RULEMAKING ISSUE
(Affirmation)

May 8, 2020 SECY-20-0043

FOR: The Commissioners

FROM: Margaret M. Doane
Executive Director for Operations

SUBJECT: DIRECT FINAL RULE: REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM (RIN 3150-AK07; NRC-2017-0151)

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 Appendix H, "Reactor Vessel Material Surveillance Program Requirements," to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Domestic Licensing of Production and Utilization Facilities." This paper does not address any new commitments or resource implications.

SUMMARY:

The direct final rule reduces regulatory burden by amending the reactor vessel material surveillance program requirements for commercial light-water power reactors in Appendix H to 10 CFR Part 50. Specifically, the direct final rule makes optional the testing of specimens that do not provide meaningful information to assess the integrity of the reactor vessel. It also extends the timeframe for licensees to submit the summary technical report of each capsule withdrawal and the test results to the U.S. Nuclear Regulatory Commission (NRC) from 1 year to 18 months. Lastly, it clarifies the requirements for the design of surveillance programs and the withdrawal schedules for reactor vessels purchased after 1982.

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The NRC staff chose the direct final rule process because it minimizes the use of agency resources and allows the revised requirements to become effective earlier, giving licensees the greatest benefit. The staff does not expect to receive significant adverse public comments that will result in withdrawing the direct final rule. The direct final rule can be implemented with no decrease in public health and safety.

BACKGROUND:

On January 9, 2019, the Commission issued Staff Requirements Memorandum (SRM)-COMSECY-18-0016, "Request Commission Approval To Use the Direct Final Rule Process To Revise the Testing and Reporting Requirements in 10 CFR Part 50, Appendix H, Reactor Vessel Material Surveillance Program Requirements (RIN 3150AK07)" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19009A517), and approved the staff's request to use the direct final rule process and publish the regulatory basis for this rulemaking. In the regulatory basis issued on April 3, 2019 (84 FR 12876 as corrected at 84 FR 14845; ADAMS Accession No. ML19038A477), the staff assessed the costs and benefits of the rulemaking options and concluded that this rulemaking should be conducted using the direct final rule process.

DISCUSSION:

As compared to the standard notice-and-comment process, when no significant adverse comment is expected, the direct final rule process results in a rulemaking that has a greater net benefit to the NRC and licensees, because the direct final rule process takes less time to complete and uses fewer NRC resources.

Revised Requirements

The direct final rule revises paragraph III.B.1 of Appendix H to 10 CFR Part 50 to clarify the design of surveillance programs and the withdrawal schedules for reactor vessels purchased after 1982 and includes information on the use of alternative provisions that reduce the number of surveillance capsule specimens included or tested. Also, it adds a new paragraph III.B.4 to provide the requirements for these alternative provisions. Lastly, this direct final rule extends the timeframe for licensees to submit a summary technical report of each capsule withdrawal and test results to the NRC from 1 year to 18 months. These revisions do not impose any changes to the licensing basis for the current fleet of operating reactors.

The direct final rule does not revise Appendix H to 10 CFR Part 50 to address extended plant operation as explained in the supporting regulatory basis. Revisions are also not necessary to address new light-water nuclear power reactor designs, because they are substantially similar to operating reactors with regard to the relevant considerations for establishing adequate reactor vessel material surveillance programs.

The final rule affects the following six areas:

(1) Heat-affected zone specimens—The direct final rule adds new paragraph III.B.4 to Appendix H to 10 CFR Part 50 to make optional the inclusion and testing of heat-affected zone specimens in current reactor vessel material surveillance programs. It also makes optional the inclusion of heat-affected zone specimens in the design of new reactor vessel material surveillance programs.

Currently, heat-affected zone specimens are required to be part of reactor vessel material surveillance programs. However, testing and studies have revealed a significant amount of scatter of the heat-affected zone Charpy test data. Charpy impact energy tests are used in assessing the fracture toughness of a material. In addition, testing has shown that the heat-affected zone material exhibits superior fracture toughness compared to the plate or forging materials. For these reasons, the continued testing and inclusion of heat-affected zone specimens are not beneficial to the assessment of reactor vessel integrity, the focus of Appendix H. Therefore, by making the current requirement optional, regulatory burden is reduced with no effect on public health and safety.

(2) Tension specimens—The direct final rule adds new paragraph III.B.4 to Appendix H to 10 CFR Part 50 to reduce the number of required tensile tests and tension specimens in surveillance capsules. The direct final rule requires current reactor vessel material surveillance programs to test one tension specimen at room temperature and one tension specimen at service temperature for all materials and irradiation levels. The disposition of the remaining tension specimens in existing surveillance capsules, if any, will be at the discretion of the licensee. Furthermore, the number of tension specimens required for reconstituted and new surveillance capsules will align with the two test temperatures described above for current and new reactor vessel material surveillance programs for all materials and irradiation levels.

Currently, tension specimens are required to be part of reactor vessel material surveillance programs. Performing tensile tests both before and after irradiation permits quantification of the hardening effect of irradiation using the increase in yield strength. However, NRC regulations do not contain requirements related to strength properties nor specify an approach to directly assess reactor vessel integrity from strength properties.

Past experience and test results have demonstrated that the differences in the required test temperatures can be small, which could yield small differences in tensile properties. Therefore, testing three tension specimens per material at the required temperatures could produce redundant tensile information.

Only testing at room temperature and service temperature for all materials at all irradiation levels allows for the comparison of the change in strength properties from both irradiation and temperature. Testing at these temperatures, will continue to allow the use of tensile data to serve as a consistency check relative to Charpy data. This is particularly true for cases in which the Charpy data show unexpected or inconsistent trends with prior data. For these reasons, revising the requirements for tension specimens will not impact the assessment of reactor vessel integrity, and regulatory burden will be reduced with no effect on public health and safety.

(3) Correlation monitor material—The direct final rule adds new paragraph III.B.4 to Appendix H to 10 CFR Part 50 to make optional the testing of correlation monitor material even if it is in included in the surveillance capsule. This regulatory action does not affect the design of reactor vessel material surveillance programs or the optional inclusion of correlation monitor material in surveillance capsules.

The editions of American Society for Testing and Materials International (ASTM) E 185, currently incorporated by reference in Appendix H to 10 CFR Part 50, specify that it is optional to include correlation monitor material in surveillance capsules. These editions of ASTM E 185 do not explicitly indicate whether or not correlation monitor material shall be tested if it is optionally included in a surveillance capsule. However, ASTM E 185 contains reporting requirements for supplemental or additional specimens (that include correlation monitor material) if testing is performed. Therefore, it is ambiguous whether correlation monitor material testing is required even though it is optional to include in surveillance capsules. For this reason, it is necessary to clarify that testing of correlation monitor material is optional even if it is included in surveillance capsules. Providing this clarification has the potential to reduce regulatory burden with no effect on public health and safety.

(4) Thermal monitors—The direct final rule adds new paragraph III.B.4 to Appendix H to 10 CFR Part 50 to make optional the inclusion and examination of thermal monitors in current reactor vessel material surveillance programs. It also makes optional the inclusion of thermal monitors in the design of new reactor vessel material surveillance programs.

Currently, thermal monitors are required to be part of reactor vessel material surveillance programs. Typically, the temperature monitors used in surveillance capsules are high-purity, low-melting-point elements, or eutectic alloys targeted to melt at specific temperatures. The monitors provide an indication of whether the melt temperature was observed, but they do not provide a time-based exposure history of the surveillance capsule, which is important to properly interpret the surveillance data.

For these reasons, the continued examination and inclusion of thermal monitors is not beneficial to the assessment of reactor vessel integrity. Based on the plant parameters already being monitored, licensees have been able to determine the irradiation temperature history of surveillance capsules to properly interpret surveillance data. By making the current requirement optional, regulatory burden is reduced with no effect on public health and safety.

(5) Reporting requirement—The direct final rule revises paragraph IV.A of Appendix H to 10 CFR Part 50 to allow licensees 18 months following the date of capsule withdrawal to submit a summary technical report of the capsule withdrawal and the test results to the NRC. Currently, licensees are required to submit this report to the NRC within 1 year of the withdrawal of a surveillance capsule. As detailed in the supporting regulatory basis, this 1-year requirement has presented a challenge for some licensees, and they have generally requested a 6-month extension. To date, the Director of the Office of Nuclear Reactor Regulation, has approved these requests.

This 1-year requirement in Appendix H to 10 CFR Part 50 became effective on July 26, 1983 (48 FR 24008). The primary purpose was to ensure timely reporting of

test results and notification of any problems determined from surveillance tests. At that time, timely reporting was crucial because there was a limited amount of available data from irradiated materials from which to estimate embrittlement trends. The number of commercial light-water reactors operating in the United States and the associated number of years of operation since this requirement was first adopted have increased significantly. This has led to an extensive amount of data and knowledge of the mechanisms associated with embrittlement of the reactor vessel; thus, there is a reduced need for prompt reporting of the test results. For these reasons, revising the reporting timeframe reduces regulatory burden, with the objective of eliminating the need for extension requests, with no effect on public health and safety.

(6) Required edition of ASTM E 185 for reactor vessels purchased after 1982—The direct final rule revises paragraph III.B.1 of Appendix H to 10 CFR Part 50 (as directed in SRM-COMSECY-18-0016) to clarify the edition of ASTM E 185 required for the design of surveillance programs and the withdrawal schedules for reactor vessels purchased after 1982. Currently, ASTM E 185-82 is the latest edition of ASTM E 185 that is incorporated by reference in Appendix H to 10 CFR Part 50 for the design of surveillance programs and the withdrawal schedule. However, there is a potential to misinterpret Appendix H to 10 CFR Part 50 as requiring the use of an edition of ASTM E 185 that is not incorporated by reference (i.e., an edition later than ASTM E 185-82). The potential misinterpretation of the current requirements is only applicable to those reactor vessels purchased to an edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code after 1982. For this reason, it is necessary to clarify that for reactor vessels purchased after 1982, the design of the surveillance program and the withdrawal schedule must meet the requirements of ASTM E 185-82, which is the latest edition of ASTM E 185 that is incorporated by reference in Appendix H to 10 CFR Part 50.

Regulatory Analysis

The NRC has prepared a regulatory analysis to examine the costs and benefits of the alternatives considered (Enclosure 3). Based on the analysis, the staff concluded that this action is cost beneficial and will reduce the regulatory burden on reactor licensees and the NRC for an issue that is not significant to safety. Specifically, the direct final rule reduces the costs for licensees associated with the testing of specimens contained within surveillance capsules and reporting the surveillance test results. Licensees will realize a savings because the direct final rule reduces the testing of some specimens and makes optional the testing of other specimens. Also, by extending the reporting period from 1 year to 18 months, the need for licensees to submit extension requests to the reporting requirements will be substantially reduced, and the NRC will realize averted costs from reviewing and approving these requests. The direct final rule is projected to result in a cost-justified change based on net averted costs to the industry and the NRC. Relative to the no-action baseline, the NRC estimates that the direct final rule will result in estimated averted costs to the industry of $1,051,000 ($816,000 using a 3-percent discount rate and $609,000 using a 7-percent discount rate) over a 20-year period. The direct final rule also will result in estimated averted costs to the NRC of $159,000 ($124,000 using a 3-percent discount rate and $92,000 using a 7-percent discount rate) over a 21-year period. As discussed in Enclosure 1, the direct final rule does not constitute backfitting or violate issue finality.

Information Collection

The revisions to Appendix H to 10 CFR Part 50 will result in changes to the information collection requirements for reporting. The Office of Management and Budget (OMB) specified that two public comment periods were needed for the information collection associated with this direct final rule. The first opportunity for public comment which lasted 60 days was noticed in the *Federal Register* on January 13, 2020 (85 FR 1825). A subsequent notice was published on January 21, 2020, (85 FR 3432), to correct the Docket ID listed in the body of the notice. No public comments were received during this period. The second opportunity for public comment on this information collection, lasting 30 days, will be conducted simultaneously with the public comment period for the direct final rule.

RESOURCES:

This rulemaking is designated as a medium priority in accordance with the common prioritization of rulemaking methodology. The Operating Reactors business line includes resources for this rulemaking for fiscal year (FY) 2020. The staff expects to complete this rulemaking in FY 2020 and has not requested resources for it beyond FY 2020. The staff will address resources beyond FY 2020, if needed, through the planning 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 Operating Reactors business line.

RECOMMENDATIONS:

The staff recommends that the Commission take the following actions:

(1) Approve the enclosed direct final rule (Enclosure 1) and companion proposed rule (Enclosure 2) for publication in the *Federal Register*.

(2) Certify that this rule, if adopted, will not have a significant impact on a substantial number of small entities, to satisfy the requirement of the Regulatory Flexibility Act (5 U.S.C. 605(b)). The *Federal Register* notice for the direct final rule (Enclosure 1) includes this certification.

(3) Note:

a. 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.

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

c. The staff has prepared a regulatory analysis for the direct final rule (Enclosure 3).

d. The Office of Congressional Affairs will inform the appropriate congressional

committees of this action.

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

f. The staff has determined that this is not a major rule under the Congressional Review Act of 1996 and has received verification from the 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 reactor vessel material surveillance program.

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Enclosures:
1. Direct Final Rule
2. Companion Proposed Rule
3. Regulatory Analysis

SUBJECT: DIRECT FINAL RULE: REACTOR VESSEL MATERIAL SURVEILLANCE PROGRAM DATED: MAY 8, 2020

ADAMS Accession Numbers: PKG: ML19184A610; SECY: ML19184A617; Direct Final Rule: ML19184A619; Companion Proposed Rule: ML19184A621; Regulatory Analysis: ML19184A625.
WITS: SRM-CMSY18-0016-1 *via e-mail

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