

# **Independent Monitoring of the Waste Isolation Pilot Plant (WIPP)**

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# CEMRC Origins

- Created in 1991 as a division within NMSU's College of Engineering
- Funded primarily by the Department of Energy Office of Environmental Management (DOE-EM) through a financial Assistance Grant
  - Guarantees *less substantial involvement* by DOE
  - Non-competitive, \$3M per year (~80% of total funding)
  - Independent monitoring of WIPP's impact on human health and the environment



# Environmental Monitoring of WIPP Operations

## ■ Monitoring activities:

- WIPP Underground Exhaust Air
- Ambient Air
- Drinking Water
- Soil and sediments
- Surface Water
- Whole Body Counting
- R&D on extraction and analytical methods

## ■ Very unique capabilities:

- Detection of radionuclides at sub-compliance levels
- Radionuclide source identification
- Very rapid sample turnaround and publication of results



Exhaust Air (Station A)



Ambient Air Station



Soil & sediments



Drinking water



Surface water

# *In- vivo* Bioassay

- State-of-the-art lung & whole body counting facility
  - 30 minute count times
- Free *in-vivo* bio-assay services to citizens in the vicinity of the WIPP
- Screens for over 30 natural and anthropogenic gamma and X-ray emitting radionuclides
- Ages 13+, following the 2014 accidental release; 18+ yr prior



CEMRC's Whole body counting facility

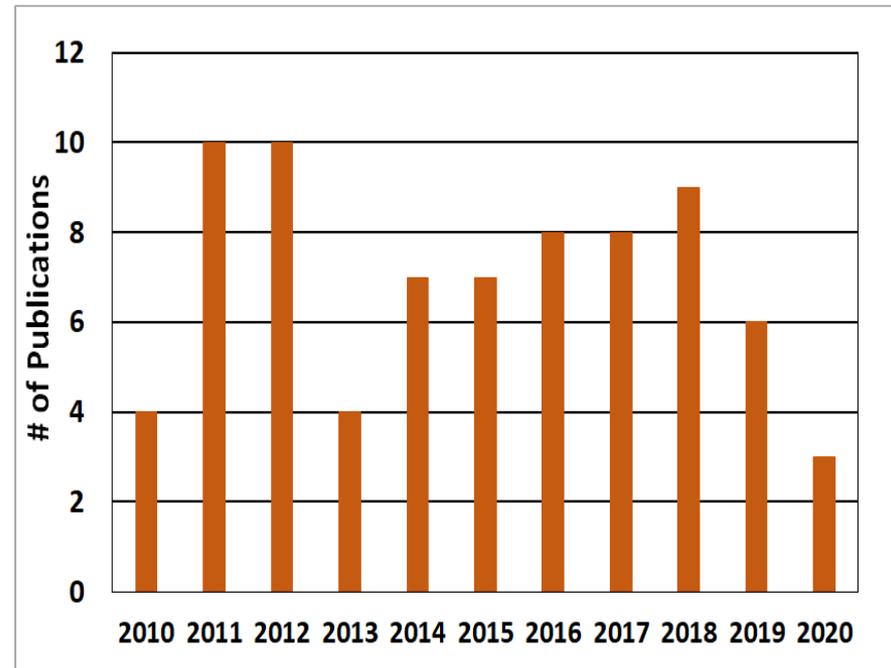
# Importance to the DOE/SE New Mexico

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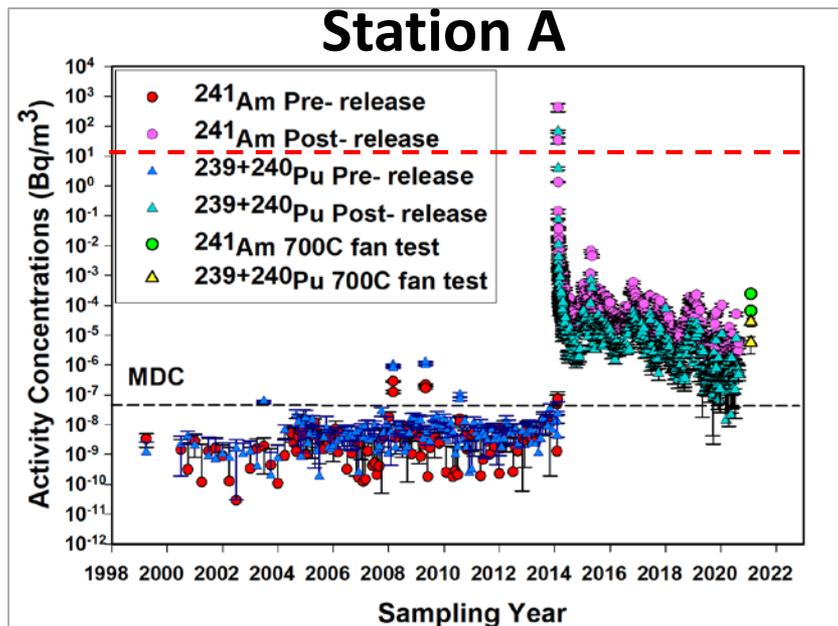
- DOE and WIPP remain welcomed neighbors in SE NM, largely because of commitment to safety and transparency (e.g., CEMRC, NMED-DOE-OB)
- CEMRC's independence and community-base increases credibility in oversight, bringing balance to the relationship with the DOE
  - *Minimal concern in the region over radioactive releases*
  - *Easier to alleviate community fears and restore confidence*
- Recognized by the Blue-Ribbon Commission on America's Nuclear Future as model relationship, between an Implementer and a Host Community.
- University affiliation and economy of scale help to maintain costs, a benefit to long-term program like WIPP.

# CEMRC's Accomplishments (Last 10 Years)

- Detected Fukushima NPP fallout in 2011
- First to detect radioactive release following the WIPP 2014 event
- Developed a capability to analyze and report radionuclide activities within **48 hr** of a release
- Evidence-supported recommendation for restart of 700 Fans and return to unfiltered exhaust, as far back as 2017
- First to report data from 700C fan 4-hr test in late Jan 2021.
- Innovative methods to characterize radionuclides associated with unconventional oil and gas, and to separate from WIPP-related isotopes.

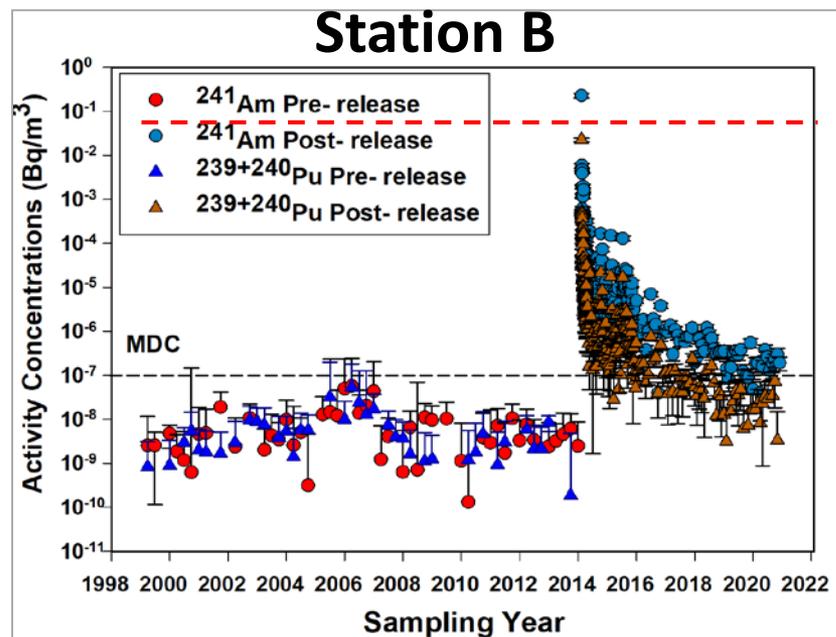


# Overview of Radiation levels in WIPP Underground Air



1 DAC Pu-239

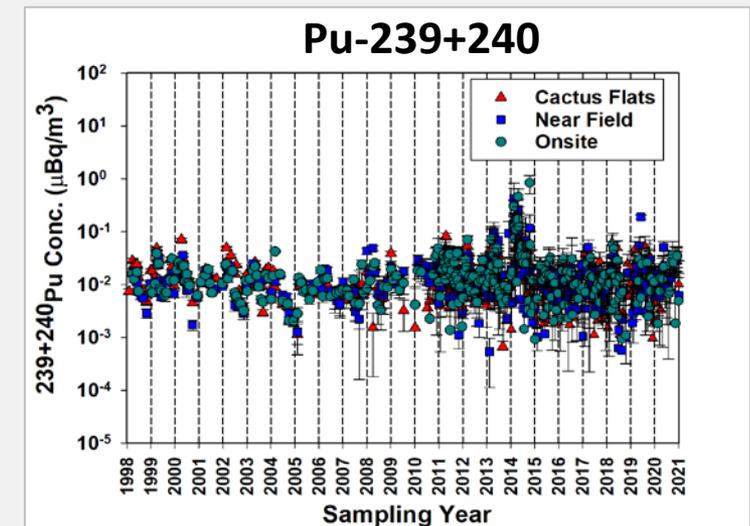
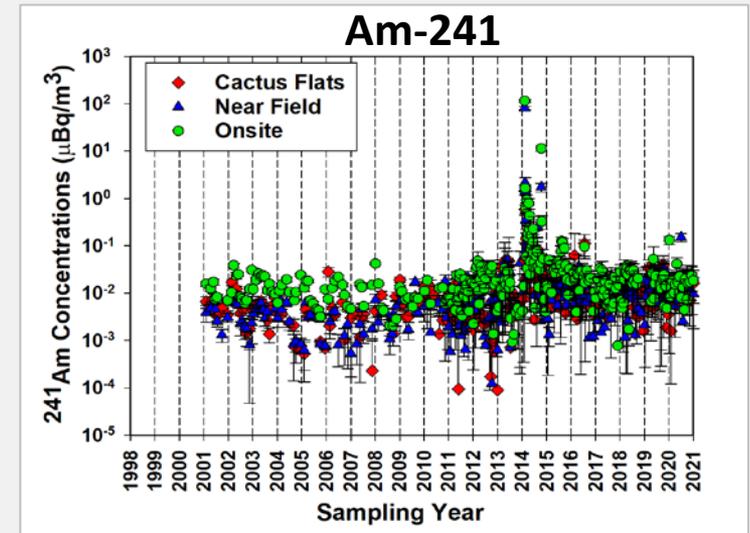
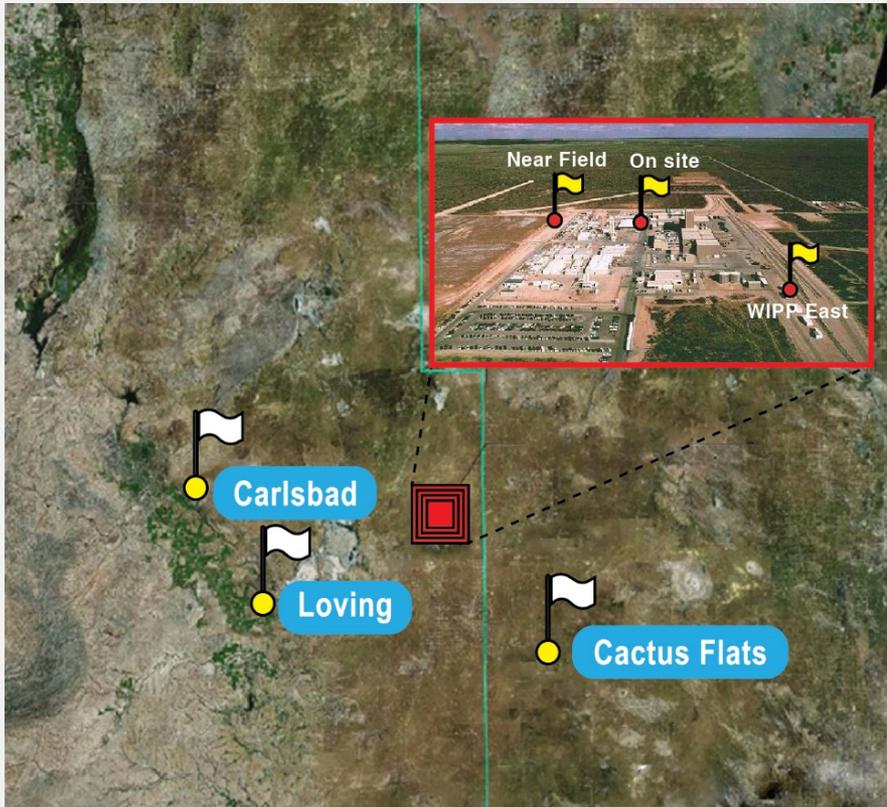
Unfiltered (Pre-HEPA) exhaust air



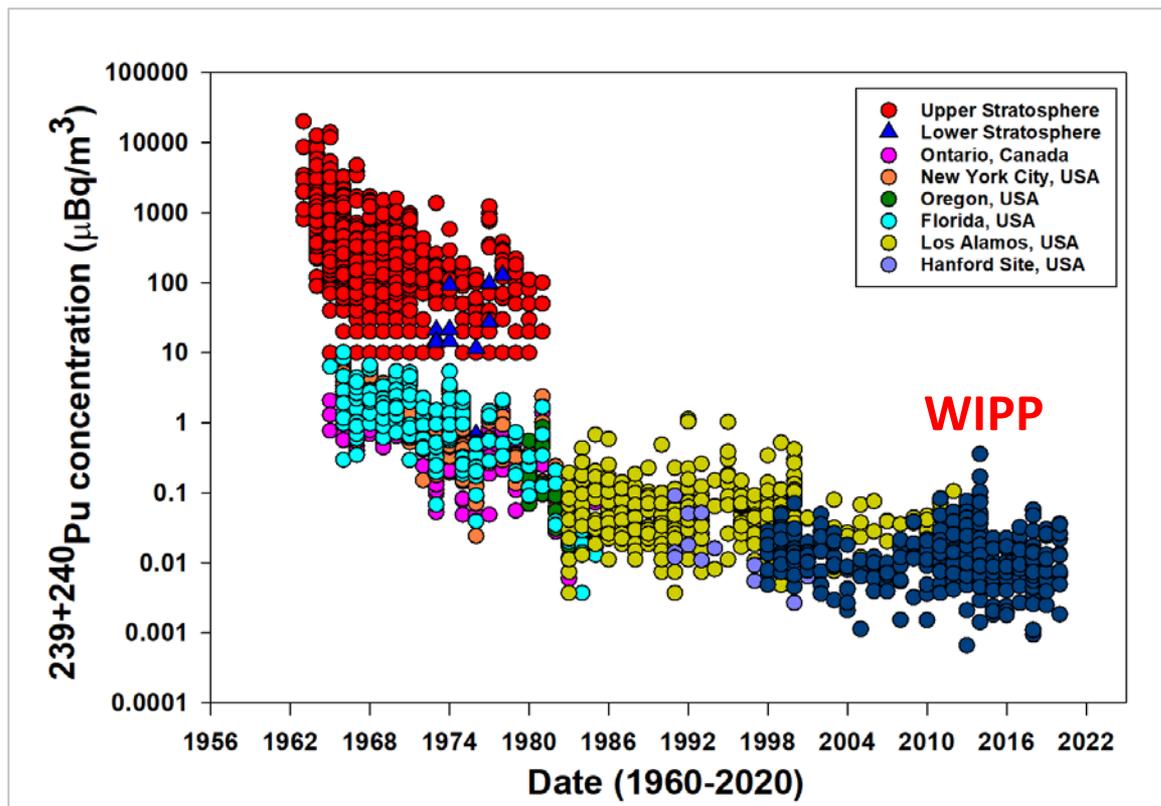
Post-HEPA (Filtered) exhaust air after 2014  
Event

# On site and Off Site Monitoring Stations

## CEMRC Air sampling sites



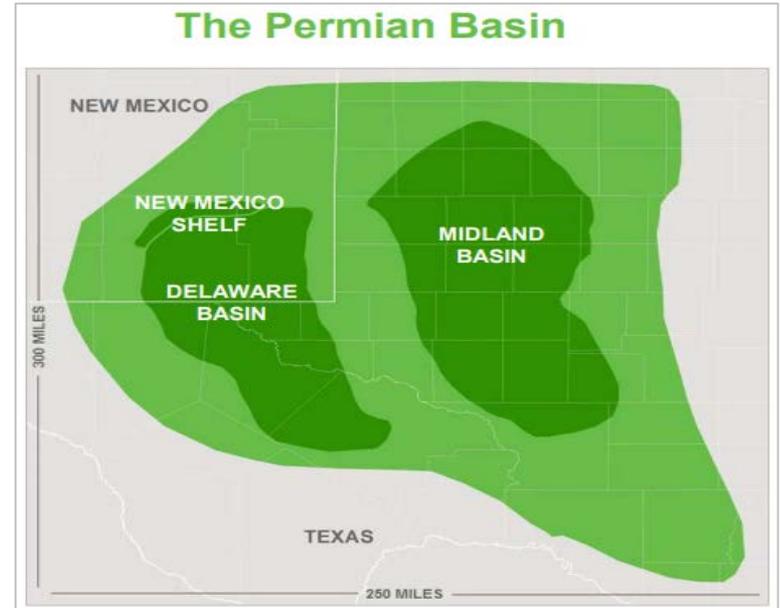
# Putting WIPP Radiation into Context



Plutonium Ambient Air Concentrations in the US  
since 1960

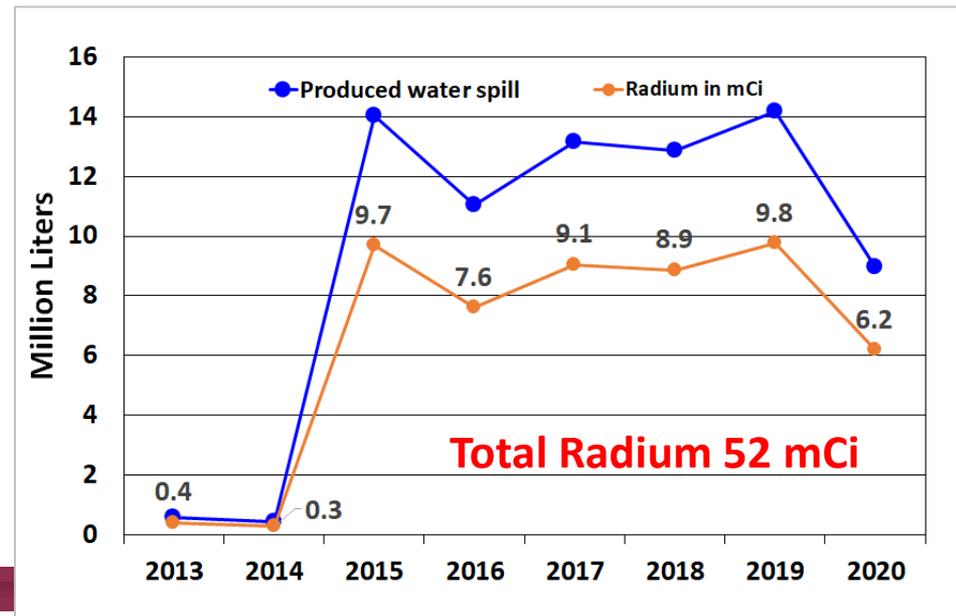
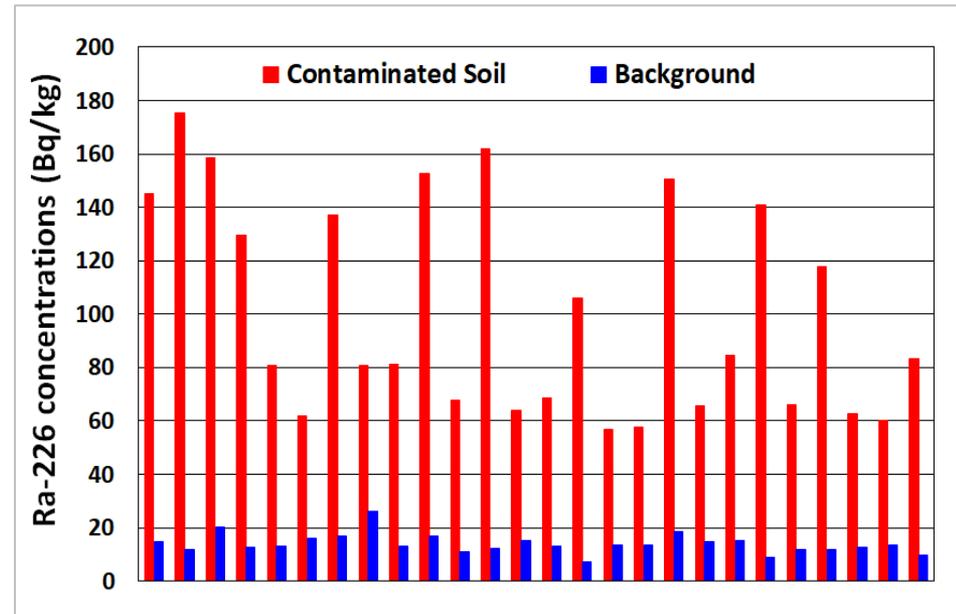
# Oil and Gas Wastes in Southeastern New Mexico

- The Permian Basin of Southeastern NM and West Texas is the largest petroleum producing basin in the United States.
- Fracking generates technologically enhanced natural occurring radioactive materials (TENORM).
- Dominant radionuclides in TENORM: Ra, U, Th, Po and Pb.
- One emerging concern is the water use and the risk from fracking wastes to the human health and to the environment.



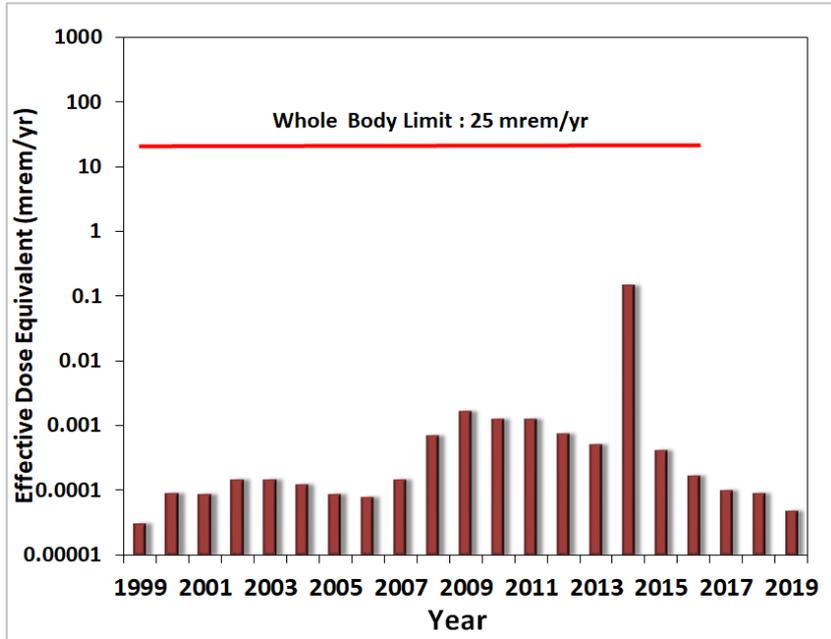
# Radionuclides in Fracking wastes

- According to Center for Western Priorities 1,217 oil and gas related spills were reported in New Mexico in 2020.
- About 88% of the spills occurred in Eddy and Lea counties.
  - ~9 million Liters of Produced water
  - >2 million liters of crude oil
  - 1.7 billion cubic feet of natural gas
- In 2020 alone  $2.3 \times 10^8$  Bq (6.2 mCi) of Radium have been accumulated in top soil.
- Ra-226 in Permian Produced water range from 19-35.9 Bq/L (EPA disposal criteria to surface water **2.22 Bq/L**).

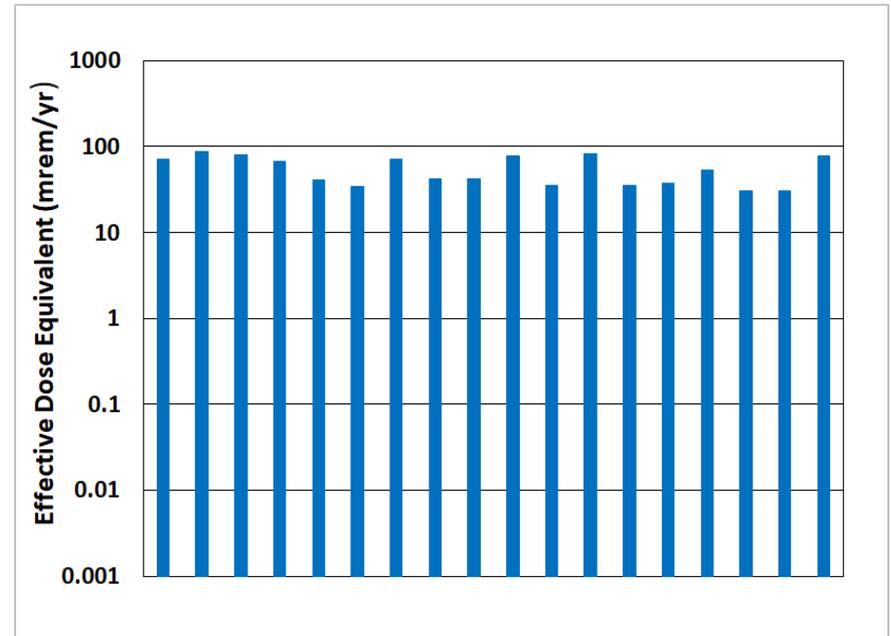


# Dose to the Public

**Natural radiation dose per person in the US 6.2 mSv (620 mrem).**



**WIPP Operations**



**Dose from oil and gas operation**

## Take home message:

- ❖ Nothing in life to be feared, it is only to be understood. Now it is the time to understand more so we may fear less- [Nobel laureate Madam Curie](#)

# CEMRC's Strategic Vision: 2021-2025

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- Environmental monitoring in the 21st century-expand mission from “legacy” contaminants to include a broad diversity of contaminants in the environments such as radionuclides in the oil and gas exploration.
- Develop capabilities to detect radionuclides in femto- gram ( $10^{-15}$ ) level of TRU radionuclides in environmental samples.
- Develop an automatic on-line separation method using EC columns and ICP-MS to reduce the analytical time and effort needed to determine TRU radionuclides in various sample media.
- Develop a centralized and easily accessible WIPP's historical monitoring database to all interested parties.
  - **Radiation data must include information for public to use, to properly interpret data without creating panic.**
- Continue to support WIPP's mission by maintaining relationships with the host community – local and online.