From:	Sebrosky, Joseph
Sent:	Thursday, October 15, 2020 1:10 PM
To:	Afzali, Amir
Cc:	Costa, Arlon; Cubbage, Amy; Hoellman, Jordan; Khan, Maryam; Oesterle, Eric; Philpott, Stephen; Reckley, William; Segala, John; Uribe, Juan; Valliere, Nanette; Van Wert, Christopher; Jung, Ian; Lauron, Carolyn; Dudek, Michael; Shams, Mohamed; Smith - NRR, Brian; Jim C. Kinsey Jr; Wayne L. Moe; 'Tom King'; Thomas Hicks; Christopher.Chwasz@inl.gov; francis Akstulewicz; Steven Nesbit; Chisholm, Brandon Michael; Shirley, Barry J.; Daniel, Charles R.; AUSTGEN, Kati; NICHOL, Marcus; Cyril Draffin; Merrifield, Jeffrey S.; KarlFleming@comcast.net; dennis.henneke@ge.com
Subject:	Supporting information for the October 22, 2020, TICAP and ARCAP Public Meeting
Attachments:	Preapplication Engagement to Optimize Application Reviews .pdf; Proposal ARCAP_TICAP - NRC_INL_10152020.pdf; NRC ARCAP-TICAP Oct 22 2020 presentation.pdf

To: Amir Afzali
Southern Company Services
Licensing and Policy Director – Next Generation Reactors

Mr. Afzali,

The purpose of this email is to provide you with the attached information to support the upcoming October 22, 2020, public meeting on the technology inclusive content of application project (TICAP) and the advanced reactor content of application project (ARCAP). The meeting notice is available at: https://www.nrc.gov/pmns/mtg?do=details&Code=20201070. This email will be captured in ADAMS and the email will be made publicly available so that interested stakeholders will have access to the information prior to the meeting.

Supporting Information for the TICAP/ARCAP Public Meeting

In preparations for the October 22, 2020, TICAP/ARCAP public meeting the NRC staff developed draft ARCAP Chapters 8, "Liquid and Gaseous Waste Requirements," and Chapter 9, "Control of Occupational Doses," that were previously provided to you and have been made publicly available (see: ADAMS Accession No. ML20262H264). The additional information being provided in this email includes an updated slide presentation, a more detailed proposal for developing TICAP and ARCAP guidance, and a document titled "Draft Preapplication Engagement to Optimize Application Reviews." We discussed a TICAP/ARCAP proposal at a high level during the August 2020 ARCAP public meeting. The attached updated proposal contains more information including a draft schedule and additional insights on how the TICAP guidance and ARCAP guidance could be integrated. The draft preapplication engagement document is in the process of being made publicly available at ADAMS Accession No. ML20281A761. The attached draft slides (see slide 8) and ARCAP/TICAP proposal (see pages 2 and 5) both reference this document. The staff is looking forward to the feedback on this updated proposal from you and other stakeholders during the public meeting.

Status of Other Items

The staff is continuing to develop a draft ARCAP Chapter 2. It is unlikely that the draft ARCAP Chapter 2 will be available prior to the October 22, 2020, public meeting. The staff hopes to provide this draft prior to the next TICAP/ARCAP public meeting. On a different note, we understand that you will be providing TICAP supporting information (including slides) prior to the October 22, 2020, public meeting. The attached slide package will be updated to include your slides and the integrated slides will be made publicly available prior to the meeting.

Please let me know if you have any questions.

Sincerely,

Joe Sebrosky
Senior Project Manager
Advanced Reactor Policy Branch
Office of Nuclear Reactor Regulation
301-415-1132

Hearing Identifier: NRR_DRMA
Email Number: 835

Mail Envelope Properties (BY5PR09MB51237460ADDB2E929675185BF8020)

Subject: Supporting information for the October 22, 2020, TICAP and ARCAP Public Meeting
Sent Date: 10/15/2020 1:10:04 PM
Received Date: 10/15/2020 1:10:04 PM
From: Sebrosky, Joseph

Created By: Joseph.Sebrosky@nrc.gov

Recipients:
"Costa, Arlon" <Arlon.Costa@nrc.gov>
Tracking Status: None
"Cubbage, Amy" <Amy.Cubbage@nrc.gov>
Tracking Status: None
"Hoellman, Jordan" <Jordan.Hoellman2@nrc.gov>
Tracking Status: None
"Khan, Maryam" <Maryam.Khan@nrc.gov>
Tracking Status: None
"Oesterle, Eric" <Eric.Oesterle@nrc.gov>
Tracking Status: None
"Philpott, Stephen" <Stephen.Philpott@nrc.gov>
Tracking Status: None
"Reckley, William" <William.Reckley@nrc.gov>
Tracking Status: None
"Segala, John" <John.Segala@nrc.gov>
Tracking Status: None
"Uribe, Juan" <Juan.Uribe@nrc.gov>
Tracking Status: None
"Valliere, Nanette" <Nanette.Valliere@nrc.gov>
Tracking Status: None
"Van Wert, Christopher" <Christopher.VanWert@nrc.gov>
Tracking Status: None
"Jung, Ian" <Ian.Jung@nrc.gov>
Tracking Status: None
"Lauron, Carolyn" <Carolyn.Lauron@nrc.gov>
Tracking Status: None
"Dudek, Michael" <Michael.Dudek@nrc.gov>
Tracking Status: None
"Shams, Mohamed" <Mohamed.Shams@nrc.gov>
Tracking Status: None
"Smith - NRR, Brian" <Brian.Smith@nrc.gov>
Tracking Status: None
"Jim C. Kinsey Jr" <jim.kinsey@inl.gov>
Tracking Status: None
"Wayne L. Moe" <wayne.moe@inl.gov>
Tracking Status: None
"'Tom King'" <thomasking2993@gmail.com>
Tracking Status: None
"Thomas Hicks" <hickste@earthlink.net>
Tracking Status: None

"Christopher.Chwasz@inl.gov" <Christopher.Chwasz@inl.gov>
Tracking Status: None
"francis Akstulewicz" <frank.atozreactorconsulting@gmail.com>
Tracking Status: None
"Steven Nesbit" <steve.nesbit@lmnt-consulting.com>
Tracking Status: None
"Chisholm, Brandon Michael" <BMCHISHO@SOUTHERNCO.COM>
Tracking Status: None
"Shirley, Barry J." <BJShirle@southernco.com>
Tracking Status: None
"Daniel, Charles R." <CRDANIEL@SOUTHERNCO.COM>
Tracking Status: None
"AUSTGEN, Kati" <kra@nei.org>
Tracking Status: None
"NICHOL, Marcus" <mrn@nei.org>
Tracking Status: None
"Cyril Draffin" <cyril.draffin@usnic.org>
Tracking Status: None
"Merrifield, Jeffrey S." <jeff.merrifield@pillsburylaw.com>
Tracking Status: None
"KarlFleming@comcast.net" <KarlFleming@comcast.net>
Tracking Status: None
"dennis.henneke@ge.com" <dennis.henneke@ge.com>
Tracking Status: None
"Afzali, Amir" <AAFZALI@southernco.com>
Tracking Status: None

Post Office: BY5PR09MB5123.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**	
MESSAGE	2857	10/15/2020 1:10:04 PM	
Preapplication Engagement to Optimize Application Reviews .pdf			231924
Proposal ARCAP_TICAP - NRC_INL_10152020.pdf		1182030	
NRC ARCAP-TICAP Oct 22 2020 presentation.pdf		2393284	

Options
Priority: Normal
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:

DRAFT Preapplication Engagement to Optimize Application Reviews

This draft staff white paper has been prepared and is being released to support ongoing public discussions.

This paper has not been subject to NRC management and legal reviews and approvals, and its contents are subject to change and should not be interpreted as official agency positions.

Purpose: The NRC staff is publishing this paper to provide information to advanced reactor developers on the benefits of robust preapplication engagement in order to optimize application reviews.

Background: In accordance with the Advanced Reactor Policy Statement[1], the NRC encourages early interactions with advanced reactor developers and prospective applicants. The Policy states:

> To provide for more timely and effective regulation of advanced reactors, the Commission encourages the earliest possible interaction of applicants, vendors, other government agencies, and the NRC to provide for early identification of regulatory requirements for advanced reactors and to provide all interested parties, including the public, with a timely, independent assessment of the safety and security characteristics of advanced reactor designs. Such licensing interaction and guidance early in the design process will contribute towards minimizing complexity and adding stability and predictability in the licensing and regulation of advanced reactors.

Further, Section 103 of the Nuclear Energy Innovation and Modernization Act (NEIMA) included requirements that the NRC (1) include the use of topical reports, standard design approval, and other appropriate mechanisms as tools to introduce stages into the commercial advanced nuclear reactor licensing process; (2) evaluate options for improving the efficiency, timeliness, and cost-effectiveness of licensing reviews of commercial advanced nuclear reactors, including opportunities to minimize the delays that may result from any necessary amendment or supplement to an application; and (3) options for improving the predictability of the commercial advanced nuclear reactor licensing process, including the evaluation of opportunities to improve the process by which application review milestones are established and met. Robust pre-application engagement is key to fulfilling these requirements..

NRC encourages pre-application interactions with advanced reactor developers to provide stability and predictability in the licensing process through early identification and resolution of technical and policy issues that would affect licensing. As such, the NRC staff is proposing a set of pre-application activities that, if fully executed, will enable staff to offer more predictable and shorter schedules and other benefits during the review of an advanced reactor license application. This proposal for pre-application activities is essentially a staged licensing approach, where some key elements of an advanced reactor design are reviewed, and the evaluation documented before the license application is submitted. A staged licensing approach has the following advantages:

[1] Policy Statement on the Regulation of Advanced Reactors (73 FR 60612; October 14, 2008)

Advantages for Applicants	Advantages for NRC
Enhanced regulatory predictability, reducing business risk	Greater review efficiency because NRC staff becomes familiar with design
Greater review efficiency because NRC staff becomes familiar with design. Efficiency translates to lower costs and shorter review schedules	Early public engagement on the attributes of a design, increasing transparency and enhancing public awareness
Regulatory requirements for the design are clarified	NRC staff become familiar with unique environmental aspects of a site and new approaches an applicant is considering
Early engagement with the Advisory Committee on Reactor Safeguards (ACRS) through the review of safety evaluations on topical reports. This early ACRS involvement will improve regulatory reliability and shorten application review times.	Early engagement with the ACRS through the review of safety evaluations on topical reports. This early ACRS involvement will reduce the number of issues addressed during the application review and lessen the effort of application review.
Early interactions between the NRC, the applicant, and other agencies that have a role in the environmental review shorten the licensing review schedule.	

Program: As required by NEIMA the NRC staff established generic milestone schedules for licensing reviews[2]. When the generic milestone schedules were established, the NRC staff noted that it will work with each licensee or applicant to establish a specific schedule for each request, which may be shorter or longer than the generic milestone schedule based on the specific needs of the licensee or applicant and the staff's resources. If an advanced reactor applicant completes the applicable items[3] described in the following sections prior to submitting the application, the NRC staff will establish a review schedule at least 6 months shorter than the generic schedules depending on the complexity of the design. The NRC staff will complete the issuance of the final safety evaluation within the established schedule as long as the following conditions are met:

- Applicants must submit responses to requests for additional information (RAIs) and other necessary information within agreed upon milestones. Otherwise the schedule may be adversely affected.
- There can be no substantive changes, other than those resulting from the RAI process, to the application after submittal as they may impact the schedule.
- The design should not change significantly between the pre-application and application so that matters “resolved” in pre-application are not adversely impacted. Significant design changes would impact the schedule.

[2] https://www.nrc.gov/about-nrc/generic-schedules.html

[3] For a design certification, only the safety review items would be applicable. For a combined license application referencing a certified design, the environmental review items would be applicable in addition to safety topics associated with site specific features and any departures to the certified design. For a combined license not referencing a certified design, all the review topics listed would be applicable.

In addition to a substantially shorter overall application review, staff will complete the acceptance review in two weeks, only addressing administrative aspects including making the application publicly available and issuing notice of availability, if the activities described below are completed before submission of an application.

A. Topical reports

The applicant should submit topical reports on key topics for review and approval during the pre-application phase. These reports should be submitted early enough to support staff issuance of final staff safety evaluations prior to submittal of an application. It should be noted that any substantive changes to the design would invalidate the staff's prior approval in these areas and may result in significant changes to the review schedule. The key areas described below should be addressed.

1. **Principle design criteria**[4]

   During the pre-application period, the applicant should submit proposed principal design criteria (PDC) for staff review and approval. As required by 10 CFR 50.34(a)(3)(i), 10 CFR 52.47(a)(3)(i), 10 CFR 52.79(a)(4)(i), proposed PDC must be included in an application for a construction permit (CP), design certification (DC), or combined license (COL). The PDC establish the necessary design, fabrication, construction, testing, and performance of safety significant SSCs. The NRC staff expects prospective non-light-water reactor (non-LWR) applicants will review the GDC pertaining to LWR provided in Appendix A to 10 CFR Part 50 and the guidance in RG 1.232, "Guidance for Developing Principal Design Criteria for Non-Light-Water Reactors," to develop their PDC and ensure that necessary safety functions and SSCs are covered under the selected PDC. The staff will review the applicant's proposed PDC to determine if they are acceptable.

2. **Selection of licensing basis events and classification and treatment of structures, systems, and components (SSCs)**

   a) The applicant should request staff review and approval of their proposed process for selection of licensing basis events and classification and treatment of SSCs or indicate that they plan to use an approved existing process such as the process described in Regulatory Guide 1.233, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors."

   b) The applicant should also submit for NRC information the anticipated list of licensing basis events and the associated list of safety related and risk significant

[4] Prospective applicant for small modular light-water reactor (SMR) designs are not required to submit PDC. SMR developers should instead discuss how the general design criteria (GDC) in Appendix A to 10 CFR Part 50 will be applied to their design and discuss any proposed exemptions to the GDC.

SSCs. This will help the staff understand the design and would support discussions on the preliminary SSC classifications, as needed, in preparation for an efficient and effective application review.

3. **Fuel qualification and testing**

   Applicants need to develop and execute fuel qualification plans that include fuel testing and validation and verification of associated engineering computer programs. The qualification plan needs to include fuel performance methodology and application. The applicant should submit the fuel qualification plan and associated methodologies to the NRC staff for review and approval. Preapplication engagement on fuel qualification should include the following steps: staff approval of the fuel qualification plan and associated methodologies, potential staff observation of execution of the testing, and verification of the results (via topical report or an audit) of the testing to support qualification of the fuel for the associated reactor design.

4. **Mechanistic or accident source term development**[5]

   Applicants need to develop a source term methodology that includes validation and verification of associated engineering computer programs. The source term development needs to include radiological source terms for effluents, radwaste system design, shielding design and equipment qualification. The applicant should submit the source term methodologies to the NRC staff for review and approval.

5. **Quality assurance program**

   Applicants should submit a quality assurance program description (QAPD) for NRC review and approval during the pre-application phase to ensure that the design and the application have been developed in accordance with 10 CFR Part 50 Appendix B. The QAPD should cover the scope of the planned type of license application (e.g., 10 CFR 52.47(a)(19) discusses the QAP requirements for DC applications and 10 CFR 52.79(a)(25) discusses the QAP requirements for COL applications) as applied to the fabrication, construction, and testing, of the SSCs of the facility. The description of the QAP must include a discussion of how the applicable requirements of Appendix B to 10 CFR part 50 have been and will be satisfied, including a discussion of how the QAP will be implemented.

6. **Safeguards Information Plan**

   The applicant should submit a plan for the protection of safeguards information (SGI) for NRC review and approval during the preapplication period to enable the NRC staff to provide the applicant with SGI information, as necessary, for the applicant to consider safeguards and security into the design of the facility and the physical security program in order for the applicant to address the requirements of 10 CFR Part 73, “Physical Protection of Plants and Materials,” and 10 CFR 50.150, “Aircraft impact assessment,” in their application.

7. **Safety and accident analysis methodologies and associated validation**

[5] SMR developers may use the accident source term in NUREG-1465, “Accident Source Terms for Light-Water Nuclear Power Plants,” or propose a design specific accident source term.

Applicants need to develop and execute plans to perform safety and accident analyses that include testing of applicable SSCs and validation and verification of associated engineering computer programs. The analysis plans need to include development of associated methodologies and applications of those methods which include but are not limited to event specific analysis methodologies, scaling methodology, setpoint methodology, reactor coolant analysis methodology, core design methodology, and reactivity control methods. The analysis plans need to include a test plan and test program as well as equipment qualification methodology to ensure appropriate verification and validation of the engineering computer programs. The applicant should submit the safety analysis methodologies and application of those methods to the NRC staff for review and approval.

B. Meetings, audits and white papers:

In addition to the topical reports discussed above, applicants should engage in pre-application interactions on the following key topics:

1. **Probabilistic Risk Assessment (PRA)**

   Applicants should allow the NRC staff to audit the preliminary PRA and PRA peer review prior to submitting an application. The PRA will likely play an important role in the selection of licensing basis events and classification and treatment of SSCs, so early feedback on the PRA can avoid delays during the application review. The applicant needs to explain how the PRA will be used to support their application (risk informed licensing, event selection for siting and emergency preparedness, maintenance rule, etc.) to determine acceptability of the PRA for its planned use. The staff will audit resolution of the peer review observations and findings. The staff will assess the acceptability of the PRA for its proposed uses and the applicant must address any issues identified before submittal of the application.

2. **Regulatory Exemptions**

   Applicants may request exemptions from the NRC's regulations on a case-by-case basis. The applicant should submit a white paper providing a regulatory gap analysis listing the areas where the applicant plans to request exemptions from NRC requirements. This would allow the staff and the applicant to establish the list of the regulations that are applicable to the design to support an efficient acceptance review. It would also allow the NRC and the applicant to establish a path forward for reviewing proposed exemption requests. Examples of potential exemption requests may include emergency planning zone size and number of armed responders for physical security in advance of completion of ongoing rulemakings.

3. **Policy issues**

   The wide spectrum of designs and/or design features being contemplated by advanced reactor designers may present unique policy issues. These policy issues need to be brought forward, through white papers or meetings, to the NRC staff as early as possible so that they can be properly considered and addressed by the NRC

before the application is submitted. If additional policy issues arise during the application review, the schedule may be impacted.

4. Novel design features or approaches

The applicant should identify any novel design features, through white papers or meetings, during the pre-application review to allow staff familiarization so staff can develop review strategy and review guidance, if needed. If the applicant intends to use novel design features (such as passive systems, inherent safety features, or simplified control features), early identification of these features or approaches to the NRC staff will facilitate timely identification and resolution of any unique regulatory topics. Topics to be considered beyond the reactor system include unique features such as seismic isolators, novel digital instrumentation and control systems, security features, or novel approaches to operational programs.

5. Consensus codes and standards and code cases

During the pre-application stage the applicant should use a white paper to identify any consensus codes and standards or code cases they intend to use and specifically identify any standards or code cases that have not been endorsed or previously accepted by the staff. For any such standards or code cases, the applicant should engage in pre-application discussions to identify any areas where additional information may be needed in the application to support the proposed approach.

6. Identification and justification of the use of engineering computer programs used in the application

The applicant should submit a white paper describing the anticipated list of the engineering computer codes and intended application during the pre-application phase. The validation and acceptability basis should be described as well as background and historical acceptance.

7. Pre-application Readiness Assessment

In addition to the above pre-application activities, the applicant should allow the staff to conduct a pre-application readiness assessment (see Office instruction LIC-116, “Pre-application Readiness Assessment,” ADAMS Accession No. ML20104B698) of both safety and environmental topics. The readiness assessment would allow the NRC staff to: (1) identify information gaps between the draft application and the technical content expected to be included in the final application submitted to the NRC, (2) identify major technical and/or policy issues not previously identified that may adversely impact the docketing or technical review of the application, and (3) become familiar with the application, particularly in areas where prospective applicants are proposing new concepts or novel design features not previously identified. The results of the readiness assessment will inform prospective applicants in finalizing their application and assist the NRC staff in planning its resources for the review once the application is formally submitted. The staff plans to engage prospective applicants to schedule a pre-application readiness assessment at least 6 months prior to the expected date of submittal. The readiness assessment is not part of the NRCs official acceptance review process and does not predetermine whether

the application will be docketed. An applicant should provide the most current draft of the environmental report, referenced documentation, and applicant staff and contractors to assist the NRC staff during its readiness assessment.

C. Environmental Activities

As a Federal agency, the NRC follows National Environmental Policy Act requirements to assess the environmental effects of proposed actions prior to making decisions. Therefore, the environmental review is an integral but distinct part of the NRC's licensing review.

Early and frequent pre-application interactions is a key component of federal directives outlined in FAST-41 and Executive Order 13807 to streamline the environmental review process. As such, the staff expects that applicants would conduct meetings, support audits, and provide white papers during pre-application activities that would occur approximately 2 years in advance of the application submittal. An applicant seeking a predictable review schedule should engage in substantive pre-application interactions with the NRC staff as early as possible in the planning process before submitting environmental information or filing an application in accordance with 10 CFR 51.40, "Consultation with NRC staff," and as discussed in Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants." In addition, an applicant is expected to address the environmental issues described in RG 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," which provides guidance to applicants for the format and content of environmental reports (ERs) that are submitted as part of an application for a permit, license, or other authorization to site, construct, and/or operate a new nuclear power plant, or provide a justification for any issues that do not need to be analyzed. In addition, an applicant should also consider following the guidance in NEI 10-07, "Industry Guideline for Effective Pre-Application Interactions with Agencies Other Than NRC During the Early Site Permit Process," and consider COL Interim Staff Guidance (ISG)-29, "Environmental Considerations Associated with Micro-reactors."

White Papers

The applicant should submit white papers on key and novel approaches to environmental topics for staff assessment and feedback during the pre-application phase. These reports should be submitted early enough to gain alignment with NRC staff, and if needed the applicant will support meetings or audits regarding the information presented in the white papers. The following key areas should be addressed in white papers and discussed with staff as needed to ensure staff understanding of the proposed methodology.

1. Unique or Novel Methodologies and Issues

The applicant should identify (in consultation with the staff if needed) any novel environmental methodology that has not previously been analyzed by the staff during the pre-application to allow staff familiarization so staff can develop review strategy and review guidance, if needed. An example of a unique issue would be unique purpose and need for the project such as uses other than electricity production. Because the purpose and need statement determines the scope of

the alternatives for the project, it is important to have early alignment with the staff.

2. Alternatives to the Proposed Project

A recurring issue on many of the previous COLs was the alternative site selection process. The applicant should present white papers and support meetings to discuss the site selection process. In addition, a unique issue for advanced reactors could be energy alternatives, depending on the electrical output of the facility, which could bring into the alternative analysis renewable energy sources previously not considered for large LWRs.

3. Cooling Water Availability

The staff understands that for advanced reactors the use of cooling water would likely be less than that of large LWRs; however, the necessary approvals by the permitting authorities for access to cooling water proved to be a challenge for many sites. Therefore, the staff expects an applicant to provide the necessary information on water consumption for the proposed facility and periodic status of obtaining the necessary permits. The staff also recommends that the applicant, the NRC staff, and the water permitting agencies meet at least once during the pre-application activities.

4. Status of Permits and Authorizations for the Proposed Project

The staff recommends that the applicant interact with other permitting agencies as discussed in NEI 10-07, “Industry Guideline for Effective Pre- Application Interactions With Agencies Other Than NRC During the Early Site Permit Process,” and provide a list of the needed authorizations, permits, licenses, and approvals for the project. This documentation should also contain a timeline for obtaining the necessary permits and the current status. The applicant should also provide copies of available correspondence between the applicant and State Historic Preservation Office (SHPO), Tribes, U.S. Fishery and Wildlife Service (FWS), U.S. Army Corps of Engineers, National Marine Fisheries Service (NMFS), state and local officials.

Meetings and Audits

The staff expects the following topics to be discussed at meetings or audits during pre-application interactions:

- Information on socioeconomics characteristics of the community
- Aquatic or terrestrial ecology studies that have been performed (if any).
- Federally listed species and critical habitats present, and potential impacts on those species and habitats
- Potential impacts on Essential Fish Habitat, including prey of Federally managed species.
- Identify historic properties and other cultural resources within the direct and indirect areas of potential effect (APE). Summarize cultural resource investigations conducted in the APE (all past and current historic and cultural resource investigations), and outreach conducted with the SHPO,

Tribal Historic Preservation Officer, American Indian Tribes, and interested parties.

- Discussion of severe accident mitigation analysis that uses the latest update to the plant's probabilistic risk assessment.
- Description of the fuel cycle and its impacts as related to the reactor design including the management of spent nuclear fuel.
- Discussion of the environmental impacts from the transportation of fuels and wastes.
- Design-specific information needed for the environmental review including:
    - radiological health impacts (10 CFR Part 20 exposure analysis, annual population dose, non-human biota dose),
    - radiological waste management including effluent releases and solid wastes, as applicable,
    - non-radiological waste management, and
    - postulated accidents and severe accident mitigation alternatives, as applicable.

Proposal for Technology Inclusive Content of Application Project and Advanced Reactor Contents of Application Project Guidance Document Development
October 15, 2020

Contents

Purpose

The purpose of this document is to outline a proposal for the next steps to develop a Technology Inclusive Content of Application Project (TICAP) and Advanced Reactor Contents of Application Project (ARCAP) guidance document. The proposal considers industry feedback provided during TICAP and ARCAP meetings throughout the year and recent Commission direction to accelerate the 10 CFR Part 53 rulemaking. This document also references the construction permit guidance that the Division of New and Renewed Licenses (DNRL) is developing for light water reactors (LWRs) as a result of industry's request to develop such guidance.

Vision and Assumptions

The industry-led TICAP's purpose is to develop the content for specific portions of the safety analysis report (SAR) that would be used to support an advanced non-light water reactor application. The TICAP portion of the SAR will be informed by the guidance found in in NEI 18-04, Revision 1, "Risk-Informed Performance-Based Technology-Inclusive Guidance for Non-Light Water Reactor Licensing Basis Development," dated August 2019 (ADAMS Accession No. ML19241A472) as endorsed by Regulatory Guide (RG) 1.233, "Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light-Water Reactors," dated June 2020 (ADAMS Accession No. ML20091L698).

ARCAP is a broader effort that is intended to provide guidance for an entire application and encompasses TICAP. The vision is that ARCAP will include high-level guidance that will include pointers to advanced reactor guidance that is under development (e.g., TICAP guidance, physical security and emergency planning rulemaking guidance) and provide guidance for areas that are not being addressed separately under an advanced reactor activity. ARCAP guidance will be developed such that it is technology inclusive, to the maximum extent possible, so a light water or non-light water reactor applicant can use the guidance if they so desire. A subset of the ARCAP guidance will address construction permit guidance where applicable. This content will be developed in parallel with industry's effort to develop TICAP construction permit guidance. In addition, it's noted that there is a near-term DNRL-led activity underway to develop interim staff

guidance (ISG) on the level of detail that would be expected in a Part 50 construction permit application for light water reactors.

A fundamental assumption is that it has never been the intention of ARCAP to develop an approach similar to the guidance found in the standard review plan (NUREG-0800) for large light water reactors or the guidance found in thousands of regulatory documents (e.g., regulatory guides, NUREGs, etc.) that have been developed over the last 50 plus years for large light-water reactors.

Originally the goal was to provide ARCAP guidance that would supplement and endorse, as appropriate, the industry developed TICAP guidance. The original target for issuing the ARCAP guidance was consistent with the schedule for the TICAP guidance (i.e., draft TICAP/ARCAP guidance in the Spring of 2021 and final TICAP/ARCAP guidance in December of 2021). The staff has revisited this schedule based on the Commission direction via the SRM to SECY-20-0032 to accelerate the 10 CFR Part 53 rulemaking and the status of various guidance documents that would be needed to support ARCAP. Therefore, the staff is now proposing that ARCAP will be developed in parallel with, and in support of, the Part 53 rulemaking activity. Because there are many regulatory guidance documents under development that will not be finalized by December of 2021 (e.g., security rulemaking, emergency planning rulemaking), the staff is taking a two-tiered approach, 1) near term guidance, and 2) guidance to support Part 53 rulemaking.

Near Term Guidance

- Near-term 10 CFR Part 50 and 10 CFR Part 52 guidance will be developed based on preapplication discussions with potential applicants in accordance with the process outlined in "Draft - Preapplication Engagement to Optimize Application Reviews," (ADAMS Accession No. ML20281A761) and the following documents:

  - Non-Light Water Reactor Review Strategy White Paper (ADAMS Accession No. ML19275F299) as amended by NRC Staff Draft White Paper "Analysis of Applicability of NRC Regulations for Non-LWRs (ADAMS Accession No. ML20241A017).

  - A Regulatory Review Roadmap For Non-Light Water Reactors (ADAMS Accession No. ML17312B567)

  - NEI Working Draft, "Industry Guideline for Development of Regulatory Engagement Plan" (ADAMS Accession No. ML18122A293)

  Near term applicants seeking guidance for a Construction Permit (CP) should raise this issue as part of a preapplication review in accordance with the preapplication engagement process discussed above. (See related CP text below for further information.)

- The staff intends to develop a regulatory guide to endorse, as appropriate, the industry developed TICAP guidance. This will allow applicants to reference this guidance in a near-term application. This draft regulatory guide is currently targeted for April 2021, dependent on upcoming TICAP interactions.

- The staff intends to develop ISGs for a selected set of ARCAP Chapters (e.g., Chapters 2, "Site Information," Chapter 8, "Control of Routine Plant Radioactive Effluents and Solid

Waste," and Chapter 9, "Occupational Dose") and other application-related topics.

- For ARCAP Chapter 2 the NRC staff is proposing transformational development that is consistent with RG 1.233 and includes a proposal to move historical information outside of the SAR. For ARCAP Chapters 8 and 9 the NRC staff is proposing a performance-based approach. for ARCAP Chapters 8 and 9 that are not being otherwise addressed in currently ongoing supplemental staff regulatory efforts.

- Developing this content using the ISG process would allow a near term light water small modular reactor (SMR) or a non-light water reactor (non-LWR) applicant to use this guidance.

ARCAP Guidance to Support 10 CFR Part 53 Rulemaking

- Because ARCAP will include a roadmap for key portions of a performance-based application for a license under Parts 50 and 52, ARCAP will naturally provide applicable guidance to address related Part 53 rulemaking efforts. Much of this guidance is under development (e.g., security and emergency planning rulemaking guidance), and the staff is targeting issuing a draft ARCAP regulatory guide at the end of Calendar year 2021. ARCAP guidance will be adjusted, as appropriate, in accordance with the 10 CFR Part 53 rulemaking effort.

Background

Figure 1 below shows the scope of ARCAP, which includes TICAP (or areas highlighted by the NEI 18-04, RG 1.233 portion of the figure). As noted in Figure 1 TICAP will address very important parts of an application.

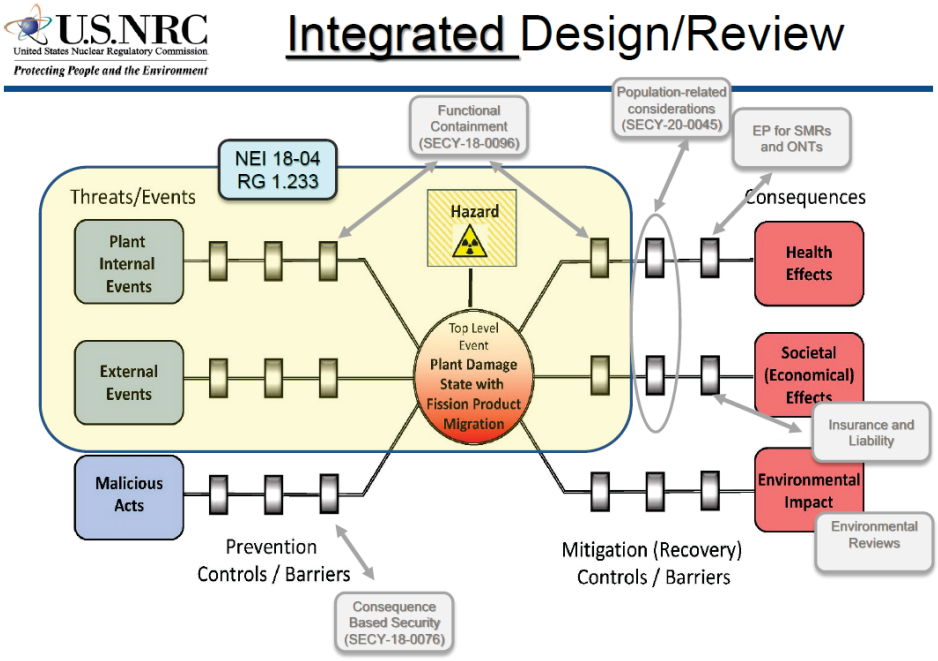


Figure 1 – Bow tie showing all areas of an application and those addressed by TICAP (i.e., licensing modernization project) or other advanced reactor activity

Figure 2 below provides the proposed structure of an FSAR based on the outcome of TICAP that industry presented during a July 30, 2020, public meeting. Industry's proposed structure of the TICAP portion of the FSAR includes the high-level concepts that were previously proposed in the INL-developed annotated outline provided during an April 22, 2020 public meeting. The INL-developed FSAR annotated outline is available in ADAMS at ML20107J565 and is not fundamentally different from the structure proposed by industry. The rest of this document discusses the proposal for ARCAP to include a pointer to whatever TICAP structure is adopted and to provide pointers for the missing pieces (if they are addressed by other ongoing activities shown in Figure 1), or to provide a proposal for developing new guidance that is technology-inclusive, risk informed and performance based.

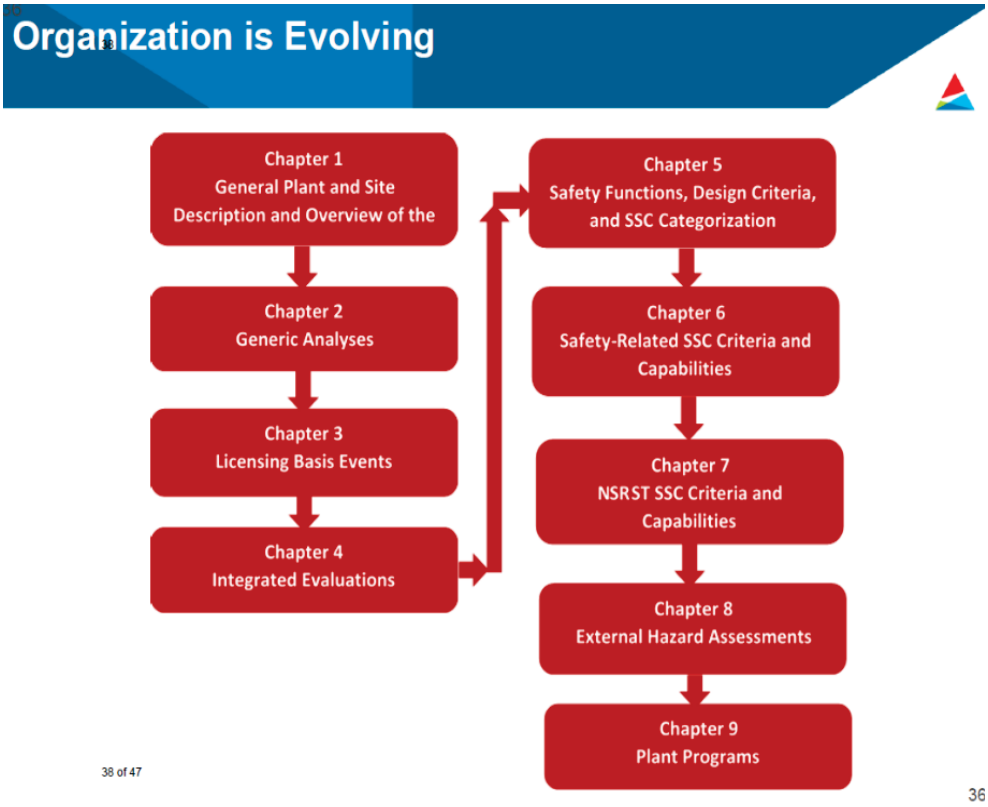


Figure 2 - Industry Proposed FSAR Structure from July 30, 2020, Public Meeting

Proposed ARCAP Guidance Document Structure

The proposed structure of the ARCAP guidance document would be in the form of a roadmap that would list various parts of an application and point to where guidance is being developed outside of ARCAP (e.g., TICAP, emergency planning and physical security rulemaking) and would contain appendices for portions of the application for which ARCAP is providing standalone guidance. ARCAP new guidance will be developed such that it is technology inclusive, to the maximum extent possible, so a light water or non-light water reactor applicant can use the guidance if they so desire. Table 1 below provides a listing of the portions of the application (using the INL-

developed annotated structure available at ADAMS Accession No. ML20107J565) and how the ARCAP would address the guidance. The Table is color coded showing where ARCAP would point to guidance that falls into one of the following categories:

- Primary portion of the guidance is derived from TICAP guidance
- Primary portions of the guidance derived from separate ongoing regulatory activities (e.g., security and emergency planning rulemaking)
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

As shown in Table 1 there is a selected set of new ARCAP guidance that is being considered for development. It should be noted that Table 1 was developed without the benefit of the TICAP annotated outline to establish a clearer understanding of what will, and what will not, be addressed as part of the TICAP guidance. Industry has indicated that TICAP will not include programmatic guidance. The NRC staff needs to better understand what this means going forward so that it can determine what potential guidance may need to be provided in ARCAP in this area

Construction Permit Guidance and Other Combinations

In a June 12, 2020, public meeting NEI and USNIC expressed a desire for the NRC to develop near-term construction permit guidance for both light water small modular reactors and non-LWRs. During a July 31, 2020, public meeting the staff provided stakeholders with its vision for developing light-water SMR guidance. Subsequent to these interactions, the NRC staff has also engaged other light water reactor vendors and is in the process of developing construction permit guidance for light water reactors. This is a DNRL-led activity, and the current thinking is that an ISG would be helpful to guide the staff on the level of detail that would be expected in a Part 50 construction permit application.

In a parallel effort more specifically focused on non-LWRs, the staff stated during the July 31, 2020, meeting that it planned to leverage the guidance that the industry-led TICAP team is developing for construction permits. The staff has also already included proposed construction permit guidance as part of the FSAR Chapter 8 annotated outline guidance it discussed during the July 31, 2020, public meeting addressing both TICAP and ARCAP. In the development of other ARCAP chapters, the addition of construction permit guidance will also be considered.

There are several possible 10 CFR Part 50 and 10 CFR Part 52 combinations that a near term applicant may pursue for licensing. As a result, near-term 10 CFR Part 50 and 10 CFR Part 52 guidance will be developed based on priorities that are informed by preapplication discussions with potential applicants in accordance with the process outlined in ""Draft - Preapplication Engagement to Optimize Application Reviews," (ADAMS Accession No.ML20281A761) and the following documents:

- Non-Light Water Reactor Review Strategy White Paper (ADAMS Accession No. ML19275F299) as amended by NRC Staff Draft White Paper "Analysis of Applicability of NRC Regulations for Non-LWRs (ADAMS Accession No. ML20241A017).

- A Regulatory Review Roadmap For Non-Light Water Reactors (ADAMS Accession No. ML17312B567).

- NEI Working Draft, “Industry Guideline for Development of Regulatory Engagement Plan” (ADAMS Accession No. ML18122A293).

Timeline

Figure 3 provides the timeline for TICAP and ARCAP guidance development. The TICAP schedule is shown above the timeline and the ARCAP schedule is shown below the timeline. As shown in the figure the staff is targeting issuing final TICAP guidance by the end of calendar year 2021, and draft ARCAP guidance by the end of calendar year 2021. Final ARCAP guidance will be issued in accordance with the 10 CFR Part 53 rulemaking effort.

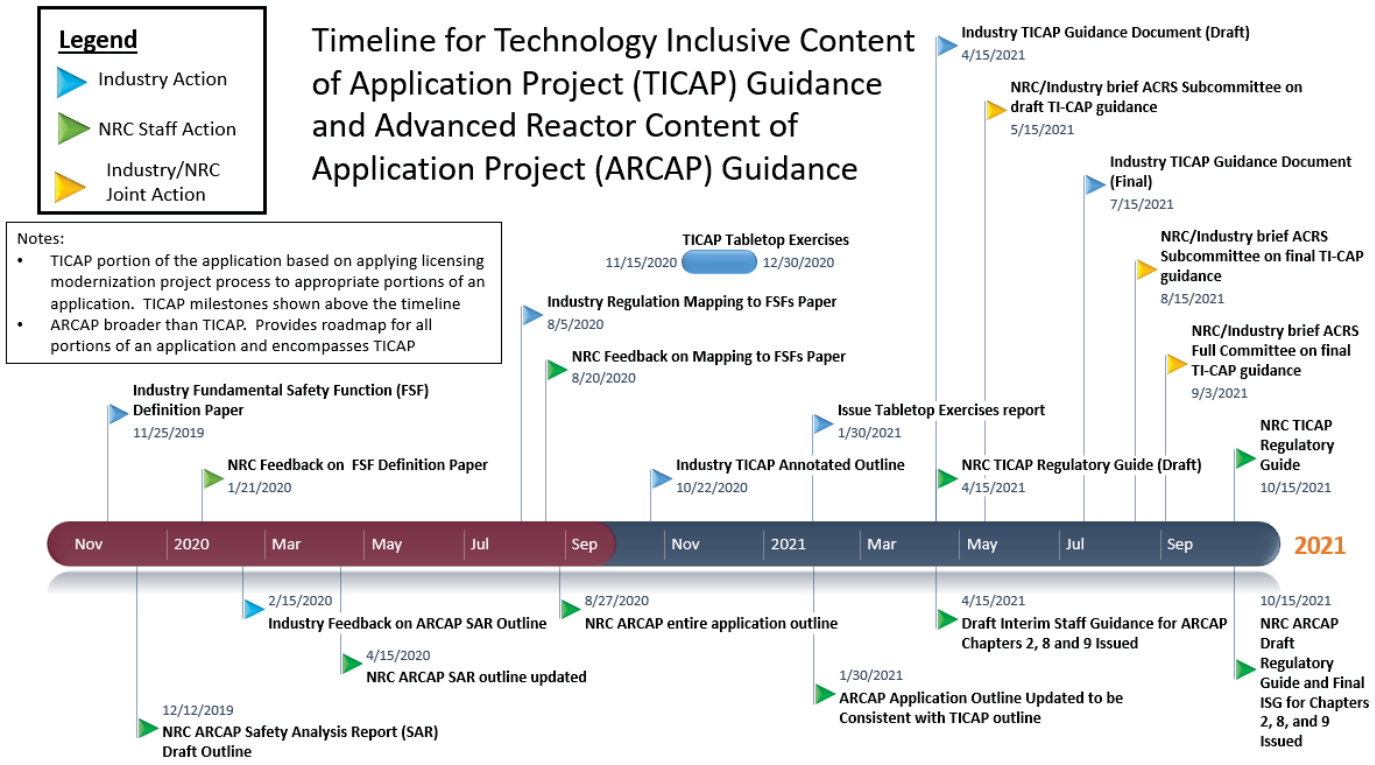


Figure 3 - TICAP and ARCAP Timeline

Table 1 - Preliminary ARCAP Roadmap

Proposed ARCAP Document Structure

Legend

- Primary portions derived from TICAP
- Primary portions derived from separate ongoing regulatory activities
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description		ARCAP Disposition	Associated Guidance		Additional Comments
				Developed*	Additional Activities**	
1	Proposed FSAR Chapters	Ch. 1 - General Information		-NEI 18-04 -RG 1.233 and RG 1.232 -Commission's 2008 "Policy Statement on Adv. Reactors" -TMI Requirements 10 CFR 50.34(f) -NUREG-0933 GSIs and USIs	-TICAP -ARCAP developing various subsections	-Includes generic description of safety case for design. -Commission statement can be found at FRN Vol. 73, No. 199, 10/14/2008 -NEI 18-04, RG 1.232 and RG 1.233 are only mentioned once but are applicable to all proposed ARCAP dispositions colored green and blue.
2		Ch. 2 – Site Information		To be determined	-TICAP Ch. 8 -SECY-20-0045 "Population Related Siting Considerations for Adv. Rxs" -DG-4028 "Volcanic Hazards Assessments for Proposed NPPs" -RES Guidance on RIPB Approach to Seismic Safety -ARCAP Ch. 2 -Non-LWR MELCOR Demonstration Project	ARCAP team is in the process of developing a draft ARCAP Chapter 2 and is targeting providing to stakholders in the Nov 2021 timeframe. ISG to be developed

Legend

Primary portions derived from TICAP
Primary portions derived from separate ongoing regulatory activities
Combination of new TICAP and ARCAP
New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.
**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
3	Ch. 3 – License Basis Event Analysis		-SECY-16-0012, "Accident Source Terms and Siting For Small Modular Reactors And Non-Light Water Reactors." -RG 1.217 -NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs"	-IAP Strategy 2 Code Assessment support -TICAP Ch. 2 and 3 -Non-LWR MELCOR Demonstration Project	
4	Ch. 4 – Integrated Plant Analysis		-RG 1.145	-TICAP Ch. 4	
5	Ch. 5 – Description and Classification of SSCs		-SECY-18-0096 "Functional Containment Performance Criteria for non-LWRs" -RG 1.201 -RG 1.129 -RG 1.100 -NUREG-0800 (SRP) Sec. 4.2 -ATF-ISG-2020-01	- TICAP Ch. 5, 6, and 7 - RG endorsing ASME Sec III, Div 5 "High Temp Materials" -RG endorsing ASME Sec XI, Div 2 "Reliability Integrity Management" -Fuel Qualification Guidance (white paper and subsequent NUREG) -Topical Report on TRISO fuel -DRG for I&C Reviews -MSR Fuel Qualification Guidance	
6	Ch. 6 – Design Basis Accident Analysis		-RG 1.203	-TICAP Ch. 3	
7	Ch. 7 – Defense in Depth			-TICAP Ch. 4	

Legend

Primary portions derived from TICAP
Primary portions derived from separate ongoing regulatory activities
Combination of new TICAP and ARCAP
New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.
**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
8	Ch. 8 – Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste		-NUREG-0800 (SRP) Secs. 11.2, 11.3, and 11.4 -RG 1.109 and RG 1.111 -RG 4.21 -NEI 07-10A	-ARCAP Ch. 8	ARCAP team developed draft guidance that discusses a performance based approach. The draft guidance has been well received by stakeholders in public meetings. Team is further refining the approach. ISG to be developed
9	Ch. 9 – Control of Occupational Dose		-RG 8.8 -RG 8.10 -ANSI/ANS 18.1-1999 -NEI 07-08A	-ARCAP Ch. 9	ARCAP team to developed draft guidance based on FSAR Chapter 8. ISG to be developed
10	Ch. 10 – Human Factors Analysis		-NUREG-0711 -NUREG-1275		
11	Ch. 11 – Physical Security		-RG 5.65 -RG 5.44 -RG 5.12 -RG 5.74 -RG 5.7		See physical security plan below
12	Ch. 12 – Overview of PRA		-RG 1.200	-RG endorsing non-LWR PRA Standard -TICAP Ch. 2 and ARCAP Ch. 12	
13	Ch. 13 – Administrative Control Programs (COLA Only)		-RG 1.8 -NUREG-0800 (SRP) Sec. 17.4 -RG 1.160	-TICAP Ch. 9	
14	Ch. 14 – Initial Startup Programs		-NUREG-0800 (SRP) Sec. 14.2		

Legend

- Primary portions derived from TICAP
- Primary portions derived from separate ongoing regulatory activities
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description		ARCAP Disposition	Associated Guidance		Additional Comments
				Developed*	Additional Activities**	
15	Additional Contents of Application	Technical Specification				TICAP will have a major impact on technical specifications. NRC and INL have identified the need for TICAP to consider tech spec development as part of TICAP. Unclear at this point how much TICAP guidance will be provided in this area. Tech Specs guidance will also be influenced by the final text of Suboart B of the final Part 53 rule.
16		Technical Requirements Manual				Existing guidance in this area needs to be adjusted to reflect LMP terminology
17		Quality Assurance Plan (design)				TICAP outcomes expected to heavily influence quality assurance plan for the design. Appendix B expected to apply to safety-related SSCs. Unclear at this point how TICAP will address QA for Non-safety related special treatment SSCs
18		Fire Protection Program (design)		-RG 1.189		Results of TICAP developed affirmative safety case expected to influence fire protection program
19		Probabilistic Risk Assessment		-RG 1.200	-RG endorsing non-LWR PRA Standard	See FSAR Chapter 12
20		Quality Assurance Plan (Construction and Operations)		-RG 1.28 -RG 1.30 -RG 1.33 -RG 1.164	-QA Plan for sodium-cooled FAST Metallic Fuel Data Qualification	TICAP outcomes expected to heavily influence quality assurance plan for the design. Appendix B expected to apply to safety-related SSCs. Unclear at this point how TICAP will address QA for Non-safety related special treatment SSCs
21		Emergency Plan		-NUREG-0396 -NUREG-0654 -RG 1.101	-SECY-18-0103 related to EP for SMRs and other technologies	EP rulemaking expected to develop guidance in this area

Legend

Primary portions derived from TICAP
Primary portions derived from separate ongoing regulatory activities
Combination of new TICAP and ARCAP
New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.
**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
22	Physical Security Plan			-SECY-18-0075 related to Consequence Based Security	Physical security rulemaking expected to develop guidance in this area
23	SNM physical protection plan				
24	SNM material control and accounting plan				MC&A is an issue that has identified as needing to have guidance developed for some of the non-lwrs. A pebble-bed MC&A application standard and review standard has been developed by ORNL. MC&A for liquid fueled molten salt reactors will be a particular challenge. Does NUREG-2159 apply?
25	Fire Protection Program (Operational)		-RG 1.189		Results of TICAP developed affirmative safety case expected to influence fire protection program
26	Radiation Protection Program				Relates to FSAR Ch.ter 8 above - more specific guidance being considered.
27	Offsite Dose Calculation Manual				Relates to FSAR Chapter 8 above - more specific guidance being considered.
28	Inservice Inspection/Inservice testing (ISI/IST)		-RG 1.17 -RG 1.178		TICAP outcomes expected to heavily influence ISI/IST. In addition ASME Section XI Section 2 guidance identified as needing to be developed.
29	Environmental Report and Site Redress Plan		-RG 4.2 -NUREG-1555 -COL/ESP-ISG-026 -COL/ESP-ISG-027	-Environmental ISG for Micro Reactors -Draft GEIS for Adv. Rxs	
30	Financial Qualification and Insurance and Liability				Report under development to address issues
31	Cyber Security Plan		-RG 5.71		Unclear at this point how much TICAP guidance will be provided in this area

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Technology Inclusive Content of Application Project (TICAP), and Advanced Reactor Content of Application Project (ARCAP) Meeting

October 22, 2020
Telephone Bridgeline: : 301-576-2978
Passcode: 883 380 220#

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Agenda

Time	Topic	Presenter
10:00 -10:10 am	Introduction	NRC
10:10 – 10:40 am	Proposal for TICAP structure	Southern
10:40 - 11:20 am	Provide scope and timing for TICAP tabletop exercises	Southern
11:20 - 11:35 am	TICAP next steps	Southern
11:35 - 12:00 pm	Stakeholder questions	All
12:00 -1:00 pm	Break	All
1:00 - 1:45 pm	Updated Proposal for ARCAP Guidance Document	NRC/Idaho National Lab
1:45 -2:15 pm	Additional Thoughts on Proposed ARCAP Chapters 8 and 9	NRC/Idaho National Lab
2:15 - 2:45 pm	Industry and Other stakeholder feedback	All
2:45 - 3:00 pm	Next Steps and Concluding Remarks	All

Updated Proposal for Advanced Reactor Content of Application Project (ARCAP) Guidance Document

Background

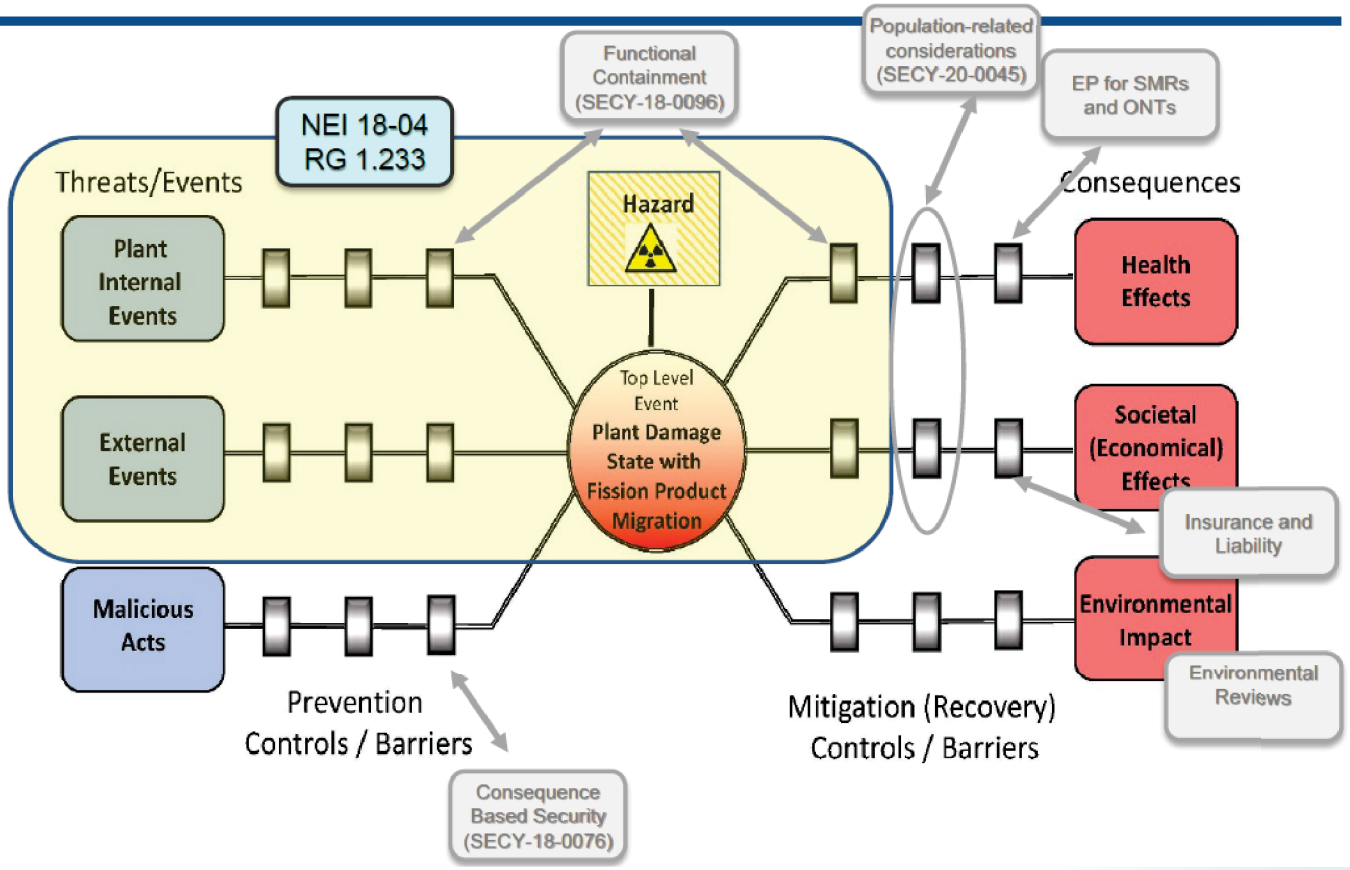
- High-level ARCAP proposal discussed during August 2020 TICAP/ARCAP meeting. Proposal included:
  - ARCAP Proposed Guidance document would provide a roadmap for developing an application
  - Roadmap would leverage existing guidance or guidance that is under development
  - Examples include:
    - Technology Inclusive Content of Application Project (TICAP) developing portions of the application associated with the Licensing Modernization Project (LMP)
    - Emergency planning and security rulemaking will provide insights to this portion of the application
  - Never the intention of the ARCAP guidance document to attempt to replicate the Standard Review Plan for Light Water Reactors (NUREG-0800)

Proposal for ARCAP Guidance Document

- Updated high level ARCAP proposal found in document referenced in meeting notice
- Uses same structure as Idaho National Lab (INL) developed outline discussed in previous ARCAP meetings. Outline can be found at ADAMS Accession No. ML20107J565
- Recognizes that the Industry-developed TICAP final safety analysis report proposed structure is different than INL-developed structure
  - Table will be updated based on final version of industry-developed TICAP structure
- Changes to ARCAP proposal from that discussed in August 27, 2020, meeting include:
  - More information providing the basis for the proposal
  - A draft schedule that integrates TICAP and ARCAP guidance development

Background

- Figure provides an overview of some of the more important efforts underway to develop advanced reactor guidance
- TICAP will use the NEI 18-04/RG 1.233 (upper left of figure) to develop portions of the application



Proposal for ARCAP Guidance Document

- Changes to ARCAP proposal from that discussed in August 27, 2020, meeting include (continued)
  - Target issuing a final TICAP Regulatory Guide by the end of 2021 that endorses, as appropriate, industry-developed TICAP guidance
  - ARCAP draft regulatory guidance focused on supporting 10 CFR Part 53 rulemaking
    - Portions of the guidance that may be beneficial to a near-term non-LWR applicant will be broken out into individual interim staff guidance documents (e.g., Chapter 8, “Control of Routine Plant Radioactive Effluents and Solid Waste”)

Proposal for ARCAP Guidance Document

- Changes to ARCAP proposal from that discussed in August 27, 2020, meeting include (continued)
  - Near term Part 50 or Part 52 non-LWR applicants encouraged to use
    - Non-Light Water Reactor Review Strategy White Paper (ADAMS Accession No. ML19275F299) as amended by NRC Staff Draft White Paper "Analysis of Applicability of NRC Regulations for Non-LWRs (ADAMS Accession No. ML20241A017)
    - Regulatory Roadmap (ADAMS Accession No. ML17312B567)
    - NEI Working Draft Industry Guideline for Development of Regulatory Engagement Plan (ADAMS Accession No. ML18122A293)
    - Preapplication process found at ADAMS Accession No. ML20281A761

Proposal for ARCAP Guidance Document

- Changes to ARCAP proposal from that discussed in August 27, 2020, meeting include (continued)
  - Portions of the TICAP guidance and ARCAP guidance can be used, as appropriate, to develop a Part 50/Part 52 application
  - Changes to Table 1 to provide a more detailed roadmap to the TICAP and ARCAP guidance that supports portions of the application
    - Assumes that TICAP will not address detailed programmatic aspects that support the NEI 18-04/RG 1.233 methodology
      - TICAP chapters updated to reflect additional guidance under development that will support these chapters

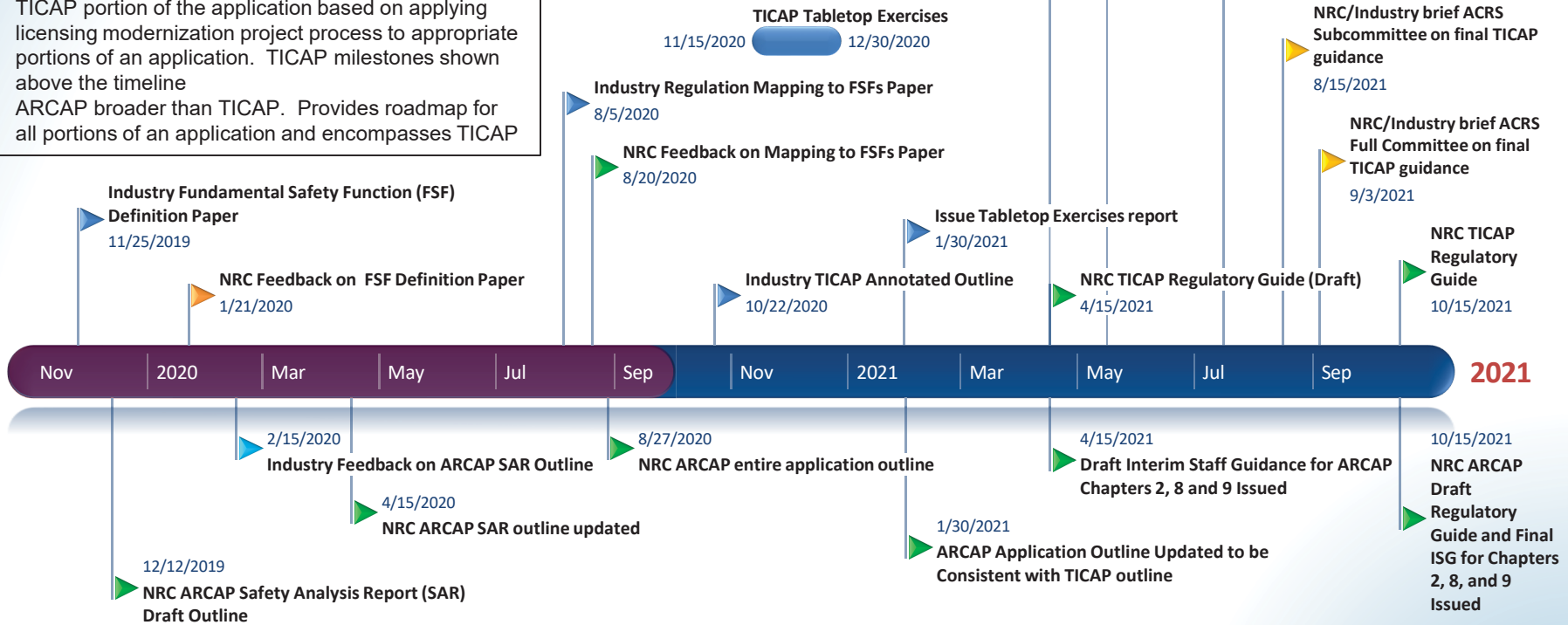
Timeline for Technology Inclusive Content of Application Project (TICAP) Guidance and Advanced Reactor Content of Application Project (ARCAP) Guidance

Legend

- Industry Action
- NRC Staff Action
- Industry/NRC Joint Action

Notes:

- TICAP portion of the application based on applying licensing modernization project process to appropriate portions of an application. TICAP milestones shown above the timeline
- ARCAP broader than TICAP. Provides roadmap for all portions of an application and encompasses TICAP



Proposal for ARCAP Guidance Document

Proposed ARCAP Document Structure

Legend

- Primary portions derived from TICAP
- Primary portions derived from separate ongoing regulatory activities
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description		ARCAP Disposition	Associated Guidance		Additional Comments
				Developed*	Additional Activities**	
1	Proposed FSAR Chapters	Ch. 1 - General Information		-NEI 18-04 -RG 1.233 and RG 1.232 -Commission's 2008 "Policy Statement on Adv. Reactors" -TMI Requirements 10 CFR 50.34(f) -NUREG-0933 GSIs and USIs	-TICAP -ARCAP developing various subsections	-Includes generic description of safety case for design. -Commission statement can be found at FRN Vol. 73, No. 199, 10/14/2008 -NEI 18-04, RG 1.232 and RG 1.233 are only mentioned once but are applicable to all proposed ARCAP dispositions colored green and blue.
2		Ch. 2 – Site Information		To be determined	-TICAP Ch. 8 -SECY-20-0045 "Population Related Siting Considerations for Adv. Rxs" -DG-4028 "Volcanic Hazards Assessments for Proposed NPPs" -RES Guidance on RIPB Approach to Seismic Safety -ARCAP Ch. 2 -Non-LWR MELCOR Demonstration Project	ARCAP team is in the process of developing a draft ARCAP Chapter 2 and is targeting providing to stakholders in the Nov 2021 timeframe. ISG to be developed

Proposal for ARCAP Guidance Document

Legend

Primary portions derived from TICAP
Primary portions derived from separate ongoing regulatory activities
Combination of new TICAP and ARCAP
New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.
**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
3	Ch. 3 – License Basis Event Analysis		-SECY-16-0012, "Accident Source Terms and Siting For Small Modular Reactors And Non-Light Water Reactors." -RG 1.217 -NEI 07-13, "Methodology for Performing Aircraft Impact Assessments for New Plant Designs"	-IAP Strategy 2 Code Assessment support -TICAP Ch. 2 and 3 -Non-LWR MELCOR Demonstration Project	
4	Ch. 4 – Integrated Plant Analysis		-RG 1.145	-TICAP Ch. 4	
5	Ch. 5 – Description and Classification of SSCs		-SECY-18-0096 "Functional Containment Performance Criteria for non-LWRs" -RG 1.201 -RG 1.129 -RG 1.100 -NUREG-0800 (SRP) Sec. 4.2 -ATF-ISG-2020-01	- TICAP Ch. 5, 6, and 7 - RG endorsing ASME Sec III, Div 5 "High Temp Materials" -RG endorsing ASME Sec XI, Div 2 "Reliability Integrity Management" -Fuel Qualification Guidance (white paper and subsequent NUREG) -Topical Report on TRISO fuel -DRG for I&C Reviews -MSR Fuel Qualification Guidance	
6	Ch. 6 – Design Basis Accident Analysis		-RG 1.203	-TICAP Ch. 3	
7	Ch. 7 – Defense in Depth			-TICAP Ch. 4	

Proposal for ARCAP Guidance Document

Legend

- Primary portions derived from TICAP
- Primary portions derived from separate ongoing regulatory activities
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
8	Ch. 8 – Control of Routine Plant Radioactive Effluents, Plant Contamination, and Solid Waste		-NUREG-0800 (SRP) Secs. 11.2, 11.3, and 11.4 -RG 1.109 and RG 1.111 -RG 4.21 -NEI 07-10A	-ARCAP Ch. 8	ARCAP team developed draft guidance that discusses a performance based approach. The draft guidance has been well received by stakeholders in public meetings. Team is further refining the approach. ISG to be developed
9	Ch. 9 – Control of Occupational Dose		-RG 8.8 -RG 8.10 -ANSI/ANS 18.1-1999 -NEI 07-08A	-ARCAP Ch. 9	ARCAP team to developed draft guidance based on FSAR Chapter 8. ISG to be developed
10	Ch. 10 – Human Factors Analysis		-NUREG-0711 -NUREG-1275		
11	Ch. 11 – Physical Security		-RG 5.65 -RG 5.44 -RG 5.12 -RG 5.74 -RG 5.7		See physical security plan below
12	Ch. 12 – Overview of PRA		-RG 1.200	-RG endorsing non-LWR PRA Standard -TICAP Ch. 2 and ARCAP Ch. 12	
13	Ch. 13 – Administrative Control Programs (COLA Only)		-RG 1.8 -NUREG-0800 (SRP) Sec. 17.4 -RG 1.160	-TICAP Ch. 9	
14	Ch. 14 – Initial Startup Programs		-NUREG-0800 (SRP) Sec. 14.2		

Proposal for ARCAP Guidance Document

Legend

- Primary portions derived from TICAP
- Primary portions derived from separate ongoing regulatory activities
- Combination of new TICAP and ARCAP
- New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #		Description	ARCAP Disposition	Associated Guidance		Additional Comments
				Developed*	Additional Activities**	
15	Additional Contents of Application	Technical Specification				TICAP will have a major impact on technical specifications. NRC and INL have identified the need for TICAP to consider tech spec development as part of TICAP. Unclear at this point how much TICAP guidance will be provided in this area. Tech Specs guidance will also be influenced by the final text of Suboart B of the final Part 53 rule.
16		Technical Requirements Manual				Existing guidance in this area needs to be adjusted to reflect LMP terminology
17		Quality Assurance Plan (design)				TICAP outcomes expected to heavily influence quality assurance plan for the design. Appendix B expected to apply to safety-related SSCs. Unclear at this point how TICAP will address QA for Non-safety related special treatment SSCs
18		Fire Protection Program (design)		-RG 1.189		Results of TICAP developed affirmative safety case expected to influence fire protection program
19		Probabilistic Risk Assessment		-RG 1.200	-RG endorsing non-LWR PRA Standard	See FSAR Chapter 12
20		Quality Assurance Plan (Construction and Operations)		-RG 1.28 -RG 1.30 -RG 1.33 -RG 1.164	-QA Plan for sodium-cooled FAST Metallic Fuel Data Qualification	TICAP outcomes expected to heavily influence quality assurance plan for the design. Appendix B expected to apply to safety-related SSCs. Unclear at this point how TICAP will address QA for Non-safety related special treatment SSCs
21		Emergency Plan		-NUREG-0396 -NUREG-0654 -RG 1.101	-SECY-18-0103 related to EP for SMRs and other technologies	EP rulemaking expected to develop guidance in this area

Proposal for ARCAP Guidance Document

Legend

Primary portions derived from TICAP

Primary portions derived from separate ongoing regulatory activities

Combination of new TICAP and ARCAP

New ARCAP guidance being developed

Version 10/15/2020

* Guidance referenced in the developed column is provided for consideration and may not always be applicable for a given design.

**For more information on "additional activities" please see: https://www.nrc.gov/reactors/new-reactors/advanced.html#advSumISRA

Item #	Description	ARCAP Disposition	Associated Guidance		Additional Comments
			Developed*	Additional Activities**	
22	Physical Security Plan			-SECY-18-0075 related to Consequence Based Security	Physical security rulemaking expected to develop guidance in this area
23	SNM physical protection plan				
24	SNM material control and accounting plan				MC&A is an issue that has identified as needing to have guidance developed for some of the non-lwrs. A pebble-bed MC&A application standard and review standard has been developed by ORNL. MC&A for liquid fueled molten salt reactors will be a particular challenge. Does NUREG-2159 apply?
25	Fire Protection Program (Operational)		-RG 1.189		Results of TICAP developed affirmative safety case expected to influence fire protection program
26	Radiation Protection Program				Relates to FSAR Ch.ter 8 above - more specific guidance being considered.
27	Offsite Dose Calculation Manual				Relates to FSAR Chapter 8 above - more specific guidance being considered.
28	Inservice Inspection/Inservice testing (ISI/IST)		-RG 1.17 -RG 1.178		TICAP outcomes expected to heavily influence ISI/IST. In addition ASME Section XI Section 2 guidance identified as needing to be developed.
29	Environmental Report and Site Redress Plan		-RG 4.2 -NUREG-1555 -COL/ESP-ISG-026 -COL/ESP-ISG-027	-Environmental ISG for Micro Reactors -Draft GEIS for Adv. Rxs	
30	Financial Qualification and Insurance and Liability				Report under development to address issues
31	Cyber Security Plan		-RG 5.71		Unclear at this point how much TICAP guidance will be provided in this area

Continued Development of ARCAP Chapters Using a Performance-Based (PB) Approach

(i.e., Approach 3)

Background

- In the July 31, 2020 ARCAP meeting, NRC provided additional details on a potential PB approach (Approach 3) for ARCAP Chapter 8, “Control of Routine Plant Radioactive Effluents and Solid Waste” (ML20197A234).

- In the August 27, 2020 ARCAP meeting, NRC presented a framework for these ARCAP chapters (ML20239B034):
  - Chapter 2, “Site Information”
  - Chapter 8, Section 8.3, “Solid Waste”
  - Chapter 9, “Control of Occupational Dose”

- Draft versions on Chapters 8 and 9 will be discussed today. Copies are available at ML20262H264

ARCAP Section 8.3 and Chapter 9 - Overview

- Continue to develop performance-based guidance for additional non-TICAP safety analysis report chapters
  - Section 8.3, Solid Waste
  - Chapter 9, Control of Occupational Dose
- Related to the two performance-based content areas above, address continued applicability of NEI developed FSAR content templates:
  - NEI 07-10A, *Generic FSAR Template Guidance for Process Control Program (PCP)*
  - NEI 07-08A, *Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures are as Low as is Reasonably Achievable (ALARA)*

ARCAP Section 8.3, Solid Waste

- Developed using same approach as Sections 8.1 and 8.2
- Reference applicable requirements for performance-based acceptance criteria, such as:

10 CFR 20.1302 and 10 CFR 20.1301(e)	10 CFR 50, Appendix A, Criterion 63
10 CFR 20.1406	10 CFR 61.55 and 10 CFR 61.56
10 CFR 50.34a	10 CFR 20.2006 and Appendix G to 10 CFR Part 20
For LWRs, 10 CFR Part 50, Appendix I, Sections II.A, II.B, II.C, and II.D	10 CFR 20.2007
40 CFR Part 190	10 CFR 20.2108
10 CFR 50, Appendix A, Criterion 60	10 CFR Part 71 and 49 CFR Parts 171–180
10 CFR 50, Appendix A, Criterion 61	49 CFR 173.443

ARCAP Section 8.3, Solid Waste (cont.)

- Develop Acceptance Criteria - System Design, such as:
  - Provide a high-level description of the solid waste management system (SWMS)
    - Describe expected sources of waste
    - Describe equipment design capacities for expected waste volumes and radioactivity inventories of Class A, B and C waste
  - Describe design provisions to control and collect any solid waste spillage from equipment malfunction or puncture of waste containers

ARCAP Section 8.3, Solid Waste (cont.)

- Develop Acceptance Criteria - Operational Controls, such as:
  - Provide a description of operational controls for waste processing and surveillance requirements which assure that:
    - Allowable doses to members of the public remain within required levels
    - The final waste product meets the requirements of applicable Federal, State and disposal site waste form requirements for burial at a 10 CFR 61 licensed Low-Level Waste (LLW) disposal site
  - As an option, applicant may refer to NEI 07-10A, *Generic FSAR Template Guidance for Process Control Program (PCP)*
    - If an applicant chooses to reference this template to address the above acceptance criteria no need to replicate text in the FSAR; may need to update/revise template to reflect operation of specific non-LWR

ARCAP Chapter 9, Control of Occupational Dose

- Develop using same approach as Chapter 8
- Address applicability to:
  - Part 50 operating license and construction permit applications
  - Part 52 design certification and combined license applications
  - Non-LWRs and small modular LWRs
- Reference applicable requirements for performance-based acceptance criteria, such as:
  - 10 CFR 19.12, as it relates to keeping workers informed who receive occupational radiation exposure (ORE)
  - 10 CFR 20, Subpart C, *Occupational Dose Limits* (20.1201 – 20.1208)
  - 10 CFR 20.1101 and the definition of ALARA in 10 CFR 20.1003, as they relate to those measures that ensure that radiation exposures resulting from licensed activities are below specified limits and ALARA

ARCAP Chapter 9, Control of Occupational Dose (cont.)

- Develop Acceptance Criteria – System Design, such as:
  - Important equipment and facility design features used to ensure that occupational radiation exposures are ALARA such as, shielding, ventilation, area radiation and airborne radioactivity monitoring instrumentation and dose assessment.
  - Major radiation sources including sources that require (1) shielding, (2) special ventilation systems, (3) special storage locations and conditions, (4) traffic or access control, (5) special plans or procedures, and (6) monitoring equipment. Information regarding sources terms used in license basis event analysis need not be described in this chapter as this information should be provided elsewhere in the application.
  - Design features provided to control access to radiologically restricted areas (including potentially very high radiation areas) and describe each very high radiation area and indicate physical access controls and radiation monitor locations for each of these areas.
  - Features that reduce the need for maintenance and other operations in radiation fields, reduce radiation sources in areas where operations may be performed, allow quick entry and easy access, provide remote operation capability, or reduce the time spent working in radiation fields, as well as any other features that reduce radiation exposure of personnel.
  - Methods for reducing the production, distribution, and retention of activation products through design, material selection, water chemistry, decontamination procedures, and so forth.

ARCAP Chapter 9, Control of Occupational Dose (cont.)

- Develop Acceptance Criteria – Operational Controls, such as:
  - Provide commitments to develop comprehensive worker protection programs, organizational structure, training and monitoring to ensure 10 CFR 19 and 10 CFR 20 requirements are met. Include commitments to any relevant regulatory guides, NEI templates, or standards
  - As an option, applicant may refer to NEI 07-08A, *Generic FSAR Template Guidance for Ensuring that Occupational Radiation Exposures are as Low as is Reasonably Achievable (ALARA)*
    - If an applicant chooses to reference this template to address the above acceptance criteria no need to replicate text in the FSAR; may need to update/revise template to reflect operation of specific non-LWR
  - These criteria for operational controls could also be addressed in the Radiation Protection Program with a reference in the FSAR