POLICY ISSUE
(Information)

June 2, 2020 SECY-20-0050

FOR: The Commissioners

FROM: Margaret M. Doane
Executive Director for Operations

SUBJECT: PLANNED REVISIONS TO THE BASELINE INSPECTION PROGRAM FOR THE AP1000 REACTOR DESIGN

PURPOSE:

The purpose of this paper is to inform the Commission of the staff's planned revisions to the baseline inspection procedures (BIPs) to ensure adequate oversight during operation of the newly constructed Advanced Passive 1000 (AP1000) reactor units at the Vogtle Electric Generating Plant (VEGP). This paper does not include any new staff commitments.

SUMMARY:

During its review, the staff identified the following attributes associated with the Reactor Oversight Process (ROP) and the AP1000 design, resulting in revisions to BIPs that are tailored to the AP1000 design:

- The AP1000 is a unique design with an expected lower risk profile than the current operating fleet of reactors due to its passive design and inherent safety features.
- The ROP is a robust risk-informed process that is adaptable to the challenges associated with adoption of new technology.
- The staff plans to leverage the flexibility inherent in the ROP to establish a risk-informed baseline inspection footprint tailored to the AP1000 units at the VEGP.

CONTACT: Stephen J. Campbell, NRR/DRO
(301) 415-3353

The staff will continue to evaluate licensee organizational implementation to further optimize the ROP.

BACKGROUND:

The VEGP is a two -unit nuclear power plant in Burke County, GA. The U.S. Nuclear Regulatory Commission (NRC) granted Southern Nuclear Company (SNC) a license to operate Units 1 and 2, which are Westinghouse four-loop pressurized-water reactors (PWRs) completed in 1987 and 1989, respectively. Units 3 and 4 are two additional units of the AP1000 reactor design that are under construction within the VEGP site. They will be the first new reactors employing such expansive passive safety features constructed and operated in the United States. SNC plans to load fuel into Unit 3 in November 2020 and Unit 4 will follow approximately 12 months after Unit 3.

In accordance with the "Implementation Plan to Ensure NRC Staff Readiness for AP1000 Operations," dated November 16, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17215A436), the staff evaluated whether existing ROP inspection procedures (IPs) and other guidance documents are practical and adequate for new reactors. The staff concluded that revising sample sizes and adding relevant guidance to existing BIPs to account for the substantive differences in the AP1000 design will ensure appropriate oversight of licensee safety performance and represent only limited changes to the baseline inspection program.

DISCUSSION:

In SECY-18-0091, "Recommendations for Modifying the Reactor Oversight Process for New Large Light Water Reactors with Passive Safety Systems such as the AP1000 (Generation III+ Reactor Designs)," dated September 12, 2018 (ADAMS Accession No. ML17166A238), the staff described the proposed revision to the existing BIPs for AP1000 inspections. The description included a discussion of modifications to inspection sample sizes as well as inspection of regulatory treatment of non-safety systems (RTNSS) structures, systems and components (SSCs) within the ROP. The staff has revised the analysis contained in SECY-18-0091 to include detailed reviews of the plant design and configuration, informed by feedback from construction inspection and oversight related to sample size and selection, to better fit the level of oversight needed for AP1000 units. The staff performed this revised analysis to account for its determination that RTNSS SSCs required no special treatment within the ROP. Additionally, the analysis was revised to better tailor inspections using construction insights related to availability of equipment during operation, current understanding of the design, and to more fully apply efficiencies due to co-location of the AP1000 units at a currently operating facility.

Enclosures 1 and 2 to this paper describe the revised BIP sample sizes and basis for all ROP inspection programs. Enclosure 3 discusses the staff's determination for the appropriate treatment of RTNSS SSCs within the ROP.

The AP1000 Is a Unique Design with an Expected Lower Risk Profile

The AP1000 design enhances the overall level of safety by leveraging passive components and natural forces. In the event of a design-basis accident, such as a reactor coolant system pipe break, the passive design of the AP1000 requires no alternating current power or operator interaction for the first 72 hours because it relies on natural forces such as gravity, convection,

and condensation cooling to achieve and maintain a safe-shutdown condition. The passive features result in a simpler and safer design with, on average, 60 percent fewer components and baseline risk estimates that are at least an order of magnitude lower than conventional PWRs. The staff notes that this comparison is based on an AP1000 design risk assessment compared with as-built and as-operated PWR facilities. Combined license holders are required to complete a plant-specific probabilistic risk assessment before initial fuel load. The staff's key assumption for this ROP adjustment was that the plant-specific risk results for VEGP Units 3 and 4 will be similar to the AP1000 design risk results from the certified design as updated in the combined license.

The ROP Is Robust and Adaptable

The ROP framework includes processes and programs for monitoring and modifying the baseline inspection program through reviews and self-assessments. The staff determined that through these reviews and self-assessments, BIPs can be modified to account for the unique aspects of the AP1000 design and future changes in its organizational structure. The staff anticipates that lessons learned from inspections may result in enhanced guidance regarding inspection samples and techniques to account for the unique aspects of the AP1000 design.

During initial ROP development, the staff developed risk information matrices (RIMs) to identify the inspectable areas, frequencies, sample sizes, and expected resource efforts for the baseline inspection program. Using the RIMs for the currently operating reactor designs and the AP1000 safety performance verification matrix, the staff developed a draft RIM to determine the risk importance of the AP1000 SSCs, including both safety systems and the RTNSS SSCs (ADAMS Accession Nos. ML16244A160 and ML16244A148) for the AP1000. The staff developed the AP1000 safety performance verification matrix to present the key attributes of the AP1000 SSCs and how they will be evaluated and assessed in the ROP.

Risk-Informed Baseline Inspection Footprint for the AP1000

The staff reviewed each of the BIPs through a three-step process to evaluate and adjust BIP sample sizes commensurate with the design and co-location with VEGP Units 1 and 2:

(1) The staff reviewed the current nominal sample sizes and existing guidance for sample size adjustment for all BIPs.

(2) The staff considered the unique aspects of the passive technology and the number of components as well as SSC accessibility during power and shutdown operations.

(3) The staff tailored inspection resources for a four-unit site because the licensee is expected to implement some common programs across the site.

Based on the analysis, the staff determined appropriate sample sizes for all BIPs to ensure adequate oversight of the AP1000 reactors. The staff grouped the BIPs into two categories—reactor technology-specific BIPs and common sitewide program BIPs—based on the expected implementation of each BIP.

For reactor technology-specific BIPs, the staff used a technology-specific component analysis and the reduced risk based on the design of the two AP1000 units to determine appropriate sample sizes, focusing on safety-related SSCs of high and intermediate importance in

accordance with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program—Operations Phase," dated July 13, 2019, and IMC 2519, "Construction Significance Determination Process," dated December 6, 2017.

For common sitewide program BIPs, the staff identified that many BIPs are not dependent on system design or numbers of components. If the applicable organizational structure is common to the four units (e.g., site security is the same for all units), the staff intends to treat the facility as a single four-unit site. For these BIPs, the staff determined that the current sample range was sufficient with the expectation that inspections will be performed at the maximum sample range and resource estimate at the VEGP. The inspection staff will choose the sample distribution for each inspection. Additionally, the inspection samples for each inspection will be chosen across all four units to ensure appropriate inspection oversight of both reactor types. The staff evaluated and adjusted, in two instances, the maximum sample sizes to provide an adequate number of samples across the two different designs.

Enclosure 1 lists the current inspection sample sizes (minimum, nominal, and maximum) for Units 1 and 2 as well as the proposed sample sizes for Units 3 and 4, and revised sample sizes for those BIPs for which the VEGP will be treated as a four-unit site. Enclosure 2 lists each BIP to be implemented for the AP1000 units, the planned sample sizes, and the basis for each inspection sample size adjustment where applicable.

Continuing Evaluation of Licensee Organizational Structure

The assessment of common sitewide BIPs discussed forms the basis of the staff's planned VEGP baseline inspection program following the transition period from construction to normal steady-state operations for Units 3 and 4. Full integration of inspection programs into common site inspections will take place as VEGP integrates organizations following the first Unit 4 refueling outage. The VEGP final organizational structure will directly impact the application of the proposed changes. Therefore, the staff will continue to evaluate the appropriate application of sitewide inspection of common programs to optimize the ROP.

CONCLUSION:

The staff completed a systematic analysis to identify appropriate modifications to the baseline inspection program for the VEGP site to account for anticipated operation of the new AP1000 reactors. This process considered the AP1000 baseline risk, passive design, and co-location with the currently operating reactors. The staff identified BIPs for individual and sitewide implementation and determined appropriate sample sizes for each IP sufficient to obtain objective evidence that the facilities are operated in a manner to provide reasonable assurance of adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. The staff plans to implement the revised inspection samples, estimated resource efforts, and necessary inspection guidance before the November 2020 fuel load date for VEGP Unit 3.

In accordance with direction provided in SRM-SECY-18-0091, dated February 24, 2020, the staff will include a section in the annual ROP self-assessment report for any insights, trends, and lessons-learned identified during the application of this revised ROP to the VEGP units. The outcome of this review may result in adjustments to the ROP to account for unique aspects of inspecting the AP1000 design.

RESOURCES:

For a standalone dual-unit AP1000, the staff-estimated resource need is approximately 1,618 hours. This represents about a 28 percent difference in inspection resources compared to currently operating dual-unit facilities that have a resource estimate of 2,245 hours.

For combined VEGP Units 1 through 4, the staff estimated resource need is approximately 1,832 hours for Units 1 and 2 and approximately 1,229 hours for Units 3 and 4. The revised resource estimate for VEGP Units 3 and 4 represents a 45 percent difference in inspection resources compared to those needed for currently operating dual-unit facilities.

This represents a revised estimate of the baseline inspection program for the AP1000 as compared to the estimate presented in SECY-18-0091.

COORDINATION:

The Office of the General Counsel reviewed this package and has no legal objection.

Margaret M. Doane

Digitally signed by Margaret M. Doane
Date: 2020.06.02 09:42:36 -04'00'

Margaret M. Doane
Executive Director
for Operations

Enclosures:
1. Proposed ROP Baseline Samples for the Vogtle Site
2. Proposed ROP Baseline Samples and Change Bases for Units 3 and 4
3. Inspection of Regulatory Treatment of Non-safety System Components

SUBJECT: PLANNED REVISIONS TO THE BASELINE INSPECTION PROGRAM FOR THE AP1000 REACTOR DESIGN DATED JUNE 2, 2020

ADAMS Accession No.: Package: ML20058F491; SECY: ML20042E443; Enclosure 1: ML20136A068; Enclosure 2: ML20136A069; Enclosure 3: ML20136A070

***Via e-mail SECY-012**

OFFICE	NRR/IRIB	NRR/IRIB	QTE*	NRR/DRO*	NRR/VPO*
NAME	SCampbell	THipschman	JDougherty	CMiller	MKing
DATE	2/11//20	2/11//20	4/7//20	3/25/20	3/25/20
OFFICE	R-II/DCO*	NSIR/DSO*	NRR/DRA*	R-II/DRS*	NSIR/DPR*
NAME	MBailey	SAtack	MFranovich	MFranke	KBrock
DATE	3/25/20	3/30/20	4/21/20	4/21/20	4/2/20
OFFICE	NSIR/OD*	R-II/RA*	OGC*	NRR/OD*	OEDO*
NAME	BHolian (SHelton for)	LDudes (JMunday for)	JMartin	HNieh	MDoane
DATE	4/2/20	4/1/20	5/11/20	5/13/20	6/2/20

OFFICIAL RECORD COPY