NEAC Fuel Cycle Technologies Subcommittee Report

Presentation to the
Nuclear Energy Advisory Committee
Washington, D.C.
June 5, 2014

Al Sattelberger

Fuel Cycle Technologies Subcommittee Members

- Carol J. Burns
- Margaret Chu
- Raymond Juzaitis
- Chris Kouts
- Sekazi K. Matingwa
- Ronald P. Omberg
- Joy L. Rempe
- Dominique Warin
- Alfred P. Sattelberger (Chair)

Fuel Cycle Technologies Subcommittee

- One day meeting on May 1, 2014

- Presentations covered:
  - FY14 Budget
  - Nuclear Fuel Cycle Evaluation and Screening Study
  - Material Protection Accounting & Control Technologies
  - Accident Tolerant Fuels

Accident Tolerant Fuels

- General Comments:
  - The ATF program is very well managed with an impressive array of industry organizations (GE, AREVA, Westinghouse), national laboratories and universities. There is also significant international interest.
  - Any reduction in resources (currently ~$30M) for this very ambitious program is likely to place the 2016 and the 2022 milestones at risk.
- Recommendations:
  - ATF should prioritize activities, and develop contingency plans in the event that resources are reduced.
  - The current program focus on fuel and cladding does not address other lower cost, reactor enhancements. The Subcommittee appreciates the program addressing of the implications of severe accidents on other plant components by performing system response analyses.
  - We must maintain and, if possible, expand domestic irradiation capabilities, and we strongly support the restart of the TREAT test facility – which NE is moving forward with at this time.

Material Protection, Accounting and Control Technologies (MPACT)

General Comments:

- Program mission is to develop innovative technologies and analysis tools to enable next generation nuclear materials management for existing and future U.S. nuclear fuel cycles to manage and minimize proliferation and terrorism risk.
- Funding for this program is modest - $5M in FY14 and $5.3M (proposed) in FY15
- NTD funds the best projects from this limited budget; support also comes from NEUP

Recommendations:

- Since the NRC has the responsibility to verify and maintain control of nuclear materials within the civilian nuclear fuel cycle, the program should increase interactions with NRC in the area of fuel storage consequence analysis.

Material Protection, Accounting and Control Technologies (MPACT)

Recommendations:

- Some of the projects have near-term milestones, but the majority appear to be in the category of “open-ended” research with no discernable endpoints. We think it advisable to do some long term planning to develop discreet objectives across the various research areas.

Fuel Cycle Options Study

General Comments:

- Presentations were provided on the FCO Study and the Evaluation and Screening (E&S) Study chartered in late 2011.
- A copy of the main draft report was made available near the end of our meeting. The planned release is pending NNSA concurrence.
- Much of the detail underlying the evaluation of alternative fuel cycles is contained in appendices to the main report – which was not available to the Subcommittee at the time of the meeting.
- The study was intended to establish an appropriate set of criteria for comparative evaluation of fuel cycle options as alternatives to the current "once-through" fuel cycle and examine the impact of weighting factors on outcomes.
- The E&S Study appears to provide a comprehensive methodology for evaluating alternative fuel cycles and should be a valuable tool for internal decision making.
- The E&S Study included a companion Independent Review Team, chaired by Mike Corradini and composed of individuals with diverse backgrounds and views. Multiple meetings were held between July 2012 and January 2014.

Evaluation and Screening Study

General comments (cont'd):

- The E&S Study used a logical framework and process to screen and evaluate alternative fuel cycles that may provide significant improvements over our current fuel cycle.
  - 9 evaluation criteria (with 25 metrics) were used to evaluate 40 fuel cycle alternatives
  - Altogether 4398 fuel cycle options were considered
  - The 9 evaluation criteria were specified by DOE
  - 6 "benefit criteria" (N waste management, proliferation risk, N material security risk, safety, resource utilization, and environmental impact)
  - 3 "challenge criteria" (development or deployment risk, institutional issues, financial risk/economics).
- An evaluation and screening software tool was developed.
- A key result of the study is the characterization of 4 groups as the most promising fuel cycle alternatives. All involve recycle; none require U enrichment; none are ready to be deployed; additional R&D is required to develop the appropriate technologies.

Evaluation and Screening Study

Observations:

- Although the stated goal of the E&S effort is to inform DOE on R&D needs that would support the development of the most promising FC options, the degree to which this evaluation drives decisions was not discussed.
- In light of the potential for the study results to impact future R&D directions and funding allocations, it is critical for the community to have confidence in the results; dissemination of the software tool will facilitate this evaluation.

Summary:

- We liked what we heard, but would like to hear and see more and have a chance to work with the software tool.

Thank you –

Questions