Stakeholder Confidence in Effective Safety Regulation:

A Regulator's View on the Role of Independent Research Capability

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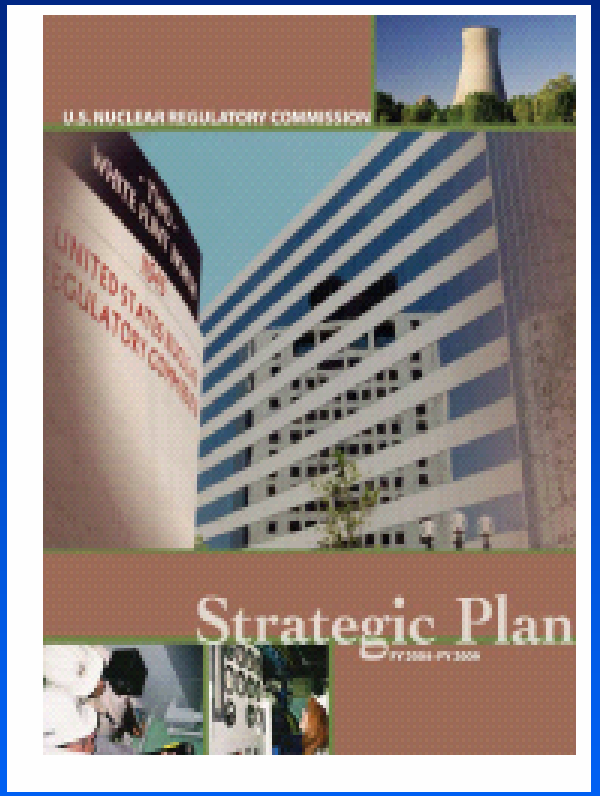
Outline of Presentation

- NRC's Openness Goal
- Openness in HLW Regulation
- Role of Independent Scientific and Engineering Analyses
- The Center for Nuclear Waste Regulatory Analyses (CNWRA)
- Conclusions

Openness: Part of NRC's Strategic Plan

- **MISSION:** License and regulate radioactive materials to protect public health and safety, promote security, and protect the environment
- **VISION:** Excellence in regulating safe and secure use of radioactive materials for the public good
- **STRATEGIC OBJECTIVE:** Realize this vision using regulatory actions that are open, effective, efficient, realistic and timely.



Strategies for Achieving Openness

- Public access to information about risks, safety and licensee performance that is accurate and timely
- Enhanced awareness of NRC as an independent regulator
- Fair and timely process for public involvement in NRC's decision-making
- Early public involvement and two-way communication to enhance public confidence in NRC's regulatory process

NRC's Role at Yucca Mountain

- Independent regulator
- Primary mission is to protect public health and safety and the environment
- Must decide whether to authorize U.S. Department of Energy (DOE) to construct the proposed repository
- If authorization is granted, must assure DOE complies with NRC regulations

To Do So in a Way That Inspires Confidence, NRC Must…

- Review all information objectively
- Make open decisions based on sound, scientific judgments about the facts
- Maintain an open and fair public process
- Ensure availability of documents
- Keep State, Counties, Tribes and public informed

On What Basis Will NRC Decide?

- Any NRC decision on a potential license application for a repository will:
  - be based on NRC staff's comprehensive, independent safety review
  - include a full and fair public hearing that follows formal, well-established rules to ensure, and document, an open, objective decision

NRC Staff Safety Review

- Review license application
- Request more information from DOE, if needed
- Conduct independent confirmatory analyses
- Document results in a Safety Evaluation Report

Public Licensing Hearing

If DOE submits a license application…

- Any NRC decision will be based on a full and fair public hearing before an independent panel of judges
- Hearing will follow formal, well-established rules, and will result in findings of fact and conclusions of law that are based on the record of the proceeding

Formal Evidentiary Hearing

- DOE has burden of proof
- State, Counties, Tribes, and other parties must present evidence to support their issues or contentions
- NRC staff will testify on the basis and conclusions of its independent safety evaluation report

Openness Challenges at Yucca Mountain

- Highly controversial, licensing decision for a first-of-its-kind facility
- Safety review will require extensive technical and scientific analyses, evaluation of expert judgment, and long-range modeling assessments of expected repository performance
- Formal, trial-type proceeding
- Law provides limited time to decide

NRC Needs Independent Scientific and Engineering Analyses to:

- Develop technical bases for regulations & guidance
- Evaluate adequacy of DOE's safety case for a potential repository at Yucca Mountain
- Assist preparation of NRC Safety Evaluation Report
- Provide technical support for NRC testimony during the licensing hearing
- Develop effective outreach and communication tools

Confidence in Regulatory Applications of Science and Engineering

- Confidence in NRC's use of science and engineering to formulate realistic regulatory requirements and make sound regulatory judgments depends on
  - Competence
  - Independence
  - Open and fair process
  - Regulatory outcomes that are subject to verification and monitoring

Formation of the CNWRA

- NRC established the Center for Nuclear Waste Regulatory Analyses (CNWRA), in 1987, to assist NRC in making independent judgments about the safety of the nation's first geological repository for high-level radioactive waste
- Creation of the CNWRA resulted from NRC's long- term, strategic preparation for the review of a license application for a potential license application for the proposed HLW repository at Yucca Mountain.
- CNWRA was chartered with clear goals and guidelines consistent with U.S. law governing Federally-Funded Research and Development Corporations

Formation of the CNWRA (cont'd)

- NRC sought to create a research and development center to provide expertise that
  - is **competent** — employing recognized experts, scientists and engineers, with in-depth knowledge of the scientific and technical issues related to the potential repository at Yucca Mountain
  - is **independent of DOE** — free from any potential conflict of interest, or the appearance of such conflicts
  - assures **long-term continuity** of focused support in technical areas, and maintenance of "corporate memory" of the evolution of repository safety and regulatory issues
  - **complements NRC's skill set** — avoiding gaps and overlaps in expertise between NRC and CNWRA

Center for Nuclear Waste Regulatory Analyses

- Supports NRC's regulatory mission with expertise, computers, laboratories, and field research
- 66 technical and 20 support staff members
- Part of Southwest Research Institute™ (SWRI), San Antonio, Texas
- SWRI is an independent, nonprofit, applied engineering and physical sciences research and development organization

- SWRI occupies 1,200 acres, with ~2,000,000 ft^2 of laboratories, test facilities, workshops, and offices for more than 2,900 employees

Roles and Responsibilities of CNWRA

- Research and technical assistance
- Technical bases for regulations and guidance
- Assist review of license application
- Hearing support to NRC staff
- Support NRC outreach and communications

CNWRA Technical Expertise

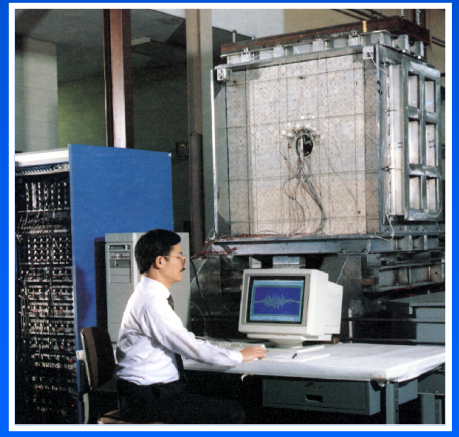
- Hydrology/Climatology
- Material Sciences
- Mechanical Engineering
- Geochemistry/Radiochemistry
- Rock Mechanics
- Mining Engineering
- Structural Geology
- Health Physics
- Nuclear Engineering
- Volcanology
- Computer Sciences
- Performance Assessment

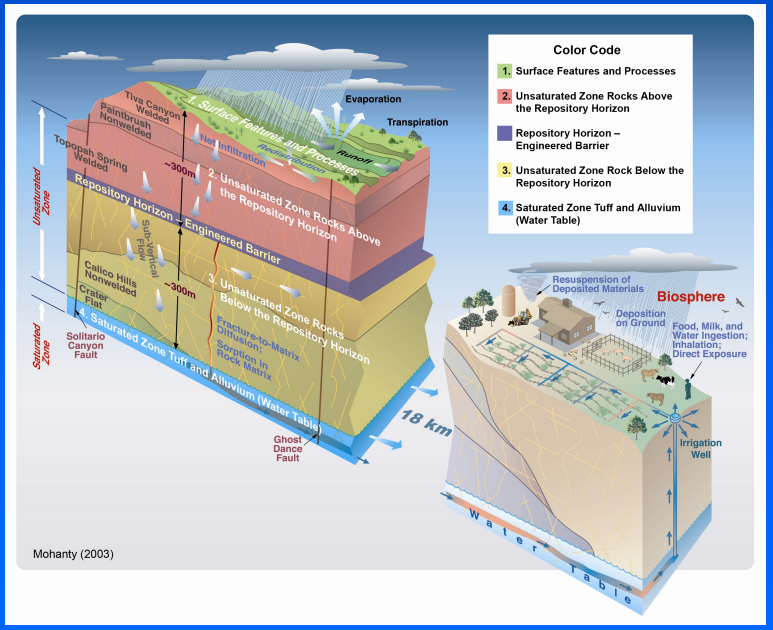
Joint NRC and CNWRA Analyses

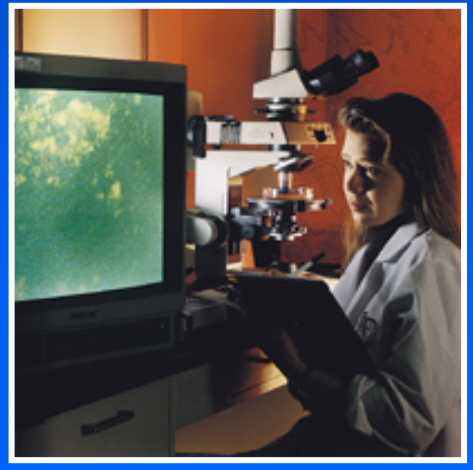
- Comprehensive understanding of repository system
- Independent performance assessment model and codes
- Evaluation of technical uncertainties
- Risk significance of repository safety issues
- Documented bases for regulatory decisions

CNWRA Provides a Wide Range of Independent Technical Support to NRC

- *Technical Experts*
- *Computer Modeling*
- *Laboratory Investigations*
- *Field Studies*
- *Safety Assessment*







NRC Relies on CNWRA for Broad Technical Support

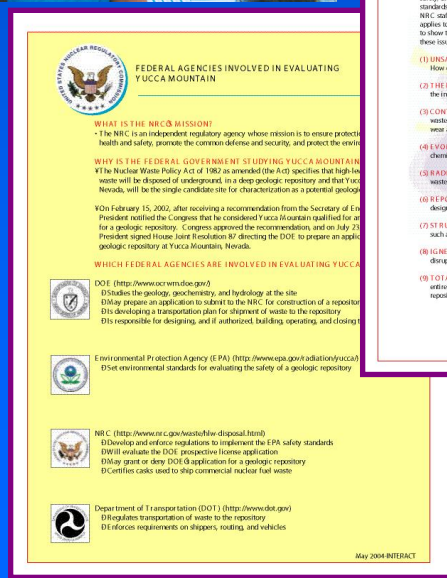
- Primary area of support is to NRC's high-level waste repository safety program
- CNWRA also performs scientific and engineering analyses for other NRC regulatory applications

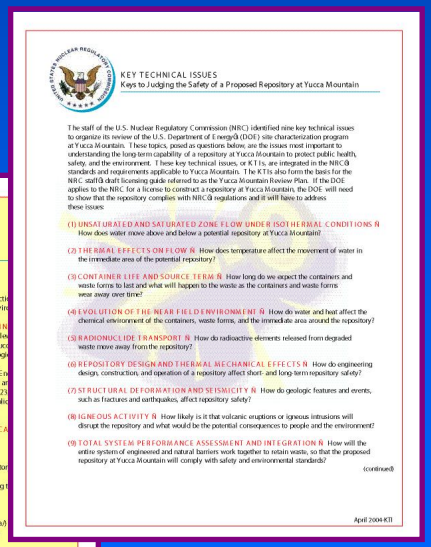
  -Uranium mining and mill tailings
  -Waste reprocessing
  -Site decommissioning
  -Spent fuel storage

- Example: Aircraft crash probability
  - Issue of contention in hearing for an interim storage facility
  - Independent CNWRA analyses used to support NRC testimony

Technical Support for Public Outreach

- CNWRA experts support NRC public meetings, open houses and conference exhibits
- Help NRC staff identify key technical concepts and defining science-based messages
- Aid NRC in translating key messages into plain language





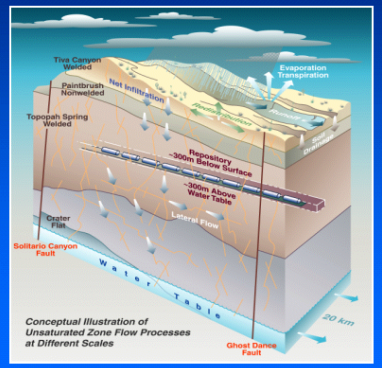
Technical Support for Public Outreach (cont.)

- CNWRA and NRC Staff strive to publish research findings and limitations in plain language
- CNWRA is working to develop physical models, computer visualization, and animations to illustrate regulatory requirements for repository performance

Explaining the Importance of the CNWRA

9 Total System Performance Assessment and Integration

How will the entire system of engineered and natural barriers work together to retain waste, so that the potential repository at Yucca Mountain will comply with safety and environmental standards?



CNWRA scientists and engineers study how the natural and engineered systems at Yucca Mountain would work together.

We use field studies to evaluate the safety of a potential repository.

Field sensors help locate and identify geologic structures beneath the ground surface that may affect the movement of groundwater.

- **Presentation at NRC Open House**

Conclusions

- NRC is committed to regulatory openness
- Independent research and development is necessary to support NRC regulatory actions and decisions regarding a proposed HLW repository at Yucca Mountain
- NRC established the CNWRA as a conflict-free body of experts to support NRC's HLW regulatory program
- NRC's reliance on independent expertise conveys to stakeholders that NRC is able to challenge DOE's assumptions and assertions and arrive at objective conclusions about the safety of the potential repository