

---

# **Proposed Plan for the U.S. Department of Energy Areas at the Former Laboratory for Energy-Related Health Research, UC Davis**

October 23, 2008



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# Meeting Agenda

- Introduction and Welcome
- DOE Presentation on the Proposed Plan
- Clarifying Questions
- Break
- Public Comments



# Meeting Objectives

- Solicit your views on the cleanup remedy for the site
- Increase your understanding by summarizing:
  - Cleanup progress at LEHR
  - Cleanup goals
  - Alternatives for additional remedial actions
  - Public participation options
- Answer clarifying questions
- Receive public comments on the Proposed Plan



# Regulatory Agencies

- U.S. Environmental Protection Agency
- California Department of Toxic Substances Control
- Regional Water Quality Control Board, Central Valley Region
- California Department of Public Health, Radiologic Health Branch



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# DOE's Role in the Cleanup

- DOE is the lead Federal agency responsible for the cleanup of the DOE areas
- To date, DOE has conducted extensive site investigations and removal actions at LEHR
- DOE is responsible for the selection of the final remedy
- DOE is responsible for the performance and maintenance of the remedy



Removal Action at LEHR



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# History

- A DOE-sponsored radiobiology lab was operated by UC Davis at the site between 1958 and 1988
- EPA identified LEHR as a Superfund (CERCLA) site in 1994 due to releases of potentially hazardous materials to soil and groundwater
- DOE and UC Davis are responsible for the cleanup of specific areas of the site



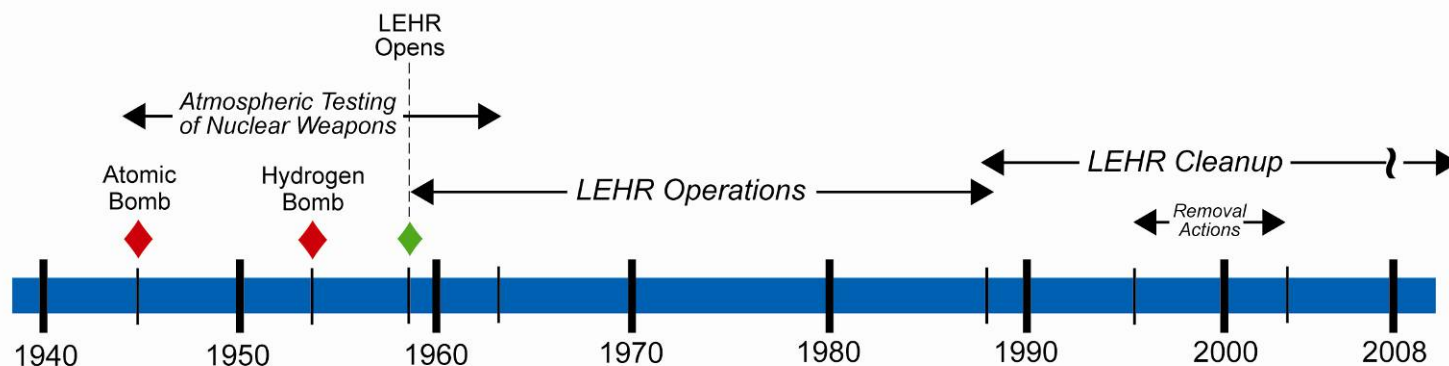
LEHR Site—Circa 1970





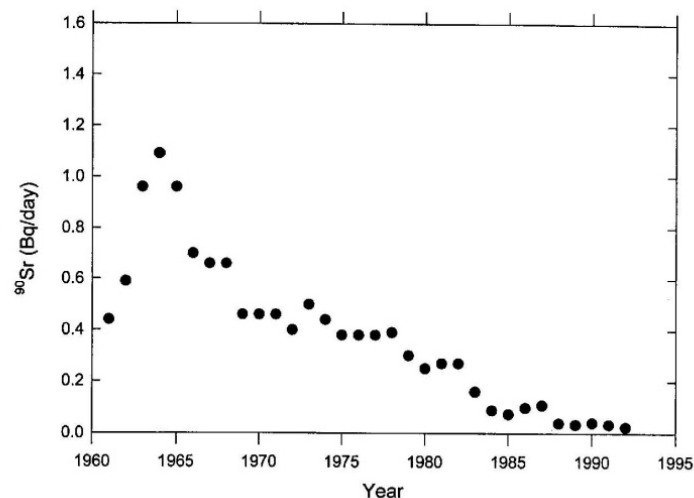


# LEHR and the Nuclear Age



## Strontium-90 Intake in the U.S., 1961–1992

Figure 1. U. S. Daily Intake of  $^{90}\text{Sr}$ , 1961 – 1992 (Cunningham *et al.*, 1994)

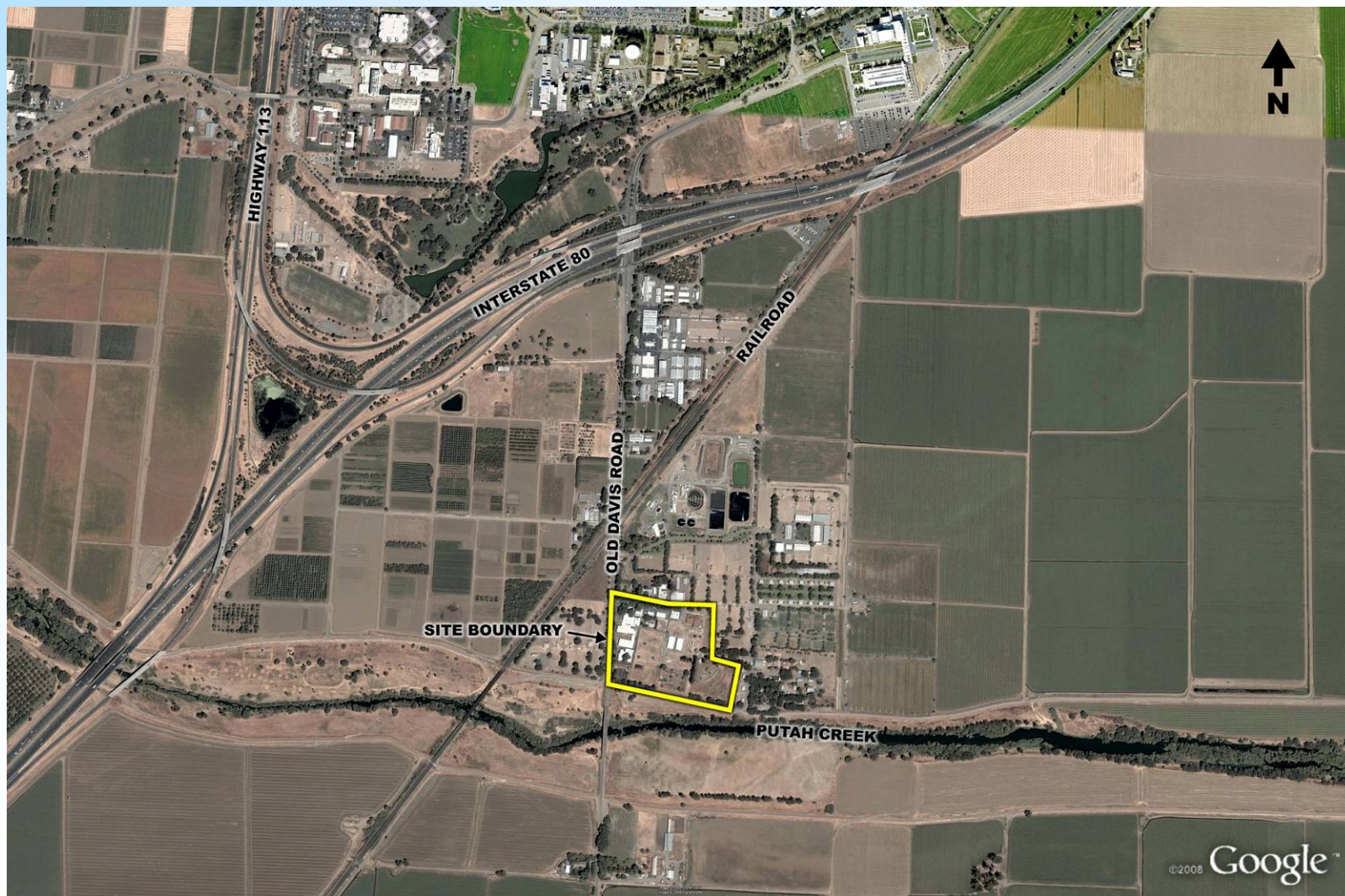


U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management



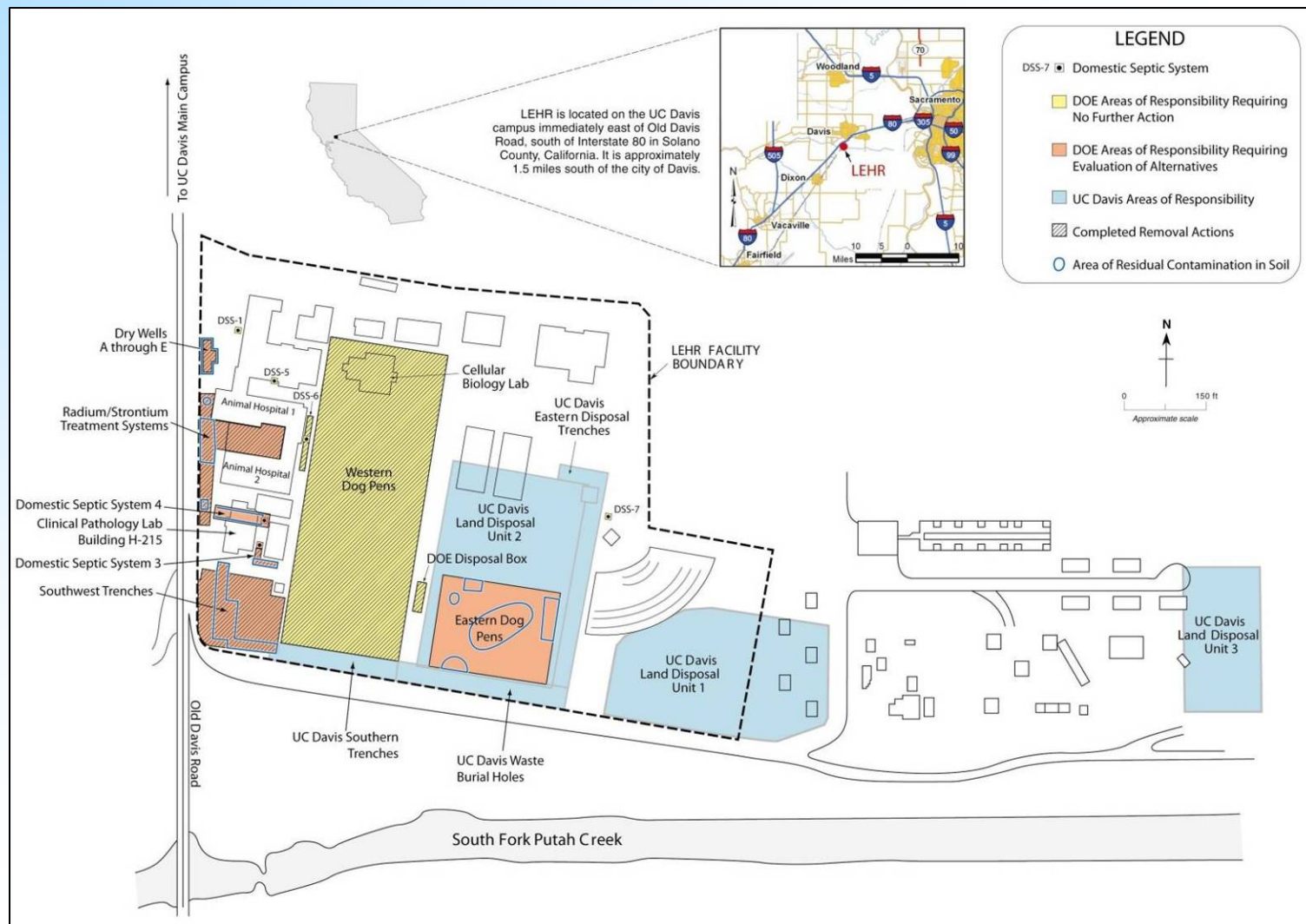
# LEHR and Surrounding Area



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# Site Map

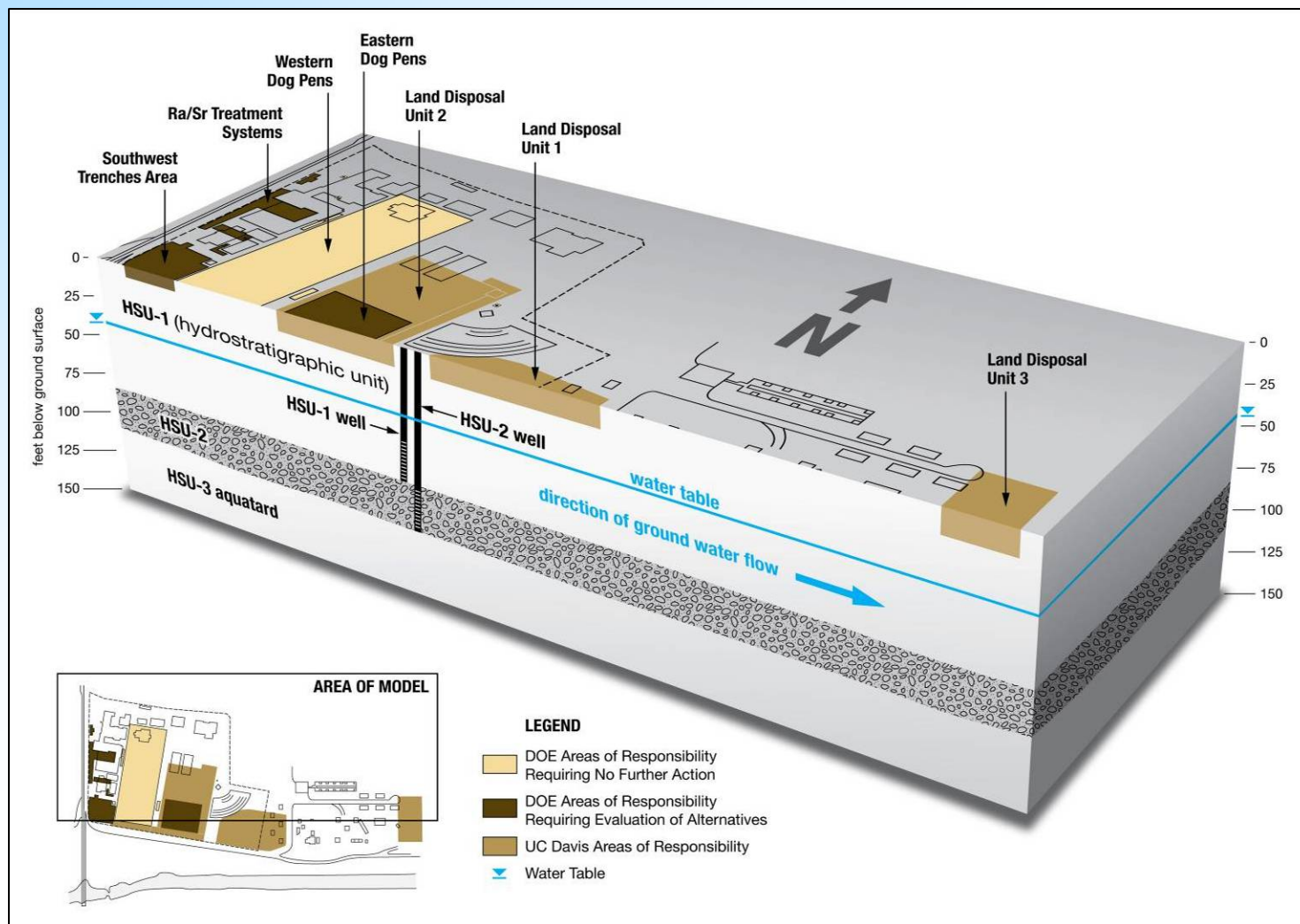


U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management



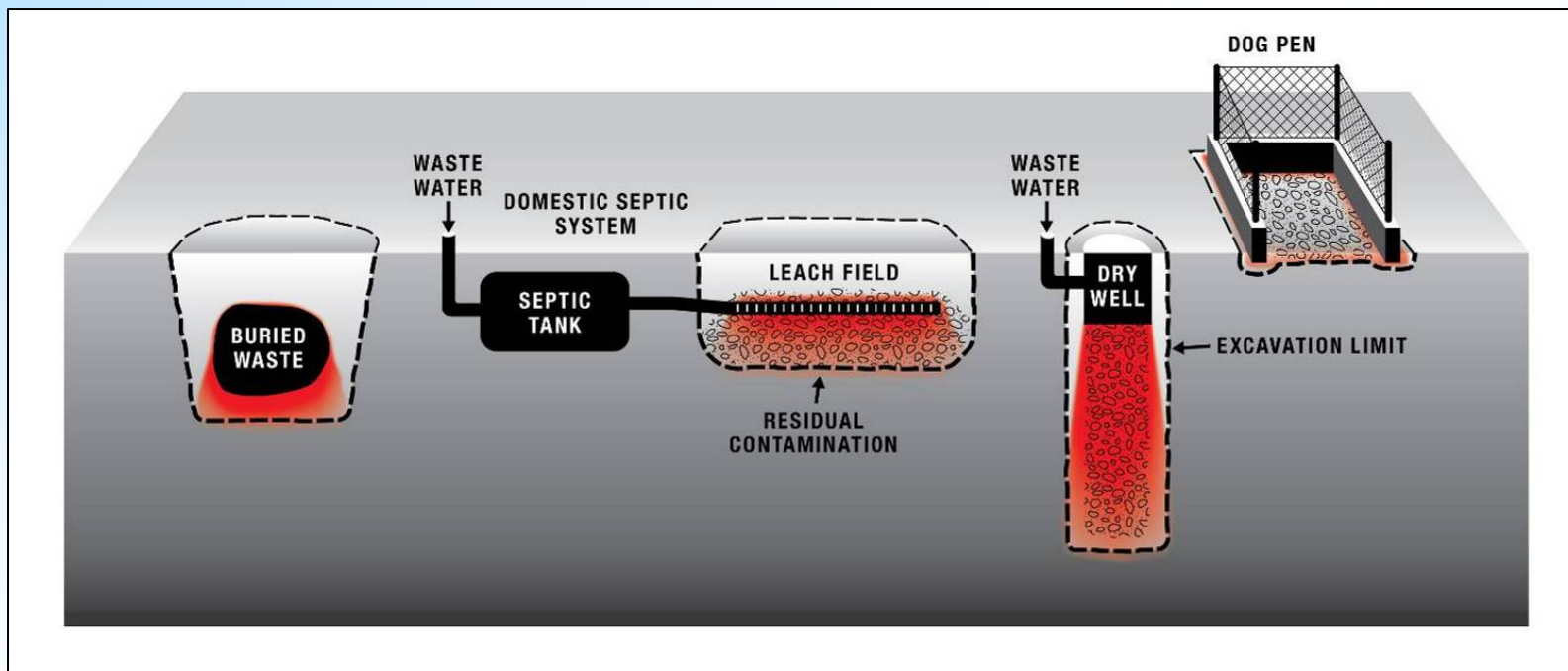
# Conceptual Site Model



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# How Contaminants Were Released





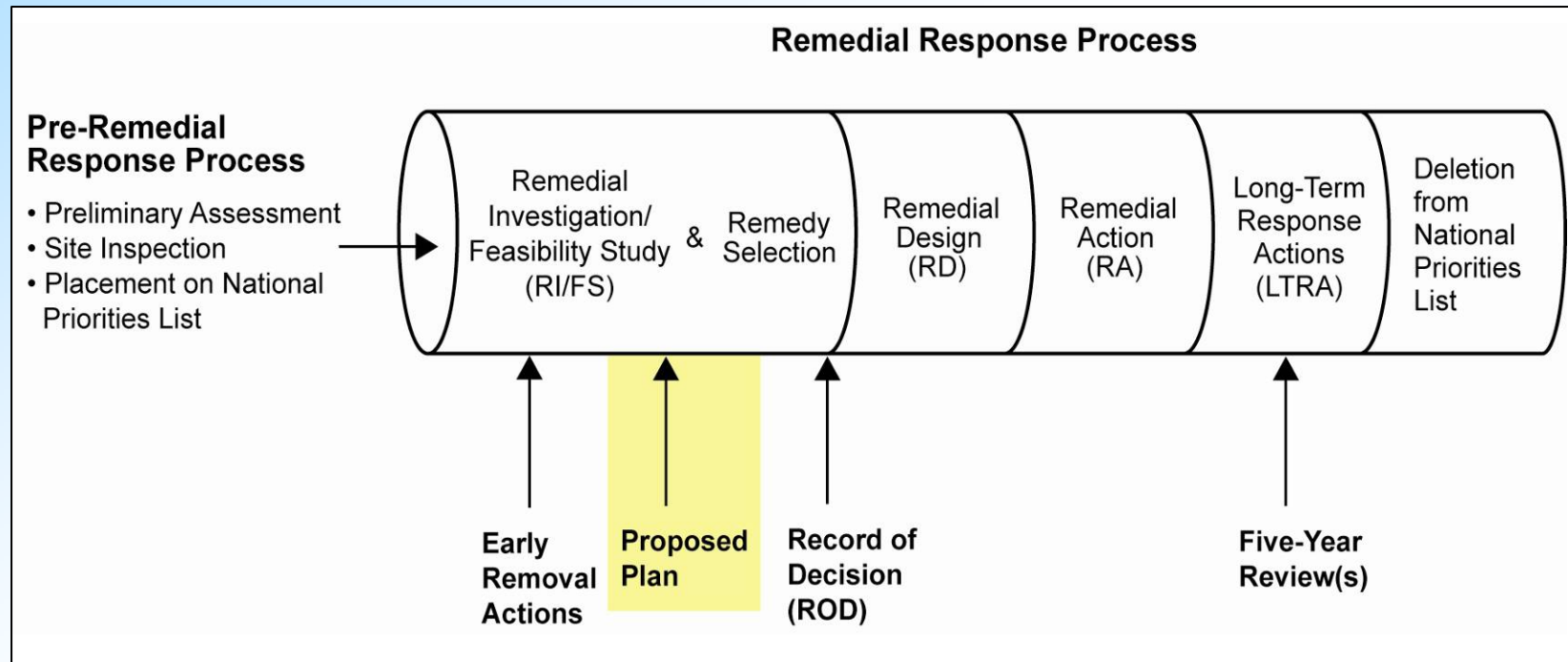
# Dog Pens—1960s



U.S. DEPARTMENT OF  
**ENERGY**

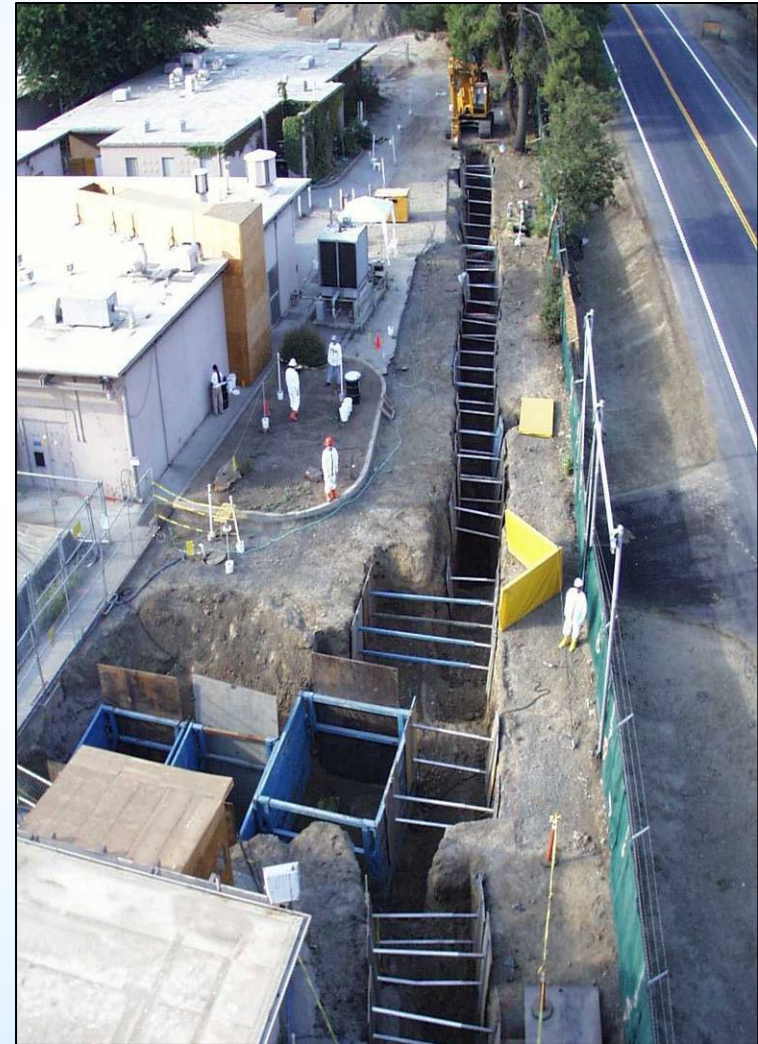
Office of  
Legacy Management

# Superfund Process



# Cleanup Progress

- Site investigations were initiated in 1988
- DOE has already removed and disposed off site most of the hazardous material in its areas
- DOE completed a Remedial Investigation and Risk Assessment to characterize the remaining contaminants
- DOE prepared a Feasibility Study report to evaluate response actions to address remaining site risks



Radium/Strontium Treatment System  
Removal Action at LEHR in 2000



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management



# Cleanup Progress (continued)

- DOE has removed more than 8,500 cubic yards of contaminated soil and debris from the site
- Post-removal action sampling indicates that the majority of the contaminants have been successfully removed



Southwest Trenches Removal Action at LEHR in 1999

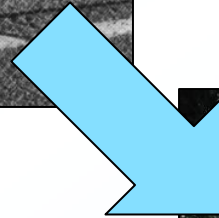
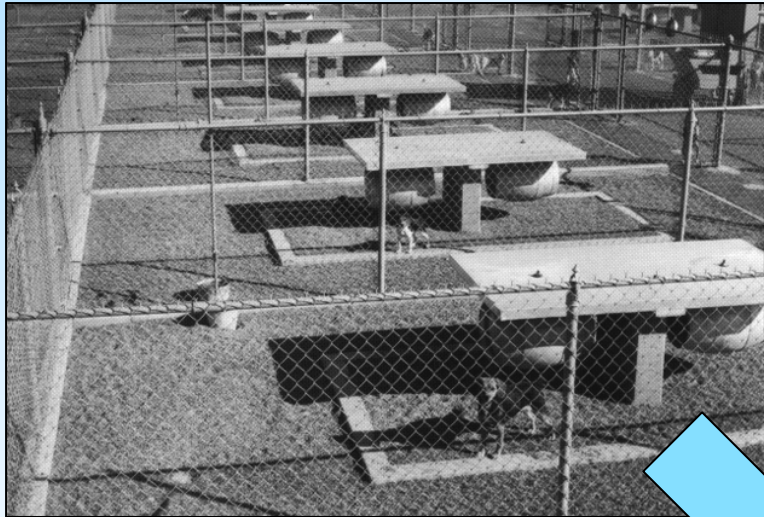


U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management



# Western Dog Pens: Before and After



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# Purpose of Proposed Plan

- Presents the preferred alternative to the public
- Summarizes the alternatives studied in detail in the Feasibility Study
- Presents key factors that led to the preferred alternative
- References sources of more detailed information
- Provides information on public participation in the final remedy selection



# Constituents of Concern by DOE Area

Area	Constituents of Concern Contained in Soil	
	Human Health Risk	Groundwater Impact
Domestic Septic System No. 1	None	None
Domestic Septic System No. 3	None	Formaldehyde, Molybdenum, Nitrate
Domestic Septic System No. 4	Polycyclic Aromatic Hydrocarbons	Selenium
Domestic Septic System No. 5	None	None
Domestic Septic System No. 6	None	None
Domestic Septic System No. 7	None	None
Dry Wells A-E Area	None	Chromium, Hexavalent Chromium, Mercury, Molybdenum, Silver, Cesium-137, Strontium-90
Radium/Strontium Treatment System	None	Nitrate, Carbon-14, Radium-226
Southwest Trenches	Strontium-90	Nitrate, Carbon-14
Western Dog Pens	None	None
Eastern Dog Pens	Dieldrin, Strontium-90	None
DOE Disposal Box	None	None



# Cleanup Objectives

- Prevent exposure to cancer risks that are greater than 1 in 10,000 to 1 in 1,000,000
- Mitigate future impacts to groundwater
- Mitigate impacts to the environment
- Comply with applicable state and federal statutes
- Mitigate impacts to UC Davis research





# Remedial Options

- The following options were identified to address contamination in the six remaining DOE areas:
  - No further action/no action
  - Long-term groundwater monitoring
  - Contingency remediation
  - Land-use restrictions
  - Capping
  - Excavation and off site disposal
  - Excavation and on site treatment
  - Limited removal and off site disposal
  - In-place (in-situ) bioremediation
- One or more options are combined to form an alternative



# EPA Evaluation Criteria

## *Threshold Criteria*

1. Overall Protection of Human Health and the Environment



2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)



## *Balancing Criteria*

3. Long-term Effectiveness and Permanence



4. Reduction of Toxicity, Mobility, or Volume Through Treatment



5. Short-term Effectiveness



6. Implementability



7. Cost



## *Modifying Criteria*

8. State Acceptance



9. Community Acceptance



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Legacy Management

# Ra/Sr Treatment Area Assessment and Alternatives

## ■ Assessment:

- Removal action completed
- No direct health risks. Conservative estimates suggest that nitrate, carbon-14 and radium-226 contained in soil could impact shallow groundwater in the future.

## ■ Alternatives evaluated:

- **Alternative 1**—No Further Action
- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- **Alternative 3**—Capping/Long-Term Groundwater Monitoring /Land-Use Restrictions



# Ra/Sr Treatment Area Assessment and Alternatives

- Alternatives evaluated (continued):
  - **Alternative 4a**—Removal and Off-Site Disposal
  - **Alternative 4b**—Removal and On-Site Treatment/  
Land-Use Restrictions
  - **Alternative 4c**—Limited Removal and Off-Site Disposal/  
Long-Term Groundwater Monitoring/  
Land-Use Restrictions
  - **Alternative 5**—In-Situ Bioremediation/Long-Term  
Groundwater Monitoring/Land-Use Restrictions





# Ra/Sr Treatment Area Preferred Alternative

- Preferred alternative:
  - **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- Rationale for proposed alternative:
  - Risk is acceptable
  - Decreasing downgradient concentrations in groundwater
  - Alternative future action will be implemented by DOE if needed



# DSS 3 Assessment and Alternatives

## ■ Assessment:

- Removal action completed
- No direct health risks. Conservative estimates suggest that formaldehyde, molybdenum, and nitrate in soil could impact shallow groundwater in the future.

## ■ The Ra/Sr Treatment Systems Area alternatives are:

- **Alternative 1**—No Further Action
- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- **Alternative 3**—Capping/Long-Term Groundwater Monitoring/Land-Use Restrictions



# DSS 3 Assessment and Alternatives

- The Ra/Sr Treatment Systems Area alternatives are (continued):
  - **Alternative 4a**—Removal and Off-Site Disposal
  - **Alternative 4b**—Removal and On-Site Treatment/Land-Use Restrictions
  - **Alternative 4c**—Limited Removal and Off-Site Disposal/Long-Term Groundwater Monitoring/Land-Use Restrictions
  - **Alternative 5**—In-Situ Bioremediation/Long-Term Groundwater Monitoring/Land-Use Restrictions



# DSS 3 Preferred Alternative

- Preferred alternative:
  - **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- Rationale for proposed alternative:
  - Risk is acceptable
  - Future action will be implemented by DOE if needed
  - Natural biodegradation of formaldehyde likely





# DSS 4 Assessment and Alternatives

## ■ Assessment:

- Limited amounts of polycyclic aromatic hydrocarbons result in a cancer risk of 5 in 10,000 to a hypothetical on-site resident. Selenium in soil could impact shallow groundwater in the future. Low concentrations of selenium are currently observed in groundwater.

## ■ Alternatives evaluated:

- **Alternative 1**—No Further Action
- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- **Alternative 3**—Capping/Long-Term Groundwater Monitoring/Land-Use Restrictions
- **Alternative 4**—Limited Removal and Off-Site Disposal (does not remove contaminated soil located below Building H-215)/Land-Use Restrictions



# DSS 4 Preferred Alternative

- Preferred alternative:
  - **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- Rationale for proposed alternative:
  - Inaccessible contamination under building
  - Alternative future action will be implemented by DOE if needed



# Dry Wells A–E Assessment and Alternatives

## ■ Assessment:

- Partial removal action completed
- No direct health risks. Conservative estimates suggest that chromium, hexavalent chromium, mercury, molybdenum, silver, cesium-137, and strontium-90 contained in soil could impact shallow groundwater in the future.

## ■ Alternatives evaluated:

- **Alternative 1**—No Further Action
- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions



# Dry Wells A–E Assessment and Alternatives

## ■ Alternatives evaluated (continued):

- **Alternative 3**—Capping/Long-Term Groundwater Monitoring/Land-Use Restrictions
- **Alternative 4a**—Removal and Off-Site Disposal
- **Alternative 4b**—Limited Removal and Off-Site Disposal/Long-Term Groundwater Monitoring/Land-Use Restrictions





# Dry Wells A–E Preferred Alternative

- Preferred alternative:
  - **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- Rationale for proposed alternative:
  - Risk is acceptable
  - No current groundwater impacts
  - Alternative future action will be implemented by DOE if needed



# SWT Assessment and Alternatives

## ■ Assessment:

- Removal action completed
- Strontium-90 concentrations result in a risk of 3 in 1,000,000 to a hypothetical on-site resident. Conservative estimates suggest that nitrate and carbon-14 contained in soil could impact shallow groundwater in the future. Carbon-14 concentrations in groundwater are above site background but well below drinking water standards.

## ■ Alternatives evaluated:

- **Alternative 1**—No Further Action
- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions
- **Alternative 3**—Capping/Long-Term Groundwater Monitoring/Land-Use Restrictions



# SWT Assessment and Alternatives

- Alternatives evaluated (continued):
  - **Alternative 4a**—Removal and Off-Site Disposal
  - **Alternative 4b**—Removal and On-Site Treatment/  
Land-Use Restrictions
  - **Alternative 4c**—Limited Removal and Off-Site Disposal/  
Long-Term Groundwater Monitoring/  
Land-Use Restrictions
  - **Alternative 5**—In-Situ Bioremediation/Long-Term  
Groundwater Monitoring/Land-Use Restrictions



# SWT Preferred Alternative

- Preferred alternative:

- **Alternative 2**—Long-Term Groundwater Monitoring/Contingency Remediation/Land-Use Restrictions

- Rationale for proposed alternative:

- Risk is acceptable
- Decreasing downgradient concentrations in groundwater
- Alternative future action will be implemented by DOE if needed





# EDPs Assessment and Alternatives

## ■ Assessment:

- Fences and concrete curbs removed
- Strontium-90 and dieldrin result in a risk of 4 in 1,000,000 to a hypothetical on-site resident

## ■ Alternatives evaluated:

- **Alternative 1**—No Further Action
- **Alternative 2**—Land-Use Restrictions
- **Alternative 3**—Removal and Off-Site Disposal



# EDPs Preferred Alternative

- Preferred alternative:
  - **Alternative 2**—Land-Use Restrictions (Soil Management Plan)
- Rationale for proposed alternative
  - Low mass of residual contaminants of concern in soil
  - Risk is acceptable



# Remedy Selection

- DOE requests your feedback on all alternatives evaluated, as well as the preferred alternative
- Comments can be made later in the meeting or by mail or e-mail
- The preferred alternative may be modified with this input, new information, or reevaluation of existing information



# Path Forward

- The public comment period ends on November 17, 2008
- In consultation with the support agencies, DOE will make a final decision on the site remedy
- The decision and its basis will be provided in the Record of Decision
- The Record of Decision will include a written summary of significant public comments or new information received during the comment period and DOE's responses to public comments





# Public Input

- Clarifying Questions



# Public Input

- Formal Public Comments

