



Advanced Reactor Stakeholder Meeting: Comments on Draft NRC Reg Guide DG-1404 and Draft ISGs

August 22, 2023

Introduction

- Following extensive interactions with the NRC throughout 2021, the Nuclear Energy Institute (NEI) submitted NEI 21-07 “Technology Inclusive Guidance for Non-Light Water Reactors – Safety Analysis Report Content for Applicants Using the NEI 18-04 Methodology” to the Nuclear Regulatory Commission (NRC) for endorsement on March 1, 2022
 - NEI 21-07 is intended to be part of a streamlined and predictable risk-informed, performance-based (RIPB) licensing pathway to deployment for advanced reactors under 10 CFR Part 50 or 52
- The NRC made draft Regulatory Guide DG-1404 on NEI 21-07 available on ADAMS on May 18, 2023, in conjunction with a number of interim staff guidance documents (ISGs) related to advanced reactors
- NEI provided detailed comments on DG-1404 and the ISGs on August 10, 2023
- The purpose of this presentation is to ensure a common understanding of the NEI comments on DG-1404 and the issues underlying them

Meeting Approach

- Discuss the industry perspective on the guidance and how the comments are intended to achieve the goals for that guidance
- Discuss specific comments and concerns related to DG-1404
 - Where slides address specific comments from the August 10, 2023, NEI comment letter, the comment number(s) are noted in red type
- Discuss some specific comments and concerns related to the interim staff guidance documents

Overview of Guidance

- Regulatory guidance should be specific, straightforward, understandable, and implementable
- Information included in the safety analysis report (SAR) should be limited to that needed to demonstrate reasonable assurance of adequate protection and satisfy applicable regulations
- DG-1404 and NEI 21-07, in combination, should address the information necessary to describe the key results of the application of the NEI 18-04 RIPB methodology and enable the NRC to perform its regulatory review function efficiently and effectively
- The advanced reactor demonstration projects and other forthcoming applications plan to use the NEI 18-04 RIPB methodology, underlining the importance of providing consistent and usable guidance in DG-1404

Overview of Guidance (cont.)

- Guidance should be clear and straightforward
 - Language should be straightforward and easy to understand
 - To the extent practical, guidance should be in one location, not spread among different sections and documents
 - Regulatory guide additions should provide distinct material that is both required and not already present in NEI 21-07
 - Repeating or restating material already provided in NEI 21-07 is counterproductive and detracts from the guidance
 - Redundancy forces users to analyze both documents in detail in an attempt to discern what is new and what is simply repeated
 - Regulatory guide clarifications should be specific and understandable with respect to refined expectations for applicants

DG-1404 Discussion Themes

1. Details on the probabilistic risk assessment (PRA) in the SAR
2. Change control considerations
3. SAR content beyond NEI 21-07 guidance
4. Light water reactor (LWR) guidance
5. Scope of guidance
6. SAR organization
7. Redundant or unclear guidance

Issue 1 – PRA Clarification C.3.e

- Clarification C.3.e relates to information on the PRA at the CP stage of an application and addresses the sentence “If conformance to ASME/ANS RA-S-1.4-2021 is planned, a simple statement to that effect should be sufficient.”
 - The NRC clarification reminds the applicant that more information is needed at the CP stage than this simple statement
 - However, that point is already amply clear from a plain English reading of NEI 21-07 Section C.2.1.1 (CP Content), which states “In either case, the applicant should address the last five items in the Section 2.1.1 list, consistent with the state of the plant design and the PRA at the time of CP application.”
 - The addition is not needed and is counterproductive **[Comment 22]**

Issue 1 – PRA Addition and Clarification C.4.a

- The introductory part of Addition and Clarification C.4.a addresses documentation of PRA source term and radiological consequence information – an issue that was resolved pursuant to discussions in 2021 and 2022 that led to changes in the guidance for NEI 18-04 Sections C.2.1.1, C.3.3.1, C.3.4.1, and C.3.5.1
 - The basis for the introductory language is not clear given that NEI 21-07 already addresses the issue
 - The addition/clarification is not needed and is counterproductive
[Comment 26]

Issue 1 – PRA Addition and Clarification C.4.a(1)

- The NRC comment addresses inclusion of supporting data “... that is significant to determining whether the frequency-consequence targets and quantitative health objectives (QHOs) are met and the development of the analysis conclusions on risk significance, SSC classification, or DID adequacy.”
 - To the extent the comment is on QHOs, those are addressed in SAR Chapter 4, not SAR Chapter 3
 - The comment is vague and unclear
 - What does “data that is significant to ... conclusions on risk significance, SSC classification, or DID adequacy” mean?
 - This criterion is open-ended and subjective
 - The addition and clarification is not needed and is counterproductive
[Comment 27]

Issue 1 – PRA Clarification C.4.b

- The NRC asserts a conflict between NEI 21-07 Section C.2.1.1 and guidance on SAR Sections 3.3.1, 3.4.1, and 3.5.1 on level of detail in the PRA for AOOs, DBEs, and BDBEs
 - **Industry does not agree there is a conflict**
 - Section C.2.1.1 specifies particular information to be include in the SAR, recognizing that the bulk of the PRA information is to be maintained as plant records
 - Guidance for Section C.2.1.1 was worked out to in 2021 and 2022 to address NRC concerns about certain types of information
 - Guidance for SAR Sections 3.3.1, 3.4.1, and 3.5.1 already provide for event-specific information PRA model information in Chapter 3
 - **The clarification is not needed and is counterproductive [Comment 29]**

Issue 1 – PRA Clarification C.5.b

- Addition C.5.b requests detailed information underpinning the PRA calculations addressing QHOs in Section 4.1
 - This change would greatly expand the PRA level of detail required in the SAR with no commensurate benefit
 - The information in question would be addressed in the PRA peer review, and it would be available for NRC to inspect in an audit
 - It is not clear the NRC appreciates the scope of this overly broad requirement – e.g., “(5) key modeling assumptions,” “(8) uncertainty/ sensitivity analysis performed”
 - Because these are integrated analyses, the requirement would apply to each and every PRA event sequence family that involves an offsite dose
 - Literal compliance may result in information on the order of SAR Chapter 19 for advanced light water reactors
 - The clarification is not needed and is counterproductive [Comment 34]

Issue 2 – Defense in Depth Change Control

- Addition C.5.d would require that the applicant provide a change control process for DID in the SAR.
 - The requirement is inappropriate for a SAR
 - Industry is working with the NRC on a change control process for licensees that follow NEI 18-04
 - This is the Technology Inclusive Risk Informed Change Evaluation (TIRICE) Project
 - Draft NEI Guidance Document NEI 22-05 includes and should address the issue
 - The addition is not needed and is counterproductive [Comment 36]

Issue 2 – Non-PRA Analyses

- Addition C.3.h would expand the coverage of SAR Chapter 2 by requiring applicants “identify and describe the non-PRA analysis and calculation methodologies used to establish their licensing bases,” and it is apparently motivated by change control considerations
 - This addition was never discussed in the extensive interactions preceding the submittal of NEI 21-07 Rev. 1
 - “... analysis and calculational methodologies used to establish their licensing basis” is ill-defined, overly broad, and subject to misuse
 - It is a circular definition
 - The SAR is not the compendium of all analyses and calculations related to a nuclear power plant

Issue 2 – Non-PRA Analyses (cont.)

- The tie to change control as justification for Addition C.3.h is inappropriate because industry is working with the NRC in the TIRICE project to address change control in the context of a plant following the NEI 18-04 methodology
- Literal compliance with the guidance would be at cross-purposes to the intended organization of NEI 21-07
 - LBE analyses would not be described in Chapter 3
 - SSC analyses would not be described in Chapters 6 and 7
 - The purpose of Chapter 2, capturing cross-cutting analyses and methodologies, would be defeated
- Addition C.3.h is not needed and is counterproductive [Comment 25]

Issue 3 – Reliability and Capability Targets

- The last two sentences of the first paragraph of DG-1404 Section 7 are confusing and do not convey appropriate guidance to the applicant
 - The penultimate sentence requests a discussion of how the applicant intends to confirm, at the OL stage, that the reliability and capability performance targets assumed in the PRA have been met
 - NEI 21-07, Section C.6.2 already addresses reliability and capability targets, including plant programs used to maintain them
 - Section C.6.2 makes it clear that reliability and capability targets are not "assumed in the PRA" as stated by DG-1404, but instead informed by PRA information and include the consideration of the NEI 18-04 criteria for plant capability DID adequacy
 - The embedded new requirement for CP applicants (how to confirm targets at the OL stage) is unnecessary and burdensome

Issue 3 – Reliability and Capability Targets (cont.)



- The last sentence of the first paragraph in DG-1404 Section 7 is confusing because it convolves inappropriately special treatments with testing and validation
 - Testing and validation are types of special treatments [Comment 41]

Issue 3 – Instrumentation and Control (I&C)

- Additions C.7.b(1) and C.8.a(1) specify additional information for I&C SSCs classified as safety-related and non-safety-related with special treatment, respectively
 - Singling out specific SSCs deterministically for additional documentation requirements (as these additions would do) is antithetical to a risk-informed, performance-based approach
 - Special treatments are already addressed adequately in the NEI 21-07 guidance, and no justification is provided for placing additional burdensome requirements for some SSCs
 - This requirement is entirely new and was never discussed as part of the extensive give-and-take that took place prior to the submittal of NEI 21-07
 - The additions are not needed and are counterproductive [Comments 48 and 52]

Issue 3 – Human Factors

- Addition C.5.c directs the inclusion of additional information on human factors in SAR Chapter 4 “... if not included in SAR Chapter 6 or 7”
 - Per discussions between industry and NRC, human factors are to be addressed in SAR Chapters 6 and 7 (in conjunction with the associated SSCs) and in SAR Chapter 11 per draft ARCAP ISG, DANU-ISG-2022-05, “Organization and Human-System Considerations”
 - There is no compelling nexus between SAR Chapter 4 and human factors as discussed in several NEI 21-07 meetings
 - The words in DG-1404 do not provide clear and actionable guidance
 - The “guidance” is an open-ended “kitchen sink” approach of “tell me everything about human factors”
 - The addition is not needed and is counterproductive **[Comment 35]**

Issue 3 – Fuel Qualification

- Addition C.6.b directs applicants to address fuel qualification in SAR Chapter 5
 - This addition is backward-looking and inappropriate for a SAR
 - Once the SAR is submitted, fuel qualification should be complete
 - It is fundamentally an issue for preapplication engagement
 - There is no need to single out fuel in a deterministic manner for safety-related status
 - The systematic, risk-informed NEI 18-04 process should properly categorize SSCs
 - The requested fuel qualification plan information is not needed but if it were, providing it in SAR Chapter 5 would be wholly inappropriate
 - The addition is not needed and is counterproductive **[Comment 40]**

Issue 3 – Codes and Standards

- Additions C.7.b(2) calls for justification in the SAR for the use of chosen codes and standards
 - The requirement goes beyond standard practice for LWRs, including advanced LWR designs
 - This requirement was not raised during discussions of NEI 21-07 prior to the submittal of the document for NRC endorsement in 2022
 - The addition is not needed and is counterproductive [Comment 49]

Issue 4 – Light Water Reactor (LWR) Guidance

- Industry has concerns with the letter and the spirit of Addition C.2.e, which would levy substantial documentation requirements even though they are largely nonapplicable to non-LWRs
- Item 1: Generic safety issues (GSIs), unresolved safety issues (USIs), and TMI action items are largely LWR-centric
 - They should not be presumed to be applicable to non-LWRs
 - Applying LWR GSIs, USIs, and TMI action items to non-LWR advanced reactors is inconsistent with the concept of risk-informed, performance based regulation

Issue 4 – LWR Guidance (cont.)

- Item 1: GSIs, USIs, and TMI action items (cont.)
 - There is no regulatory requirement that non-LWR Part 50 applicants address GSIs, USIs, and TMI action items in the SAR
 - NRC should not impose unnecessary requirements related to GSIs, USIs, and TMI action items on Part 50 applicants
- If NRC retains Addition C.2.e Item 1, **NRC should clarify that it does not presume applicability to non-LWRs**

Issue 4 – LWR Guidance (cont.)

- Item 2: Regulatory guides
 - Regulatory guides are not regulatory requirements and most were developed specifically for LWRs
 - There should be no presumption that regulatory guides are applicable to non-LWRs and NRC should be clear on that point
 - If the NRC retains Addition C.2.e Item 2 for SAR Chapter 1, **it should be clear that the expectation is a simple list of material addressed elsewhere in the SAR, not a justification for the disposition of each and every regulatory guide**

Issue 4 – LWR Guidance (cont.)

- Item 3: Codes and Standards
 - Codes and standards will be addressed in appropriate sections of the SAR
 - If the NRC retains Addition C.2.e Item 3 for SAR Chapter 1, **it should be clear that the expectation is a simple list, with any substantive information provided in later chapters as presently directed by NEI 21-07**
- See Comment 16 covering Items 1, 2, and 3

Issue 5 – Scope: Manufacturing Licenses (MLs) and Standard Design Approvals (SDA)



- NEI 21-07 Section A.3 states the document applies to specific licensing approaches
 - Part 52 combined construction permit and operating license (COL)
 - Part 52 design certification (DC)
 - Part 50 two-step license (CP/OL)
- Guidance for an ML or SDA should be very similar to guidance for a DC
 - Design-centered guidance
 - Both an ML and an SDA contemplate a CP application under Part 50 or a COL application under Part 52

Issue 5 – Scope: MLs and SDAs (cont.)

- DG-1404 states in several places the document applies to the aforementioned approaches plus a Part 52 manufacturing license (ML) and a Part 52 standard design approval (SDA)
 - However, DG-1404 provides no specific guidance for applicants pursuing an ML or an SDA
- Industry agrees that an ML or SDA applicant following NEI 18-04 should be able to use the NEI 21-07 guidance with appropriate adjustments
- Rather than providing no recognition of the lack of ML- and SDA-specific guidance, **NEI recommends that DG-1404 direct such applicants make appropriate adjustments to the existing guidance**
- It is expected such adjustments would be the subject of preapplication engagement with the NRC **[Comment 2]**

Issue 5 – Scope: Non-LMP Approaches

- Addition C.2.c provides guidance to "... non-LWR applicants pursuing a CP under 10 CFR Part 50 using a risk-informed, performance-based approach other than the LMP"
 - NEI 21-07 is for applicants using LMP, so this is clearly beyond scope
 - NEI 21-07 provides flexibility for applicants, but it is not reasonable to expect it to be used by applicants employing a totally different approach than LMP
 - NEI 21-07 Section C.1.3.1 places the onus on the applicant which deviates from NEI 18-04 to address and justify those deviations
 - It is inappropriate for a reg guide that endorses NEI 21-07 to attempt to address all possible deviations from NEI 21-07
 - The addition is not needed and is counterproductive **[Comment 14]**

Issue 6 – Deterministic Material in SAR

Chapter 3

- NRC wants applicants to include certain information related to deterministic events and requirements in SAR Chapter 3
- Industry would like to ensure the events are clearly delineated as separate from licensing basis events (AOO, DBEs, BDBEs, and DBAs) as defined in NEI 18-04
- **Industry recommends the NRC Regulatory Guide instruct applicants to put the information in a new Section 3.7, Special Event Analyses [Comment 30]**

Issue 6 – Deterministic Material (cont.)

- Addition C.4.c(1) addresses aircraft impact assessments per 10 CFR 50.150
 - The guidance is different from the guidance provided in the ARCAP Roadmap ISG DANU-ISG-2022-01 (p. 39 of 56)
 - Rather than have different and potentially conflicting guidance in multiple documents, **NRC should put the guidance in one location and referred to by reference in other locations, if needed** [Comment 31]

Issue 6 – Deterministic Material (cont.)

- Addition C.4.c(2) addresses mitigation of specific beyond design basis events per 10 CFR 50.155
 - A comprehensive evaluation of such events should not be necessary at the CP stage
 - **Industry requests the NRC add guidance to the effect that information addressing this regulation is not required at the CP stage unless the applicant is requesting design finality [Comment 32]**

Issue 7 – Defense in Depth (DID) Guidance

- Addition C.5.a discusses aspects of DID and then solicits a discussion on DID adequacy assessment processes for the life of the plant
 - The first two sentences are essentially quotes from NEI 21-07 and are therefore unnecessary
 - The sentence “The CP application should provide a discussion in the SAR to establish DID adequacy” is worded awkwardly, and it seems to be soliciting a description of the approach to DID
 - NEI 18-04 already describes the approach to DID
 - NEI 21-07 already addresses requirements for DID information in the SAR

Issue 7 – Defense in Depth Guidance (cont.)

- Concerning the DID adequacy discussion, NRC goes on to say in Addition C.5.a “A discussion in the SAR to implement the DID adequacy assessment processes in RG 1.233 is considered acceptable for this purpose.”
 - The sentence is worded awkwardly and the intent is unclear
- DG-1404 then addresses the situation in which the applicant does not intend to follow Reg Guide 1.233
 - Applicants are already required to explain deviations from NEI 21-07 and Reg Guide 1.233 (see NEI 21-07 Section C.1.3.1)
- Addition C.5.a is not needed and is counterproductive [Comment 33]

Issue 7 – Incorporated by Reference

- Clarification C.3.a addresses separate licensing documents that are incorporated by reference in the SAR, and states that NEI 21-07, Rev. 1, does not address them
 - NEI 21-07 does address the issue thoroughly in Section B.3, including a reference to NEI 98-03, Rev. 1
 - Even if the clarification were necessary, which it is not, it would be inappropriate to make is specific to Section C.2 of NEI 21-07 (guidance on SAR Chapter 2, Methodologies and Analyses)
 - The guidance would apply to the entirety of the SAR
 - That is why the guidance on incorporated by reference is provided in NEI 21-07 Section B.3, which is general guidance
 - The addition is not needed and is counterproductive [Comment 18]

Issue 7 – PRA Clarification C.3.f

- Clarification C.3.f addresses a clarifying note in NEI 21-07 Section C.2.1.1 pertaining to PRAs that do not follow the non-LWR PRA standard
 - The NEI 21-07 note in question clearly applies to the baseline guidance in NEI 21-07 which is for a COL application
 - Guidance for a CP applicant is in the following section, entitled “Two-Step Licensing (CP Content)”
 - That CP guidance addresses both situations – following the non-LWR PRA standard and not following the standard
 - The NRC “clarification” introduces confusion that did not previously exist
 - The addition is not needed and is counterproductive **[Comment 23]**

Issue 7 – PRA Addition and Clarification C.4.a(2-4)



- The NRC comment seeks to ensure that “all of the information in the second bulleted list” for certain AOOs, DBEs, and BDBEs” is provided
 - In each case, NEI 21-07 states “the following information should be provided” or similar words (see guidance in NEI 21-07 for SAR Sections 3.3.1, 3.4.1, and 3.5.1)
 - Example in Section 3.3.1 “The following information should be provided for any AOO with a release.”
 - The “following information” is clearly the second bulleted list
 - The current NEI 21-07 language is clear and the NRC comment appears to be guarding against an impossible misinterpretation
 - The additions/clarifications are not needed and are counterproductive
[Comment 28]

Issue 7 – DBHL Guidance

- Clarification and Addition C.7.a addresses DBHL loads and related analyses and evaluations
 - The necessary guidance is already provided in NEI 21-07 Section C.6.1.1
 - The C.7.a statement “Preapplication interaction with the staff may be appropriate to determine the necessary level of information” does not add value
 - The same statement could be included in every section of DG-1404
 - The ARCAP Roadmap ISG already provides a robust discussion on the use of preapplication guidance
 - The DG-1404 guidance neither clarifies nor adds to the NEI 21-07 guidance
 - The clarification and addition is not needed and is counterproductive
[Comment 45]

Issue 7 – Principal Design Criteria (PDC)

- Addition C.6.a(1), Clarification C.6.a(2), and Addition C.6.a(3) address various aspects of the approach to PDC as presented in NEI 21-07 Section C.5.3
 - The DG-1404 PDC discussion repeats material contained in NEI 21-07 about PDC, but it is not apparent what is actually added or clarified in DG-1404
 - The applicant will be left to puzzle through a page of “guidance” in DG-1404 and guess what, if anything, the NRC desires that is different from what is already in NEI 21-07
 - NRC should delete the additions and clarifications in C.6.a or revise the material to make it clear what the “ask” is [Comments 37-39]

Issue 7 – Addition C.2.b on Scope of the SAR



- Addition C.2.b reminds the applicant there is more to a SAR than the documentation of the NEI 18-04 process as provided in NEI 21-07.
 - This point is already amply made in NEI 21-07 (Sections A.1 and A.3) and in the ARCAP Roadmap ISG
 - e.g., A.3: “This guidance addresses only the portion of an advanced reactor SAR related directly to the implementation of the NEI 18-04 methodology. Concurrently with the development of this document, NRC is developing guidance for the remaining parts of an advanced reactor license application (including part of the SAR) in its Advanced Reactor Content of Application Project (ARCAP).
 - It is simply inconceivable an applicant would get this wrong
 - The addition is not needed and is counterproductive [Comment 13]

Issue 7 – Other Unnecessary Material in Body of DG-1404

- There are statements in parts of DG-1404 outside of specific additions and clarifications which industry considers unnecessary and, in some cases, inaccurate or misleading.
 - Industry provided specific comments to the NRC identifying those instances
 - As with the additions and clarifications, industry believes it is important to avoid restating guidance that is already in NEI 21-07
 - These slides do not address those comments individually, but industry is ready to discuss any of the comments if NRC has any questions or concerns with them

Other Package Comments to Highlight

- ARCAP goal was guidance applicable for any technology (non-LWR and LWR), any licensing approach (LMP, classical, etc.), and any licensing path (CP, COL, DC etc.)
- Maintain independence of Part 50/52 and Part 53 efforts
 - Disagree with including guidance based on unapproved on-going rulemaking efforts
 - Facility Safety Program itself has concern as noted in Part 53 comments and summarized here

Thank You for Your Time and Attention