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NRC Response to Questions Regarding Depleted Uranium

Utah Radiation Control Board Meeting

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1. What are the criteria used by the NRC staff in their report to the NRC Commissioners, regarding the possible re-classification of DU? How did the 3 options vary that were presented?

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Answer:

- Reclassification was not attempted as part of SECY-08-0147
- Primary variable of options was the degree of change (minimal to extensive)

2. Is there a possibility that the classification of DU will be revisited in the near future? If not, why not? Is the NRC "strongly" considering placing DU as a special subset of Class A waste with different disposal requirements?

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Answer:

- Unlikely in the near future
- Deliberative process with stakeholders important
- No immediate public health and safety concern
- It is unlikely large quantities of DU can be disposed of as Class A waste without additional requirements
- Analysis must support its safe disposal

3. Please describe the performance analysis that was used to develop the specifications for the waste disposal of DU. For example, source function (i.e. amounts), time scale, and possible events that could impact the outcome?

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Answer:

- See next four slides

  - **Source type and quantity**: variable (1 to 1E6 MT)
  - **Time scale**: variable (1,000 to 1,000,000 years)
  - **Events**: normal natural processes (not geomorphological processes)

Depleted Uranium: NRC Analysis

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- Screening model developed for SECY-08-0147
- Developed to examine key variables:
  - Period of performance
  - Disposal depth
  - Receptor types and scenarios
  - Site characteristics
- Performed probabilistic assessment
- Analysis methodology for unique waste streams consistent with original Part 61 analysis

Depleted Uranium: NRC Analysis

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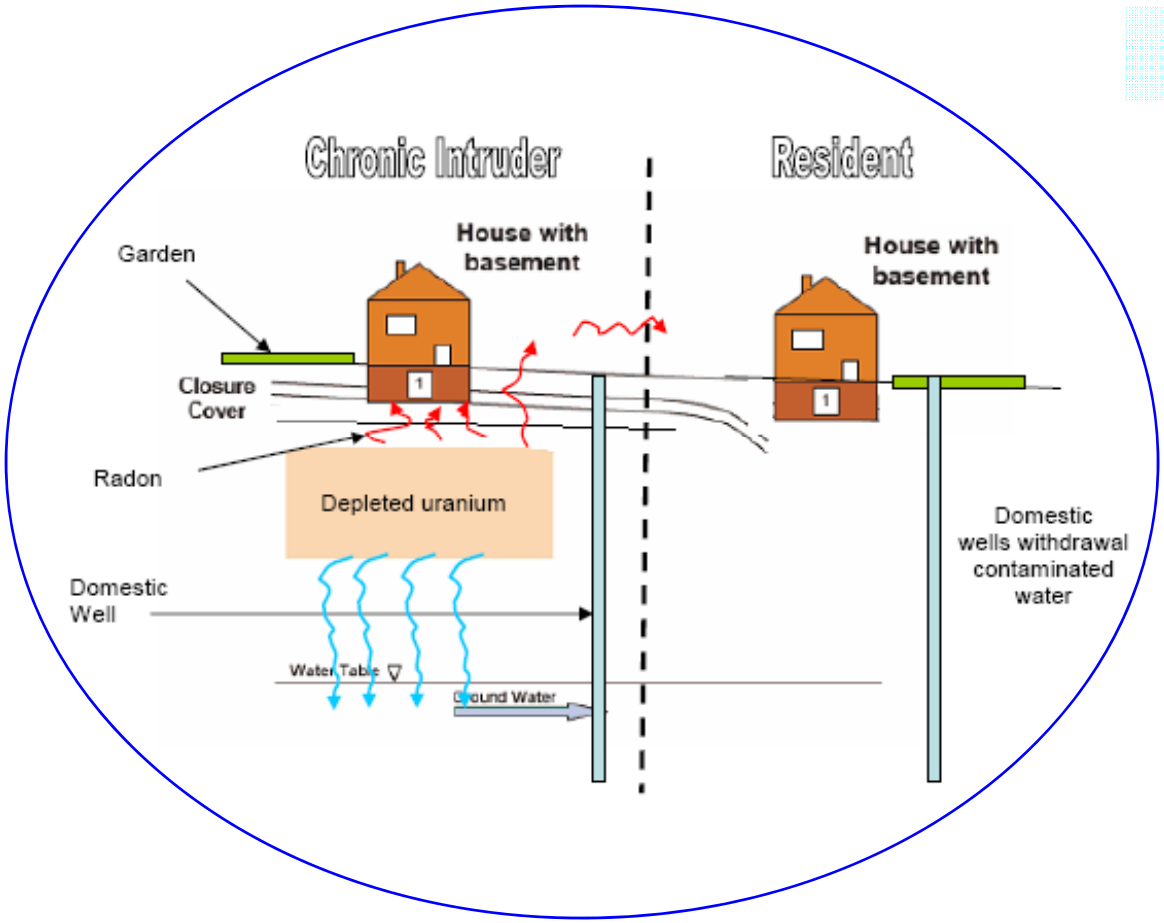

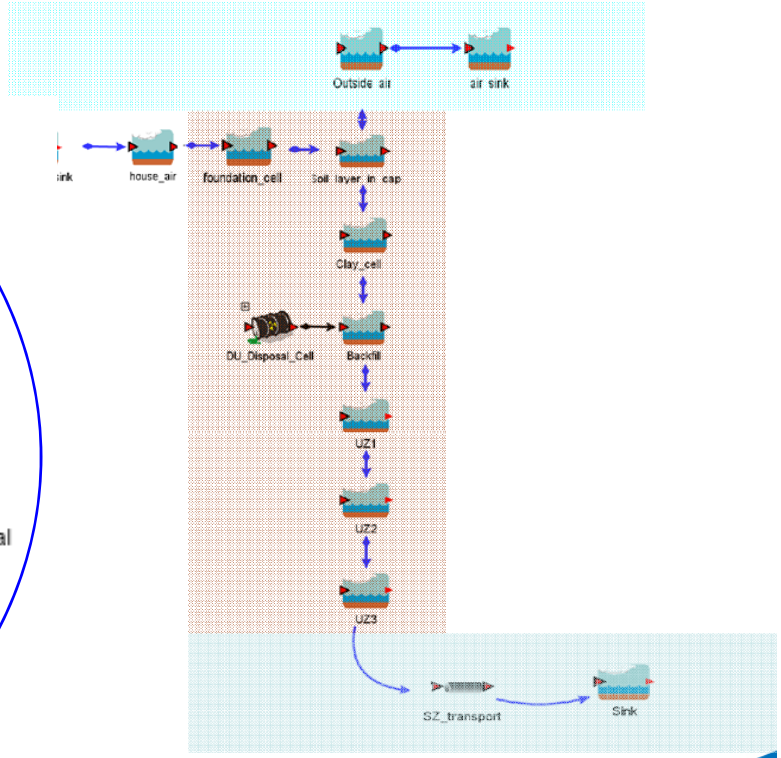

Receptor Scenarios

Depleted Uranium: NRC Analysis

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- Major variables: period of performance, disposal depth, receptor scenarios
- Uncertainty analysis performed with genetic algorithms
- Key parameters:
  - Hydraulic conductivity and gradient of the aquifer
  - Infiltration rate
  - Geochemical conditions
  - Liquid saturation
  - Properties of the house and scenario (radon related)

Depleted Uranium: NRC Analysis

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- If radon is included, shallow disposal at an arid site is challenging
- For humid sites, the groundwater pathway can exceed the performance objectives
- Greater consideration of long-term stability needed
- Site-specific conditions can result in large variance in impacts

4. If the State of Utah either banned or placed a moratorium on DU disposal within the State, what would the NRC reaction be? Would this action threaten Utah's inclusion as one of the "agreement states"?

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Answer:

- This depends on the basis of a ban or moratorium:

  - Utah should provide NRC with any proposed language
  - NRC staff would make a determination regarding compatibility
  - NRC would work with the State to resolve any issues that affect compatibility of the low-level waste program

- This action could affect compatibility status (of this specific area)

5. What are the long and short-term dangers of DU in an engineered facility? What are the health and safety issues related to DU in an above-ground waste facility as opposed to a geological facility similar to Yucca Mountain?

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Answer:

- Short-term risks are minimal in an engineered facility
- Long-term risks can result from groundwater (leaching), radon, and direct exposure pathways (if disturbed)
- Above ground vs. geologic disposal:
  - Radon risk is highly-nonlinear with depth
  - Likelihood of disturbance is higher with near surface
  - Geologic stability is higher with deep disposal

6. Is it possible that the Energy Solutions site at Clive Utah will not be a suitable disposal site for DU given its above-ground shallow cells? (See question #9)

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Answer:

- Suitability of the Clive site for DU must be evaluated with a site-specific analysis
- Utah Division of Radiation Control has responsibility as agreement State regulator
- Above-grade disposal is not ideal for long-lived waste, but may be suitable
- Assessment becomes more challenging with long-lived radioactive waste

Uranium in the Environment

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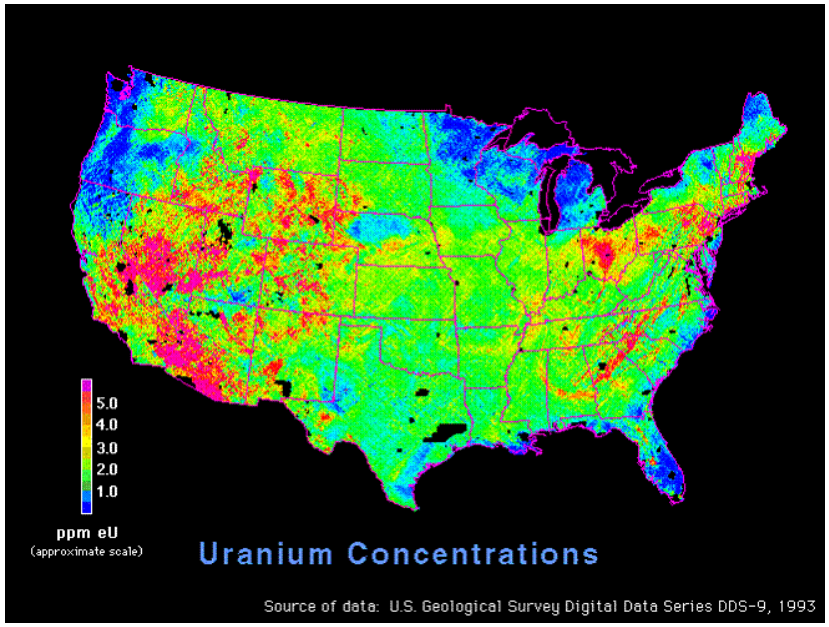
- Uranium in surface soils ~ 1 to 5 ppm
- Mean atmospheric radon is ~ 0.25 pCi/L
- Indoor average radon levels ~ 1.5 to 4.2 pCi/L
- Radon contributes roughly 70% of the average annual dose in the United States (~250 mrem/yr)



7. How much DU needs to be disposed, both domestic and foreign? What's DOE's role in this? Is there a pressing need for disposal? What are the projected timeframes?

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Answer:

- Greater than 1,000,000 MT (700k DOE, 400k LES, other)
- Not aware of foreign sources
- 14,800 drums of legacy waste from SRS – Sept 2009
- DOE de-converted DU disposal - mid-2010

8. What are the health and safety issues associated with DU disposal prior to the final rule making by the NRC? Are preemptive actions required?

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Answer:

- Material disposed of in an engineered facility under institutional control poses minimal risk
- Preemptive actions are not anticipated

9. Does increasing the burial depth to a minimum of 10 feet remove the risks? If not, what does NRC feel the burial depth should be? This should be asked for short or long term time periods.

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Answer:

- Increasing burial depth can lessen but not eliminate risk

Examples (Regulatory Guide 3.64 [20 pCi/(m^2 s)])[1,2]:

- arid conditions/ peak ~8 m (5 to 13)
- humid conditions/ peak ~2 m
- arid conditions/ 10,000 yr ~5 m (2 to 7)
- humid conditions/ 10,000 yr ~1 m

[1] Use of clay (if kept wet) can reduce thicknesses
[2] Site-specific analysis is needed

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Thank you, questions?

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Backup

Commission Direction

- Memorandum and Order CLI-05-20, 10/19/05
  - Commission directed staff, “outside of the LES adjudication, to consider whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55 (a)(6) or the section 61.55 (a) waste classification tables.”

Options Evaluated

- Generic Communication
- Require site-specific analysis
- Classification of DU within existing classification framework
- Re-examine existing waste classification framework

Path Forward

- Commission chose a two-tiered approach
  - Site-specific performance assessment
  - Budget to re-examine the waste classification framework in the long-term

Site-specific PA + Re-examine framework