RULEMAKING ISSUE
(Affirmation)

February 19, 2019 SECY-19-0020

FOR: The Commissioners

FROM: Margaret M. Doane
Executive Director for Operations

SUBJECT: DIRECT FINAL RULE: ADVANCED POWER REACTOR 1400 DESIGN CERTIFICATION (RIN 3150-AJ67; NRC-2015-0224)

PURPOSE:

The purpose of this paper is to obtain Commission approval to publish in the *Federal Register* the enclosed notice of a direct final rule (Enclosure 1) and companion proposed rule (Enclosure 2) that amends Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," to certify the Advanced Power Reactor 1400 (APR1400) standard plant design. This paper addresses no new commitments.

SUMMARY:

On December 23, 2014, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Co., Ltd. (KEPCO/KHNP) submitted an application for certification of the APR1400 standard plant design. The staff completed its review of the APR1400 design control document, Revision 3, and issued a final safety evaluation report in September 2018. The staff also issued a standard design approval for the APR1400 design on September 28, 2018.

The APR1400 design builds upon the Combustion Engineering System 80+ design (now owned by Westinghouse), which was certified in May 1997, is similar to several plants currently operating in the United States, and incorporates advanced design features to enhance safety

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and operational flexibility. During the staff's review of the APR1400 design certification (DC) application, members of the public did not express any safety concerns. For these reasons, the staff considers this rulemaking to be noncontroversial and is recommending to use the direct final rule process for this rulemaking.

BACKGROUND:

On December 23, 2014, KEPCO/KHNP submitted an application for certification of the APR1400 standard plant design. The U.S. Nuclear Regulatory Commission (NRC) published a notice of receipt of the application in the *Federal Register* (80 FR 5792; February 3, 2015). On March 12, 2015, the NRC formally accepted the application as a docketed application for a DC (80 FR 13035) and assigned it Docket No. 52-046. (The pre-application information submitted before the NRC formally accepted the application can be found in the NRC's Agencywide Documents Access and Management System (ADAMS) under Docket No. PROJ0782.) The staff completed its review of the APR1400 design control document, Revision 3 (ADAMS Accession No. ML18228A667), and issued a final safety evaluation report in September 2018 (ADAMS Accession No. ML18087A364). The staff also issued a standard design approval for the APR1400 design on September 28, 2018 (ADAMS Accession No. ML18261A187).

DISCUSSION:

Rulemaking Procedure

The APR1400 design builds upon the Westinghouse (originally Combustion Engineering) System 80+ design, which was certified in May 1997, is similar to several plants currently operating in the United States, and incorporates advanced design features to enhance safety and operational flexibility. In addition, the applicant has successfully constructed and operated the design internationally. During the review process of the APR1400 DC, members of the public did not express any safety concerns. For these reasons, the staff considers this rulemaking to be noncontroversial and does not expect to receive significant adverse comments.

The staff analyzed options for conducting the rulemaking, comparing timelines and resources, while considering opportunities to gain efficiencies. As a result, the staff is recommending to use the direct final rule process for this rulemaking. The direct final rule process is allowed if an agency considers a rulemaking to be noncontroversial and does not anticipate significant adverse comments. If approved, the NRC would publish the direct final rule in the *Federal Register* to be effective 120 days from publication. At the same time as the publication of the direct final rule, the NRC would publish a separate notice of proposed rulemaking with a 30 day comment period. If no significant adverse comments are received, the NRC would publish a notice confirming the effective date of the final rule in the *Federal Register* on the effective date of the rule. In the event the NRC receives any comments that are determined not to be significant and adverse, the NRC will respond to those comments in the notice to confirm the effective date; this notice is signed by the Executive Director for Operations.

If significant adverse comments are received, the NRC would withdraw the final rule and consider any comments received on the proposed rule. If appropriate, the staff would have an opportunity for additional engagement with the public and stakeholders, for example, by providing an additional comment period. After considering the comments and any additional input, the NRC may determine to continue the rulemaking by responding to comments and publishing a final rule in the *Federal Register*.

Compliance with Requirements Governing Incorporation by Reference

The direct final rule must comply with the Office of the Federal Register's (OFR) requirements governing incorporation by reference, which were adopted in a November 7, 2014, rulemaking (79 FR 66267). The OFR regulations require an agency to include in a proposed rule a discussion of the ways that the materials the agency proposes to incorporate by reference are reasonably available to interested parties or how it worked to make those materials reasonably available to interested parties. Consistent with the OFR's regulations, this direct final rule contains a discussion of this subject in section XV, "*Availability of documents*."

Overview of Technical Issues

The staff did not identify any policy or regulatory issues during the review process for the APR1400 DC application. An overview of the significant technical issues that were addressed during the APR1400 DC application review process are provided below.

Tier 2 and Inspections, Tests, Analyses, and Acceptance Criteria*

For the APR1400 DC review, the staff followed the approach described in SECY-17-0075, "Planned Improvements in Design Certification Tiered Information Designations," (ADAMS Accession No. ML16196A321), to evaluate the applicant's designation of information as Tier 1 or Tier 2 information. Unlike prior DC applications, this application did not contain any Tier 2* information. As described in SECY-17-0075, in each of the prior DC rules in 10 CFR Part 52, Appendices A through D, information contained in the design control document was divided into three designations: Tier 1, Tier 2, and Tier 2*. Tier 1 information is the portion of design-related information in the generic design control document that the Commission approves in the Part 52 DC rule appendices. To change Tier 1 information, NRC approval by rulemaking or approval of an exemption from the certified design rule is required. Tier 2 information is also approved by the Commission in the Part 52 DC rule appendices, but it is not certified and licensees who reference the design can change this information using the process outlined in Section VIII of the appendices. This change process is similar to that in 10 CFR 50.59 and is generally referred to as the "50.59-like" process. If the criteria in Section VIII are met, a licensee can change Tier 2 information without prior NRC approval. The NRC created a third category, Tier 2*, to address industry requests to minimize the scope of Tier 1 information and provide greater flexibility for making changes. Tier 2* information is included in Tier 2 and has the same safety significance as Tier 1 information, but the NRC decided to provide more flexibility for licensees to change this type of information. In prior DC rules, Tier 2* is significant information included only in Tier 2 that cannot be changed without prior NRC approval of a license amendment requesting the change.

The applicant included Tier 1 and Tier 2 information in the APR1400 DC application and did not designate or categorize any information as Tier 2* information. Generally, where an applicant includes only Tier 1 and Tier 2 information in an application, the staff will evaluate the Tier 2 information to determine whether any of that information requires NRC approval before it is changed. If the staff identifies any such information in Tier 2, then the staff will request that the applicant revise the application to categorize that information as Tier 1 or Tier 2*, depending on whether the change must be made by approval of a license amendment and an exemption requesting the change (Tier 1), or a license amendment alone (Tier 2*). Because the applicant did not designate any information as Tier 2* information, the staff also considered whether the applicant had included information in Tier 2 that prior DC applicants had identified as Tier 2* but that the NRC staff determined should be categorized as Tier 1. Using requests for

additional information, the staff questioned KEPCO/KHNP's categorization of certain information as Tier 2 that past DC applicants had identified as Tier 2* and, in some instances, the staff requested that the applicant revise the application to add that information to Tier 1. This approach required staff and KEPCO/KHNP to identify for each request for additional information the verifiable, important to safety parameters which must be included in Tier 1 to be certified in the rule and verified by inspections, tests, analyses, and acceptance criteria (ITAAC). After several public meetings, some information was added to or updated in Tier 1 (including modifications to some ITAAC) and the requests for additional information were resolved and closed without the designation of any Tier 2* information.

Of these updates in Tier 1, the most significant concerned the design parameters for the critical structural sections[1] for seismic Category I structures. Past DC applications identified dimensions of length to define critical structural sections as Tier 2* information. During recent construction activities for another design, actual dimensional lengths were found to be outside of their design tolerances. This variance did not necessarily reduce safety but did require additional license amendments to resolve the issue associated with the design tolerances, resulting in increased costs and possible construction schedule impacts. For the APR1400 design, the resolution was to revise Tier 1 and the ITAAC for these critical structural sections to use the design load and design load capacity in lieu of dimensions of length, as specific dimensions are not necessarily as important to safety. By focusing on important to safety parameters and including them in ITAAC, rather than in Tier 2* information (thus eliminating the need for Tier 2* information), the staff expects that the need for license amendments to address changes during construction will be greatly reduced while still maintaining reasonable assurance of safety.

The applicant has elected not to use standard ITAAC for the APR1400 design. The regulations in 10 CFR 52.47(b)(1) require a DC applicant to include ITAAC sufficient to provide reasonable assurance that, if the inspections, tests, and analyses are performed and the acceptance criteria are met, a facility that incorporates the DC has been constructed and will be operated in conformity with the DC and the applicable rules and regulations. Recent construction experience for other designs has highlighted the difficulty of creating ITAAC that are understood and can be met at the time of construction and inspection. In an effort to improve ITAAC, the nuclear industry has worked with the NRC to create standard ITAAC to be adopted by and used for each new DC applicant. The staff provided the standard ITAAC to KEPCO/KHNP for the APR1400 on August 3, 2016 (ADAMS Accession No. ML16208A548). After several months of evaluation, KEPCO/KHNP responded on January 26, 2017 (ADAMS Accession No. ML17026A455), that it was in its best interest not to use the standard ITAAC. After receiving KEPCO/KHNP's decision, the NRC continued to work with them to improve the existing ITAAC and implement the lessons learned from construction experience.

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[1] When evaluating the acceptability of the information for seismic Category I structures, the staff's review focuses on a subset of structural information that includes seismic analysis methods, key parameters of seismic Category I structures, and the design of "critical sections." The use of critical sections in the design of safety-related structures is a risk-informed graded approach to achieve the reasonable assurance of safety. In lieu of the safety review of a large number of structural component designs, the staff performs a detailed review of a limited number of critical sections described in the design control document Section 3.8 that contribute to the overall risk significance of the structures. This approach provides the staff with reasonable assurance of the overall safety performance of the structures based on the successful performance of these limited, but critical, risk-significant locations. However, even minor changes to these critical sections could, when applied to the entire safety-related structure, result in significant changes to the overall performance of the structure and, therefore, invalidate the basis for the staff's approval.

Design Acceptance Criteria

In the APR1400 design, design acceptance criteria (DAC) are used for the human factors engineering (HFE) design only. On June 30, 1994, the Commission issued SRM-COMSECY-94-024 (ADAMS Accession No. ML003708098), in which it approved the staff's recommendation to use DAC in the DC process. Subsequently, DAC have been applied in the areas of instrumentation and controls, control room design/human factors engineering, radiation protection, and piping design for other DCs. The NRC established the policy of accepting DAC in lieu of detailed design information because detailed design information may not be available for rapidly changing technologies, and because the agency prefers to avoid the use of obsolete technology for instrumentation and controls and human factors engineering. The NRC also accepted DAC if completing the final design is not practical given the unavailability of sufficient as-built or as-procured information (e.g., for piping and shielding). However, given the maturity of the APR1400 design, the use of DAC was not necessary for instrumentation and controls, piping design, or shielding design. Instead, DAC are used for the HFE design only. As part of the ITAAC review discussed above, the human factors engineering ITAAC were written to ensure that a licensee referencing the APR1400 rule will meet the DAC during construction before loading fuel.

Operational Experience

The NRC's continued monitoring and dissemination of operational experience became important during the APR1400 DC application review. The agency had issued Information Notice (IN) 2009-23, Supplement 1, "Nuclear Fuel Thermal Conductivity Degradation," dated October 26, 2012 (ADAMS Accession No. ML121730336), to alert the industry that operating experience indicated that existing computer codes to perform fuel performance calculations and safety analyses may be less conservative than previously understood. NRC regulations require DC applicants to consider and address operating experience in their applications, pursuant to 10 CFR 52.47(a)(22). During the review of the APR1400 DC, the NRC determined that the APR1400 DC did not adequately address the concern identified by IN 2009-23, Supp. 1. After multiple discussions, KEPCO/KHNP and the NRC agreed to more restrictive fuel temperature limits to ensure necessary conservatism in the performance calculations and safety analyses. This solution was consistent with those applied to the APR1400 reactor plants under construction in the Republic of Korea and the United Arab Emirates.

APR1400 Standard Design Approval

On March 8, 2018, as part of the submission of the APR1400 design control document, Revision 2 (ADAMS Accession No. ML18079A146), KEPCO/KHNP requested that the NRC provide a final design approval for the APR1400 design. On August 13, 2018, as part of the submission of the APR1400 design control document, Revision 3 (ADAMS Accession No. ML18228A680), KEPCO/KHNP corrected its request for a final design approval to a request for a standard design approval in accordance with 10 CFR Part 52, Subpart E, "Standard Design Approvals." The NRC issued a standard design approval for the design given in the APR1400 design control document, Revision 3, on September 28, 2018 (ADAMS Accession No. ML18261A187), following the agency's issuance of the APR1400 final safety evaluation report (ADAMS Accession No. ML18087A364).

The regulations in 10 CFR 52.145, "Finality of Standard Design Approvals; Information Requests," discuss the finality of the standard design approval. The standard design approval is valid for 15 years from the date of issuance, as described in 10 CFR 52.147, "Duration of

Design Approval." The standard design approval will be updated, as needed, to conform to any changes resulting from this rulemaking.

Access to Safeguards Information and Sensitive Unclassified Nonsafeguards Information

Paragraph E of Section VI, "Issue Resolution," of this direct final rule (see Enclosure 1) describes the procedure that an interested member of the public must follow to obtain access to safeguards information and sensitive unclassified non-safeguards information for the APR1400 design to request and participate in hearings that involve licenses and applications that reference the APR1400 design.

Backfitting and Issue Finality Considerations

The APR1400 DC direct final rule does not constitute a backfit as defined in the backfit rule (10 CFR 50.109), and is consistent with applicable issue finality provisions in 10 CFR Part 52. This initial DC rule does not constitute backfitting as defined in the backfit rule because there are no operating licenses under 10 CFR Part 50 referencing this DC rule. The APR1400 DC rule is consistent with applicable issue finality provisions in 10 CFR Part 52 because it does not impose new or changed requirements on existing DC rules in Appendices A through E to 10 CFR Part 52, and no combined licenses or manufacturing licenses issued by the NRC at this time reference a final APR1400 DC rule. For these reasons, neither a backfit analysis nor a discussion addressing the issue finality provisions in 10 CFR Part 52 was prepared for this rule.

RESOURCES:

This rulemaking is designated as a high-priority rulemaking in accordance with the common prioritization of rulemaking. The New Reactors business line includes resources for this rulemaking for fiscal year (FY) 2019. The staff expects to complete this rulemaking in FY 2019 and has not requested resources beyond FY 2019 for this rulemaking. The NRC staff will address resources beyond FY 2019, if needed, through the planning, budget, and performance management process and will prioritize these activities in a manner consistent with the current common prioritization of rulemaking process and other priorities in the New Reactors business line.

RECOMMENDATIONS:

The NRC staff recommends that the Commission approve the enclosed direct final rule (Enclosure 1) and companion proposed rule (Enclosure 2) for publication in the *Federal Register*.

1. Upon Commission approval, the NRC will publish the direct final rule and companion proposed rule in the *Federal Register* for a 30-day public comment period.

2. This direct final rule contains new information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). The NRC staff will submit information collection requirements to the Office of Management and Budget (OMB) for its review and approval on or immediately after the date of publication of the direct final rule in the *Federal Register*.

3. The staff prepared an environmental assessment that evaluated severe accident mitigation design alternatives for the proposed rule, which resulted in a finding of no significant impact (Enclosure 3).

4. The Office of Congressional Affairs will inform the appropriate congressional committees.

5. The Office of Public Affairs will issue a press release when the direct final rule is published in the *Federal Register*.

6. The staff will follow a communications plan containing frequently asked questions on the DC rule process and the use of a DC rule in referenced combined license applications, as well as questions specifically prepared for the APR1400 standard plant design.

7. The staff submitted a letter to the Director of the Office of Federal Register (OFR) requesting approval of the APR1400 design control document for incorporation by reference and has received approval from the OFR.

8. The staff has determined that this is not a major rule under the Congressional Review Act of 1996 and has received verification from OMB.

COORDINATION:

The Office of the General Counsel has no legal objection to the publication of the direct final rule and companion proposed rule related to the APR 1400 design. The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objections. The NRC staff will provide an information copy of the FRNs to the Advisory Committee on Reactor Safeguards after publication.

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Enclosures:
1. Direct Final Rule
2. Companion Proposed Rule
3. Environmental Assessment

SUBJECT: DIRECT FINAL RULE: ADVANCED POWER REACTOR 1400 DESIGN CERTIFICATION DATED, FEBRUARY 19, 2019.

ADAMS Accession No.: ML18302A055 (pkg) ***via e-mail** **SECY-012**

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