

# CDC's Response to an accidental release at the WIPP nuclear waste site: implications for a public health response

**Robert L. Jones, PhD**

Chief, Inorganic and Radiation  
Analytical Toxicology Branch

June 7th, 2016

APHL National Meeting

# Disclosure

**Mention of company or product names does not constitute endorsement by the National Center for Environmental Health (NCEH), Centers for Disease Control (CDC), or the Public Health Service.**

# Background

## DOE Carlsbad, NM, WIPP site “Radiological Dispersal Incident”

- 2/14/2014 a fire in the WIPP underground facility may have contaminated 13+ workers
- Am-241 and Pu-239 were thought to be the main contaminants released

# CDC's Initial Involvement

2/26/2014: A DOE notification to WIPP employees shared with CDC

3/1/2014: DOE request for CDC assistance – bioassay for 14 samples of workers possibly contaminated

3/4/2014: “Official” request from DOE arrives for the bioassay analysis of worker samples

# CDC Radiation Laboratory Contacted

- DOE asked CDC Bioassay Laboratory for assistance in Worker contamination assessment
- DOE requested bioassay analysis for Am-241 and Pu-239 in workers' urine samples (split aliquot)
- CDC requested that no Private identifying Information (PII) [e.g. names] be sent to CDC
- DOE will aliquot a subsample and send to CDC
- DOE 24 hour sample was acidified, so no creatinine adjustment possible

# Actions and Timelines

- CDC/DLS Project approval entered into the DLS LIMS system on 3/3/2014
- DOE shipped urine samples on 3/3/2014
- CDC received the samples on 3/4/2014
- CDC/DLS “Technical Assistance “Project approved on 3/4/2014
- CDC Bioassay lab analyzes the samples for Am-241 on 3/5/2014
- CDC Bioassay lab analyzes the samples for Pu-239 on 3/5/2014
- CDC reports analytical results to the DOE on 3/6/2014

# CDC's Urine Radionuclide Screen

Urine "Spot" Sample

Gamma Radionuclide Screen

Alpha/Beta Radionuclide Screen/Quantification

Alpha (Long Lived) ICP-MS Screen

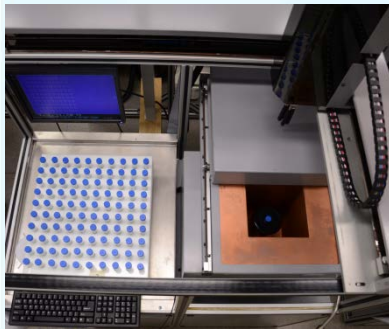


Gamma Spectrometry Quantification

Alpha Spectrometry Quantification

Mass Spectroscopy Quantification

High Resolution Mass Spectroscopy Quantification



# Techniques for the determination of Am-241

- High Purity Germanium (HPGe) gamma spectrometry: directly determine Bq/g or higher levels
- Alpha spectrometry is most commonly applied
- ICP-MS has substantial advantages over conventional radiometric techniques

Am-241 half life = 432.6 years



# Sector Field – High Resolution ICP-MS



# Pu-239 Method

- 2mL of urine with a Pu-242 tracer
- 1 mL TEVA, solid phase extraction column isolation
- 1 mL of eluent used for the ICP-MS
- High Resolution ICP-MS (Element XR)
- Aridus II desolvation unit
- LOD of 0.75 pg/L (less than 1/3 of the NCRP 161 CDG for a child or pregnant woman)
- Throughput of ~100 samples per day per instrument

NCRP = National Council on Radiation Protection & Measurements  
CDG = Clinical Decision Guide

# Am-241 Method

- 10mL of urine with a Am-243 tracer
- 1 mL DGA, solid phase extraction column isolation
- 2 mL of eluent used for the ICP-MS
- High Resolution ICP-MS (Element XR)
- Aridus II desolvation unit
- LOD of 0.22 pg/L (less than 1/3 of the NCRP i61 CDG for a child or pregnant woman)
- Throughput of ~120 samples per day per instrument

# Summary

- WIPP Facility had a possible radionuclide contamination (exposure) incident
- DOE wanted an “outside” confirmation of possible exposure
- DOE requested “Technical Assistance” from the CDC
- CDC used their Emergency Response Radiation Bioassay analytical methods and processes to assess possible contamination of workers
- Samples received, processed, analyzed and reported in less than 48 hours
- No contamination of the workers observed above CDC LODs for Pu-239 and Am-241

# Acknowledgements

- David Saunders, PhD
- Ge Xiao, PhD
- Kathleen Caldwell, PhD

**Questions?**

# Contact

Robert L. Jones, PhD

Centers for Disease Control and Prevention

4770 Buford Hwy

Mailstop F-50

Atlanta, GA 30341-3724

RLJones@cdc.gov

“The findings and conclusions in this study are those of the authors and do not necessarily represent the views of the U.S. Department of Health and Human Services, or the U.S. Centers for Disease Control and Prevention. Use of trade names and commercial sources is for identification only and does not constitute endorsement by the U.S. Department of Health and Human Services, or the U.S. Centers for Disease Control and Prevention.