

Yucca Mountain: Public Health and Radiation Standards

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Yucca Mountain: Background

- “High-Level” radioactive waste
- Approx. 77,000 tons in U.S.
- Most stored in above ground casks
- Spent Nuclear fuel:
 - Commercial/military electric power generation
 - Production of fissile material
 - Some medical waste



Yucca Mountain: Background

- Nuclear Waste Policy Act of 1982
- National policy for disposal of high level Nuclear waste
 - DOE responsible for:
 - Finding a site
 - Building site
 - Operating a underground disposal facility (geologic repository)



Yucca Mountain: Background

- 1984: 10 Sites Chosen Including Yucca Mountain
- 1985: President Reagan Selects Three Sites for Intensive Characterization. Yucca Mountain Among These Three.
- 1987: Congress Directs That Yucca Mountain be Selected
- 2002: President Bush Approves Yucca Mountain and Directs the DOE to Begin Licensing Procedures



Yucca Mountain: Site Characterization

- Since 1985 Over 7 Billion dollars spent studying Yucca Mountain
- “The Most Studied Piece of Real Estate on the Planet”
- Much of the cost is paid for through taxation of commercial Nuclear electricity and by the Federal Government



Yucca Mountain: Standards

- Environmental Protection Agency (EPA) chartered with producing comprehensive public health and radiation standards to govern Yucca Mountain.
- The EPA relied extensively on *Technical Bases for Yucca Mountain Standards* produced by the National Academy of Sciences for their standards.



Yucca Mountain: Standards

- July 13, 2001: First EPA standard released
- Standards were to apply for 10,000 years from the date the repository closes.
- Path of radiation exposure expected through groundwater.
- Relied on dose based limits (vs. risk based):
 - 15 mrem/yr for individual dose
 - 15 mrem/yr human intrusion dose
 - Groundwater limits the same as currently in use



Yucca Mountain: Standards

- Dose limits apply to Reasonably Maximally Exposed Individual (RMEI)
 - Lives a life approx. similar to today's lifestyle
 - Lives directly above highest levels of radioactivity
 - Drinks 2L of contaminated water per day
 - No knowledge of existence of repository
 - No method of detecting, treating or preventing radiation exposure



Yucca Mountain: Standards

- EPA 2001 Standard immediately met with fierce criticism.
- State of Nevada primary opposition group (NIMBYism?).
- Some criticism justified, some not:
 - 10,000 year timeframe
 - RMEI vs. Critical Group
 - Dose based vs. risk based standard



Yucca Mountain: Standards

- July 2004: United States Court of Appeals for the District of Columbia handed down decisions on thirteen judicial cases against the EPA's standards.
- The majority of the cases were brought by the State of Nevada.
- All but one case was rejected by the court.
- 10,000 yr time period was the only upheld case.



Yucca Mountain: Standards

- *Technical Bases for Yucca Mountain Standards* determined that max radiation levels would not be reached until at least 300,000 yrs after the repository closed.
- Additionally, extensive geological studies showed that the site would remain stable for at least one million years.



Yucca Mountain: Standards

- The court called into question why the EPA chose 10,000 yrs as a window for applicable standards.
- EPA response: “..it is not possible to make reliable estimates over such long time frames. ...[the] 10,000 yr compliance period is consistent with.. the time frame used for many geological disposal programs.”



Yucca Mountain: Standards

- EPA Solution: On August 22, 2005 the EPA published a revised set of public health and radiation standards.
- Original standards for first 10,000 yrs remained unchanged.
- From 10,000 yrs – 1,000,000 yrs dose limits raised to 350 mrem/yr.



Yucca Mountain: Standards

- 2005 Standard also met with immediate criticism.
- Primary criticism: ethical principle of “intergenerational equity” violated.
- Senator Harry Reid: “..nothing more than voodoo science and arbitrary numbers.”



Yucca Mountain: Current Situation

- Steps to open site:
 - EPA must set 2005 standards
 - DOE must submit app. To NRC for construction license
 - NRC must revise license reqmts. To comply w/ 2005 standard
 - DOE must build site and then apply for license to store material
 - NRC must determine that site meets EPA standards



Yucca Mountain: Bottom Line

- Over \$5 billion spent
- 20 years of study
- Assuming no opposition to the project (highly unlikely) earliest estimated date for project opening:
–2017



Yucca Mountain: Conclusion

- The EPA standards are central to the debate on Yucca Mountain.
- Time period considered enormous and unprecedented.
- Concerted effort **MUST** be made by U.S. Government to separate politics from sound scientific and technical opposition.
- If this does not occur, Yucca Mountain will not succeed.

