Ethical responsibilities in a national waste management programme

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Ethical Principles in Waste Disposal

- Intergenerational Equity
  - "fairness to future generations"
- Intragenerational Equity
  - "fairness across current generations"
- Others
  - Sustainability
  - Precautionary Principle
  - Polluter pays

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Intragenerational Equity Issues

- Risk levels relative to other activities
  - Risk-based regulation - rare!
- Social and economic impacts
  - Proper use of society's resources
  - Fair compensation of host communities
- Spatial distribution of risks and benefits
  - Siting debate national and international
  - Compensation issues
- Public involvement
  - Dialogue - not just one way information flow!
  - Participation in decision making

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Intergenerational Equity Issues

- Minimise burdens
  - Financial, technical and institutional
- Protect at same (or higher) level
  - Guidance for dose or risk criteria
- Maximise choice
  - Disposal vs surface storage
  - Design for retrievability

Current practices (ICRP)

- Justification: No practice should be adopted unless sufficient benefit can be shown. Any protective measures taken should do more good than harm.
- Optimisation: All exposures should be kept as low as reasonably achievable, taking economic and social factors into account
- Limitation of dose and risk: limits should be set to ensure that no individual is subjected to unacceptable radiation.

Potential future exposures

- IAEA Principle 4: Protection of future generations: potential exposures to future generations should not be greater than those that are acceptable today.
- IAEA Principle 5: Burdens on future generations: Radioactive waste shall be managed in a way that will not impose undue burdens on future generations

Safe management of spent nuclear fuel and high-level wastes

- Deep geological disposal can ensure safety without imposing significant burdens on society. There is no other currently feasible way to ensure safety for future generations.
- For technical (heat emission) and societal reasons, the implementation of a deep geological repository is a task that takes decades.
- Safe storage is feasible for many decades – but it is not a final solution.
- Every responsible nuclear programme should have a credible geological disposal strategy that ensures safety at all times and leaves choices open as far as is consistent with this safety goal.

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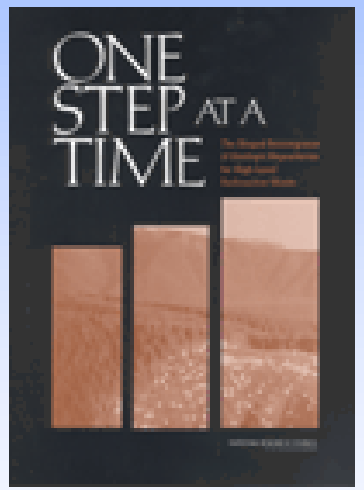
Requirements on a credible spent fuel and HLW disposal programme

1. A feasible technical design for a repository that will ensure long-term safety when sited in an appropriate location
2. A funding mechanism to ensure that the resources needed for implementing the repository are set aside in a fund that will be available when needed.
3. A site or sites that have been investigated to the level needed to ensure that it will meet regulatory standards.
4. A sufficiently broad societal consensus that components 1-3 have been fulfilled.

Achieving societal acceptance



One Step at a Time:

The Staged Development

of Geologic Repositories

Some keys to Adaptive Staging

- Deliberate decision-making process between stages
- Options remain open, including reversibility
- Focus on program progress more than on pre-arranged milestones
- Emphasis on continuous learning and response to new knowledge
- Seek and be responsive to public input
- Communicate clear definition of program success

Specific recommendations for the U.S. program

- DOE should adopt Adaptive Staging
- Pilot, test, and possibly demonstration activities
- Independent scientific oversight group and stakeholder advisory board
- Safety analysis and a safety case based on the full inventory (with USNRC)
- Ensure that the regulatory process enables the application of Adaptive Staging
- Consider the impact of Adaptive Staging on the overall waste management system
- Continue to actively promote a safety culture

Future options

- Implement a first stage or pilot geological repository that can demonstrate unequivocally that the four components of a credible strategy have been satisfied

or

- Implement the full geological repository in a manner that allows retrievability, even at a high cost, should future generations decide on this action

or

- Stop short of implementation – BUT ONLY AFTER FULFILLING THE FOUR REQUIREMENTS – including siting consensus

A credible and ethical future programme for the USA

- Openly acknowledge that the Yucca Mountain closure is a policy decision rather than a negative judgement on the safety of the site or on geological disposal specifically
- Initiate a new adaptively staged siting program that is geologically and geographically broad based and that includes willingness of a local community to host a deep repository.
- Continue work on advanced technologies that might positively affect the nature or the volumes of the long-lived radioactive wastes to be disposed of in the future.

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The End

Other Principles

- Sustainability
  - Most relevant for nuclear power, for siting of repositories
- Precautionary Principle
  - No irreversible harm unless compelled; don't do it if we don't understand it
  - Less relevant if potential impacts localised and non-catastrophic
- Polluter pays
  - Principle universal, method of application to disposal varies

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