## Stabilizing Probabilistic Risk Assessment (PRA) Quality Expectations:

The staff has had several ongoing efforts in stabilizing expectations for PRA quality. These efforts have been part of the plan for the Phased Approach to PRA quality (ML041470505). The plan involved a three-phased approach that defined the needed PRA quality for current or anticipated applications and the process for achieving the quality while allowing risk-informed decisions to be made using currently available methods until the necessary guidance documents defining quality were developed and implemented.

On December 18, 2003, the Commission issued Staff Requirements Memorandum (SRM) COMNJD-03-0002, "Stabilizing the PRA Quality Expectations and Requirements" (Agencywide Document Access and Management System (ADAMS) Accession No. ML033520457) in which the Commission approved implementation of a phased approach to achieving an appropriate level of quality for PRAs associated with risk-informed regulatory decisionmaking. The Commission recognized that not all the necessary guidance (e.g., PRA standards) were developed and implemented. The staff submitted the plan to the Commission in SECY-04-0118, "Plan for the Implementation of the Commission's Phased Approach to Probabilistic Risk Assessment Quality," on July 13, 2004 (ADAMS Accession No. ML041470505), and received approval in an SRM dated October 6, 2004 (ADAMS Accession No. ML042800369). The staff's plan involved a three-phased approach:

- Phase 1 represented the situation, where guidance on PRA quality is general, and staff review of the base PRA supporting the activity was performed on a case-by-case basis. In this phase, while all contributions to risk from the different operational modes and internal and external initiating events had to be addressed when making the decision, if the PRA did not include an assessment of some of these contributions, they could have been addressed qualitatively, by bounding methods, by implementing compensatory measures, or by defining the change so that the risk from these missing contributions was not impacted (i.e., did not significantly affect the decision).

- Phase 2 took advantage of the work that had been performed to develop PRA standards. Phase 2 occurred when PRA standards and the associated regulatory guides were in place to address those PRA scope items that are significant to the decision. To be in Phase 2, the licensee's submittal was expected to be in conformance with the published NRC-endorsed standards as they were relevant to the specific application.

- Phase 3 provided a regulatory framework for the development of a PRA that would be of sufficient quality to support current and anticipated applications. Phase 3 was completed by December 31, 2008. It is the staff's intention once Phase 3 was achieved and following a reasonable transition period, to return non-conforming applications (approved in July 13, 2004 SRM to SECY-04-0118).

Central to the plan was the development and staff endorsement of national consensus Level 1 (core damage frequency) and limited Level 2 (large early release frequency) PRA standards and associated industry guidance documents, such as peer review guidance. Regulatory Guide (RG) 1.200 was developed and describes an acceptable approach for determining the technical adequacy of the PRA to support risk-informed regulatory decision. RG 1.200 provides the staff position for one acceptable approach and allows an NRC-endorsed consensus standard in conjunction with a peer review to be used to demonstrate conformance with the staff position.

As such, RG 1.200 endorses the relevant PRA standards and peer review guidance documents. Further, the plan allowed licensees up to 1 year following NRC endorsement (in RG 1.200) to implement the NRC-endorsed PRA standards for the various elements of the PRA (e.g., internal and external hazards, and at-power and low-power and shutdown modes of operation) and to perform the necessary peer review. Following the 1-year implementation period, the NRC expected all risk-informed license amendment submittals to be supported by a PRA that implements the appropriate revision of RG 1.200 for all aspects of the PRA that could impact the outcome of the licensing decision. The staff noted in the plan its intention of working closely with industry in the development of the guidance documents; however, the staff would develop the necessary standards not developed by a Standards Developing Organization.

Revision 2 to RG 1.200 was issued in March 2009 and endorsed the PRA Standard, ASME/ANS RA-Sa-2009. This standard provides requirements[1] for an at-power, Level 1/Limited Level 2 PRA addressing both internal and external hazards. Issuance of Revision 2 to RG 1.200 completed Phase 3 of the staff plan for operating reactors. At the time the plan was developed, peer review and technical guidance documents were recognized as being needed; however, they were not an aspect of completing Phase 3. Further, the plan did not address new reactor licensing.

ASME and ANS currently have efforts underway for development of standards to support new reactor licensing for both new light water reactors (LWRs) and advanced non-LWRs. Peer review guidance has been developed by NEI for addressing internal hazards which is endorsed in RG 1.200. No effort has been initiated at this time by industry for peer review guidance for addressing external hazards or PRA for new LWRs and advanced non-LWRs.

With regard to the development of guidance for technical issues needing resolution, the treatment of uncertainties, seismic and other external hazards, and human performance were identified. In addition, it was noted that as the guidance was implemented, additional technical issues would likely be identified. Work on uncertainties, external events and human performance is ongoing. Since the publication and implementation of Revision 2 to RG 1.200, insights and issues associated with RG 1.200 and the associated standards and peer review guidance have been identified. Some of the issues are associated with aspects of uncertainties, external events and human performance; other issues have been identified, but are also associated with ongoing efforts.

As part of the staff plan, the staff was to develop a “Phase 3 guidance document,” which was to represent “the union of all the documents related to quality for the PRAs addressing contributors to risk that are significant to any of the envisioned applications” for operating reactors. The staff is initiating efforts on the development of such a document. The objective of this document is to identify and link all the documents supporting the identified risk-informed activities for both operating and new reactors. As such, this document will identify where there are potential insufficiencies or gaps in support of PRA technical acceptability for risk-informed activities. For the identified risk-informed activities, the document will identify the risk metrics, the scope and level of detail, and the key technical issues and the nature (significance and complexity) of the issues that need to be addressed. Consequently, the document will identify what remaining standards are needed, and will also identify what methodology guidance is needed along with the specific issues to be addressed. In addition, this document will serve to identify high priority

[1] The standards are written in terms of “requirements.” Therefore, the use of this word is standards language (e.g., in a standard, it states the standards “sets forth requirements”) and is not meant to imply a regulatory requirement.

work and as a communication tool with industry. These activities will involve continuation of standards, peer review and technical guidance, and their status will be documented in future updates to the RPP. The staff will continue to work closely with industry in these efforts.