

Discussion on Regulatory Framework for 6/12 Meeting with Exelon

Introduction:

In your presentation at the April 30th meeting and your June 1st letter, you have proposed a regulatory framework for licensing the PBMR. This proposal includes the use of risk information to determine licensing requirements for the PBMR. In response, the NRC has developed a multi-office working group, consisting of personnel from the offices of Nuclear Reactor Regulation, Research and our General Council, to assess your proposal.

What we know:

The Agency has a policy on probabilistic risk assessment that encourages the use of risk information, so we are receptive to risk-informed, performance-based approaches. We include performance-based because we feel its an important adjunct and should be incorporated into any licensing scheme.

The regulations acknowledge other technologies. From ^{our} ~~or~~ regulations, 10 CFR 50.34 (Contents of applications; technical information): The safety analysis report should include...a discussion on the preliminary design of the facility including...the principal design criteria for the facility. Appendix A, General Design Criteria for Nuclear Power Plants, establishes minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in design and location to plants for which construction permits have previously been issued by the Commission and provides guidance to applicants for construction permits in establishing principal design criteria for other types of nuclear power units;

The Agency has had some dealings with gas cooled reactors. We licensed Peach Bottom 1 and Ft. Saint Vrain to operate and performed extensive preapplication reviews on General Atomics' Modular High-Temperature Gas-Cooled Reactor (MHTGR) design. The MHTGR review in particular is applicable because it is more recent and raised many of the same ideas that you currently raise. To that end, I'd like to point you to our draft revised preapplication safety evaluation report for the MHTGR, published in 1995, which contains a wealth of information. Its available under accession number 9703180167. ←

Staff general comments:

To support the licensing schedules that you've proposed, the staff believes (and thinks you concur) that the licensing of the PBMR would be accomplished within the existing regulations using exemptions where a regulation is not applicable and license conditions where there is a gap in the regulations for this technology. This differs from the longer term efforts being proposed by NEI which would include rulemaking. To that end, there are requirements upon the staff regarding exemptions that must be followed and may result in a licensing document/process that is not as "clean" as one from a risk-informed, performance-based licensing framework.

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Also to support your proposed schedules, we need to work together on the packaging of the application. Briefly, when a license application is received, technical review is parsed out based on our organizational structure, Division of Engineering, Division of System Safety and Analysis, etc. The ease with which the application can be parsed in that manner will help expedite the review.

Risk-informing regulations is hard work. I point you to SECY-00-0198 which discusses the status of our efforts to risk-inform Part 50 of 10 CFR in general and 10 CFR 50.44 (Combustible Gas Control) in particular. The staff is moving forward in these areas but must do so in a open, transparent, and deliberate manner.

While not particularly necessary at this stage, the staff feels that it is important to note that the actual licensing of a facility under a risk-informed performance-based framework will require detailed plant design and risk information. Which leads me into:

Staff specific comments and questions:

As we all know, the devil's in the details. When the NRC speaks of regulatory framework, it speaks of authorizing statutes, the regulations, and supporting guidance documents like Reg Guides and the Standard Review Plan. These guidance documents have been refined over time as a result of concerns identified in previous licensing reviews. The regulations are high level, but the licensing review must be detailed. To that end, the staff doesn't see how guidance documents (either use of the current ones or development of PBMR-specific ones) is incorporated in your process. Also to that end, the staff feels that performance of the comparison described in your process requires that one be able to sit with the regulations in one hand and a detailed design in the other.

In order to make a policy recommendation to the Commission regarding any risk-informed, performance-based licensing framework, the staff will have to address a number of issues listed below. To the extent practical, Exelon should provide information to the staff on how it intends to address these issues so that the staff can provide a meaningful assessment of Exelon's proposal (Most of these are discussed in Reg Guide 1.174, which really only deals with license amendments, but still provides a good discussion):

- defense-in-depth - For example, why shouldn't there be a risk goal on core damage prevention as a defense-in-depth measure?
- treatment of uncertainties safety margins

- monitoring
- safety margins
- Inclusion of deterministic data and engineering calculation data, given a risk-informed versus risk-based process
- SSC safety classification (SR/Non-SR versus graded approach)
- Definition of facility: are risk & QHO safety goals applied to a module or a set of modules - For example, why shouldn't the frequency selection criteria for individual AOOs, DBEs and EP be a factor of 10 lower to account for cumulative effects?

In your June 1st letter, you asked three questions of the NRC staff:

- 1) Are the regulatory mission linkages presented appropriate and acceptable for a HGTR design?
- 2) Are the top-level regulatory criteria presented acceptable and can they remain valid through final design approval of a HGTR design? and
- 3) Can the relationship between criteria and acceptable ranges, as presented, provide the acceptance goals for HGTR approval?

As part of my response, I note that similar questions were discussed in the MHGTR preapplication review that I referenced before. A summary of that review is that the staff concluded that while the top-level regulatory criteria are valid (and necessary) because they must be met for a nuclear power plant to be licensed, they do not provide sufficient assurance that the design provides the same degree of protection for the public and environment that is required for current-generation LWRs. Other criteria need to be included including appropriate guidance documents referenced above. This fact, along with the experience with risk-informing 10 CFR Part 50, suggests to the staff that a better approach by Exelon would be to use the "risk chart" and "objectives" in your proposal as a tool to 1) identify gaps in the current regulations that can be addressed by license conditions, and 2) provide a basis for the NRC to grant exemptions to regulations that do not contribute to providing adequate safety or an equivalent level of safety as current LWRs when applied to a PBMR.