



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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June 8, 2021

MEMORANDUM TO: John P. Segala, Chief
Advanced Reactor Policy Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

FROM: Eric R. Oesterle, Senior Project Manager
Advanced Reactor Policy Branch
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SUBJECT: SUMMARY OF MAY 26, 2021, PUBLIC MEETING TO DISCUSS
TECHNOLOGY INCLUSIVE CONTENT OF APPLICATION
PROJECT

On May 26, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff held a public meeting with stakeholders, to discuss the technology inclusive content of application project (TICAP). The meeting notice is available in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession No. ML21144A002, and the presentation slides are available at ADAMS Accession No. ML21146A088. The Enclosure 1 to this summary provides the attendees for the meeting as captured by Microsoft Teams.

Meeting Highlights

The meeting was in the form of a workshop. The purpose of the workshop was to discuss industry's draft TICAP guidance document found at ADAMS Accession No. ML21106A013. Prior to the workshop the NRC staff identified a list of 23 items that were identified as topics to be discussed during this workshop and remaining TICAP workshop scheduled for May 26, 2021. The list of issues can be found at ADAMS Accession No. ML21120A057. Thirteen of the 23 items were discussed during the May 11, 2021 workshop (see meeting summary at ADAMS Accession No. ML21132A295) and seven of the 23 items were discussed during the May 19, 2021 workshop (see meeting summary at ADAMS Accession No. ML21154A290). A path forward for several of the issues discussed during workshop was identified. Enclosure 2 documents the results of the workshop in the disposition column.

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Two topical areas were identified during this workshop for further focused discussion towards resolution of the content of the TICAP guidance discussions needed for these topics:

- Topic 9, “reliability and capability targets,” from the list found in Enclosure 2. This issue was originally identified as an outcome of the TICAP tabletop exercises that were held in the February through March 2021 time frame. The observations from these TICAP tabletop exercises can be found at ADAMS Accession No. ML21125A139.

The NRC staff noted that industry’s draft TICAP guidance document does not appear to be consistent with NEI 18-04, Rev 1, “Risk-Informed Performance-Based Technology Guidance for Non-Light Water Reactors,” (ADAMS Accession No. ML19241A336) in that the reliability and capability targets are not proposed to be captured in the safety analysis report (SAR). From the staff’s perspective the SAR should describe reliability targets and performance requirements used as input to the probabilistic risk assessment and for structures, systems and components that were used to develop the selection of special treatment requirements (i.e., programmatic actions used to maintain performance within the design reliability targets). The staff noted this information is important to capture in the SAR and in some cases could also be captured as part of technical specification requirements. From the industry’s perspective, there is a concern that placing such information in the SAR is unnecessary and would potentially create a burden from a change control process standpoint. The staff and industry agreed to discuss this issue further in a future focused meeting.

- Topic 6 from the list found in Enclosure 2 associated with the development of principal design criteria (PDC).

The staff believes the TICAP approach to establishing the RFDC as the PDC is too narrow. The staff believes the following statement is not correct “For plants that use the NEI 18-04 methodology, the PDC that flows from the LMP methodology and are needed to support the LMP-based safety case are based on the RSFs and the Required Functional Design Criteria (RFDC).” RFDCs are used to “supplement or modify” ARDCs in developing PDCs. RG 1.232 should be referenced since there are other PDCs that are not tied to RFDCs (e.g., ARDCs 1 through 4). NEI 18-04 4.1 Task 7 states: “RFDCs are defined to capture design-specific criteria that may be used to supplement or modify the applicable General Design Criteria or Advanced Reactor Design Criteria in the formulation of Principal Design Criteria.”

Industry does not believe the intent of NEI 18-04 was to impose deterministic PDC on a risk-informed, performance-based process. The TICAP methodologies are trying to adapt the PDC concept to the affirmative safety case approach and equate the PDC to those associated with RSFs. In that approach, considering non-reactor sources could have associated RSFs and PDCs if high-consequence events might be associated with such inventories. Other issues associated with the LWR GDC or ARDC may be addressed by other parts of an application.

The issue will be considered further by the staff and industry and discussed again at Workshop #3. Aspects for consideration include cross-cutting GDC/ARDC; areas outside the TICAP scope such as releases during normal operation (GDC 60); and implications of GDC imposing requirements beyond those that might be established by LMP (e.g., GDC 17 and single failure).

At the end of the workshop the staff noted the dates for the remaining workshop and the target date of early June 2021 for the NRC staff to provide a complete set of comments on the industry's draft TICAP guidance document and industry's target of late July for providing a revision to the document. The staff noted that the list provided in Enclosure 2 are the high-level issues associated with industry's draft guidance document. The staff informed industry that it was also developing comments embedded within the draft document that did not rise to a level to be discussed during the workshops. The staff and industry also discussed the need for a future meeting focused on resolution of Topics 6 and 9, as discussed above, and agreed to coordinate on scheduling of this during the June 2021 timeframe.

Enclosure:

1. Attendance List
2. List of Topics of Discussion for TICAP Workshops

SUBJECT: SUMMARY OF MAY 26, 2021, PUBLIC MEETING TO DISCUSS TECHNOLOGY INCLUSIVE CONTENT OF APPLICATION PROJECT DATED: June 8, 2021

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NAME	EOesterle	JSegala	EOesterle
DATE	6/7/2021	6/8/2021	6/8/2021

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May 26, 2021, Public Meeting to Discuss
Technology Inclusive Content of Application Project
Attendance List*

NAME	AFFILIATION	NAME	AFFILIATION
Nathan Sanfilippo	NRC/NRR/DANU	Amir Afzali	Southern Company
Martin Stutzke	NRC/NRR/DANU	Jason Redd	Southern Nuclear
William Reckley	NRC/NRR/DANU/UARP	Brandon Chisholm	Southern Company
John Segala	NRC/NRR/DANU/UARP	Mike Tschiltz	NEI
Prosanta Chowdhury	NRC/NRR/DANU/UARP	Cyril Draffin	US Nuclear Industry Council
Maryam Khan	NRC/NRR/DANU/UARP	George Flanagan	Oak Ridge National Lab
Eric Oesterle	NRC/NRR/DANU/UARP	Ed Wallace	GNBC Associates
Arlon Costa	NRC/NRR/DANU/UARP	Steven Nesbit	LMNT Consulting
Juan Uribe	NRC/NRR/DANU/UARP	Frank Akstulewicz	A to Z Reactor Consulting Services
Amy Cabbage	NRC/NRR/DANU/UARP	Steve Vaughn	X-energy
Joe Sebrosky	NRC/NRR/DANU/UARP	Travis Chapman	X-Energy
Nan Valliere	NRC/NRR/DANU/UARP	Jim Kinsey	Idaho National Laboratory (INL)
Jordan Hoellman	NRC/NRR/DANU/UARP	Tom King	INL
Stephen Philpott	NRC/NRR/DANU/UARP	Christopher Chwasz	INL
Alex Chereskin	NRC/NRR/DANU/UARP	Tom Hicks	INL
Margaret O'Banion	NRC/NRR/DANU/UARP	Ricardo Davis-Zapata	GE Power
Jan Mazza	NRC/NRR/DANU/UARL	Dennis Henneke	GE Power
Mallecia Sutton	NRC/NRR/DANU/UARL	George Wadkins	GE Power
Hanh Phan	NRC/NRR/DANU/UART	Archana Manoharan	Not Available (NA)
Alexandra Siwy	NRC/NRR/DANU/UARL	Farshid Shahrokhi	NA
Michelle Hayes	NRC/NRR/DANU/UART	Lance Sterling	NA
Michelle Hart	NRC/NRR/DANU/UART	Bill Fowler	NA
Timothy Lupold	NRC/NRR/DANU/UART	Michael Mayfield	NA
Ian Jung	NRC/NRR/DANU/UART	Alan Levin	NA
Chris Van Wert	NRC/NRR/DANU/UART	Tom Braudt	NA
Boyce Travis	NRC/NRR/DANU/UART	Karl Fleming	NA
Tim Drzewiecki	NRC/NRR/DANU/UART	Jana Bergman	NA
Carolyn Lauron	NRC/NRR/DNRL/NLRB	Rob Burg	NA
Eric Bowman	NRC/COMM/CS	Barton Landon Pate	NA
Yuan Cheng	NRR/NRC/DEX/EXHB	Amanda Spalding	NA
Julie Ezell	NRC/OGC	Narasimha Kadambi	NA
Marcia Carpentier	NRC/OGC	Stephen Burns	NA
David Heeszal	NRC/NRR/DEX/EXHB	Parthasarathy Chandran	NA
Barbara Hayes	NRC/NRR/DEX/EXHB	Steven Pope	NA
Baindur Satyen	NA	Alan Jelalian	NA
Kamal Manoly	NRC/NRR/DEX	Jason Andrus	NA
Andrew Zach	EPW	Anthony Schoedel	NA

NAME	AFFILIATION	NAME	AFFILIATION
Caroline Cochran	Oklo	Rachel Turney	NA
Chantal Morin	NA		

* Attendance list based on Microsoft Teams Participant list. List does not include 5 unidentified individuals that connected via phone.

List of Topics of Discussion for Technology Inclusive Content of Application Project Workshops

Workshop 1	Cell color denotes workshop in which issue was first discussed
Workshop 2	
Workshop 3	

Red font indicates Workshop #3 updates on topics discussed in prior workshops

Issue #	Topic	Priority	Comments	Disposition
1	The construction permit (CP) guidance contained in the two-step Licensing section is not sufficiently detailed to ensure consistent implementation.	Hi	<p>For Sections 1.2, 1.3, 1.4, 2.4 there is no CP guidance. For Section 2.3, simplified and/or qualitative analyses should be available to support reasonable assurance findings (examples are provided in Appendix C of NRC's Construction Permit White Paper found at ADAMS Accession No. ML21043A339)</p> <p>Chapter 3 – Use of term “preliminary assessments.” What does that mean? Should reference bounding assumptions and conservative modeling to account for the uncertainty in final design details. Should reference discussion of the major SSCs of the facility that are intended to mitigate the radiological consequences of a design basis accident (DBA).</p> <p>For Chapter 4, the staff would like to understand better the use of term “preliminary description of the integrated plant performance.”</p> <p>For Chapter 6, guidance for first of a kind (FOAK) structures, systems and components (SSCs) does not appear to be sufficiently detailed to ensure consistent implementation.</p> <p>The CP guidance should consider including a description of the research and development (R&D) plans supporting the design.</p> <p>The minimum level of detail to support a CP application should be considered for discussion. The CP white paper provides thoughts regarding minimum level of detail.</p> <p>The non-light water reactor probabilistic risk assessment (NLWR PRA) standard (ASME/ANS RA-S-1-4-2021) contains</p>	<p>Workshop #2</p> <p>Comment 4: TICAP reiterated its intention to take another look at how/if TICAP guidance needs to address 50.43(e) (see Issue 7 from Workshop 1).</p> <p>Comment 5: TICAP will expand guidance on R&D plans. Currently this is in Section 2.3, but it could be expanded to SSC system descriptions in Chapters 6 and 7.</p> <p>Comment 7: TICAP will revise Section 2.1.1 to clarify that the PRA assumptions should be available for NRC audit but are not required to be provided in the PSAR.</p> <p>TICAP will consider adding CP guidance for Section 2.4 as well, recognizing that it will necessarily be general.</p> <p>TICAP will consider NRC expectations in the draft TICAP Guidance Document Reg Guide for incorporation into the Guidance Document. This includes PRA documentation at the CP stage.</p> <p>TICAP will look at early site permit (ESP) guidance in Reg Guide 1.206 for potential application to CP guidance, but noted that the inherent differences between ESPs and CPs may</p>

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			<p>numerous supporting requirements to document the assumptions made in lieu of detailed design information. Will these assumptions be identified in the preliminary safety analysis report (PSAR) or will they be provided in the detailed PRA information (which is only available to the staff via an onsite audit)? This comment is related to Issue #8 below.</p> <p>The staff expects that the TICAP guidance document will be used to support near-term non-LWR CP applications. Discussions of how the TICAP guidance document might be used along with preapplication discussions to aid the near-term reviews could be a topic of a workshop. Such an approach could potentially be used to develop near-term guidance with revised updated guidance being issued at a later date. The revised guidance could be based on lessons learned from the initial construction permit reviews.</p>	<p>limit applicability. NRC also noted the Clinch River ESP as a possible resource.</p>
2	Source term guidance might need to be expanded.	Med	<p>The source term discussion should require the attenuation mechanisms be described. These are just as important in limiting radionuclide release as is fuel performance.</p> <p>Source terms should be detailed for each licensing basis event (LBE), but no confirmatory analyses is done to ensure inclusion of all source terms.</p>	<p>Workshop #1</p> <p>TICAP to clarify in guidance that attenuation mechanisms are to be described.</p>
3	The guidance in several areas is too general to ensure consistent and adequate implementation, such as the use of terms like “relevant phenomena,” “initial operating conditions,” and “identify treatments.” Additional examples in this area are provided in items 3a through 3d below.			<p>Workshop #1</p> <p>TICAP acknowledges that some guidance can be made more specific but there are limitations on how specific for technology inclusive guidance.</p> <p>NRC to provide additional examples as part of written comments.</p>

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3a	<p>The guidance should be more specific in specifying initial plant parameters, settings of protection system functions, meteorological assumptions, and uncertainty assumptions, and characteristics of fission product releases assumed in the LBE analysis.</p> <p>The guidance regarding the defense in depth (DID) content should be expanded to address the areas discussed in the staff's April 2020 annotated outline in Chapter 7 (see: ADAMS Accession No. ML20107J565) which were derived from NEI 18-04</p>		<p>For modular nuclear power reactor design; describe and analyze the possible operating configurations of the reactor modules with common systems, interface requirements, and system interactions.</p>	<p>TICAP believes multiple modules are addressed in LBE descriptions (Chapter 3) and interface requirements and system interactions are addressed in system descriptions (Chapters 6 and 7). However, TICAP will review the current wording to see if enhancements are warranted.</p>
3b			<p>Section 4.2 (DID) states that the scope and content of the final safety analysis report (FSAR) are focused on presenting results, not details of the process. It goes on to say that the topics to be addressed in the evaluation of DID are for background and there is no requirement to address each topic in the FSAR. Why isn't discussion of the evaluation topics important enough to be placed in the FSAR? This provides the technical basis for the DID adequacy determination. Other sections (4.2.1, 5.4) make similar statements with no basis.</p> <p>NEI 18-04 (Section 5.9.3) states that the adequacy of DID is confirmed when the actions and decisions (listed in 5.9.3) are completed by the Integrated Decision-Making Process (IDP). There is hardly any mention of the IDP in the TICAP guidance, yet NEI 18-04 emphasizes it.</p> <p>Section 5.4 (Safety-Related SSCs) states in the introduction that in identifying safety-related SSCs, the SSCs not selected as safety-related constitute one element of Plant Capability DID. However, the introduction goes on to say that these DID SSCs are not design basis information. Why aren't DID SSCs in the design basis? What is the basis for excluding the information used to select the safety-related SSCs from the SAR?"</p>	<p>TICAP discussed desire to focus SAR content on results rather than process.</p> <p>NRC to provide specific recommendations where additional DID content is desired in the SAR, along with the rationale.</p> <p>NRC provided additional comments on DID on May 17, 2021. Response to those several comments follow; note that these issues were cross-cutting for Topics 3b, 10, 12.</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		TICAP guidance document Section 4.2 addresses defense-in-depth (DID). It is unclear from the guidance that an adequate level of detail would be included in the SAR regarding the evaluation of DID.	<p>General Comment Response:</p> <ul style="list-style-type: none"> - Multiple comments have overlapping themes and content. TICAP reconciliation of the basic comments required to extract individual points for inclusion in TICAP guidance updates. - TICAP plans to update the DID guidance with the following common understanding: <ul style="list-style-type: none"> o TICAP DID content will focus on the final results of the Integrated Review Process. o Supporting records will contain additional details of the IDP deliberations. o DID baseline content, i.e. that necessary to set the framework for future DID change evaluations should be provided in the SAR. o DID topic discussion outlined in NEI 18-04 will be parsed among multiple TICAP chapters, i.e, 3, 4, 5, 6, 7 and 8 as appropriate to support the specific topic discussions in those chapters. - The revised DID guidance will also reflect the dispositions associated with Comments 1-7 below.

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3.b	Additional NRC DID Comments dated May 17, 2021		<p>Comment 1 Add the following to Section 4.2: "Baseline Evaluation of Defense in Depth</p> <p>This section should describe the "baseline" level of defense in depth provided by the proposed facility. This baseline is established when the recurring evaluation of plant capability and programmatic capability associated with design and PRA update cycles no longer identifies risk-significant vulnerabilities where potential compensatory actions can make a practical, significant improvement to the LBE risk profiles or risk-significant reductions in the level of uncertainty in characterizing the LBE frequencies and consequences. This baseline DID evaluation and its outcome are to be documented in sufficient detail to assure that future changes to physical, functional, operational, or programmatic features of the facility can be effectively evaluated for their potential for reduction of DID before proceeding."</p>	<p>Disposition See General Comment Response above</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		<p><u>Comment 2</u> Section 4.2.1 describes SAR content guidance for plant capability DID evaluations. Suggest the following changes to Section 4.2.1:</p> <p>“The purpose of this section is to provide a description of the SSCs and the layers of defense they represent in the overall achievement of an acceptable level of DID. The application should describe how the design meets the guidelines for plant capability attributes provided in NEI 18-04 Table 5-2 [“Guidelines for Establishing the Adequacy of Overall Plant Capability Defense-in-Depth”]. Separate discussions of plant capabilities that are relied upon to meet these plant capability attributes should be provided in this section. For example, describe how the design minimizes the frequency of challenges to safety-related SSCs including controlling abnormal operation, detecting failures and preventing design basis accidents.”</p>	<p>Response 2.1- See General Comment Response above.</p> <p>Response 2.2 – re “minimization” The parties agreed that minimization was not the objective.</p> <p>TICAP agreed to review the “chain of evidence” required across the chapters to make sure the DID Attributes in NEI 18-04 are captured in the various guidance sections.</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		<p>Comment 3 Modify TICAP text in Section 4.2.1.2 as follows:</p> <p>“This section should describe how the design addresses each qualitative guideline in NEI 18-04 Table 5-2 for each LBE and describe any departures from the stated criteria. The applicant should provide a summary identification of the layers of defense for each risk-significant LBE and describe the extent of independence between different LBE layers of defense. The applicant should describe for each risk-significant LBE how the design does not have an over reliance on a single design feature, barrier, or operational feature relied upon to meet quantitative objectives. The criteria used to decide whether or not an over reliance exists should be provided. The application should describe how the process identifies the potential for common cause failures and how those vulnerabilities were eliminated. Describe how the design provides an appropriate balance between event prevention and mitigation in the layers of defense for risk-significant LBEs. The criteria used to decide whether or not there is an appropriate balance between prevention and mitigation should be provided.”</p>	<p>Response 3.1- See General Comment Response above.</p> <p>Response 3.2 – TICAP clarified that “single feature” evaluation would be summarized in Chapter 4. TICAP also emphasized that the SAR content for DID adequacy focused on results and should not have to document negative findings of the review that had no impact on the design or operational programs. Such “negative findings” should be available in supporting records of the IDP.</p> <p>Response 3.3 – TICAP clarified its position on the term “over-reliance” as used in the TICAP guidance and NEI 18-04 and the adequacy of NEI 18-04 to deal with this qualitative objective.</p> <p>Response 3.4 – TICAP identified the PRA standard and resulting records as the source of information for “common cause” evaluations. The necessary content is part of the Plant Capability evaluation of LBEs.</p> <p>Response 3.5 – TICAP clarified that its approach to prevention-mitigation balance is contained in the examination of layers of defense. The need for additional guidance on layers of defense in Chapter 3 and 4 will be reviewed.</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		<p><u>Comment 4</u> Add new text to section 4.2.1.2 as follows:</p> <p>“For SSCs that perform prevention and mitigation functions for risk-significant LBEs, describe the set of requirements related to the performance, reliability, and availability of the SSC functions that are relied upon to ensure the accomplishment of their tasks, as defined by the PRA or deterministic analysis. This section should also describe the capability of those SSCs relied upon for DID. This should include how that capability is ensured through testing, maintenance, inspection and performance monitoring. If this information is provided in other sections it need not be repeated here.”</p>	<p>Response 4.1- see related discussion in Response 3.5.</p> <p>Response 4.2- Performance targets are being addressed under Topic 9.</p> <p>Response 4.3 – TICAP clarified that special treatments are discussed in Chapters 5, 6 and 7.</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		<p><u>Comment 5</u> Section 4.2.2 describes SAR content guidance for programmatic DID evaluations. Suggest modifying the text in Section 4.2.2 as follows:</p> <p>“Programmatic DID should be used to address uncertainties when evaluating plant capability DID as well as uncertainties in programmatic measures. It should provide the basis for defining special treatment requirements to ensure there is reasonable assurance that the predicted performance of SSCs and programmatic measures can be achieved throughout the life of the plant. The application should describe how the design incorporates the programmatic capability attributes provided in NEI 18-04 Table 5-6 to provide adequate assurance that the risk, reliability, and performance targets will be met and maintained throughout the life of the plant with adequate consideration of sources of significant uncertainties. This description should support the discussion of special treatment programs selected for safety-significant SSCs described in Chapters 6 and 7. Special treatments described in NEI 18-04 Table 5-7 should be considered, although the application does not need to address items that are not applicable. The application should describe how uncertainty in programmatic DID is addressed and how additional measures are in place to address unknowns.”</p>	<p>Response 5.1- See General Comment Response above.</p> <p>Response 5.2- TICAP clarified that the discussion on uncertainties related to evaluating plant capability uncertainties, not programmatic uncertainties. The TICAP guidance in Chapter 4 is being revised and will contain additional guidance on the topic of uncertainties.</p> <p>Response 5.3- NRC clarified that the comment on “unknowns” was referring to the DID attributes in NEI 18-04 Table 5-6.</p>

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3.b	Additional NRC DID Comments dated May 17, 2021		<p><u>Comment 6</u> Add a requirement to summarize the integrated decision-making process (IDP) which NEI 18-04 emphasizes (in Section 5.6) as “responsible for making the deliberate, affirmative decision that DID adequacy has been achieved”. Suggest the following be added to the TICAP guidance document:</p> <p>“The application should summarize how the IDP process was applied in evaluating the overall adequacy of DID. The description should address how each of the decision guidelines listed in NEI 18-04, Section 5.9.3, was evaluated and the basis for an affirmative response. The criteria used in making the decisions (e.g., risk margins are sufficient, prevention/mitigation balance is sufficient, etc.) should be provided. If quantitative measures were used as part of the criteria, they should be provided. A description of how the results of the IDP process are documented and available for future DID decision-making and operations support should also be provided.”</p>	<p>Response 6.1- TICAP noted that Chapter 4 will focus on the integrated DID results not contained in other chapters.</p> <p>Response 6.2- reaffirmed that the DID SAR content is focused on results for the DID baseline and that the results will be distributed across multiple chapters.</p>
3.b	Additional NRC DID Comments dated May 17, 2021		<p><u>Comment 7</u> Add the following to the end of section 4.2: “Evaluation and Incorporation of Changes to Defense in Depth The change control process should be described addressing how the baseline DID evaluation will be re-evaluated, based on proposed changes, to determine which programmatic or plant capability attributes have been affected for each layer of defense. Changes that impact the definition and evaluation of LBEs, safety classification of SSCs, or risk significance of LBEs or SSCs must be assessed. This section should also describe how any changes to the baseline DID evaluation will be documented and implemented.”</p>	<p>Response 7.1- TICAP observed that the general topic of SAR change control was common to other portions of the licensing. TICAP confirmed that the discussion of “baseline” DID information in NEI 18-04 was in recognition of this need.</p> <p>The parties agreed that the change control topic is broader than TICAP. Further discussion of change control outside of TICAP are anticipated.</p>

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3c	<p>In addressing the special treatments the guidance should specify that the application address the special treatment requirements from NEI 18-04, Table 4-1, on a case-by-case basis and in the context of the SSC functions in the prevention and mitigation of applicable LBES.</p>		<p>Describe safety related (SR) SSC reliability targets and performance requirements used as input to the PRA for SSCs that were used to develop the selection of special treatment requirements (i.e., programmatic actions used to maintain performance within the design reliability targets).</p> <p>Guidance should point to NEI 18-04 Table 4-1 and have the applicant address the items in that list: (from NEI 18-04, Table 4-1, as applicable)</p> <ul style="list-style-type: none"> i. Equipment qualification ii. Seismic qualification iii. Materials qualification iv. Pre-service and risk-informed in-service inspections v. Pre-op and startup testing requirements vi. Surveillance testing requirements <p>The programmatic actions used to maintain performance within the design reliability targets should include a description of how actual SSC reliability is determined and compared against the design reliability target (e.g., as part of the Maintenance Rule program).</p>	<p>TICAP will enhance the linkages between special treatments in Chapters 6 and 7 and the programs in Chapter 8.</p> <p>TICAP stated that the SAR content for the LMP-based affirmative safety case should focus of the special treatments that were selected through the LMP process, vs. documenting why special treatments were not selected.</p>
3d	<p>Similarly, guidance discussion of "optional" programs should instead make a clearer tie between identified special treatments and the programs that implement those treatments</p>			<p>TICAP will revisit the linkages between special treatments and programs (see 3c).</p> <p>NRC clarified that optional refers to whether or not the special treatment invoking the program was selected.</p>
4	<p>The guidance references the modular high temperature gas cooled reactor preliminary safety information document (PSID) as guidance but does not reference the staff's safety evaluation report on that PSID which identified gaps in necessary content. Discuss whether actual guidance that is referenced should be placed in the TICAP guidance document instead of referencing the document</p>	Hi	<p>An example discussion from the staff's safety evaluation found at ADAMS Accession No. ML052780497 is as follows:</p> <p>"Some events were not defined explicitly enough to quantify properly. Common-mode and common-cause events were not present explicitly in the models. Human failure events were too vaguely described to determine whether they were assumed to occur before the event initiation or after...Most restrictive in tracing the results of the PRA was the fact that there is no list of basic events that includes the occurrence probability associated with each event."</p>	<p>Workshop #1</p> <p>The PSID references were for the purposes of guidance documentation only; the safety evaluation is therefore not relevant to the guidance.</p> <p>TICAP will revisit the PSID examples to update them or, if necessary, replace them with TICAP examples.</p> <p>TICAP will endeavor to include the examples directly in the guidance rather than referencing them.</p>

Issue #	Topic	Priority	Comments	Disposition
5	<p>The document describes a move away from compliance-based applications to a more performance-based approach. It's not clear from these statements whether applicants will be expected to describe how they comply with the regulations that are associated with the performance-based scope and outcomes of the affirmative safety case approach. regulations is an expectation for application content.</p>	Hi	<p>The TICAP guidance does not require the NRC regulations applicable to the design be identified or discussed. Isn't the purpose of the FSAR to demonstrate compliance with the applicable regulations?</p> <p>LMP primarily addresses the 50.34 requirements to identify events, plant response to those events, and associated safety margins. This provides an alternative to the LWR-based regulations that directly connect to this part of 50.34 (50.46 requirements for ECCS, for example). Is this the basic population of regulations industry is referring to in its proposed change from "compliance-based"?</p> <p>Does the content of this TICAP guidance align with the NRC's regulatory applicability assessments in "NRC Staff Draft White Paper - Analysis of Applicability of NRC Regulations for Non-Light Water Reactors", as discussed in recent non-LWR stakeholder meetings?</p> <p>Potentially another way to consider the affirmative safety case approach is stated in RG 1.233 as "... safety evaluations may demonstrate compliance with or justify exemptions from specific NRC regulations and identify where design-specific regulatory controls are warranted." An application will need to address the results from the safety case in terms of where current regulations do not contribute to safety (exemptions) or where current regulations are lacking (additional requirements). Whereas the safety case should focus on satisfying subject functions, it would be useful to agree on a format for compliance/exemption discussions, be they embedded, in a table, or other format.</p>	<p>Workshop #2</p> <p>TICAP will revisit wording of "compliance-based" in the Guidance Document (p. 4 under "Scope") to ensure there is no unintended implication that a TICAP application is not required to comply with regulations.</p>

6	<p>The guidance for inclusion of principal design criteria (PDC) may be incomplete, since only "LMP outcomes" are addressed, and other topics from Part 50 App. A (like Monitoring Fuel & Waste Storage) are not clearly included for consideration</p>	Hi	<p>This statement is not correct "For plants that use the NEI 18-04 methodology, the PDC that flows from the LMP methodology and are needed to support the LMP-based safety case are based on the RSFs and the Required Functional Design Criteria (RFDC)." RFDCs are used to "supplement or modify" ARDCs in developing PDCs. RG 1.232 should be referenced since there are other PDCs that are not tied to RFDCs (e.g., ARDCs 1 through 4).</p> <p>Section 5.3 seems to imply that PDCs are only for DBEs and DBAs. What design criteria are applied to address BDBEs?</p> <p>Section 5.3: "For plants that use the NEI 18-04 methodology, the PDC that flows from the LMP methodology and are needed to support the LMP-based safety case are based on the RSFs and the Required Functional Design Criteria (RFDC)"</p> <p>Section 5.6: "Thus, the PSAR content for Chapter 5 should include functional decomposition of FSFs to RSFs, a preliminary set of RFDC/PDC with performance-based criteria"</p> <p>From NEI 18-04 4.1 Task 7: "RFDCs are defined to capture design-specific criteria that may be used to supplement or modify the applicable General Design Criteria or Advanced Reactor Design Criteria in the formulation of Principal Design Criteria."</p> <p>The TICAP methodologies are trying to adapt the PDC concept to the affirmative safety case approach and equate the PDC to those associated with RSFs. In that approach, considering non-reactor sources could have associated RSFs and PDCs if high-consequence events might be associated with such inventories. Other issues associated with the LWR GDC or ARDC may be addressed by other parts of an application.</p>	<p>Workshop #2</p> <p>NRC believes the TICAP approach to establishing the RFDC as the PDC is too narrow. TICAP does not believe the intent of NEI 18-04 was to impose deterministic PDC on a risk-informed, performance-based process.</p> <p>The issue will be considered further by TICAP and NRC and discussed again at Workshop #3. Aspects for consideration include cross-cutting GDC/ARDC; areas outside TICAP scope such as releases during normal operation (GDC 60); and implications of GDC imposing requirements beyond those that might be established by LMP (e.g., GDC 17 and single failure).</p> <p>A future conversation will be held between TICAP and NRC/INL staff regarding the definition of Principal Design Criteria (PDC) in Appendix A of 10 CFR Part 50 and the most efficient way for TICAP PDC to comply with existing regulations while not losing the advantages provided by an RIPB approach. One specific aspect to discuss is the amount of specificity (i.e., how detailed a PDC must be) that is appropriate and/or required for the set of PDC (e.g., are derived requirements necessary to be identified as PDC?).</p>
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Issue #	Topic	Priority	Comments	Disposition
7	<p>The guidance includes a requirement to include testing/qualification plans for first-of-a kind (FOAK) safety-related SSCs for CP applications. This requirement is reflected in 50.43(e), and also applies to the other types of applications covered in the guidance (COL, DC, OL) but is not discussed in the guidance for those other application types.</p>	Hi	<p>50.34(e)(1)(i): “The performance of each safety feature of the design has been demonstrated through either analysis, appropriate test programs, experience, or a combination thereof”</p> <p>50.43(e) requires applicants to provide the collection of analyses, tests, OE, etc. necessary to assure the expected performance of “safety features”. Does this “safety feature” requirement apply to both SR and NSRST SSCs?</p> <p>Chapters 6 & 7 of the SAR in an application would reflect the required capabilities of SR and NSRST SSCs. Where would the proof of those capabilities be provided to address 50.43(e)? (It’s noted that this topic is called out for FOAK SR SSCs reflected in two-step CP applications, but the document seems to be silent on the issue for DC, COL, ML).</p>	<p>Workshop #1</p> <p>NRC believes that 50.43(e) testing is inherently fundamental to the safety case and should therefore be included under TICAP guidance.</p> <p>TICAP believes that the NEI 18-04 methodology does not encompass the 50.43(e) regulation, but that results of 50.43(e) testing would likely appear in the technical justifications supporting the safety case (e.g., benchmark data for computer codes used to analyze DBAs).</p> <p>This is an example of disagreement on the scope of the TICAP guidance. Additional clarity with respect to scope and NRC expectations will be needed.</p> <p>Nevertheless, TICAP will take another look at whether and, if so, how the 50.43(e) testing could be addressed by TICAP.</p> <p>TICAP will modify its guidance to reflect that it is not just CPs but DCs and COLs that may invoke FOAK testing as special treatments.</p> <p>Disposition is as discussed on the slides for workshop #3 - modification of guidance for Chapters 2, 6, and 7 as indicated. If the NRC desires a specific section in the SAR covering a 50.43(e) test program, NRC will develop guidance for that section. TICAP believes the appropriate location for such a section would be SAR Chapter 2.</p>

Issue #	Topic	Priority	Comments	Disposition
8	<p>The level of detail in the SAR, supporting information placed on the docket, and information that is available for audit were identified as potential items for further discussion during the TICAP tabletop exercises. During the TICAP tabletop exercises it was also noted that there is a distinction between items incorporated by reference (IBR) into the SAR and references to the SAR. IBR'd item is considered to be part of the licensing basis for the plant.</p>	Hi	<p>Discuss that if the staff relies on something they review as part of an audit to make their safety finding, that the specifics of that item then need to be elevated into the FSAR or an IBR document?</p> <p>Make clear that reports that are IBR'd are part of the licensing basis and change control process.</p> <p>Section 1.2 states that the site attributes relevant to the safety case are in Chapter 2. There is no site information in Chapter 2.</p> <p>There is no mention of fuel qualification.</p> <p>RG 1.233 provided clarifications in certain areas. Does the TICAP guidance document intend to include these?</p>	<p>Workshop #1</p> <p>TICAP understands that NRC citing an item in an audit report does not put that in the licensing basis.</p> <p>TICAP confirmed that IBR in the SAR makes the information in the IBR reference part of the licensing basis and subject to the NRC change control processes.</p> <p>TICAP explained that the reference to site information in Chapter 2 is based on the understanding that ARCAP will address site information there.</p> <p>The treatment of fuel qualification will be discussed in ARCAP/TICAP discussions in Workshop #3.</p>

Issue #	Topic	Priority	Comments	Disposition
9	<p>During the discussion of non-safety related with special treatment (NSRST) structures, systems, and components (SSC) SAR content, the NRC staff raised a question regarding where the reliability information for these SSCs would be located (e.g., PRA or SAR) and what this information might entail. The NRC staff believes further discussion on this topic would be beneficial. TICAP stated that the applicant is responsible for ensuring it is addressing Reg Guide 1.233 including clarifications and limitations therein. TICAP does not see much daylight between NEI 18-04 and Reg Guide 1.233.</p>	Hi	<p>SAR should describe reliability targets and performance requirements used as input to the PRA for SSCs that were used to develop the selection of special treatment requirements (i.e., programmatic actions used to maintain performance within the design reliability targets).</p> <p>Section 6.2 states that the SSC reliability and availability information will not be in the FSAR. This is design basis information that is needed for determining the effectiveness of the maintenance program, the reliability assurance program and the ISI/IST programs. What is the basis for excluding it from the FSAR?</p> <p>Section 7.1 defines NSRST special treatment requirements, no tie to performance targets</p> <p>Section 8 plant programs has "special treatments for SR SSCs and NSRST SSCs may involve programs relied upon to provide reasonable assurance"</p> <p>The introduction to Chapter 6 says " This further detail [Chapter 6] includes SRDC, reliability and capability performance-based targets, and special treatment requirements to provide sufficient confidence that the performance-based targets intended in the design will be achieved in the construction of the plant and maintained throughout the licensed plant life. This statement appears to support that these targets should be in SAR.</p> <p>It may be acceptable to point to where the information resides (e.g., reliability assurance program) versus putting actual reliability assumptions in the SAR.</p>	<p>Workshop #1</p> <p>NRC believes the reliability targets should be provided in the SAR. NRC notes that NEI 18-04 stated "...the reliability and capability targets for SR and NSRST SSCs, and special treatment requirements for SR and NSRST SSCs define safety-significant aspects of the descriptions of SSCs that should be included in safety analysis reports." NRC further believes the information should be in the SAR.</p> <p>TICAP believes the targets should be owner-controlled information, not maintained in the SAR. TICAP acknowledges the NEI 18-04 statement but believes TICAP guidance specifically for the SAR can supersede NEI 18-04 statements on SAR content. TICAP acknowledges that one in the draft guidance (introduction to Chapter 6) is not aligned with the TICAP position, but that statement was mistakenly included in the April 15, 2021 draft guidance.</p> <p>TICAP and NRC will consider the issue further and revisit it at Workshop 3.</p> <p>TICAP acknowledges the need to be consistent with the guidance in NEI 18-04. The NRC and the TICAP Team plan to have a focused follow-up meeting on the topic, probably in the mid-June time frame.</p>

Issue #	Topic	Priority	Comments	Disposition
10	<p>The SAR content should focus on presenting the results of implementing the LMP process. For discussion purposes, it may be beneficial to discuss what type of documentation may exist from implementing the LMP process by the applicant, including narrative on the iterations in the process, and the deliberations and decisions of the integrated decisionmaking process (IDP) and whether this documentation may be something that is audited by the NRC staff.</p>	Hi	<p>The description should address each of the decision guidelines described in Section 5.9.3 of NEI 18-04, including the basis for concluding the guideline has been met. For those guidelines where a quantitative measure can be provided, those measures used in the decision-making should be provided.</p> <p>Numerous places in 18-04 detail documentation needs for bases or decisions. The TICAP report should highlight what is documented in a TR, and what is in the SAR</p>	<p>Related to item 8 Workshop #1</p> <p>See disposition of additional NRC DID comments under Issue 3b.</p>

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11	NEI 18-04 (Section 3.2.2 – Task 6) states that, where possible, external events are to be analyzed in the PRA but, in some cases, may be selected and treated deterministically. There is no discussion in the TICAP guidance document about how to select and treat external events selected using a deterministic approach. Accordingly, the VTR report did not address this topic.	Hi	<p>There is Note on Page 51 that reads “ Note: The development of the DBEHLs is addressed by ARCAP and summarized in SAR Chapter 2.</p> <p>Section 6.1.1 states that the design only needs to protect against external hazards with a frequency greater than 1 E-4/yr. Does this exclude BDBE external hazards from consideration?</p> <p>Section 2.2 includes external events in the PRA. How are deterministically selected external events addressed in the PRA?</p> <p>Additionally, incorporation of external hazards into the LBE determination process lacks basis and detail in 18-04 and the TICAP document.</p> <p>Proposed 10 CFR 53.510(a) sets the design basis external hazard levels (DBEHLs) at 1E-5/plant-year. RG 1.208 (seismic) establishes the site-specific ground motion response spectrum (GMRS) such that the frequency of significant inelastic deformation (FOSID) is 1E-5/y. RG 1.76 (tornados) and RG 1.221 (hurricanes) set DBEHLs at 1E-7/y.</p>	<p>Workshop #2</p> <p>TICAP will consider additional guidance in Section 6.1.1 to clarify the deterministic selection of DBEHLs.</p> <p>TICAP will consider additional guidance in Chapter 3 about incorporation of external hazards into the LBE determination process.</p> <p>TICAP will consider typical information in Chapter 3 of LWR SARs and determine if the level of detail in Section 6.1.1 should be enhanced.</p>
12	The discussion of DID in Section 4.2 of a SAR developed using the TICAP guidance is a good candidate for discussion as part of the upcoming workshops with the NRC/INL staff.	Hi	<p>Section 4.2 it states “Note that the above information [topics listed in NEI 18-04 Table 5-1] is provided for background, and there is no requirement to address each topic in the SAR material.” How does an applicant address this?</p>	<p>Related to one of the sub-bullets in item 3 – Workshop #1</p> <p>See disposition of additional NRC DID comments under Issue 3b.</p>
13	Based on internal discussion with the staff – believe a discussion of principal design criteria guidance embedded in draft industry document is appropriate in accordance with eVinci TICAP tabletop exercise comments	Hi	<p>Note that the guidance more accurately reflects the NEI 18-04 PDC development than was performed by eVinci.</p>	<p>Workshop #2</p> <p>No items identified for disposition specific to this issue. PDC issues are being covered under Issue 6.</p>

Issue #	Topic	Priority	Comments	Disposition
14	<p>Currently the scope of the TICAP guidance document covers only COLs. The scope of the TICAP guidance document should be expanded to include applicability for OL applicants under Part 50 and the supplemental guidance for the two-step licensing process should be limited to just CP applicants.</p>	Hi	<p>The guidance document needs to also address scope of ESP, DC and ML applications. Regarding ESPs, the staff believes an applicant using the TICAP guidance might leverage information from an ESP in developing their application (e.g., informing the DBEHL determination).</p> <p>The level of detail and design maturity for an OL application is expected to be the same as for a COL applicant. By incorporating this comment the guidance for CP applicants can be made more clear and specific – currently the entries under the Two Part Licensing Process are confusing, inaccurate in some places, and lack specificity in others.</p> <p>On 4/2/2021, NEI submitted comments (ML21092A115) on the draft CP ISG. One comment stated that “... the NRC should not be requiring that the design and analysis for a CPA be at the same level of completion as for a COLA.” This differs from the TICAP statement.</p>	<p>Workshop #1</p> <p>TICAP to consider changes to clarify that alternative licensing paths two-step licensing guidance is applicable to the CP, not to the OL, and that the baseline TICAP guidance is applicable to the OL.</p> <p>NRC to provide details of examples of TICAP guidance departing from NEI positions as stated in NEI comments on the draft construction permit Interim Staff Guidance.</p>
15	<p>For supplemental guidance for Design Certifications there are no entries for several sections. Need to clarify intent for these no entries (i.e., guidance provided for COLs applies) or if additional discussion is intended</p>	Med	<p>Similar to #14, all licenses should be covered</p>	<p>Workshop #1</p> <p>TICAP clarified that no entry for DC means no adjustments to the baseline guidance for DCs.</p>
16	<p>For supplemental guidance for Design Certifications, it appears that perhaps only limited DID adequacy assessments might be able to be performed due to the fact that the expectations on operational program descriptions for DC applicants is not equivalent to COL applicants. May also have some impact on identification of special treatments.</p>		<p>DCs should address DID as part of the design including identification of needed special treatments. The only difference from a COL is the development of the operational program description which would not be expected in a DC.</p>	<p>Workshop #1</p> <p>TICAP will revise guidance as needed to reflect DC adjustments due to the fact that DC does not address operating plant-specific topics.</p>
17	<p>The TICAP guidance document refers to “licensing basis”, however, there is a</p>	Med	<p>The staff notes that this issue could be considered as Part 53 language is developed for Subpart H and I.</p>	<p>Workshop #3</p>

Issue #	Topic	Priority	Comments	Disposition
	<p>definition of “current licensing basis” contained in 10 CFR 54.3 which was necessitated by license renewal. Should a reference to that definition be included in the guidance or should that definition be revisited and redefined for the purposes of use of the LMP approach or for inclusion in Part 53 for that matter. Question for discussion is whether or not the definition needs to be modified for the purposes of this guidance document or other advanced reactor guidance documents?</p>			<p>TICAP did not take issue with the basic definition of current licensing basis in 10CFR54.3. TICAP does not plan to include a licensing basis definition or reference in the TICAP Guidance.</p> <p>[Note: TICAP indicated that it would take a further look at the use of that definition more broadly and its basis would have any unintended consequences if the definition was used outside the scope of Part 54. This review was targeted for completion by mid-June.]</p>
18	<p>There should be alignment on the proposal to not include licensing basis information in Chapter 1. The purpose, I think, is to also exclude Chapter 1 for the change process and reduce future regulatory burden. However, our current concept of the change process is 10 CFR 50.59 and it is not clear as to what the change process under Part 53 might be.</p>		<p>Need to align on the proposal that Chapter 1 is not licensing basis information w/o having a clear definition of “licensing basis” for LMP-based SARs or even what the change process would entail.</p>	<p>Workshop #3</p> <p>TICAP to review chapter 1 and the use of “licensing Basis” terminology to see how it can clarify that Chapter 1 is not somehow excluded from the 50.59 change process since it is a part of the FSAR. This should be done in the context of our review of Issue 17 which is also focused on “licensing basis” and the definition in 10CFR54.3.</p>
19	<p>Several sections refer to tables in the LMP Tabletop Exercise Report or to useful guidance in the MHTGR PSID document. (ERO)</p>	Hi	<p>It would be more useful to include the tables and useful guidance referred to within the TICAP guidance document.</p>	<p>Workshop #1</p> <p>See Disposition of Issue #4</p>

Issue #	Topic	Priority	Comments	Disposition
20	<p>Around Workshop #3, the staff is considering discussion of a draft TICAP RG and an ARCAP roadmap ISG to start the discussion on how industry's guidance is envisioned to fit within TICAP and the staff's initial thinking on where industry's TICAP guidance is envisioned to be supplemented (e.g., fuel qualification, ASME Section III Division 5, design review guide for I&C)</p>	Med		<p>Workshop #3</p> <p>The NRC will consider the TICAP comments as provided on the Workshop #3 TICAP slides as it continues to develop its ARCAP ISG and TICAP Reg Guide.</p>
21	<p>The term "safety case" is not currently used in NRC licensing processes.</p>	Hi	<p>TICAP page 4 states "The term safety case is a collection of statements that, if confirmed to be true by supporting technical information, establishes reasonable assurance of adequate protection for operation of the nuclear power plant described in the application." TICAP Figure 1 on page 6 shows the relation between TICAP and an advanced reactor license application; specifically, the affirmative safety case addressed by TICAP is necessary, but not sufficient, to establish reasonable assurance of adequate protection. Need alignment on what a safety is and, equally important, what it is not.</p>	<p>No items identified for disposition specific to this issue.</p>

Issue #	Topic	Priority	Comments	Disposition
22	<p>The staff has provided industry with a list of NRC observations from the TICAP tabletop exercises. To date, industry's feedback on these observations has been limited to the first two TICAP tabletop exercise observations. The NRC staff would be interested in industry's feedback on the NRC observations for the last two TICAP tabletop exercises (i.e., the eVinci microreactor, and the molten chloride reactor experiment (MCRE)). In particular, the NRC staff would be interested in whether industry identifies potential workshop items from eVinci and MCRE TICAP tabletop exercises that are not captured in the items identified above.</p>	Hi		<p>Workshop #3</p> <p>TICAP has not identified additional items for discussion which have not already been covered by other Issues.</p>

Issue #	Topic	Priority	Comments	Disposition
23	The NRC staff finds that additional information and clarity on PRA is needed in the TICAP guidance.	Hi	<p>In Section 2.1.1, the overview of PRA needs additional clarity regarding peer review, the use of “technically adequate PRA”, the level of details, and so on. In addition, PRA for construction permit applications needs discussion with the NRC staff since there is ongoing discussions on the subject as part of the NRC staff’s ongoing development of guidance on construction permit.</p> <p>In Section 2.1.2, the summary of key PRA results should include other information such as key assumptions, the results and insights from importance, sensitivity, and uncertainty analyses, and so on.</p> <p>Although other Chapters (i.e., Chapter 3 and 4) include some of the PRA results or insights (such as risk-significant SSCs, human actions, etc.), it may be useful to have these key results under Section 2.1.2 to have the comprehensive PRA results in one place. Alternatively, a set of pointers (not at the Chapter level) at the individual topic areas may be included in Section 2.1.2.</p>	<p>No items identified for disposition specific to this issue.</p> <p>The NRC may provide specific written comments related to this issue.</p> <p>It is noted that the NRC recently updated CP guidance regarding non-LWR designs and PRAs; the CP angle is addressed under Issue #1.</p>