility Assessment (RFA)
- RCRA Facility Investigation (RFI)
- Corrective Measures Study (CMS)
- Corrective Measures Implementation (CMI)
- Closure

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Discovery Phase

Are contaminants present?

- Relatively limited judgmental/biased sampling/measurements
- Broad suite analyses
- Relatively high levels of analytical quality
- Individual sample results typically compared to some threshold
 - Soil screening levels
 - Background threshold values

Cleanup Phase

Are contaminants above cleanup levels?

- Relatively more, systematic sampling
- More limited set of target contaminants
- Opportunity for using lower quality analytical methods suitable for contaminants of concern/cleanup levels
- Sets of sample results compared to cleanup levels

Different Media Require Different Characterization Approaches

Media	Strategies/Methods
Soils	<ul style="list-style-type: none"> • Systematic/biased soil samples with on site or off-site laboratory analysis for contaminants of concern • Direct measurement of soils for some contaminants of concern • Non-intrusive geophysics to look for buried wastes
Groundwater	<ul style="list-style-type: none"> • Monitoring wells with groundwater samples • Direct push sample collection/measurements • Subsurface physical characteristics important (water table depth, groundwater flow direction, hydraulic conductivity, lithology, etc.)
Waste Streams	<ul style="list-style-type: none"> • Systematic sampling/screening of waste stream materials
Process Equipment	<ul style="list-style-type: none"> • Systematic sampling/screening of equipment

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Insufficient Data Lead to Bad Consequences

- Missing contaminants of concern altogether
- Missing site-specific dose or health risks that should be addressed
- Spending resources on remedial actions that are not truly necessary from a risk or dose perspective
- Inefficient remedial actions that were based on misleading data

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The Decision Unit for Criteria is Often **Not** Well-Defined

“Lead should not exceed 400 ppm in soils”

or

“TCE should not exceed 5 ppb in ground water”

Decisions are often ambiguous because cleanup criteria do not provide enough information to define the decision units.

For Soils, Three Cleanup Requirement Definitions are Most Common:

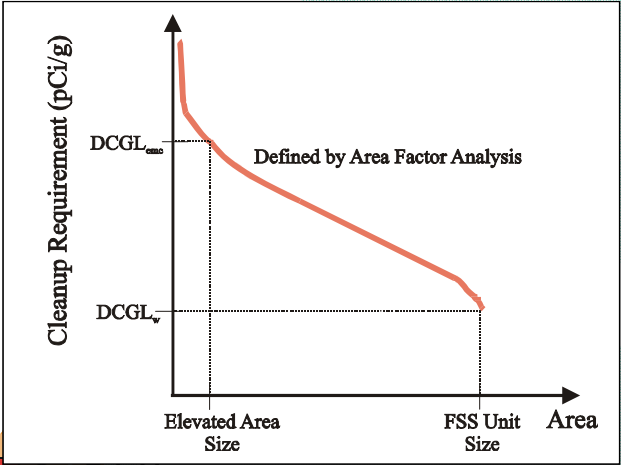
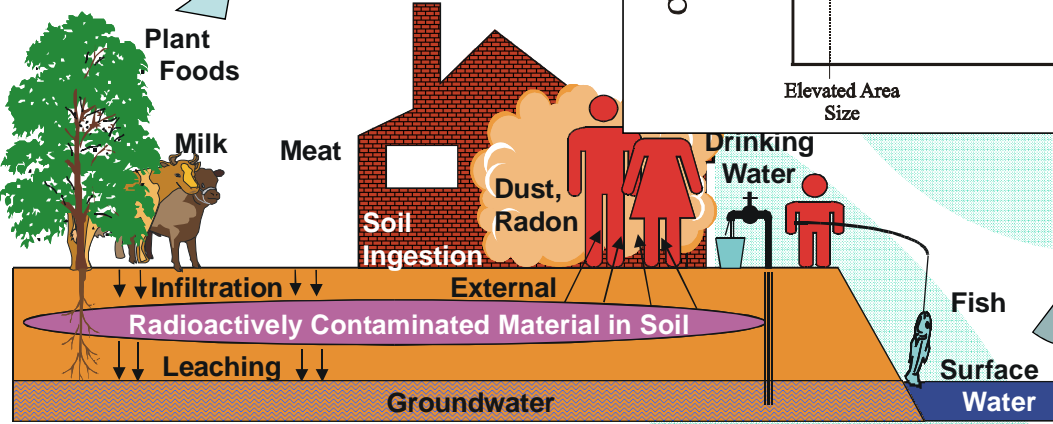
- Never-to-Exceed Criteria: “Lead concentrations cannot be > 400 ppm”
- Hot-Spot Criteria: “Lead concentrations cannot be > 400 ppm averaged over 100 m^2 ”
- Averaged Criteria: “The average concentration of lead over an exposure unit cannot be > 400 ppm”

MARSSIM Requires DCGLs

- Rad sites are covered by MARSSIM (Multi-Agency Radiation Survey and Site Investigation Manual)
- MARSSIM poses cleanup requirements as DCGL (Derived Concentration Guideline Levels)
- $DCGL_w$ – wide area standard that must be achieved over an area the size of a survey unit
- $DCGL_{emc}$ – elevated measurement comparison, a higher level defined for smaller areas

DCGL Derivation

Site Specific Risk or Dose-Based Requirements



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Any Questions?



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