



Safely delivering the Idaho Cleanup Project

Idaho Cleanup Project Clearance Limits for Personal Property

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Chronological Timeframe

- **Jan 2011:** Identified a Significant Presence of Hard-To-Detect (HTD) Radionuclides (Ni-63 in spent fuel pools)
 - Performed an In-Depth HTD Characterization
 - Also identified a need to resolve: Pu-241 in the transuranic category and Sr-90 controlled in the thorium category
 - Primary source term: aged fission products, activation products, and transuranic radionuclides
- **Feb 2011:** DOE O 458.1 Approved – 18 mo's to implement
 - Required Instrument Detection Capability per MARSAME for Personal Property
 - Discovered Limitations in Instrument Sensitivity
- **Mar 2012:** Made Proposal to the Department of Energy for Revised Clearance Limits for DOE O 458.1

Proposed Clearance Limits

- **Transuranic and Thorium Categories** – specified for alpha emission only with associated decay products
- **Created a HTD Category** for radionuclides with primary emission due to beta or electrons up to **50 keV ave (<10% instrument efficiency)**
- **Sr-90 and most Iodine radionuclides** were placed in the beta-gamma emitter category
- **I-129 and Pu-241** grouped in the HTD category

Proposed Clearance Limits

Radionuclide Category	Removable (dpm/100 cm ²)	Total (dpm/100 cm ²)
Uranium-nat, U-235, U-238, and associated decay products	1,000 (alpha)	5,000 (alpha)
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, and associated decay products {removed I-125 and I-129}	20 (alpha)	100 (alpha)
Thorium-nat, Th-232, Ra-223, Ra-224, U-232, and associated decay products {removed Sr-90, I-126, I-131 and I-133}	200 (alpha)	1,000 (alpha)
Beta-gamma emitters {removed "except Sr-90 and others noted above"}	1,000	5,000
HTD: C-14, Ca-41, Fe-55, Ni-59, Ni-63, I-129, Sm-151, Eu-155, Pu-241	10,000	50,000
Tritium and STCs	10,000	See Footnote

Original Application Basis

- **Limitations in Detection Sensitivity-MARSAME**
 - GM Pancake Probe Scan MDC was 5,000 dpm/100 cm² for typical background
 - $\beta\gamma$ -100 cm² Scintillation Probe Scan MDC was not sufficient for meeting the Thorium clearance limit
- **Environmental Pathway Analysis relied fully on ANSI/HPS N13.12-1999**
 - not accepted by DOE upon first submittal due to its pending revision

ANSI/HPS N13.12 Comparison

- **1999 vs 2013 Total Contamination Comparison**
 - ANSI (2013) based primarily on IAEA-RS-G-1.7 (2004)

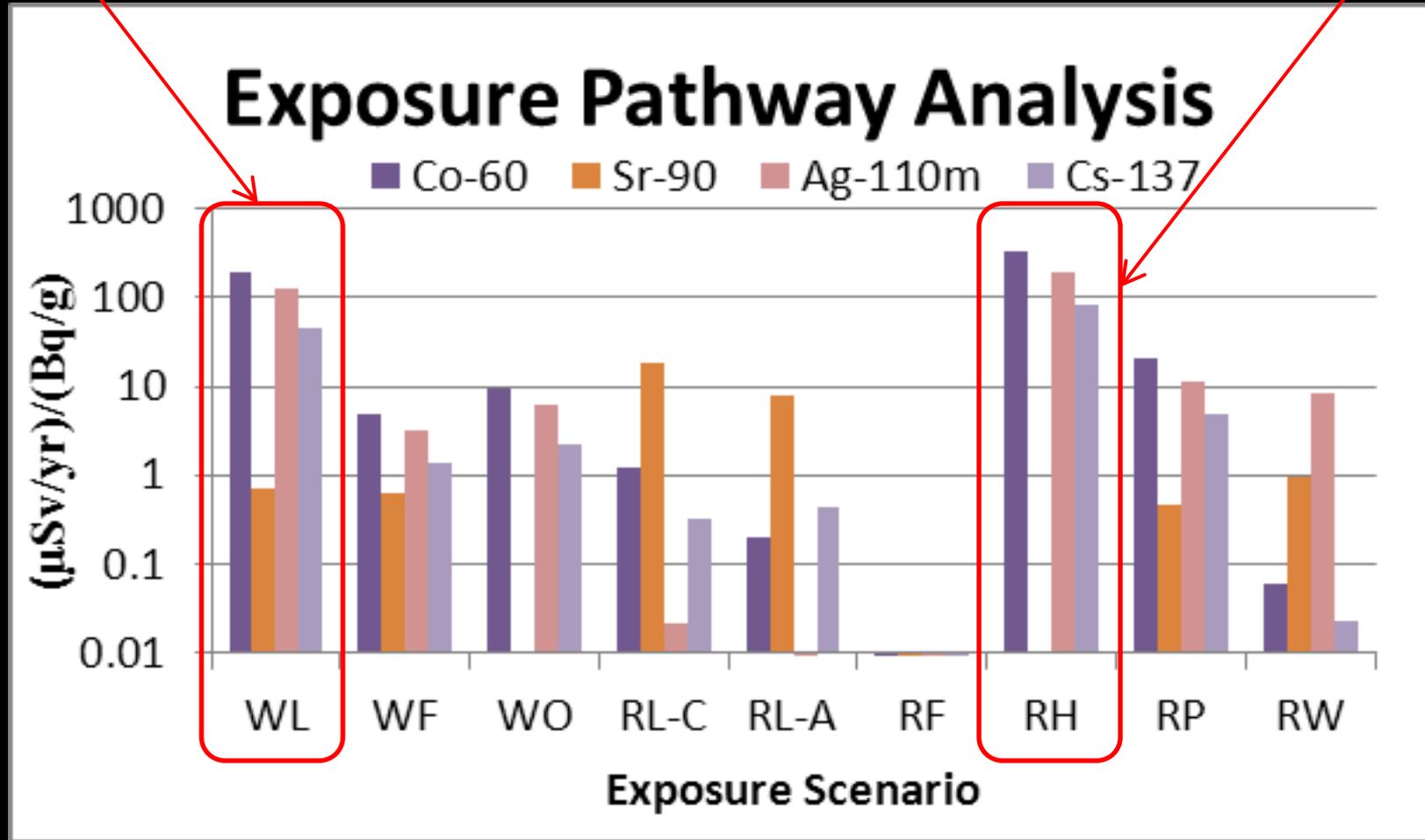
Nuclide	1999 (dpm/100 cm²)	2013 (dpm/100 cm²)
C-14	600,000	6,000
Co-60	6,000	600
Sr-90	6,000	6,000
I-129	60,000	600 (60)*
Cs-137	6,000	600
Pu-239	600	600

*Reduced limit applies to landfill disposal due to ground water concerns

IAEA Safety Report Series No. 44

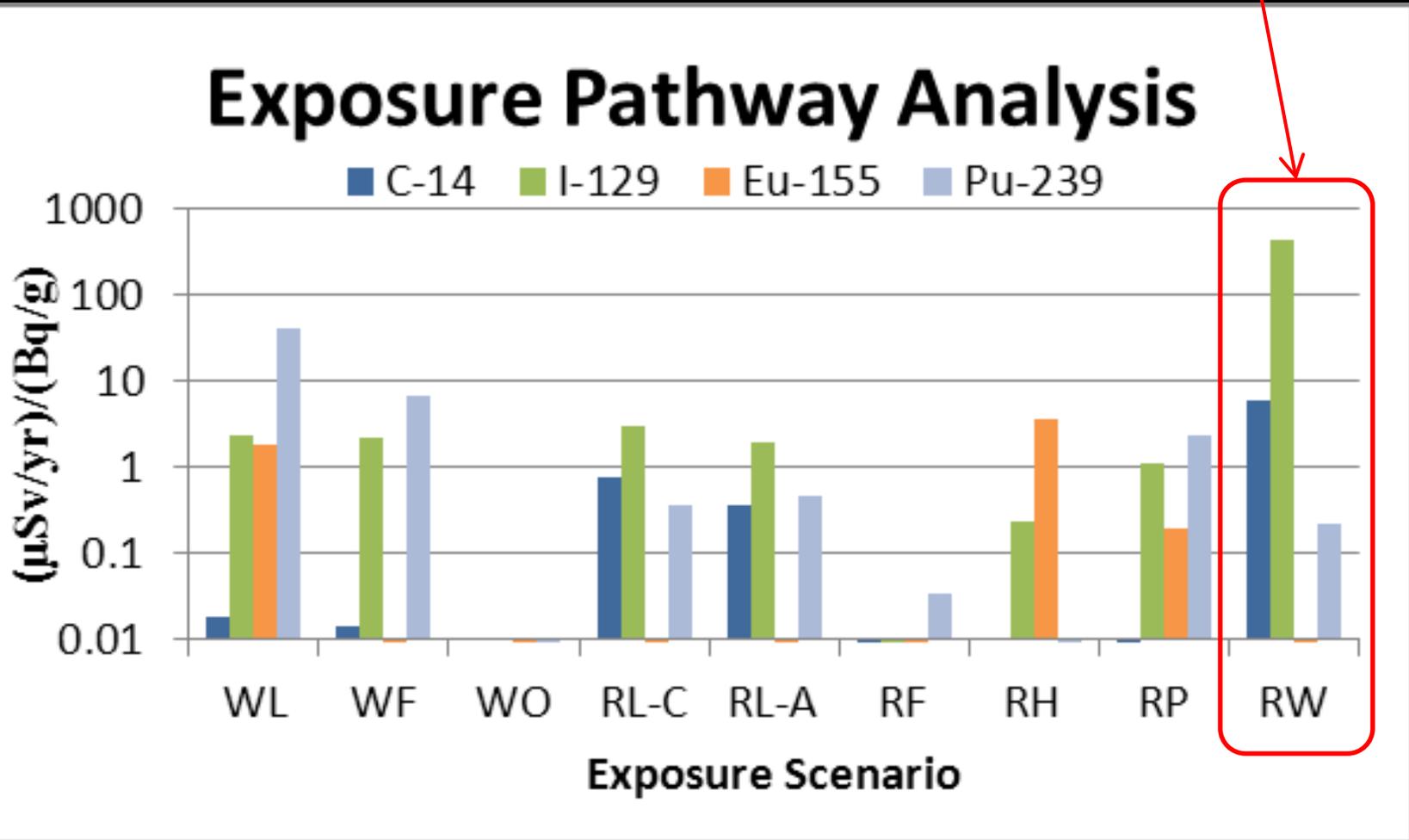
Landfill Worker

Resident at Home



IAEA Safety Report Series No. 44

Residential Water Pathway



Revised Basis

- **Environmental Pathway Analysis** – release to the public
- **Literature Review and Analysis**
 - **IAEA Safety Report Series No. 44** (2005), “Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance” [Supports IAEA RS-G-1.7 (**basis for ANSI/HPS N13.12-2013**)]
 - **IAEA Safety Report Series No. 111-P-1.1** (1992), “Application of Exemption Principles to the Recycle and Reuse of Materials from Nuclear Facilities”
 - **ANL/EVS/TM/11-3** (Kamboj et al. 2011), “Potential dose distributions at proposed surface radioactivity clearance levels resulting from occupational scenarios”
- **May 2012 - Revised proposal submitted**

Current Status

- **Sept 2013** – After a long comment resolution period the proposed limits were approved, contingent upon:
 - Getting an Exemption from 10 CFR 835 App D, due to much of the property remaining within DOE control
 - Coordinating with other Site Contractors
- **Exemption request submitted (Jan 2014)**
 - Affects release of items to DOE controlled areas, personnel exit surveys, posting and area control
 - Final decision (pending)

Clearance Limits (pending)

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Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, and associated decay products	20 (alpha)	100/500(835.AppD) (alpha)
Thorium-nat, Th-232, Ra-223, Ra-224, U-232, and associated decay products	200 (alpha)	1,000 (alpha)
Beta-gamma emitters	1,000	5,000
HTD: C-14, Ca-41, Fe-55, Ni-59, Ni-63, I-129, Sm-151, Eu-155, Pu-241	10,000	50,000
Tritium and STCs	10,000	See Footnote

Lessons Learned

- Start Early with Involving Regulatory Members
- Include an Environmental Pathway Analysis
- Perform an extensive Literature Review and Analysis related to the request
- Benchmark and obtain support from other sites who had experienced similar challenges
- Be persistent

References

- 10 CFR 835, “Occupational Radiation Protection”
- ANL/EVS/TM/11-3 (2011), “Potential dose distributions at proposed surface radioactivity clearance levels resulting from occupational scenarios”
- DOE Order 458.1 (2011-2013), “Radiation Protection of the Public and the Environment”
- IAEA Safety Report Series No. 111-P-1.1 (1992), “Application of Exemption Principles to the Recycle and Reuse of Materials from Nuclear Facilities”
- IAEA Safety Guide No. RS-G-1.7 (2004), “Application of the Concepts of Exclusion, Exemption and Clearance”
- IAEA Safety Report Series No. 44 (2005), “Derivation of Activity Concentration Values for Exclusion, Exemption and Clearance” [Supports IAEA RS-G-1.7]
- MARSAME (2009), “Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual”

Questions?

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