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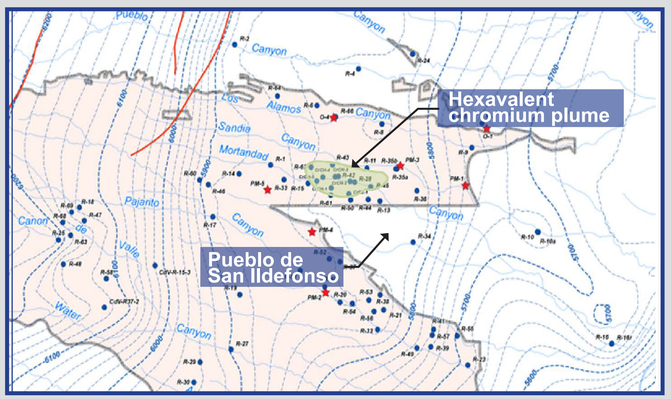
Historical Context of the Hexavalent Chromium (Cr) Plume

Origin of the Hexavalent Cr Plume

- The source of the hexavalent Cr plume was a non-nuclear power plant at Los Alamos National Laboratory (LANL) that periodically flushed water containing potassium dichromate from the plant's cooling towers into Sandia Canyon from 1956-1972.
- Up to 160,000 lbs of hexavalent Cr was released during this period, but not all of it migrated into the regional aquifer.
- Current measurements estimate the hexavalent Cr plume is ~1 mile long x ½ mile wide.



Movement of the Hexavalent Cr Plume

- Water containing hexavalent Cr traveled down Sandia Canyon.

- Unsaturated zones in tilted rock formations beneath the canyon allowed hexavalent Cr to infiltrate into the regional aquifer underlying Mortandad Canyon.

First Samples

- Monitoring Well R-28 was installed in Mortandad Canyon in 2004 to investigate the regional aquifer beneath LANL.
- The first groundwater samples from R-28 contained hexavalent Cr concentrations ~8x the New Mexico chromium groundwater standard.
- EM-LA prepared the Environmental Assessment for Chromium Plume Control Interim Measure and Plume-Center Characterization (DOE/EA-2005) to analyze environmental impacts of actions to limit downgradient migration of the plume edge in the regional aquifer.

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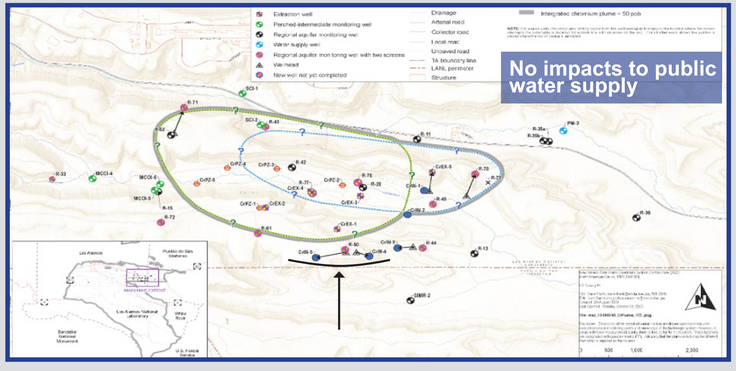
The Interim Measures (IM) for Hexavalent Chromium Plume Control

Primary Objective of the IM

- The objective of the IM is to control migration of the hexavalent chromium (Cr) groundwater plume beyond the Laboratory boundary.
- Plume control is achieved through extraction and treatment of contaminated groundwater ("pump and treat") and injection of treated (clean) groundwater along the downgradient plume edge.
- The IM includes extraction and injection wells and associated equipment necessary to prevent migration of the hexavalent Cr plume beyond the LANL boundary.

Key Highlights Associated with IM Design

- Installed wells R-35a and R-35b in 2006 as an early warning for hexavalent Cr approaching Los Alamos County supply well PM-3.
- Prior to the IM, 10 regional monitoring wells, 2 perched-intermediate wells, and 6 core holes/ piezometers were installed to define the nature and extent of the plume.
- Hydraulic control successfully moved the southern extent of the hexavalent Cr plume ~500 feet away from the Pueblo de San Ildefonso.



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Alternatives Evaluated

No Action Alternative – "Continue Interim Measures and Plume Characterization"

- Under the No Action Alternative, EM-LA would continue to control plume migration and maintain hexavalent chromium (Cr) contamination levels within the LANL boundary while long-term corrective action remedies continue to be evaluated and implemented.
- EM-LA would continue to further characterize the hexavalent Cr plume to evaluate the effectiveness and feasibility of implementing a remedy.

Proposed Action "Adaptive Site Management"

- EM-LA would use adaptive site management to remediate the hexavalent Cr plume.
- This approach would create a framework of structured and continuous planning, implementation, and monitoring that accommodates new information, changing site conditions, and public participation.
- Proposed Action Alternative includes four options, or a combination of these options:
  - **Option 1:** Mass Removal via Expanded Treatment
  - **Option 2:** Mass Removal with Land Application
  - **Option 3:** Mass Removal via In-situ Treatment
  - **Option 4:** Monitored Natural Attenuation

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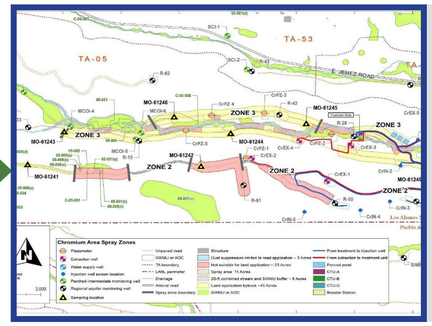
Adaptive Site Management: Proposed Action Alternative Options

Continue Interim Measures and Plume Characterization:

Control plume migration and maintain chromium contamination concentrations within LANL boundary while continuing to evaluate long-term corrective action remedies, including options for chromium mass removal. Continue characterization with additional monitoring wells, studies, and modeling.

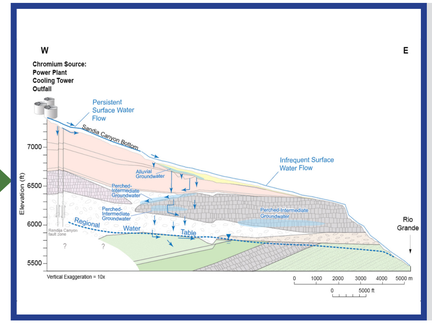
Option 1 - Mass Removal via Expanded Treatment:

Under this option, additional extraction, injection and monitoring wells would be added. These additional wells would raise the rate of groundwater extraction and increase the rate of mass removal, treatment, and injection into the regional aquifer.



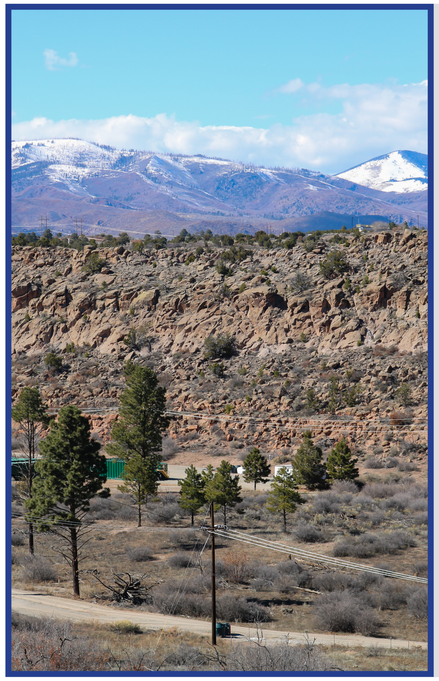
Option 2 - Mass Removal with Land Application:

This option would use land application of treated groundwater as a disposition method. A Discharge Permit would regulate land application rates and requirements.



Option 3 - Mass Removal via In-situ Treatment:

This option would use in-situ treatment to address hexavalent chromium contaminated groundwater. In-situ treatment involves injecting reducing agents in untreated water and relying on chemical processes (e.g., sodium dithionite amendments) to immobilize and detoxify contaminants within soil or groundwater without removing them from the ground. In-situ treatments would be used to target both source area contamination in Sandia Canyon as well as groundwater contamination beneath Mortandad Canyon.



Option 4 - Monitored Natural Attenuation:

Monitored natural attenuation (MNA) relies on natural physical, chemical, or biological processes to reduce concentrations, toxicity, or mobility of chromium and incorporates regular monitoring to verify that MNA is working. In the case of chromium, attenuation occurs via the reduction of mobile Cr(VI) to insoluble Cr(III). EM-LA would consider MNA when contamination poses relatively low risks, the plume is stable or shrinking, and the natural attenuation processes are projected to achieve remedial objectives in a reasonable timeframe, compared to more active methods.

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National Environmental Policy Act (NEPA)

Purpose of the NEPA Environmental Assessment (EA)

- EM-LA is following the National Environmental Policy Act (NEPA) process to evaluate potential environmental impacts of continued operations of the Interim Measures (IM) to control migration of the hexavalent chromium plume and to evaluate the environmental impacts of alternatives for the remedy.
- Public meetings provide interested stakeholders with opportunities to ask questions and submit comments on the considered alternatives for the proposed EA. After public comments are received, EM-LA will prepare a Final EA.
- The proposed action may include well pad and access road installation and maintenance, piezometer placement, and pipeline placement in the 100-year floodplain in Mortandad and Sandia canyons on LANL.

NEPA Timeline

60-day Comment Period Starts
December 14, 2023

↓

Public Meetings*
January 22 and 24, 2024

↓

60-day Comment Period Ends
February 12, 2024

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Final EA Notice of Availability*
Spring 2024

**Includes opportunities for public involvement*

How to Provide Comments

Submit comments by:

- **Email:** emla-nepa@em.doe.gov
  Please include “Draft EA Comment” in the subject line
- **U.S. Mail** - Mail to:
  ATTN: NEPA Document Manager
  U.S. DOE Environmental Management
  Los Alamos Field Office
  1200 Trinity Drive, Suite 400
  Los Alamos, NM 87544

Comments should be postmarked by February 12, 2024 for consideration in the Final EA.

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NEPA Environmental Assessment

Environmental Impacts

- **Air Quality**
- **Cultural Resources**
- **Ecological Resources**
  - » Vegetation
  - » Wildlife
  - » Threatened and Endangered Species
  - » Migratory Birds and Sensitive Species
- **Environmental Justice**
- **Geology and Soils**
- **Hazardous Materials and Waste Generation**
- **Human Health and Worker Safety**
- **Land Use**
- **Noise**
- **Socioeconomics**
- **Traffic and Transportation**
- **Utilities and Infrastructure**
  - » Electricity
  - » Water
  - » Roads
- **Visual Resources**
- **Water Resources**
  - » Groundwater
  - » Surface Water