

RISK ASSESSMENT AND DECISION MAKING IN US SOIL CLEANUP

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Major Remediation Programs for Land in US

- Abandoned Sites (Superfund)
- Operating facilities (Corrective Action)
- Underground Storage Tanks
- Brownfields Revitalization
- Other Federal and State programs

Specific Program Expectations About Cleanup Vary

- Certain laws, regulations, guidance provide greater details than others about **what cleanups are expected to achieve**.
 - Human health risk or radiation dose targets?
 - Ecosystem protection?
 - Permanence of the remedy?
 - Treatment vs containment?
 - Groundwater restoration vs control vs other?
 - Implementaion instructions also vary.
- **Implementing organizations** also vary.

Superfund

- ~1500 NPL sites (700-900+ yet to address).
- Strong national program for the cleanup of nation's most contaminated properties.
- National guidelines for assessment of risk and decision making.
- Federal government plays strong role in site-specific cleanup decisions and action.
- Risk targets common to all cleanups.

Operating Facilities

(RCRA Corrective Action)

- About 3800 facilities with cleanups planned or underway.
- National expectations for cleanup similar to Superfund.
- 38 of 50 states authorized to run their own program, plus Guam.
- Federal oversight limited.

Underground Storage Tanks

- About 125,000 to address.
- Thousands of new releases *each year*.
- Federal program provides only general guidance.
- States define their own programs.
- “Risk-based decision making” encouraged (no specific protocol or expectations for cleanup).

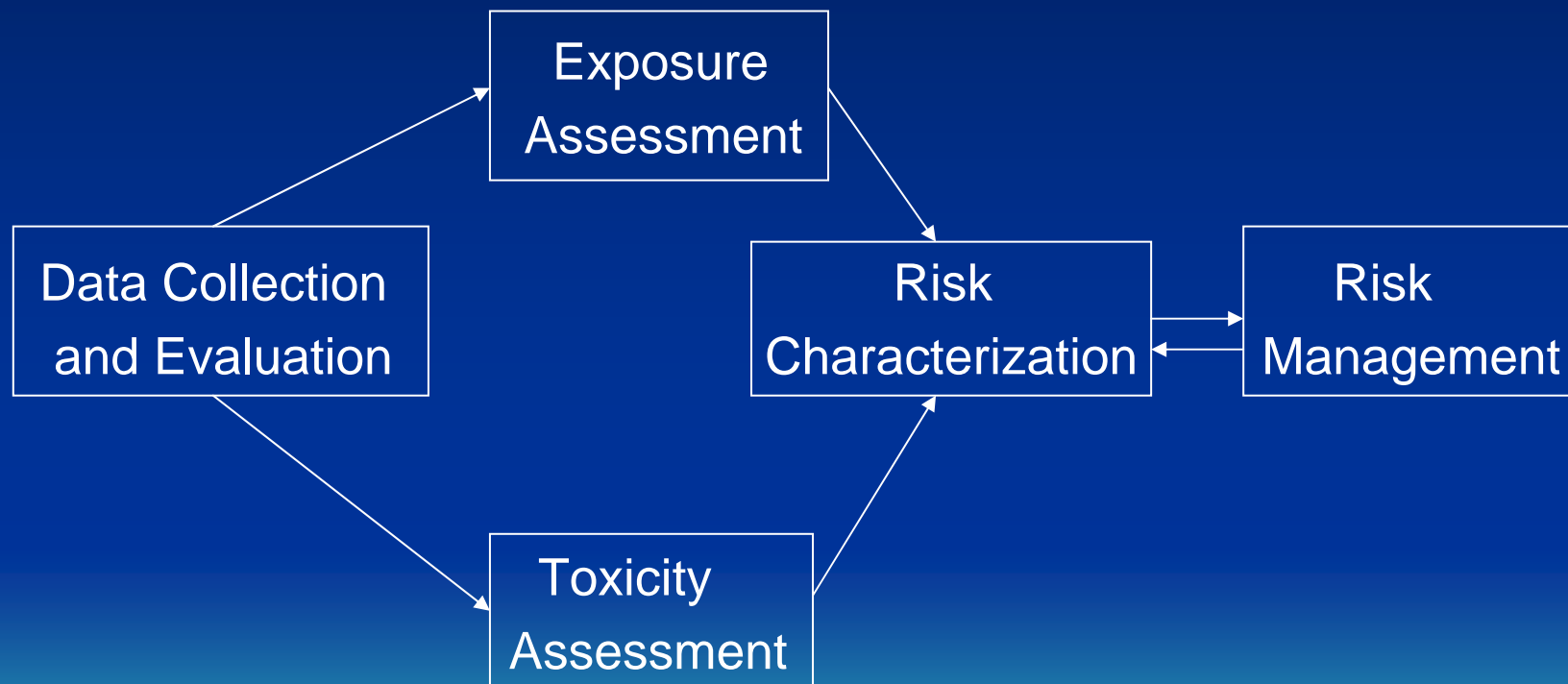
Brownfields

- Tens of thousands of sites in the US.
- Grants money and technical assistance to states, local authorities and others to in support of the reuse of potentially contaminated land.
- Proposed cleanups must protect human health and the environment.
- No specific guidelines or expectations.

Other Cleanup Programs

- Oil Spills (~14,000 / year)
- Federal Facilities (~14,400)
- State and private (~150,000)

Common Risk Assessment Framework



Applying the Framework at Superfund Sites

- Data collection and Evaluation
 - Site-specific
 - Decision-specific
- Toxicity Assessment
 - Integrated Risk Information System (IRIS)
 - Provisional Peer Reviewed Toxicity Values
 - Other sources (California, ATSDR, HEAST)

Applying the Framework at Superfund Sites

- Exposure Assessment
 - Reasonable Maximum Exposure
 - Site-specific land use scenarios (current/future)
 - Standard exposure factors
 - Site-specific factors, when supportable
- Risk Characterization
 - Qualitative
 - Quantitative
 - Emphasis on key uncertainties that drive cleanup decisions.
 - Consider risk management criteria in presentation.

Determining Risk-Based Cleanup Goals Under Superfund

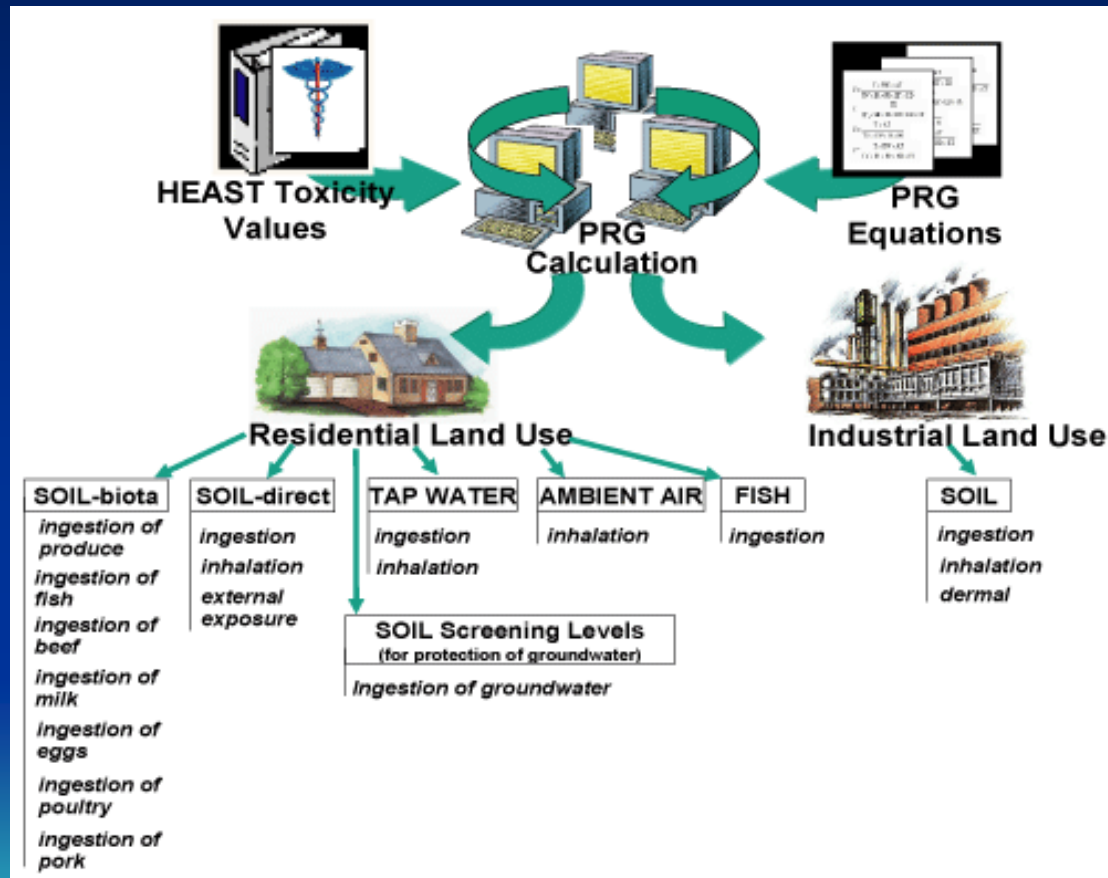
- Preliminary Remediation Goals (PRGs)
- Protect human health
 - current and future land use
- Protect the environment
- Achieve other state and Federal regulatory program “requirements”
- PRGs not final word on cleanup levels...

Back Calculate “Preliminary” Risk Based Cleanup Goals

- Define/agree on current and reasonably anticipated future land use.
- Tailor exposure scenarios and factors to site conditions.
- Residential -- Soil Screening Levels Guidance and Calculator (http://risk.lsd.ornl.gov/calc_start.shtml)
- Non-Residential Scenarios -- Peer Review Draft Guidance (<http://www.epa.gov/oswer/riskassessment/misc.htm> , listed item#15)

Radiation PRG Calculator

(<http://epa-prgs.ornl.gov/radionuclides/>)



Risk is One Among Many Decision Criteria

- Long term effectiveness?
- Permanence?
- Impacts of cleanup alternatives?
- Can the remedy be implemented?
- What is the cost? Who pays? (construction? O&M? Need for institutional controls?)
- Stakeholder acceptance? State, local?
- Other environmental laws/ requirements?

Soil Clean Up Levels Vary

- Example ranges (orders of magnitude):
 - Lead 231.00 mg/kg to 11,000 mg/kg
 - Arsenic 0.43 mg/kg to 2,500 mg/kg
 - TCE 0.42 mg/kg to 520 mg/kg
 - Chlordane 0.07 mg/kg to 180 mg/kg
 - PCP 0.3 mg/kg to 235 mg/kg

Bowers Landfill (after)



Source: U.S. EPA

1997: Wetlands that were created during the cleanup flourish with a variety of plants and wildlife.

Luminous Processors (after)



Source: U.S. EPA

A McDonald's fast food restaurant and playground now occupies the former hazardous waste site, providing many positive benefits to the community.

Old Works /East Anaconda Smelter (after)



Denver Radium (after)



Further Information About Superfund Risk Assessment

- Superfund Risk Assessment
 - (http://www.epa.gov/oswer/riskassessment/risk_superfund.htm)
- Superfund Lead Risk Assessment (IEUBK)
 - (<http://www.epa.gov/superfund/programs/lead/ieubk.htm>)
- Superfund Radiation Risk Assessment
 - http://risk.lsd.ornl.gov/rad_start.shtml
- Superfund Cleanup Decisions
 - (www.epa.gov/superfund/action/guidance/remedy/index.htm)

Risk Assessment Guidance and Tools for Other Cleanup Programs

- Underground Storage Tank Program
(http://www.epa.gov/oswer/riskassessment/risk_oust.htm)
- Risk Based Corrective Action (RBCA)
<http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/PAGES/E1739.htm?L+mystore+dhtl4866+1037849175>
- Emergency Preparedness
http://www.epa.gov/oswer/riskassessment/risk_ceppo.htm
- US Federal Facilities
http://www.epa.gov/oswer/riskassessment/risk_ffro.htm
- Operating Facilities (RCRA)
http://www.epa.gov/oswer/riskassessment/risk_rcra.htm
- EPA Risk Assessment Tools
(<http://cfpub.epa.gov/ncea/cfm/ncearisktools.cfm>)

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