# *Update on OCRWM's Science and Technology Program*

***Presentation to***
***Nuclear Waste Technical Review Board Panel on the Engineered System***
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***On detail to U.S. Department of Energy,***
***Office of Civilian Radioactive Waste Management***
***S&T Program***

# S & T Program Objectives

- Improve existing and develop new technologies to:
  - Achieve savings in the waste management system schedule and life-cycle costs
  - Achieve efficiencies in the waste management system (transportation, waste handling, disposal)
- Increase understanding of repository performance

# *Philosophy*

- The longer view (3 - 5 - 10 years or longer)
- Explicitly distinct from the mainline OCRWM activities
- The scope is very broad: To support all OCRWM activities
- S&T should resist the tendency to get tied up with shorter-term issues
- Goal is to institutionalize the Science & Technology objectives as an enduring OCRWM activity

# *Relationship of S&T with Other Ongoing OCRWM Technical Work*

- We have developed a clear distinction between the scope of the S&T Program and the scope of the main Project technical work (License Application, Performance Confirmation, Testing & Evaluation, etc.)

- S&T projects are characterized by:
  - Longer-term work
  - Outcomes are less assured
  - Work is not needed to support the License Application or to support OCRWM's interactions with the U.S. NRC during the license-review period
  - Aim: Improvements in design or operations can be incorporated later

# *Approach*

- FY 2003:  A few initial projects ($1.7 million)
- FY 2004:  We have launched a major S&T Program ($25 million this year)
- Planning a public solicitation (Request For Proposals)
- International collaborations are being sought and encouraged

# *Initial FY 2003 Work*

- We started a few projects in FY 2003 (total $1.7 million)
  - Advanced protective coatings (with DOD-DARPA)
  - Advanced welding method for waste packages
  - Analogue study at Peña Blanca, Mexico
  - Analogue study at the Nevada Test Site
  - Decay heat effect on in-drift environment
  - Decay heat effect on in-package environment
  - Improved seismic modeling of the site
  - Novel “getter” for Tc and other radionuclides
  - Improved modeling of seepage into the drifts

# *FY 2004 Funding Processes*

- Two different funding processes
  - DOE National Laboratories + U.S. Geological Survey
    - directed funding
    - based on special capabilities
  - Private sector (universities, private firms, institutes, etc.)
    - initial open solicitation soon (Request for Proposals)

# *FY 2004 S&T Program*

- This Year (FY 2004), Main S&T “Program Thrust” Areas
  - Advances in Materials
  - Natural System (UZ and SZ flow and transport, seismic, colloids, analogues)
  - Robotics and Sensors
  - Drift Engineering
  - Source Term

# *Advances in Materials*

- Surface Amorphous Metal coatings, with DOD-DARPA
- Welding Technologies
  - Advanced Electron-Beam Welding
  - Scoping Study of Other Methods
- Advanced Corrosion Science
- Getters
- Advanced Materials in the Drifts
- Advanced Cementitious Materials:  Scoping Study

# *Natural Systems Areas*

- Unsaturated Zone Phenomena
- Saturated Zone Phenomena
- Colloids
- Seismic Hazard
- Analogues:  Peña Blanca, Nevada Test Site

# *Unsaturated Zone*

- Fracture/Matrix Interactions
  - Field & laboratory studies
  - Theoretical & computational studies (including scaling)
  - Workshop for specialists
- Drift Shadow Studies
  - Off-site analogues
  - Lithophysae at Yucca Mountain
  - Scaled laboratory samples

# *Saturated Zone*

- SZ Transport Studies
  - Carbon-14 groundwater analyses
  - Better integration of site and regional flow models
- SZ Hydrological Parameters
  - Lab sorption reversibility studies
  - Natural-gradient tracer test
  - Planning for long-term pumping test in the volcanics

# *Advanced Robotics*

- Robotics Technology: Scoping Study
- Collaboration with DOE-NNSA “University Research Program in Robotics” to develop advanced robotics technologies:
  - Manipulators
  - Control systems
  - Mobile systems
  - High-radiation environments

# *Collaborations with DOE's Office of Science*

- Goal is to identify areas where DOE's Office of Science and OCRWM can work on joint projects, or use common capabilities, to advance mutual objectives.
- Successful Corrosion meeting in July 2003
- Planning an Unsaturated Zone Phenomena meeting in the spring
- Discussing a "Getter" meeting sometime soon

# Summary

- We have confirmed the original vision that many S&T opportunities exist:
  - Advanced alternative technologies
  - Advanced methods of analysis
- The FY 2004 S&T Program is pursuing many of these opportunities already
- Other opportunities are being developed now and will receive support in the future