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# Dose/Risk Analyses to Support Facility Closure

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# Outline

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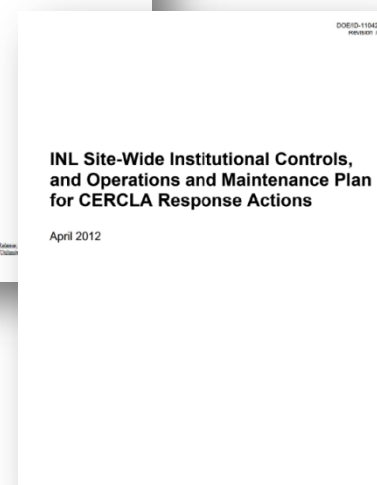
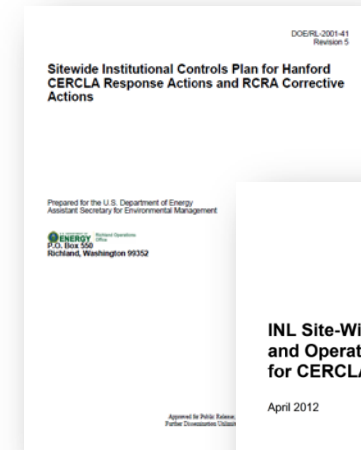
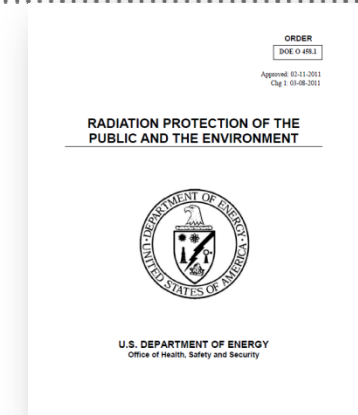
- Provide perspective on approaches used for risk and dose assessment for closure of facilities
  - Regulatory Framework (States, US EPA, US DOE)
  - Assessment Strategy and Methods (graded approach for risk-informed decision making)
  - Software Tools
  - Key Assumptions



# Regulatory Framework

Objective: Achieve a risk-based end state consistent with future land use

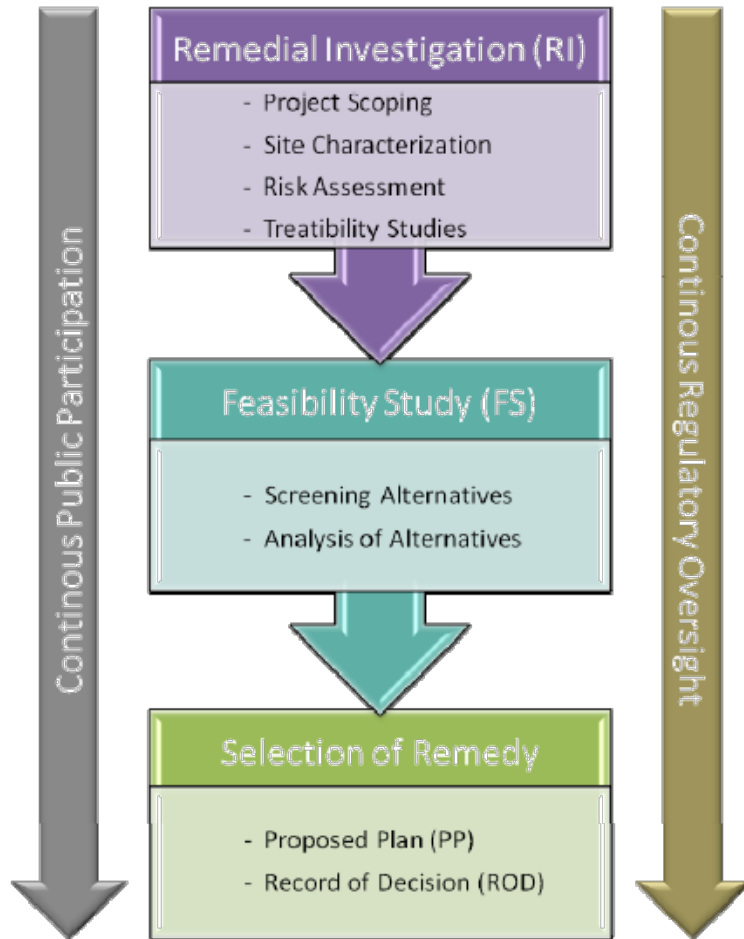
- CERCLA and DOE Order 458.1, Radiation Protection of the Public and Environment
  - Establishes risk-based end state in consideration of future uses:
    - Residential, industrial, and/or recreational
    - Institutional controls are specified and must be maintained
  - Result of joint policy decision by US EPA and DOE to develop an approach to decommissioning that ensures:
    - Protection of worker and public health, and the environment
    - Provides stakeholder involvement
    - Achieves risk reduction in a timely manner
- DOE Order 435.1, Radioactive Waste Management, must also be met for disposal of decommissioning waste at DOE facilities



# General Process

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## CERCLA Decision Process



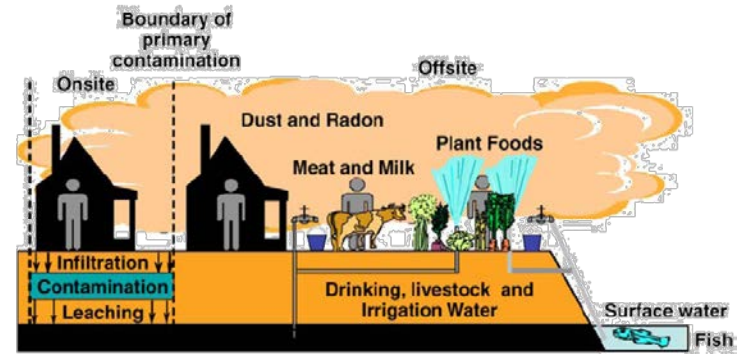
## NINE CRITERIA TO COMPARE ALTERNATIVES

- **Threshold Criteria**
  - Protection of human health and the environment
  - Compliance with Federal and State regulations
- **Balancing Criteria**
  - Long-term effectiveness and permanence
  - Reduction of toxicity, mobility, or volume
  - Short-term effectiveness
  - Implementability at the site
  - Cost-effectiveness
- **Modifying Criteria**
  - Regulatory acceptance (State and/or US EPA)
  - Community acceptance

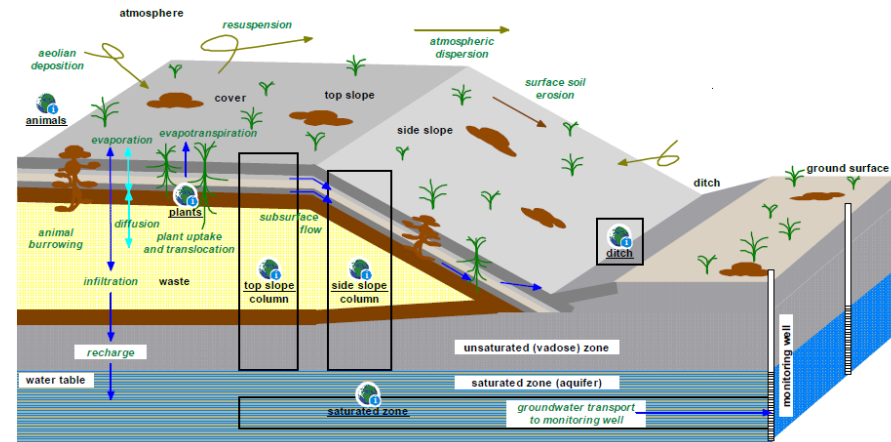


# Assessment Strategy and Methods

- Graded and iterative approach (risk informed)
- Core teams involving DOE and regulatory representatives can be used to agree on assumptions and approaches (scoping and during assessment)
- Site and facility-specific exposure pathways, receptors and scenarios are agreed upon
- Baseline risk assessment to consider no-action alternative (often involves screening)
- Baseline and alternatives are assessed quantitatively for threshold criteria (e.g., protection of human health)



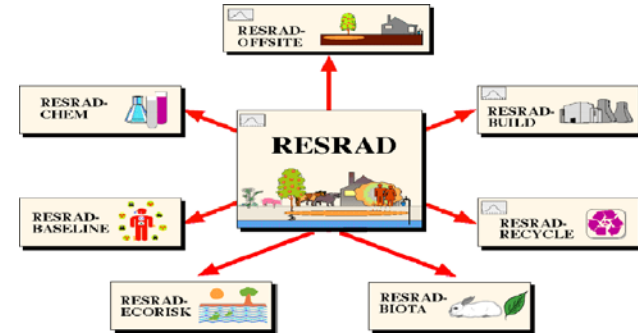
From NUREG/CR-6937, Fig. 1.1





# Modeling Tools

- Active efforts are maintained for continuous improvement of modeling tools
- Decision-making is often based on output from software such as the RESRAD Family, GoldSim™, or site-specific screening tools
- These tools are often supported with more detailed simulations using tools such as PORFLOW, MODFLOW, STOMP, etc.
- DOE-EM is also supporting development of more detailed assessment tools, including the Advanced Simulation Capability for Environmental Management and the Cementitious Barriers Partnership.



# End State Influences the Dose and Risk Analysis

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Credit: USDOE Photos

## Key Considerations Related to Application of Approach

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- **Robust and structured approach for decision-making involving external regulators and input from the public**
- **Strong commitments to maintain institutional controls as necessary to support selected option**
- **Must meet external regulatory requirements and DOE requirements**
- **Involves quantitative and qualitative assessment of potential impacts of multiple alternatives**
- **Multiple different tools are available and are continuously being enhanced, level of detail in models depends on risk**





# Questions

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