THE EPA HIGH-LEVEL WASTE STANDARDS HISTORY AND ISSUES

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EPA'S AUTHORITY

- Derived from the Atomic Energy Act via Reorganization Plan No. 3 of 1970.
- "Generally applicable environmental standards" are "limits on radiation exposures or levels, or concentrations or quantities of radioactive material, in the general environment . . ."

HLW DISPOSAL OBJECTIVES (EPA, 1978)

- The fundamental goal should be complete isolation for the hazardous life of the waste.

- Criteria for risk acceptability:

  1. Further reduction is not practicable.
  2. Risks to a future generation are no greater than acceptable to the current generation.
     - Likely effects are smaller than similar ones generally accepted by society.
     - The probability of a large consequence is much less than for productive technologies.

HLW DISPOSAL OBJECTIVES (ICRP, 1985)

- Justification - Must be a positive net benefit.
- Optimization - All radiation exposures must be as low as reasonably achievable.
- Individual dose limit - 1 mSv/yr from all sources.
  - Individual risk limit for unlikely exposures: 1/100,000/yr from all sources.
  - Applies to all projected future exposures.

HLW DISPOSAL OBJECTIVES (IAEA, 1989)

- Isolate wastes without relying on future generations or imposing significant constraints on them.
- Ensure long-term radiological protection as recommended by ICRP.

DEVELOPMENT OF EPA'S HLW STANDARDS (1975-82)

- EPA used simple models of hypothetical repositories to project releases.
- Unmined uranium ore was used as a reference point to judge the acceptability of repository releases.
- EPA's derivation was a generic determination of "as low as reasonably achievable."
- Emphasis was on protection of populations rather than individuals.

Int'l. - site specific analysis should be used

Premature cancer deaths expected w/n 10,000 yrs. after disposal

PROPOSED STANDARDS (DEC, 1982)

- Limit impacts to 1,000 deaths/10,000 years.
- Probabilistic format.
- Limits on cumulative releases.
- Applicable for 10,000 years after disposal.
- No protection for individuals.
- "Assurance requirements" re: implementation, including ALARA.

NRC COMMENTS (MAY, 1983)

- Probabilistic format is unworkable.
- Strongly support cumulative release limits.
- Offer additional support for 10,000 yr cutoff.
- Agree that individual protection could encourage dilution.
- Object strongly to "Assurance Requirements."

EPA'S SCIENCE ADVISORY BOARD COMMENTS (FEB, 1984)

- Increase release limits 10X.
- Modify probabilistic format.
- Cumulative release limits are satisfactory.
- Retain 10,000 yr cutoff.
- Individual protection should be provided for first 500 years.

EPA FINAL STANDARDS (AUG, 1985)

- Release limits increased about 7X.
- Probabilities increased 10X. $10^{-2}/10^{-4} \rightarrow 10^{-1}/10^{-3}$
- Cumulative release limits retained.
- 10,000 yr cutoff retained.
- Individual and groundwater protection added. Apply only for first 1,000 years and for "undisturbed performance."

APPEALS COURT DECISION (JULY, 1987)

- Inadequate opportunity for public comment on groundwater protection criteria.
- A repository seems to be "underground injection." If so, individual protection criteria are not adequate.
  - Dose limit is too high (25 vs 4 mrem/yr).
  - 1,000 year time period is too short.

WORKING DRAFT NO. 3 (APRIL, 1991)

- The "containment requirements" remain unchanged from 1985.
  - Same probabilistic format.
  - Same release limits.
- Individual and GW protection requirements list options for responding to Court decision.
  - Dose limit for ind. prot. (25 or 10 mr/yr).
  - Time period (1,000 or 10,000 years).

CURRENT ISSUES (AUG, 1991)

- Probabilistic format - is it workable?
- Stringency - is 1,000 deaths appropriate? What about carbon-14?
- Release limits - would dose limits be better? Emphasize populations or individuals?
- Human intrusion - include or treat separately?
- Reasonable expectation - what does it mean?
- Jurisdictional issues.

CHAIRMAN'S ISSUES (AUG, 1991)

- Probabilistic standards are OK, but a multiple barrier concept is also needed.
- EPA's release limit for carbon-14 is clearly too stringent.
- Human intrusion should be addressed deterministically.
- 1,000 fatality basis for the standards is OK, but 90% level of confidence is too high.
- EPA should delete assurance requirements, etc.