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DRAFT REGULATORY GUIDE

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PREPUBLICATION

DRAFT REGULATORY GUIDE DG-1122

AN APPROACH FOR DETERMINING THE TECHNICAL ADEQUACY OF PROBABILISTIC RISK ASSESSMENT RESULTS FOR RISK-INFORMED ACTIVITIES

A. INTRODUCTION

This regulatory guide is being developed to provide guidance acceptable to the NRC staff on determining that the quality of the parts[1] of a probabilistic risk assessment (PRA) analysis that are used to support an application and the associated documentation is sufficient to provide an appropriate level of confidence in the results used in regulatory decision making for light-water reactors.

Over the past 25 years a significant number of PRAs have been performed by the NRC and the nuclear industry. The scope, depth, and technical content of the PRAs have varied depending on their purposes and uses. Results from PRAs have increasingly been used in the regulatory process, starting with generic safety issue prioritization and progressing to regulatory analysis in support of rulemaking and backfits and currently risk-informed regulation. This last activity opens up the possibility of using PRA information for decision making in many new ways.

The NRC issued a Policy Statement (Ref. 1) on the use of PRA in 1995, encouraging its use in all regulatory matters. The Policy Statement states that ". . . the use of PRA technology should be increased to the extent supported by the state of the art in PRA methods and data and in a manner that complements the NRC's deterministic approach." Since that time, many uses have been implemented or undertaken, including the initiation of work to modify the reactor

[1]In this regulatory guide, a part of a PRA can be understood as being equivalent to that piece of the analysis for which an applicable PRA standard identifies a supporting level requirement.

regulations and inspection program. As a result, PRA is becoming a mainstream regulatory tool and, as such, is providing valuable input into the decision-making process regarding the design, operation, and maintenance of plants. Consequently, confidence in the information derived from a PRA is an important issue: the accuracy of the technical content must be of sufficient rigor to justify the specific results and insights from the PRA that are used to support the decision under consideration. Finally, documentation of the process used, including the supporting data and references for methodology guidance, must be sufficiently accurate and complete as appropriate for the particular application.

Several regulatory guidance documents have been written to address risk-informed applications that use PRA information. These include Regulatory Guide 1.174 (Ref. 2) and Standard Review Plan (SRP) Chapter 19 (Ref. 3), which provide general guidance on applications that address changes to the licensing basis; guidance is in separate regulatory guides for specific applications such as inservice testing (Ref. 4), inservice inspection (Ref. 5), quality assurance (Ref. 6), and technical specifications (Ref. 7). SRP chapters were also prepared for each of the application-specific regulatory guides with the exception of quality assurance. These documents address the modeling of the changes to the plant by using the PRA and require that the underlying PRA be of sufficient quality to support the results used. These documents provide little guidance, however, on how to determine whether the underlying PRA is of sufficient quality.

Regulatory guides are issued to describe to the public methods acceptable to the NRC staff for implementing specific parts of the NRC's regulations, to explain techniques used by the staff in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with regulatory guides is not required. Regulatory guides are issued in draft form for public comment to involve the public in developing the regulatory positions. Draft regulatory guides have not received complete staff review; they therefore do not represent official NRC staff positions.

B. DISCUSSION

In its March 1999 report, "Nuclear Regulation: Strategy Needed To Regulate Safety Using Information on Risk," GAO/RCED-99-95 (Ref. 8), the General Accounting Office (GAO) identified a number of issues that it believed required resolution for the NRC to successfully implement a risk-informed regulatory approach. Among these, GAO indicated that more was needed to "develop standards on the scope and detail of risk assessments needed for utilities to determine that changes to their plants' designs will not negatively affect safety."

PRA standards have been under development by the American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS). On April 5, 2002, ASME issued a standard for a full-power, internal events (excluding fire) Level 1 PRA and a limited Level 2 PRA (Ref. 9). In the future, ANS plans to issue standards for PRAs for evaluating external events and internal fire risk and risk from low power and shutdown modes of operation.

Reactor owners' groups have been developing and applying a PRA peer review program for several years. In a letter dated April 24, 2000, the Nuclear Energy Institute (NEI) submitted NEI-00-02 ("Probabilistic Risk Assessment Peer Review Process

Guidance," Revision A3) (Ref. 10) to the NRC for review in the context of the staff's work to risk-inform the scope of special treatment requirements contained in 10 CFR Part 50 (discussed in SECY-99-256) (Ref. 11). On December 18, 2001, NEI requested (Ref. 12) the NRC staff to extend its review of NEI-00-02; and on August 16, 2002, the NEI submitted draft industry guidance for self-assessments (Ref. 13) to address the use of industry peer review results in demonstrating conformance with the ASME PRA standard. This guidance supplements and will ultimately become part of NEI-00-02. This additional guidance contains:

1. Self assessment guidance document
2. Appendix 1 – actions for industry self assessment
3. Appendix 2 – industry peer review subtier criteria

Concerns regarding PRA quality and the standards development effort were discussed during the March 31, 2000, Commission briefing on the Risk-Informed Regulation Implementation Plan. The Commission, in their April 18, 2000, Staff Requirements Memorandum (SRM) (Ref. 14) on that briefing, indicated that the staff "should provide its recommendations to the Commission for addressing the issue of PRA quality until the ASME and ANS standards have been completed, including the potential role of an industry PRA certification process." In response to the Commission's SRM, the staff issued SECY-00-162, "Addressing PRA Quality in Risk-Informed Activities" (Ref. 15), which described an approach for addressing PRA quality, including identification of the scope and minimal functional attributes necessary to ensure that the PRA information is adequate for its intended application in decision making. The Commission, in their October 27, 2000, SRM (Ref. 16), indicated that ". . . the timely resolution of PRA quality requirements is necessary to support existing and developing risk-informed regulation . . . ."

SECY-02-0070, "Publication of Revisions 1 to Regulatory Guide 1.174 and SRP Chapter 19 and Notice of A Staff Plan for Endorsing Consensus Probabilistic Risk Assessment Standards and Industry Peer Review Programs" (Ref. 17), was issued in March, 2002. This SECY informed the Commission of the staff's plans to publish Revisions 1 to Regulatory Guide 1.174 and SRP Chapter 19. The SECY also provided information on the staff's plan for endorsement of the then pending ASME and ANS consensus standards and peer review programs on PRA. The endorsement was to be provided in a new regulatory guide (this document) and a new SRP Chapter.

Purpose and Scope of this Regulatory Guide

The purposes of this regulatory guide are (1) to provide guidance to licensees for an acceptable approach to demonstrate with appropriate documentation that those parts of the PRA used in a regulatory application are of sufficient quality to support the analysis, (2) to provide guidance on determining the technical adequacy of the PRA results (via, for example, consensus PRA standards), and (3) to provide the NRC position on consensus PRA standards and industry PRA program documents.

Relationship to Other Guidance Documents

This regulatory guide is a supporting document to other NRC regulatory guides that address risk-informed applications. These guides include Regulatory Guide 1.174 and SRP Chapter 19 (Refs. 2 and 3), which provide general guidance on applications that address changes to the licensing basis. Guidance for specific applications such as for inservice testing, inservice inspection, quality assurance, and technical specifications is in References 4 through 7. There are corresponding SRP chapters for the application-specific guides.

Figure 1 shows the relationship of this new regulatory guide and risk-informed activities, application specific guidance, consensus PRA standards, and industry programs (e.g., NEI-00-02).

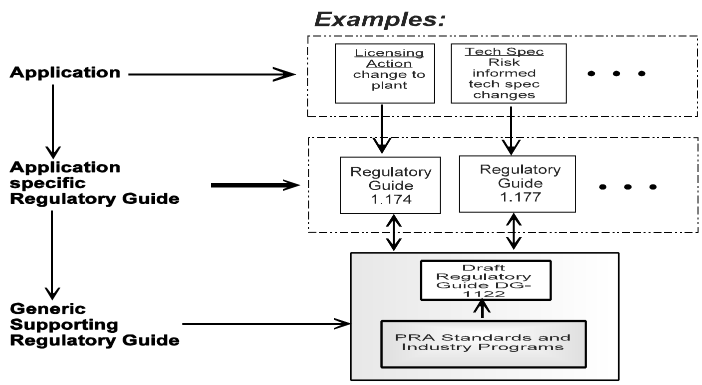

Figure 1. Relationship of DG-1122 to Risk-Informed Activities

C. REGULATORY POSITION

1. Demonstrating the Technical Adequacy of a PRA Used To Support a Regulatory Application

This section of the regulatory guide addresses the first purpose identified above, namely, to provide guidance to licensees on an approach acceptable to the NRC staff to demonstrate, with appropriate documentation, that those elements of the PRA used to support a regulatory application are of sufficient quality to support the analysis. The role of this regulatory guide to support a specific application is illustrated in Figure 2 and discussed in the following sections. The application-specific regulatory guides identify the specific PRA results to support the decision making and the analysis needed to provide those results. The parts of the PRA to support that analysis must be identified, and it is for these elements that the guidance in this regulatory guide is applied.

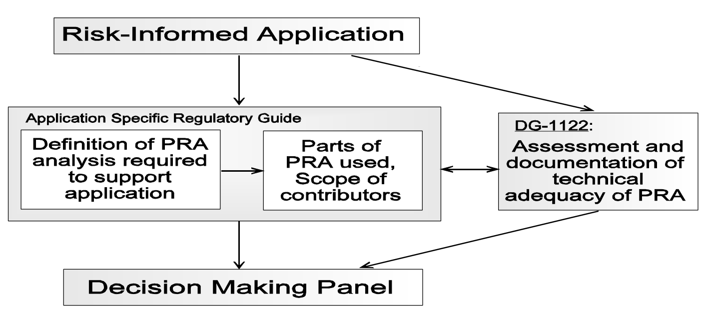

Figure 2. Role of DG-1122 in the Decision-Making Process

1.1 Identification of Parts of a PRA Used To Support the Application

A risk analysis is dependent on the application for which its results and derived insights are intended, and on the role those results and insights play in the decision-making process. When using this regulatory guide, it is anticipated that the licensee's description of the application will include the following:

- Structures, systems, and components (SSCs), operator actions, and plant operational characteristics affected by the application
- A description of the cause-effect relationships between the change and the above SSCs, operator actions, and plant operational characteristics
- Mapping of the cause-effect relationships onto PRA model elements
- A definition of the acceptance criteria or guidelines:
  - — Identification of the PRA results that will be used to compare against the acceptance criteria or guidelines, and how the comparison is to be made
  - — Scope of risk contributors to support the decision.

Based on an understanding of how the PRA model is to be used to achieve the desired results, the licensee will have identified those parts of the PRA required to support a specific application. These include not only the logic model events onto which the cause-effect relationships are mapped, but also all the events that appear in the accident sequences in which the first group of elements appear and the parts of the analysis to evaluate the necessary results. For some applications, this may be a limited set, but for others, e.g., risk-informing the scope of special treatment requirements, all parts of the PRA model are relevant.

1.2 Scope of Risk Contributors Addressed by the PRA Model

Based on the definition of the application, and in particular the acceptance criteria or guidelines, the scope of risk contributors (internal and external initiating events and modes of plant operation) for the PRA can be identified. For example, if the application is designed around using the acceptance guidelines of Regulatory Guide 1.174, the evaluations of core damage frequency (CDF), ΔCDF, large early release frequency (LERF), and ΔLERF should be performed with a full-scope PRA, including external initiating events and all modes of operation. However, since most PRAs do not address this full scope, the decision makers must make allowances for these omissions. Examples of approaches to making allowances include the introduction of compensatory measures, restriction of the implementation of the proposed change to those aspects of the plant covered by the risk model, and use of bounding arguments to cover the risk contributions not addressed by the model. This regulatory guide does not address this aspect of decision making, but it is focused specifically on the quality of the PRA information used.

The PRA standards and industry PRA programs that have been, or are in the process of being, developed address a specific scope. For example, the ASME PRA standard (Ref. 9) addresses internal events at full power for a limited Level2 PRA analysis. Similarly NEI-00-02 (Ref. 10) is a peer review process for the same scope (with the exception of internal flooding, which is not considered in NEI-00-02). Neither addresses external (including internal fire) initiating events nor the low power and shutdown modes of operation. The different PRA standards or industry PRA programs are addressed separately in appendices to this regulatory guide. In using this regulatory guide, the applicant will identify which of these appendices is applicable to the PRA analysis.

1.3 Demonstration of Technical Adequacy of the PRA

There are two aspects to demonstrating the technical adequacy of the parts of the PRA to support an application. First, is the assurance that the parts of the PRA used in the application have been performed in a technically correct manner. This implies that: (a) the PRA model, or those parts of the model required to support the application, represents the as-built and as-operated plant, which, in turn, implies that the PRA is up to date and reflects the current design and operating practices, (b) the PRA logic model has been developed in a manner consistent with industry practice and that it correctly reflects the dependencies of systems and components on one another and on operator actions, and (c) the probabilities and frequencies used are estimated consistently with the definitions of the corresponding events of the logic model.

The current state of the art in PRA technology is that there are issues for which there is no consensus on methods of analysis. Furthermore, PRAs are models, and in that sense the developers of those models rely on certain approximations to make the models tractable, and on certain assumptions to address uncertainties as to how to model certain issues. This is recognized in the application specific regulatory guides such as Regulatory Guide 1.174, which give guidance on how to address the uncertainties. The second aspect, therefore, is associated with the assessment that those assumptions and approximations used in developing the PRA model, which may have an impact on the application, are appropriate.

1.3.1 Assessment that the PRA Model is Technically Correct

When using risk insights based on a PRA model, the applicant must ensure that the PRA model, or at least those parts of it needed to provide the results, is technically correct as discussed above.

The licensee is to demonstrate that the model is up to date in that it represents the current plant design and configuration, and represents current operating practices to the extent required to support the application. This can be achieved through a PRA maintenance plan that includes a commitment to update the model periodically to reflect significant changes.

The various consensus PRA standards and industry PRA programs that provide guidance on the performance of, or reviews of, PRAs are addressed individually in the appendices to this regulatory guide. These appendices document the staff's regulatory position on each of these standards or programs.

When the issues raised by the staff are taken into account, the standard or program in question may be interpreted to be adequate for the purpose for which it was intended. If the parts of the PRA can be shown to have met the requirements of these documents, with attention paid to the NRC's clarifications or objections, it can be assumed that the analysis is technically correct and review by NRC staff will not be necessary, other than an audit. Where deviations from these documents exist, the applicant must demonstrate either that its approach is equivalent or that the influence on the results used in the application are insignificant.

1.3.2 Assessment of Assumptions and Approximations

Since the standards and industry PRA programs are not (or are not expected to be) prescriptive, there is some freedom on how to model certain phenomena or processes in the PRA; different analysts may make different assumptions and still be consistent with the requirements of the standard or the assumptions may be acceptable under the guidelines of the peer review process. The choice of a specific assumption or a particular approximation may, however, influence the results of the PRA. It is the responsibility of the NRC staff to be cognizant of which of these features of the analysis have the potential to alter the conclusions drawn from the results that can impact the decision. For each application that calls upon this regulatory guide, the applicant identifies the assumptions and approximations that have the potential to significantly alter the results used in the application. This will be used to identify the sensitivity studies for the uncertainty analysis as input to the decision making associated with the application. Each of the documents addressed in the appendices either requires, or in the case of the industry peer review program, represents, a peer review. One of the functions of the peer review is to address the assumptions and make judgments as to their appropriateness. This in turn provides a basis for the sensitivity studies.

2. Scope, Level of Detail, and Technical Adequacy of the PRA

This section provides the scope, level of detail, and technical adequacy of the PRA needed in a risk-informed application. However, the scope, level of detail, and technical adequacy of the PRA is to be commensurate with the application for which it is intended and the role the PRA results play in the integrated decision process.

Since this regulatory guide is intended to support a variety of applications, the guidance regarding scope, level of detail, and technical adequacy is for a full-scope Level 1 and Level 2 PRA. (The guidance is in accord with SECY-00-0162.) However, a full-scope PRA may not be necessary for a specific application. The guidance provided in Regulatory Position 1 is used to determine which pieces of the PRA are needed to support the application, and therefore, if used in the decision, will have the technical adequacy as specified in this section.

2.1 Scope of PRA

The metrics used for **risk characterization** in risk-informed applications are CDF and LERF (as surrogates for latent and early fatalities, respectively). Issues related to the reliability of barriers, in particular containment integrity and consequence mitigation, are addressed through consideration of defense in depth. To provide the risk perspective for use in decision making, a Level 1 PRA is required to provide CDF. A limited Level 2 PRA is needed to address LERF and may be helpful in addressing issues related to long-term containment integrity.

The risk characterization (CDF and LERF) is to account for all plant operating states and initiating events, either quantitatively or qualitatively, as warranted by the application under consideration.

Plant operating states (POSs) are used to subdivide the plant operating cycle into unique states such that the plant response can be assumed to be the same for all subsequent accident initiating events. Operational characteristics (such as reactor power level; in-vessel temperature, pressure, and coolant level; equipment operability; and changes in decay heat load or plant conditions that allow new success criteria) are examined to identify those important to defining plant operational states. The important characteristics are used to define the states, and the fraction of time spent in each state is estimated using plant specific information. The risk perspective is based on the total risk connected with the operation of the reactor, which includes not only full power operation, but also low power and shutdown conditions. Therefore, to gain the maximum benefit from a PRA, the model addresses all modes of operation.

Initiating events are the events that have the ability to challenge the condition of the plant. These events include failure of equipment from either “internal plant causes” such as hardware faults, operator actions, floods or fires, or “external plant causes” such as earthquakes or high winds. The risk perspective is based on the total risk connected with the operation of the reactor, which includes events from both internal and external sources. Therefore, to gain the maximum benefit from a PRA, the model addresses both internal and external initiating events.

2.2 Level of Detail of a PRA

Table 1 provides the level of detail (i.e., the list of general technical elements) that are necessary for a PRA. A PRA that is missing one or more of these elements would not be considered a complete PRA. A brief discussion of the objective and purpose that these elements should accomplish is provided below.

Table 1. Technical Elements of a PRA

Scope of Analysis	Technical Element	
Level 1	• Initiating event analysis • Success criteria analysis • Accident sequence analysis • Systems analysis • Internal flood analysis • External Hazards Analysis	• Parameter estimation analysis • Human reliability analysis • Quantification • Interpretation of results • Internal fire analysis
Level 2	• Plant damage state analysis • Accident progression analysis	• Quantification • Interpretation of results

2.2.1 Level 1 Technical Elements

Initiating event analysis identifies and characterizes the random internal events that both challenge normal plant operation during power or shutdown conditions and require successful mitigation by plant equipment and personnel to prevent core damage from occurring. Events that have occurred at the plant and those that have a reasonable probability of occurring are identified and characterized. An understanding of the nature of the events is performed such that a grouping of the events into event classes, with the classes defined by similarity of system and plant responses (based on the success criteria), may be performed to manage the large number of potential events that can challenge the plant.

Success criteria analysis determines the minimum requirements for each function (and ultimately the systems used to perform the functions) to prevent core damage (or to mitigate a release) given an initiating event. The requirements defining the success criteria are based on acceptable engineering analyses that represent the design and operation of the plant under consideration. For a function to be successful, the criteria are dependent on the initiator and the conditions created by the initiator. The codes used to perform the analyses for developing the success criteria are validated and verified for both technical integrity and suitability to assess plant conditions for the reactor pressure, temperature, and flow range of interest, and they accurately analyze the phenomena of interest. Calculations are performed by personnel who are qualified to perform the types of analyses of interest and are well trained in the use of the codes.

Accident sequence development analysis models, chronologically, the different possible progression of events (i.e., accident sequences) that can occur from the start of the initiating event to either successful mitigation or to core damage. The accident sequences account for the systems and operator actions that are used (and available) to mitigate the initiator based on the defined success criteria and plant operating procedures (e.g., plant emergency and abnormal operating procedures and as practiced in simulator exercises). The availability of a system includes consideration of the functional, phenomenological, and operational dependencies and interfaces between the different systems and operator actions during the course of the accident progression.

Systems analysis identifies the different combinations of failures that can preclude the ability of the system to perform its function as defined by the success criteria. The model representing the various failure combinations includes, from an as-built and as-operated perspective, the system hardware and instrumentation (and their associated failure modes) and the human failure events that would prevent the system from performing its defined function. The basic events representing equipment and human failures are developed in sufficient detail in the model to account for dependencies between the different systems and to distinguish the specific equipment or human event (and its failure mechanism) that has a major impact on the system's ability to perform its function.

Parameter estimation analysis quantifies the frequencies of the identified initiating events and quantifies the equipment failure probabilities and equipment unavailabilities of the modeled systems. The estimation process includes a mechanism for addressing uncertainties, has the ability to combine different sources of data in a coherent manner, and represents the actual operating history and experience of the plant and applicable generic experience as applicable.

Human reliability analysis identifies and provides probabilities for the human failure events that can negatively impact normal or emergency plant operations. The human failure events associated with normal plant operation include the events that leave the system (as defined by the success criteria) in an unrevealed, unavailable state. The human failure events associated with emergency plant operation include the events that, if not performed, do not allow the needed system to function. Quantification of the probabilities of these human failure events is based on plant and accident specific conditions, where applicable, including any dependencies among actions and conditions.

Quantification provides an estimation of the CDF given the design, operation, and maintenance of the plant. This CDF is based on the summation of the estimated CDF from each initiator class. If truncation of accident sequences and cutsets is applied, truncation limits are set so that the overall model results are not impacted significantly and that important accident sequences are not eliminated. Therefore, the truncation limit can vary for each accident sequence. Consequently, the truncation value is selected so that the accident sequence CDF before and after truncation only differs by less than one significant figure.

Interpretation of results entails examining and understanding the results of the PRA and identifying the important contributors sorted by initiating events, accident sequences, equipment failures, and human errors. Methods such as importance measure calculations (e.g., Fussel-Vessely, risk achievement, risk reduction, and Birnbaum) are used to identify the contributions of various events to the model estimation of core damage frequency for both individual sequences and the model as a total. Sources of uncertainty are identified and their impact on the results analyzed. The sensitivity of the model results to model boundary conditions and other key assumptions is evaluated using sensitivity analyses to look at key assumptions both individually or in logical combinations. The combinations analyzed are chosen to fully account for interactions among the variables.

2.2.2 Level 2 Technical Elements

Plant damage state analysis groups similar core damage scenarios together to allow a practical assessment of the severe accident progression and containment response resulting from the full spectrum of core damage accidents identified in the Level 1 analysis. The plant damage state analysis defines the attributes of the core damage scenarios that represent important boundary conditions to the assessment of severe accidents progression and containment response that ultimately affect the resulting source term. The attributes address the dependencies between the containment systems modeled in the Level 2 analysis with the core damage accident sequence models to fully account for mutual dependencies. Core damage scenarios with similar attributes are grouped together to allow for efficient evaluation of the Level 2 response.

Severe accident progression analysis models the different series of events that challenge containment integrity for the core damage scenarios represented in the plant damage states. The accident progressions account for interactions among severe accident phenomena and system and human responses to identify credible containment failure modes, including failure to isolate the containment. The timing of major accident events and the subsequent loadings produced on the containment are evaluated against the capacity of the containment to withstand the potential challenges. The containment performance during the severe accident is characterized by the timing (e.g., early versus late), size (e.g., catastrophic versus bypass), and location of any containment failures. The codes used to perform the analysis are validated and verified for both technical integrity and suitability. Calculations are performed by personnel qualified to perform the types of analyses of interest and well trained in the use of the codes.

Source term analysis characterizes the radiological release to the environment resulting from each severe accident sequence leading to containment failure or bypass. The characterization includes the time, elevation, and energy of the release and the amount, form, and size of the radioactive material that is released to the environment. The source term analysis is sufficient to determine whether a large early release or a large late release occurs. A large early release is one involving significant, unmitigated releases from containment in a time frame prior to effective evacuation of the close-in population such that there is a potential for early health effects. Such accidents generally include unscrubbed releases associated with early containment failure at or shortly after vessel breach, containment bypass events, and loss of containment isolation. With large late release, significant, unmitigated release from containment occurs in a time frame that allows effective evacuation of the close-in population such that early fatalities are unlikely.

Quantification integrates the accident progression models and source term evaluation to provide estimates of the frequency of radionuclide releases that could be expected following the identified core damage accidents. This quantitative evaluation reflects the different magnitudes and timing of radionuclide releases and specifically allows for identification of the LERF and the probability of a large late release.

Interpretation of results entails examining results from importance measure calculations (e.g., Fussel-Vesely, risk achievement, risk reduction, and Birnbaum) to identify the contributions of various events to the model estimation of LERF and large late release probability for both individual sequences and the model as a total. Sources of uncertainty are identified and their impact o the results analyzed. The sensitivity of the model results to model boundary conditions and other key assumptions is evaluated using sensitivity analyses to look at key assumptions both individually or in logical combinations. The combinations analyzed are chosen to fully account for interactions among the variables.

2.2.3 Internal Floods Technical Elements

Flood identification analysis identifies the plant areas where flooding could pose significant risk. Flooding areas are defined on the basis of physical barriers, mitigation features, and propagation pathways. For each flooding area, flood sources that are due to equipment (e.g., piping, valves, pumps) and other sources internal to the plant (e.g., tanks) are identified along with the affected SSCs. Flooding mechanisms are examined that include failure modes of components, human-induced mechanisms, and other water releasing events. Flooding types (e.g., leak, rupture, spray) and flood sizes are determined. Plant walkdowns are performed to verify the accuracy of the information.

Flood evaluation analysis identifies the potential flooding scenarios for each flood source by identifying flood propagation paths of water from the flood source to its accumulation point (e.g., pipe and cable penetrations, doors, stairwells, failure of doors or walls). Plant design features or operator actions that have the ability to terminate the flood are identified. Credit given for flood isolation is justified. The susceptibility of each SSC in a flood area to flood-induced mechanisms is examined (e.g., submerge, spray, pipe whip, and jet impingement). Flood scenarios are developed by examining the potential for propagation and giving credit for flood mitigation. Flood scenarios can be eliminated on the basis of screening criteria. The screening criteria used are well defined and justified.

Quantification analysis provides an estimation of the CDF of the plant that is due to internal floods. The frequency of flooding-induced initiating events that represent the design, operation, and experience of the plant are quantified. The Level 1 models are modified and the internal flood accident sequences quantified to: (1) modify accident sequence models to address flooding phenomena, (2) perform necessary calculations to determine success criteria for flooding mitigation, (3) perform parameter estimation analysis to include flooding as a failure mode, (4) perform human reliability analysis to account for performance shaping factors (PSFs) that are due to flooding, and (5) quantify internal flood accident sequence CDF. Modification of the Level 1 models are performed consistent with the characteristics for Level 1 elements for transients and loss of coolant accidents (LOCAs). In addition, sources of uncertainty are identified and their impact on the results analyzed. The sensitivity of the model results to model boundary conditions and other key assumptions is evaluated using sensitivity analyses to look at key assumptions both individually or in logical combinations. The combinations analyzed are chosen to fully account for interactions among the variables.

2.2.4 Internal Fire Technical Elements

Screening analysis identifies fire areas where fires could pose a significant risk. Fire areas that are not risk significant can be "screened out" from further consideration in the PRA analysis. Both qualitative and quantitative screening criteria can be used. The former address whether an unsuppressed fire in the area poses a nuclear safety challenge; the latter are compared against a bounding assessment of the fire-induced core damage frequency for the area. The potential for fires involving multiple areas is addressed. Assumptions used in the screening analysis are verified through appropriate plant walkdowns. Key screening analysis assumptions and results, e.g., the area-specific conditional core damage probabilities (assuming fire-induced loss of all equipment in the area), are documented.

Fire initiation analysis determines the frequency and physical characteristics of the detailed (within-area) fire scenarios analyzed for the unscreened fire areas. The analysis identifies a range of scenarios that will be used to represent all possible scenarios in the area. The possibility of seismically induced fires is considered. The scenario frequencies reflect plant-specific experience, quantified in a manner that is consistent with their use in the subsequent fire damage analysis (discussed below). Each scenario is physically characterized in terms that will support the fire damage analysis (especially with respect to fire modeling).

Fire damage analysis determines the conditional probability that sets of potentially risk-significant components (including cables) will be damaged in a particular mode, given a specified fire scenario. The analysis addresses components whose failure will cause an initiating event, affect the plant's ability to mitigate an initiating event, or affect potentially risk significant equipment (e.g., through suppression system actuation). Damage from heat, smoke, and exposure to suppressants is considered. If fire models are used to predict fire-induced damage, compartment-specific features (e.g., ventilation, geometry) and target-specific features (e.g., cable location relative to the fire) are addressed. The fire suppression analysis accounts for the scenario-specific time to detect, respond to, and extinguish the fire. The models and data used to analyze fire growth, fire suppression, and fire-induced component damage are consistent with experience from actual nuclear power plant fire experience as well as experiments.

Plant response analysis involves the modification of appropriate plant transient and LOCA PRA models to determine the conditional core damage probability, given damage to the sets of components defined in the fire damage analysis. All potentially significant fire-induced initiating events, including such "special" events as loss of plant support systems and interactions between multiple nuclear units during a fire event, are addressed. The analysis addresses the availability of non-fire affected equipment (including control) and any required manual actions. For fire scenarios involving control room abandonment, the analysis addresses the circuit interactions raised in NUREG/CR-5088 (Ref. 18), including the possibility of fire-induced damage prior to transfer to the alternate shutdown panels. The human reliability analysis of operator actions addresses fire effects on operators (e.g., heat, smoke, loss of lighting, effect on instrumentation) and fire-specific operational issues (e.g., fire response operating procedures, training on these procedures, potential complications in coordinating activities). In addition, sources of uncertainty are identified and their impact o the results analyzed. The sensitivity of the model results to model boundary conditions and other key assumptions is evaluated using sensitivity analyses to look at key assumptions both individually or in logical combinations. The combinations analyzed are chosen to fully account for interactions among the variables.

2.2.5 External Hazards Technical Elements

Screening and bounding analysis identifies external events other than earthquake (such as river-induced flooding) that may challenge plant operations and require successful mitigation by plant equipment and personnel to prevent core damage from occurring. The term "screening out" is used here for the process whereby an external event is excluded from further consideration in the PRA analysis. There are two fundamental screening criteria embedded here. An event can be screened out if either (1) it meets the design criteria, or (2) it can be shown using an analysis that the mean value of the design-basis hazard used in the plant design is less than 10^{-5}/year, and that the conditional core-damage probability is less than 10^{-1}, given the occurrence of the design-basis hazard. An external event that cannot be screened out using either of these criteria is subjected to the detailed-analysis.

Hazard analysis characterizes non-screened external events and seismic events, generally, as frequencies of occurrence of different sizes of events (e.g., earthquakes with various peak ground accelerations, hurricanes with various maximum wind speeds) at the site. The external events are site specific and the hazard characterization addresses both aleatory and epistemic uncertainties.

Fragility analysis characterizes conditional probability of failure of important structures, components, and systems whose failure may lead to unacceptable damage to the plant (e.g., core damage) given occurrence of an external event. For important SSCs, the fragility analysis is realistic and plant-specific. The fragility analysis is based on extensive plant-walkdowns reflecting as-built, as-operated conditions.

Level 1 model modification assures that the system models include all important external-event caused initiating events that can lead to core damage or large early release. The system model includes external-event-induced SSC failures, non-external-event-induced failures (random failures), and human errors. The system analysis is well coordinated with the fragility analysis and is based on plant walkdowns. The results of the external event hazard analysis, fragility analysis, and system models are assembled to estimate frequencies of core damage and large early release. Uncertainties in each step are propagated through the process and displayed in the final results. The quantification process is capable of conducting necessary sensitivity analyses and identifying dominant sequences and contributors.

2.2.6 Documentation

Traceability and defensibility provide the necessary information such that the results can easily be reproduced and justified. The sources of information used in the PRA are both referenced and retrievable. The methodology used to perform each aspect of the work is described either through documenting the actual process or through reference to existing methodology documents. Assumptions[2] made in performing the analyses are identified and documented along with their justification to the extent that the context of the assumption is understood. The results (e.g., products and outcomes) from the various analyses are documented.

2.3 Technical Adequacy of a PRA

The PRA must realistically reflect the actual design, construction, operational practices, and operational experience of the plant and its owner.

In Tables 2 and 3, for each technical element of a PRA, the technical characteristics and attributes are listed that provide the guidelines in determining the technical adequacy of the PRA such that the goal and purpose, defined in Regulatory Position 2.2, are accomplished.

Table 2. Summary of Technical Characteristics and Attributes of a PRA

Element	**Technical Characteristics and Attributes**
PRA Full Power, Low Power and Shutdown	
Level 1 PRA (internal events -- transients and LOCAs)	
Initiating Event Analysis	• sufficiently detailed identification and characterization of initiators • grouping of individual events according to plant response and mitigating requirements • proper screening of any individual or grouped initiating events
Success Criteria Analysis	• based on best-estimate engineering analyses applicable to the actual plant design and operation • codes developed, validated, and verified in sufficient detail 1. analyze the phenomena of interest 2. be applicable in the pressure, temperature, and flow range of interest
Accident Sequence Development Analysis	• defined in terms of hardware, operator action, and timing requirements and desired end states (e.g., core damage or plant damage states (PDSs)) • includes necessary and sufficient equipment (safety and non-safety) reasonably expected to be used to mitigate initiators • includes functional, phenomenological, and operational dependencies and interfaces

[2] Assumptions include the decisions and judgments that were made in the course of the analysis.

Table 2. Summary of Technical Characteristics and Attributes of a PRA

Element	Technical Characteristics and Attributes
Systems Analysis	models developed in sufficient detail to: • reflect the as built, as operated plant including how it has performed during the plant history • reflect the success criteria for the systems to mitigate each identified accident sequence • capture impact of dependencies, including support systems and harsh environmental impacts • include both active and passive components and failure modes that impact the function of the system • include common cause failures, human errors, unavailability due to test and maintenance, etc.
Parameter Estimation Analysis	• estimation of parameters associated with initiating event, basic event probability models, recovery actions, and unavailability events that account for plant-specific and generic data • consistent with component boundaries • estimation includes a characterization of the uncertainty
Human Reliability Analysis	• identification and definition of the human failure events that would result in initiating events or pre- and post-accident human failure events that would impact the mitigation of initiating events • quantification of the associated human error probabilities taking into account scenario (where applicable) and plant-specific factors and including appropriate dependencies both pre- and post-accident
Quantification	• estimation of the CDF for modeled sequences that are not screened due to truncation, given as a mean value • estimation of the accident sequence CDFs for each initiating event group • truncation values set relative to the total plant CDF such that the frequency in not significantly impacted
Interpretation of Results	• identification of the key contributors to CDF: initiating events, accident sequences, equipment failures and human errors • identification of sources of uncertainty and their impact on the results • understanding of the impact of the key assumptions* on the CDF and the identification of the accident sequence and their contributors
Level 2 PRA	
Plant Damage State Analysis	• identification of the attributes of the core damage scenarios that influence severe accident progression, containment performance, and any subsequent radionuclide releases • grouping of core damage scenarios with similar attributes into plant damage states • carryover of relevant information from Level 1 to Level 2

Table 2. Summary of Technical Characteristics and Attributes of a PRA

Element	Technical Characteristics and Attributes
Severe Accident Progression Analysis	• use of verified, validated codes by qualified trained users with an understanding of the code limitations and the means for addressing the limitations • assessment of the credible severe accident phenomena via a structured process • assessment of containment system performance including linkage with failure modes on non-containment systems • establishment of the capacity of the containment to withstand severe accident environments • assessment of accident progression timing, including timing of loss of containment failure integrity
Quantification	• estimation of the frequency of different containment failure modes and resulting radionuclide source terms
Source Term Analysis	• assessment of radionuclide releases including appreciation of timing, location, amount and form of release • grouping of radionuclide releases into smaller subset of representative source terms with emphasis on large early release (LER) and on large late release (LLR)
Interpretation of Results	• identification of the contributors to containment failure and resulting source terms • identification of sources of uncertainty and their impact on the results • understanding of the impact of the key assumptions* on Level 2 results
Documentation	
Traceability and defensibility	• the documentation is sufficient to facilitate independent peer reviews • the documentation describes all of the important interim and final results, insights, and important sources of uncertainties • walkdown process and results are fully described
* Assumptions include those decisions and judgments that were made in the course of the analysis.	

In addressing the above elements, because of the nature and impact of internal flood and fire and external hazards, their attributes are discussed separately in Table 3. This is because flood, fire, and external hazards analyses have the ability to cause initiating events but also have the capability to impact the availability of mitigating systems. Therefore, regarding the PRA model, the impact of flood, fire, and external hazards is to be considered in each of the above technical elements.

Table 3 Summary of Technical Characteristics and Attributes of an Internal Flood and Fire Analysis and External Hazards Analysis

Areas of Analysis	Technical Characteristics and Attributes**
Internal Flood Analysis	
Flood Identification Analysis	• sufficiently detailed identification and characterization of: – flood areas and SSCs located within each area – flood sources and flood mechanisms – the type of water release and capacity – the structures functioning as drains and sumps • verification of the information through plant walkdowns
Flood Evaluation Analysis	• identification and evaluation of – flood propagation paths – flood mitigating plant design features and operator actions – the susceptibility of SSCs in each flood area to the different types of floods • elimination of flood scenarios uses well defined and justified screening criteria
Quantification	• identification of flooding induced initiating events on the basis of a structured and systematic process • estimation of flooding initiating event frequencies • estimation of CDF for chosen flood sequences • modification of the Level 1 models to account for flooding effects including uncertainties
Internal Fire Analysis	
Fire Area Identification and Screening Analysis	• all potentially risk-significant fire areas are identified and addressed • all mitigating components and their cables in each fire area are identified • screening criteria are defined and justified • necessary walkdowns are performed to confirm the screening decisions • screening process and results are documented • unscreened events areas are subjected to appropriate level of evaluations (including detailed fire PRA evaluations as described below) as appropriate
Fire Initiation Analysis	• all potentially significant fire scenarios in each unscreened area are addressed • fire scenario frequencies reflect plant-specific features • fire scenario physical characteristics are defined • bases are provided for screening fire initiators

Table 3 Summary of Technical Characteristics and Attributes of an Internal Flood and Fire Analysis and External Hazards Analysis

Areas of Analysis	Technical Characteristics and Attributes**
Fire Growth and Damage Analysis	• damage to all potentially significant components is addressed; considers all potential component failure modes • all potentially significant damage mechanisms are identified and addressed; damage criteria are specified • analysis addresses scenario-specific factors affecting fire growth, suppression, and component damage • models and data are consistent with experience from actual fire experience as well as experiments • includes evaluation of propagation of fire and fire effects (e.g., smoke) between fire compartments
Plant Response Analysis	• all potentially significant fire-induced initiating events are addressed so that their bases are included in the model • includes fire scenario impacts on core damage mitigation and containment systems including fire-induced failures • analysis reflects plant-specific safe shutdown strategy • potential circuit interactions which can interfere with safe shutdown are addressed • human reliability analysis addresses effect of fire scenario-specific conditions on operator performance
Quantification	• estimation of fire CDF for chosen fire scenarios • identification of sources of uncertainty and their impact on the results • understanding of the impact of the key assumptions* on the CDF • all fire risk-significant sequences are traceable and reproducible
External Hazards Analysis	
Screening and Bounding Analysis	• credible external events (natural and man-made) that may affect the site are addressed • screening and bounding criteria are defined and results are documented • necessary walkdowns are performed • non-screened events are subjected to appropriate level of evaluations
Hazard Analysis	• the hazard analysis is site and plant-specific • the hazard analysis addresses uncertainties
Fragility Analysis	• fragility estimates are plant-specific for important SSCs • walkdowns are conducted to identify plant-unique conditions, failure modes, and as-built conditions.

Table 3 Summary of Technical Characteristics and Attributes of an Internal Flood and Fire Analysis and External Hazards Analysis

Areas of Analysis	Technical Characteristics and Attributes**
Level 1 Model Modification	• important external event caused initiating events that can lead to core damage and large early release are included • external event related unique failures and failure modes are incorporated • equipment failures from other causes and human errors are included. When necessary, human error data is modified to reflect unique circumstances related to the external event under consideration • unique aspects of common causes, correlations, and dependencies are included • the systems model reflects as-built, as-operated plant conditions • the integration/quantification accounts for the uncertainties in each of the inputs (i.e., hazard, fragility, system modeling) and final quantitative results such as CDF and LERF • the integration/quantification accounts for all dependencies and correlations that affect the results
*Assumptions include those decisions and judgments that were made in the course of the analysis. **Documentation also applies to flood, fire and external hazards.	

2.4 Characteristics and Attributes of a Peer Review

One approach a licensee could use to ensure technical adequacy is to perform a peer review of the PRA. A peer review process can be used to identify the strengths and weaknesses in the PRA and their importance to the confidence in the PRA results. An acceptable peer review is performed by qualified personnel, is performed according to an established process that compares the PRA against the characteristics and attributes, documents the results, and identifies both strengths and weaknesses of the PRA.

The **team qualifications** determine the credibility and adequacy of the peer reviewers. To avoid any perception of a technical conflict of interest, the peer reviewers will not have performed any actual work on the PRA. The members of the peer review team must have technical expertise in the PRA elements they review, including experience in the specific methods that are used to perform the PRA elements. This technical expertise includes experience in performing (not just reviewing) the work in the element assigned for review. Knowledge of the key features specific to the plant design and operation is essential. Finally, each member of the peer review team must be knowledgeable in the peer review process, including the desired characteristics and attributes used to assess the adequacy of the PRA.

The **peer review process** includes a documented procedure used to direct the team in evaluating the adequacy of a PRA. The review process compares the PRA against desired PRA characteristics and attributes such as those provided in Regulatory Position 2.4 and elaborated on in a PRA standard. In addition to reviewing the methods used in the PRA, the peer review determines whether the application of those methods was done correctly. The PRA models are compared against the plant design and procedures to validate that they reflect the as-built and as-operated plant. Key assumptions are reviewed to determine if they are appropriate and if they have a significant impact on the PRA results. The PRA results are checked for fidelity with the model structure and for consistency with the results from PRAs for similar plants. Finally, the peer review process examines the procedures or guidelines in place for updating the PRA to reflect changes in plant design, operation, or experience.

Documentation provides the necessary information such that the peer review process and the findings are both traceable and defensible. Descriptions of the qualifications of the peer review team members and the peer review process are documented. The results of the peer review for each technical element and the PRA update process are described, including the areas in which the PRA does not meet or exceed the desired characteristics and attributes used in the review process. This includes an assessment of the importance of any identified deficiencies on the PRA results and potential uses and how these deficiencies were addressed and resolved.

Table 4 provides a summary of the characteristics and attributes of a peer review.

Table 4. Summary of the Characteristics and Attributes of a Peer Review

Element	Characteristics and Attributes
Team Qualifications	• independent with no conflicts of interest • expertise in all the technical elements of a PRA including integration • knowledge of the plant design and operation • knowledge of the peer review process
Peer Review Process	• documented process • utilizes a set of desired PRA characteristics and attributes • reviews PRA methods • reviews application of methods • reviews key assumptions • determines if PRA represents as-built and as-operated plant • reviews results of each PRA technical element for reasonableness • reviews PRA maintenance and update process
Documentation	• describes the peer review team qualifications • describes the peer review process • documents where PRA does not meet desired characteristics and attributes • assesses and documents significance of deficiencies

2.5 Principles and Objectives for a PRA Standard

A PRA standard can also provide guidance to a licensee for the technical adequacy of a PRA. If this approach is used, the standard needs to be consistent with the attributes and characteristics provided in the previous subsections and should be based on a set of principles and objectives. Table 5 provides a set of principles and objectives that were established by ASME with consensus from industry and the NRC.

Table 5 Principles and Objectives of a Standard

1. The PRA standard provides well-defined criteria against which the strengths and weaknesses of the PRA may be judged so that decision makers can determine the degree of reliance that can be placed on the PRA results of interest. 2. The standard is based on current good practices as reflected in publicly available documents. The need for the documentation to be publicly available follows from the fact that the standard may be used to support safety decisions. 3. To facilitate the use of the standard for a wide range of applications, categories can be defined to aid in determining the applicability of the PRA for various types of applications. 4. The standard thoroughly and completely defines what is technically required and should, where appropriate, identify one or more acceptable methods. 5. The standard requires a peer review process that identifies and assesses where the technical requirements of the standard are not met. The standard needs to ensure that the peer review process: – determines whether methods identified in the standard have been used appropriately; – determines that, when acceptable methods are not specified in the standard, or when alternative methods are used in lieu of those identified in the standard, the methods used are adequate to meet the requirements of the standard; – assesses the significance of the results and insights gained from the PRA of not meeting the technical requirements in the standard; – highlights assumptions that may significantly impact the results and provides an assessment of the reasonableness of the assumptions; – is flexible and accommodates alternative peer review approaches; and – includes a peer review team that is composed of members who are knowledgeable in the technical elements of a PRA, are familiar with the plant design and operation, and are independent with no conflicts of interest. 6. The standard addresses the maintenance and update of the PRA to incorporate changes that can substantially impact the risk profile so that the PRA adequately represents the current as-built and as-operated plant. 7. The standard is a living document. Consequently, it should not impede research. It is structured so that, when improvements in the state of knowledge occur, the standard can easily be updated.

3. CONSENSUS PRA STANDARDS AND INDUSTRY PRA PROGRAMS

A PRA that can be used to support a risk-informed application must meet the attributes and characteristics provided in Regulatory Position 2 in an acceptable manner. An approach to demonstrate this is to use an industry consensus PRA standard. ASME has issued “Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications” (Ref. 9), with a scope for a PRA for Level 1 and limited Level 2 (LERF) for full-power operation and internal events (excluding internal fires). The staff regulatory position regarding this document is provided in Appendix A to this regulatory guide. If it is demonstrated that the parts of a PRA that are used to support an application comply with the ASME standard, when supplemented to account for the staff's regulatory position, it is considered that the PRA is adequate to support that risk-informed regulatory application.

An alternative approach to using the ASME standard is to use the industry-developed peer review program, "Probabilistic Risk Assessment Peer Review Process Guidance" (Ref. 10), with a scope for a PRA for Level 1 and limited Level 2 (LERF) for full-power operation and internal events (excluding internal floods and fires). The staff regulatory position on this document is provided in Appendix B to this regulatory guide. When the staff's regulatory position is taken into account, use of this document can be used to demonstrate that the PRA is adequate to support a risk-informed application.

Additional appendices will be added in future updates to this regulatory guide to address PRAs for other risk contributors, such as accidents caused by external hazards or internal fire or caused during the low power and shutdown modes of operation.

4. DOCUMENTATION AND SUBMITTAL

4.1 Introduction

To facilitate the NRC staff's review of a risk-informed submittal, the licensee provides documentation to demonstrate that the parts of the PRA used in a regulatory application are of sufficient quality to support the analysis.

4.2 Archival Documentation

Archival documentation includes a detailed description of the process used to determine the adequacy of the PRA. In addition, should the staff elect to perform an audit on all or any parts of the PRA used in the risk-informed application, the documentation maintained by the licensee must be legible and retrievable (i.e., traceable), and of sufficient detail that the staff can comprehend the bases supporting the results used in the application. Regulatory Position 2.4 of this guide provides the attributes and characteristics of archival documentation.

The archival documentation associated with a specific application is expected to include enough information to demonstrate that the scope of the review of the base PRA is sufficient to support the application. This includes:

- the impact of the application on the plant design, configuration, or operational practices

- the acceptance guidelines and method of comparison

- the scope of the risk assessment in terms of initiating events and operating modes modeled

- the parts of the PRA required to provide the results needed to support comparison with the acceptance guidelines.

4.3 Licensee Submittal Documentation

To demonstrate that the technical adequacy of the PRA used in an application is of sufficient quality, the staff expects the following information will be submitted to the NRC:

- A description of the process for maintenance, update, and control of the PRA.

- Identification of changes to design or operational practices whose impacts have not been incorporated in the PRA model used to support the application, and either a justification of why this does not impact the results used or the results of a sensitivity study to demonstrate that the impact is not significant.

- Documentation that the parts of the PRA required to produce the results used in the decision are performed consistently with the standard or peer review process as endorsed in the appendices to this regulatory guide, or a discussion of the impact of not meeting the standard or the criteria of the peer review process on the results and either a justification of why this does not impact the results used or the results of a sensitivity study that demonstrate that the impact is not significant.

- A characterization of the assumptions and approximations that have a significant impact on the results used, which includes the peer reviewers' assessment of those assumptions, and either a justification of why this does not impact the results used or the results of a sensitivity study that demonstrate that the impact is not significant. This provides information that the NRC staff may find useful to support the assessment of whether the sensitivity studies performed to support the decision are appropriate.

- A discussion of the resolution of the peer review comments that are applicable to the parts of the PRA required for the application and either a justification of why this does not impact the results used or the results of a sensitivity study that demonstrate that the impact is not significant.

The standards or peer review process documents recognize different categories or grades that are related to level of detail, degree of conservatism, and degree of plant specificity. The licensee's documentation is to identify the use of the parts of the PRA that conform to the less detailed categories, and the limitations this imposes.

References

1. USNRC, "Use of Probabilistic Risk Assessment Methods in Nuclear Activities: Final Policy Statement," *Federal Register*, Vol. 60, p. 42622 (60 FR 42622), August 16, 1995.

2. USNRC, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Regulatory Guide 1.174, July 1998.[1]

3. USNRC, "Use of Probabilistic Risk Assessment in Plant-Specific, Risk-Informed Decisionmaking: General Guidance," Chapter 19 of the Standard Review Plan, NUREG-0800, July 1998.[1]

4. USNRC, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Inservice Testing," Regulatory Guide 1.175, August 1998.[1]

5. USNRC, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Inservice Inspection of Piping," Regulatory Guide 1.178, September 1998.[1]

6. USNRC, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Graded Quality Assurance," Regulatory Guide 1.176, August 1998.[1]

7. USNRC, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," Regulatory Guide 1.177, August 1998.[1]

8. GAO, "Nuclear Regulation: Strategy Needed To Regulate Safety Using Information on Risk," GAO/RCED-99-95, U.S. General Accounting Office, March 1999.[2]

9. American Society of Mechanical Engineers, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications," ASME RA-S-2002, April 5, 2002.[3]

10. Nuclear Energy Institute, "Probabilistic Risk Assessment Peer Review Process Guidance," NEI-00-02, Revision A3, March 20, 2000.[4]

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[1] Requests for single copies of draft or active regulatory guides (which may be reproduced) and certain SRP sections, or for placement on an automatic distribution list for single copies of future draft guides in specific divisions should be made in writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Reproduction and Distribution Services Section, or by fax to (301)415-2289; email <DISTRIBUTION@NRC.GOV>. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR's mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; e-mail <PDR@NRC.GOV>.

[2] Copies may be obtained from the General Accounting Office, 441 G Street, NW, Washington, DC 20548; phone (202)512-6000.

[3] Copies may be obtained from the American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990; phone (212)591-8500.

[4] Copies may be obtained from the Nuclear Energy Institute, Attn: Mr. Biff Bradley, Suite 400, 1776 I Street, NW, Washington, DC 20006-3708; phone (202)739-8083.

11. USNRC, SECY-99-256, “Rulemaking Plan for Risk-Informing Special Treatment Requirements,” October 29, 1999.[5]

12. Letter from NEI, Anthony Pietrangelo, Director of Risk and Performance Based Regulation Nuclear Generation, to the USNRC, Ashok Thadani, Director of Office of Nuclear Regulatory Research, December 18, 2001.

13. Letter from NEI, Anthony Pietrangelo, Director of Risk and Performance Based Regulation Nuclear Generation, to the USNRC, Scott Newberry, Director of Division of Risk Analysis and Applications, August 16, 2002.

14. USNRC, Staff Requirements Memorandum (SRM), “Commission Briefing on Risk-Informed Regulation Implementation Plan (SECY-00-0062) on March 31, 2000,” April 18, 2000.

15. USNRC, “Addressing PRA Quality In Risk-Informed Activities,” SECY-00-0162, July 28, 2000.[5]

16. USNRC, SRM regarding SECY-00-0162, “Addressing PRA Quality In Risk-Informed Activities,” October 27, 2000.[5]

17. USNRC, “Publication of Revisions 1 to Regulatory Guide 1.174 and SRP Chapter 19 and Notice of a Staff Plan for Endorsing Consensus Probabilistic Risk Assessment Standards and Industry Peer Review Programs,” SECY-02-0070, April 24, 2002.[5]

18. J.A. Lambright et al., “Fire Risk Scoping Study,” NUREG/CR-5088, USNRC, January 1989.[6]

[5] Copies are available electronically through NRC’s web site, <www.nrc.gov> through the Electronic Reading Room to Commission Documents. Copies are also available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike (first floor), Rockville, MD; the PDR’s mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or 1-(800)397-4209; fax (301)415-3548; e-mail <PDR@NRC.GOV>.

[6] Copies are available at current rates from the U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20402-9328 (telephone (202)512-1800); or from the National Technical Information Service by writing NTIS at 5285 Port Royal Road, Springfield, VA 22161; (telephone (703)487-4650; <http://www.ntis.gov/ordernow>. Copies are available for inspection or copying for a fee from the NRC Public Document Room at 11555 Rockville Pike, Rockville, MD; the PDR’s mailing address is USNRC PDR, Washington, DC 20555; telephone (301)415-4737 or (800)397-4209; fax (301)415-3548; email is PDR@NRC.GOV.

APPENDIX A
NRC REGULATORY POSITION ON ASME PRA STANDARD

Introduction

The American Society of Mechanical Engineers (ASME) has published ASME RA-S-2002, "Standard for Probabilistic Risk Assessment for Nuclear Power Plant Applications" (April 5, 2002). The standard states that it "sets forth requirements for probabilistic risk assessments (PRAs) used to support risk informed decisions for commercial nuclear power plants, and describes a method for applying these requirements for specific applications." The NRC staff has reviewed ASME RA-S-2002 against the characteristics and attributes for a technically acceptable PRA as discussed in Chapter 3 of this regulatory guide. The staff's position on each requirement (referred to in the standard as a requirement, a high-level requirement, or a supporting requirement) in ASME RA-S-2002 is categorized as "no objection," "no objection with clarification," or "no objection subject to the following qualification," and defined as follows:

- No objection: the staff has no objection to the requirement.

- No objection with clarification: the staff has no objection to the requirement. However, certain requirements, as written, are either unclear or ambiguous and therefore, the staff has provided its understanding of these requirements.

- No objection subject to the following qualification: the staff has a technical concern with the requirement and has provided a qualification to resolve the concern.

Table A-1 provides the staff position on each requirement in ASME RA-S-2002. A discussion of the staff concern (issue) and the staff proposed resolution is provided. In the proposed staff resolution, the staff clarification or qualification to the requirement is indicated either in bolded text (i.e., **bold**) or strikeout text (i.e., ~~strikeout~~); that is, the necessary additions or deletions to the requirement (as written in ASME RA-S-2002) for the staff to have no objection are provided.

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
Chapter 1			
1.1	The standard is only for current generation LWRs, the requirements may not be sufficient or adequate for other types of reactors	Clarification	"This Standard sets forth requirements for PRAs used to support risk-informed decisions for commercial light water reactor nuclear power plants, and prescribes a method for applying these requirements for specific applications **(additional or revised requirements may be needed for more advanced reactor designs)**."
1.2 - 1.7	----------------	No objection	---------------------------
Tbl 1.3-1	----------------	No objection	---------------------------

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
Chapter 2			
2.1	-----------------	No objection	----------------------------
2.2			
Accident sequence	The definition provided is very general and does not distinguish the different types of accident sequences developed in a PRA. This distinction is necessary because some of the SRs are dependent on the accident sequence type.	Clarification	*accident sequence*, **a representation in terms of an initiating event followed by a sequence of failures or successes of events (such as system, function, or operator performance) that can lead to undesired consequences, with a specified end state (e.g., core damage or large early release).** ~~A representation in terms of an initiating event followed by a combination of system, function, and operator failures or successes, of an accident that can lead to undesired consequences, with a specified end state (e.g., core damage or large early release). An accident sequence may contain many unique variations of events (minimal cut sets) that are similar.~~ ***accident sequence, class*, a grouping of accident sequences by initiator type (e.g., LOCA, LOSP) or by similar functional loss (e.g., station blackout, loss of decay heat).** ***accident sequence, functional*, the sequence of events are represented by the key safety functions necessary to mitigate the effects of the initiating event.** ***accident sequence, systemic*, the sequence of events are represented by the front-line systems necessary to mitigate the effects of the initiating event.** ***accident sequence, scenario*, the sequence of events are represented by the specific components or trains, support systems and operator actions necessary to mitigate the effects of the initiating event.**

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
Accident sequence, dominant	The first part of the definition provides little value and may be inaccurate, a large fraction may be outside the stated range (i.e., smaller or larger than 10 to 20). In addition, it is not clear what is meant by large fraction. The term "dominant" is also used to modify other events such as contributors, human events. Several different terms (modifiers) are used in the standard. In some places, these modifiers are used interchangeably (to have the same meaning) and in other places, they are used to convey different meanings (e.g., used to distinguish whether a requirement is imposed). A common and specific quantitative understanding of these modifiers is necessary. Specifically, these modifiers include: important, significant and dominant.	Clarification	~~*accident sequence, dominant*: an accident sequence that is usually represented by the top 10 or 20 events or groups of events modeled in a PRA and accounts for a large fraction of the core damage or large early release frequency.~~ ***dominant, significant, important, contributor*, an entity or entities (contributor(s) or event(s) such as failure of a specific piece(s) of equipment, human failure event(s), accident sequence(s)) that exercises the most influence or control to an outcome, and where each dominant entity has the ability to effect the second significant figure of the quantitative outcome** (i.e., x.***y***E-z).
Best estimate	Best estimate, as defined, is never used in the standard. The term, as used in the standard (SC-B1), does not match the provided definition; the term is used to mean realistic which is already stated in the requirement (see SC-B1)	Qualification	~~*best estimate*: the point estimate of a parameter that is not biased by conservatism or optimism. Generally, the best estimate of a parameter is represented as a mean value.~~
key safety functions	The functions listed are imprecise and redundant (e.g., core heat removal is redundant with both reactor coolant inventory control and reactor coolant heat removal) and other safety functions are missing.	Qualification	"...These include reactivity control, ~~core heat removal~~, **reactor pressure control**, reactor coolant inventory control~~, reactor coolant heat removal~~, **decay heat removal**, and containment integrity in appropriate combinations..."
large early release	QHOs address both early and latent fatalities where LERF is used as a surrogate for the early fatality QHO, therefore, the definition to include the potential for early health effects is necessary.	Clarification	"...of off-site emergency response and protective actions **such that there is a potential for early health effects**."
Skill of the craft	This term is used in the standard and a definition is necessary.	Qualification	**skill of the craft: that level skill expected of the personnel performing the associated function**

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
unavailability	Fraction of time is one method for calculating unavailability, it is not suitable for calculating unavailabilities such as failure on demand.	Qualification	"The **probability** that a system or component is not capable of supporting its function..."
Other definitions	----------------	No objection	---------------------------
Chapter 3 No objection			
3.1 thru 3.6	----------------	No objection	---------------------------
Chapter 4			
4.1 - 4.2	----------------	No objection	---------------------------
4.3			
4.3.1-4.3.2	----------------	No objection	---------------------------
4.3.3	The use of the word "should" does not provide a minimum requirement.	Clarification	"The PRA analysis team **shall** ~~should~~ use outside experts..."
4.3.4-4.3.7	----------------	No objection	---------------------------
4.4	----------------	No objection	---------------------------
4.5	The standard provides SRs for different PRA capabilities, but there is no requirement for the PRA to identify which capability category is met for each SR.	Qualification	"... a PRA will meet that HLR. **The capability category that has been met for each SR shall be identified and documented.** Boldface is used....in the three Capability Categories."
4.5 Tables 4.5.1-2(d) 4.5.2-2(c) 4.5.3-2(c) 4.5.4-2(c) 4.5.5-2(i) 4.5.6-2(e) 4.5.7-2(f) 4.5.8-2(f) 4.5.9-2(g)		No objection	
4.5.1 - IE			
4.5.1.1	----------------	No objection	---------------------------
Table 4.5.1-1	----------------	No objection	---------------------------
Tables 4.5.1-2(a) thru 4.5.1-2(d)			
IE-A1,A3, A7,A8,A9, A10	----------------	No objection	---------------------------

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Index No	Issue	Position	Resolution
IE-A2	There is no definition of "active components." As such, the requirement is unclear and too open ended.	Clarification	"...(c) ISLOCAs: INCLUDE postulated events representing active components **(i.e., components that will need to change state)** in systems interfacing with the reactor coolant system..."
IE-A4	As written, the distinction between Cat II and III could be taken to mean that only those initiating events resulting from failures of complete systems as opposed to single trains of systems will be considered.	Clarification	Cat II: "USE a structured approach .... to assess and document the possibility of an initiating event resulting from **individual** systems or **train failures**."
IE-A5	As written, there is an implication that more work is needed in (a): not every event that occurs at other than at-power operation should be incorporated.	Clarification	"....INCORPORATE (a) events that have occurred at condition other than at-power operation (i.e., during low power or shutdown conditions, **unless it is determined that an event is not applicable to at-power operation.** (b) events...."
IE-A6	As written, there is an implication that more work is needed for Cat II than for Cat III, since it is not clear whether the interviews from other plants are to be used instead of or as a complement to plant specific interviews. However, interviews from other plants would appear to be more resource intensive.	Clarification	Cat II: "INTERVIEW plant operations, ... to determine if potential initiating event have been overlook." ~~Information from interviews conducted at similar plants may be used~~.
IE-B2,B3, B4	-------------------------	No objection	-------------------------
IE-B1	For the functional IE categories and quantification IE categories, as written, it is implied that two different groupings are performed. Therefore two different sets of accident sequences would be developed and quantified. In addition, the definitions provided are too limiting, other IE categories can exist for grouping.	Clarification	"....in the Quantification element (para.4.5.8). ~~Functional initiating event categories refer to initiating events grouped for the purpose of accident sequence definition, while quantification initiating event categories refer to those grouped for separate quantification of the accident sequences.~~ When initiating events are not grouped ~~for either of these purposes~~, PROVIDE a separate accident-sequence evaluation for each selected initiating event."
IE-C2,C3, C4,C6,C7,C 8,C10, C11	-----------------	No objection	---------------------------

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Index No	Issue	Position	Resolution
IE-C1	As written, there appears to be an internal inconsistency -- SR requires the "USE of the most recent data" then requires justification to exclude "data from the initial year of commercial operation. Further in IE-C5, SR requires justification of "exclusion of earlier years" It is not clear what is an acceptable justification for deviating from the standard, as such the requirement is too open ended.	Clarification	"...USE the most recent applicable data to quantify the initiating event frequencies. **JUSTIFY excluded data that is not considered to be either recent or applicable (e.g., provide evidence via design or operational change that the data are no longer applicable).** CREDIT recovery actions***(see note)*** as appropriate; JUSTIFY each such credit **(as evidenced such as through procedures or training)**. ~~Data from the initial year of commercial operation may be excluded; if excluded, JUSTIFY.~~ **<u>Note</u>: these recovery actions are those implied in IE-C4(c) or those implied and discussed in IE-C6 through IE-C9."**
IE-C5	It is not clear what is an acceptable justification for deviating from the standard, as such the requirement is too open ended. SR needs to be consistent with IE-C1	Clarification	<u>Cat III</u>: "...JUSTIFY **excluded data that is not considered to be either recent or applicable (e.g., provide evidence via design or operational change that the data are no longer applicable)** ~~exclusion of earlier years that are not representative of current data~~. One acceptable methodology....""
IE-C9	Fault tree modeling of an initiating event is plant-specific by definition (see IE-C6 thru IE-C8) and the treatment of recovery actions needs to be consistent with the requirements in the HRA section of the standard (HR-F and HR-G).	Clarification	<u>Cat I</u>: ~~No requirement to use plant-specific information in the fault-tree modeling.~~ **"If fault-tree modeling is used, USE plant-specific information in the assessment and quantification of recovery actions where available. See Human Reliability Analysis (para. 4.5.5) for further guidance."**
IE-C12	For Cat I and II, there is no minimum list of features and procedures that could significantly influence the ISLOCA frequency.	Clarification	<u>Cat I and II</u>: "In the ISLOCA frequency analysis, INCLUDE features of plant and procedures that could significantly influence the ISLOCA frequency: **(a) configuration of potential pathways including numbers and types of valves and their relevant failure modes, existence and positioning of relief valves** **(b) provision of protective interlocks** **(c) relevant surveillance test procedures**"
IE-D2,D3, D4	----------------	No objection	---------------------------
IE-D1	It is not clear what is an acceptable justification for deviating from the standard, as such the requirement is too open ended.	Clarification	"....(a) LIST and JUSTIFY **(by plant-specific or applicable generic analyses)** functional categories..."
<u>4.5.2. - AS</u>		No objection	

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Index No	Issue	Position	Resolution
Table 4.5.2-1	HLR-AS-B is inconsistent with the HLR written for Table 4.5.2-2(b). The SRs in Table 4.5.2-2(b) are appropriate for the HLR as written for that table.	Clarification	HLR-AS-B ~~Dependencies due to initiating events, human interface, functional dependencies, environmental and spatial impacts, and common cause failures shall be addressed.~~ **"Dependencies that can impact the ability of the mitigating systems to operate and function shall be addressed."**
Tables 4.5.2-2(a) thru 4.5.2-2(c)			
Table 4.5.2-2(b)	----------------	No objection	---------------------------
AS-A1, A2,A3 A4, A5,A7,A8,A10,A11	----------------	No objection	---------------------------
AS-A6	As written, with the term "when practical," there is no minimum, there is no SR for when it is not practical.	Clarification	"Where practical, sequentially ORDER....in the accident progression. **Where not practical, provide the bases and provide the rationale used for the ordering.**"
AS-A9	This SR appears to be redundant with SRs in SC; effects other than environmental are addressed by the requirements under success criteria.	Clarification	Cat I, II and III: "...thermal-hydraulic analyses to determine ~~accident progression parameters (e.g., timing, temperature, pressure, steam)~~ **the environmental effects (e.g., temperature, pressure, steam) during the accident progression** that could potentially affect the operability of the mitigating systems."
AS-B1, B2, B3 B4,B5	----------------	No objection	---------------------------
AS-B6	As written, there appears to be an implication that the list provided is complete.	Clarification	"INCLUDE events for which time-phased dependencies might exist. **Examples are**:...."
AS-C1, C2,C3,C4	----------------	No objection	---------------------------
4.5.3 - SC			
4.5.3.1	----------------	No objection	---------------------------
Table 4.5.3-1	----------------	No objection	---------------------------
Tables 4.5.3-2(a) thru 4.5.3-2(c)			
SC-A1, A2,A3 A4, A5,A6	----------------	No objection	---------------------------
SC-B2, B3,B4 B5, B6	----------------	No objection	---------------------------

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Index No	Issue	Position	Resolution
SC-B1	The meaning of "best-estimate" as used in this requirement does not agree with the definition in Section 2; in the SC-B1 context it is redundant with "realistic" and is not needed.	Qualification	Cat II: "USE appropriate realistic ~~best-estimate~~ generic analyses/evaluations.....requiring detailed computer modeling. Realistic models or analyses may be supplemented..." Cat III: "USE ~~best-estimate~~ **realistic**, plant-specific models...."
SC-C1, C2,C3,C4	----------------	No objection	---------------------------
4.5.4 - SY			
4.5.4.1	----------------	No objection	---------------------------
Table 4.5.4-1	----------------	No objection	---------------------------
Tables 4.5.4-2(a) thru 4.5.4-2(c)			
SY-A1 thru A18, A20, A21, A22	----------------	No objection	---------------------------
SY-A8	Boundaries of a component must match the data.	Qualification	"....MATCH the definitions used to establish the component failure data~~, or JUSTIFY an alternative assumption~~. For example, if the pump failure data for the pump include control circuit failures, then the pump boundary must include the control circuitry. ...."
SY-A19	If there are not any engineering analyses, there can be no justification for the assumption.	Qualification	Cat I and II: "...If engineering analyses are not available, ASSUME that the equipment/system fails with a probability of 1.0. ~~or JUSTIFY the assumed failure probability.~~"
SY-A23	There are no commonly used analysis methods for recovery in the sense of repair, other than use of actuarial data.	Clarification	"....is justified through an adequate ~~recovery analysis or~~ examination of data **collected in accordance with DA-C14."** ~~(See DA-C14.)~~
SY-B2 thru B9, SY-B12 thru B16	----------------	No objection	---------------------------
SY-B1	For Cat I, as written, this implies more effort than probably intended by this requirement.	Clarification	For Cat I: "MODEL intra-system common-cause failures when supported by generic or plant-specific data (an acceptable model is the screening approach of NUREG/CR-5485, which is consistent with DA-D5), or SHOW that they do not impact the results."
SY-B11	It is not clear what is an acceptable justification for deviating from the standard; as such, the requirement is too open ended.	Clarification	"....MODEL them unless a justification is provided **(i.e., that is unique to the system and highly reliable)**. ....."

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Index No	Issue	Position	Resolution
SY-B12	It is not clear what is an acceptable justification for deviating from the standard; as such, the requirement is too open ended.	Clarification	"~~COMPARE~~ **MODEL the limitation of** the available inventories of air, power, and cooling with ~~those required~~ respect to support**ing** the mission time. ~~TREAT these inventories in the model unless a justification is provided.~~"
SY-C1,C2 C3	-----------------	No objection	----------------------------
<u>4.5.5 - HR</u>			
4.5.5.1	-----------------	No objection	----------------------------
Table 4.5.5-1	-----------------	No objection	----------------------------
Tables 4.5.5-2(a) thru 4.5.5-2(i)			
HR-A1, A2, A3	-----------------	No objection	----------------------------
HR-B1,B2	-----------------	No objection	----------------------------
HR-C1, C2,C3	-----------------	No objection	----------------------------
HR-D1, D2,D3, D4,D5, D6,D7	-----------------	No objection	----------------------------
HR-E1, E2, E3, E4	-----------------	No objection	----------------------------
HR-F1,F2	-----------------	No objection	----------------------------
HR-G1, G2,G3, G5,G6, G7,G9	-----------------	No objection	----------------------------
HR-G4	For Cat II, plant-specific thermal-hydraulic analysis is required which seems inconsistent with SC-B1 that allows realistic but "similar plant" T-H for Cat II.	Clarification	<u>Cat II</u>: **"BASE the time available to complete actions on appropriate, realistic generic thermal-hydraulic analyses, or simulations from similar plants (e.g., plant of similar design and operation). SPECIFY the point in time at which operators are expected to receive relevant indications.** <u>Cat III</u>: "BASE the time available to complete actions on plant-specific thermal-hydraulic analyses, or simulations SPECIFY the point in time at which operators are expected to receive relevant indications.
HR-G8	It is not clear what is an acceptable justification; as such, the requirement is too open ended.	Clarification	"DEFINE and JUSTIFY **(provide evidence that there are not any dependencies, e.g., shaping factors, management, among the human failure events such that cutsets were inappropriately truncated)** the minimum probability...."

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Index No	Issue	Position	Resolution
HR-H1	To be consistent with HR-H2 and HR-H3, it is necessary that this SR clearly indicate that recovery does not include repair, which is dealt with actuarially, not by modeling via human reliability analysis.	Clarification	Cat I and II: "INCLUDE....the dominant sequences. **Recovery actions are limited to those to which HRA techniques can be applied, such as system reconfiguration, or simple actions such as manually opening or closing a failed valve, but not repair."** Cat III: "INCLUDE.....components. **Recovery actions are limited to those to which HRA techniques can be applied, such as system reconfiguration, or simple actions such as manually opening or closing a failed valve, but not repair."**
HR-H2	The criteria provided for crediting recovery actions are incomplete; there are other factors equally important that are to be addressed before credit can be allowed. As written, there is no requirement to justify multiple recovery actions which can result in inaccurate and misleading results.	Qualification	"....skill of the craft exist **(c) attention is given to the relevant performance shaping factors provided in HR-G3 (d) there is sufficient manpower to perform the action. If credit is taken for multiple operator recovery actions ENSURE that it has been determined that the appropriate manpower is available, taking into account such things as the fluctuating manpower with time of the day."**
HR-I1	-----------------	No objection	----------------------------
4.5.6 - DA			
4.5.6.1		No objection	
Table 4.5.6-1	-----------------	No objection	----------------------------
Tables 4.5.6-2(a) thru 4.5.6-2(e)			
DA-A1, A2,A3	-----------------	No objection	----------------------------
DA-B1,B2	-----------------	No objection	----------------------------
DA-C1, C2,C3,C4,C5,C6,C7, C8,C9, C10,C11, C12,C13, C15	-----------------	No objection	----------------------------
DA-C14	This SR, which provides a justification for crediting equipment repair, assumes plant-specific data will be sufficient to justify this credit. For such components as pump repair, plant-specific data is insufficient and a broader base is necessary.	Qualification	"IDENTIFY instances of ~~plant-specific~~ component repair from **both plant-specific and industry experience** and for each repair, COLLECT...."

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Index No	Issue	Position	Resolution
DA-D2, D4, D6, D7	-----------------	No objection	----------------------------
DA-D1	For Cat I, as written, the requirements are not practical in that they are difficult if not impossible to meet. If the feature is unique, there may be little to no plant-specific data. For Cat II and III, as written, requirements appear to be inconsistent with Table 1.3-1 and IE-C2	Clarification	Cat I: "USE plant-specific parameter estimates **for events modeling** the unique design or operational features **if available, or use generic information modified as discussed in DA-D2; USE** ~~with~~ generic information for the remaining events." Cat II: "CALCULATE realistic parameter estimates for dominant contributors; **if sufficient plant-specific data is not available**, use a Bayesian update **process of generic industry data**. CHOOSE prior distributions as either non-informative, or representative of variability in industry data. CALCULATE parameter estimates for the remaining events **by using generic industry data.**" Cat III: **"CALCULATE realistic parameter estimates; if sufficient plant-specific data is not available, use a Bayesian update process of generic industry data. CHOOSE prior distributions as either non-informative, or representative of variability in industry data."**
DA-D3	For Cat II, a mean value is required for CDF and LERF; assigning mean values only to events that "contribute measurably" can result in combining events where some have mean values and some are point estimates, which does not result in a mean CDF or LERF. Cat II and III, as written, a mean value of the uncertainty intervals is required, which is incorrect (caused by incorrect comma after 'representation of').	Qualification	Cat II: "PROVIDE a mean value of, and a statistical representation of the uncertainty intervals for, the parameter estimates that contribute measurably to CDF and LERF. **The parameter estimates that contribute measurably are those events that are retained in the sequences that survive truncation in the final quantification of CDF and LERF**. Acceptable systematic methods include Bayesian updating, frequentist method, or expert judgment." Cat III: "PROVIDE a mean value of, and a statistical representation of the uncertainty intervals for**,** the parameter estimates. Acceptable systematic methods include Bayesian updating, frequentist method, or expert judgment."
DA-D5	Cat I, does not appear to be consistent with SY-B1. Cat II and III: the SR already provides the generally used and known approaches, therefore, it is not clear what is an acceptable justification for an alternative. As such, the requirement is too open ended.	Clarification	Cat I: "USE the Beta-factor approach **(i.e., the screening approach in NUREG/CR-5485)** or an equivalent for the estimation of CCF parameters." Cat II and III: "...JUSTIFY the use of alternative methods **(i.e., provide evidence of peer review or QA of the method which demonstrates its acceptability)**.
DA-E1	-----------------	No objection	----------------------------

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Index No	Issue	Position	Resolution
4.5.7 - IF			
4.5.7.1	----------------	No objection	---------------------------
Table 4.5.7-1	----------------	No objection	---------------------------
Tables 4.5.7-2(a) thru 4.5.7-2(f)			
IF-A1,A2, A3 A4	----------------	No objection	---------------------------
IF-B1,B2, B3 B4	----------------	No objection	---------------------------
IF-C1,C3 C4,C6	----------------	No objection	---------------------------
IF-C2	It is not clear what is an acceptable justification for deviating from the standard; as such, the requirement is too open ended.	Clarification	"....~~JUSTIFY any credit given, particularly any credit given for~~ *INCLUDE credit only when there are available* non-flood proof doors or barriers, and ~~credit~~ **procedures or skill of the craft exist for isolation of a flood source including the method of detection (i.e., operator detection via control room indication or alarms)**, accessibility to the isolation device, and time available to perform the action.
IF-C5	Cat II and III: the SR already provides criteria, therefore, it is not clear what is an acceptable justification for an alternative; as such, the requirement is too open ended.	Clarification	"....JUSTIFY any other qualitative screening criteria **(provide evidence that the qualitative alternative used is acceptable)**."
IF-D1,D2, D3 D4, D5	----------------	No objection	---------------------------
IF-E1,E2, E3,E4,E6, E7	----------------	No objection	---------------------------
IF-E5	Use of JUSTIFY is too open ended, particularly considering these are extraordinary recovery actions that are not proceduralized.	Clarification	"...JUSTIFY the use of extraordinary recovery actions that are not proceduralized **(i.e., provide evidence of appropriate training that would ensure knowledge, skill of the craft)**.
IF-F1,F2	----------------	No objection	---------------------------
4.5.8 - QU			
4.5.8.1	----------------	No objection	---------------------------
Table 4.5.8-1	HLR-QU-A and Table 4.5.8-2(a) objective statement just before table: These objective statements do not exactly agree.	Clarification	HLR-QU-A: "...core damage frequency **and shall support the quantification of LERF**."
Tables 4.5.8-2(a) thru 4.5.8-2(f)			

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Index No	Issue	Position	Resolution
QU-A1,A3 A4	-----------------	No objection	----------------------------
QU-A2	The SR is incomplete, and as written, a point estimate may be quantified for CDF and LERF for Cat II and III.	Qualification	Cat I: "ESTIMATE the ~~overall~~ **point estimate** from internal events. ~~QUANTIFY~~ **PROVIDE estimates of the** individual sequences **in a manner consistent with the estimation of total CDF** to identify dominant sequences....is appropriately reflected. The estimates may be accomplished by using....split fractions." Cat II: "ESTIMATE the ~~overall~~ **mean** CDF from internal events, **ensuring that the "state-of-knowledge" correlation between event probabilities is taken into account**. ~~QUANTIFY~~ **PROVIDE estimates of the** individual sequences **in a manner consistent with the estimation of total CDF** to identify dominant sequences....is appropriately reflected. The estimates may be accomplished by using....split fractions." Cat III: ~~ESTIMATE~~ **CALCULATE** the ~~overall~~ **mean** CDF from internal events **by propagating the uncertainty distributions, ensuring that the "state-of-knowledge" correlation between event probabilities is taken into account**. ~~QUANTIFY~~ **PROVIDE estimates of the** individual sequences **in a manner consistent with the estimation of total CDF** to identify dominant sequences....is appropriately reflected. The estimates may be accomplished by using....split fractions."
QU-B1, B2, B3, B4, B5, B6, B7, B8, B9,	-----------------	No objection	----------------------------
QU-C2,C3	-----------------	No objection	----------------------------
QU-C1	Screening values as used in the Human Reliability Analysis section are values that, if shown not to contribute, may be retained in the model as is. QU-C1 is to perform an analysis using artificially high values for HEPs to identify those cutsets that contain multiple HFEs and are to be reviewed for dependency.	Clarification	"IDENTIFY cutsets with multiple HFEs **by requantifying the PRA model with HEP values set to values that are sufficiently high that the cutsets are not truncated**. The final quantification of these post-initiator HFEs may be done at the cutset level or saved sequence level."
QU-D1,D2 D3, D4, D5	-----------------	No objection	----------------------------

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Index No	Issue	Position	Resolution
QU-E1,E2 E4	-----------------	No objection	----------------------------
QU-E3	For Cat II, the uncertainty intervals associated with parameter uncertainties are to be estimated taking into account the "state of knowledge" correlations.	Qualification	<u>Cat II</u>: "ESTIMATE the uncertainty interval of the overall CDF results. ESTIMATE the uncertainty intervals associated with parameter uncertainties **taking into account the "state-of-knowledge" correlation.**"
QU-F1, F2, F4, F5, F6	-----------------	No objection	----------------------------
QU-F3	Important assumptions and causes of uncertainty can significantly effect the decision-making when using results from any category and QU-F3 is inconsistent with QU-F1(l) for categories I and II.	Qualification	<u>Cat I and II</u>: **"DOCUMENT important assumptions and causes of uncertainty, such as: possible optimistic or conservative success criteria, ... possible spatial dependencies, etc."** ~~No requirement to document important assumptions and causes of uncertainty.~~
<u>4.5.9 - LE</u>			
4.5.9.1	-----------------	No objection	----------------------------
Table 4.5.9-1		No objection	
Tables 4.5.9-2(a) thru 4.5.9-2(g)			
LE-A1,A2, A3, A4, A5	-----------------	No objection	----------------------------
LE-B1, B3	-----------------	No objection	----------------------------
LE-B2	The modifiers (e.g., may, possible) in Cat I, II, and III appear to eliminate the distinction between Category I, II, and III, and do not provide a minimum in Cat I or II.	Clarification	<u>Cat I</u>: "...An acceptable alternative is the approach in NUREG/CR-6595 [Note (1)]." ~~Realistics loads may be used when available.~~ <u>Cat II</u>: USE containment loads....that are realistic ~~when possible~~ for significant challenges to containment. Conservative treatment ~~may be~~ ***is*** used for non-dominant LERF contributors. <u>Cat III</u>: USE containment loads....that are realistic ~~when possible~~ for ~~significant~~ challenges to containment.
LE-C1,C5 C6, C7	-----------------	No objection	----------------------------
LE-C2	It is not clear what is an acceptable justification; as such, the requirement is too open ended. Credit for equipment repair is to be consistent with the Level 1 requirements.	Clarification	<u>Cat II and III</u>: "...Repair of equipment may be considered if **it can be established that the plant conditions do not preclude repair and actuarial data exists from which to estimate the repair failure probability."** ~~appropriate justified~~

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Index No	Issue	Position	Resolution
LE-C3	It is not clear what is an acceptable justification; as such, the requirement is too open ended.	Clarification	Cat II and III: "...PROVIDE technical justification **(by plant-specific or applicable generic calculations demonstrating the feasibility of the actions, scrubbing mechanisms, or beneficial failures)** ..."
LE-C4	The modifiers (e.g., may, possible) in Cat I, II and III appear to eliminate the distinction between Category I, II and III, and do not provide a minimum in Cat I or II.	Clarification	Cat I: "USE conservative system success criteria." ~~Realistic criteria may be used.~~ Cat II: "....Conservative system success criteria ~~may be~~ **is** used for non-dominant LERF contributors."
LE-C8	The modifiers (e.g., may, possible) in Cat I, II and III appear to eliminate the distinction between Category I, II and III, and do not provide a minimum in Cat I or II.	Clarification	Cat I: "...An acceptable alternative is the approach in NUREG/CR-6595 [Note (1)]." ~~A realistic treatment may be used.~~ Cat II: "....in a realistic manner ~~when possible~~. Conservative treatment ~~may be~~ ***is*** used for non-dominant LERF contributors. Cat III: "TREAT .... in a realistic manner" ~~when possible~~.
LE-C9	The modifiers (e.g., may, possible) in Cat I, II and III appear to eliminate the distinction between Category I, II and III, and do not provide a minimum in Cat I or II.	Clarification	Cat I: "...An acceptable alternative is the approach in NUREG/CR-6595 [Note (1)]." ~~A realistic treatment may be used.~~ Cat II: "....in a realistic manner ~~when possible~~. Conservative treatment ~~may be~~ **is** used for non-dominant LERF contributors. Cat III: "TREAT .... in a realistic manner" ~~when possible~~.
LE-C10	Modifiers in Cat I appear to eliminate the distinction between Cat I and II, and therefore, there is not a minimum in Cat I It is not clear what is an acceptable justification; as such, the requirement is too open ended.	Clarification	Cat I: "...An acceptable alternative is the approach in NUREG/CR-6595 [Note (1)]." ~~Realistic treatment may be used.~~ Cat II and III: "...JUSTIFY any credit taken for reducing the class of the release by scrubbing **(i.e., provide the source of the decontamination factor used)**."
LE-D1	It is not clear what is an acceptable justification; as such, the requirement is too open ended. The 'may' term in Cat I and II appears to eliminate the distinction between Cat I and II, and does not provide a minimum in Cat I or II.	Clarification	Cat I: "....USE a conservative evaluation of containment capacity for dominant containment failure modes. ~~A realistic evaluation may be used.~~..... EVALUATE impact of ..... vent pipe bellows, **and** INCLUDE ~~in~~ **as potential** failure modes, as required..... Such considerations ~~may~~ need to be included for small volume containments...."

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Index No	Issue	Position	Resolution
			Cat II: "...PERFORM a realistic containment capacity analysis for dominant containment failure modes. ~~The analysis may include some conservative parameters~~ **USE a conservative evaluation of containment capacity for non-dominant containment failure modes.** EVALUATE impact of ..... vent pipe bellows, **and** INCLUDE ~~in~~ **as potential** failure modes, as required.... JUSTIFY applicability to the plant being evaluated. **Analyses may consider use of similar containment designs or estimating containment capacity based on design pressure and a realistic multiplier relating containment design pressure and median ultimate failure pressure.** Quasi-static containment capability evaluations .... Such considerations ~~may~~ need to be included for small volume containments...."
LE-D2	It is not clear what is an acceptable justification; as such, the requirement is too open ended.	Clarification	Cat I: "...JUSTIFY applicability of generic and other analyses. **Analyses may consider conservative comparison with similar failure locations in similar containment designs.** An acceptable alternative...."
LE-D3	Stating a "realistic evaluation is acceptable" in Cat I appears to eliminate the distinction between Cat I and II, and does not provide a minimum in Cat I. It is not clear what is an acceptable justification; as such, the requirement is too open ended.	Clarification	Cat I: "USE a conservative evaluation of interfacing system failure probability for ~~dominant~~ failure modes. ~~A realistic evaluation is acceptable.~~ IF generic analyses generated for similar plants are used, JUSTIFY applicability to the plant being evaluated. **Analyses may consider conservative comparison with similar interfacing systems in similar containment designs."** Cat II: "PERFORM a **realistic** interfacing system failure probability analysis. Evaluation .... may include conservatisms. **USE a conservative evaluation of interfacing system failure probability for non-dominant failure modes**..... JUSTIFY applicability to the plant being evaluated. **Analyses may consider realistic comparison with similar interfacing systems in similar containment designs** Cat III: "PERFORM a realistic interfacing system failure probability analysis for ~~dominant~~ the failure modes.....

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Index No	Issue	Position	Resolution
LE-D4	The 'may' term in Cat I appears to eliminate the distinction between Cat I and II, and does not provide a minimum in Cat I. It is not clear what is an acceptable justification; as such the requirement is too open ended.	Clarification	Cat I: "USE a conservative evaluation of secondary side isolation capability for ~~dominant~~ SG tube failure modes. ~~A realistic evaluation may be used.~~ IF generic analyses generated for similar plants are used, JUSTIFY applicability to the plant being evaluated. **Analyses may consider conservative comparison with similar isolation capability in similar containment designs."** Cat II: "PERFORM a **realistic** secondary side isolation capability analysis for dominant SG tube failure modes. Evaluation .... may include conservatisms. **USE a conservative evaluation of secondary side isolation capability for non-dominant SG tube failure modes.**.... JUSTIFY applicability to the plant being evaluated. **Analyses may consider realistic comparison with similar isolation capability in similar containment designs"** Cat III: "PERFORM a realistic secondary side isolation capability analysis for ~~dominant~~ SG tube failure modes..."
LE-D5	The modifiers (e.g., may, possible) in Cat I, II and III appear to eliminate the distinction between Cat I, II and III, and do not provide a minimum in Cat I or II.	Clarification	Cat I: "TREAT induced SG tube rupture in a conservative manner." ~~A realistic treatment may be used.~~ Cat II: "TREAT induced SG tube rupture in a realistic manner, ~~when practical. Conservative treatment may be used, when justified.~~"
LE-D6	The 'may' term in Cat I appears to eliminate the distinction between Cat I and II, and does not provide a minimum in Cat I.	Clarification	Cat I: "TREAT containment isolation in a conservative manner." ~~A realistic treatment may be used.~~ Cat II: "TREAT containment isolation in a realistic manner **for dominant contributors**. Conservative treatment **is** ~~may be~~ used for non-dominant contributors.
LE-E1,E3	-----------------	No objection	----------------------------
LE-E2	Modifiers in Cat II appears to eliminate the distinction between Cat II and III, and therefore, there is not a minimum in Cat II.	Clarification	Cat II: "USE realistic parameter estimates ~~when possible~~ for dominant LERF sequences. **Conservative parameter estimates are used for non-dominant LERF sequences.**" Cat III: "USE realistic parameter estimates ~~when possible~~."
LE-F1	Inconsistent with QU-D5.	Clarification	Cat I: "LIST the dominant contributors to LERF....REVIEW for reasonableness." Cat II and III: PERFORM an importance analysis .... to LERF."

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
LE-F2	Inconsistent with QU-E	Clarification	Cat III: **"PROVIDE uncertainty analysis which identifies the key sources of uncertainty and includes sensitivity studies."**
LE-G1, G2,G3, G4,G5, G6,G7, G8	----------------	No objection	---------------------------
Table 4.5.9-3	----------------	No objection	---------------------------
Chapter 5			
5.1 thru 5.3	----------------	No objection	---------------------------
5.4	As a PRA is maintained, it may go through changes such that the results are significantly impacted (e.g., very different contributors, order magnitude change in CDF).	Clarification	3rd para: "Changes to a PRA due to PRA maintenance **and PRA upgrade (where applicable**) shall meet the requirements of Section 4. **Prior to an application, if the changes have significantly impacted the PRA results, the maintained PRA shall receive a peer review and which satisfy the peer review requirements specified in Section 6, but limited to aspects of the PRA that have been maintained**. Upgrades of a PRA **shall receive a peer review and** shall satisfy the peer review requirements specified in Section 6, but limited to aspects of the PRA that have been upgraded."
5.5	The use of the word "should" does not provide a minimum requirement.	Clarification	"....These changes **shall** ~~should~~ be addressed in a fashion..."
5.6		No objection	
5.7	----------------	No objection	---------------------------
5.8 (a)-(d), (f)-(g)	----------------	No objection	---------------------------
5.8 (e)	It is unclear what is to be documented from the peer review.	Clarification	"(e) record of the performance and results of the appropriated PRA reviews **(consistent with the requirements of Section 6.6)**"
Chapter 6			

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
6.1	The purpose, as written, implies that it is solely an audit against the requirements of Section 4. A key objective of the peer review is to ensure when evaluating the PRA against the requirements in Section 4, the "quality" (i.e., strengths and weaknesses) of the PRA; this goal is to be clearly understood by the peer review team.	Clarification	"...The peer review shall assess the PRA to the extent necessary to determine if the methodology and its implementation meet the requirements of this Standard **to determine the strengths and weaknesses in the PRA. Therefore, the peer review shall also assess the appropriateness of the significant assumptions.** The peer review need not assess..."
6.1.1	See issue discussed on 5.4.	Clarification	"....When peer reviews are conducted on **PRA maintenance** or PRA upgrades, the latest review shall be considered the review of record...."
6.1.2	See issue discussed on 5.4.	Clarification	<u>3rd para</u>: "NEI-00-02 provides an example of an acceptable review methodology **(subject to clarifications and qualifications described in Appendix B of this regulatory guide)**; however, the differences....."
<u>6.2</u>			
6.2.1	-----------------	No objection	----------------------------
6.2.2	As written, in Section 6.2.2.2, it appears that the constraints on the team members only apply when the review is performed for a PRA upgrade. See issue discussed on 5.4.	Clarification	"6.2.2.1 The peer review team members individually shall (a) be knowledgeable....(b) be experienced ....for which the reviewer is assigned. **The peer review team members shall (a) not be allowed to review their own work or work for which they have contributed, (b) not be allowed to review a PRA for which they have a conflict of interest, such as a financial or career path incentive or disincentive that may influence the outcome of the peer review.** 6.2.2.2 When a peer review is being performed on a PRA maintenance or a PRA upgrade, reviewers shall have knowledge and experience appropriate for the specific PRA Elements being reviewed. However, the other requirements of this Sections shall also apply." ~~The peer review team members shall (a) not be allowed to review their own work or work for which they have contributed, (b) not be allowed to review a PRA for which they have a conflict of interest, such as a financial or career path incentive or disincentive that may influence the outcome of the peer review.~~

Table A-1 Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
6.2.3	See issue discussed on 5.4. As written, it appears that the last paragraph could allow a team to be composed of a single member.	Clarification	5th para: "...such as a review of a **maintenance or** upgrade of a PRA element,..." 6th para: "Exceptions to the requirements of this paragraph may be taken based on the availability of appropriate personnel to develop a team *(where a team is a group of several individuals).* All such exceptions shall be documented in accordance with para. 6.6 of this Standard."
6.3	As written, there does not appear to be a minimum set. The requirement as written provides "suggestions." A minimal set of items is to be provided; the peer reviewers have flexibility in deciding on the scope and level of detail for each of the minimal items.	Clarification	1st para: "The peer review team shall use the requirements..... of this Standard. **For each PRA element, a set of review topics required for the peer review team are provided in the subparagraphs of para. 6.3.** ~~Some subparagraphs of para. 6.3 contain specific suggestions for the review team to consider during the review.~~ Additional material for those Elements may be reviewed depending on the results obtained. The judgment of the reviewer shall be used to determined the specific scope and depth of each review topic for each PRA element."
6.3.1	-----------------	No objection	----------------------------
6.3.2	-----------------	No objection	----------------------------
6.3.3 (a)-(j)	-----------------	No objection	----------------------------
6.3.4	-----------------	No objection	----------------------------
6.3.5	The requirement, as written, is only for the reviewers to look at the HEPs and does not include the HFEs. Identification of the HFEs is a major part of the HRA, as indicated in Section 4.5.5.	Qualification	**"(i) the selection and identification of the HFEs associated with the HEPs for the above review topics."**
6.3.6 (a)	As written, it does not appear that review of the data values would include the defined boundary for the component, which is an essential aspect of the review. It is not clear that "contributing" would include components, if degraded would have a significant impact.	Clarification	"(a) data values **and the defined component boundary** for component failure modes contributing to the CDF or LERF **(including active components with high RAW values)** calculated in the PRA"
6.3.6 (b)-(d)	-----------------	No objection	----------------------------
6.3.7	-----------------	No objection	----------------------------
6.3.8		No objection	
6.3.9	-----------------	No objection	----------------------------
6.4	-----------------	No objection	----------------------------

Table A-1   Staff Position on ASME RA-S-2002

Index No	Issue	Position	Resolution
6.5	See issue discussed on 5.4.	Clarification	"The peer review team shall review the process, including implementation, for **maintaining or** upgrading the PRA against the configuration control requirements of this Standard."
6.6			
6.6.1	As written, It is not clear whether certain essential items are included in the documentation requirements that are necessary to accomplish the goal of the peer review.	Clarification	**"(j) identification of the strengths and weaknesses that have a significant impact on the PRA** **(k) assessment (e.g., significance) of the assumptions playing a key role in the PRA results** **(l) confirmation of the capability categories noted in the PRA for each SR from Section 4.5 of the Standard."**
6.6.2	-----------------	No objection	----------------------------

APPENDIX B
NRC POSITION ON THE NEI PEER REVIEW PROCESS (NEI 00-02)

INTRODUCTION

The NEI Peer Review Process is documented in NEI 00-02. It provides guidance for the peer review of PRAs and the grading of the PRA subelements into one of four capability categories. This document is supplemented by the NEI subtier criteria (to be included in a revised version of NEI 00-02). The NEI subtier criteria provide the criteria for assigning a grade to each PRA subelement. The NEI subtier criteria for a Grade 3 PRA have been compared by NEI to the requirements in the ASME PRA standard listed for a Capability Category II PRA. A comparison of the criteria for other grades/categories of PRAs was not performed since NEI contends that the results of the peer review process generally indicate the reviewed PRAs are consistent with the Grade 3 criteria in NEI 00-02. The comparison of the NEI subtier criteria with the ASME PRA standard has indicated that some of the Capability Category II ASME PRA standard requirements are not addressed in the NEI Grade 3 PRA subtier criteria. Thus, NEI has provided guidance to the licensees to perform a self-assessment of their PRAs against the criteria in the ASME PRA standard that was not addressed during the NEI peer review of their PRA. A self-assessment is likely to be performed in support of risk-informed applications. This self-assessment guidance will eventually be included in NEI 00-02.

This appendix provides the staff's position on the NEI Peer Review Process (i.e., NEI 00-02), the proposed self-assessment process, and the self-assessment actions. The staff's positions are categorized as following:

- No objection: the staff has no objection to the requirement.

- No objection with clarification: the staff has no objection to the requirement. However, certain requirements, as written, are either unclear or ambiguous, and therefore the staff has provided its understanding of these requirements.

- No objection subject to the following qualification: the staff has a technical concern with the requirement and has provided a qualification to resolve the concern.

In the proposed staff resolution, the staff clarification or qualification that is needed for the staff to have no objection are provided.

NRC POSITION ON NEI 00-02

Table B-1 provides the NRC position on the NEI Peer Review Process documented in NEI 00-02. The stated positions are based on the historical use of NEI 00-02 and on the performance of a self assessment to address those requirements in the ASME PRA standard that are not included in the NEI subtier criteria. If NEI 00-02 is used for future peer review, the staff would have to revisit the stated positions in this appendix.

Table B-1. NRC Regulatory Position on NEI 00-02.

Report Section	Regulatory Position	Commentary/Resolution
Section 1 INTRODUCTION		
1.1 Overview and Purpose	Clarification	The NEI process uses “a set of checklists as a framework within which to evaluate the scope, comprehensiveness, completeness, and fidelity of the PRA being reviewed.” The checklists by themselves are insufficient to provide the basis for a peer review since they do not provide the criteria that differentiates the different grades of PRA. The NEI subtier criteria provide a means to differentiate between grades of PRA. The ASME PRA standard (with the staff’s position provided in Appendix A of this regulatory guide) can provide an adequate basis for a peer review of an at-power, internal events PRA (including internal flooding) that would be acceptable to the staff. Since the NEI subtier criteria does not address all of the requirements in the ASME PRA standard, the staff’s position is that a peer review based on these criteria is incomplete. The PRA standard requirements that are not included in the NEI subtier criteria (identified for a Grade 3 PRA in Table B-3) need to be addressed in the NEI self-assessment process as endorsed by the staff in this appendix.
1.1 Scope	Clarification	This section states that the NEI peer review process is a one-time evaluation process but indicates that additional peer review **may** be required if substantial changes are made to the PRA models or methodology. The staff position on additional peer reviews is to follow the guidance in Section 5 of the ASME PRA standard which **requires** a peer review for both PRA maintenance (plant changes) and updates (PRA methodology changes).
1.2 Historical Perspective	No objection	
1.3 Process	Clarification	Figure 1-3 indicates in several locations that the checklists included in NEI 00-02 are used in the peer review process. As indicated in the comment on Section 1.1 of NEI 00-02, the staff’s position is that a peer review based on the checklists and supplemental subtier criteria is incomplete. The NEI self-assessment process, as endorsed by the staff in this appendix, should be performed.
1.4 PRA Peer Review Criteria and Grades	Clarification	The NEI peer review process provides a summary grade for each PRA element. The use of a PRA for risk-informed applications needs to be determined at the subelement level. The staff does not agree with the use of an overall PRA element grade in the assessment of a PRA.
	Clarification	This section indicates that “the process requires that the existing PRA meet the process criteria or that enhancements necessary to meet the criteria have been specifically identified by the peer reviewers and committed to by the host utility.” Thus, the assigned grade for a subelement can be contingent on the utility performing the prescribed enhancement. An application submittal that utilizes the NEI peer review results needs to identify any of the prescribed enhancements that were not performed.
	Clarification	The staff believes that the use of PRA in a specific application should be of sufficient quality to support its use by the decision makers for that application. The NEI peer review process does not require the documentation of the basis for assigning a grade for each specific subtier criterion. However, the staff position is that assignment of a grade for a specific PRA subelement implies that all of the requirements listed in the NEI subtier criteria have been met.
1.5	No Objection	

Table B-1. NRC Regulatory Position on NEI 00-02.

Report Section	Regulatory Position	Commentary/Resolution
Section 2 PEER REVIEW PROCESS		
2.1 Objectives	Clarification	See comment for Section 1.1.
2.2 Process Description	Clarification	The ASME PRA standard (with the staff's position provided in Appendix A of this regulatory guide) can provide an adequate basis for a peer review of an at-power, internal events PRA (including internal flooding) that would be acceptable to the staff. Since the NEI subtier criteria does not address all of the requirements in the ASME PRA standard, the staff's position is that a peer review based on these criteria is incomplete. The PRA standard requirements that are not included in the NEI subtier criteria (identified for a Grade 3 PRA in Table B-3) need to be addressed in the NEI self-assessment process as endorsed by the staff in this appendix.
Steps 4, 7, & 8	Clarification	See previous comment.
2.3 PRA Peer Review Team	Clarification	The peer reviewer qualifications do not appear to be consistent with the following requirements specified in Section 6.2 of the ASME PRA standard: the need for familiarity with the plant design and operation the need for each person to have knowledge of the specific areas they review the need for each person to have knowledge of the specific methods, codes, and approaches used in the PRA The NEI self-assessment process needs to address the peer reviewer qualifications with regard to these factors.
2.4 and 2.5	No objection	
Section 3 PRA PEER REVIEW PROCESS ELEMENTS AND GUIDANCE		
3.1	No objection	
3.2 Criteria and 3.3 Grading	Clarification	See comment for Section 1.1.
3.3 Grading	Clarification	The NEI peer review process grades each PRA element from 1 to 4, while the ASME PRA standard uses Capability Categories I, II, and III. The staff equates Grades 2, 3, and 4 as corresponding to Capability Categories I, II, and III, respectively.
	Qualification	The staff believes that different applications of a PRA can require different PRA subelment grades. The NEI peer review process is performed at the subelement level and does not provide an overall PRA grade. Therefore, it is inappropriate to suggest an overall PRA grade for the specific applications listed in this section. The staff does not agree with the assigned overall PRA grades provided for the example applications listed in this section of NEI 00-02.
3.4 Additional Guidance on the Technical Elements Review	Clarification	The general use and interpretation of the checklists in the grading of PRA subelements is addressed in this section. The subtier criteria provide a more substantial documentation of the interpretations of the "criteria" listed in the checklists. However, as previously indicated, the subtier criteria does not fully address all of the PRA standard requirements. The PRA standard requirements that are not included in the NEI subtier criteria (identified for a Grade 3 PRA in Table B-3) need to be addressed in the NEI self-assessment process as endorsed by the staff in this appendix.

Table B-1. NRC Regulatory Position on NEI 00-02.

Report Section	Regulatory Position	Commentary/Resolution
Section 4 PEER REVIEW PROCESS RESULTS AND DOCUMENTATION		
4.1 Report	Clarification	A primary function of a peer review is to identify those assumptions and models that have a significant impact on the results of a PRA and to pass judgement on the validity and appropriateness of the assumptions. The peer review requirements in the ASME PRA standard requires analysis of important assumptions. A review of the NEI 00-02 and the subtier criteria section on quantification and results interpretation failed to identify specific wording in any requirements to review the impact of key assumptions on the results. However, there are requirements to "identify unique or unusual sources of uncertainty not present in typical or generic plant analyses." Since the evaluation of the impact of assumptions is critical to the evaluation of a PRA and its potential uses, the NEI peer review process need to address all important assumptions, not just those that are unique or unusual. The NEI self-assessment process needs to address those assumptions not reviewed in the NEI peer review process.
	Qualification	The NEI peer review report provides a summary grade for each PRA element. The use of a PRA for risk-informed applications needs to be determined at the subelement level. The staff does not agree with the use of an overall PRA element grade in the assessment of a PRA.
4.2 and 4.3	No objection	
Appendix A PREPARATION MATERIAL FOR THE PEER TEAM REVIEW		
A.1 through A.6	No objection	
A.7 Sensitivity Calculations	Clarification	A list of sensitivity calculations that a utility can perform prior to the peer review is provided. Additional or alternative sensitivities can be identified by the utility. Sensitivity calculations that address key assumptions that may significantly impact the risk-informed applications results needs to be considered in the NEI self-assessment process.
A.8 through A.10	No objection	
Appendix B TECHNICAL ELEMENT CHECKLISTS		
Checklist tables	No objection	As previously stated, the staff position is that the checklists by themselves are insufficient to provide the basis for a peer review (see the comment for Section 1.1). Because of this, the staff has not reviewed the contents or the assigned grades in these checklists. However, the staff position on the comparison of the Grade 3 NEI subtier criteria to the Capability Category II requirements in the ASME PRA standard is documented in Table B-3.

Table B-1. NRC Regulatory Position on NEI 00-02.

Report Section	Regulatory Position	Commentary/Resolution
Appendix C GUIDANCE FOR THE PEER REVIEW TEAM		
C.1 Purpose	No objection	
C.2 Peer Review Team Mode of Operation	No objection	
C.3 Recommended Approach to Completing the Review	Clarification	See comment for Section 4.1.
C.4 Grading	Clarification /Qualification	See the two comments on Section 3.3.
C.5 Peer Review Team Good Practice List	No objection	
C.6 Output	Qualification	See the comments on Section 4.1.
C.7 Forms	Clarification	The staff does not agree with the use of an overall PRA element grade (documented in Tables C.7-5 & C.7-6) in the assessment of a PRA.

NRC POSITION ON SELF-ASSESSMENT PROCESS

The staff position on the self-assessment process proposed by NEI to address the requirements in the ASME PRA standard that are not included in the NEI subtier criteria are addressed in this section. Both the self-assessment process and the specific actions recommended by NEI to address missing ASME standard requirements are addressed.

Table B-2 provides the NRC position on the NEI self-assessment process. The staff's position on specific aspects of this process use the categories provided in Section B.2 of this regulatory guide.

Table B-2. NRC Regulatory Position on NEI Self-Assessment Process.

Report Section	Regulatory Position	Commentary/Resolution
Summary	No objection	
Regulatory Framework	No objection	
Industry PRA Peer Review Process	Clarification	See the staff comments on the NEI peer review process provided in Table B-1.
ASME PRA Standard	Clarification	See the staff comments on the ASME PRA standard provided in Appendix A of this regulatory guide.

Table B-2. NRC Regulatory Position on NEI Self-Assessment Process.

Report Section	Regulatory Position	Commentary/Resolution
Comparison of NEI 00-02 and ASME Standard	Clarification	The staff does not agree or disagree with the number of supporting requirements of the ASME PRA standard that are addressed (completely or partially) in the NEI subtier criteria. The staff's focus is on ensuring that the self-assessment addresses important aspects of a PRA that are not explicitly addressed in the NEI subtier criteria.
General Notes for Self-Assessment Process		
1.	Clarification	The review of the NEI comparison of the subtier criteria to the ASME PRA standard was performed under the condition that all of the requirements in the NEI subtier criteria be mandatory. Thus, the staff position on the self-assessment process is predicated on the requirement that all of the requirements in the NEI subtier criteria are interpreted as "shall" being required. The self-assessment process needs to identify subelements using the verb "should" that were not required and the requirements where alternative approaches or substantially different interpretations were used.
2.	Clarification	Certain ASME PRA standard requirements, although not explicitly listed in the NEI subtier criteria, may generally be included as good PRA practice. Credit may be taken for meeting these ASME requirements **subject to confirmation in the self-assessment that the requirements were in fact addressed by the peer review**. Table B-3 identifies the ASME PRA standard requirements not explicitly addressed in the NEI subtier criteria that the staff believes needs to be addressed in the NEI self-assessment process.
3.	No objection	
Self-Assessment Process		
1.	Clarification	The ASME PRA standard and the staff's position on the standard documented in Appendix A of this regulatory guide needs to be used in the self-assessment of the PRA subelements required for the application against the missing requirements.
2. A	Clarification	The staff's comments on which ASME PRA requirements that needs to be addressed in the self-assessment and on the NEI suggested actions (Appendix 1 of the NEI self-assessment guidance) are provided in Table B-3. The list of items subject to the self assessment needs to include those requirements where "Yes" is listed in the "Addressed by NEI" column and there are actions listed in the "Industry Self Assessment Actions" column.
2. B	No objection	
2. C	Clarification	For the PRA subelements assigned a grade other than a Grade 3 in the NEI peer review (i.e., a Grade 1, 2, or 4), a self-assessment of those PRA subelements required for the application against the corresponding Capability Category requirements in the ASME PRA standard (as qualified in Appendix A of this regulatory guide) needs to be performed and documented.
2. D	No objection	
3.	No objection	

Tables B-3 and B-4 provide the staff position on the NEI comparison of the NEI 00-02 (including the subtier criteria) to the ASME PRA standard and the self-assessment actions provided in Appendix 1 of the NEI self-assessment process. The staff's position on the ASME PRA standard documented in Appendix A of this regulatory guide was considered in the comparison. The review of the NEI comparison and proposed actions was performed under the assumption that all of the requirements in the NEI subtier criteria were treated as mandatory. Thus, the staff position is predicated on the requirement that all of the requirements in the NEI subtier criteria are interpreted as "shall" being required.

Table B-3 provides the staff position of the "explanatory" table preceding the comparison and self assessment actions table provided in Appendix 1. The first two columns are taken directly from the table in Appendix 1.

Table B-3 NRC Regulatory Positions on Actions Utilities Need to Take in Self Assessment Actions

TEXT	UTILITY ACTIONS	REGULATORY POSITION	COMMENT/RESOLUTION
YES and NONE in Action column	None	No objection	
YES and clarifications included in action column	Review comment. It is believed Peer Review Process addressed the requirements. Unless it is suspected a problem exists, no further action required.	Clarification	As written, no action may be taken which is in conflict with the actions specified in the table providing the industry self assessment actions. It is assumed that the actions provided in that table will be taken.
PARTIAL	Take action(s) specified in comments column	No Objection	
NO	Take action(s) specified in comments column	No Objection	

In Table B-4, the "NEI Assessment" includes, for each supporting requirement in the ASME standard (ASME SR), NEI's assessment if this SR is addressed in NEI 00-02 (NEI 00-02), if it is addressed then where it is addressed (NEI 00-02 ELEMENTS), and whether NEI recommends any self assessment by the licensee (INDUSTRY SELF ASSESSMENT ACTIONS).

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				**REGULATORY POSITION**
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
INITIATING EVENTS				
IE-A1	Yes	IE-7, IE-8, IE-9, IE-10	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
IE-A2	Yes	IE-5, IE-7, IE-9, IE-10	Confirm that the initiators were included. This can be done by either citing peer review facts and observations (F&O's) or examples from your model. NEI 00-02 does not explicitly mention human-induced initiators but in practice peer reviews have addressed this.	No objection with clarification: Self-assessment needs to also confirm that human-induced initiators were included; the definition of active component provided in the clarification of IE-A2 in Appendix A needs to be used when verifying ISLOCAs were modeled; IE-7 is the applicable NEI 00-02 element
IE-A3	Yes	IE-8, IE-9	None	No objection; IE-8 is the applicable NEI 00-02 element
IE-A4	Partial	IE-5, IE-7, IE-9, IE-10	Check for initiating events that can be caused by a train failure as well as a system failure.	No objection; IE-10 is the applicable NEI 00-02 element
IE-A5	Yes	IE-8	No further action required. Identification of low power and shutdown events not explicitly addressed in NEI 00-02, but in practice, the peer reviews have addressed events resulting in a controlled shutdown that include a scram prior to reaching low power.	No objection with clarification: Self-assessment needs to document if events at low power that could occur at power were included in the PRA
IE-A6	Yes	IE-16	No further action required. Specifying plant Operations, etc review and participation is not explicitly addressed in NEI 00-02, but in practice, the peer reviews have addressed the need for examination of plant experience (e.g., LERs), and input from knowledgeable plant personnel.	No objection with clarification: Self-assessment needs to document if interviews with plant operations were used to identify potential IEs. Per the clarification of IE-A6 provided in Appendix A, interviews conducted at similar plants are not acceptable justification for excluding IEs.
IE-A7	Yes	IE-16, IE-10	None	No objection with qualification: Self-assessment needs to document if precursor information was used in IE quantification.
IE-A8	Yes	IE-10	None	No objection
IE-A9	Yes	IE-5, IE-10	None	No objection; IE-5 is the applicable NEI 00-02 element
IE-A10	Yes	IE-6	None	No objection
IE-B1	Yes	AS-4, IE-4	None	No objection
IE-B2	Yes	IE-4, IE-7	None	No objection
IE-B3	Yes	IE-4, IE-12	None	No objection
IE-B4	Yes	IE-4	None	No objection
IE-C1	Yes	IE-13, IE-15, IE-16, IE-17	None	No objection with qualification: Self-assessment needs to confirm that appropriate justification for crediting recovery actions was used in the PRA. Appropriate justification is provided in the clarification of IE-C1 provided in Appendix A. IE-16 is the applicable NEI 00-02 element; .
IE-C2	Yes	IE-13, IE-16	None	No objection; IE-16 is the applicable NEI 00-02 element

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
IE-C3	No		Document that the ASME standard requirements were met. NEI 00-02 does not address this supporting requirement.	No objection
IE-C4	No		Document that the ASME standard requirements were met. Specific screening criteria were not used in NEI-00-02, but bases for screening of events were examined in the peer reviews. The text of the ASME standard needs to be assessed.	No objection. Acceptable criteria for dismissing IEs are listed in IE-C4 in the ASME PRA standard.
IE-C5	No req. for Cat II	N/A		No objection; the ASME PRA standard only requires time trend analysis for a Cat III PRA
IE-C6	Yes	IE-15, IE-17	Check that fault tree analysis when used to quantify IE's, meet the appropriate systems analysis requirements.	No objection
IE-C7	No		Document that the ASME standard requirements were met. NEI 00-02 does not address this supporting requirement.	No objection
IE-C8	No		Document that the ASME standard requirements were met. NEI 00-02 does not address this supporting requirement.	No objection
IE-C9	Yes	IE-15, IE-16	Check that the recovery events included in the IE fault trees meet the appropriate recovery analysis requirements. This can be done by either citing peer review F&O's or examples from your model.	No objection
IE-C10	Yes	IE-13	None	No objection
IE-C11	Yes	IE-12, IE-13, IE-15	Check that the expert elicitation requirements in the ASME PRA standard were used when expert judgement was applied to quantifying extremely rare events.	No objection; IE-15 is the applicable NEI 00-02 element
IE-C12	Yes	IE-14	NRC has added a clarification in Appendix A on IE-C12 (to be confirmed by them); the features listed for a Grade 4 PRA (in the subtier criteria) must also be considered for a Grade 3 PRA.	No objection
IE-D1	Partial	IE-18, IE-19	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC request for additional information (RAIs) relative to applications.	No objection; see the clarification to IE-D1 in Appendix A

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
IE-D2	Partial	IE-9, IE-20	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
IE-D3	Partial	IE-9, IE-18, IE-19	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
IE-D4	Partial	AS-4, DE-5, SY-21	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
ACCIDENT SEQUENCE ANALYSIS				
AS-A1	Yes	AS-4, AS-8	None	No objection
AS-A2	Yes	AS-6, AS-7, AS-8, AS-9, AS-17	None	No objection; AS-6 is the applicable NEI 00-02 element
AS-A3	Yes	AS-7, SY-17, AS-17	None	No objection; AS-17 is the applicable NEI 00-02 element
AS-A4	Yes	AS-19, SY-5	None	No objection; AS-19 is the applicable NEI 00-02 element
AS-A5	Yes	AS-5, AS-18, AS-19, SY-5	None	No objection
AS-A6	Yes	AS-8, AS-13, AS-4	None	No objection
AS-A7	Yes	AS-4, AS-5, AS-6, AS-7, AS-8, AS-9	None	No objection
AS-A8	Partial	AS-20, AS-21, AS-22, AS-23	Since there is no explicit requirement for steady state condition for end state in NEI 00-02 checklists, this should be evaluated even though this was an identified issue in some reviews. This can also be done by either citing peer review F&O's or examples from your model. Refer to SC-A5.	No objection
AS-A9	Yes	AS-18, TH-4	None	No objection with qualification; AS-A9 is related to the environment conditions challenging the equipment during the accident sequence, AS-18 and TH-4 are focused on the initial success criteria.

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
AS-A10	Yes	AS-4, AS-5, AS-6, AS-7, AS-8, AS-9, AS-19, SY-5, SY-8, HR-23	None	No objection; AS-4 and AS-7 are the applicable NEI 00-02 elements.
AS-A11	Yes	AS-8, AS-10, AS-15, DE-6, AS Checklist Note 8	AS-8 states that transfers may be treated quantitatively or qualitatively while AS-15 states that transfers between event trees should be explicitly treated in the quantification. The guidance in AS-15 must be followed.	No objection
AS-B1	Yes	IE-4, IE-5, IE-10, AS-4, AS-5, AS-6, AS-7, AS-8, AS-9, AS-10, AS-11, DE-5	None	No objection; AS-4 is the applicable NEI 00-02 element
AS-B2	Yes	AS-10, AS-11, DE-4, DE-5, DE-6	None	No objection; AS-10 and AS-11 are the applicable NEI 00-02 elements
AS-B3	Yes	DE-10, SY-11, TH-8, AS-10	None	No objection; AS-10 and SY-11 are the applicable NEI 00-02 elements
AS-B4	Yes	AS-8, AS-9, AS-10, AS-11	NEI-00-02 does not attempt to instruct on use of specific analysis software; ensure the software is used properly.	No objection with clarification: Self-assessment needs to confirm that the requirement of AS-B4 was met (the staff disagrees that this is a software issue).
AS-B5	Yes	DE-4, DE-5, DE-6, AS-10, AS-11, QU-25	NEI 00-02 does not provide an explicit discussion of flag settings. Ensure settings are properly made.	No objection; AS-10, AS-11, DE-6, QU-25 are the applicable NEI 00-02 elements
AS-B6	Yes	AS-13	None	No objection
AS-C1	Yes	AS-24, AS-25	None	No objection
AS-C2	Yes	AS-24, AS-25; AS-26	None	No objection; AS-26 is the applicable NEI 00-02 element
AS-C3	Partial	AS-11, AS-17, AS-20, AS-24, TH-5, DE-6	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
AS-C4	Partial	AS-11, AS-24	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications..	No objection
SUCCESS CRITERIA				
SC-A1	Yes	AS-20, AS-22, AS FOOTNoTE 4	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
SC-A2	Yes	TH-4, TH-5, TH-7, AS-22, AS FOOTNoTE 4	None	No objection
SC-A3	Yes	AS-6, AS-7, AS-17, AS-20	None	No objection; AS-6 is the applicable NEI 00-02 element
SC-A4	Yes	AS-7, AS-17, AS-18, SY-17, TH-9, IE-6, DE-5, SY-8	Confirm that this requirement is met. This can be done by either citing peer review F&O's or examples from your model. Although there is no explicit requirement in NEI 00-02 that mitigating systems shared between units be identified, in practice, review teams have evaluated this.	No objection
SC-A5	Partial	AS-21, AS-23, AS-20	Ensure mission times are adequately discussed as per the ASME standard. Since there are no explicit requirements for steady state condition for end state, refer to the ASME standard for requirements or cite peer review F&O's or examples from your model. Refer to AS-A8.	No objection
SC-A6	Yes	AS-5, AS-18, AS-19, TH-4, TH-5, TH-6, TH-8, ST-4, ST-5, ST-7, ST-9, SY-5	None	No objection; TH-5 is the applicable NEI 00-02 element
SC-B1	Yes	AS-18, SY-17, TH-4, TH-6, TH-7	None	No objection
SC-B2	No	TH-4, TH-8	NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements. Refer to SC-C2.	No objection
SC-B3	Yes	AS-18, TH-4, TH-5, TH-6, TH-7	None	No objection
SC-B4	Yes	AS-18, TH-4, TH-6, TH-7	None	No objection
SC-B5	Yes	TH-9, TH-7	None	No objection; TH-7 is the applicable NEI 00-02 element
SC-B6	Yes	QU-27, QU-28	None	No objection
SC-C1	Yes	ST-13, SY-10, SY-17, SY-27, TH-8, TH-9, TH-10, AS-17, AS-18	None	No objection; TH-9 and TH-10 are the applicable NEI 00-02 elements
SC-C2	No	TH-10	NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements. Refer to SC-B2.	No objection
SC-C3	Yes	AS-12, AS-13, TH-9, TH-10	None	No objection; TH-10 is the applicable NEI 00-02 element

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
SC-C4	Partial	AS-24, SY-27, TH-9, TH-10, HR-30	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
SYSTEMS ANALYSIS				
SY-A1	Yes	SY-4, SY-19	None	No objection; SY-19 is the applicable NEI 00-02 element
SY-A2	Yes	AS-19, SY-5, SY-13, SY-16	None	No objection; SY-5 and SY-16 are the applicable NEI 00-02 elements
SY-A3	Yes	SY-5, SY-6, SY-8, SY-12, SY-14	None	No objection with clarification: Although there are no explicit requirements in NEI 00-02 that match SY-A3, performance of the systems analysis would require a review of plant-specific information sources
SY-A4	Partial	DE-11, SY-10, SY FOOTNoTE 5	Confirm that this requirement is met. This can be done by either citing peer review F&O's or example documentation. NEI 00-02 does not address interviews with system engineers and plant operators to confirm that the model reflects the as-built, as-operated plant.	No objection
SY-A5	Partial	QU-12, QU-13, SY-8, SY-11	Although NEI 00-02 does not explicitly address both normal and abnormal alignments, their impacts are generally captured in the peer review of the listed elements. This can be done by either citing peer review F&O's or example documentation.	No objection with clarification: Self-assessment needs to confirm that the PRA considered both normal and abnormal system alignments
SY-A6	Yes	SY-7, SY-8, SY-12, SY-13, SY-14	None	No objection
SY-A7	Yes	SY-6, SY-7, SY-8, SY-9, SY-19	Check for simplified system modeling as addressed in SY-A7.	No objection
SY-A8	Partial	SY-6, SY-9	Check to ensure boundaries are properly established. This can be done by either citing peer review F&O's or example documentation. NEI 00-02 does not address component boundaries except for EDGs. There is no explicit requirement that addresses modeling shared portions of a component boundary. In practice, the peer reviews have examined consistency of component and data analysis boundaries.	No objection
SY-A9	Yes	QU-12, QU-13, SY-6, SY-19	None	No objection; SY-6 is the applicable NEI 00-02 element

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
SY-A10	Partial	SY-9	NEI 00-02 does not address all aspects of modularization. Determine if the requirements of the ASME standard are met.	No objection
SY-A11	Yes	AS-10, AS-13, AS-16, AS-17, AS-18, SY-12, SY-13, SY-17, SY-23	None	No objection
SY-A12	Partial	SY-6, SY-7, SY-8, SY-9, SY-12, SY-13, SY-14	Document that modeling is consistent with exclusions provided in SY-A14	No objection. The criteria in SY-7 states that passive components should be included in a Grade 4 PRA if they **influence** the CDF or LERF. No definition of the word **influence** is provided. Consistent with subelement SY-A12 of the ASME PRA standard, critical passive components whose failure affect system operability must be included in system models regardless of the grade of PRA.
SY-A13	Yes	DA-4, SY-15, SY-16	None	No objection
SY-A14	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
SY-A15	Yes	SY-8, HR-4, HR-5, HR-7	None	No objection; SY-8 and HR-4 are the applicable NEI 00-02 elements
SY-A16	Yes	SY-8, HR-8, HR-9, HR-10	None	No objection; SY-8 and HR-8 are the applicable NEI 00-02 elements
SY-A17	Yes	AS-13, SY-10, SY-11, SY-13	NRC stated that NEI 00-02 does not explicitly address including conditions that cause a system to isolate or trip. NEI disagreed with NRC comment.	No objection with clarification: Self-assessment needs to confirm that each system models address the conditions that cause the system to isolate or trip.
SY-A18	Yes	DA-7, SY-8, SY-22	None	No objection; DA-7 is the applicable NEI 00-02 element
SY-A19	Yes	AS-18, DE-10, SY-11, SY-13, SY-17, TH-8	Ensure there is a documented basis (engineering calculations are not necessarily needed) for modeling of the conditions addressed in SY-A19.	No objection; SY-A19, as qualified in Appendix A, requires that the system be assumed to fail with a probability of 1.0 if there is no engineering basis for system operation under adverse conditions.
SY-A20	Partial	AS-19, SY-5, SY-11, SY-13, SY-22, TH-8	Document component capabilities where applicable. NEI 00-02 does not explicitly require a check for crediting components beyond their design basis.	No objection
SY-A21	Yes	SY-18	None. Comment: footnote to SY-18 explains lack of Grade provision for this sub-element.	No objection
SY-A22	Yes	DE-4, DE-5, DE-6, AS-10, AS-11, SY-12, SY-18	None	No objection; SY-12 is the applicable NEI 00-02 element (wording in this element is vague and may not be interpreted as addressing support states)

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
SY-A23	Yes	SY-24, DA-15, QU-18	Determine if any repair credit is appropriately justified and documented by actual data, resources and time.	No objection with clarification: disagree that SY-24, DA-15 and QU-18 address SY-A23; however, agree with self assessment actions
SY-B1	Yes	DA-8, DA-14, DE-8, DE-9, SY-8	None	No objection
SY-B2	No req. for Cat II		None	No objection
SY-B3	Yes	DE-8, DE-9, DA-10, DA-12	None	No objection
SY-B4	Yes	DA-8, DA-10, DA-11, DA-12, DA-13, DA-14, DE-8, DE-9, QU-9, SY-8	None	No objection; DA-8 is the applicable NEI 00-02 element
SY-B5	Yes	DE-4, DE-5, DE-6, SY-12,	None	No objection
SY-B6	Yes	SY-12, SY-13	None	No objection with qualification: Self-assessment needs to confirm that the support system success criteria reflect the variability in the conditions that may be present during postulated accidents.
SY-B7	Yes	AS-18, SY-13, SY-17, TH-7, TH-8	None	No objection
SY-B8	Yes	DE-11, SY-10	None	No objection; SY-10 is the applicable NEI 00-02 element
SY-B9	Yes	AS-20, L2-8, L2-9, L2-11, L2-13, SY-10	None	No objection; SY-10 is the applicable NEI 00-02 element
SY-B10	Yes	SY-12, SY-13	None	No objection
SY-B11	Yes	SY-8, SY-12, SY-13,	Confirm by either citing peer review F&O's or examples from your model. NEI 00-02 does not explicitly address permissives and control logic. In practice, the items in SY-B11 have generally been examined in the peer reviews.	No objection with clarification: self-assessment needs to consider clarification to SY-B11 in Appendix A
SY-B12	Yes	SY-13	None	No objection
SY-B13	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
SY-B14	Partial	DE-6, AS-6	Confirm that by either citing peer review F&O's or examples from your model. Ensure that modeling includes situations where one component can disable more than one system.	No objection
SY-B15	Yes	SY-11	None	No objection
SY-B16	Yes	SY-8	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
SY-C1	Partial	SY-23, SY-25, SY-26, SY-27	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
SY-C2	Yes	SY-5, SY-6, SY-9, SY-27	None	No objection
SY-C3	Yes	SY-18, SY-27	None. Comment: footnote to SY-18 explains lack of Grade provision for this sub-element.	No objection
HUMAN RELIABILITY ANALYSIS				
HR-A1	Yes	HR-4, HR-5	Determine if analysis has included and documented failure to restore equipment following test or maintenance.	No objection
HR-A2	Yes	HR-4, HR-5	None	No objection
HR-A3	Yes	DE-7, HR-5	None	No objection
HR-B1	Yes	HR-5, HR-6	None	No objection; HR-6 is the applicable NEI 00-02 element
HR-B2	Partial	HR-5, HR-6, HR-7, HR-26, DA-5, DA-6	Since the screening rules in HR-6 do not preclude screening of activities that can affect multiple trains of a system, ensure single actions with multiple consequences are evaluated in pre-initiators.	No objection.
HR-C1	Yes	HR-27, SY-8, SY-9	None	No objection
HR-C2	Yes	HR-7, HR-27, SY-8, SY-9	Confirm that this requirement is met. The specific list of impacts in HR-C2 is not included in NEI 00-02, but in practice the peer reviewers (in reviewing sub-elements HR-7 and related sub-elements) addressed these items.	No objection
HR-C3	Yes	HR-5, HR-27, SY-8, SY-9	None	No objection
HR-D1	Yes	HR-6	None	No objection
HR-D2	Yes	HR-6	None	No objection
HR-D3	No		This item is implicitly included in the peer review of HEP by virtue of the ability to implement the procedure within the required time under the conditions of the accident. Action is to confirm and document that the procedure quality is sufficient to support the crew response within the times assigned in the PRA evaluation.	No objection with clarification: Self-assessment needs to also confirm and document that the factors listed in HR-D3 were considered in the pre-action human error probability evaluation (NEI action statement incorrectly implies this is for post-action errors).
HR-D4	No		NEI 00-02 does not address use of expert judgment. Use the ASME standard for requirements.	No objection with clarification: This requirement does not pertain to expert judgement. Self-assessment needs to address requirements in HR-D4.
HR-D5	Yes	DE-7, HR-26, HR-27	None	No objection; HR-26 is the applicable NEI 00-02 element

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
HR-D6	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
HR-D7	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
HR-E1	Yes	AS-19, HR-9, HR-10, HR-16, SY-5	None	No objection; the example process in HR-9 for a Grade 3 PRA (i.e., identify those operator actions identified by others) is not good practice and contrary to HR-10 which is the recommended process in HR-E1
HR-E2	Yes	HR-8, HR-9, HR-10, HR-21, HR-22, HR-23, HR-25	None	No objection (HR-9 and HR-10 do not appear to match subject matter but HR-8 does)
HR-E3	Partial	HR-10, HR-14, HR-20	NEI 00-02 does not explicitly specify the same level of detail that is included in the ASME standard. The peer review team experience is relied upon to investigate the PRA given general guidance and criteria. The ASME standard supporting requirements are to be used during the self-assessment to confirm that the ASME intent is met for this requirement.	No objection
HR-E4	Partial	HR-14, HR-16	NEI 00-02 does not explicitly specify the same level of detail that is included in the ASME standard. The peer review team experience is relied upon to investigate the PRA given general guidance and criteria. The ASME standard supporting requirements are to be used during the self-assessment to confirm that the ASME intent is met for this requirement.	No objection
HR-F1	Yes	AS-19, HR-16, SY-5	None	No objection
HR-F2	Partial	AS-19, HR-11, HR-16, HR-17, HR-19, HR-20, SY-5	NEI 00-02 does not explicitly address indication for detection and evaluation. Determine whether the requirements of the ASME standard are met.	No objection
HR-G1	Yes	HR-15, HR-17, HR-18	None	No objection
HR-G2	Yes	HR-2, HR-11	NEI 00-02 criteria for Grade 3 requires a methodology that is consistent with industry practice. This includes the incorporation of both the cognitive and execution human error probabilities in the HEP assessment. HR-11 provides further criteria to ensure that the cognitive portion of the HEP uses the correct symptoms to formulate the crew response.	No objection with qualification: self-assessment needs to document if both cognitive and execution errors are included in the evaluation of HEPS

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
HR-G3	Partial	HR-17, HR-18	NEI 00-02 does not explicitly specify the same level of detail that is included in the ASME standard. The peer review team experience is relied upon to investigate the PRA given general guidance and criteria. The ASME standard supporting requirements are to be used during the self-assessment to confirm that the ASME intent is met for this requirement.	No objection
HR-G4	Partial	AS-13, HR-18, HR-19, HR-20	NEI 00-02 does not explicitly specify the same level of detail that is included in the ASME standard. The peer review team experience is relied upon to investigate the PRA given general guidance and criteria. The ASME standard supporting requirements are to be used during the self-assessment to confirm that the ASME intent is met for this requirement.	No objection; HR-19 is the applicable NEI 00-02 element and agrees with the clarification of HR-G4 provided in Appendix A
HR-G5	Partial	HR-16, HR-18, HR-20	Evaluate proper inputs per the ASME standard or cite peer review F&O's or examples from your model. NEI 00-02 does not explicitly address observation or operations staff input for time required, although HR-16 includes simulator observations.	No objection
HR-G6	Yes	HR-12	Check to ensure they are met by citing peer review F&O's or examples from your model. HR-12 does not explicitly address all the items of the ASME standard list. In practice peer reviews addressed these items.	No objection
HR-G7	Partial	DE-7, HR-26	Check to see if factors that are typically assumed to lead to dependence were included, e.g., use of common indications and/or cues to alert control room staff to need for action; and a common procedural direction that leads to the actions. This can also be done by either citing peer review F&O's or examples from your model. NEI 00-02 does not provide explicit criteria that address the degree of dependence between HFEs that appear in the same accident sequence cutset. In general, the peer reviews addressed this. See also QU-C2.	No objection
HR-G8	No	HR-27	The lower bound combined HEP of 1E-06 suggested in HR-27 is probably too low. Justify the lower bound.	No objection; see the clarification of HR-G8 in Appendix A for acceptable means of justification
HR-G9	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
HR-H1	Yes	HR-21, HR-22, HR-23	None	No objection with qualification: The self-assessment needs to confirm that the additional requirements specified in the staff's qualification of HR-H1, provided in Appendix A were addressed in the HRA; HR-21 is the applicable NEI 00-02 element
HR-H2	Yes	HR-22, HR-23	The additional requirements specified in the staff's qualification of HR-H2, provided in Appendix A, are not covered in NEI 00-02	No objection with clarification: The self-assessment needs to confirm that the additional requirements specified in the staff's qualification of HR-H2, provided in Appendix A were included in the HRA
HR-H3	Yes	HR-26	None	No objection
HR-I1	Partial	HR-28, HR-30	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
DATA ANALYSIS				
DA-A1	Yes	DA-4, DA-5, DA-15, SY-8, SY-14	None	No objection
DA-A2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-A3	Yes	DA-4, DA-5, DA-6, DA-7, SY-8	None	No objection with qualification: The subject matter in DA-A3 is not explicitly addressed in NEI 00-002 (not a critical requirement since identification of the needed parameters would be a natural part of the data analysis)
DA-B1	Yes	DA-5	None	No objection
DA-B2	Yes	DA-5, DA-6	Confirm that this requirement is met. Grouping criteria listed in DA-5 should be supplemented with a caution to look for unique components and/or operating conditions and to avoid grouping them.	No objection
DA-C1	Yes	DA-4, DA-7, DA-9, DA-19, DA-20	None	No objection
DA-C2	Yes	DA-4, DA-5, DA-6, DA-7, DA-14, DA-15, DA-19, DA-20, MU-5	None	No objection
DA-C3	Partial	DA-4, DA-5, DA-6, DA-7, MU-5	NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
DA-C5	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C6	Yes	DA-6, DA-7	Confirm that this requirement is met. NEI 00-02 only addresses data needs when the standby failure rate model is used for demands. There are no criteria for the demand failure model; however, in practice this was addressed during peer reviews.	No objection
DA-C7	Yes	DA-6, DA-7	None	No objection
DA-C8	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C9	Yes	DA-4, DA-6, DA-7	Confirm that this requirement is met. Although there is no specific criteria for determining operational time of components in operation or in standby, the development needs to include these times. These issues were addressed during peer reviews.	No objection
DA-C10	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C11	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C12	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C13	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-C14	Yes	DA-15, AS-16, SY-24	None	No objection; DA-15 agrees with clarification of DA-C14 provided in Appendix A
DA-C15	Yes	IE-13, IE-15, IE-16, AS-16, DA-15, SY-24, QU-18	Confirm that this requirement is met. Although, it is relatively rare to see credit taken for repair of failed equipment in PRA's (except in modeling of support system initiating events), any credit taken for repair should be well justified, based on ease of diagnosis, the feasibility of repair, ease of repair, and availability of resources, time to repair and actual data. This can be done by either citing peer review F&O's or example documentation.	No objection.
DA-D1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection. The clarification, provided in Appendix A, of the requirements in subelement DA-D1 of the ASME PRA standard specifies the staff position on when Bayesian analysis should be used to calculate parameter estimates for important components.
DA-D2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
DA-D3	Partial	QU-30	A requirement for establishing the parameter distributions is not in the data analysis section but could be inferred from QU-30. QU-30 does not provide guidance on which events to include in the uncertainty analysis. The guidance in the qualification of DA-D3 provided in Appendix A to NRC Reg Guide should be followed.	No objection.
DA-D4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
DA-D5	Partial	DA-8, DA-9, DA-10, DA-11, DA-12, DA-13, DA-14	Check for acceptable common cause failure models. The criteria for NEI 00-02 elements DA-13 & DA-14 only apply to Grade 4. This can be done by either citing peer review F&O's or example documentation.	No objection; use the clarification to DA-D5 in Appendix A in the self assessment
DA-D6	Partial	DA-8, DA-9, DA-10, DA-11, DA-12, DA-13, DA-14	Check for plant-specific screening of generic common cause failure data. The criteria for NEI 00-02 elements DA-13 & DA-14 only apply to Grade 4. This can be done by either citing peer review F&O's or example documentation.	No objection
DA-D7	No		NEI 00-02 does not specifically address how to deal with data for equipment that has been changed. Use the ASME standard for requirements.	No objection
DA-E1	Partial	DA-1, DA-19, DA-20	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
INTERNAL FLOODING				
IF-A1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-A2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection. The subject matter in IF-A2 is covered in NEI 00-02 in element DE-10
IF-A3	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-A4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-B1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-B2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-B3	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
IF-B4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-C1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-C2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection; use the clarification to IF-C2 in Appendix A in the self assessment
IF-C3	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-C4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-C5	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection with clarification: use the clarification to IF-C5 in Appendix A in the self assessment
IF-C6	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-D1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-D2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-D3	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-D4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-D5	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E3	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E5	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection with clarification: use the qualification to IF-E5 in Appendix A in the self assessment
IF-E6	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-E7	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
IF-F1	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
IF-F2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
QUANTIFICATION ANALYSIS				
QU-A1	Yes	AS-4, AS-5, AS-6, AS-7, AS-8, AS-9, AS-10, AS-19	None	No objection; the requirement in QU-A1 is not explicitly stated in any element but is achieved by compliance with other NEI 00-02 elements
QU-A2	Yes	QU-8	None	No objection with qualification: the self-assessment needs to confirm that the requirements in the ASME standard as qualified in Appendix A of this regulatory guide have been met
QU-A3	Yes	QU-4, QU-8, QU-9, QU-10, QU-11, QU-12, QU-13	None	No objection; the requirement in QU-A3 is not explicitly stated in any element but is achieved by compliance with other NEI 00-02 elements
QU-A4	Yes	QU-18, QU-19	None	No objection
QU-B1	Yes	QU-4, QU-5, QU-6	None	No objection except QU-5 and portions of QU-4 are not pertinent to the requirements in QU-B1
QU-B2	Yes	QU-21, QU-22, QU-23, QU-24	Confirm that this requirement is met. In practice, the industry peer reviews have generally used the stated guidance as a check on the final cutset level quantification truncation limit applied in the PRA.	No objection; QU-21 and QU-23 are the relevant elements that addresses the requirements in QU-B2 while the remaining NEI 00-02 elements provide additional guidance on truncation. It is not clear what events and failure modes are being addressed in QU-22. If the element is referring to a cutset truncation limit, then the values presented are reasonable.
QU-B3	Partial	QU-19, QU-22, QU-24	Evaluation before and after recovery actions are applied is not relevant unless there are two models – with and w/o recovery actions. The truncation guidance in NEI-00-02 does not exclude important cutsets that include recovery.	No objection; the staff's position is that the final truncation limit must be such that convergence towards a stable value of CDF is achieved. This requirement is addressed in QU-24.
QU-B4	Yes	QU-4	None	No objection. Although the stated purpose of the criterion for QU-4 is to verify that "the base computer code and its inputs have been tested and demonstrated to produce reasonable results", the sub-tier criteria do not address this criterion, but instead provides some do's and don'ts for quantification.
QU-B5	Yes	QU-14	None	No objection
QU-B6	Yes	AS-8, AS-9, QU-4, QU-20, QU-25	Check for proper accounting of success terms. The NEI-00-02 guidance adequately addresses this requirement, but QU-25 should not be restricted to addressing just delete terms.	No objection
QU-B7	Yes	QU-26	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
QU-B8	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
QU-B9	Partial	SY-9	SY-9 addresses the traceability of basic events in modules but does not address the correct formulation of modules that are truly independent. The warnings in SY-A10 must be considered in the modularization process.	No objection; the self assessment needs to confirm that the warnings in SY-A10 were considered in the modularization process
QU-C1	Yes	QU-10, QU-17, HR-26	None	No objection; the requirement in QU-C1, as clarified in Appendix A, is achieved by compliance with these NEI 00-02 elements and HR-27
QU-C2	Partial	QU-10, QU-17	NEI 00-02 does not address cognitive aspects. Use the ASME standard for these requirements. See also HR-G7.	No objection
QU-C3	Yes	QU-20	Confirm that this requirement is met. QU-20 does not explicitly require that the critical characteristic, not just the frequency, be transferred, but in practice during peer reviews this was addressed.	No objection
QU-D1	Yes	QU-8, QU-9, QU-10, QU-11, QU-12, QU-13, QU-14, QU-15, QU-16, QU-17	None	No objection; the requirements in QU-D1 are addressed primarily in QU-8. The requirements in QU-9, QU-10, QU-14, QU-16, and QU-17 appear to be focused on modeling and not interpretation of results. As such, they are redundant to elements in the data, dependent failure, and HRA sections.
QU-D2	Partial	QU-27, QU-28, SY-22	The identified NEI 00-02 elements do not address the consistency of the human actions with the procedures and the range of conditions modeled in the PRA. Use the ASME standard for requirements related to human actions.	No objection
QU-D3	Yes	QU-8, QU-11, QU-31	None	No objection; consistency with other PRA results is also addressed in QU-8 and QU-31
QU-D4	Yes	QU-15	None	No objection
QU-D5	Yes	QU-8, QU-31	Confirm that this requirement is met. The subject matter in QU-D5 is partially addressed in NEI 00-02 in element QU-31 (QU-8 checks the reasonableness of the results). The contributions from IE's, component failures, common cause failures, and human errors are not addressed. In practice, these were addressed during peer reviews.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
QU-E1	Yes	QU-30	NEI 00-02 provides for an alternative for assessing uncertainties by, "A quantification of selected uncertainties is performed, or the impact of the selected uncertainties on the final risk measures is estimated." This was generally addressed in peer reviews.	No objection with qualification: QU-30 does not provide guidance consistent with DA-D3 on which events to include in the uncertainty analysis. The guidance in the qualification of DA-D3 provided in Appendix A needs to be addressed in the self assessment.
QU-E2	Yes	QU-27, QU-28	Confirm that this requirement is met. QU-27 and QU-28 focus on the unusual sources of uncertainty. Unusual sources of uncertainty correspond to plant specific hardware, procedural, or environmental issues that would significantly alter the degree of uncertainty relative to plants that have been assessed previously, such as NUREG-1150 or RMIEP, Unusual sources of uncertainty could also be introduced by the PRA methods and assumptions. In practice, when applying NEI-00-02 sub-elements QU-27 and QU-28, the reviewers considered sources of uncertainty in a broad sense.	No objection
QU-E3	Partial	QU-30	Key model uncertainties should be propagated or justified. An estimate of the overall uncertainty interval is required, including parametric, modeling, and completeness contributors to uncertainty.	No objection; the estimate of the uncertainty in the overall CDF needs to include the qualification to QU-E3 provided in Appendix A.
QU-E4	Partial	QU-28, QU-29, QU-30	NEI 00-02 does not explicitly specify that sensitivity studies of logical combinations of assumptions and parameters be evaluated. Use the ASME standard for requirements.	No objection
QU-F1	Partial	QU-31, QU-32, QU-34	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
QU-F2	Yes	QU-31	None	No objection
QU-F3	Yes	QU-27, QU-28, QU-32	None	No objection with qualification: The self assessment needs to address the qualification to QU-F3 in Appendix A, which states that important assumptions and causes of uncertainty must be identified for all categories of PRAs. No element in NEI 00-02 requires documentation of assumptions and uncertainties (QU-27 and QU-28 requires their identification).
QU-F4	Yes	QU-12, QU-13	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
QU-F5	Yes	QU-4, MU-7	No action required. Normal industry practice requires documentation of computer code capabilities.	No objection with qualification: Self assessment needs to confirm computer code has been sufficiently verified such that there is confidence in the results
QU-F6	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements at the time of doing an application.	No objection
LERF ANALYSIS				
LE-A1	Yes	AS-14, AS-20, AS-21, AS-22, AS-23, L2-7, L2-8, L2-22	No further action required. NEI 00-02 does not address criteria for the grouping into PDSs, i.e., there are no criteria provided as to what information has to be transferred from the Level 1 to the Level 2 analysis. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not specifically identify the type of information that must be transferred. L2-7 does refer to grouping sequences with similar characteristics and cautions care in transferring dependencies on accident conditions, equipment status and operator errors. In practice this step included review of the process for developing and binning the plant damage states (PDSs) and ensuring consistency between the PDSs and the plant state. Thus the adequacy of the transfers and the process of developing the PDSs were addressed in peer reviews.	No objection with qualification: See comment for LE-A5 for self assessment action. NEI 00-02 does not address the requirements in LE-A1. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not identify the type of information that must be transferred. AS-20, AS-22, L2-8, and L2-22 are not pertinent to Level1 physical characteristics needed for the LERF analysis
LE-A2	Yes	L2-7, L2-8, AS-21	No further action required. NEI 00-02 does not address criteria for the grouping into PDSs, i.e., there are no criteria provided as to what information has to be transferred from the Level 1 to the Level 2 analysis. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not identify the type of information that must be transferred. The adequacy of the transfers were addressed in peer reviews.	No objection with qualification: See comment for LE-A5 for self assessment action

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
LE-A3	Yes	L2-7, L2-8, L2-21	No further action required. NEI 00-02 does not address criteria for the grouping into PDSs, i.e., there are no criteria provided as to what information has to be transferred from the Level 1 to the Level 2 analysis. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not identify the type of information that must be transferred. The adequacy of the transfers were addressed in peer reviews.	No objection with qualification: See comment for LE-A5 for self assessment action. L2-21 is not pertinent to the subject matter in LE-A3 and specific methods for transferring Level 1 information to the LERF analysis are not identified.
LE-A4	Yes	AS-20, AS-21, L2-7, L2-21. L2-8	No further action required. NEI 00-02 does not address criteria for the grouping into PDSs, i.e., there are no criteria provided as to what information has to be transferred from the Level 1 to the Level 2 analysis. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not identify the type of information that must be transferred. The adequacy of the transfers were addressed in peer reviews.	No objection with qualification: See comment for LE-A5 for self assessment action. AS-20 and L2-21 are not pertinent to the subject matter in LE-A3 and specific methods for transferring Level 1 information to the LERF analysis are not identified.
LE-A5	Yes	AS-20, L2-8, L2-21	No further action required. NEI 00-02 does not address criteria for the grouping into PDSs, i.e., there are no criteria provided as to what information has to be transferred from the Level 1 to the Level 2 analysis. L2-7 states the transfer from Level 1 to Level 2 should be done to maximize the transfer of relevant information, but does not identify the type of information that must be transferred. The adequacy of the transfers were addressed in peer reviews.	No objection with qualification: The self assessment needs to confirm the requirements in LE-A5 have been met.
LE-B1	Yes	L2-8, L2-10, L2-15, L2-16, L2-17, L2-19	None	No objection; It appears that the intent of the requirements of LE-B1 are met by the identified elements
LE-B2	Yes	L2-13, L2-14	None	No objection; adequately addresses the clarification to LE-B2 provided in Appendix A
LE-B3	Yes	ST-4, L2-14, L2-15	No further action required. NEI 00-02 does not specify that plant-specific thermal-hydraulic analyses be performed to evaluate the containment and RPV under severe accident conditions; however, this was addressed during peer reviews.	No objection with qualification: The self assessment needs to confirm that plant-specific thermal-hydraulic analyses were used to evaluate the containment and RPV under severe accident conditions.
LE-C1	Yes	L2-24	None	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
LE-C2	Yes	L2-9, L2-12, L2-25	Repair of equipment would be subsumed under recovery actions in L2-9 and L2-5. If credit was taken for repair, actual data and sufficient time must be available and justified.	No objection with clarification: The self assessment needs to confirm that the guidance provided in the clarification of LE-C2 in Appendix A was followed for any repairs included in the LERF evaluation.
LE-C3	Yes	L2-8, L2-24, L2-25	None	No objection with qualification: L2-25 provides general requirements that may cover those in LE-C3. The self assessment needs to confirm that the justification for inclusion of any of the features listed in LE-C3 meet the requirements in the clarification of LE-C3 provided in Appendix A.
LE-C4	Yes	L2-4, L2-5, L2-6	None	No objection with qualification: The self assessment needs to confirm that the requirements of LE-C4 and the clarification provided in Appendix A were met.
LE-C5	Yes	AS-20, AS-21, L2-7, L2-11, L2-25	None	No objection except that L2-11 appears to be the only relevant element that addresses the requirements in LE-C5
LE-C6	Yes	L2-12, L2-24, L2-25	None	No objection except that L2-12 appears to be the relevant element that addresses the requirements in LE-C6
LE-C7	Yes	L2-7, L2-11, L2-12, L2-24	None	No objection with qualification: The self assessment needs to confirm that the requirements in LE-C7 were met.
LE-C8	Yes	L2-11, L2-12	None	No objection with qualification: The self assessment needs to confirm that the treatment of environmental impacts meet the requirements of LE-C8 as clarified in Appendix A.
LE-C9	Yes	AS-20, L2-11, L2-12, L2-16, L2-24, L2-25	No further action required. NEI 00-02 does not differentiate between containment harsh environments and containment failure effects on systems and operators. This was addressed during peer reviews.	No objection with qualification: The self assessment needs to confirm that the treatment of environmental impacts meet the requirements of LE-C9 as clarified in Appendix A.
LE-C10	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection with clarification; the clarification to LE-C10 in Appendix A also needs to be considered in the self assessment.
LE-D1	Yes	L2-14, L2-15, L2-16, L2-17, L2-18, L2-19, L2-20, ST-5, ST-6	None	No objection with qualification: The self assessment needs to confirm that the containment performance analysis meets the requirements of LE-D1 as clarified in Appendix A.
LE-D2	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	NEI 00-02?	NEI 00-02 ELEMENTS	INDUSTRY SELF ASSESSMENT ACTIONS	
LE-D3	Yes	IE-14, ST-9	No further action required. In practice, peer review teams evaluated the ISLOCA frequency calculation. F&O's under IE and AS would be written if this was not adequate.	No objection with qualification: The self assessment needs to confirm that the ISLOCA analysis meets the requirements in LE-D3 as clarified in Appendix A.
LE-D4	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection with clarification; the clarification to LE-D4 in Appendix A also needs to be considered in the self assessment.
LE-D5	No		NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection with clarification; the clarification to LE-D5 in Appendix A also needs to be considered in the self assessment.
LE-D6	Yes	L2-16, L2-18, L2-19, L2-24, L2-25	No further action required. The guidance provided in NEI 00-02 does not explicitly address the requirements in LE-D6, but in practice the peer review teams addressed this.	No objection with qualification: The guidance provided in NEI 00-02 does not explicitly address the requirements in LE-D6. The self assessment needs to confirm that the containment isolation treatment meets the requirements in LE-D6 as clarified in Appendix A.
LE-E1	No	L2-5, L2-11, L2-12	NEI 00-02 does not address equipment reliability data related to harsh environments for the LERF analysis. Use the ASME standard for requirements.	No objection; except L2-5 is not applicable to the requirement in LE-E1.
LE-E2	Yes	DA-4, HR-15, L2-12, L2-13, L2-17, L2-18, L2-19, L2-20	None	No objection with qualification: The self assessment needs to confirm that the parameter estimation meet the requirements in LE-E2 as clarified in Appendix A.
LE-E3	Yes	QU sub-elements applicable to LERF		No objection with qualification: The self assessment needs to confirm that the ASME standard requirements are met.
LE-F1	Yes	QU-8, QU-9, QU-10, QU-11, QU-31	None	No objection with clarification; The requirement in LE-F1 appears to be addressed in L2-26
LE-F2	No	QU-27	NEI 00-02 does not address this supporting requirement. Use the ASME standard for requirements.	No objection
LE-G1	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G2	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection

Table B-4. NRC Regulatory Position on Industry Self Assessment Actions.

NEI ASSESSMENT				REGULATORY POSITION
ASME SR	**NEI 00-02?**	**NEI 00-02 ELEMENTS**	**INDUSTRY SELF ASSESSMENT ACTIONS**	
LE-G3	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G4	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G5	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G6	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G7	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection
LE-G8	Partial	L2-26, L2-27, L2-28	In general specified documentation items not explicitly addressed in NEI 00-02 checklists were addressed by the peer review teams. Action is to confirm availability of documentation. If not available, documentation may need to be generated to support particular applications or respond to NRC RAIs relative to applications.	No objection

DRAFT REGULATORY ANALYSIS

1. STATEMENT OF THE PROBLEM

Over the past 25 years a significant number of probabilistic risk assessments (PRAs) have been performed by the NRC and the nuclear industry. The results from these PRAs have increasingly been used in the regulatory process, starting from generic safety issue prioritization and progressing to regulatory analysis in support of rulemaking and backfits, and most recently in decision-making for risk-informed regulatory activities. In 1995, the Commission issued a policy statement saying that "....the use of PRA technology should be increased to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach." Consistent with the Policy Statement on PRA, in 1998, the staff published a series of guidance documents, regulatory guides, and standard review plan (SRP) sections, addressing the application of PRA in various risk-informed regulatory activities. These activities were inservice inspection, technical specifications, inservice testing, and graded quality assurance. Draft Regulatory Guide DG-1122 complements the previously published risk-informed documents in that it provides guidance on the quality of a PRA analysis and the documentation needed to support a specific regulatory application. This topic was not addressed explicitly in the 1998 guidance documents. Confidence in the information derived from a PRA is an important issue; The accuracy of the technical content must be of sufficient rigor to justify its use in regulatory decision making. In addition, this information must be documented appropriately for the specific application. PRA standards have been under development by the American Society of Mechanical Engineers and the American Nuclear Society. A part of the purpose of the proposed regulatory guide DG-1122 is to provide the NRC position on the PRA consensus standards and other industry PRA program documents.

2. OBJECTIVE

To: (1) provide guidance to power reactor licensees on an acceptable approach to demonstrate with appropriate documentation that those parts of the PRA used in a regulatory application are of sufficient quality to support the analysis, (2) provide guidance on determining the technical adequacy of the PRA results (via, e.g., consensus PRA standards) and (3) provide the NRC position on consensus PRA standards and industry PRA program documents.

3. ALTERNATIVES

The increased use of PRA information in regulatory decision making as addressed in the PRA Policy Statement, in DG-1122, and in the previously issued RGs and SRPs, is voluntary. Licensees can continue to operate their plants under the existing deterministicly oriented approaches defined in their current licensing bases. It is expected that licensees will choose to utilize a PRA approach to address future regulatory issues only when it is perceived to be to their benefit to do so.

4. CONSEQUENCES

The staff believes that the net effect of the plant risk changes associated with risk-informed programs (such as are addressed in DG-1122 and in the 1998 regulatory guides and standard review plan sections), should result in either small and acceptable increases in risk (as defined in Regulatory Guide 1.174), essentially no significant change in risk, or net reductions in risk in some cases. The regulatory guidance provided in DG-1122 will contribute to improving the quality of information used in decision-making situations that affect plant risk.

5. DECISION RATIONALE

In the Commission's approval of the Policy Statement on the expanded use of PRA, the Commission stated its expectation that the implementation of this policy would improve the regulatory process in three areas: (1) foremost, through safety decision-making enhanced by the use of PRA insights, (2) through more efficient use of agency resources, and (3) through a reduction in unnecessary burdens on licensees. Indeed, it is believed that the changes in regulatory approach provided for in the risk-informed RGs and SRPs will result in a significant improvement in the allocation of resources spent for reactor safety, both for the NRC and for the industry (due to the improved prioritization of activities). It is also believed that the use of PRA in risk-informed regulatory activities can be implemented while maintaining an adequate level of safety at the plants that choose to implement risk-informed programs.