NEAC Facilities Subcommittee Report

Presentation to the NEAC Committee

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Facilities Subcommittee Members

- John Ahearne
- Denis Beller
- Dana Christensen
- Tom Cochran
- Mike Corradini
- Dave Hill
- Andy Klein
- Paul Murray
- John Sackett, chair

Subcommittee Objectives

- The objective of our deliberations has been to develop a means to identify, prioritize and make available those facilities important to Nuclear Energy Research and Development.
- All facilities are considered, including those existing at DOE laboratories, universities, industry and international

Background

- There have been many studies conducted to identify facilities that exist within the DOE and university complex. The list of facilities is long.
- It is difficult to independently assess capability and readiness of many of these facilities, not only because there are so many, but also because their use and availability changes as program priorities and needs change.

Background, contd.

- Facilities important to nuclear R&D are expensive and without consistent funding, will be lost.
  - Prioritization is important.
- The U.S. at one time was the world leader in nuclear R&D but is no longer.
  - The question of how many facilities can be supported is of real concern.
- It is important, therefore, that the work of the subcommittee address the issue of facility availability in new ways.

Many Important Studies Have Been Conducted

- *"Facilities for the Future of Nuclear Energy Research: A Twenty-year Outlook", DOE-NE, Feb/ 2009*
- *"2012 Annual Report for the Research Reactor Infrastructure Program", Idaho National Laboratory*
- *"Research and Test Facilities Required in Nuclear Science and Technology", NEA, Organization for Economic Co-operation and Development, ISBN 978-92-64-99070-8, NEQA No. 6293, OECD 2009*
- *"Nuclear Energy for the Future, Executive Recommendations for R&D Capabilities", Battelle, July 2008*

Approach

- Previous studies have provided an excellent library of information. Prioritization has been elusive.
  - Major facilities are well documented and prioritized.
  - Deficiencies are noted, particularly in transient testing and fast-flux irradiation.
  - University capability is underutilized while DOE facilities are at capacity in many cases.
- A consistent theme is the need to maintain U.S. expertise at a high level by conducting relevant research. The question is how to accomplish that goal with seemingly ever-changing priorities for research that requires facility support.
- We may have found a way.

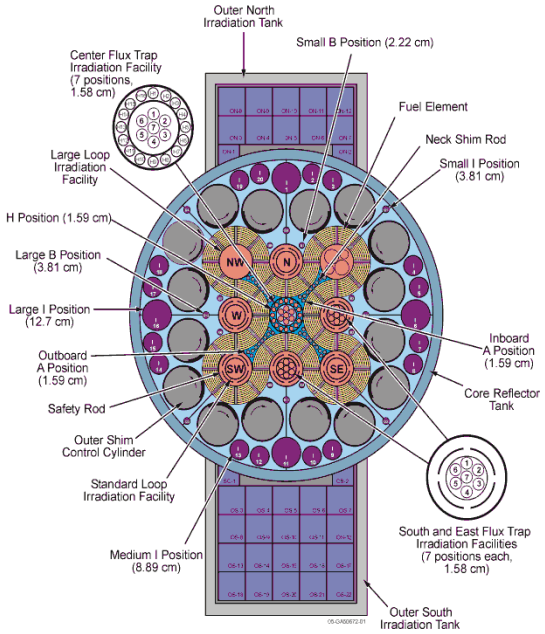
Approach, contd.

- DOE and the INL have been conducting a pilot program for the creation of a “virtual laboratory” user-facility since 2007.
- At its heart it provides a means for researchers at national laboratories, universities and industry to access facility capability that would otherwise be unknown or unavailable.
- The pilot is the Advanced Test Reactor – National Scientific User Facility (ATR-NSUF)

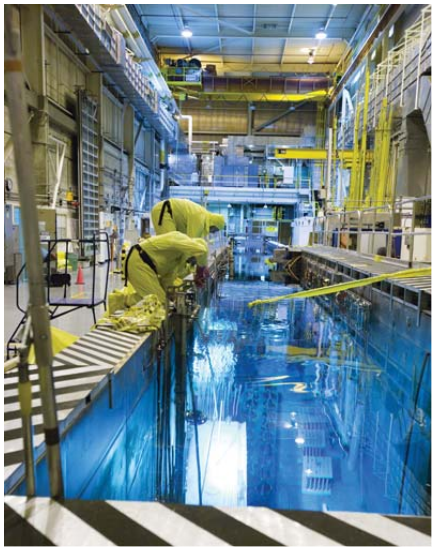
Where did the ATR-NSUF start?

Allow the research community access to test reactor space and existing post-irradiation examination capability

Advanced Test Reactor



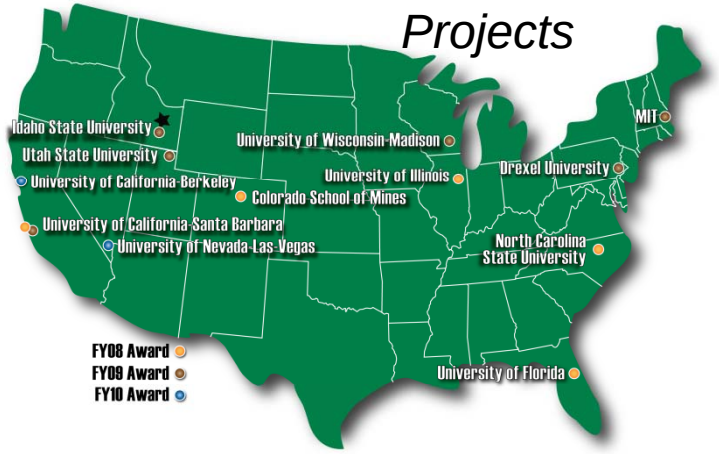
INL Examination Facilities (HFEF, EML)

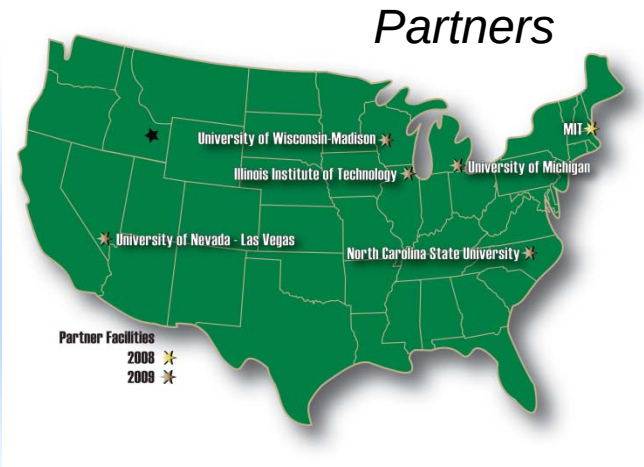


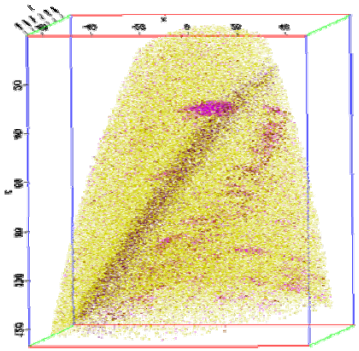
Plans to upgrade ATR by adding PWR loop and hydraulic shuttle

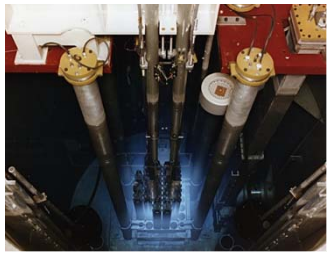
What Has the ATR-NSUF become

- ATR
- ATR Critical Facility
- Post-irradiation Examination Sample Library/Rapid Turnaround Projects
- Significantly upgraded examination equipment
- Network of university partners providing irradiation and examination capability
- Connections to other User Facilities









Seventy-five project proposals submitted as part of the first five solicitations, twenty-three ongoing projects

User-Facility Partners

- Partners self-select, offering their facilities for use by others as part of the user facility.
- Currently, there are 3 national laboratories, 8 universities and 1 industry partner that have elected to participate.
- The benefit of self-selection is that it draws capabilities that are both current and relevant, with demonstrated support from their parent institutions.
- Support from parent institutions includes training and assistance to researchers who are interested in use of an individual facility.

Partner-Facility Certification

- The pilot program has been successful, in spite of limited funding. Important features include
  - 1) Team visits at offered facilities to verify advertised capabilities and expertise,
  - 2) Reviews by independent experts to confirm capability and need,
  - 3) Training for researchers in use of facilities and equipment,
  - 4) Assessment of research proposals to recommend the best facilities considering capability, availability and cost, and
  - 5) Subsidies for researchers based upon priorities and need,
- Even with limited budgets, there have been 76 projects awarded, university and laboratory researchers have produced 114 research papers, and an average of ~90 people participate in users week each year

Expanding the Scope is In Order

- The scope of DOE interests in nuclear technology is much broader than materials development, heretofore the major emphasis. Consideration should be given to including facilities that support other areas
- Criticality safety, which is highly cross-disciplinary (conducted within NNSA, not DOE/NE), is an excellent example.
- Others of interest include thermal-hydraulic testing (both integral and special effects), ion-beam irradiation capabilities, and severe accident testing facilities. Some of these might also include detector-testing composed of many sites/facilities, sources, and capabilities.
- The Modeling and Simulation community needs support in validation and verification. An expanded scope could help the user facility become the underpinning for this role.
- With the expanded scope, a name change is in order; Perhaps the National Nuclear Scientific User Facility (NNSUF)

Recommendations

- ***The DOE-NE pilot program for a virtual user facility, which began in 2007, should be expanded to include the use of all facilities important to DOE NE's programs in nuclear technology research and development***.
  - That program, the "ATR"-National Scientific Users Facility (NSUF) has proven its worth and provides an effective means for identifying, prioritizing and making available facilities at national laboratories, universities and industry.

- ***The scope of the user facility should be expanded beyond its present emphasis on materials development.***
  - As modeling and simulation of nuclear systems has become an increasingly important aspect of nuclear technology development, the importance of validation and verification through testing has also become increasingly important. The user facility could underpin this need.

- ***The "NNSUF" should be prominent in the next update of the DOE-NE Roadmap for nuclear technology R&D as the coordinating mechanism for nuclear-facility use and prioritization.***
  - The name of the user facility, namely the Advanced Test Reactor (ATR) – National Scientific User's Facility (NSUF) reflects its origins but is not representative of its current status or our recommendation.