

June 18, 2007

Ms. Christiana Lui
Mail Stop T10-K8
U.S. Nuclear Regulatory Commission
Washington DC 20555

Subject: Draft U.S. NRC Long Term Research Plan: FY2009 Activities

Dear Ms. Lui:

Thank you for your request for comments on the Draft U.S.NRC Long Term Research plan: FY2009 Activities, as forwarded by Dr. Brian Sheron's letter dated 16 May 2007.

As you know, EPRI has historically taken great interest in working with NRC's Office of Nuclear Regulatory Research (RES), especially in areas where we have collaborated on joint research under the Memorandum of Understanding (MOU) between NRC and EPRI on Cooperative Nuclear Safety Research. In particular, we appreciate the efforts of Brian Sheron, Gene Carpenter and others in supporting a revision of that MOU this spring.

We appreciate the opportunity to review and comment on the NRC's research programs. EPRI previously commented in numerous letters during the 2000-2001 Expert Panel review of NRC research, and again in June 2002 when NRC called for comments on its proposed anticipatory research programs via the Federal Register.

Our response to this most recent request is provided in two sections below – the first containing general comments and the second providing specific comments on the individual long term research areas and activities proposed in the NRC's plan.

General Comments:

EPRI fully supports the "Research-Related Strategies" supporting the NRC's goals, as displayed in the boxes on pages i. and 1. We support the need for a research program at NRC and the need for that program to maintain both a short- and long-term view. We also support NRC's:

- efforts to seek outside input from stakeholders and other experts
- expectation that it will continue to rely on extensive collaboration and coordination with external organizations (ref.: your page 3).
- intent to leverage its resources with other research organizations (ref.: your p. ii, 3.).

- need for staff development and enhanced problem-solving skills related to technical issues. EPRI has long supported the need for NRC to maintain in-house expertise in technical disciplines likely to be subject of future licensing actions (in contrast to reliance on outside contractors in regulatory decision-making). This is particularly important today, considering NRC's expectations for retirements of experts in key areas (ref.: your page iv.)
- expectation that industry will perform the developmental research activities used to justify regulatory decisions and that agency-sponsored research activities will largely remain confirmatory in nature (ref.: your page 3).

The Nexus Between Collaboration and Independence

This last point – NRC's expectation that industry will perform the developmental research – is important to limiting the resource demands on NRC and helping focus its research efforts. This allocation of responsibilities is also consistent with the Energy Reorganization Act (ERA) of 1974 that established the NRC's research program. ERA clearly stated that technology development was the responsibility of the applicant. The ERA requires RES to not engage in research that is a licensee/vendor responsibility in support of a submittal: "The regulatory agency should never be placed in a position to generate, and then have to defend, basic design data of its own."

However, there is no hint of concern in the ERA about a conflict of interest with regard to cooperating with industry on research and data needs for resolving generic safety issues. The RES plan states "...NRC's research enables the independent review of industry's research results..." on page i. Placing this point in the context of the ERA (and as discussed in EPRI inputs as part of the Expert Review Panel in 2001), NRC's independence is required in the regulatory decision-making phase, not the data/information gathering phase. The latter can be done collaboratively, as long as NRC staff is actively engaged in managing or monitoring the activity.

The ERA also places significant emphasis on leveraging other federal agencies: "In keeping with the concept of confirmatory assessment, it is not intended that the Commission build its own laboratories and facilities for R&D, or try to duplicate the R&D responsibilities of ERDA." The Commission has extended this principle (e.g., in its 1996 Direction-Setting Initiatives and specifically within DSI-22, and in its support for the NRC-EPRI MOU), to logically include international collaboration and domestic industry collaboration, as long as that collaboration is limited to data collection and preparation, and does not extend into the decision-making process.

Timely and Relevant NRC Research Activities

EPRI's members expect us to engage constructively with NRC's research programs and to review them in terms of importance, relevance, timeliness and value to the regulatory process. Since NRC research activities are funded via Part 171 fees on licensees, they also expect us to identify research activities that may be unnecessary, or excessively costly for the value derived. That expectation is factored into the comments provided here.

In general, EPRI believes that the purposes of NRC's long term research activities can be achieved with limited resources. With some key exceptions, these purposes can be achieved via literature searches, limited scoping studies, participation by NRC staff in meetings, conferences, etc. on the relevant technologies of interest. In general, the familiarity that the NRC staff needs to be prepared for advanced technologies and methods that are more than five years out can be derived without conducting major contractor-funded studies or expensive research projects.

In this vein, EPRI would like to offer to assist RES in scoping the likelihood and timing of new technology applications in the nuclear industry. Some areas addressed in your plan are probably decades away from nuclear industry application, while others could be more imminent. We agree that RES should be prepared to deal with new technologies (e.g., digital I&C) that improve plant safety and reliability, and for which industry will likely seek regulatory approval. Since EPRI has a similar need to appreciate likely commercialization timelines, we should collaborate in gathering and assimilating this information, perhaps through a series of workshops.

The primary exception to the above is EPRI's consistent support for RES efforts in the area of improved data and methods to resolve regulatory issues. We listed this as *the top priority* in our June 2002 letter to NRC, recommending that: "NRC should identify and replace all current data that is out of date, excessively conservative, non-mechanistic, or otherwise not risk-informed, with up-to-date, best-estimate information. RES should make a long-term commitment to deal with test data, operating experience data, risk and reliability data, vulnerability and initiator frequency data, etc., as well as to the models that use these data sources. Recent experience with out-of-date and overly conservative NUREGs that have been taken out of context provides clear proof of this need to eliminate out-of-date information. NRC's support of our joint fire risk requantification studies is an excellent example of productive efforts to improve data."

Later, ... "NRC should maintain research expertise and fund collaborative research in areas where we know industry will be seeking opportunities for generic regulatory improvement, including areas of improved data and computer codes, areas where current regulations are out of date and/or appropriate for burden reduction initiatives, risk-informed initiatives, etc."

In general, EPRI agrees that NRC should not sponsor its own research facilities, but rather contract with or leverage existing facilities to meet its needs. This is consistent with EPRI's own practices and with the principles of the ERA. Constructing dedicated facilities carries with it the burden of ensuring ongoing research projects to maintain the facility and associated staff, even after the original need for the facility has been satisfied. This general approach to the question of dedicated facilities is revisited below in the case of specific RES proposals in this area.

Both NRC and the industry need to exploit the advances in technology that have been made in other industries, and rely more on the beneficial operating experience and lessons learned as we apply these advances to nuclear plants. Ample evidence exists of high reliability of digital I&C systems in the airline and defense industries. Modular construction and advanced fabrication techniques are mature in other industries. We can save time and resources by learning from others.

Specific Comments:

2.1. Global Nuclear Energy Partnership (GNEP) / Reprocessing

EPRI believes that establishing a Research Program at NRC to address the future needs of the DOE Global Nuclear Energy Partnership is premature. With tremendous uncertainty regarding the future direction of this program, the significant work that needs to be done before any specific technology pathways can be selected, and the overall uncertainty and long term nature of any commercial deployment scenario, NRC should defer work in this area until the program is better defined and on a firm funding foundation. It should be sufficient, at this point in the GNEP process, for NRC to make clear its responsibilities for regulating future GNEP facilities.

The only exception to the above is the potential for useful work in technology-independent aspects of GNEP, such as:

- completing work on NRC's technology-neutral framework (e.g., per NEI's proposed Part 53)
- conducting scoping studies of the likely environmental requirements and siting requirements for future GNEP facilities, including interim spent fuel storage facilities, especially where this work could help DOE make future siting decisions. This work should include a review of existing U.S. regulations and limits on environmental releases applicable to reprocessing facilities, site hydrology and seismic requirements, etc.

Additionally, any work on GNEP by NRC (including RES) should be paid for by DOE or by GNEP applicants under Part 170, not from Part 171 fees.

2.2. Reactor License Renewal Beyond 60 Years

NRC also proposes a new Research Program to address reactor license renewal beyond 60 years. EPRI supports this proposal and is committed to working with both NRC and DOE in this area. EPRI is beginning to examine this area (as is DOE), so this is the appropriate time to establish a joint effort. As you are aware, EPRI has already initiated discussions with DOE on this topic, and we understand NRC has as well.

The program description in the plan is an excellent summary of the current situation and the issues and prospects for this important option to meet future U.S. energy needs. It properly notes that 2014 to 2019 is the earliest timeframe that NRC might expect to receive such an application. As a result, very few licensees are currently giving any detailed thought to exercising this option. However, initial consideration of this option by EPRI and DOE suggest that it is a likely scenario for a number of existing plants, and thus deserves an advance look by both industry and NRC to determine its feasibility.

EPRI, DOE, and EPRI have different perspectives on the work needed to establish the option for license renewal beyond 60 years. For example, much of industry's examination will focus on cost aspects and the

pros and cons of a business case for renewal beyond 60 years vs. new plant construction. Such economic considerations are outside NRC's scope. However, underlying the question of feasibility are a number of common questions about aging phenomena, adequacy of existing aging management programs, etc., which are quite appropriate for collaboration and joint efforts.

2.3. Test Facilities

As discussed above under general comments, the ERA takes the position that NRC should not build its own research facilities. We agree in principle, but are sympathetic to the two specific needs cited in the RES plan:

- 2.3.3. Integrated Digital I&C and Human Machine Interfaces Research Facility
- 2.3.4. Integral Effects Test Facilities for Advanced Non-Light Water Reactors

For the former, RES points out the limitations in existing facilities and the potential advantages in an integrated facility. EPRI agrees that a need exists for better facility support in this area, especially given the anticipated rapid expansion of digital technology in nuclear plant applications and the greater reliance on digital technology in all ALWRs that will be built in the next decade. We are not yet convinced that a single integrated facility is necessary, and would like to explore with RES options for a "virtual" integrated facility that couples the capabilities of some key existing facilities in a more integrated testing and evaluation system than exists today.

We are concerned, however, that work on the digital I&C facility could draw NRC resources away from critical work on digital systems for ALWRs and digital upgrades for current plants. These short term issues must take priority and have the undivided attention of each and every I&C expert within NRC. ***Long term research must wait for resolution of all near term issues.***

For the latter facility supporting non-LWRs, the need is real but less urgent. The most likely scenario for non-LWR development would have high temperature gas reactors moving toward commercial application prior to fast reactor technologies. Also, work on GEN IV designs lacks applicability to the needs of current licensees – it is primarily relevant to the needs of GEN IV designers and DOE.

For both proposed facilities, EPRI believes that the DOE must be involved and the primary sponsor of the facility, with NRC a prime user, per the ERA. Further, as with Halden and many other facilities that currently meet these needs, industry access is key. In other words, these facilities, if built, should be user facilities open to all, and largely self-sustaining in terms of funding. NRC contributions to funding should be a minor part of the overall budget. In the latter case, all NRC funding should be from either DOE or GEN IV vendors via Part 170 fees, not Part 171 fees.

2.4. Cross-Cutting Research

This section provides brief comments on a number of smaller proposed areas of long term research:

2.4.4. Advanced Analytical Capabilities

This section proposes work in the following areas: advanced computational methods, multiphase computational fluid dynamics capability, advanced modeling techniques for level 2/3 PRA, and advanced offsite consequence code.

EPRI encourages RES work in this area. It is consistent with our general comment about improved data and methods. EPRI is working in varying degrees in all these areas and would welcome the opportunity to work jointly with NRC in each of these areas. We believe that both NRC and industry would greatly benefit from a more common suite of tools.

Historically we have benefited from independent tools, especially in areas of high uncertainty, as these independent tools (both benchmarked against real data) helped identify flaws in modeling, opportunities for simplifying assumptions, etc. But as our knowledge of phenomena and library of validating data have improved, the need for independent tools has diminished. The advantages of common tools are obvious – much faster convergence on the right technical answers to technical questions, enabling more efficient resolution of issues, more efficient reviews of industry submittals, etc.

We propose a meeting to discuss where industry and NRC can move to both more realistic analytic capabilities and greater commonality in our tools.

2.4.5. Advanced Fabrication Techniques

EPRI encourages RES work in this area, and as above, would appreciate the opportunity to work with NRC in validating these methods for use during new plant construction, anticipated to begin in the 2010 timeframe. Regulatory acceptance of these advanced techniques could become critical to meeting cost and schedule goals, making this a prime area for collaboration.

2.4.6. Extended In-Situ and Real-time Inspection and Monitoring Capabilities

EPRI is already exploring many of the technologies discussed in this section and would welcome the opportunity to pursue many of these areas jointly. We encourage this area of work at NRC. As in the above area of advanced fabrication techniques, regulatory acceptance of these advanced inspection and monitoring capabilities could benefit both NRC and industry, in both new plant construction, and improved monitoring of current plant performance.

2.4.7. Offsite Mitigation Strategies

EPRI has considered some of these strategies as part of its work on improved off-site consequence modeling and code improvement, and believes it could be a fruitful area for further work. As above, EPRI would appreciate the opportunity to work with RES in this area. Our work to date in more realistic and scientifically based off-site consequence analysis has been done in support of an NEI initiative, and has been briefed to the NRC Office of Nuclear Security and Incident Response, which is working on similar tasks with Sandia National Laboratory.

2.4.8. Nanotechnology for Nuclear Plant Applications

EPRI has done significant work in this area, but has not yet focused on applications to nuclear plants in a significant way. This is an area where we would encourage some preliminary scoping work before embarking on significant research, since we need to first determine the likelihood and extent of nuclear plant applications.

2.4.9 Fire Effects on Fiber Optic Cables

EPRI concurs with the need to conduct research in this area and again would appreciate the opportunity to work with NRC to scope and execute the needed work.

2.4.10. Risk Assessment for Advanced Reactor and Fuel Cycle Facilities

RES work in this area should be limited to scoping out the issues and areas that currently lack a regulatory basis for NRC review and approval. Developmental work in these areas should remain the primary responsibility of DOE and GEN IV reactor designers, per the ERA. Any work by NRC in these areas should be funded by DOE or by GEN IV reactor designers via Part 170 fees, not Part 171.

2.4.11. Formal Decision Analysis Methods

RES work in this area should be limited to scoping the issues, with an expectation that industry should be the primary driver for developing these methods for nuclear plant application.

Comments on Areas not Covered in the Draft U.S. NRC Long Term Research Plan

EPRI envisions work by industry and perhaps DOE in the future on high burnup fuel, in order to extend outage cycles, provide increased fuel margins to assist in fuel reliability goals, reduce volume of spent fuel generated, etc. Since this optimization program, if undertaken and successful will evaluate nuclear fuel enrichments in excess of 5%, it is likely that RES should anticipate some long term R&D in this area.

Ms. Christiana Lui
June 18, 2007
Page 8

As a general comment, it is difficult to review NRC's long term research program without the benefit of a side-by-side review of its shorter term regulatory research program. Perhaps fuel research that could support high burnup fuel is already included. We would appreciate a copy of NRC's Regulatory Research Program Plan, to better inform our reviews and efforts to find opportunities for research collaboration.

Summary

EPRI appreciates the opportunity to review the NRC's Long Term Research Plan and compliments RES on the quality of thought, effort and organization of this plan. If beneficial to RES, EPRI would be pleased to review any further detailed plans in these areas as they are developed.

To reiterate, EPRI sees many opportunities to leverage resources and research talent to execute many key areas in this plan in a joint manner, to include DOE, EPRI, reactor vendors, international R&D partners, and other key stakeholders.

Our highest priority in working with RES must remain in helping resolving issues in the near term category, such as digital I&C, seismic, risk-informed applications, etc. Our ability to work with NRC on these long term issues will probably be limited by resources, suggesting we undertake an effort, with DOE, to prioritize the work for greatest benefit to all.

Sincerely,



DJM/tw

c: Marv Fertel, NEI
Rebecca Smith-Kevern, DOE