

Updates from the Carlsbad Environmental Monitoring & Research Center (CEMRC)

Radioactive and Hazardous Materials Committee
August 13, 2026

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Carlsbad Environmental Monitoring &
Research Center (CEMRC)

NM
STATE

New Mexico State University



Outline

- Introduction to CEMRC
- Introduction to WIPP
- Current scope of CEMRC work
- Departments and capabilities



Introduction to CEMRC

- Created in 1991
- Component of the College of Engineering
- Light Hall completed in December of 1996
- **Mission:** To develop, implement, and sustain an **independent health and environmental monitoring program** in the vicinity of the Waste Isolation Pilot Plant (WIPP) facility, making results easily accessible to all stakeholders



Introduction to WIPP

- Deep geological repository licensed to store transuranic waste related to the production and testing of nuclear weapons for 10,000 years
- Site selected in 1973
- U.S. Congress authorized construction in 1979 (PL 96-164)
“... for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission.”



Introduction to WIPP

- Only deep geologic repository in the US
- Salt mine located approximately 30 miles east of Carlsbad
- Located in Salado Formation of the Delaware Basin, formed during the Permian period 250 million years ago
- Located approximately 2,150 ft below surface



This map of the Carlsbad region in southern New Mexico provides a detailed view of the area's geography and infrastructure. Major highways, including US-62, US-180, and NM-285, are shown in red, while state routes are in blue. The map highlights the Carlsbad Caverns National Park and the Living Desert State Park. A red line indicates the proposed route for the New Mexico Rail Runner Express, with stations marked at Carlsbad, Lovings, and Malaga. The map also shows the location of the Waste Isolation Pilot Project (WIPP) and the Pecos River.

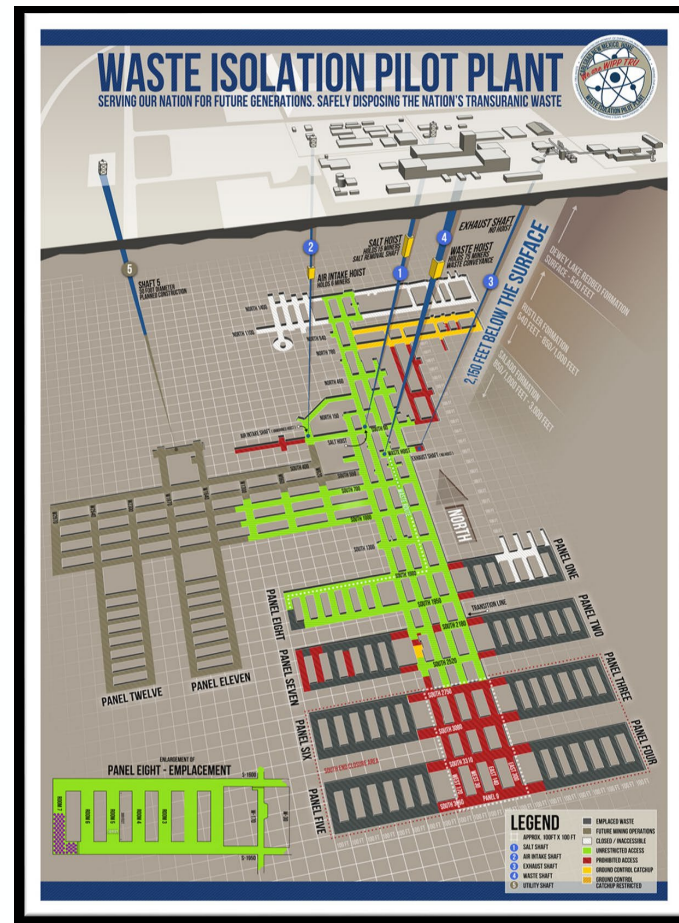


Footprint of the Cold War Legacy

U.S. Department of Energy – Office of Environmental Management

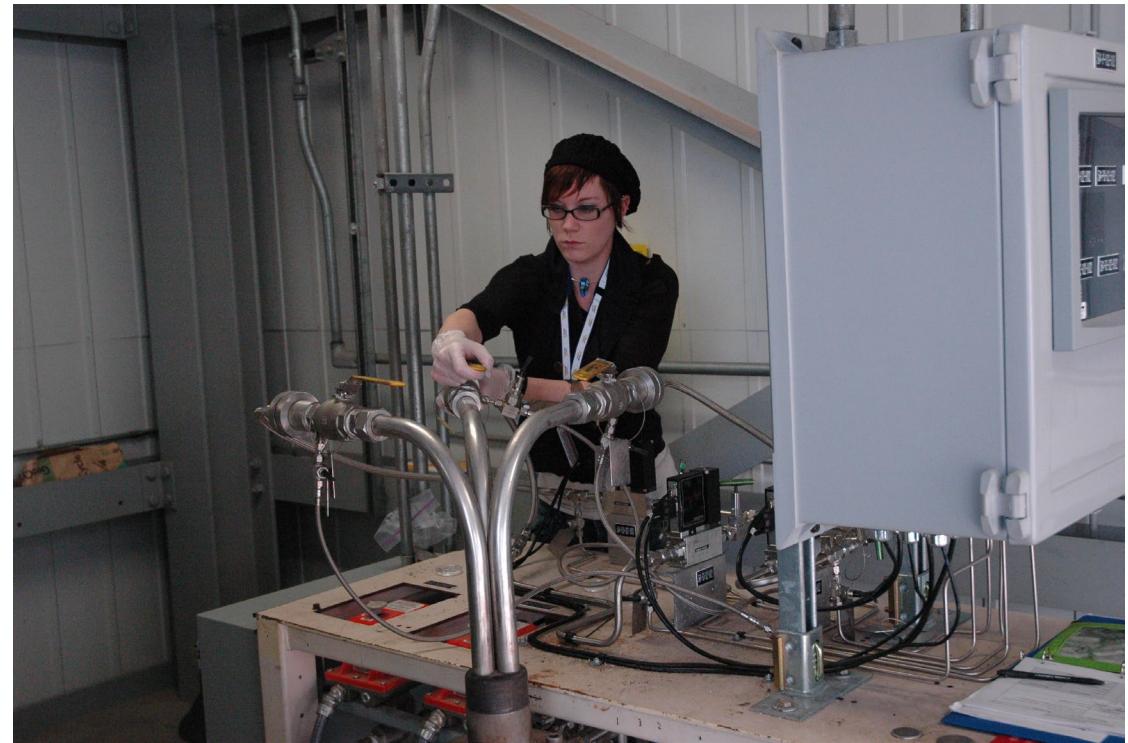


- Salt haul truck fire – February 5, 2014
- Radiation release – February 14, 2014



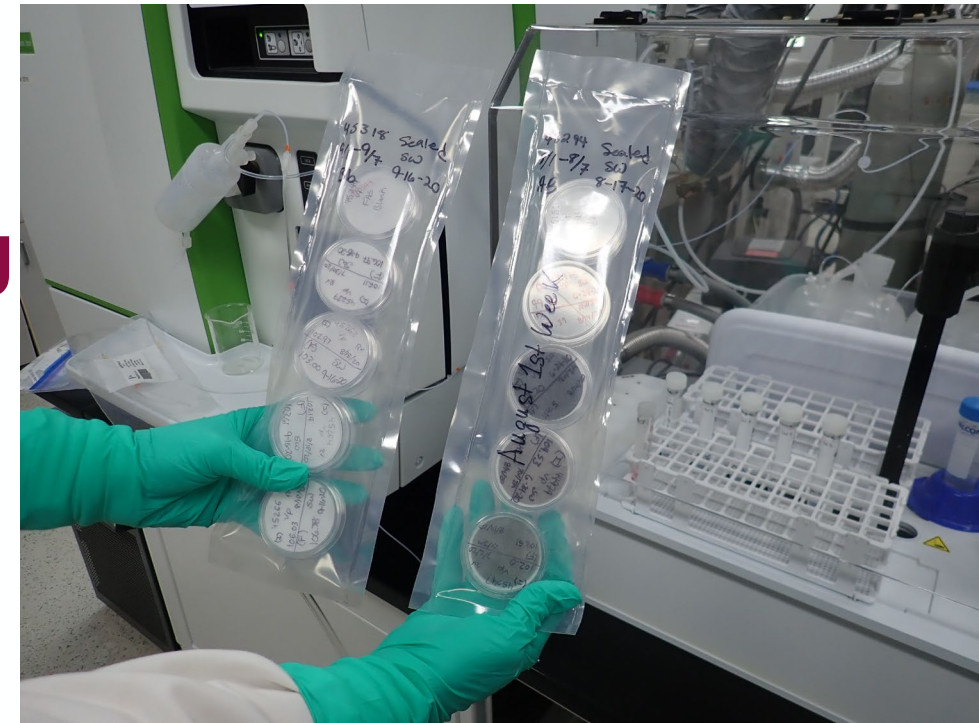
CEMRC Current Scope of Work

- WIPP airborne effluent monitoring – Fixed Air Samplers (FAS), Stations F (unfiltered) and G (HEPA-filtered)
- Airborne particulate monitoring (6 sites)
- Soil sampling (4 sites)
- Surface water sampling (7 sites)
- Drinking water sampling (6 sites)
- Groundwater sampling (6 sites)
- Sediment sampling (3 sites)
- Vegetation sampling (6 sites)
- *In-vivo* monitoring



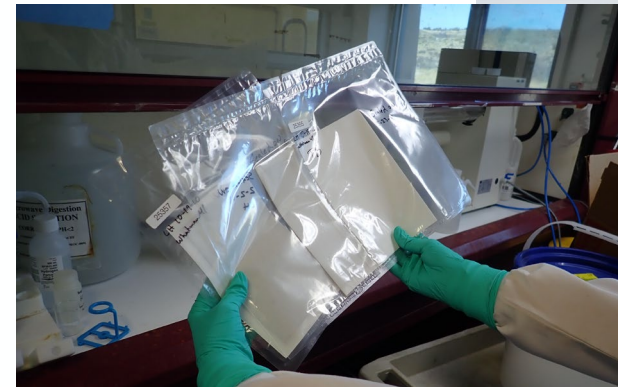
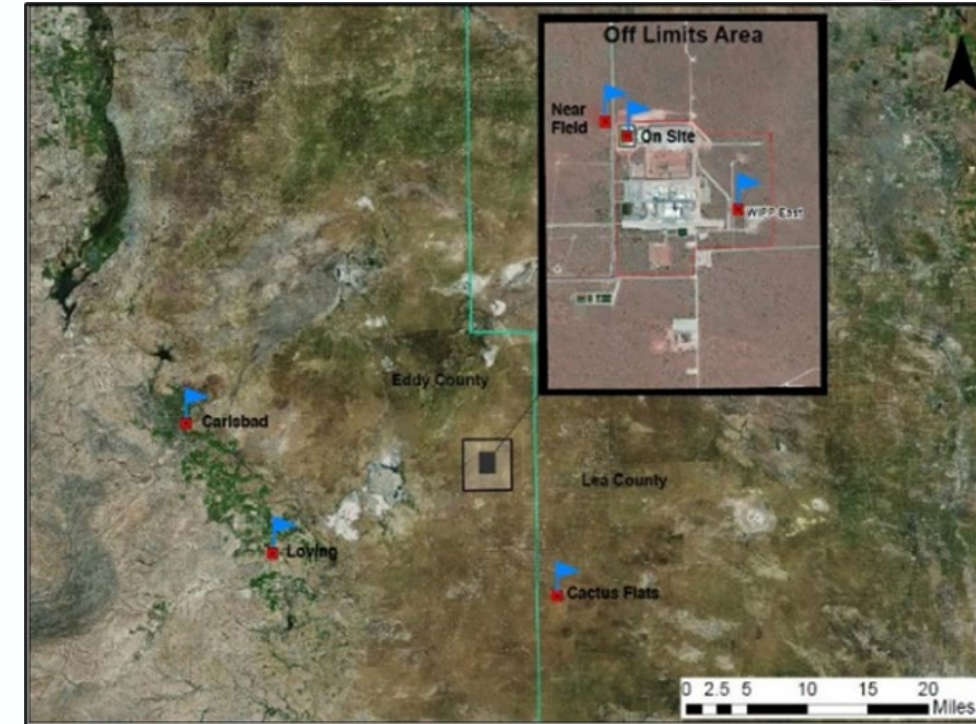
WIPP Airborne Effluent Monitoring

- Fixed air sampler (FAS) Station F (unfiltered) composited weekly
- Fixed air sampler (FAS) Station G (HEPA-filtered) composited monthly
- Radiological components: Gross alpha and gross beta;
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U
- Non-radiological components: NH_4^+ , Al, Cd, Ca, Pb, Mg, K, Si, Th, Na, U; Cl^- , NO_3^- , CO_3^{2-} , SO_4^{2-} , PO_4^{3-}



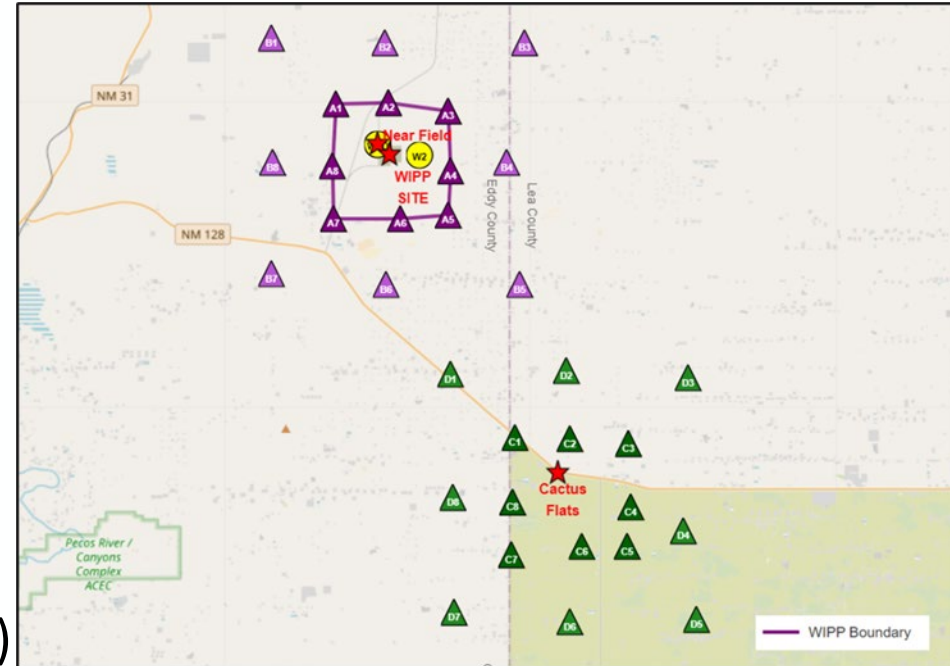
Airborne Particulate Sampling

- On Site, Near Field, Cactus Flats, WIPP East, Carlsbad, Loving (6 sites)
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U ,
 ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th ,
 ^{232}Th , ^{236}U
- Non-radiological components: NH_4^+ , Al, Cd, Ca, Pb, Mg, K, Si, Th, Na, U; Cl^- , NO_3^- , CO_3^{2-} , SO_4^{2-} , PO_4^{3-}



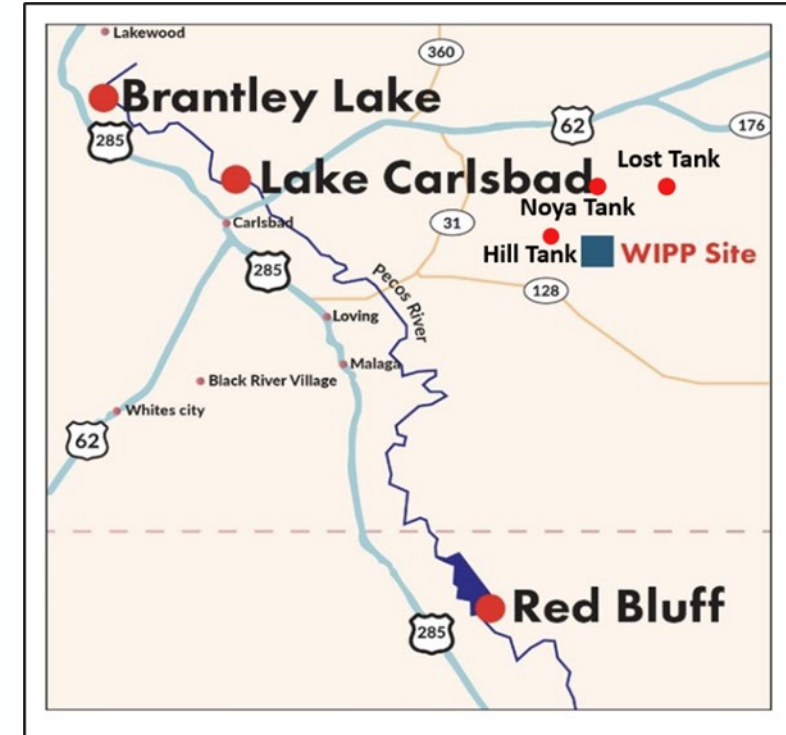
Soil Sampling

- Near Field, Cactus Flats, and 2 additional sites with NMED/WIPP coordination (4 sites total)
- Multiple sampling points per site
- Sampling of 3 different depths at each point (depth profiling)
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U



Surface Water Sampling

- Lake Carlsbad, Brantley Lake, Red Bluff Lake, and 3 additional sites with NMED/WIPP coordination (6 sites total); *adding in 2026*: monthly sampling of Laguna Cinco spring near WIPP
- Shallow and deep samples in each reservoir
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U
- Non-radiological components: Density, conductivity, alkalinity, pH, TOC, TDS, TSS, Ca, Mg, K, Na, Cl^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag, Tl, V



Drinking Water Sampling

- Sheep Draw, Double Eagle, Hobbs, Loving, Malaga, Otis (6 sites)
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U
- Non-radiological components: Density, conductivity, alkalinity, pH, TOC, TDS, TSS, Ca, Mg, K, Na, Cl^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag, Tl, V

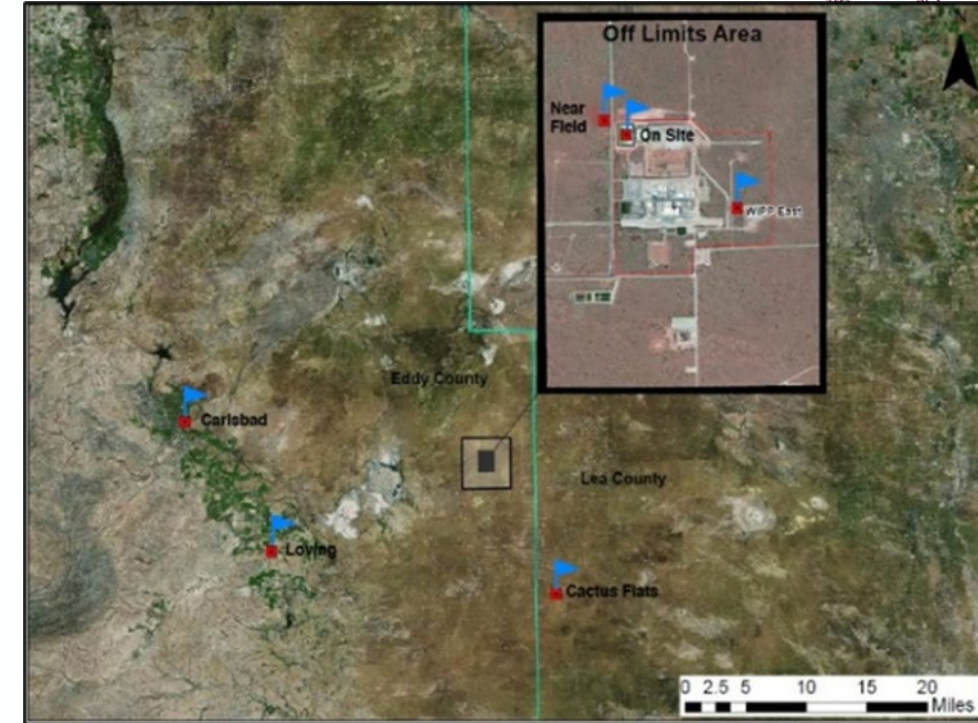


Groundwater Sampling

- Groundwater wells on site (WQSP-1, WQSP-2, WQSP-3, WQSP-4, WQSP-5, and WQSP-6)
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U
- Non-radiological components: Density, conductivity, alkalinity, pH, TOC, TDS, TSS, Ca, Mg, K, Na, Cl^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag, Tl, V

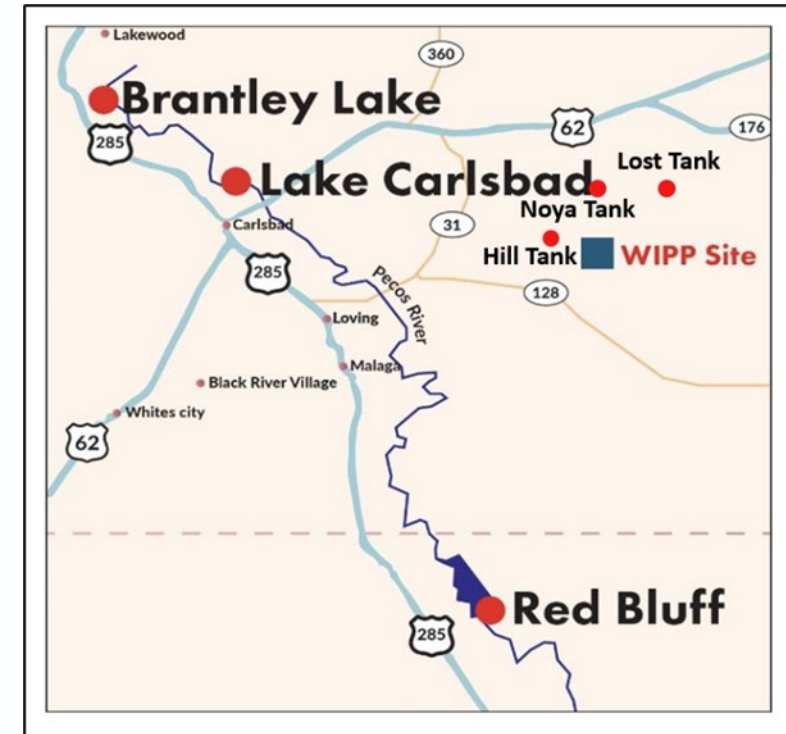
Vegetation Sampling

- On Site, Near Field, Cactus Flats, WIPP East, Carlsbad, Loving (6 sites) – locations around airborne particulate sampling locations
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U , ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc , ^{230}Th , ^{232}Th , ^{236}U



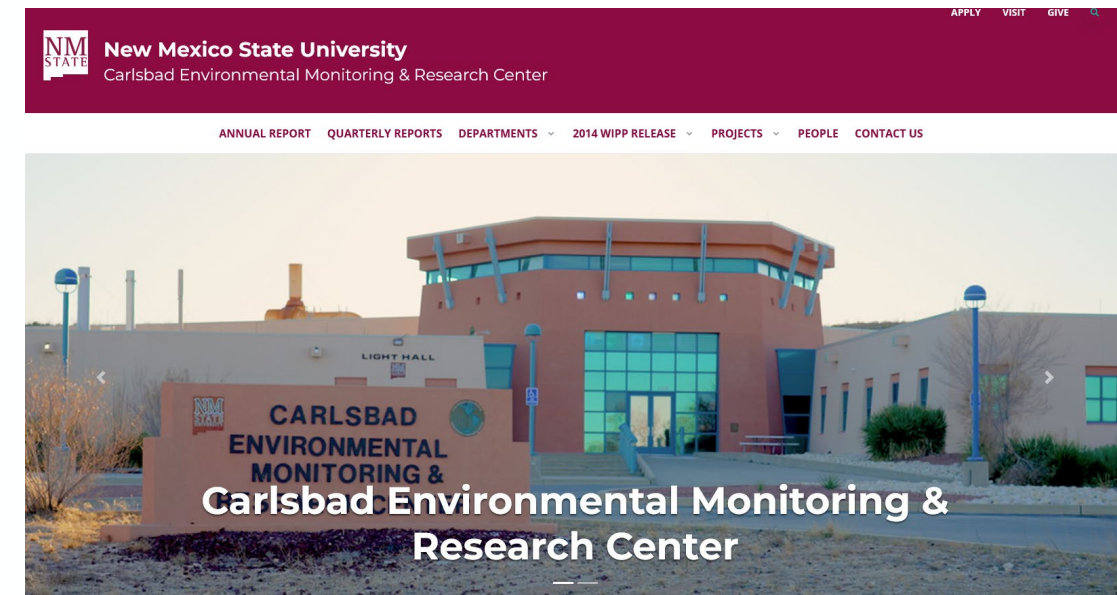
Sediment Sampling

- Lake Carlsbad, Brantley Lake, and Red Bluff Lake (3 sites)
- Radiological components:
 ^{241}Am , ^{90}Sr , ^{238}Pu , $^{239+240}\text{Pu}$, $^{233+234}\text{U}$, ^{235}U , ^{238}U ,
 ^{60}Co , ^{137}Cs , ^{40}K ;
adding in 2026: ^{237}Np , ^{242}Pu , ^{226}Ra , ^{228}Ra , ^{99}Tc ,
 ^{230}Th , ^{232}Th , ^{236}U



CEMRC Unique Capabilities

- Rapid detection of accidental releases of radionuclides
- State-of-the-art whole-body counting system that can detect radioactive elements at extremely low levels
- Ability to monitor radionuclides to below background levels, not just compliance levels
- Free access of the public to the whole-body counting program and monitoring data (www.cemrc.org)
- Only organization combining all aspects of monitoring, including sampling, analyzing, and reporting



Departments and Capabilities

- Radiochemistry
- Environmental Chemistry
- Internal Dosimetry
- Field Programs
- Information Management
- Quality Assurance

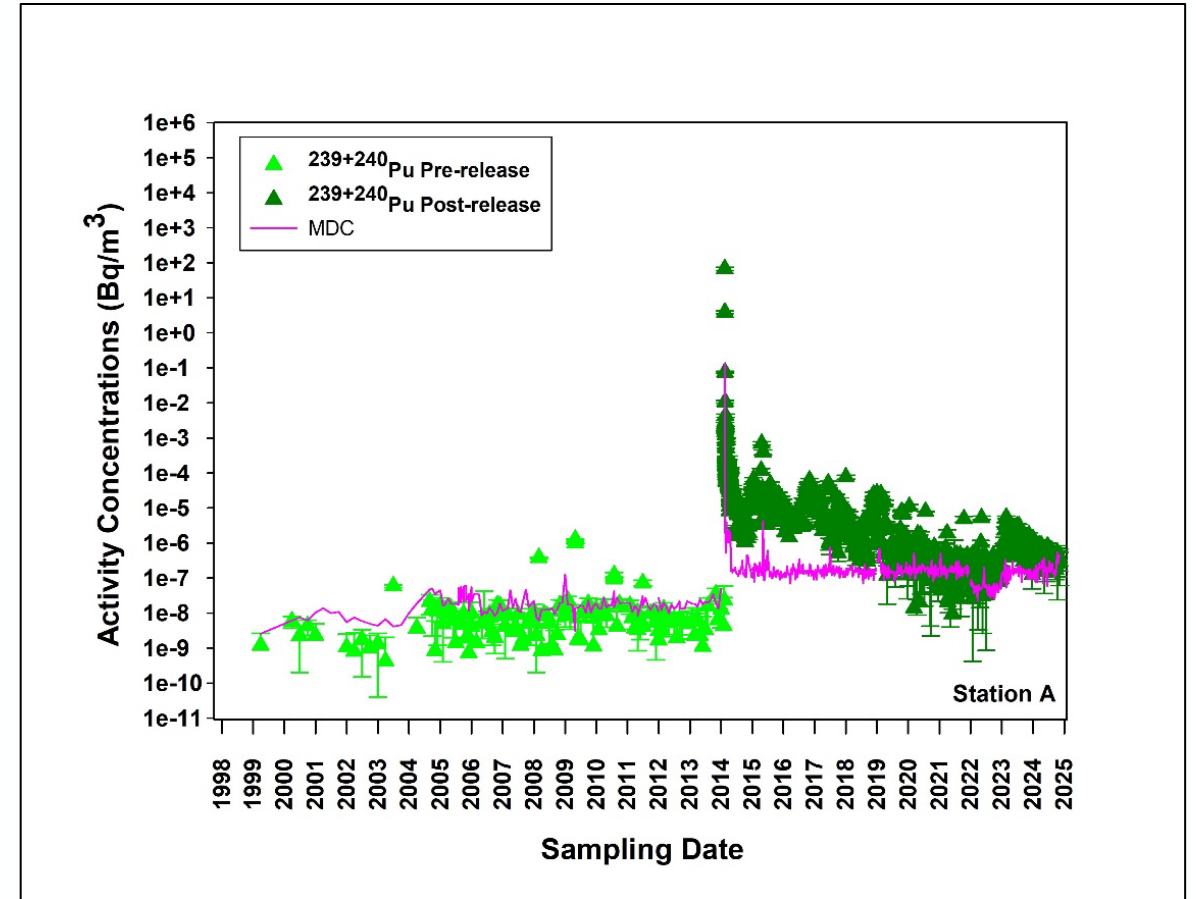
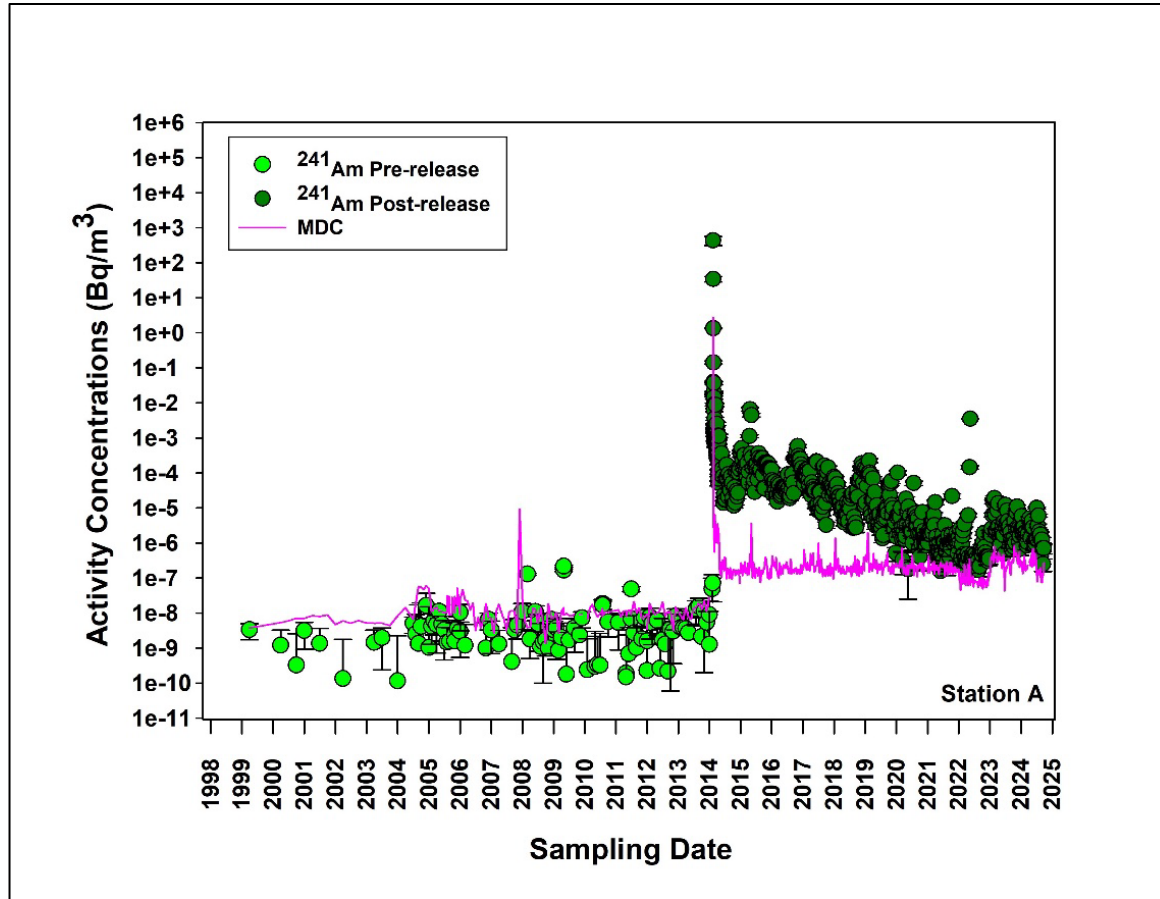
www.cemrc.org



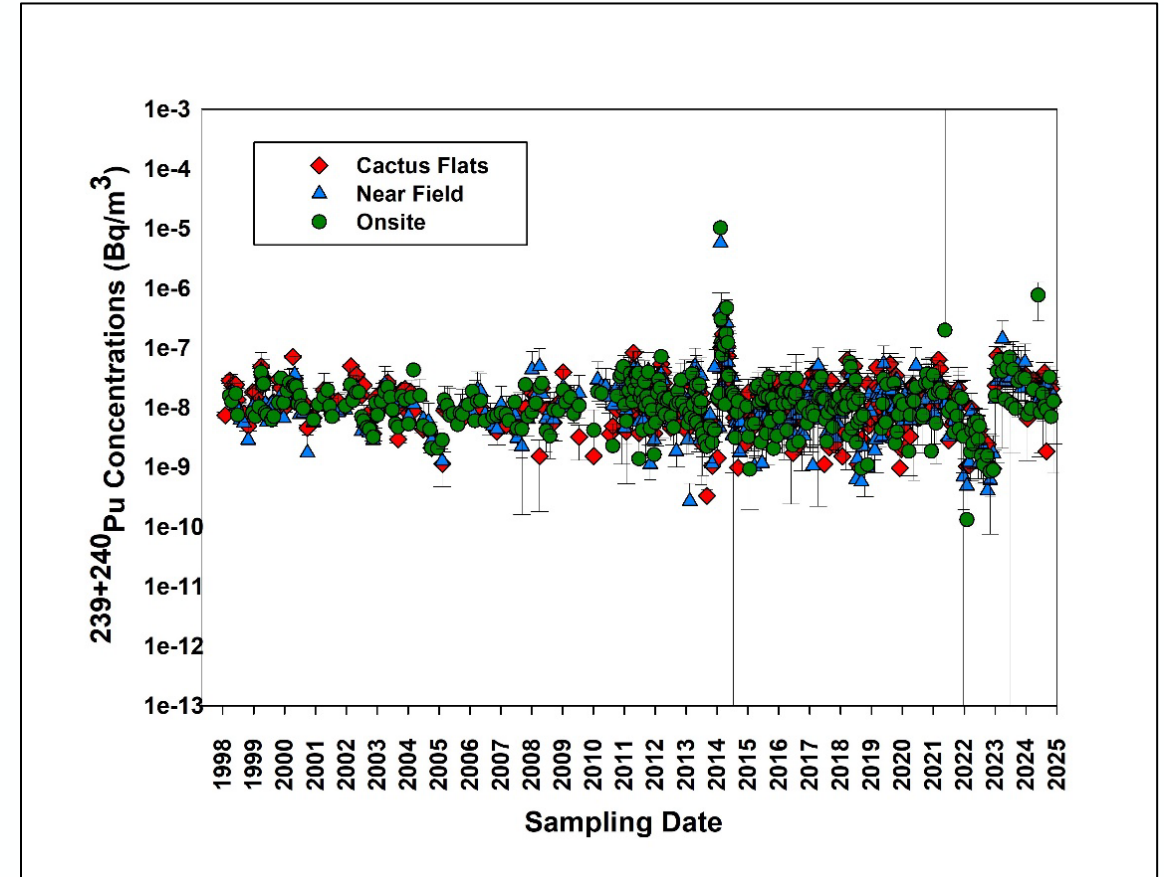
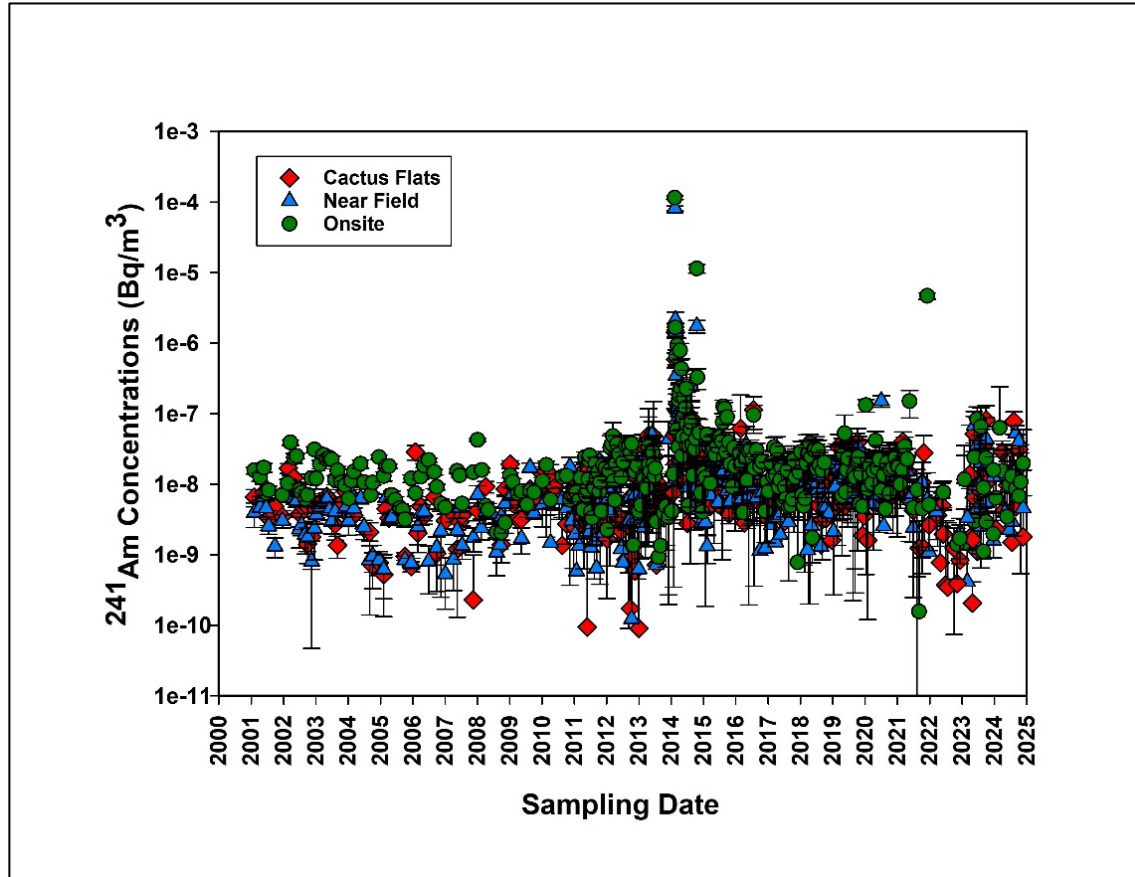
Radiochemistry

- Sample preparation and processing, including separation and purification to determine the activity of alpha, beta, and gamma-radiation emitting radioisotopes
- Gas proportional counters
- Alpha spectrometers
- Gamma spectrometers

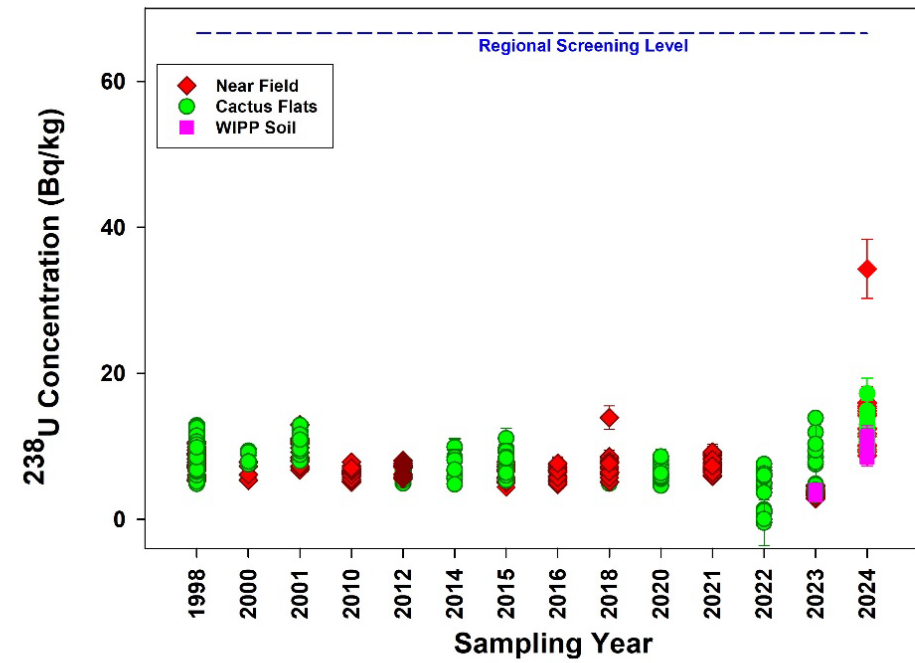
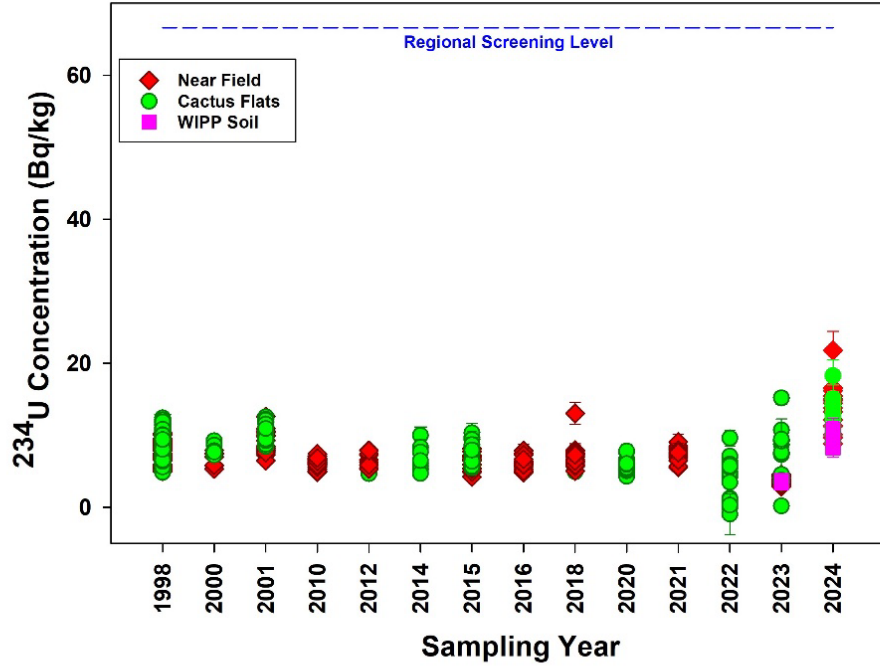




Historical Concentrations of ^{241}Am and $^{239+240}\text{Pu}$ at Station A



Historical Concentrations of ^{241}Am and $^{239}+^{240}\text{Pu}$ at the Cactus Flats, Near Field, and Onsite Stations

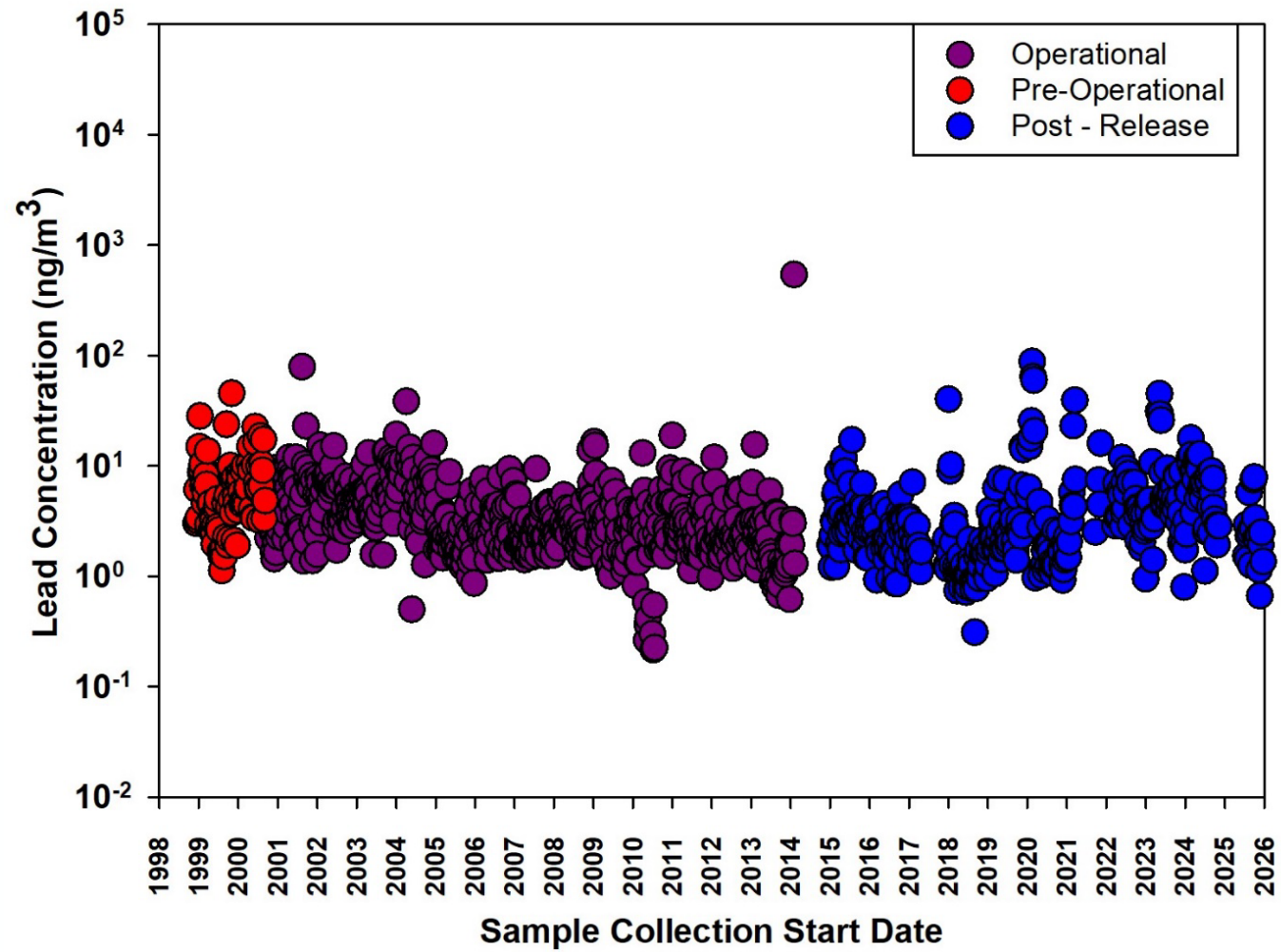


Historical Concentrations of ^{238}U and ^{234}U in Soils

Environmental Chemistry

- Sample preparation and processing, including digestion and purification to determine the concentration of anions, cations, metals, and metalloids
- Microwave ovens (digestions)
- Ion chromatograph (IC) – anions and cations
- Inductively coupled plasma – mass spectrometer (ICP-MS) – metals and metalloids





Historical Concentrations of Lead in FAS Filters

Internal Dosimetry

- *In-vivo* radiobioassays, including lung and whole-body counts
- *Lie Down and Be Counted* (LDBC) public program



CEMRC Monitoring Contract Renewal

- Funded through U.S. Department of Energy – Office of Environmental Management
- Performance Period: 7/1/2026 to 6/30/2031
- Total Funding: \$22,122,374
- Equipment: \$2,253,983 (10.19% of total)

Challenges – Infrastructure

