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Technology Inclusive Content of Application Project Public Meeting

August 17, 2021
Microsoft Teams Meeting
Bridgeline: 301-576-2978
Conference ID: 934 684 217#

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Agenda

Time	Topic*	Speaker
9:30 – 9:40 am	Opening Remarks	NRC/Southern
9:40 – 10:40 am	First Issue - principal design criteria	NRC/Southern
10:40 – 11: 50 am	Other Significant Topics	NRC/Southern
11:50 – 12 pm	Stakeholder Questions	All
12:00 – 1:00 pm	Break	All
1:00 – 1:10 pm	Opening Remarks	NRC/Southern
1:10 - 1:40 pm	Continuation of Discussion of Other Significant Topics	NRC/Southern
1:40 – 1:50 pm	Stakeholder Questions	All
1:50 – 2:00 pm	Next Steps and Closing Remarks	NRC/Southern

*Note that Industry's TICAP guidance document is available at: **https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21215A577** and industry's white paper on principal design criteria is available at: **https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21214A008**

TICAP Public Meeting

- The purpose of this meeting is to discuss with the nuclear industry issues related to the draft guidance document for safety analysis report (SAR) content for an advanced reactor application based on the licensing modernization project (LMP) described in NEI 18-04
- Key documents associated with this meeting are referenced in the meeting notice and include:
  - Industry-developed draft TICAP guidance document (ADAMS Accession No. ML21215A577)
  - Industry White Paper on Principal Design Criteria (ADAMS Accession No. ML21214A008)
- Continuation of public meetings held on May 11, May 19, May 26 and June 23, 2021
- Additional background available on the NRC ARCAP/TICAP public webpage (see: https://www.nrc.gov/reactors/new-reactors/advanced/details.html#advRxContentAppProj)

ARCAP and TICAP – **Nexus**

Outline Safety Analysis Report (SAR) – Based on TICAP Guidance

1. General Plant Information, Site Description, and Overview of the Safety Case
2. Generic Analyses
3. Licensing Basis Event (LBE) Analysis
4. Integrated Plant Analysis
5. Safety Functions, Design Criteria, and SSC Categorization
6. Safety Related SSC Criteria and Capabilities
7. Non-safety related with special treatment SSC Criteria and Capabilities
8. Plant Programs

Additional SAR Content –Outside the Scope of TICAP

9. Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste
10. Control of Occupational Doses
11. Organization
12. Initial Startup Programs

Audit/inspection of Applicant Records

- Calculations
- Analyses
- P&IDs
- System Descriptions
- Design Drawings
- Design Specs
- Procurement Specs

Additional Portions of Application

- Technical Specifications
- Technical Requirements Manual
- Quality Assurance Plan (design)
- Fire Protection Program (design)
- PRA
- Quality Assurance Plan (construction and operations)
- Emergency Plan
- Physical Security Plan
- SNM physical protection program
- SNM material control and accounting plan
- Cyber Security Plan
- Fire Protection Program (operational)
- Radiation Protection Program
- Offsite Dose Calculation Manual
- Inservice inspection/Inservice testing (ISI/IST) Program
- Environmental Report
- Site Redress Plan
- Exemptions, Departures, and Variances
- Facility Safety Program (under consideration for Part 53 applications)

- Safety Analysis Report (SAR) structure based on clean sheet approach

*Additional contents of application outside of SAR are still under discussion. The above list is draft and for illustration purposes only

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Principal Design Criteria

- Principal Design Criteria (PDCs) are required by regulations: 10 CFR 50.34; 10 CFR 52.47, 52.79, 52.137, and 52.157
- The purpose of the PDCs is described in 10 CFR 50, Appendix A, as establishing “the necessary design, fabrication, construction, testing and performance requirements for SSCs”
- General Design Criteria (GDCs) in 10 CFR Part 50, Appendix A are applicable to light-water reactors (LWRs) (“minimum requirements”)
- GDCs in 10 CFR 50, Appendix A are not requirements for non-LWRs, therefore, non-LWR applicants would not necessarily need to request an exemption from the GDCs in 10 CFR Part 50 when proposing PDCs for a specific design.
- Regulatory Guide (RG) 1.232 provides guidance for developing PDCs for non-LWR advanced reactors

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Principal Design Criteria

- Applicant must provide PDCs and supporting information that justifies to the NRC how their proposed PDCs demonstrate adequate assurance of safety and how their design meets their proposed PDCs to demonstrate adequate assurance of safety

- During the June 23rd public meeting, the NRC raised some concerns and examples for discussion regarding the scope of PDCs that may not be addressed when developed using the LMP process but are included in GDCs and advanced reactor design criteria (ARDCs) which are expected to be used as insights during PDC development, for example:
  - Normal operations (LMP is focused on licensing basis events (LBEs))
  - Safe, stable end state (i.e., subcritical)
  - Construction, testing, and inspection

- Industry asked NRC whether an exemption request to address the proposed scope of PDCs using LMP would be needed

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Principal Design Criteria

- NRC previously identified that using the LMP process may not address all aspects considered necessary for demonstrating adequate assurance of safety (e.g., normal operations, subcriticality, etc.) and is interested in how these would be proposed to be addressed via the TICAP guidance.

Example:

The LMP process is focused on off-normal events from anticipated operational occurrences (AOOs) to beyond design basis events (BDBEs) and identifies the design features, performance and special treatment needed to keep those events within the frequency- consequence (F-C) curve and cumulative individual risk targets. Dose at the exclusion area boundary (EAB) and cumulative individual risk are the only measures used as acceptance criteria. However, LMP does not address other concerns associated with the normal operation portion of the design basis, prevention of severe accidents, recovery from off-normal events or non-reactor on-site hazards.

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Principal Design Criteria

- NRC previously identified that the LMP process assigns special treatments to several design attributes (e.g., quality assurance, protection from external hazards, testability, inspectability, etc.) that are addressed in specific and cross-cutting ARDCs.

Examples:

- Various ARDCs (ARDC 39 & 40 as examples) in RG 1.232 include criteria that the design of certain SSCs accommodate the capability for their inspection and testing. These kinds of considerations should be included when assessing SSC special treatments as they relate to associated PDCs, where applicable.

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Principal Design Criteria

- Industry White Paper on PDCs (ADAMS Accession No. ML21214A008) provided to NRC in early August notes the following regarding RG 1.232 ARDCs associated with normal operations and special treatment:
  - Namely that industry believes that the TICAP approach demonstrates that its proposed PDCs focused on design and performance functions, combined with its programmatic requirements, meet the intent and purpose of the safety concepts embodied in the 10 CFR Part 50, Appendix A GDCs and/or RG 1.232 ARDCs
- The NRC staff is still reviewing the Industry White Paper and the question on whether an exemption request is needed regarding the purpose of PDCs
- At issue is the industry proposal to equate the Required Function Design Criteria (RFDCs) in NEI 18-04 to PDCs. As stated in the Industry White Paper, the RFDCs address the "How" portion of the design, whereas historical PDC address both "How" and "How Well."

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Principal Design Criteria

- The NRC staff is considering the following options to move forward on TICAP guidance while the PDC issue is under review:
  - The NRC staff's draft TICAP Regulatory Guide white paper may be updated after considering the following options:
    - The LMP-based approach provides an acceptable approach for identifying PDCs associated with off-normal conditions
    - Review the applicant's proposed treatment of areas associated with normal operations and areas associated with proposed special treatments (e.g., quality assurance, protection from external hazards, testability, inspectability) and identify if PDCs, as well as proposed complimentary design criteria (CDCs), are appropriate in this area.
    - The LMP-based approach cannot be reconciled with the current PDC framework under 10 CFR Parts 50 and 52, and an exemption may be required.

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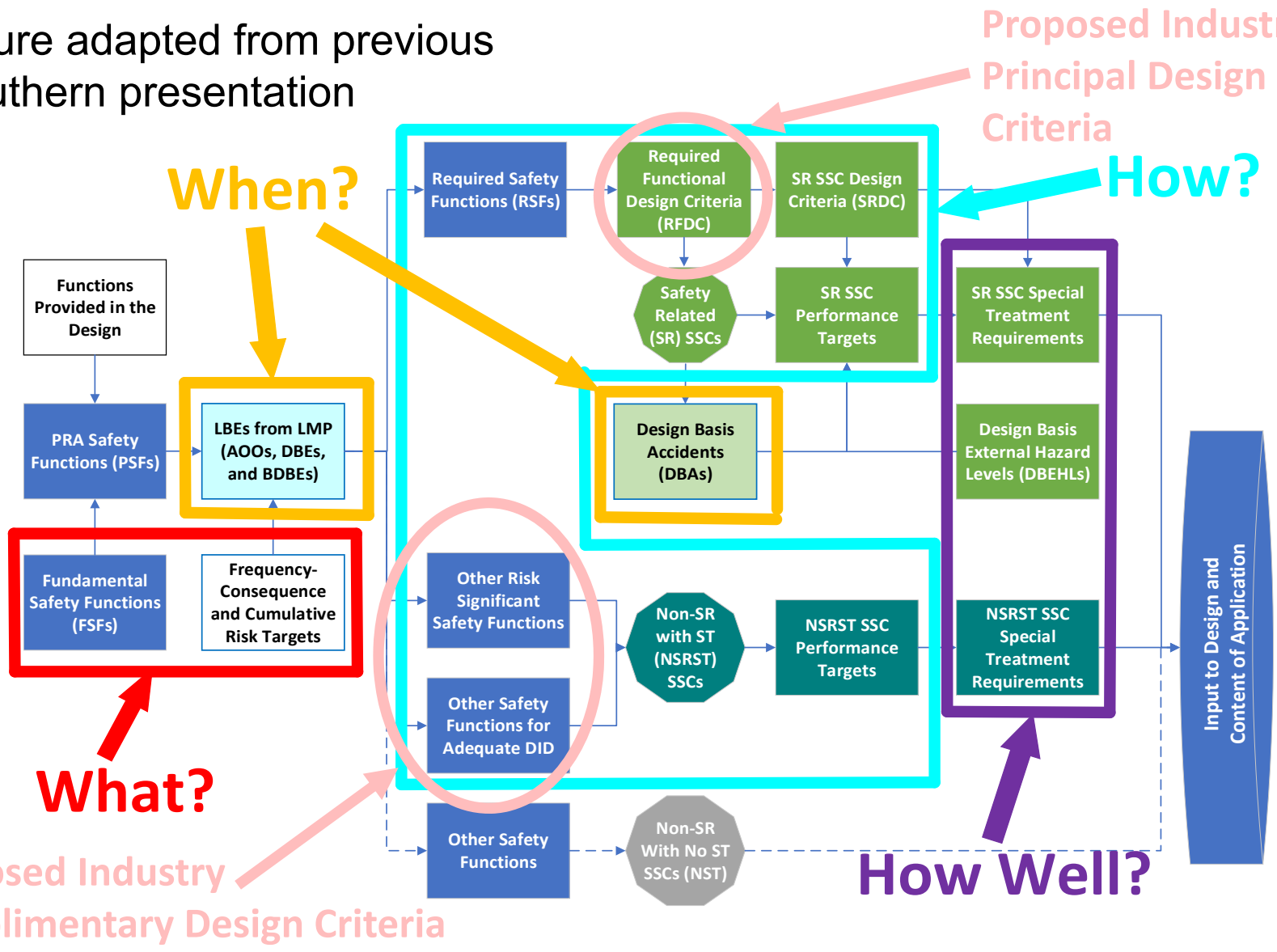
Principal Design Criteria

Figure adapted from previous Southern presentation



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Other Comments

- Staff Feedback on Industry TICAP Guidance document found in ADAMS at ML21225A565

- Feedback includes both editorial comments and comments that are more significant
  - The more significant comments are highlighted in yellow

- Significant comments include the following:
  - The NRC staff does not believe that the TICAP and ARCAP guidance are alone sufficient to support issuance of an operating license (Chapter 1 – page 4)
    - TICAP alone does not provide reasonable assurance of adequate protection
    - The TICAP and ARCAP guidance support development of safety evaluation
    - Other considerations for issuance of operating license (e.g., environmental regulations) outside scope of TICAP/ARCAP support issuance of license

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Other Comments

- The expectation regarding programs is not clear (Chapter 1 – page 10)
  - Programs descriptions supporting the safety case should generally be a part of the licensing basis, submitted on the docket, and incorporated by reference into the application

- Regarding discussion in TICAP Chapter 1 (page 10)
  - Industry proposes that this chapter be considered “outside the licensing basis”
    - Proposal not consistent with requirements such as 10 CFR 50.34 that includes a requirement that applications include a description of intended use of the reactor

- General Comment that much of the proposed industry italicized text should be part of the guidance
  - What are the criteria?

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Other Comments

- Regarding probabilistic risk assessment guidance (Section 2.2.1 – page 25)
  - The NRC staff is considering whether guidance should include an expectation that the SAR include a summary of the peer review scope, approach, and results

- Anticipated Operational Occurrences (AOOs) (Section 3.3.1 – page 34)
  - Confirm that SAR description of end state would include whether specific radioactive barriers fail
  - Propose inclusion of other information in the SAR relating to calculation of releases from AOOs

- Design Basis Events (DBEs) (Section 3.4.1 – page 35)
  - Include additional information related to releases (e.g., timing, dispersion analysis)
  - Provide listing of settings for protection system functions used in DBE evaluations

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Other Comments

- Beyond Design Basis Events (BDBEs) (Section 3.5.1 – page 37)
  - Include additional information related to releases (e.g., timing dispersion analysis)

- Design Basis Accidents (DBAs) (Section 3.6.1 – page 38)
  - Include additional information related to releases (e.g., timing, dispersion analysis)

- Integrated Evaluations (Section 4.1.1 & 4.1.3 – page 40)
  - Describe not only results and margins but assumed plant and site parameters (where not addressed in Chapter 2)
  - Add guidelines to ensure consistency in the individual risk calculations.
    - Some aspects of the calculations will be plant-specific (e.g., meteorology) but some should be plant and site independent (e.g., source of exposure [cloud shine], risk coefficients, inhalation rate, etc.).

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Other Comments

- Plant Capability DID and Programmatic DID Summaries (Section 4.2 – pages 42 and 46)
  - Proposed guidance appears to minimize SAR discussion related to DID.
    - Section 4.2 guidance appears to contradict the statement in Section 1.3.3 that states “DID is a key element of the LMP-based affirmative safety case and the demonstration of reasonable assurance of adequate protection of public health and safety.”

- Layers of Defense Evaluation (Section 4.2.1.2 – page 44)
  - The guidance should include an expectation that the applicant state the acceptance criteria for the affirmative safety case determination and explain how they are met, not just provide a statement that they are met.

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Other Comments

- Integrated DID Evaluation (Section 4.2.3 – page 47)
  - It would seem appropriate for this section to require a summary of how the attributes in NEI 18-04, Section 5.9.3, “IDP Actions to Establish DID Adequacy” were evaluated and determined adequate
    - NEI 18-04, Section 5.9.3 provides the most comprehensive list of what determines DID adequacy. Why it is not discussed in the TICAP guidance document is not clear

- RFDCs and PDCs
  - See beginning presentation on PDCs

- General statement regarding language to the effect of "this section should affirmatively state..." (ex: Section 4.2.1 - page 46; 14.2, p. 49)
  - This language is used throughout the document. In some cases, a statement supported by background documentation could be appropriate; in others, it isn't clear to the staff how an affirmative statement adequately captures in the licensing basis how the affirmative statement is supported.

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Other Comments

- Safety-Related SSCs (Section 5.4 – page 50)
  - The NRC staff does not agree with the industry guidance that appears to suggest that not all of the DID features are in the design basis (i.e., not in the SAR).

- Complimentary Design Criteria (CDCs) (Section 5.6 – page 54)
  - Why aren't the CDCs that are necessary to achieve the success criteria established in the PRA considered to be a part of the PDCs, and included in that category for the NRC staff review as a part of the safety assessment process?

- Design Basis External Hazard Levels (DBEHLs) (Section 6.1 – page 57)
  - Beyond listing a hazard level value in a table, the guidance should specify that the applicant describe how each DBEHL is used as an input parameter to the design analysis of safety-related SSCs.
  - DBEHLs are defined in TICAP guidance to include internal plant hazards (e.g., internal fire), contrary to NEI 18-04.

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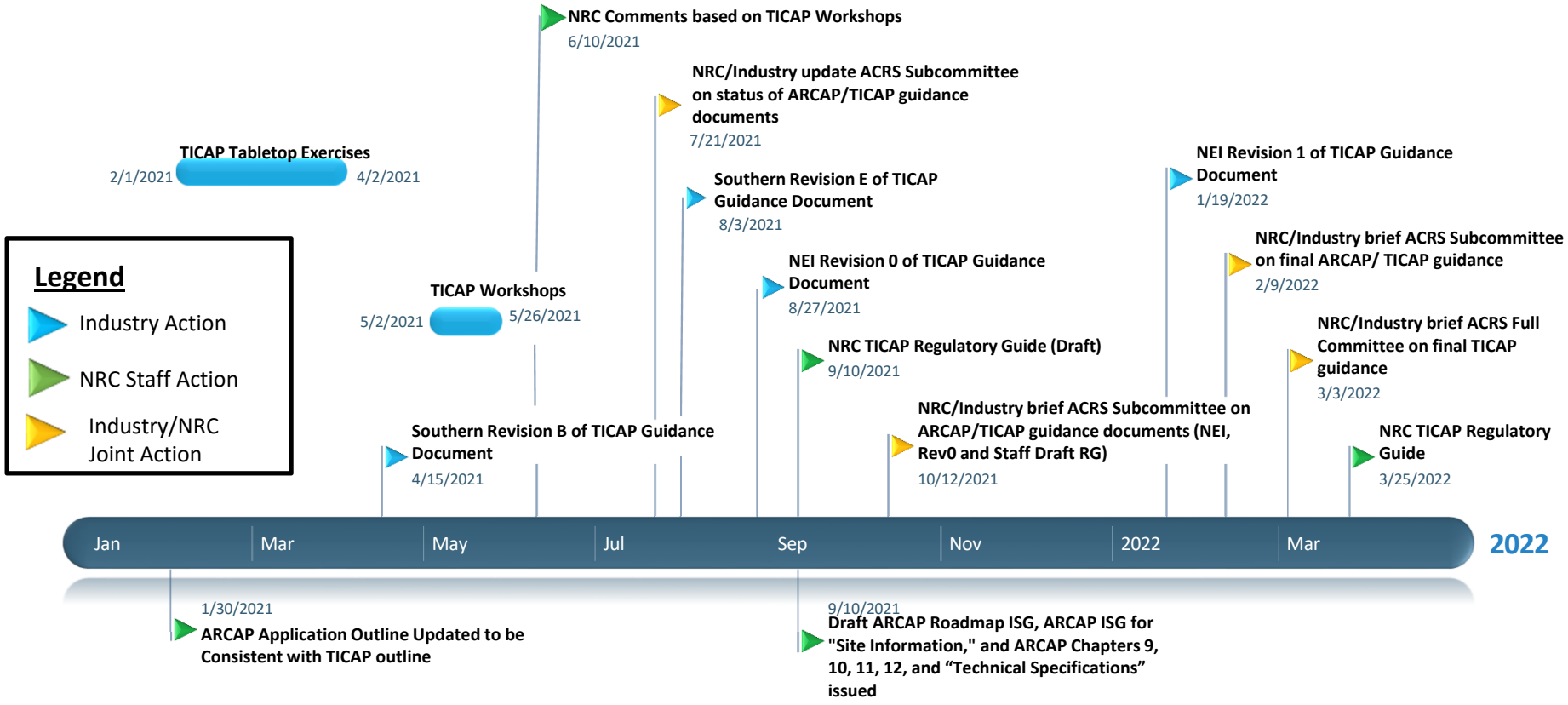
Other Comments

- Reliability and Capability Targets (Section 6.2 – page 60)
  - Expectation regarding documentation of SSC-level targets is not clear.
  - SR and NSRST SSC reliability and capability targets should be described in the application.

- Special Treatment Requirements (Section 6.3 – page 62)
  - Testing and verification of advanced reactor design features need to comply with 10 CFR 50.43(e) and 10 CFR Part 50 Appendix B, Section III Design Control, that require analysis, appropriate test programs, experience, or a combination thereof, or a prototype facility, before a design certification (DC), combined license (COL), manufacturing license (ML), operating license (OL), or standard design approval (SDA) lapproval.
    - The TICAP guidance focuses only on test programs and should be revised to reflect these other requirements.

- Plant Programs (Chapter 8 – page 69)
  - There does not appear to be sufficient guidance regarding what information about the program needs to be provided in the SAR if an approved template is not utilized.

Timeline for Technology Inclusive Content of Application Project (TICAP) Guidance and Advanced Reactor Content of Application Project (ARCAP) Guidance (rev 7/13/2021)



Next Steps – Future Milestones

TICAP Near-Term Milestones	Target Date
NEI Revision 0 of TICAP Guidance Document	Late August 2021
Update of NRC Draft Guidance Documents	September 2021
ACRS Future Plant Subcommittee Meeting on ARCAP/TICAP Guidance Documents	October 2021