



# Proposed Standards for Yucca Mountain

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for the  
**Nuclear Waste Technical Review Board**

by

**Ray Clark**

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# Purpose

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- Provide background on the Yucca Mountain standards
- Outline the provisions in the proposed standards
- Present the plans for the final standards

# Background

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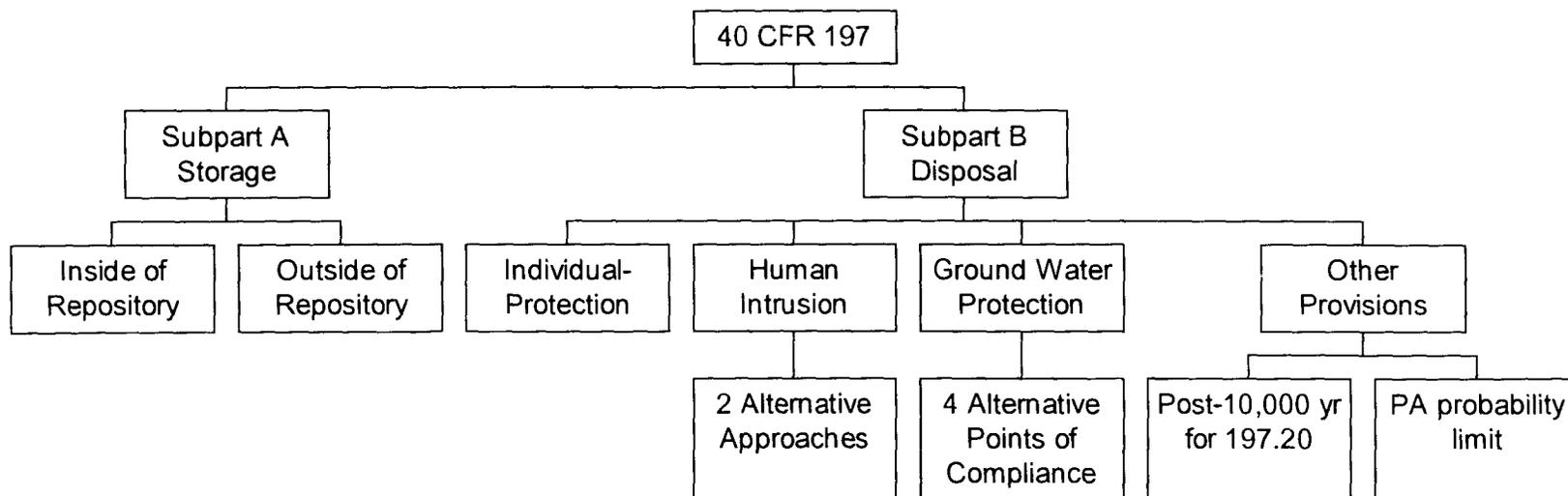
- Energy Policy Act
  - EPA to set site-specific standards for YM
  - NAS to provide technical recommendations
  - NRC licensing regulations to be consistent with EPA's standards
- EPA proposed the standards on  
27 Aug 99

# Background (continued)

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- EPA not bound to NAS Report, but weighs it heavily
  - Many findings written as suggestions
  - Congress directed EPA to set standards “by rule”
  - Federal function
- 40 CFR Part 191 is a precedent

# Organization of the Standards



# Subpart A

## Storage

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- 150 microsieverts ( $\mu\text{Sv}$ ) CEDE/year (yr)
- Doses from repository (Part 197) and surface operations (Part 191) combined
- Consistent with Part 191 and NAS suggested annual risk levels ( $10^{-6}$  to  $10^{-5}$  or about 20 to 200  $\mu\text{Sv}$ )

# Subpart B

## Individual-Protection Standard

- 150  $\mu\text{Sv}$  CEDE/yr through all pathways over 10,000 yr
- Reasonably maximally exposed individual (RMEI)
  - Located near Lathrop Wells intersection
  - Similar to mean of critical group
  - Representative of current residents of Amargosa Valley
  - Drinks 2 liters (L) per day of ground water

# Why RMEI not Critical Group?

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- Other EPA programs use RMEI
- RMEI is representative of most highly exposed part of the general population
- Uses mixture of 95th percentile and average values for exposure parameters
- Used to estimate high-end doses
- Goal is to project doses within an expected range rather than most extreme case
- Results similar to CG approach

# Subpart B

## Human Intrusion

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- NAS recommended that EPA set scenario through rulemaking
- 150  $\mu\text{Sv}/\text{yr}$  over 10,000 yr
- Scenario
  - Single intrusion as a result of water exploration
  - Borehole to the aquifer; not carefully sealed
  - Occurs as soon as a canister is sufficiently degraded that it is not noticed

# Subpart B -- Human Intrusion (cont.)

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- Alternative approach
  - If intrusion could not occur at or prior to 10,000 yr, results of assessments and their bases must be placed into the Yucca Mountain environmental impact statement (EIS)

# Ground Water Protection

- Limits are the maximum contaminant levels (MCLs as est. under the Safe Drinking Water Act) in a representative volume of ground water
- MCLs:
  - 5 picocuries (pCi)/L of Ra-226 and -228
  - 15 pCi/L of gross alpha (excl. Rn and U)
  - 4 mrem/yr beta and photon

# Why Have Separate Ground Water Standards?

- Administration policy to protect ground water
- Protect current and future resource
- Prevention easier and cheaper than mitigation
- Consistent with other programs, e.g.,
  - 40 CFR Part 191
  - WIPP certification
  - Hazardous and municipal waste disposal
  - Underground injection control

# Representative Volume of Ground Water

- Volume of ground water withdrawn to meet a specified demand
- Centered on the highest concentration
- Position and dimensions based upon average hydrologic characteristics along the flow path

# Representative Volume of Ground Water (cont.)

- Two alternatives for calculating the dimensions
  - Well-capture zone
  - Slice of the plume

# Representative Volume of Ground Water (cont.)

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- Proposed: 1,285 acre-feet (ac-ft)/yr
  - Small farming community - 25 people
  - 255 acres of alfalfa x 5 ac-ft/yr =  
1,275 ac-ft/yr
  - Plus 10 ac-ft/yr (family of four with a garden)

# Representative Volume of Ground Water (cont.)

- Other volumes (ac-ft/yr) for comment
  - 10 (minimum volume of a public water supply system)
  - 120 (150-person community based upon current water use for the area and 20 yr projection of land use at 20 km)
  - 4,000 acre-feet (annual yield of Jackass Flats sub-basin)

# Ground Water Point of Compliance

- Two approaches -- Four alternatives
  - Controlled area
    - 5 kilometers from repository
    - 5 kilometers plus NTS boundary  
(the “18-km” alternative)
  - Designated points (w/fixed distance alternative)
    - Lathrop Wells intersection (~20-km)
    - Southern Amargosa Valley (~30-km)

# Other Provisions

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- Post-10,000 yr results for individual-protection
  - Peak dose after 10,000 yr
  - Include the results in the Yucca Mountain EIS
- Limit on PA consideration
  - Consider only processes and events with probability  $\geq 10^{-8}$  /yr

# Subpart B

## Reasonable Expectation

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- All disposal standards based upon “reasonable expectation”
- Takes into account inherently greater uncertainty of long-term projections
- Less stringent than “reasonable assurance” used for reactor systems

# Subpart B

## Reasonable Expectation (cont.)

- Includes all important parameters/ processes, even if not precisely quantifiable
- Compliance determination not heavily influenced by “worst case” assumptions
- Includes full range of reasonable parameter-value distributions

# Next Steps

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- Public hearings in October in Washington, DC (13th), Amargosa Valley (19th), Las Vegas (20th-21st), and a Midwest location (final week)
- Comment period is open until 26 Nov 99
- Response-to-comments document
- Final technical background documents
- Target for final is August 2000