

Implementation of a Dose Standard after 10,000 Years

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Outline

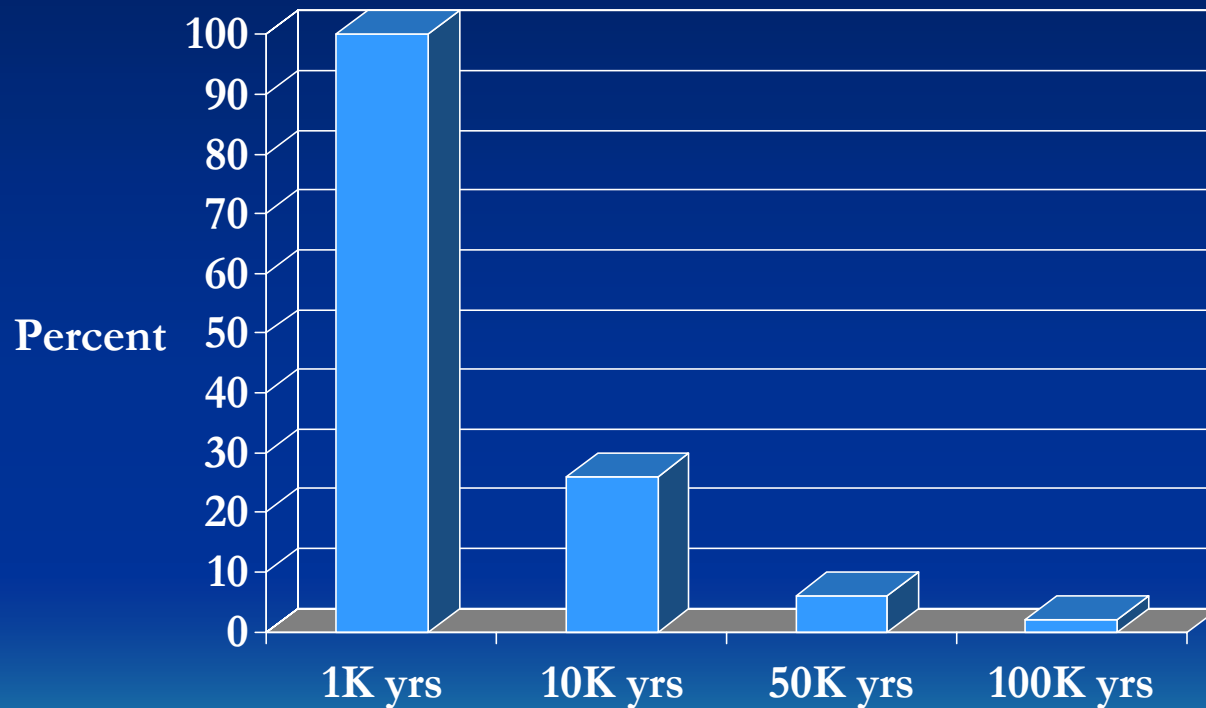
- Purpose of Proposed Part 63
- Inventory Perspective
- Dosimetry Perspective
- Representation of Climate Change
- Status of Part 63

Purpose of NRC's Proposed Rule

- Implement new standards for doses that could occur after 10,000 years
- Specify estimates of worker and public doses use the same, current weighting factors
- Specify treatment of climate change at Yucca Mountain after 10,000 years

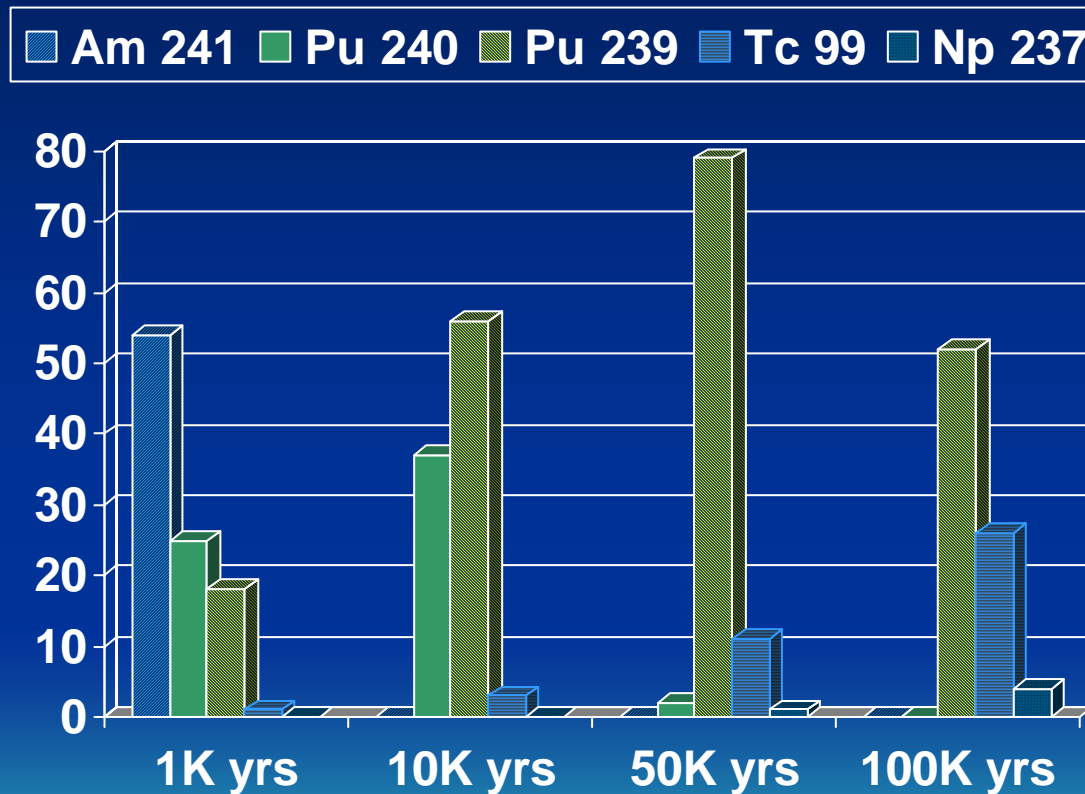
Variation in Inventory over Time

(relative to inventory in curies at 1,000 years)



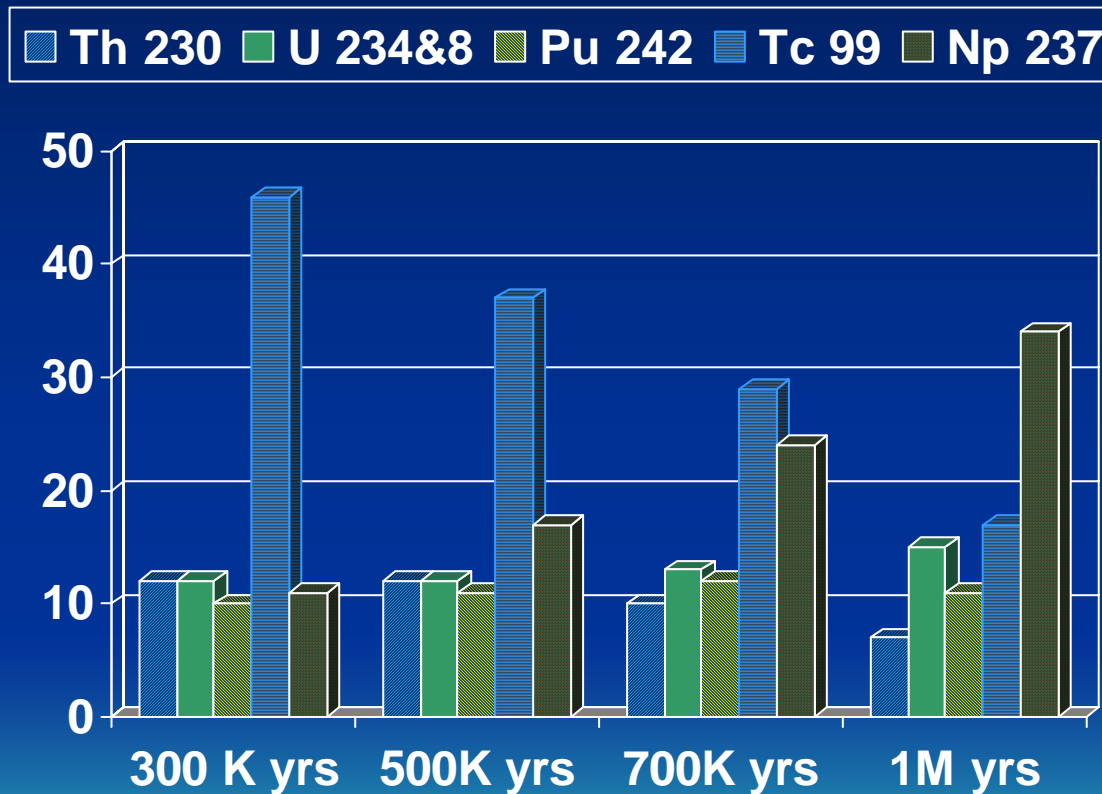
Radionuclide Inventory

(Percent of total inventory, in curies, at specific times)



Radionuclide Inventory

(Percent of total inventory, in curies, at specific times)



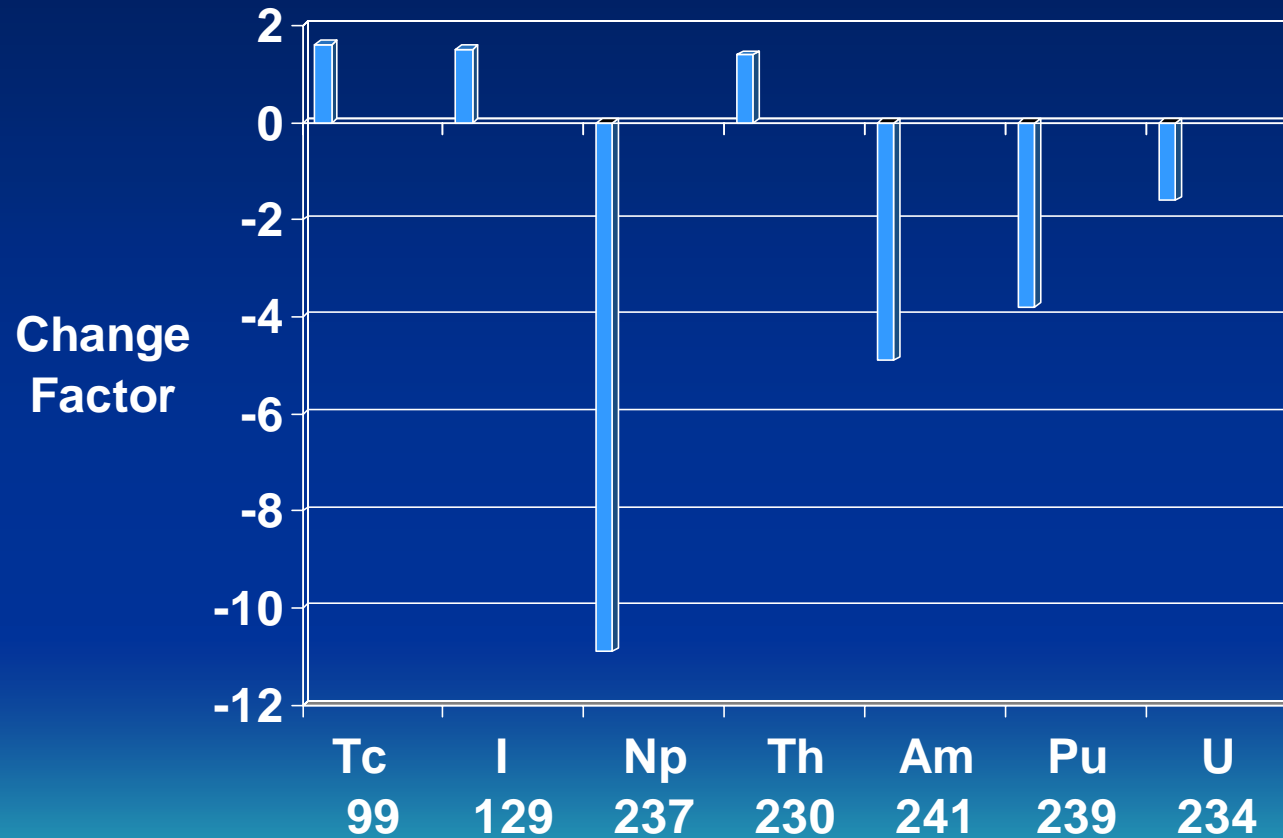
EPA Guidance Documents

(Internal Exposures)

- Federal Guidance Report No. 11 (FGR 11)
 - September 1988
- Federal Guidance Report No. 13 (FGR 13)
 - September 1999

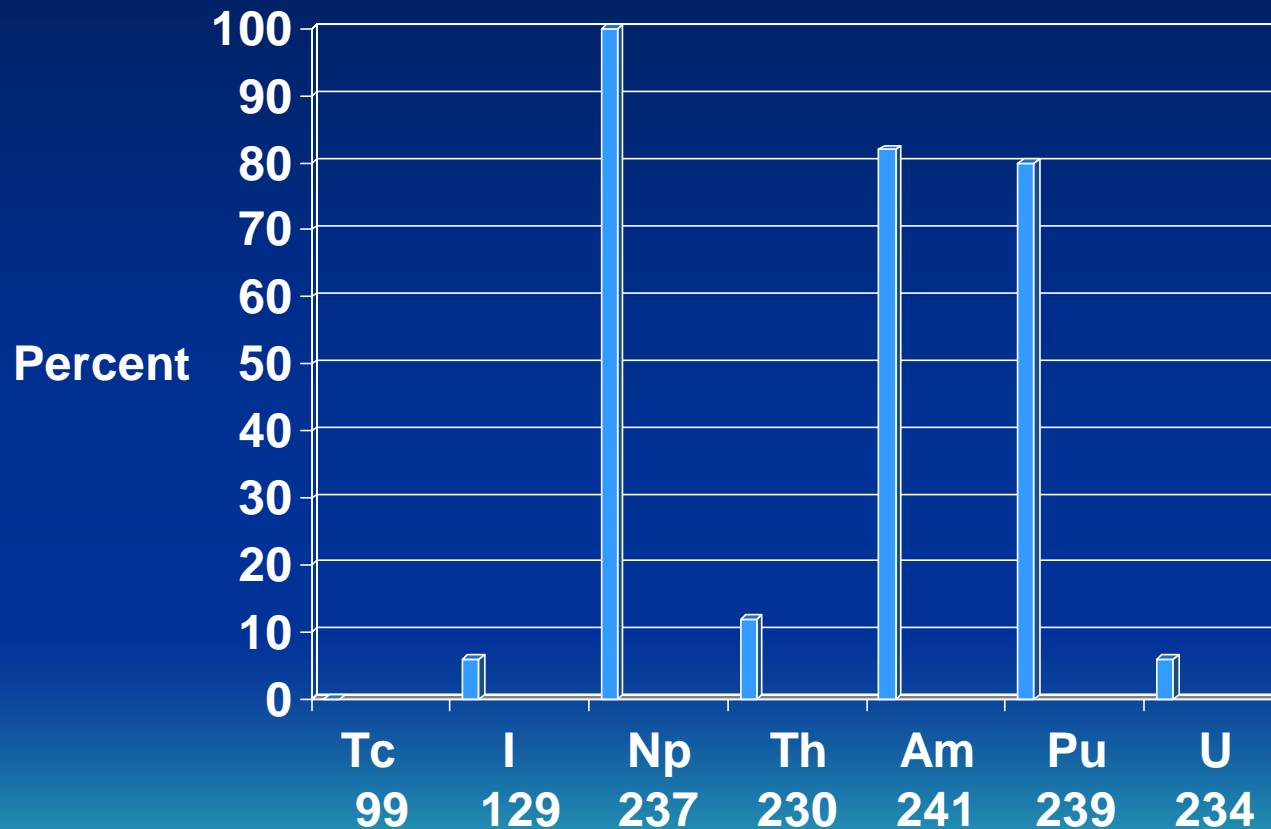
Change in Dose Conversion Factor

(Ingestion – change from FGR 11 to FGR 13)



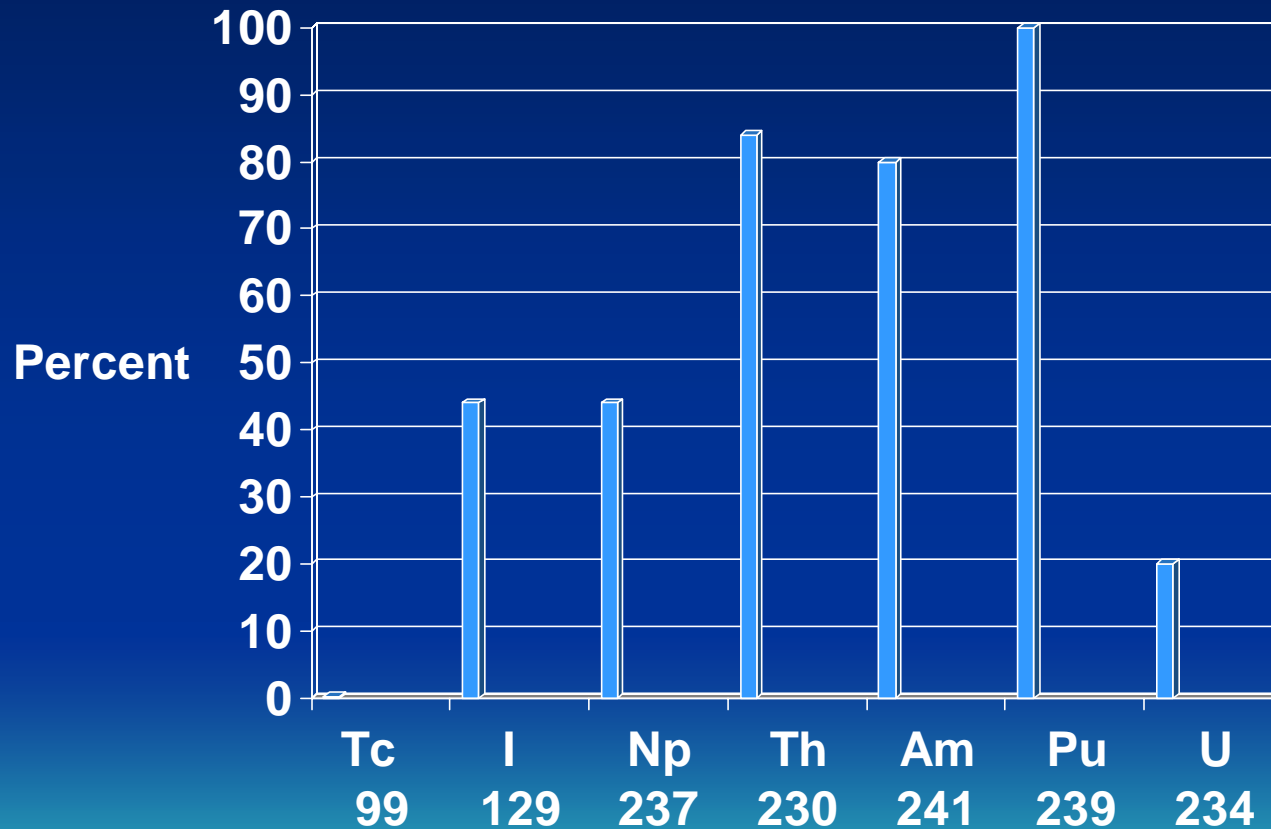
Relative Dose Conversion Factor

(Ingestion – FGR 11)



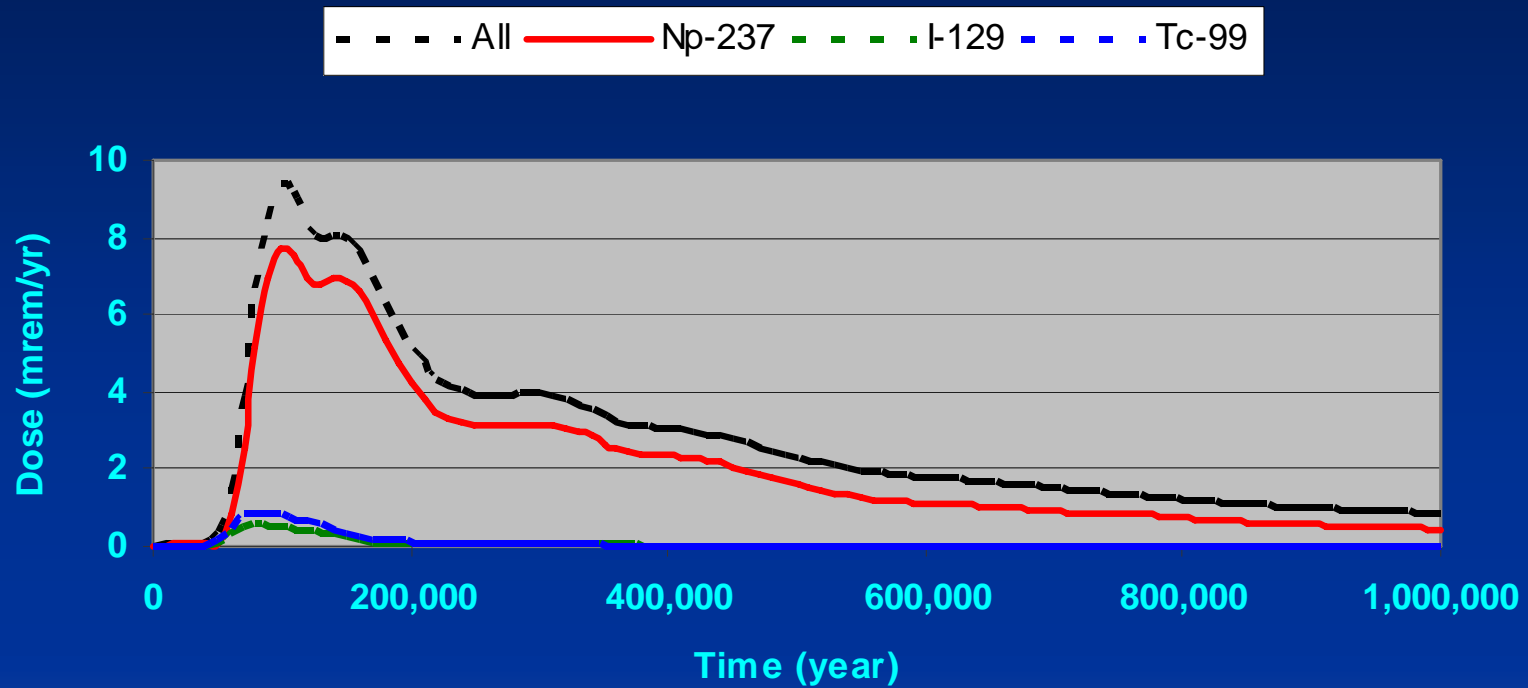
Relative Dose Conversion Factor

(Ingestion – FGR 13)



Illustrative Dose Estimate

(FGR 13 Dosimetry – Ground Water Pathway)



Representation of Climate Change: 40 CFR 197

- Assessment may be limited to the effects of increased water flow through the repository as a result of climate change
- Nature and degree of climate change can be reasonably represented by constant conditions after 10,000 years

Representation of Climate Change: 40 CFR 197 (cont.)

- NRC shall specify in regulation the values to be used to represent climate change such as temperature, precipitation, or infiltration rate of water

Deep Percolation

- Deep percolation, or the amount of water flowing to the repository horizon, directly influences repository performance
- Deep percolation is controlled by a variety of processes such as precipitation, temperature, evaporation, and plant transpiration

Estimating Future Deep Percolation

- Representative range for mean annual precipitation
 - glacial-transition/monsoon states dominate long-term climate state
- Representative range for fraction of precipitation that ends up as deep percolation

Future Precipitation

- Analog sites based on vegetation
 - modern sites that have vegetation similar to late Pleistocene vegetation found in packrat middens
- Precipitation at Yucca Mountain analog sites estimated as 266 to 321 mm per year
 - last glacial maximum

Fraction of Precipitation Resulting in Deep Percolation

- TPA code estimates of deep percolation include consideration of precipitation, temperature, soil depth, evaporation and transpiration
- 5 to 20 Percent of Precipitation Could Reach the Repository Under Intermediate/Monsoon to Full Glacial Climate Conditions
 - precipitation 250 to 420 mm/year

Future Deep Percolation

- Future Deep Percolation Range:
 - 13 mm/year (5% of 266 mm/year)
 - 64 mm/year (20% of 321 mm/year)
- Log-uniform Distribution
 - deep percolation is a multiplicative process suggesting logarithmic distribution
 - no basis for favoring either end of the distribution suggesting a uniform distribution

Future Deep Percolation (cont.)

- Mean value of 32 mm/year
 - approximately 6 times greater than current rate for deep percolation

Status of Proposed Part 63

- EPA comment period ended November 21
- NRC comment period ended December 7
- NRC will consider the comments and expects to finalize its regulation shortly after the EPA finalizes its standard