# Policy and Technology for Nuclear Waste Management and Advanced Fuel Cycles

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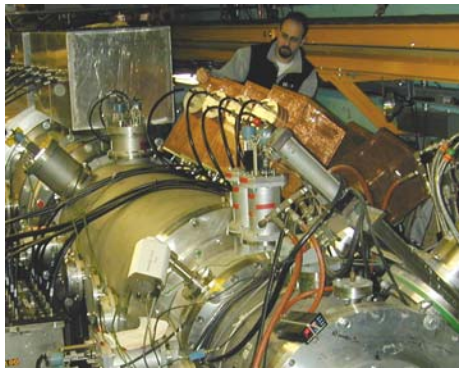


# The U.S. approach to nuclear waste management suffers from a policy vacuum

- **A key element of the 1982 Nuclear Waste Policy Act no longer makes sense**
  - **The requirement to develop a second repository for waste in excess of 70,000 MTIHM was political**
    - » **The 1982 act eliminated crystalline rock as a candidate material (to end further study along the U.S. eastern seaboard)**
    - » **Not building a repository on the heavily populated eastern seaboard probably makes sense anyhow**
    - » **"Punishing" people living on the eastern seaboard 10,000 years from now to provide "equity" hardly makes sense**
- **The NWPA requirement that nuclear electricity consumers fully fund the life cycle costs of waste management does make sense**
    - » **The lack of a policy for waste in excess of 70,000 MTIHM makes it impossible to assess the adequacy of the Nuclear Waste Fund fee without guessing what Congress might decide in the future**
    - » **There exists a yet larger problem to assess the fee if advanced fuel cycle technology is implemented**

# What are some potential elements of a future nuclear waste policy?

- **Continue the current licensing process for Yucca Mountain to determine whether the site can meet the EPA safety standard**
  - **Do this for the current 70,000 MTIHM design**
  - **If the license application is successful, amend the license in the future to implement changes in the use of the repository**
  - **If the license application is not successful, restart the search for a national repository site**

# More elements

- **In parallel with fully funding the licensing process for Yucca Mountain, Congress could commission a National Academy study of technical options to Yucca Mountain**
  - **Review how the EPA safety standard for Yucca Mountain compares to standards for chemicals and other hazards**
  - **Review the alternatives to geologic disposal to determine if the long term scientific and technical consensus favoring geologic isolation remains true**
  - **Review the work that was performed by the original DOE Office of Crystalline Repository Development**
    - » **Studied Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont**
  - **Review new options for geologic media and potential sites**

# Additional policy options

- **Open WIPP for the disposal of low-heat-generating civilian wastes, in addition to its current mission to manage low-heat-generating defense transuranic wastes**
  - **The constraints against using WIPP for this purpose were political, and politics have evolved**
    - » **(now, for example one can question the illogic of requiring (in reality) that the U.S. develop a third repository for waste in excess of 70,000 MTIHM)**
  - **There exists a natural marriage between Yucca Mountain and WIPP**
    - » **Yucca Mountain provides an ideal location for the management of high heat generating wastes because it can be ventilated**
    - » **Future generations will retain the option to move materials to WIPP after heat generation drops off, or to close Yucca Mountain**

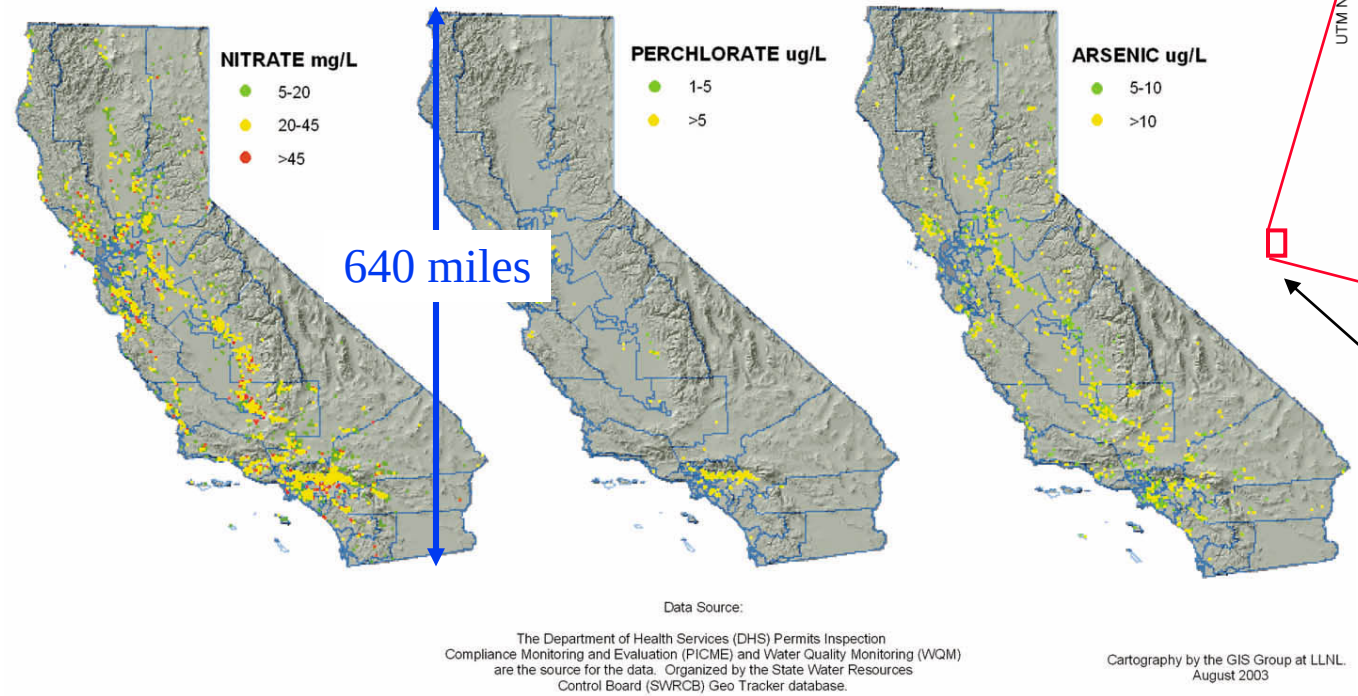
# Yet another policy option

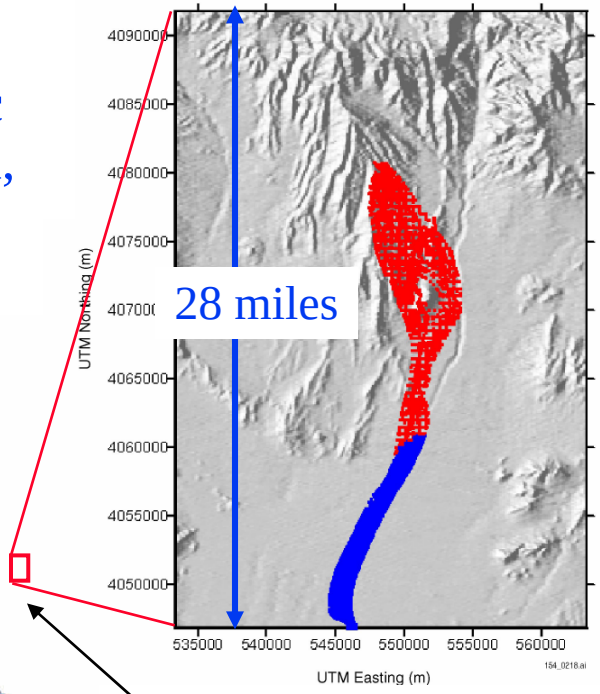
- **Transfer the responsibility for managing the allocation of repository space to private industry**
  - **Lease space or issue space permits to private industrial consortia**
  - **Develop appropriate NRC and EPA regulatory requirements for the industrial consortia to achieve safety, security and environmental goals**
  - **Utilities would contract with these consortia to obtain spent fuel management services**
  - **The government would get out of the business of mandating fuel cycle technology, and instead would support R&D to develop new technologies and would address first-of-a-kind risks through appropriate mechanisms such as loan guarantees**

# More information

# Long-term Safety Requirements are Stringent Compared to Those for Chemicals

The potential long-term impact from geologic disposal is limited groundwater contamination, a problem that current public health systems already understand how to manage




The potential incremental impact from Yucca Mountain in the next 1 million years is small

# U.S. policy internalizes the costs of spent-fuel disposition into the price consumers pay for electricity

- **The Nuclear Waste Policy Act (NWPA, 1982, as amended) requires that the consumers of nuclear electricity bear the costs of waste disposition:**
  - "While the Federal Government has the responsibility to provide for the permanent disposal of high-level radioactive waste and such spent nuclear fuel as may be disposed of in order to protect the public health and safety and the environment, **the costs of such disposal should be the responsibility of the generators and owners of such waste and spent fuel.**"
- **The NWPA requires the payment of a fee of 0.1 cents per kilowatt hour of electricity production, providing**
  - **When electricity is generated: ~$310/kg**
  - **Yucca Mountain cost: ~$540/kg spent fuel**
  - **Waste fund real interest rate: 2.6% to 4.2% after 25 years storage: $590 to $870/kg**
  - **Secretary of Energy is required to evaluate the adequacy of the fee annually**
- **Advanced fuel cycle economics assessments must consider impacts on the waste-fund fee**