

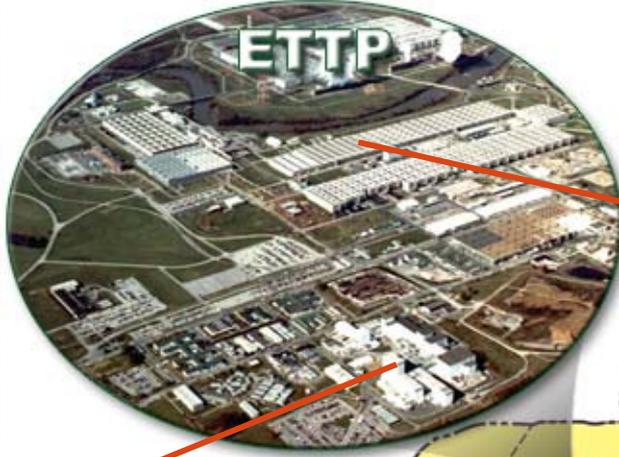
Overview of the Oak Ridge National Laboratory

Presented to the
General Nuclear Services, Inc.

M. Jonathan Haire, Manager
Depleted Uranium Uses R&D Project

September 10, 2002

Oak Ridge Facilities



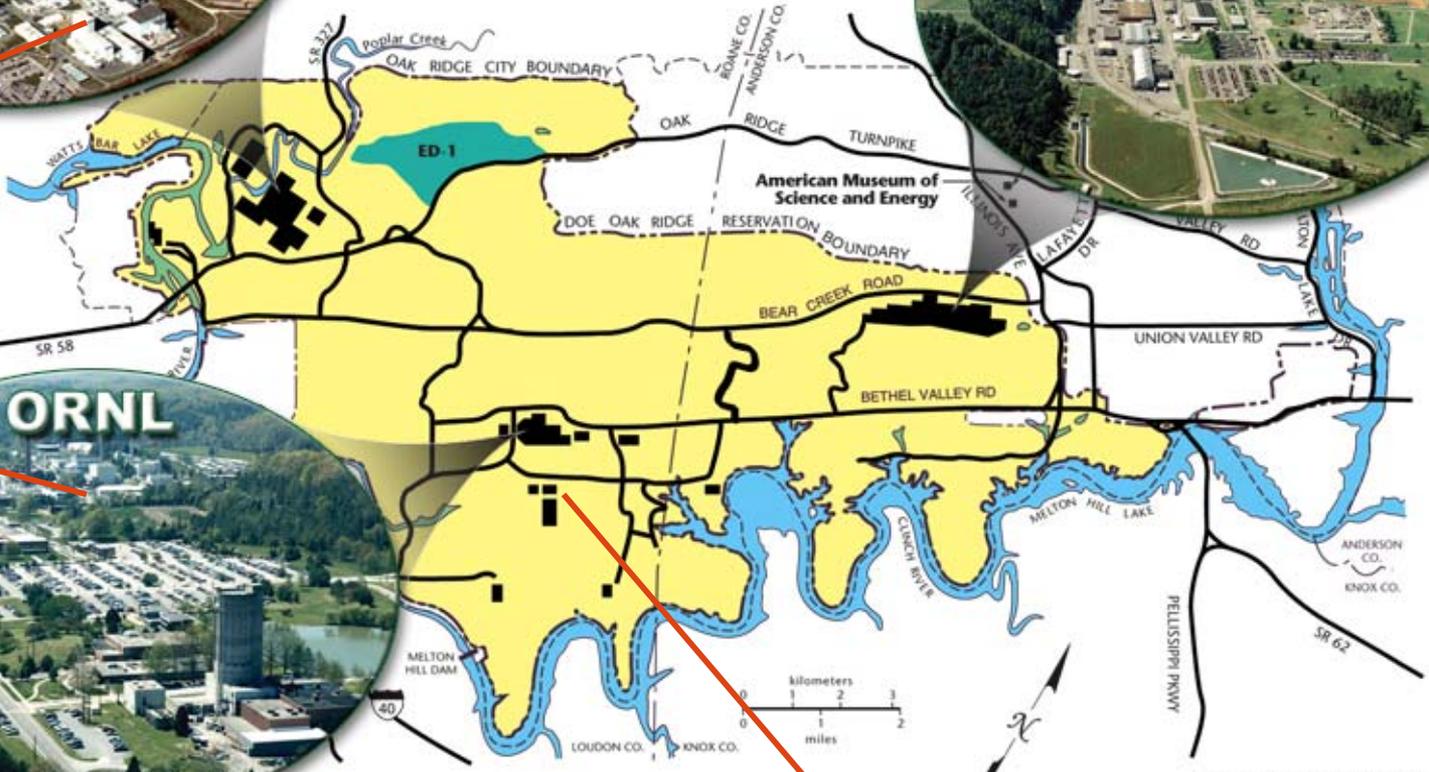
Gaseous diffusion facilities



Uranium Conversion Facilities (oxide to UF6)

Gaseous Centrifuge Facilities

PUREX Fuel Reprocessing



REDC Fuel Reprocessing Facility (kgs /y)

ORNL 2001-03779/djr

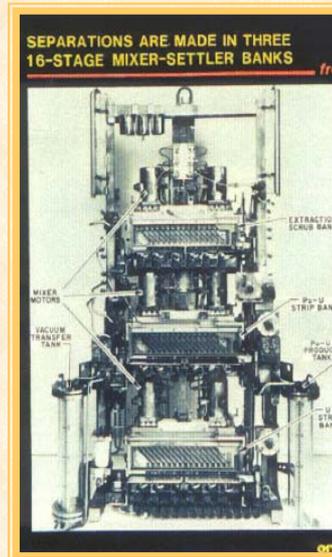
Oak Ridge National Laboratory



- DOE's largest multipurpose science laboratory
- Nation's largest concentration of unclassified materials research
- Nation's largest energy R&D laboratory
- \$850 million budget (FY 02); 90% from Department of Energy
- Sixteen research divisions – 1450 R&D staff
- 3000 guest scientists and engineers annually
- 19 user facilities

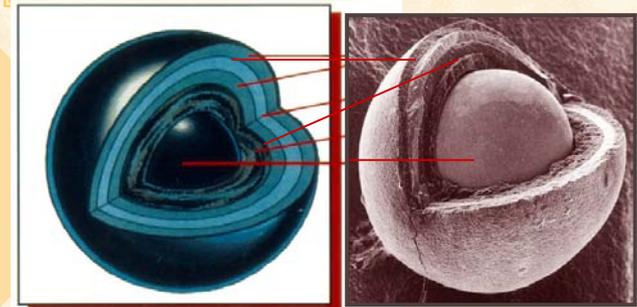
ORNL is DOE's premier energy laboratory

- Most diverse portfolio among the DOE labs
- Largest share of DOE energy funding
- Peer recognition: leadership, R&D 100 awards, etc.
- Strong history in nuclear, energy efficiency, fossil, materials science, and chemical separation
- Oversight for about \$400M of ORNL's budget with almost 1200 employees
 - Nuclear Science and Technology Division budget is \$180M in FY2002



ORNL Solvent Extraction Test Facility - Fuel Reprocessing Demo on High-burnup Fuels

Gas-cooled reactor fuel fabrication R&D at ORNL



ORNL's gas centrifuges for Uranium Enrichment

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

UT-BATTELLE

Neutron sciences



SNS is on schedule and within budget



HFIR has been upgraded, restarted, and is running at full power

Combined ORNL budget for nuclear and neutron sciences = \$510M

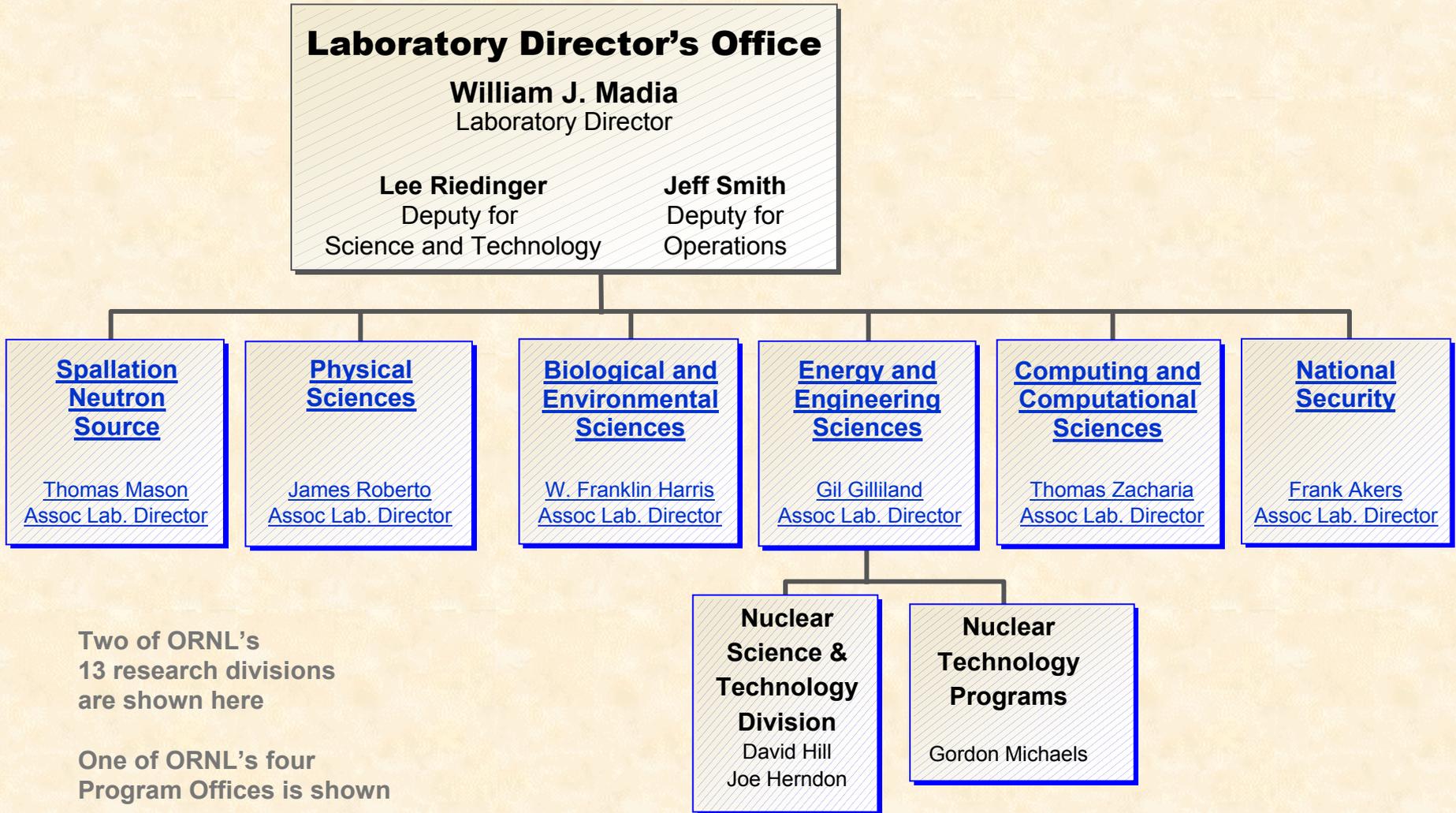


Joint Institute for Neutron Sciences will build international collaborations

**OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY**



Oak Ridge National Laboratory



Two of ORNL's
 13 research divisions
 are shown here

One of ORNL's four
 Program Offices is shown

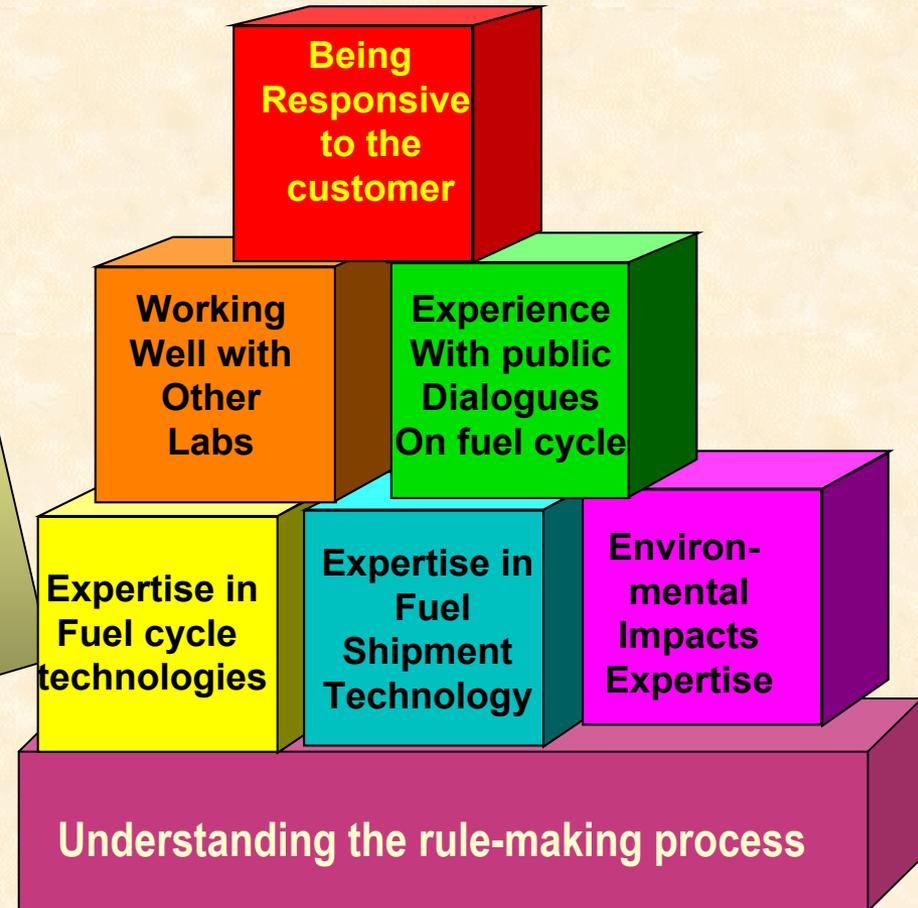
Relevant ORNL capabilities



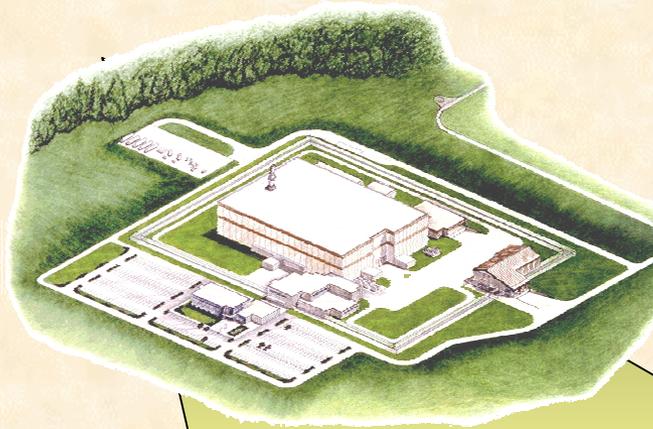
DUF6 cylinders at Oak Ridge

ORNL Fuel Cycle Experience - 1

- ORNL was developer of chemical separations technology for solution mining of Uranium
- Formerly operated Uranium Enrichment plants (diffusion, centrifuge)
- Extensive experience with conversion of U oxides to UF₆ (at Y12)
- **DOE lead lab for Depleted UF₆ Disposition**
 - *defined technical basis and impacts for Argonne's EIS on DUF₆ conversion*



Relevant ORNL capabilities



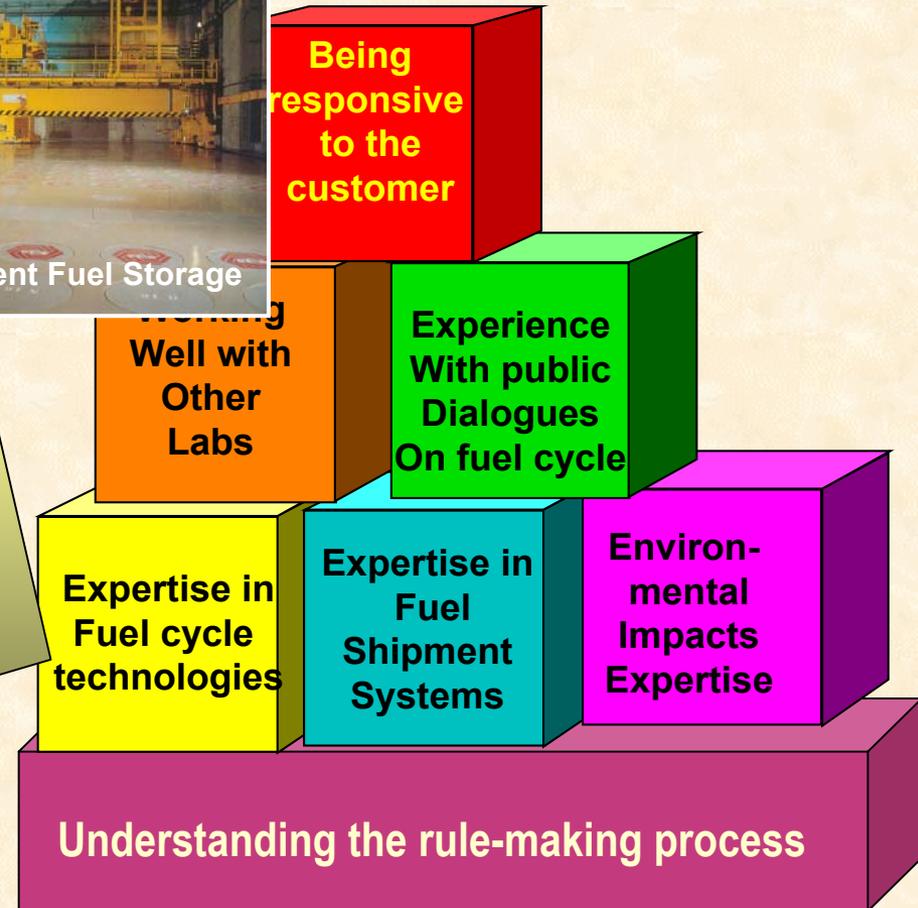
DCS MOX fuel fabrication plant



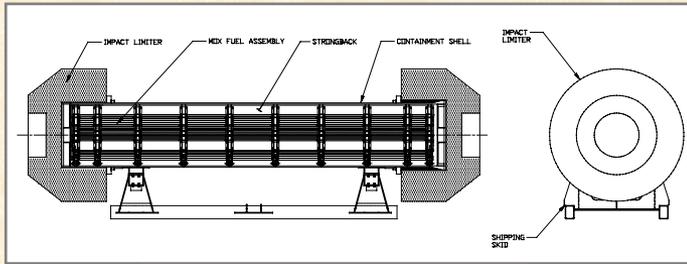
La Hague Spent Fuel Storage

ORNL Fuel Cycle Experience - 2

- DOE lead lab for MOX reactor-based Pu disposition
 - *assisting DOE with oversight of MOX fuel fab plant at Savannah River, including waste streams & interfaces*
 - *designing MOX fuel fab plants in Russia*
 - *analyzed MOX spent fuel characteristics*
- Developed PUREX, conducted recent exchange program with La Hague reprocessing plant
- Conducted Cooperative Fuel Reprocessing Program with Japan (until 1995)



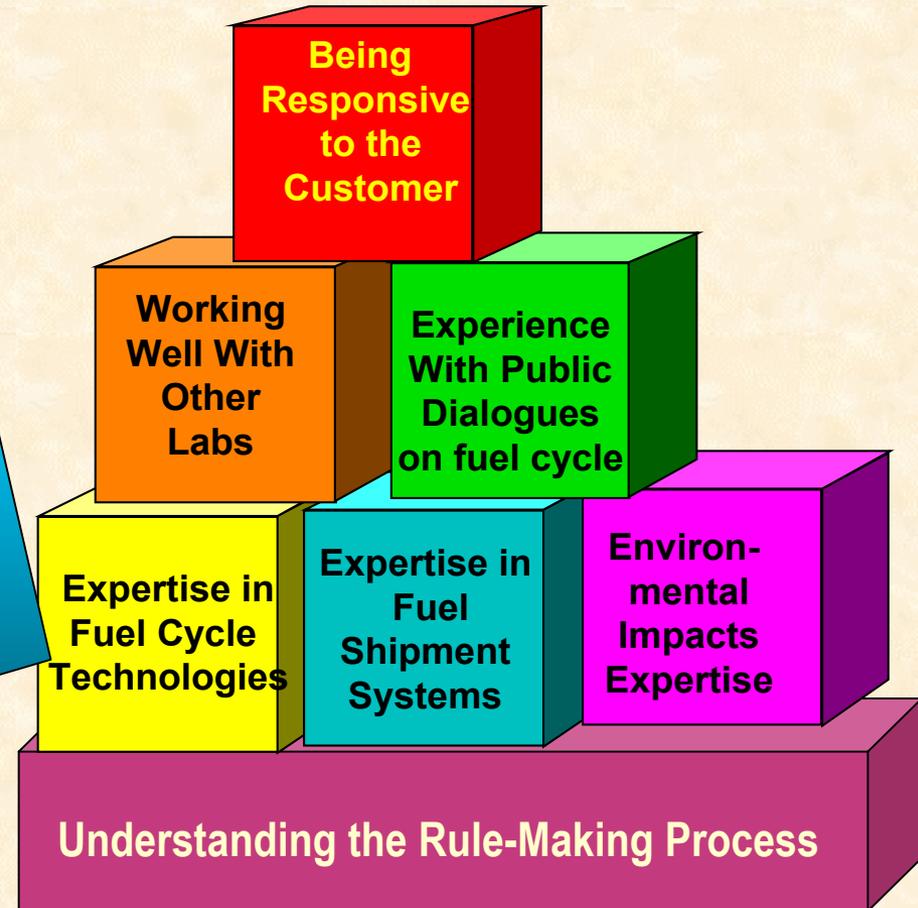
Relevant ORNL capabilities



MOX Fresh Fuel transport cask

Fuel Transportation Roles - 1

- DOE MOX Program lead lab
 - analyzed MOX spent fuel characteristics, impacts of shipments and cask design issues
 - developed concept for MOX fresh fuel shipping container and transferred to industry (DCS, LLC)
- Recently performed spent fuel transportation analyses for NRC
 - Skull, Valley Utah EIS (2001)
 - NUREG 1437 GEIS for License Renewal, Transportation Table 9.1
 - NUREG/CR6176 Nuclide Importance to... Transport.... Of High-Burnup Fuel



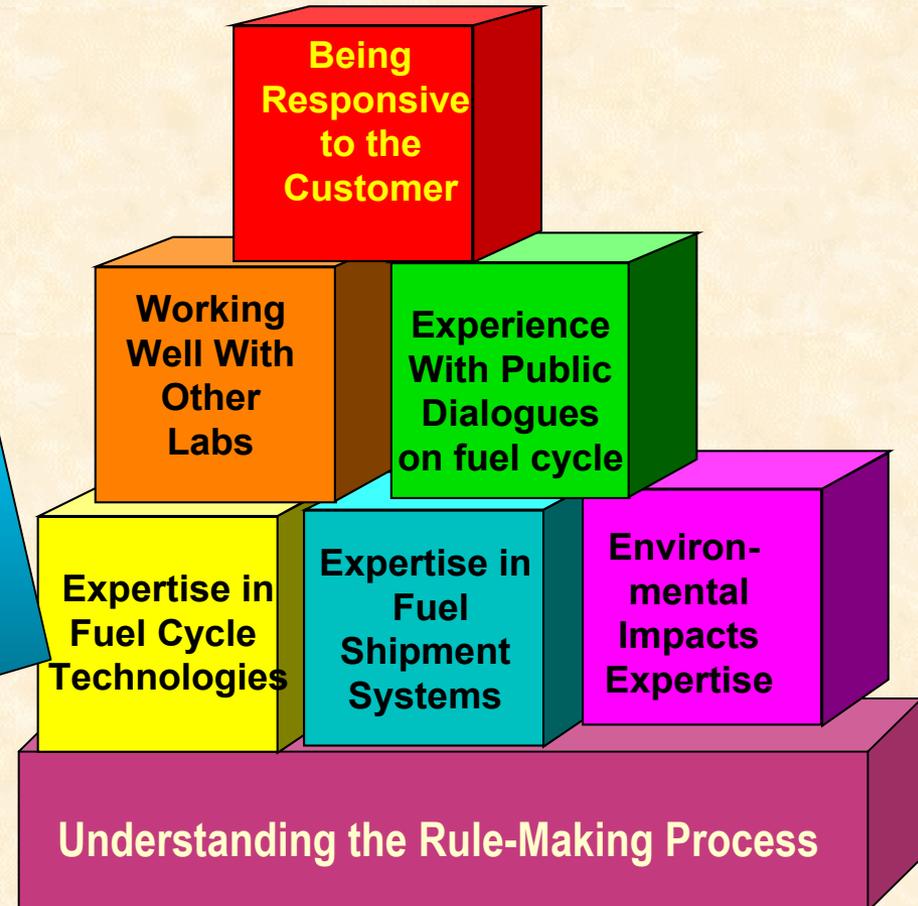
Relevant ORNL capabilities



Spent fuel transport cask

Fuel Transportation Roles - 2

- Supported Yucca Mtn project (through 1997) and DOE-EM on transportation
- *Rulemaking support*
- *Accident consequence analysis*
- *Dose rate estimation*
- *Source term evaluations*
- *Routing criteria studies*
- *Burnup credit assessments*
- *Regulatory guidance support*
- *Cask design, certification, and utilization*
- *Cask testing*
- *Radioactive materials packaging handbook*



Relevant ORNL experience



Mill tailings pile at Moab, Utah

Environmental Assessments:

- Led U.S./EC Joint Study on Nuclear Fuel Cycle Environmental Impacts and their External Costs/Benefits
- Over 500 EISs or EAs for Nuclear facility licenses
 - Generic EIS for power plant relicensing
 - Envirocare EIS (low-level radioactive waste disposal)
 - Skull Valley, Utah, EIS (spent fuel storage)
 - Crown Point, NM EIS (in-situ mining)
 - Moab, Utah mill tailings EIS

