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Subject: Transmittal of Advanced Reactor Content of Application Project Revised Chapter 11, "Organization and Human-System Considerations"
Attachments: ARCAP Ch 11 - Nov revision final.pdf

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Mr. Afzali, Mr. Holtzman, and Mr. Draffin,

The purpose of this email is to provide you with the attached Advanced Reactor Content of Application Project Revised Chapter 11, "Organization and Human-System Considerations," Draft White Paper Interim Staff Guidance (ISG). The staff has revised the previous draft white paper guidance for this Chapter (see: ADAMS Accession No. [ML21049A277](#)) that was discussed in a February 25, 2021 public meeting (see: <https://www.nrc.gov/pmns/mtg?do=details&Code=20210148>) to expand the scope of the guidance beyond application guidance associated with the key organizational structure for the facility. The attached revised draft white paper ISG expands the scope of the previous version of the document to include proposed guidance in human factors engineering, operator licensing, operator training and staffing. The proposed guidance includes a discussion of considerations for administering the first operator licensing examinations prior to fuel load. The staff notes that the information detailed in this section is not required to be included within an operating license or combined license application. The purpose of providing the information is to assist in identifying the specific information that will need to be developed and available prior to the first advanced reactor operator licensing examinations administered at a facility. Portions of this guidance could be removed and placed in other non-application guidance (e.g., guidance that supports operator licensing and inspection processes).

The attached document will be referenced in the NRC staff presentations during an upcoming advanced reactor stakeholder meeting scheduled for November 10, 2021. 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.

If you have questions regarding the attached documents please contact me.

Sincerely,

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

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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

**“Organization and
Human-System
Considerations”**

Interim Staff Guidance

November x, 2021

**DANU [XX]-ISG-
[YYYY-##]
Advanced Reactor
Content of Application
“Organization and
Human-System
Considerations”
Interim Staff Guidance**

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INTERIM STAFF GUIDANCE
ADVANCED REACTOR CONTENT OF APPLICATION
“ORGANIZATION AND HUMAN-SYSTEM CONSIDERATIONS”
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 an 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 design certification (DC), a combined license (COL), or a standard design approval (SDA) 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 “Organization and Human-System Considerations.”

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

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. The rule language for 10 CFR Part 53 is under development and as such the guidance found in this document is subject to change based on the outcome of this rulemaking. 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.

This edition of the 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 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-##, “Guidance for Performing the

Review of a Technology-Inclusive Advanced Reactor Application - Review Roadmap,” which provides a roadmap for developing all portions of an application. The guidance in this ISG is limited to the portions of an advanced reactor application associated with the organization and human-system interface considerations of the proposed facility. Guidance regarding operational programs, conduct of operations, and procedures is not within the scope of this ISG but rather is addressed in a separate document titled TICAP Draft Regulatory Guide DG-xxxx, Chapter 8, “Plant Programs.”

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 finalized this ISG guidance will be supplemented, as necessary, to provide guidance in the organizational and training areas to reflect any differences in requirements between Part 50/52 and Part 53. 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 monthly ARCAP meetings.

APPLICABILITY

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

GUIDANCE

Design, Construction, Operating Organization – Key Management Positions

An application should include descriptions of the organizational structure and key management positions within the design, construction and operating organizations that are responsible for facility design, design review, design approval, construction management, testing, and operation of the plant. Acceptance criteria are based on meeting the relevant requirements of the following Commission regulations:¹

- 10 CFR Part 50, Appendix B
- 10 CFR 50.34(a)(6), (9) and (119)
- 10 CFR 50.34(b)(6)(i) and (vii)

¹ As the 10 CFR Part 53 requirements are finalized this ISG guidance will be supplemented, as necessary, to provide guidance in the organizational and training areas to reflect any differences in requirements between Part 50/52 and Part 53.

- 10 CFR 50.34(f)(3)(vii)²
- 10 CFR 50.40(b)
- 10 CFR 50.48(a)(1)(ii)
- 10 CFR 50.71
- 10 CFR 52.47(a)(7)
- 10 CFR 52.79(a)(26), (27), (28), (29)(i) and (31)
- 10 CFR 52.137(a)(7)

An application for a CP/OL or COL should include the following information:

- Organizational charts of the applicant's corporate-level management, technical support, and operations organizations, including organizational and management structure responsible for direction and support of design and construction of the proposed plant,
- A general staffing plan for construction, startup testing,
- Details of the interaction of design and construction within the applicant's organization and the manner by which the applicant will ensure close integration of the architect engineer (AE) and the nuclear reactor vendor,
- Plans (preliminary for CP applicants) for the applicant's operations organization, including a general staffing plan for operations (OL and COL),
- The relationship of the nuclear-oriented part of the organization to the rest of the corporate organization,
- A description of the provisions for technical support for operations including interfaces between corporate, operations and the Technical Support Center (if applicable) (OL and COL),

For a DC or SDA application, the information provided should focus on the corporate level management and technical support organizations of the design organization. For the design, construction and pre-operational period (DC, SDA, CP/OL or COL), key management responsibilities in the following areas should be described:

- Principal site-related engineering studies of the meteorology, geology, seismology, hydrology, demography, and environmental effects,
- Design of safety-significant (i.e., safety-related and non-safety-related with special treatment) SSCs,
- The appropriate organization's review and approval of safety-related and safety-significant SSC design features,
- Development of probabilistic risk assessment (PRA), defense-in-depth, and

² For 10 CFR Part 50 applicants not listed in § 50.34(f), its requirements are not applicable. There is an ongoing rulemaking underway to align the requirements of Parts 50 and 52 that is considering making those requirements applicable to all Part 50 applicants. In the interim, staff should propose license conditions on Part 50 applications to address § 50.34(f)(3)(vii).

licensing basis event analysis,

- Material and component specification review and approval,
- Procurement of materials and equipment,
- Management of construction activities,
- Quality assurance activities for design and construction.

For the operational period (OL or COL), key management responsibilities in the following areas should be described:

- Nuclear, PRA, mechanical, structural, electrical, thermal-hydraulic, metallurgy and materials, and instrumentation and controls engineering (design and technical support)
- Plant chemistry
- Health physics
- Fueling and refueling operations support
- Maintenance support
- Operations support
- Fire protection
- Quality assurance
- Training
- Safety review
- Startup testing
- Emergency planning
- Security

If the application is for more than one module/unit, the applicant should provide information addressing staffing plans that take into account the staggered timelines for additional modules/units scheduled to come on-line with respect to pre-operational testing, fuel load, startup, and power ascension testing of each new module/unit. The applicant should describe the organizational arrangement and functions to meet the needs of the multiple modules/units. The applicant should include in this discussion the extent to which the organizational arrangement and functions are shared between or among the modules/units addressed in the application and describe the organizational arrangement and functional divisions or controls that have been established to preserve integrity between individual modules/units and/or programs.

For plant sites with existing, operating nuclear modules/units, the application should include a discussion of the extent to which the organizational arrangement and functions are shared between the new and existing modules/units. In addition, the applicant should include a discussion of the organizational arrangement and functional divisions or controls that have been established to preserve integrity between the new and existing operational modules/units and/or programs. NRC guidance regarding the operating organization is described in Regulatory Guide (RG) 1.33, "Quality Assurance Program Requirements

(Operation),” which references the guidance in ANSI/ANS 3.2-2012, “Managerial, Administrative and Quality Assurance Controls for the Operational Phase of Nuclear Power Plants.”

Educational and Experience Requirements for Key Management Personnel

The application should describe the educational and experience requirements for each key management position described above. For a CP or COL application, the information should describe the applicant’s past experience in the design and construction of nuclear power plants or relevant non-power reactor design and construction experience with similar attributes to those found in the application. Experience in activities of similar scope and complexity should also be described.

The CP or COL applications should include information that demonstrates the ability of the technical staff to support or perform the safety-related activities specified in the application. The applicant should describe the level of risk analysis experience available to perform necessary probabilistic risk assessments.

The reviewer should compare the education and experience of key personnel described above with the qualifications and experience guidance endorsed by RG 1.8, “Applicable experience,” i.e., work performed in a nuclear-fueled electric power production plant (commercial or military during pre-operational, startup-testing, or operational activities. Individual experience which may not be entirely applicable should be weighed against the requirements of the position.

Human Factors Engineering

The application for a CP/OL or COL should include relevant human factors engineering (HFE) information commensurate with the specific design and safety analysis. The information should clearly describe the most important HFE issues for a particular applicant and demonstrate that the applicant’s HFE program incorporates HFE practices and guidelines that satisfy the current requirements.³ The HFE review covers the HFE design process, the HFE final design, its implementation, and ongoing performance monitoring.

NRC guidance provides one method of meeting the current HFE requirements. Guidance acceptable to the NRC staff to inform an advanced reactor application include NUREG-0800 Chapter 18, NUREG-0711, and NUREG-1791. The NRC staff will use flexibilities in the HFE process that are currently described in NUREG-0800 during the review of a specific design (see NUREG-0800 Introduction Part 2). The application should include information related to flexibilities incorporated and/or deviations in the HFE analysis from the existing HFE guidance (for instance by relying on a supporting safety case). The information provided by applicants should demonstrate why these deviations still support the safe operation of the proposed facility.⁴

³ For 10 CFR Part 50 applicants not listed in § 50.34(f), its requirements are not applicable. There is an ongoing rulemaking underway to align the requirements of Parts 50 and 52 that is considering making those requirements applicable to all Part 50 applicants. In the interim, the staff expects applicants to address § 50.34(f)(2)(iii).

⁴ Certain standards which contain HFE requirements may also be applicable to a given application. For example, 10 CFR 50.55a(h)(3) requires that “Applications filed on or after May 13, 1999, for construction permits and operating licenses under this part, and for design approvals, design certifications, and

Consistent with ARCAP roadmap ISG Appendix x preapplication activities can aid the staff to better understand the proposed HFE approach and analysis, and ultimately align resources effectively and commensurate with the anticipated level of effort of the review.

The NRC staff has also developed additional guidance related to a scalable HFE approach to inform the proposed 10 CFR 53 rulemaking activities (See “Final Report: Development of HFE Review Guidance for Advanced Reactors,” ADAMS Accession No. ML21287A088). Insights from this report may also be used to inform the development of an HFE analysis under 10 CFR Parts 50 and 52. As a result of additional ongoing activities, the HFE guidance found in this document is subject to updates based on the outcome of those efforts.

Training for Plant Staff

The NRC regulations listed below provide information pertaining to the training of nuclear powerplant personnel. The OL/COL applicant should describe the training programs that are to be developed to meet these regulations. In describing compliance to these regulations, the applicant may reference in this section material discussed elsewhere in the application (i.e., external to the safety analysis report)⁵

- 10 CFR 19.12, “Instruction to Workers”
- 10 CFR 26.29, “Training”
- 10 CFR 50.34(a)(6) and (9)
- 10 CFR 50.34(b)(6)(i), (ii), (iii), and (iv)
- 10 CFR 50.34(f)(2)(i)⁶
- 10 CFR 50.40(b)
- 10 CFR 50.48, “Fire Protection”
- 10 CFR 50.54(i-1)
- 10 CFR 50.120, “Training and Qualification of Nuclear Power Plant Personnel”
- 10 CFR Part 50, “Licensing of Production and Utilization Facilities,” Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants”

combined licenses under part 52 of this chapter, must meet the requirements for safety systems in IEEE Std. 603–1991 and the correction sheet dated January 30, 1995.” This standard further states in Section 5.14, “Human Factors Considerations” that “Human factors shall be considered at the initial stages and throughout the design process to assure that the functions allocated in whole or in part to the human operator(s) and maintainer(s) can be successfully accomplished to meet the safety system design goals, in accordance with IEEE Std 1023-1988.”

⁵ As the 10 CFR Part 53 requirements are finalized this ISG guidance will be supplemented, as necessary, to provide guidance in the organizational and training areas to reflect any differences in requirements between Part 50/52 and Part 53

⁶ This section is applicable to the listed CP applicants in § 50.34 only and includes the need for a simulator capability that correctly models the control room and includes the capability to simulate small-break loss of coolant accidents (SBLOCAs), which are LBES for LWRs. Staff should propose license conditions to address this requirement for other applicants to address the capability to model the control room and, for those applicants to which SBLOCA simulation is technically relevant, to address that capability.

- 10 CFR Part 50, Appendix E, “Emergency Planning and Preparedness for Production and Utilization Facilities”
- 10 CFR 52.79(a)(14), (21), (33), (34), (35), (39), (40) and (44)

With respect to nuclear plant worker training, NRC guidance includes RG 1.8, "Qualification and Training of Personnel for Nuclear Power Plants." RG 1.8, Revision 4, endorses ANSI/ANS-3.1-2014, "Selection, Qualification, and Training of Personnel for Nuclear Power Plants." The application should indicate the extent to which the applicable portions of this guidance is used and should justify any exceptions. The training programs should focus on those tasks that are important to plant operations with regard to nuclear safety, defense-in-depth, or that are risk-significant using a systems (or systematic) approach to training (SAT) as defined by 10 CFR 55.4. The program description addressing the applicable sections of 10 CFR Part 26, "Fitness for Duty Programs," should be provided in a CP/OL/COL application document separate from the safety analysis report.

Licensed Operator Initial and Continuing (Requalification) Training

Considerations for Administering the First Operator Licensing Examinations Prior to Fuel Load⁷

OL and COL applicants should provide a description and timeline for establishing the testable content for initial operator licensing examinations. This may include development of a knowledge and abilities catalog, or similar mechanism to identify the items that will be tested on initial licensing examinations and to determine the importance ratings and basis for these items. This should include the use of subject matter experts, including those with prior work experience at an operating nuclear reactor, to determine the scope of systems/procedures to be included as well as rating the importance of topical items/statements with respect to safe operation of the facility. The scoping criteria should not limit systems/procedures to those related to protecting the reactor core/containment. The scoping criteria should allow for inclusion of any systems/procedures important to overall safe plant operation. The description should also include a requirement to link statements to the applicable 10 CFR Part 55.41, "Written Examination: Operators," 10 CFR 55.43, "Written Examination: Senior Operators," or 10 CFR 55.45, "Operating Tests," to establish the regulatory basis for examination content validity. The testable content for initial operator licensing examinations must be developed prior to administering initial operator licensing examinations.

OL and COL applicants should inform the NRC staff if an exemption will be requested to use the criteria in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors" in lieu of 10 CFR Part 55.40(a). If so, the applicant should provide a description of the examination methods, such as multiple choice written questions, job performance measures, or scenarios, as well as the structure, such as the number of written questions. In addition, the applicant should provide the proposed passing score for the applicable sections of the examination. The applicant should provide the basis for how the chosen examination methods, structure, and passing score(s) support examination validity,

⁷ Note: The information detailed within this section is not required to be included within OL and COL applications. This information is discussed within this ISG for the purpose of assisting IOLB staff in identifying specific information that will need to be developed and available prior to the first operator licensing examinations being administered by the facility.

reliability, and fairness. The requirements in 10 CFR Part 55.41, 55.43, and 55.45 apply unless an exemption from these requirements is also requested and granted.

OL and COL applicants should describe how the SAT was used for determining the job tasks to assist in developing the testable content, as well as the examination methods. They should also include how examination security requirements will be met per 10 CFR 55.49.

COL applicants should provide a description of how to designate procedures that may still be considered draft but are approved for use to support examinations. Procedures used to support examination material should receive: (1) an administrative review to verify that the procedure meets the facility licensee's writer's guide requirements and satisfies all technical specifications and final safety analysis report requirements, and (2) a technical review to verify the procedure is correct for proper operations of plant systems and equipment. Additionally, the applicant should ensure that procedures provided to the NRC for each initial operator licensing examination will be approved by the facility licensee's management in accordance with the facility licensee's administrative procedure requirements.

OL and COL applicants should provide a description of the simulation facility to be used to administer initial operator licensing examinations. The simulation facility must meet the requirements of 10 CFR 55.46(c) or be approved by the Commission under 10 CFR 55.46(b) prior to administering any operator licensing examinations.

OL and COL applicants should provide a timeline for initial operator licensing examinations needed prior to fuel load as well as the anticipated number of individual license operator applicants in order to determine the NRC staff resources that will be required to meet those needs.

A preapplication meeting to discuss details associated with an exemption from 10 CFR 55.40 as well as the timeline for administration of the first operator licensing examinations prior to fuel load would assist in ensuring appropriate resources are available.

Implementation of Training Programs

OL and COL applications should provide a description and schedule for establishing the initial training programs for reactor operators and senior reactor operators that meet the requirements in 10 CFR 55 with milestones for implementation during construction. This should include a description of how the requirements for a SAT-based training program are met. This should also include the details of individuals' qualifications for entry into the program, details on courses of instruction to be administered by the facility, the nature of training to be provided by the facility, and startup and shutdown experience provided. In lieu of these details, the application may state that the applicant will seek accreditation from the National Academy of Nuclear Training (NANT). If accreditation is selected but it is not achieved prior to the administration of the first initial operator licensing examination, then the NRC staff will need to complete an inspection of the applicant's training program prior to the first examination. As an option to addressing the licensed operator training criterion, the applicant may provide a commitment to meet the guidelines of NEI 06-13A, "Template for an Industry Training Program Description," Revision 2, for its licensed operator training program.

The OL and COL applications should also describe the licensed operator requalification program as required in 10 CFR 50.54(i-1) and 10 CFR 55.59, "Requalification," including

the first anticipated requalification period per 10 CFR 55.59(a)(1). Additionally, applicants should consider how operator license applicants will maintain knowledge, skills and abilities following successful completion of the initial operator licensing examination if there is a significant time lag between the examination and license issuance (for example, as a result of cold licensing experience requirements, such as preoperational testing, needing to be completed).

A meeting to discuss whether Commission-approval of the training program will be requested will assist in ensuring that sufficient resources are aligned for a timely review.

Use of Simulation Facilities for Operator Training, Experience, and Examinations during Construction

The licensed operator training program description should address the use of a simulator. The RG 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations" is an acceptable approach for utilizing simulation facilities. This description should state whether a plant referenced simulator or Commission-approved simulator will be used for operator licensing examinations. If a plant referenced simulator will be used, the application should provide a commitment to inform the NRC when a determination has been made that the simulation facility meets the requirements to be a plant-referenced simulator. This notification should occur well in advance of the first scheduled operator licensing examination.

For Commission-approved simulators, the description should include the items listed in 10 CFR 55.46(b), including a description of the components of the simulation facility intended to be used, a description of the performance tests for the simulation facility as part of the request and the results of these tests, and a description of the procedures for maintaining examination and test integrity per 10 CFR 55.49. Additionally, the applications should provide the following information: how the simulator allows for performance of actions necessary to accomplish a representative sample of the 13 items listed in 10 CFR 55.45(a), that the simulator response will model that of the reference plant during operating tests, that the simulator can perform a sufficient number of operating tests such that the examination is not predictable, and that any open simulator discrepancies will not negatively affect the examination. If these items are not yet available, the description should include a proposed timeline for when the items will be available for review by the Commission. A Commission-approved simulator may require significant review resources, so a pre-submittal meeting would assist in ensuring sufficient resources are available to support review and approval in advance of any operator licensing examinations. The simulation facility must meet the requirements of 10 CFR 55.46(c) or be approved by the Commission under 10 CFR 55.46(b) prior to administering any operator licensing examinations.

Issuance of Licenses Prior to Fuel Load

The OL and COL applicant should describe the process to be used to ensure that operator licenses will be maintained active per the requirements of 10 CFR 55.53(e) prior to initial fuel load. This may include that operators on shift performing the functions of a reactor operator or senior reactor operator will perform meaningful duties analogous to the minimum licensed positions under technical specifications. This may include operating the controls and apparatus during preoperational testing that, once fuel is loaded and plant

startup occurs, will directly affect reactivity or power level.

Prior to fuel load, OL and COL holders should submit an exemption request from the requirements of 10 CFR Part 55.31(a)(5), which requires reactivity manipulations be performed on the actual plant or a plant-referenced simulator that meets the requirements of Part 55.46(c), including a requirement for the simulator to model the most recent core load of the reference plant. For plants under construction, licensed operators will be required prior to the loading of fuel, and there is no recent core load; therefore, an exemption from 10 CFR 55.31(a)(5) is required to be requested and granted.

OL and COL applicants for a multi-unit facility should consider the guidance for licensing operators at multiple units per NUREG-1021. If the licensing will occur simultaneously, the application should include a description of how those requirements are met. If licensing for one unit is expected to occur after the individual is licensed on another unit, an exemption of the requirement to request another examination be administered for the subsequent units may be requested. A pre-application meeting to discuss what exemptions will be requested for licensing operators prior to fuel load will assist in ensuring that sufficient resources are aligned for a timely review.

Non-licensed Personnel Training

For OL and COL applicants, describe the training program for non-licensed nuclear plant personnel that meets the requirements of 10 CFR 50.120(b)(2) and (b)(3). Describe how the training program is derived from a systems approach to training as defined in 10 CFR 55.

The non-licensed plant staff training program should include, in addition to the technical training that is required for each non-licensed plant staff position, training in the following areas: physical security, emergency protection, radiological emergency, administrative procedures, radiation protection, fire protection, quality assurance, and fitness for duty (addressed in a separate application document).

The application should describe a program to periodically evaluate the non-licensed plant staff training programs by individuals other than those directly responsible for the training. This evaluation should include an assessment of program effectiveness in developing the trainees' ability to meet performance requirements of the job. The program should be periodically revised and updated, to reflect the result of program evaluations, industry experience, and changes to the facility, procedures, regulations, and quality requirements.

The program descriptions should include the initial training, periodic retraining, and qualification that are required for non-licensed plant staff. These programs are to be established, implemented, and maintained 18 months prior to the scheduled date for initial fuel load.

As an option to addressing the non-licensed plant staff training criterion, the applicant may provide a commitment to meet the guidelines of Nuclear Energy Institute (NEI) 06-13A, "Template for an Industry Training Program Description," for its non-licensed plant staff training program.

Basis/number of operating shift crews, their staffing and responsibilities⁸

The requirements in 10 CFR 50.54(k) and 10 CFR 50.54(m) identify the minimum number of licensed operators who must be on site, in the control room, and at the controls. The requirements are conditions in every nuclear power reactor operating license issued under 10 CFR Part 50. The requirements are also conditions in every COL issued under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants"; however, they are only applicable after the Commission makes the finding under 10 CFR 52.103(g) that the acceptance criteria in the COL are met.

The application should describe the functions, responsibilities, and authorities of the following plant positions (OL or COL):

- operations supervisors,
- operating shift supervisors/managers,
- shift technical advisors,
- reactor operators and senior operators,
- non-licensed operators.

For each position listed above, describe the interfaces with offsite personnel or key management positions. Such interfaces include defined lines of reporting responsibilities (e.g., from the plant manager to the immediate superior), lines of authority, communication channels, and roles in risk-informed evaluations and decision making. Provide a description of the authority that may be granted to operations supervisors; to operating crew shift supervisors/managers, including the authority to issue standing or special orders; and to reactor operators and senior operators.

The application should also describe the shift position titles, applicable operator licensing requirements for each, and the minimum numbers of personnel planned for each shift for all combinations of modules/units proposed to be at the station in either operating or safe shutdown mode. The applicant should also describe shift crew staffing plans unique to refueling operations. In addition, the application should describe the proposed means of assigning shift responsibility for implementing the radiation protection and fire protection programs on a round-the-clock basis where appropriate.

If the station contains, or there are plans that it contains, power generating facilities other than those specified in the application (e.g., fossil-fueled units), the applicant should describe interfaces with the organizations operating the other facilities. The description should include any proposed sharing of personnel between the units, a description of the duties of the shared personnel, and the proportion of the time these shared personnel will be assigned to the nonnuclear units.

The staffing requirements in 10 CFR 50.54(k) and (m) do not apply to applicants for a CP, DC, or SDA. However, the staff expects that DC, SDA, and CP applicants have considered the minimum licensed operator staffing needed at the facility because, as a practical matter,

⁸ As the 10 CFR Part 53 requirements are finalized this ISG guidance will be supplemented, as necessary, to provide guidance in the organizational and training areas to reflect any differences in requirements between Part 50/52 and Part 53.

staffing is a necessary consideration when designing and constructing a facility. Additionally, when the proposed licensed operator staffing for the facility will not meet the requirements in 10 CFR 50.54(k) and (m), and in the absence of alternative requirements, future licensees of these facilities will need to request an exemption from these staffing requirements. In order to provide regulatory certainty on the issue of licensed operator staffing, a DC, SDA, or CP application should address licensed operator staffing.

One option that would provide issue finality and regulatory certainty for a DC applicant is to propose for certification as part of the DC rulemaking an alternative control room staffing level requirement that a facility licensee could satisfy in lieu of 10 CFR 50.54(m). The DC applicant can provide the technical basis for rulemaking language that would address control room staffing in conjunction with control room configuration as part of the DCA. A future licensee that follows the certified facility-specific staffing requirements will not need an exemption from 10 CFR 50.54(m) because the DC rule will address the applicability of the regulation (i.e., paragraph V, "Applicable Regulations," of the DC rule in the applicable 10 CFR Part 52 appendix will include the alternative staffing requirement rule language, including the requirement provisions, staffing table, and appropriate table notes). If a DC applicant chooses this approach, then it should include the requirement provisions, staffing table, and appropriate table notes with the DCA (e.g., in the DCA, Section 7). A recent example of this approach is the NuScale Design Certification Application, Part 7, Section 6, "10 CFR 50.54(m), Control Room Staffing" (ADAMS Accession No. ML20224A521). The staff's evaluation of NuScale's proposed control room staffing is documented in Chapter 18, "Human Factors Engineering," Section 18.5.4.2, "Evaluation of the Applicant's Technical Basis (Criterion 6.4(2))," of the Final Safety Evaluation Report (See ADAMS Accession No. ML20023B605).

Another option is that a DC, SDA, and CP applicant may provide the technical basis for a future exemption from 10 CFR 50.54(m) and/or 10 CFR 50.54(k) in the application. Under this approach, the DC, SDA, or CP applicant would not request an exemption from 10 CFR 50.54(m) and/or 10 CFR 50.54(k) in its application but would include the technical basis a future COL or OL applicant would need to request an exemption. A COL or OL applicant would use the technical basis documented in the DC, SDA, or CP application as the justification for the exemption.

NUREG-1791, "Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)," provides guidance for developing the technical basis to support alternatives to the minimum staffing requirements. Notably, NUREG-1791 does not address reducing licensed operator staffing levels to zero, such as might be the case for a fully autonomous advanced reactor plant design. For fully autonomous plant, extensive preapplication activities are critical for ensuring a thorough understanding of the design. The considerations associated with fully autonomous facilities and those not using any licensed operators are discussed within the "Risk-Informed and Performance-Based Human-System Considerations for Advanced Reactors" white paper (See ADAMS Accession No. ML21069A003) and may be informative for addressing such an operational approach.

Acceptance Criteria⁹

1. The applicant has described the assignment of plant operating responsibilities; the reporting chain up through the chief executive officer of the applicant; the proposed size of the regular plant staff; the functions and responsibilities of each major plant staff group; the proposed shift crew complement for single-module/unit or multiple-module/unit operation; the qualification requirements for key members of its plant staff.
2. The applicant is technically qualified, as specified in 10 CFR 50.34, 10 CFR 50.40, 10 CFR 50.48, and 10 CFR Part 50 or Part 52 (as applicable).
3. The key positions for ensuring the safe operation of the plant are in the operating organization. On-shift personnel are able to provide initial facility response in the event of an emergency.
4. The applicant has adequately described the groups and key positions responsible for implementing the initial test program and providing technical support for the operation of the facility.
5. The applicant has committed that the experience and qualifications of key members of the management and technical support organizations meet or exceed those endorsed by RG 1.8, or justified exceptions.
6. The applicant's organizational requirements conform to the guidance of RG 1.33, "Quality Assurance Program Requirements (Operation)" or the applicant has provided justification for an alternative.
7. An adequate number of licensed operators will be available at all required times to satisfy the minimum staffing requirements of 10 CFR 50.54(j), (m), or the applicant has provided adequate justification for an exemption. Compliance with 10 CFR 50.54(i), (j), (k), (l), and (m) requires the applicant to demonstrate/describe how the operating organization satisfies minimum requirements for operator supervision and the availability of licensed senior operators and licensed operators during specific reactor conditions and modes of operation. Any requests for exemptions from the licensed operator staffing requirements specified in 10 CFR 50.54(m) should be justified using the guidance set forth in NUREG-1791, "Guidance for Assessing Exemption Requests from the Nuclear Power Plant Licensed Operator Staffing Requirements Specified in 10 CFR 50.54(m)."
8. Engineering expertise on shift should be consistent with the Commission's Policy Statement on Engineering Expertise on Shift and the guidelines of Three Mile Island (TMI) Action Plan Item I.A.1.1 of NUREG-0737, or the applicant should provide justification for an alternative.
9. The applicant has described the role and function of the AE and the NSSS vendors during design and construction and has described organizational controls over the project-related activities of the AE and nuclear reactor vendors including preservation of documentation.

⁹ As the 10 CFR Part 53 requirements are finalized this ISG guidance will be supplemented to provide guidance in the organizational and training areas to reflect any differences in requirements between Part 50/52 and Part 53.

10. The applicant has identified and described the reporting responsibilities and authorities in the functional areas of radiation protection/health physics, quality assurance, and training. The reporting responsibilities and authorities ensure independence from normal operating pressures.
11. The applicant has defined the responsibilities of the operating organization related to activities important to the safe operation and maintenance of the facility. Functional areas, (e.g., maintenance, operations, training, etc.), are separately supervised and/or managed.
12. Sufficient managerial depth is available to provide qualified backup for overall station operation in the event of unexpected contingencies of a temporary nature.
13. The number of licensed and non-licensed personnel for onsite shift operating crews should be sufficient to avoid the routine use of overtime.
14. The training program for licensed operators meets the requirements of 10 CFR 55.
15. The training program for non-licensed nuclear plant personnel meets the requirements of 10 CFR 50.120(b)(2) and (b)(3).

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

DRAFT

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."