

From: Amy Cabbage } NRR
To: Lyons, James }
Date: Thu, Jan 24, 2002 2:10 PM
Subject: Fwd: Draft Commission Note

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Jim,

I just got the attached draft note to the Commission regarding the new schedule for the PBMR pre-application review.

Stu does not plan to have NRR concur but has requested comments.

Do we want to be on concurrence?

Amy

CC: Benner, Eric; Gamberoni, Marsha, Koenick, Stephen; Williams, Joseph

FF/BS

NOTE TO: Chairman Meserve
Commissioner Diaz
Commissioner Dicus
Commissioner McGaffigan
Commissioner Merrifield

FROM: William D. Travers
Executive Director for Operations

SUBJECT: STATUS OF PREAPPLICATION ACTIVITIES ON THE PEBBLE BED
MODULAR REACTOR (PBMR)

PURPOSE:

To inform the Commission of progress to-date and changes in deliverables, schedules, and resources associated with the staff's preapplication activities for the PBMR.

BACKGROUND.

By Staff Requirements Memorandum (SRM) dated June 19, 2001, the Commission approved the staff's recommendation to proceed with the activities described in SECY-01-0070, "Plan for Preapplication Activities on the Pebble Bed Modular Reactor (PBMR)," including the technology assessment and transfer activities sponsored by the U.S. Department of Energy (DOE). In the SRM the Commission requested that it be kept informed of progress in implementing the plan. The PBMR preapplication review plan in SECY-01-0700 described an 18-month review schedule involving the preparation of two Commission papers, the first covering safety and technical issues and the second covering policy issues. The first was to be provided to the Commission by April 2002 and the second was to be provided by December 2002.

During CY2001 the staff conducted a series of public meetings with Exelon and interested stakeholders to obtain information on topics related to the staff's preapplication review. Based on the limited number of topics that had been covered in to the key safety and technical areas, in a letter dated September 26, 2001, the staff identified the technical information that it envisioned to be focal to the preapplication review. In the letter the staff requested Exelon to assess whether the identified information could be provided by December 2001, and if not, to identify an alternative schedule. In a letter dated November 15, 2001 Exelon informed the staff that the detailed design phase for the PBMR had been delayed in order to resolve a few key technical issues. Exelon's best judgement was that the requested information can be provided to the staff in near-term and longer-term technical documents that can be submitted in a twenty-four month period between January 2002 and December 2003. Subsequent discussions between Exelon and the staff resulted agreement that the technical documents that can be

provided up to the end of CY 2002 would provide the basis for the scope and content of the staff's pre-application review. During this period it is expected that the near-term information will be provided by Exelon in all of the key technical areas as technical white papers and public meeting presentations.

In adapting to schedule changes necessitated by the timing, scope, and depth of information being provided by Exelon, the staff now plans to provide in April 2003 a single Commission paper that will encompass the policy, safety, and technical issues of the PBMR based on the preliminary (near-term) and in some cases final (longer-term) information.

DISCUSSION:

Deliverables, Schedules, and Resources

Since April 2001, the staff has held a number of public meetings with Exelon Generation Company, the U.S. Department of Energy and interested stakeholders to provide a forum for the staff to obtain preapplication information on the PBMR. These meetings have provided the staff to begin the process of early identification of technical, safety and policy issues and the paths for their resolution. At Exelon's request, topics related to legal and financial issues and the proposed PBMR licensing approach were the focus of the initial meetings for the PBMR preapplication review. SECY-01-0207, "Legal and Financial Issues Related to Exelon's Pebble Bed Modular Reactor (PBMR)," was sent to the Commission on November 20, 2001. Additionally, a Commission paper on PBMR licensing approach is undergoing final staff review for transmittal to the Commission. Because SECY-01-0070 did not consider that legal and financial issues would be part of the PBMR pre-application review, resources expended in addressing these issues had to be assigned from other activities and the start of discussions on technical topics were postponed to later meetings. Attachment 1 summarizes the topics for the meetings that have been conducted to date. In some cases the technical subject matter did not focus on or directly relate to the key technical and safety issues envisioned by the staff for the PBMR preapplication review.

The SECY-01-0070 planning basis, was founded on the staff's Modular High-Temperature Gas-Cooled Reactor (MHTGR) preapplication experience from the late 1980s and early 1990s which included an integrated and complete preliminary design document and a preliminary PRA. The PBMR pre-application review technical information has consisted of meeting slide handouts and more recently technical "white papers" to formally document these presentations including questions raised during these meetings. These documents do not provide the comprehensive level of detail of technical, design and safety analyses information that was provided for the MHTGR pre-application review. Exelon has informed the staff that neither a PBMR preliminary design document nor a preliminary PRA can be provided to the staff for the PBMR preapplication review available because of the status of the PBMR design and the documented information which has been documented for review. The necessary detailed information needed to support a license application and regulatory decisions is currently being developed and documented by the PBMR design organization in the Republic of South Africa (RSA). This information only will become available to Exelon and the NRC if and when an actual application is submitted as part of a PBMR construction-and-operating license (COL). Therefore, the timing, scope, and level of detail of the technical information provided by Exelon has negatively impacted the review and schedule for the technical and safety issues and the resolution that could have been identified during the PBMR preapplication phase.

In a letter to Exelon dated September 26, 2001, (Attachment 2) the staff outlined its expectations regarding the major technical and safety issues to be addressed through the preapplication interactions and requested clarification as to when and how Exelon would provide the needed technical information for assessment issues and possible resolution. Exelon's response, dated November 15, 2001, is provided as Attachment 3. Exelon's response shows that the information for all of the key technical and safety topics will be available by the end of CY2002. For several important topics, the documented information will be preliminary. The information will also be provided as technical white papers. This schedule is considerably later than had been anticipated in SECY-01-0070. In adjusting to Exelon's planned schedule and level of depth and detail of the technical information, the staff plans to provide a single Commission paper covering policy issues and technical and safety issues. The staff plans to submit the paper around the beginning of the second quarter of CY2003, rather than the previously planned two Commission papers identified in SECY-01-0070 mid FY02 and early FY03. The first paper on technical and safety issues had been targeted for transmittal to the Commission by April 2002 and the second paper had been targeted for transmittal to the commission by December 2002. Completion of the PBMR pre-application review is now defined by the issuance of the single Commission paper in April 2003. The overall completion is therefor expected to involve a delay of approximately 4 months. However it should be recognized that achieving an April 2003 completion date for all of the key topics will depend on Exelon's ability to meet its revised schedule for submitting the technical white papers as well as their timely response to staff questions on these papers. An updated schedule is provided in Attachment 4.

The additional work on legal and financial issues and the revised schedule, extending the review into CY2003, and efforts for technical and safety issues identified in the PBMR preapplication activities has resulted in additional fiscal and staff resources in FY2002 and FY2003 being required. In addition, the NRC has been informed by DOE that changes in the DOE budget has resulted in a reduction in the resources that can be provided to the NRC by DOE under the NRC/DOE reimbursable agreement. For FY2002 DOE has reduced the level of resources from the \$900K that had been assumed in SECY-01-0070 to \$500K. However, DOE has agreed to provide the difference, \$400K, in FY2003. This change should have a modest impact on the preapplication review.

Infrastructure Development Summary Status

A second major area of planning described in SECY-01-0070 was the development of NRC's infrastructure for the conduct of licensing reviews of HTGRs, such as the PBMR. This is an area that continues to improve. Key activities and achievements to date aimed at developing the staff's knowledge, understanding and capabilities for the review of HTGR licensing, technology and safety issues include the following:

Interactions with DOE: Twenty-five staff from RES, NRR, and NMSS completed a DOE-sponsored training course on the technology of modular high-temperature reactors (HTRs). The 5-day course, held in September and October 2001 at the DOE offices in Germantown, MD. was developed and implemented by DOE. The course was given specifically to enhance the NRC staff's technical knowledge to enhance our ability to conduct the pre-application review and will be beneficial for conducting an effective licensing review of modular HTRs, such as PMBR or the Gas-Turbine Modular Helium Reactor (GT-MHR). A DOE/NRC interagency agreement established on June 19, 2001, reimburses the NRC for selected HTGR safety review and research activities. The results of these activities will provides important input

back to DOE for making decisions on their advanced reactor programs. Current initiatives within the agreement involve assessing the technical and safety issues that are generic to modular HTR designs, assessing modeling issues and validation needs for HTR safety analysis codes and methods, and supports development of an HTR fuel test program.

Technical Exchanges: During CY2001, staff representatives visited Germany, Japan, China, South Africa, and the United Kingdom to exchange technical information for infrastructure development and to support the pre-application review and potential future HTGR license application reviews. These visits focused on HTGR design, technology, and safety issues; regulatory infrastructure; and specific technical issues such as fuel, graphite, and high-temperature materials performance, as well as codes and standards. Additionally, exchanges are being discussed in areas such as graphite behavior, high temperature materials research, and codes and standards.

International Workshops: On October 10-12, 2001, the NRC hosted a workshop with various national and international experts. The purpose of the workshop was to discuss HTGR technology, safety, and research issues, including research needs and opportunities for further cooperative HTGR safety research. The workshop provided input to the staff's plans for advanced reactor research to support efficient and effective licensing process for advanced HTGRs. In February, NRR and RES staff will also be attending and presenting at the NEA Committee of the Safety of Nuclear Installations workshop on necessary advanced nuclear reactor safety issues and research needs in France. This workshop is being co-sponsored by the International Atomic Energy Agency and organized in collaboration with the Commission of the European Communities. The RES Office Director will co-chair this workshop.

CONCLUSION:

Over the past 8 months, the staff has significantly improved its knowledge and understanding of gas-cooled technology. During this time, the staff prepared two SECY papers that deal with difficult and complex issues associated with licensing a pebble-bed modular reactor, a design that has and continues to press the state-of-the-art in high temperature, gas-cooled technology. Although significant progress has been made, a 3-month delay in completion of the preapplication review of the PBMR is expected. This is due to delays in receiving key technical information from Exelon, in areas such as fuel testing, licensing basis events, source term, safety related systems, structures and components and containment design, planned testing.

The staff has significantly expanded the scope and the depth its knowledge and understanding of HTGR, including PBMR, safety and technology through a number of activities involving interactions with Exelon and DOE, international technical exchanges, and hosting and participation in international workshops. Due to schedule changes associated with the timing, scope, and depth of information provided by Exelon, the staff now plans to provide in April 2003 a single Commission paper that will address policy, safety, and technical issues associated with PBMR licensing and regulation. The staff's schedule is contingent on Exelon's schedule for providing necessary information.

Attachments:

1. Tabular listing of NRC/Exelon meetings
2. Letter from Thomas L. King, NRC to James Muntz, Exelon, September 26, 2001.
3. Letter from James A. Muntz, Exelon, to Thomas L. King, November 15, 2001.

4. Updated schedule for PBMR preapplication activities

PBMR Pre-Application Review Technical Topics
Presented and Documented by Exelon

Meeting Date	Topic Number	Meeting Presentation Technical Topic	White Paper Submittal Date
Jun 12-13	1	Fuel Overview -Design, Manufacturing, QC and Qualification	11/16/01
Jul 17-18	2	Design Codes and Standards	10/30/01
	3	Fuel Irradiation Program	TBD
Aug 15-16	4	<u>Analytical Codes and Software Control</u> 1. Engineering Analysis 2. Reactor Analysis 3. Radiation Analysis 4. Fuel Design & Performance Analysis 5. Risk and Consequence Analysis	10/30/01
	5	Fuel Design Logic	TBD
	6a	Core Design	11/16/01
	6b	Heat Removal	11/16/01
Sept 18	-	No Technical Topics	N/A
Oct 25	7	High Temperature Materials Graphite	10/23/01
	8	Control of Chemical Attack	10/23/01
	9	PBMR Systems Design Approach and Status	N/A
	10	High Temperature Materials	TBD
Nov 29-30	11	PBMR Operational Modes and States	11/28/01
	12	Testing Requirements for a COL	11/28/01
Dec	-	No Meeting	N/A

Availability of PBMR Information

