Review of the NEAC Facilities Subcommittee

In 2008 then NE-1 Spurgeon tasked NEAC to examine "Facilitization of US Nuclear R&D Infrastructure." A preliminary response was produced in July of 2008. Subsequently this was incorporated in the NEAC Technical Subcommittee report in the November 2008 NEAC report *Nuclear Energy: Policies and Technology for the 21st Century.* This section used several reports which also served as a base for the facilities subcommittee: *Nuclear Energy for the Future: Required R&D Capabilities – An Industry Perspective*, Battelle, September 2008; *Required Assets for a Nuclear Energy Applied R&D Program*, INL, September 2008; *Executive Recommendations for Nuclear R&D Capabilities,* Battelle, July, 2008; *Evaluation of Existing DOE Facilities to Support the Advanced Fuel Cycle (ACFC) Mission*, DOE, 2008.

In December 2009, NE-1 Miller established a Facilities subcommittee. Miller described "[t]he purpose of the Facilities Subcommittee is to review and provide expert guidance to the Nuclear Energy Advisory Committee (NEAC) and the Assistant Secretary for Nuclear Energy through NEAC on both the short term and longer term direction of research and development (R&D) facility requirements and capabilities."

We have had three meetings: at INL, ORNL, and in DC. The NEAC members are John Ahearne, chair, Dana Christenson, Michael Corradini, Tom Cochran, and John Sackett. The other members are Andrew Klein, Oregon State University, and Paul Murray, AREVA.

We visited INL on 19-20 May, 2010.We toured the nuclear infrastructure and discussed INL plans for facility modernization. Prior to the visit we reviewed two important DOE documents: 1) Facilities for the Future of Nuclear Research; a Twenty –year Outlook, February 2009, and 2) Nuclear Research and Development Roadmap: Report to Congress, April 2010.

We received briefings from several lab leaders, including David Hill, Deputy Lab Director for Science and Technology and Phillip Finck, Associate Lab Director for Science and Technology. We toured the Center for Advanced Energy Studies (CAES), the Advanced Test Reactor (ATR), the Test Train Assembly Facility (TTAF), the Materials and Fuels Complex (MFC), the Hot Fuel Examination Laboratory (HFEF), the Fuels and Applied Science Building, and the Electron Microscopy Laboratory.

Among our positive summary items:

We endorsed the overarching objective of building and operating a suite of world-class user facilities, primarily for fuel cycle R&D without engaging in advocacy for or against particular advanced reactor and fuel cycle options.

The facilities that were visited appear to be well maintained and upgrades appear to be consistent with authorization basis requirements.

The CAES represents a significant expansion of engagement for the Laboratory and eh laboratory should capitalize on this facility as soon as possible.

The ATR appeared to be in excellent working order and the life extension program appears to be addressing aging challenges within the facility. This facility is a national asset for materials research and will be essential to the development of next generation reactor fuels and materials.

Hot-cell facilities all appeared to be in a well maintained condition and they all appeared to be well, perhaps fully, utilized.

The development of new LEU fuels for the GTRI program – funded by NNSA rather than by NE – represents perhaps the best use of several of the INL facilities pending further development of NE-sponsored nuclear fuels research at INL.

On 26 August 2010 we visited ORNL. We received comprehensive briefings from several lab leaders, including the lab director, Tom Mason, Jim Powers, and Sherrell Greene. We toured a Fluoride Salt Reactor Loop and Salt Melt Demonstration, the Irradiation Fuel Examination Laboratory (IFEL), the Low Activation Materials Design and Analysis Laboratory (LAMDA), the TRISO Fuel Fabrication Laboratory, the Irradiated Material Examination and Testing Laboratory IMET), the High Flux Isotope Reactor (HFIR), and the Radiochemical Engineering Development Center (REDC).

Summary of positive comments:

Over the past decade, ORNL has done a good job in consolidating, integrating and coordinating its hot cell facilities, reducing the number of hot cell facilities from 10 in 2001 to four today. These facilities, together with hot cell facilities at INL are adequate to fulfill the basic research and development missions of DOE-NE which require hot cells.

HFIR appears to be fully utilized and well run.

Lack of facilities does not appear to be a roadblock to DOE-NE basic research and development plans. More critical are institutional inefficiencies, for example, those caused by limits placed on waste inventories at INL imposed by the State of Idaho.

The HFIR reactor is a national resource and highly utilized along with the REDC labs affiliated with it.

Managed collaboration/competition should be encouraged between the labs (especially INL and ORNL for NE).

On 10 December 2010 we met in this hotel to review NE's infrastructure needs. These were presented by Sol Golub, ADAS in the Office of Nuclear Reactor Technologies and by Ken Keller who addressed Fuel Cycle R&D needs. Golub concluded that the current infrastructure generally exists to support near-term R&D activities for most reactor

program areas and that new or enhanced capabilities are required in many areas over the mid-term to long-term. Keller provided a list of "Fundamental Fuel Cycle Needs" and concluded that NE lacks the suite of capabilities needed to develop and demonstrate advanced fuel cycles, which will require a test reactor.

Todd Allen, the scientific director of the Advanced Test Reactor, reviewed progress of ATR as a user facility. Seventy –five proposals were submitted as part of the first five solicitations but the Idaho Facilities Management account has not been able to fund all the projects accepted: eight were funded, eight were not.

Member comments:

1)In this new era of shrinking budgets both domestically and internationally the infrastructure of NE should be reviewed.

Can we afford to keep multiple similar facilities operating across the NL system or can we consolidate and make individual labs lead labs for a certain aspect of the fuel cycle. Then we can concentrate the money and properly fund the RD. The sub comm could review and make recommendations.

As internally budgets shrink is this a major opportunity for the US to establish key jointly funded international facilities. I believe a review of international facilities by our sub comm would be very timely.

2) In thinking about your request, I am reminded that our work on the facility committee is closely aligned with R&D requirements from the programs, which are in nearly constant flux. I think that it would be good to emphasize our goal of identifying facility capabilities which are pretty much universal. When DOE invests in the maintenance or upgrades for these facilities, it gives them the best chance of maintaining what is essential as programs, policies and politics change.

3) Without a good discussion and agreement among the programs (even as they gyrate) on what those universal needs are, they will continue to tear into each other and treat each other as the opposition.