

Summary of Major ACRS Subcommittee Members' Feedback from the August 24, 2017, Meeting on RG 1.174 and Staff Responses

The following summarizes the feedback received from Members of the Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on Reliability and PRA during the meeting on August 24, 2017. The staff noted nine major points of feedback from the ACRS Subcommittee Members and have documented the staff response to those points of feedback. The square brackets at the end of the heading for the ACRS Subcommittee Members' feedback indicates the pages in the meeting transcript relevant to each point of feedback. The meeting transcript is available in the Agencywide Document and Access Management System under accession number [ML17242A259](#).

(1) ACRS Subcommittee Members' Feedback [pp. 44–50]:

Regarding the last paragraph in Section C before Element 1, which states the following,

"In addition, for plants licensed under 10 CFR Part 52, the deterministic containment performance metric should also be maintained. The designs certified by the NRC under 10 CFR Part 52 implement design features that are in addition to those required by 10 CFR Part 50, particularly features for severe accidents. The requirements for these design features were codified in the Appendixes to 10 CFR Part 52 for each certified design in a section titled "Applicable Regulations." The certified designs include features to ensure containment performance. Plants licensed under 10 CFR Part 52 should ensure that the containment maintains its role as a reliable, leak-tight barrier for approximately 24 hours following the onset of core damage under the more likely severe accident challenges and, following this 24-hour period, the containment should continue to provide a barrier against the uncontrolled release of fission products [emphasis added]. More information can be found in SECY-90-016, "Evolutionary Light-Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements" (Ref. 22), and SECY-93-087, "Policy, Technical, and Licensing issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs" (Ref. 23), as approved by the SRM on SECY-90-016, "Evolutionary Light-Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements" (Ref. 24) and the SRM on SECY-93-087, "Policy, Technical, and Licensing issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs" (Ref. 25), respectively."

The ACRS Subcommittee Members expressed that the paragraph, and particularly the sentence underlined above, seems to indicate that a plant licensed under 10 CFR Part 52 cannot use the guidance to make associated risk-informed changes related to the containment. They were unclear whether this is the intent of this text.

Staff Response:

The staff reviewed the related SECYs, SRMs, and ACRS letters on the staff's previous efforts in this area to confirm agreement with the revised guidance in DG-1285 and whether the revised guidance addresses the direction in the SRMs.

In particular, the staff noted that SECY-12-0081 states: *"The first topic discussed during the October 5, 2011, workshop was application of the general principles of risk-informed regulation for proposed changes to the licensing basis as described in RG 1.174. The general consensus of the staff and participating stakeholders is that no substantive changes to the key principles and other guidance to address new reactors are*

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necessary. However, the staff plans to augment the existing discussion on long-term containment performance in Section 2.2 of RG 1.174 by referring to the containment performance objectives for new reactors as described in Commission-approved guidance such as SECY-90-016, 'Evolutionary Light Water Reactor (LWR) Certification Issues and Their Relationship to Current Regulatory Requirements,' dated January 12, 1990, and SECY-93-087, 'Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs,' dated April 2, 1993.'

Further, Recommendation 2 of SECY-12-0081 states: *"The staff believes that adding a reference to containment performance for new reactors in RG 1.174 per SECY-90-016 and SECY-93-087 is appropriate and consistent with established Commission policy. In its letter of April 26, 2012, the ACRS agreed with this recommendation."*

The ACRS letter dated April 26, 2012, states: *"We concur with the staff's recommendation of Option 2C for transition from use of the conditional containment failure probability (CCFP) and large release frequency (LRF) metrics to the use of only the large early release frequency (LERF) metric at or prior to initial fuel load."*

Based on a review of the documents cited above, the staff determined that it was appropriate to include a discussion on maintaining the deterministic containment performance objective was retained in RG 1.174. The staff revised the cited paragraph to eliminate some of the text that is considered redundant and to specifically refer to the containment performance objective (i.e., versus the containment performance metric).

(2) ACRS Subcommittee Members' Feedback [pp. 50-57]:

Regarding the fourth Consideration in Section C.2.1.1.2, ACRS Subcommittee Members expressed that the discussion in RG 1.174 is very prescriptive and inconsistent with the level of information provided for the other considerations. Moreover, the examples provided in the last paragraph (e.g., "An example of this type of defense might be fire or flood barriers that limit component failures from fires of floods to only one train of redundant equipment.") are not defenses against the listed coupling factors. It is recommended that the discussion on coupling factors be deleted.

Staff Response:

The staff agrees with the ACRS Subcommittee Members' feedback and revised the cited language to remove the discussion of coupling factors from Section C.2.1.1.2; replace that discussion with a more general discussion of defenses against common cause failures (CCFs); and provide a general reference to relevant detailed documentation on CCFs in Section C.2.1.1.3 in place of a detailed discussion of coupling factors.

(3) ACRS Subcommittee Members' Feedback [pp. 57-61]:

Regarding the first paragraph in Section C.2.1.1.3, which states the following,

"Although the guidance is presented separately for each consideration, the evaluation of the proposed licensing basis change should be performed in an integrated fashion. The proposed licensing basis change is considered to maintain consistency with the defense-in-depth philosophy if the integrated assessment demonstrates no significant impact on

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a single consideration (i.e., the intent of each defense-in-depth consideration is met) or there is not a significant impact collectively across all seven considerations.”

and Section C.2.1.1.4, which states the following,

“The guidance for evaluation of the seven considerations described above should enable the licensee to demonstrate the impact of a proposed licensing basis change on defense-in-depth. The licensee should be able to conclude whether the change maintains consistency of the plant design with the defense-in-depth philosophy by showing that the intent of each consideration is still met following the implementation of the proposed licensing basis change.

The evaluation should demonstrate the licensee’s understanding of how the change impacts plant design and operation both from risk and traditional engineering perspectives.”

ACRS Subcommittee Members expressed that the guidance in these two sections is inconsistent. Further, it was expressed that Section C.2.1.1.4 does not address demonstrating that there is not a significant impact collectively across all seven considerations, despite the title of the section.

Staff Response:

The staff agrees with the ACRS Subcommittee Members’ feedback and moved the cited sentence, including the last sentence of that same paragraph, from Section C.2.1.1.3 to the end of the first paragraph in Section C.2.1.1.4 as the guidance. The staff does not believe these sentences were important to include in Section C.2.1.1.3 and are better suited to Section C.2.1.1.4.

(4) ACRS Subcommittee Members’ Feedback [pp. 61–65]:

Regarding the sixth Consideration in Section C.2.1.1.3, ACRS Subcommittee Members pointed out that the first sentence uses the phrasing, “should not significantly increase,” while the second sentence uses the phrasing, “does not adversely affect.” They expressed that the latter implies that absolutely no adverse effects are allowed which is not consistent with the first sentence. They recommended that the staff consider revising the phrasing of the second sentence to be consistent with the phrasing of the first sentence.

Staff Response:

The staff agrees with the ACRS Subcommittee Member’s feedback and replaced “does not adversely affect” in the second cited statement with “does not significantly reduce”.

(5) ACRS Subcommittee Members’ Feedback [pp. 65–69]:

Regarding the last paragraph in Section C.2.3.2, which states the following,

“The ASME/ANS PRA standard provides technical supporting requirements for each technical element in terms of three Capability Categories. The intent of the delineation of

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the Capability Categories within the supporting requirements is generally that the degree of level of detail, the degree of plant specificity, and the degree of realism increase from Capability Category I to Capability Category III. In general, the staff anticipates that current good practice, that is, Capability Category II in the ASME/ANS standard is acceptable for the majority of applications. RG 1.200 defines current good practice as those states-of-practice that are generally accepted throughout the industry and have been shown to be technically acceptable in documented analyses or engineering assessments. However, for some applications, Capability Category I may be sufficient for some requirements, whereas for other applications it may be necessary to achieve Capability Category III for specific requirements. It should be noted that the ASME and ANS Joint Committee on Nuclear Risk Management has successfully balloted to remove Capability Category III and retain Capability Categories I and II in the next edition of the ASME/ANS PRA standard.”

ACRS Subcommittee Members expressed that the staff should avoid including speculative statements in the RG. Additionally, they pointed out that, based on the cited discussion, users could interpret the guidance to say that Capability Category III could be ignored, which may not always be appropriate. ACRS Subcommittee Members recommended that this issue just be addressed in RG 1.200 as opposed to RG 1.174.

Staff Response:

The staff agrees with the ACRS Subcommittee Members feedback and revised the cited paragraph to present a generalized discussion of the Capability Categories that eliminates the need to refer to specific Capability Category numbers. Additionally, the staff deleted the last sentence in the cited text above.

(6) ACRS Subcommittee Members' Feedback [pp. 69–77]:

Regarding the second paragraph in Section C.2.5, which states the following,

“However, licensees are not granted the same discretion when incorporating these guidelines by reference into other programs (e.g., Technical Specification Task Force (TSTF) Traveler TSTF-505, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b", 10 CFR 50.69). For example, a licensee may use its approved 10 CFR 50.69 program to re-categorize additional systems without prior NRC approval provided that the increase in risk meets the acceptance guidelines in this guide. In this context the licensee needs to treat the guidelines as hard criteria and is not allowed to consider the acceptance guidelines as met when the values are even slightly exceeded.”

ACRS Subcommittee Members expressed that this discussion is not appropriate for this RG citing that RG 1.174 provides more general guidance on the treatment of the acceptance guidelines. Members believed that this discussion should instead be considered for related application-specific RGs, such as RG 1.201, etc. Additionally, it was recommended that the paragraph be deleted as it seemed to be potentially confusing or that the concern should be framed in terms of a staff expectation, not a requirement.

Staff Response:

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The staff agrees in part with the ACRS Subcommittee Members' feedback and revised the cited paragraph to remove the specific examples and the language that appeared not to be appropriate for this guide. The staff also determined that, because of the changes made to the acceptance guideline figures (i.e., Figures 4 and 5) and recent experience with applications involving self-approval, it is important to include at least a general discussion on how the acceptance guidelines should be treated when the risk metric values exceed the acceptance guidelines in a self-approval process. As such, the staff revised the cited paragraph to include a more generalized discussion.

(7) ACRS Subcommittee Members' Feedback [pp. 77–80]:

Regarding the first paragraph of Section C.2.5.1, which states the following,

“There are two facets to uncertainty that, because of their natures, should be treated differently when creating models of complex systems. They have recently been termed aleatory and epistemic uncertainty. The aleatory uncertainty is associated with events or phenomena being modeled that are characterized as occurring in a “random” or “stochastic” manner and probabilistic models are adopted to describe their occurrences. It is this aspect of uncertainty that gives PRA the probabilistic part of its name. The epistemic uncertainty is associated with the analyst’s confidence in the predictions of the PRA model itself and reflects the analyst’s assessment of how well the PRA model represents the actual system being modeled. Epistemic uncertainty has also been referred to as state-of-knowledge uncertainty. This section discusses the epistemic uncertainty; the aleatory uncertainty is built into the structure of the PRA model itself.”

ACRS Subcommittee Members expressed that they generally did not like this paragraph as it was felt that the portrayal of aleatory and epistemic uncertainties is not entirely correct or even appropriate for the RG.

Staff Response:

The staff agrees with the ACRS Subcommittee Members' feedback and removed the cited paragraph entirely as well as all other instances of the terms “epistemic” and “aleatory” in the RG.

(8) ACRS Subcommittee Members' Feedback [pp. 80–88]:

Regarding Section C.2.6 on integrated decisionmaking, ACRS Subcommittee Members noted that there is not any mention of uncertainty within the discussion and that uncertainty is an important aspect of the decisionmaking and should be mentioned beyond just referencing NUREG–1855. In addition, ACRS Subcommittee Members noted that the list of items for the submittal in Section C.2.6 does not include submittal of the uncertainty distribution and that this issue should also be similarly addressed in Section C.6.3.1.

Staff Response:

The staff agrees in part with the ACRS Subcommittee Members feedback and added general references to uncertainties associated with risk insights and PRA and references to NUREG–1855 in Section C.2.6. However, the staff refrained from including any

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additional language stating that licensees should submit uncertainty distributions associated with the risk metric mean values. This is largely based on the fact that doing so is considered to be inconsistent with the approach that has been promulgated in RG 1.174 since its initial issuance in 1998. Specifically the approach for the treatment of uncertainty described in RG 1.174 is that parametric uncertainty and any explicit model uncertainties are addressed in the assessment of mean values; sensitivity studies are performed to evaluate the impact of using alternate models related to key model uncertainties and; quantitative analyses or qualitative analyses are used as necessary to address incompleteness as appropriate to the decision and the acceptance guidelines. As discussed in SECY-97-287, "Final Regulatory Guidance on Risk-Informed Regulation: Policy Issues," the uncertainty analysis is used in this approach as a tool to analyze the results of the PRA (i.e., determine the robustness of the results and highlight possible areas of concern) and serves largely as a communication aid.

Other approaches to the treatment of uncertainty that include consideration or evaluation of the risk metric probability distribution are also discussed in SECY-97-287 and are considered to likely involve a policy decision regarding acceptable usage of the probability distribution (e.g., acceptable assurance levels/percentiles). Any policy decisions on the acceptable use of the probability distributions would require the development of new guidance to address the implementation of that policy decision. For these reasons, including language in RG 1.174 specifically related to having licensees submit the probability distributions associated with their risk metric values is considered to be a potentially significant effort that requires additional time and resources well beyond what the current project schedule can accommodate.

Regarding Section C.6.3.1, the staff similarly refrained from including any language specifically stating that licensees should submit uncertainty distributions associated with the risk metric mean values. However, an additional bullet was included to provide guidance on reporting the licensee's treatment of uncertainties, consistent with NUREG-1855.

(9) ACRS Subcommittee Members' Feedback [pp. 88-96]:

Regarding the last paragraph in Section C.6.3, which states the following,

"The licensee's resolution of the findings of the peer review should also be submitted. For example, this response could indicate whether the PRA was modified following the peer review or could justify why no change was necessary to support decisionmaking for the licensing basis change under consideration.¹ As discussed in Section C.2.2 of this guide, the staff's decision on the proposed license amendment is based on its independent judgment and review."

¹ *The NRC has accepted via a letter issued on May 3, 2017, (See ADAMS Accession No. ML17079A427) an industry process entitled "Close-out of Facts and Observations (F&Os)" (See ADAMS Accession No. ML17086A431) that allows a licensee to formally close F&Os that were generated during a peer review process. If a licensee meets the conditions of acceptance as described in the NRC's letter, a licensee does not need to submit the closed F&Os in any future applications. It should be noted that the NRC position on the submission of peer review findings in the May 3rd letter is expected to be incorporated into the next revision of RG 1.200."*

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ACRS Subcommittee Members did not believe the footnote was appropriate as it is considered to be speculative and relates to something that is yet to happen (i.e., the incorporation of the staff position in the next revision of RG 1.200).

Staff Response:

The staff agreed with the ACRS Subcommittee Members feedback and revised the first sentence of the cited paragraph to include a general statement about what should be submitted regarding the licensee's resolution of peer review findings without reference to the NRC's letter. The staff deleted the footnote and will include the footnote discussion in the *Federal Register* notice announcing final publication of the RG.