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Subject: Draft White Paper Associated with Advanced Reactor Content of Application Project Chapter 10, "Control of Occupational Dose"
Attachments: ARCAP Chapter 10 - Occupational Dose - Interim Staff Guidance_July 21 version.docx

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The purpose of this email is to transmit to you the draft white paper associated with the Advanced Reactor Content of Application Project (ARCAP) Chapter 10, "Control of Occupational Dose."

The staff is re-baselining its ARCAP and Technology Inclusive Content of Application Project (TICAP) draft guidance documents in July of 2021. The draft guidance associated with ARCAP Chapter 10 was previously made publicly available on September 16, 2020 (see: <https://www.nrc.gov/docs/ML2026/ML20260H366.pdf>). The September 2020, version was not in a draft interim staff guidance (ISG) format and was previously identified as ARCAP Chapter 9. Because the TICAP safety analysis report (SAR) chapters have been reorganized since September of 2020, the guidance in the attached document is now identified as ARCAP Chapter 10 instead of ARCAP Chapter 9. The attached version is in the ISG format and other minor formatting changes have been made to the document. The technical content of the document has not changed from the previous version. The staff is reissuing some of the earlier versions of the ARCAP and TICAP guidance documents such that the documents are in a consistent format.

This email (including the attachment) will be made publicly available in ADAMS such that the documents can be referenced in Table 2 of the ARCAP/TICAP public webpage (see <https://www.nrc.gov/reactors/new-reactors/advanced/details.html#advRxContentAppProj>).

Please let me know if you have any questions.

Sincerely,

Joe Sebrosky
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Project Chapter 10, "Control of Occupational Dose"
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Options

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Reply Requested: No

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This draft staff white paper has been prepared and is being released to support ongoing public discussions. This draft white paper uses an interim staff guidance (ISG) format because the staff is considering using this format to provide staff guidance in the near future to support the review of advanced reactor applications.

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.



DANU [XX]-ISG-[YYYY-##]

Advanced Reactor Content of Application

Chapter 10 “Control of Occupational Dose”

Interim Staff Guidance

July X, 2021

**DANU [XX]-ISG-[YYYY-##]
Advanced Reactor Content of
Application
Chapter 10 “Control of Occupational
Dose”
Interim Staff Guidance**

ADAMS Accession No.: MLxxxxxxxxx

TAC: xxxxxx

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INTERIM STAFF GUIDANCE
ADVANCED REACTOR CONTENT OF APPLICATION
CHAPTER 10 “CONTROL OF OCCUPATIONAL DOSE”
DANU-ISG-YYYY-##

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC, or Commission) staff is providing this interim staff guidance (ISG) to facilitate the review of advanced reactor content of application guidance that is used to support reviews of non-light water reactors (non-LWRs), stationary micro reactors, and small modular LWRs submitting risk-informed applications for a construction permit (CP) or operating license (OL) under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, “Domestic Licensing of Production and Utilization Facilities”; or for a combined license (COL), manufacturing license (ML), or design certification (DC) under 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.” The guidance found in this ISG supports the development of the portion of an advanced reactor application associated with an applicant’s “Control of Occupational Dose.”

It is anticipated that this guidance will be updated to use for reviews of advanced nuclear reactor license and permit applications submitted under 10 CFR Part 53, “Licensing and Regulation of Advanced Nuclear Reactors,” once the content of that regulation is developed.

BACKGROUND

This ISG is based on the advanced reactor content of application project (ARCAP), whose purpose is to develop technology-inclusive, risk-informed, and performance-based application guidance. The ARCAP is broader than, and encompasses, the industry-led technology-inclusive content of application project (TICAP). The guidance found in this ISG supplements the guidance found in DANU-ISG-YYYY-##, “Advanced Reactor Content of Application Guidance,” which provides a roadmap for developing all portions of an application. The guidance in this ISG is limited to the portion of an advanced reactor application associated with the development of risk-informed control of occupational dose for the nuclear reactor plant applicant.

The Part 53 regulation is under development, and as such, the guidance found in this document is subject to change based on the outcome of this rulemaking. As the 10 CFR Part 53 requirements are developed, this ISG guidance will be supplemented, as necessary, to provide guidance for developing site information to reflect any differences in requirements between Part 50/52 and Part 53. The goal of the 10 CFR Part 53 rulemaking effort is to develop the regulatory infrastructure to support the licensing of advanced nuclear reactors. The term “advanced nuclear reactor,” for purposes of this rulemaking, means “a nuclear fission or fusion reactor with significant improvements compared to commercial nuclear reactors operating on the date of enactment of the Energy Act of 2020” or under construction as of January 2019. This rulemaking would revise the NRC’s regulations by adding a risk-informed, technology-inclusive regulatory framework for advanced nuclear reactors, in response to a growing interest

in possible licensing and deployment of advanced nuclear reactors and the related requirements of the Nuclear Energy Innovation and Modernization Act (NEIMA; Public Law 115-439), as amended by the Energy Act of 2020. Key documents related to the Part 53 rulemaking, including preliminary proposed rule language and stakeholder comments, can be found at Regulations.gov under Docket ID NRC-2019-0062.

RATIONALE

Note – this section will be updated with additional stakeholder interactions – expected during the periodic ARCAP meetings.

APPLICABILITY

This ISG is applicable to applicants for non-LWRs, stationary micro reactors, and small modular LWRs submitting risk-informed applications for a CP or OL under 10 CFR Part 50 or for a COL, DC, or ML under 10 CFR Part 52. Once the content of Part 53 is developed and this ISG is updated where necessary, this guidance will also apply to applicants for a power reactor CP, OL, DC, and ML under 10 CFR Part 53.

GUIDANCE

This chapter should provide information on facility and equipment design, radiation sources, and operational programs that are necessary to ensure that the occupational radiation protection standards set forth in 10 CFR Part 20 are met. The applicant should provide commitments to develop the management policy and organizational structure necessary to ensure occupational radiation exposures are ALARA.

Requirements described in 10 CFR 50.34, 52.47, 52.79 and 52.179, specify that an application for a construction permit (CP), an operating license (OL), a combined license (COL), a design certification (DC) or a Standard Design Approval (SDA) describe, in part, the kinds and quantities of radioactive materials expected to be produced in the operation and the means for controlling and limiting radiation exposures within the limits set forth in Part 20.

The guidance in the chapter applies to non-LWR (including microreactors) and small modular LWR applications for a Part 50 OL or a Part 52 COL, SDA or DC [although for a DC the design information may be conceptual (refer to Regulatory Guide 1.206, Rev 1) and the programmatic information may be deferred to the COL stage using COL action items]. Applications for construction permits (10 CFR 50.34(a), preliminary safety analysis reports) need only provide: (1) a commitment to develop comprehensive worker protection programs, organizational structure, training and monitoring to ensure 10 CFR 19 and 10 CFR 20 requirements are met; (2) a commitment to include in the OL application design provisions to ensure that occupational doses are ALARA. The additional information requested below can be provided by the applicant during the OL application review.

This guidance summarizes the information that should be provided in the application regarding control of occupational dose. Information being requested in this FSAR chapter may be described in the Radiation Protection Program (RPP) document which may be part of a separate application document. Because the staff will rely on information in the RPP document

and the FSAR to make its safety finding, information in the RPP document does not need to be repeated in the FSAR. However, the FSAR should incorporate the RPP information by reference to ensure that future changes to this information are properly evaluated by the FSAR change process to determine the need for prior NRC approval.

The application must provide assurance that occupational doses will be controlled and meet the requirements in 10 CFR 20. Specifically:

- a. 10 CFR 19.12, as it relates to keeping workers informed who receive occupational radiation exposure (ORE).
- b. 10 CFR 20, Subpart C, Occupational Dose Limits (20.1201 – 20.1208).
- c. 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.

Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:

- 10 CFR 50.34,
- 10 CFR 52.47,
- 10 CFR 52.79,
- 10 CFR 52.179,
- 10 CFR 19.12
- 10 CFR 20, Subpart C (20.1201 – 20.1208),
- 10 CFR 20.1101,
- 10 CFR 20.1003, and
- 10 CFR 50.34(a)

Acceptance Criteria

The application should include information sufficient to allow the staff reviewer to understand the general design and operational controls that will be used to control occupational doses. The applicant should provide information of the following type for the NRC reviewer to be able to reach a safety finding and address the topic in the staff's safety evaluation report:

- a. Describe 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.
- b. Describe 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.

- c. Describe the 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.
- d. Describe those 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.
- e. Describe methods for reducing the production, distribution, and retention of activation products through design, material selection, water chemistry, decontamination procedures, and so forth.
- f. 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 a description of the important elements of these programs. Include commitments to any relevant regulatory guides, NEI templates, or standards.
 - i. 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 there is no need to replicate text in the FSAR. An applicant may need to update/revise template to reflect operation of the specific non-LWR.
 - ii. These criteria for operational controls could also be addressed in the Radiation Protection Program with a reference in the FSAR.

IMPLEMENTATION

The staff will use the information discussed in this ISG to determine the following:

[Identify how the information will facilitate staff review of license amendments, license renewal applications, etc.]

BACKFITTING AND ISSUE FINALITY DISCUSSION

[OGC provides this discussion, but the staff can propose text for OGC consideration].

Example: The NRC staff issuance of this ISG is not considered backfitting as defined in 10 CFR 50.109(a)(1), nor is it deemed to be in conflict with any of the issue finality provisions in 10 CFR Part 52.

CONGRESSIONAL REVIEW ACT

[OGC provides this discussion to support issuance of the final ISG. However, the staff can propose text for OGC consideration].

Example: This ISG is a rule as defined in the Congressional Review Act (5 U.S.C. §§ 801-808). However, the Office of Management and Budget has not found it to be a major rule as defined in the Congressional Review Act.

FINAL RESOLUTION

By [insert date], this information will be transitioned into [identify the appropriate regulatory process (Standard Review Plan (SRP), Regulatory Guide (RG))]. Following the transition of this guidance to the [SRP, RG], this ISG will be closed.

APPENDIX

A. Resolution of Public Comments

APPENDIX A

Resolution of Public Comments

A notice of opportunity for public comment on this Interim Staff Guidance (ISG) was published in the *Federal Register* (insert FR Citation #) on [date] for a 30-60 day comment period. [Insert number of commenters] provided comments which were considered before issuance of this ISG in final form.

Comments on this ISG are available electronically at the NRC's electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this page, the public can gain entry into ADAMS, which provides text and image files of NRC's public documents. Comments were received from the following individuals or groups:

Letter No.	ADAMS No.	Commenter Affiliation	Commenter Name	Abbreviation
1				
2				
3				
4				
5				

The comments and the staff responses are provided below.

Comment 1: [Each comment summary must clearly identify the entity that submitted the comment and the comment itself].

NRC Response: Comment responses should begin with a direct statement of the NRC staff's position on a comment, e.g., "the NRC staff agrees with the comment" or the "NRC staff disagrees with the comment".

- If the NRC staff agrees, explain why and provide a clear statement as to how the relevant language was revised or supplemented to address the comment. Include the following language at the end of the comment response: "The final ISG was changed by <describe the change; if necessary by quoting the newly revised language>."
- If the NRC disagrees with a comment and no change was made to the generic communication, then explain why and provide the following language at the end of the comment response: "No change was made to the final ISG as a result of this comment."

APPENDIX B

References

DRAFT