UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, DC 20555 - 0001

ACNWR-0262

June 27, 2007

The Honorable Dale E. Klein
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: NRC OFFICE OF NUCLEAR REGULATORY RESEARCH (RES) LONG-TERM RESEARCH: FISCAL YEAR 2009 ACTIVITIES

Dear Chairman Klein:

During the 179th meeting of the Advisory Committee on Nuclear Waste and Materials (ACNW&M or the Committee), May 16-17, 2007, the Office of Nuclear Regulatory Research (RES) briefed the Committee on their draft plan (Reference 1), "U.S. Nuclear Regulatory Long-Term Research: FY 2009 Activities." RES will use the plan as a basis for the fiscal year (FY) 2009 research budget request, as well as for budget requests for subsequent years. The plan is intended to be a living document, and recommendations are made based on this understanding.

In preparing the plan, the staff solicited candidate research topics from NRC internal stakeholders as reported in SECY 07-0068 (Reference 2). The Advisory Committee on Reactor Safeguards (ACRS) has already been briefed and has written a letter (Reference 3) on research topics associated with the reactor programs. This letter responds to the briefing that the Committee received on activities associated with the nuclear waste and materials area.

RES plays an important role in the regulatory process by developing the technical bases for new and existing regulations, facility licensing, regulatory guidance, and by investigating emerging scientific and technical issues on public and worker health and safety. An additional long-term research focus would support the potential licensing of the next generation of nuclear facilities.

In this context, RES presented the following three general topical areas for long-term consideration:

1. The aspects of the proposed Global Nuclear Energy Partnership (GNEP) that deal with radioactive waste, effluents, and materials

2. Extended in-situ and real-time inspection and monitoring techniques

3. Advanced quantitative risk assessment methods, including the Advanced Offsite Consequence Code

The ensuing text discusses each of these topics and makes reference to the recommendations pertaining to that topic. The Committee has also included some additional recommendations.

Topic 1: The GNEP and Fuel Recycle Facilities (Recommendation 1)

Reprocessing spent nuclear fuel produces a variety of effluent releases and waste streams that may challenge the current regulatory scheme. Managing the radioactive waste streams and effluents associated with recycled spent nuclear fuel may require new technology and related regulatory initiatives. Licensing recycling facilities is likely to require new or modified regulation based on technical principles that the NRC has not yet considered intensively. Candidate research on recycle facilities should address waste streams and effluents as well as focusing on the facilities.

Regulation of the waste generated by fuel recycling may suggest consideration of a different waste classification system. An intermediate class for radioactive waste that is between low-level radioactive waste (LLW) and high-level waste (HLW) is used in other countries (Reference 4) where recycling of nuclear fuels occurs, as well as by the International Atomic Energy Agency (IAEA). The current two-tiered system (HLW and LLW), with the provision of Title 10 of the Code of Federal Regulation (10 CFR) 61.58, "Alternative Requirements for Waste Classification and Characteristics," that allows the Commission to develop alternate schemes of waste classification, could be crafted to regulate the radioactive materials in wastes generated by recycling.

Topic 2. In-Situ And Real-Time Inspection And Monitoring Techniques (Recommendation 2)

Research is needed to develop and improve in-situ and real-time inspection and monitoring techniques that focus on predicting behavior. The use of real-time sensor technology and advanced performance assessment methods could benefit licensees by establishing a basis for lower decommissioning costs, and reduced inspections. The need to allocate resources to deal with decommissioning at the end of life, together with reduced decommissioning costs, could become one of the major benefits of the program.

Topic 3. Advanced Quantitative Risk Assessment Methods (Recommendation 3)

The Committee has previously commented (Reference 5) on the need for quantitative risk assessment for fuel cycle facilities other than reactors. Integrated Safety Assessments (ISAs) currently used to assess the safety of fuel fabrication facilities may not be robust enough for reprocessing facilities, which are more complex and produce larger quantities of, and a variety of different kinds of, waste streams. The staff should ensure that codes used in ISAs are up-to-date and should continue to develop them consonant with both their application to advanced systems and current computer technology. The best risk tools available should be applied to the design features and human actions that are important to facility operation and oversight.

In addition, the Committee believes that "long term" research planning should look further into the future than FY2009 for perhaps 5 to 10 years. A long-term plan is expected to include future technical needs (e.g., experimental and test facilities, computer models and codes, data) and a forward-looking regulatory perspective (e.g., rules, regulatory guides, standard review plans).

The Committee also observes the continuing need for research efforts to maintain up-to-date information technology, including data management and retrieval related to RES activities.

RECOMMENDATIONS

1. Regarding recycled fuel, RES should consider issues of waste classification with respect to the adequacy of the current two-tiered system (HLW and LLW) of waste classification versus the three-tiered system (low, intermediate, high) used in other countries that recycle fuel. Research should be undertaken on technology for management and disposition of waste and effluents produced in the recycling of spent nuclear fuels.

2. RES should maintain and continue to develop real-time inspection and monitoring techniques, and focus future efforts on "early-warning" monitoring systems as well as monitoring for compliance.

3. RES should improve research-related data organization and retrieval, and investigate advanced programming and artificial intelligence techniques for data management and analysis.

4. The RES plan should take a longer range view of perhaps 5 to 10 years in the future. RES's definitions of "short-term" and "long-term" research planning could be misinterpreted. While the staff reported on plans that were specific through FY 2009, no details were provided for activities beyond FY 2009.

The Committee supports RES long-term planning of research activities and believes it is important that the plan be kept as a living document and be updated periodically to include new information. RES has a successful history of leveraging limited resources by undertaking cooperative programs with other Federal and state agencies. Investigation of cooperative research should continue in the long term.

The Committee would like to remain informed of the plan's evolution and of any significant updates.

Sincerely,

/RA/

Michael T. Ryan
Chairman

References:

1. Office of Nuclear Regulatory Research Report, Subject: "U.S. Nuclear Regulatory Commission Long-Term Research: FY 2009 Activities," March 2007 (Official Use Only - Sensitive Internal Information – Draft)

2. Memorandum to The Commissioners from Luis A. Reyes, Executive Director for Operations, Subject: SECY-07-0068, "Candidate Agency Long-Term Research Activities for Fiscal Year 2009," April 6, 2007. (Official Use Only Document - Sensitive Internal Information - Limited to NRC Unless the Commission Determines Otherwise)

3. Report dated May 16, 2007, from William J. Shack, Chairman, ACRS to Dale E. Klein, Chairman, NRC, Subject: Development of an Integrated Long-Term Regulatory Research Plan

4. ACNW White Paper NUREG-1853, “History and Framework of Commercial Low-Level Radioactive Waste Management in the United States,” January 2007

5. Report dated January 14, 2002, from, George M. Hornberger, Chairman, ACNW to Richard A. Meserve, Chairman, NRC, Subject: Risk-Informed Activities in the Office of Nuclear Material Safety and Safeguards

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Chairman

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