

# Deep Vadose Zone

Addressing contamination deep in the vadose zone

Enter

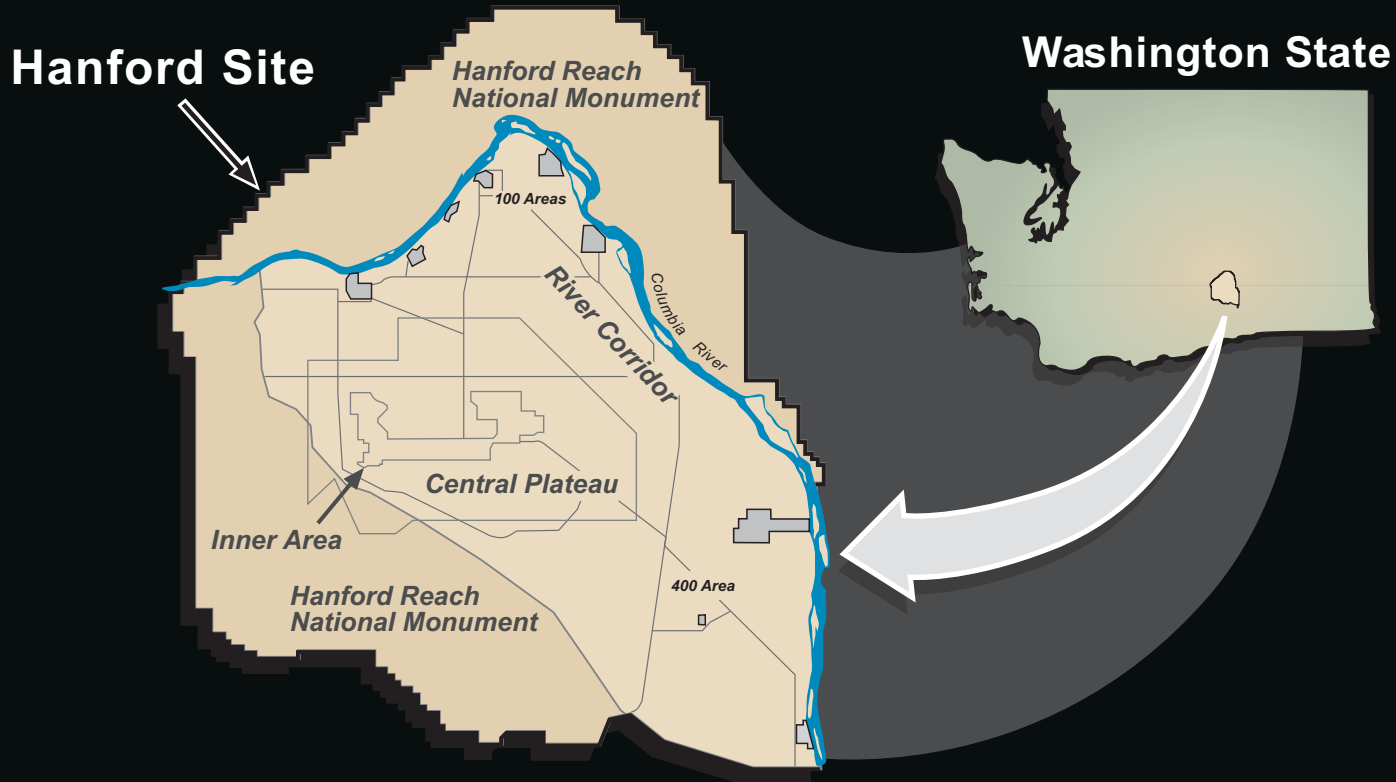
*Please use your mouse to navigate*



## Contents

- Where is the Hanford deep vadose zone?
- What is the vadose zone?
- How was it contaminated?
- What are the risks?
- Why is it so tough to clean up?
- What is being done?
- What's next?
- For more information

# Where is the Hanford deep vadose zone?



At the Hanford Site in southeast Washington, the U.S. Department of Energy (DOE) is addressing contamination deep in the soil of the Central Plateau, a 75-square-mile area at the center of the site.

# What is the vadose zone?

## Shallow Vadose Zone

Practical limit of surface-based remedies such as excavation

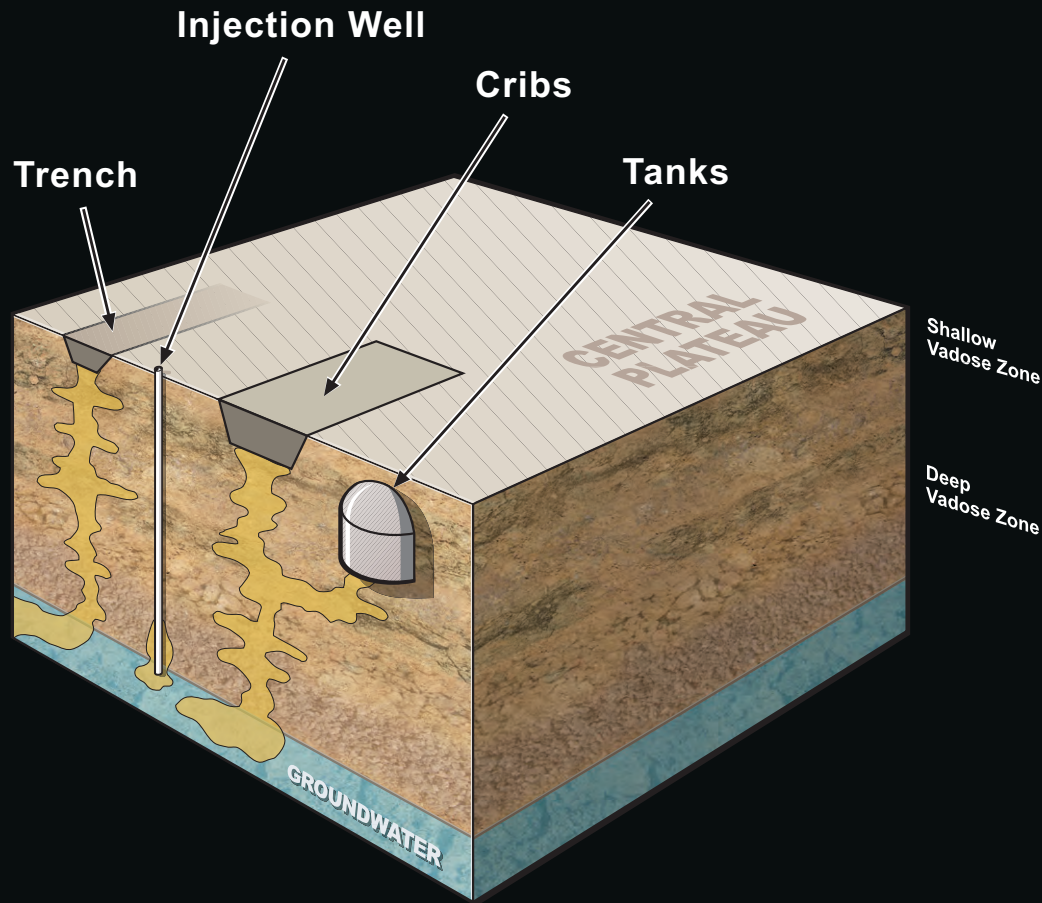
## Deep Vadose Zone

Contamination that poses a potential threat to groundwater and is not easily mitigated by surface-based remedies



The vadose zone is the area between the surface and the groundwater at Hanford's Central Plateau. It is approximately 250 feet thick. The "deep" vadose zone is the region above groundwater and below the practical limits of surface-based cleanup methods.

# How was it contaminated?

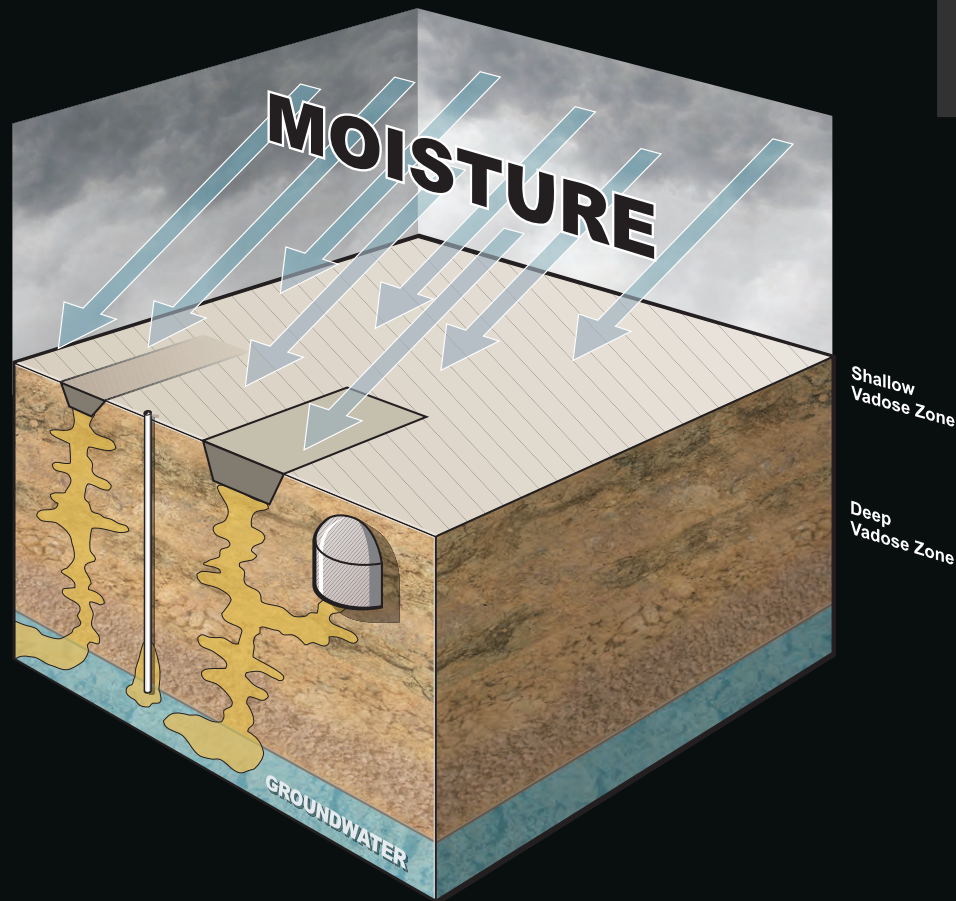


The vadose zone was contaminated during Hanford's plutonium production operations from the 1940s to 1980s. Liquid wastes were intentionally stored in underground tanks and disposed in engineered disposal structures such as cribs, trenches, and injection wells. Waste was also released unintentionally.

# What are the risks?

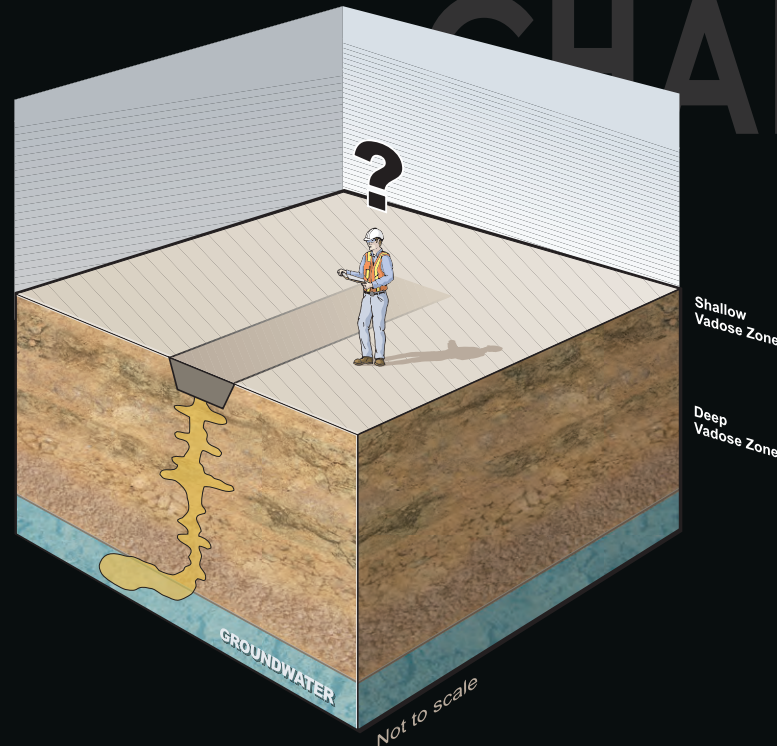
Deep Vadose Zone

RISKS



Discharged liquid waste moved contamination deep into the soil. Some has reached the groundwater and some has the potential to reach groundwater. Moisture in the soil migrates downward, driving contaminants toward the groundwater, which eventually reaches the Columbia River.

# Why is it so tough to clean up?



Cleaning up contamination in the deeper portion of the vadose zone is challenging because:

- Some conventional methods may have limited effectiveness
- Deep contamination is difficult to characterize and access
- Different contaminants occur in different depths and soil types and may require multiple methods to address
- Deep vadose zone remedies are challenging to monitor

# What is being done?



DOE, contractors, the U.S. Environmental Protection Agency and the Washington State Department of Ecology are collaborating to identify solutions for characterizing, remediating, and monitoring the deep vadose zone. The current path forward includes:

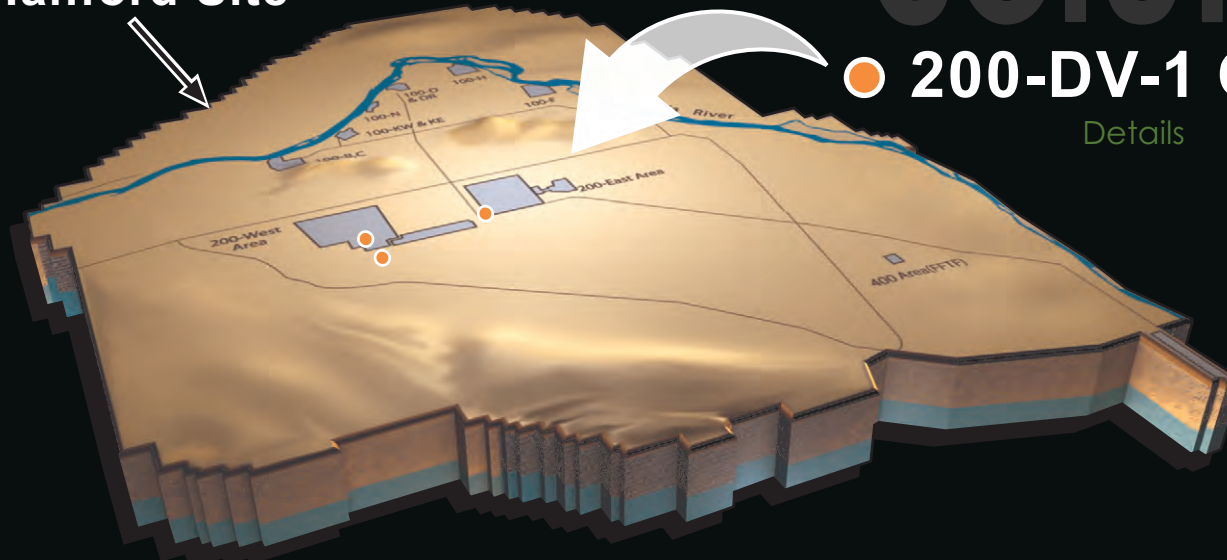
- Continuing ongoing remediation and treatability studies [more info](#)
- Establishing a deep vadose zone operable unit with a time frame and milestones for making cleanup decisions [more info](#)
- Creating a toolbox of technologies to treat the contamination [more info](#)
  - In addition, the Deep Vadose Zone Applied Field Research Initiative has been established to help develop new technologies [more info](#)



# What is being done?

## Solutions

Hanford Site



● 200-DV-1 OU

Details

### Establishing a deep vadose zone operable unit (200-DV-1):

- Treats the deep vadose zone as an operable unit (OU) - a group of waste sites that require specialized remediation approaches and cannot be remediated using typical surface-based techniques
- Brings a centralized focus and systematic approach to making decisions about how to clean up the deep vadose zone
- Excludes the deep vadose zone associated with Hanford's tank waste sites, which will be addressed separately



# What is being done?



## Treatment Technologies

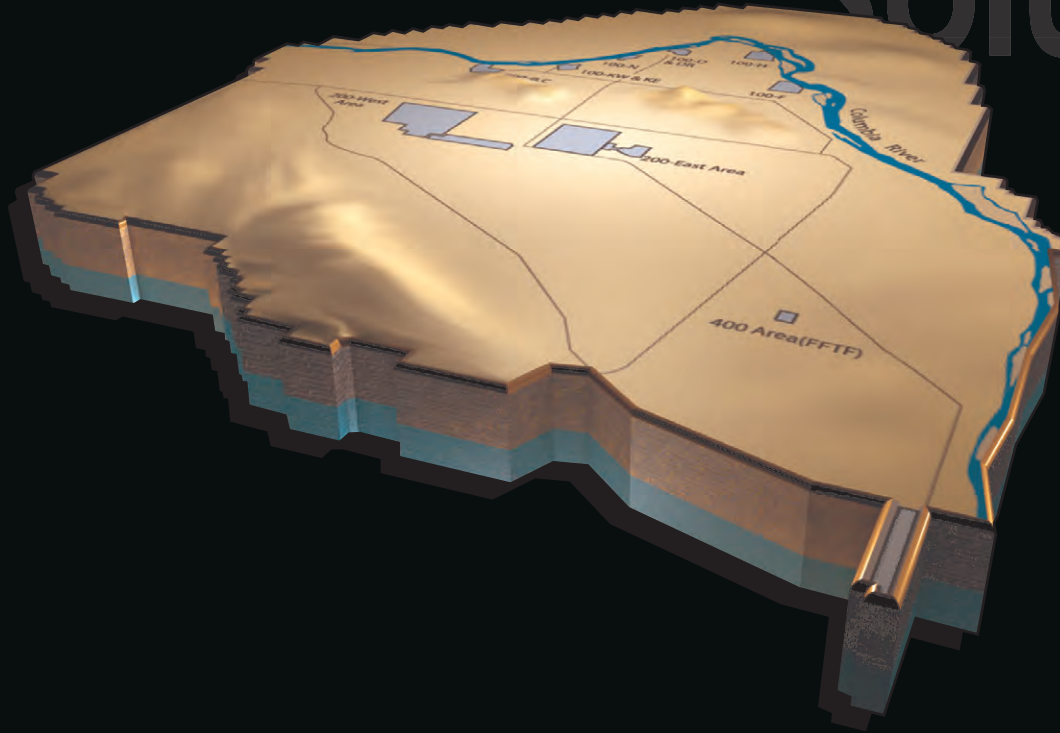
DOE and Hanford Site contractors are working together to develop a toolbox of technologies with the capabilities to remediate contamination in the deep vadose zone. New technologies are being researched, developed, and evaluated to determine their effectiveness.

The main types of treatment technologies being considered and tested include:

- Containment [more info](#)
- Removal [more info](#)
- Ex-situ treatment and disposal [more info](#)
- In-situ treatment [more info](#)

# What is being done?

## Solutions



### Deep Vadose Zone Applied Field Research Initiative [more info](#)

The initiative includes close collaboration and communication between participants on the project, DOE Office of Science, academia, industry, and field activities supported by DOE Richland Operations Office, CH2M HILL Plateau Remediation Company, Washington River Protection Services, and the DOE Office of River Protection.



# What's next?

## Path Forward

The Tri-Party Agreement agencies are engaging the Tribal Nations and stakeholders throughout the cleanup decision-making process with public involvement opportunities, including a deep vadose zone information exchange on June 7, 2011.

The public will also receive updates at existing Tribal Nations and Hanford Advisory Board meetings.

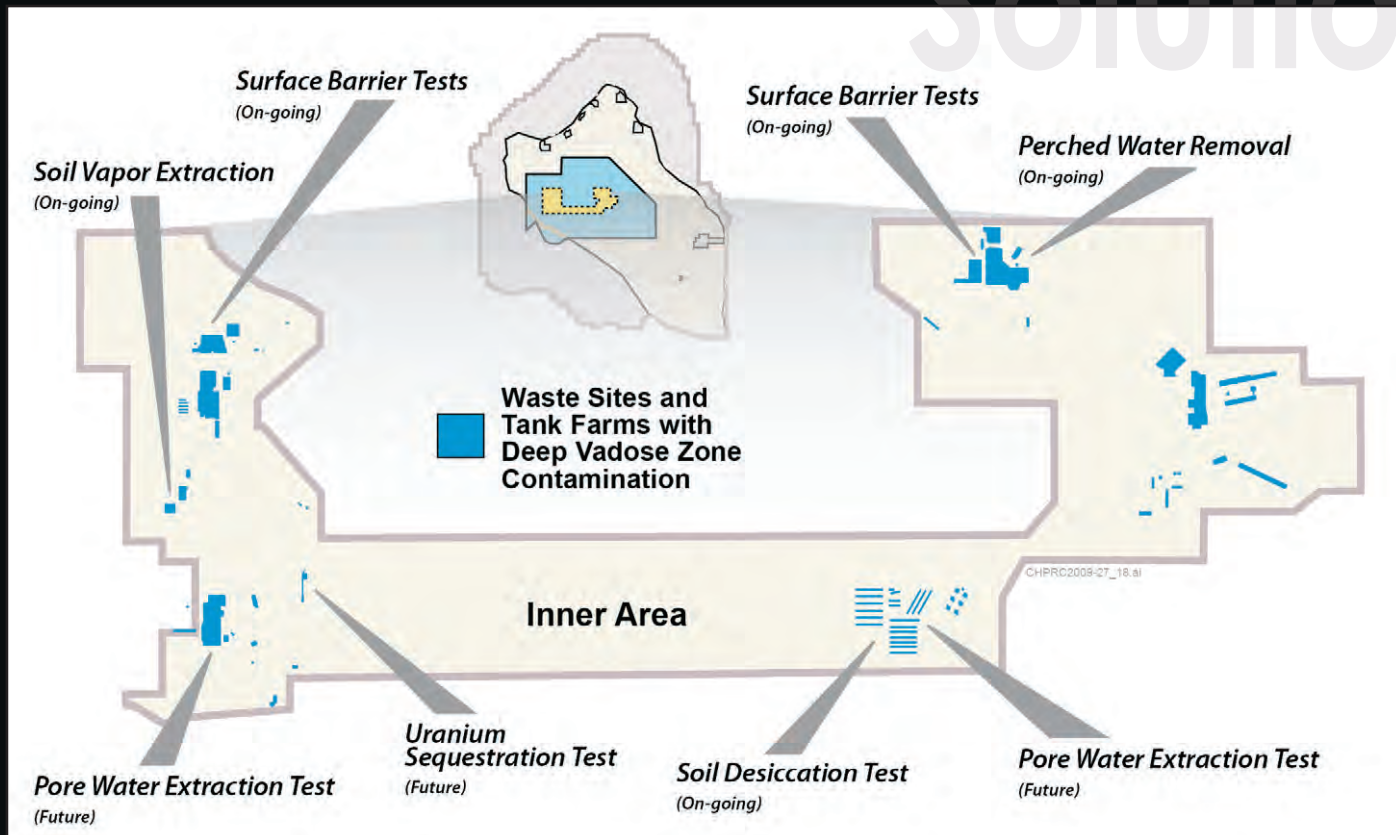
### Tri-Party Agreement Milestones

The Tri-Party Agreement is an agreement between DOE, the U.S. Environmental Protection Agency and the Washington State Department of Ecology that includes legally-binding deadlines, or "milestones", for Hanford cleanup. The milestones that address the deep vadose zone are:

**M-015-110A**, submit Resource Conservation and Recovery Act (RCRA) Facility Investigation/Corrective Measures Study & Remedial Investigation/Feasibility Study work plan for the 200-DV-1 OU to Ecology. The work plan shall include technology screening that identifies technologies applicable for characterization, treatment, and monitoring of deep vadose zone contaminants. Due date: 9/30/2012.

**M-015-110B**, submit Corrective Measures Study & Feasibility Study Report and Proposed Plan/Proposed Corrective Action Decision for the 200-DV-1 OU to Ecology. Due date: 9/30/2015.

# What is being done?

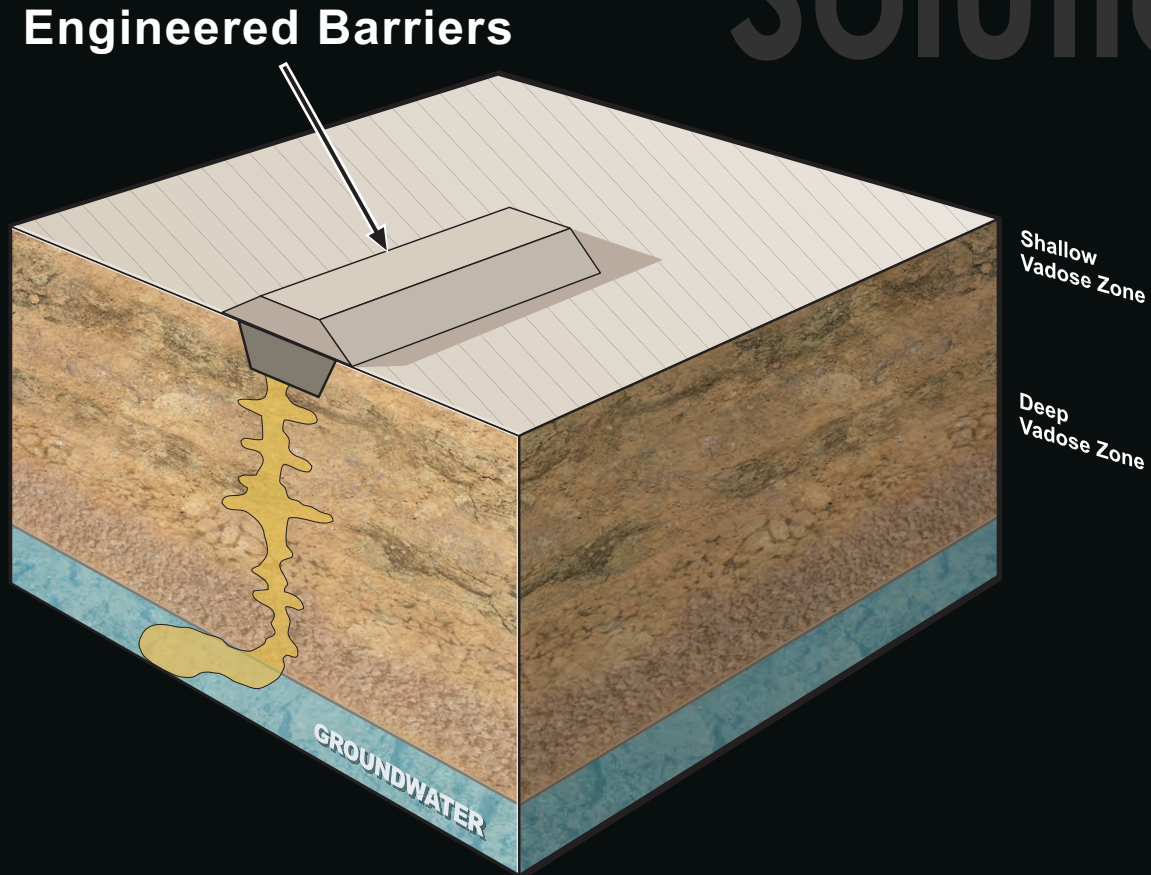


## Continuing ongoing remediation and treatability studies

The technologies shown above are either currently in place or being field tested at deep vadose zone sites at the inner area of the Central Plateau.

# What is being done?

# Solutions



## Containment

Surface-based remedies impede moisture from entering the soil where it can force contamination downward to the groundwater.

# What is being done?

## Solutions

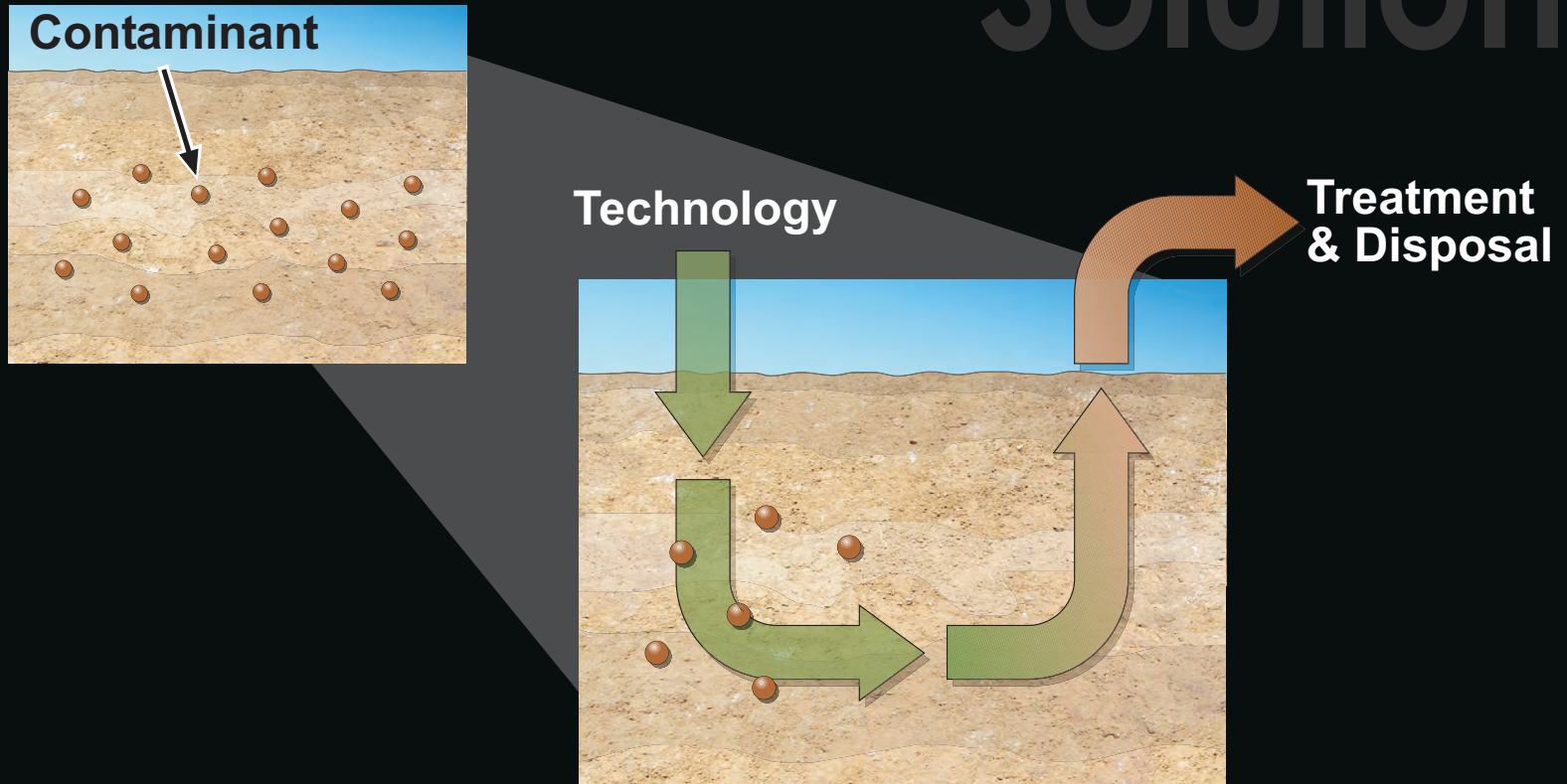


### Removal

An action or technology is applied to remove the contamination for disposal.

# What is being done?

## Solutions



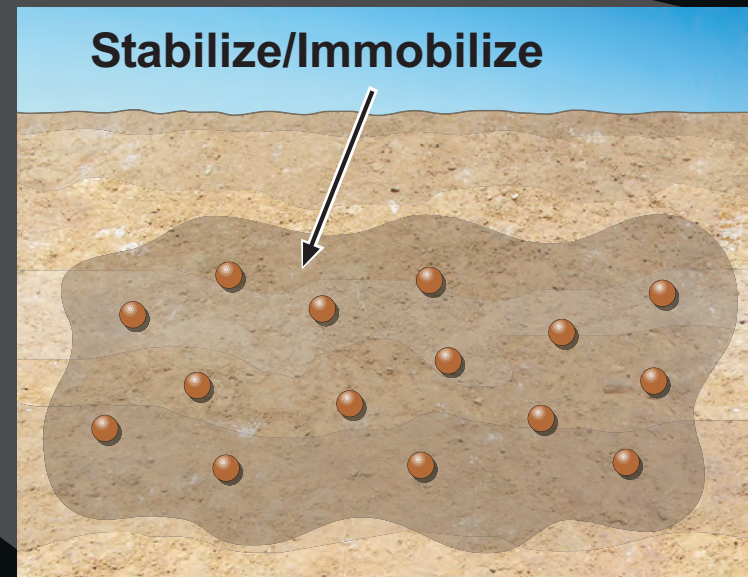
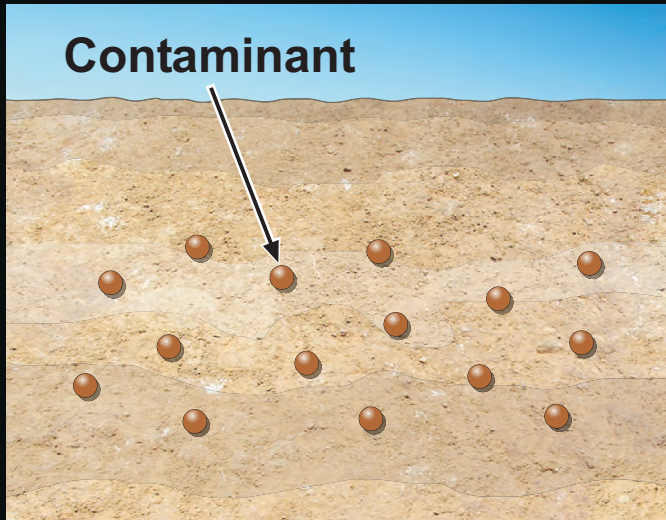
### Ex-situ treatment and disposal

An action or technology is applied that removes the contaminant from its current location to be treated elsewhere and then disposed.



# What is being done?

# Solutions



## In-situ treatment

An action of technology is applied to contaminants where they reside, stabilizing and/or immobilizing the contaminant to decay or altering the contaminant to a less hazardous form.



We appreciate your interest in Hanford's deep vadose zone

**For more information contact:**

Paula Call, Stakeholder and Community Outreach  
509-376-8230

For a calendar of Hanford Public Involvement events, visit  
<http://www.hanford.gov/pageAction.cfm/Calendar>

Close

[View printable version](#)

[Home](#)

Close

Home







