



*Protecting People and the  
Environment*

---

SEMIANNUAL STATUS REPORT ON THE  
LICENSING ACTIVITIES AND REGULATORY DUTIES OF THE  
U.S. NUCLEAR REGULATORY COMMISSION

**April–September 2019**

Note: The period of performance covered by this report includes activities that occurred from the first day of April to the last day of September 2019. The transmittal letter to Congress accompanying this report provides additional information to keep Congress fully informed on the current licensing and regulatory activities of the U.S. Nuclear Regulatory Commission.

Enclosure

## CONTENTS

I.	Reactor Oversight Process .....	2
II.	Implementing Risk-Informed and Performance-Based Regulations .....	2
III.	Status of Issues Tracked in the Reactor Generic Issues Program.....	3
IV.	Licensing Actions and Other Licensing Tasks .....	5
V.	Status of License Renewal Activities .....	6
VI.	Summary of Reactor Enforcement Actions .....	8
VII.	Security and Emergency Preparedness and Incident Response Activities.....	13
VIII.	Power Upgrades .....	16
IX.	New Reactor Licensing .....	16
X.	Response to Lessons Learned from the Fukushima Accident in Japan throughout FY 2019 .....	28
XI.	Planned Rulemaking Activities .....	29

## **I. Reactor Oversight Process**

The U.S. Nuclear Regulatory Commission (NRC) uses the Reactor Oversight Process (ROP) to assess the performance of operating power reactor licensees and to guide the assignment of inspection resources. Using inputs from both agency self-assessments and independent evaluations, the NRC adjusts the ROP on an ongoing basis to enhance its effectiveness and efficiency. The NRC staff meets with interested stakeholders periodically to collect feedback on the effectiveness of the process and considers this feedback when making improvements to the ROP.

The agency's most recent performance assessments show that all plants continue to operate safely. The staff conducts assessment reviews, communicates changes in licensee performance quarterly, and issues end-of-cycle assessment letters. The NRC issued the annual assessment letters to licensees in March 2019. The NRC website reflects the latest performance assessments as of August of calendar year (CY) 2019.

## **II. Implementing Risk-Informed and Performance-Based Regulations**

Forty-six operating nuclear power reactors have committed to transitioning to the risk-informed, performance-based fire protection licensing basis permitted under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.48(c), using National Fire Protection Association Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Of these 46 reactor units, 44 have received license amendments and have transitioned or are in the process of transitioning to the Standard 805 licensing basis. The NRC staff is currently reviewing license amendment requests that cover the remaining two units. The staff anticipates completing its review of the requests by the end of the third quarter of fiscal year (FY) 2020.

The industry communicated its plans to submit applications under 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." In 2014, the NRC approved the pilot application for Vogtle Electric Generating Plant (Vogtle). The industry has submitted 19 applications to adopt 10 CFR 50.69 since issuance of the pilot. The NRC staff has approved 11 applications and is currently reviewing 5 applications; 3 applications were withdrawn. The NRC anticipates receiving two additional applications by the end of CY 2019.

After the March 2011, event at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC issued orders to implement a comprehensive set of requirements. These requirements resulted in the mitigating strategies for maintaining or restoring core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. Although the equipment and strategies were specifically intended to mitigate the effects of a beyond-design-basis external event, the NRC recognizes that the equipment can potentially be used for other functions (e.g., to support refueling outages, as defense-in-depth measures). The NRC staff is evaluating whether credit is appropriate for mitigating strategies and equipment (diverse and flexible coping strategies, referred to as FLEX) in risk-informed regulatory areas. Crediting the mitigating strategies poses challenges in the areas of human reliability analysis (HRA) and the collection of equipment reliability data. The NRC staff is continuing to work with the industry to understand and appropriately account for these challenges. In the area of HRA, the NRC held an expert elicitation, with industry participation, to inform efforts to develop an HRA tool capable of evaluating applications that credit mitigating strategies. With respect to equipment reliability data, the industry has recently completed an

effort to collect fleetwide reliability data for FLEX equipment. The NRC plans to audit the results of this effort in CY 2019.

The NRC is also pursuing a risk-informed approach in its rulemaking on the decommissioning of production and utilization facilities, particularly commercial nuclear power reactors. Following public comment on the draft regulatory basis, the NRC staff completed and issued the regulatory basis and provided the draft proposed rule to the Commission. The draft proposed rule would implement a graded approach to the requirements applicable throughout decommissioning. The draft proposed rule would also address other relevant issues, such as cybersecurity and drug and alcohol testing, and would align regulatory requirements with the reduction in risk that occurs over time as facilities decommission, while continuing to maintain safety and security. Similarly, the staff is applying a consequence-oriented approach to emergency preparedness requirements in the draft proposed rule on emergency preparedness for small modular reactors (SMRs) and other new technologies, discussed in Section IX of this report.

### **III. Status of Issues Tracked in the Reactor Generic Issues Program**

During this reporting period, the NRC staff closed one open generic issue (GI), continued its evaluation of two other open GIs, and dispositioned two proposed GIs. For the first proposed GI, related to the effects of high-energy arcing faults involving aluminum at nuclear power plants, the staff continued its assessment to determine whether the issue should proceed to the regulatory office implementation stage of the GI process. In particular, in September 2019, the Office of Nuclear Regulatory Research conducted several confirmatory tests, following small-scale testing at Sandia National Laboratories, involving aluminum components in high-energy arcing faults. The test results will be used in future pilot plant risk evaluations. For the second proposed GI, related to the adequacy of licensee procedures to address anticipated operational occurrences, the staff determined that the proposed issue did not meet the screening criteria to proceed in the GI program. This issue is now closed.

The two open GIs currently in the regulatory office implementation stage are GI-199 and GI-204. The staff closed GI-191 on July 23, 2019. The sections below summarize the actions associated with these two open GIs and the closed GI and the technical issues involved with each. The NRC provides additional information on the status of open GIs on the GI dashboard on the agency's public website at <https://www.nrc.gov/about-nrc/regulatory/gen-issues/dashboard.html>.

#### **GI-191, "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"**

In July 2019, the NRC closed GI-191 after completing a risk-informed assessment of debris accumulation in pressurized-water reactor (PWR) sumps. This assessment concluded that the potential debris accumulation at the core inlet following an accident is a low-safety-significance issue and supported the NRC's determination that the potential hazards and phenomena associated with GI-191 are well understood.

In 1996, the NRC identified GI-191, which pertains to the possibility that, after a loss-of-coolant accident (LOCA) in a PWR, debris accumulating on the emergency core cooling system sump screen might result in the restriction of water flow to the emergency core cooling pumps. In Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004,

(Agencywide Documents Access and Management System (ADAMS) Accession No. ML042360586), the NRC followed up on related issues, including the potential for debris to pass through the sump strainers and enter the reactor core, the impact of chemical effects, and compliance with existing regulation.

Over the past 20 years, the NRC and its licensees have completed numerous actions to better understand the complex phenomena and mitigate the effects. These actions included testing, computer modeling, and physical modifications to the plants. Physical modifications included the installation of larger and improved strainers, modifications to piping insulation, and administrative controls to limit potential debris. Testing evaluated debris generation and transport, chemical effects, strainer performance, and fuel performance. The NRC conducted independent evaluations of these modifications, including onsite audits at several plants and testing facilities, to verify that the industry appropriately addressed the issues.

On November 30, 2018, the Director of the Office of Nuclear Reactor Regulation (NRR) signed a letter to the PWR Owners Group Chairman (ADAMS Accession No. ML18311A297). The letter stated that the NRC staff was reevaluating the closure path for GI-191 and GL 2004-02, particularly related to in-vessel effects. On June 13, 2019, the NRC staff issued a technical evaluation report, which concluded that the safety significance of in-vessel downstream effects is low since post-LOCA debris is unlikely to result in a loss of long-term core cooling (ADAMS Accession No. ML19178A252). On July 23, 2019, the NRC closed GI-191 (ADAMS Package Accession No. ML19203A303). The agency conducted a public webinar shortly before closure of GI-191, that covered the technical justification for closure and discussed the remaining actions. The staff intends to develop a knowledge management plan for this topic to capture the use of risk-informed decisionmaking for complex technical issues.

On September 4, 2019, the NRC issued its staff review guidance for evaluating the remaining responses to GL 2004-02, “U.S. Nuclear Regulatory Commission Staff Review Guidance for In-Vessel Downstream Effects Supporting Review of Generic Letter 2004-02 Responses” (ADAMS Accession No. ML19228A011). Approximately one-third of the U.S. PWR fleet has already addressed all aspects of GI-191, including responding to GL 2004-02. The remaining plants are currently completing their GL 2004-02 responses as described above, including a few that are pursuing risk-informed evaluations to document acceptable performance of their sump strainers. The industry is developing guidance to ensure complete and consistent licensee submittals. The NRC anticipates the completion of this guidance by the end of CY 2019 and will support the remaining licensee responses to GL 2004-02, which are expected to be submitted starting in early CY 2020.

This update will be the last for GI-191, as it is now closed.

### **GI-199, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants”**

This GI addresses how current estimates of the seismic hazard level at some nuclear sites in the central and eastern United States might be higher than the assessments used in their original designs and previous evaluations. The NRC staff later expanded the scope of this GI to include plants in the western United States. Following collaboration with the Electric Power Research Institute, in September 2010, the NRC staff issued a safety/risk assessment report, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants.” The NRC staff also issued Information Notice 2010-18, “Generic

Issue 199, 'Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants,'" dated September 2, 2010.

After the nuclear event at Fukushima in 2011, the NRC incorporated GI-199 into the work being performed in response to the accident, which this report discusses further in Section X. Based on current schedules, the staff expects to complete activities associated with GI-199 by the end of CY 2020.

#### **GI-204, "Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures"**

This GI relates to potential flooding effects from upstream dam failures on nuclear power plant sites, spent fuel pools, and sites undergoing decommissioning with spent fuel stored in spent fuel pools. The NRC is addressing this GI as part of its response to the Fukushima nuclear accident, discussed further in Section X of this report. Based on current schedules, the staff expects to complete the activities associated with GI-204 by the end of CY 2020.

### **IV. Licensing Actions and Other Licensing Tasks**

Licensing actions related to operating power reactors include orders, license amendments, exemptions from regulations, relief from inspection or component testing, topical reports submitted on a plant-specific basis, or other actions requiring NRC review and approval before licensees can carry out certain activities.

Other licensing tasks for operating power reactors include the following:

- licensees' responses to NRC requests for information through GLs or bulletins
- NRC review of generic topical reports
- updates to final safety analysis reports
- other licensee actions that do not require NRC review and approval before licensees can carry them out

The FY 2020 NRC Congressional Budget Justification incorporates four output measures (performance indicators) related to the age of the inventory of licensing actions and other licensing tasks.

Table 1 shows the actual FY 2016 through FY 2020 results to date and the FY 2020 goals for NRC performance indicators for operating power reactor licensing actions and other licensing tasks.

The agency continues to communicate with licensees about planned licensing submittals. The NRC's senior management remains fully engaged in monitoring the licensing action workload to maintain target performance goals.

**Table 1 Results and FY 2020 Goals for the NRC's Congressional Budget Justification Performance Indicators**

<b>Output Measure</b>	<b>FY 2016 Actual</b>	<b>FY 2017 Actual</b>	<b>FY 2018 Actual</b>	<b>FY 2019 Actual</b>	<b>FY 2020 Goals</b>
Licensing actions completed per year	837	967	861	847	Not Applicable
Age of inventory of licensing actions	95% ≤1 year and 100% ≤2 years	96% ≤1 year and 99% ≤2 years	98% ≤1 year and 100% ≤2 years	95% ≤1 year and 100% ≤2 years	95% ≤1 year and 100% ≤2 years
Other licensing tasks completed per year	641	644	362	337	Not Applicable
Age of inventory of other licensing tasks	90% ≤1 year and 99% ≤2 years	100% ≤1 year and 100% ≤2 years	98% ≤1 year and 100% ≤2 years	98% ≤1 year and 100% ≤2 years	90% ≤1 year and 100% ≤2 years

## **V. Status of License Renewal Activities**

The staff did not review any initial license renewals during this reporting period. The NRC staff continued to review three subsequent license renewal (SLR) applications. The staff is on track to complete the environmental and safety reviews for the Turkey Point, Peach Bottom, and Surry SLR applications within the established 18-month target review schedules.

### *Turkey Point Nuclear Generating, Units 3 and 4*

On January 30, 2018, Florida Power & Light Company (FPL) submitted its SLR application (ADAMS Accession No. ML18037A812). FPL supplemented its application on February 9, 2018 (ADAMS Accession No. ML18044A653); February 16, 2018 (ADAMS Accession No. ML18053A123); March 1, 2018 (ADAMS Accession No. ML18072A224); and April 10, 2018 (ADAMS Accession No. ML18113A132).

On April 26, 2018, the NRC staff accepted the SLR application for review.

On May 21, 2019, the NRC staff issued its safety evaluation report (SER) with open items (ADAMS Accession No. ML19078A010). On June 21, 2019, the staff met with the Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on Plant License Renewal. On July 22, 2019, the staff issued its SER with no open items (ADAMS Accession No. ML19191A057). On September 4, 2019, the staff met with the ACRS Full Committee.

On March 29, 2019, the NRC staff issued its draft supplemental environmental impact statement (SEIS) for public comment (ADAMS Accession No. ML19078A330). A public meeting to discuss the staff's findings was held in Homestead, FL, on May 1, 2019, and the public comment period ended on May 20, 2019. The staff is currently addressing public comments and finalizing the SEIS, which it plans to issue in October 2019.

The agency published a notice of opportunity to request a hearing and petition to intervene in the *Federal Register* on May 2, 2018. The NRC received three requests for hearings/petitions to intervene. The Atomic Safety and Licensing Board (ASLB) heard oral arguments on the petitions in Homestead, FL, on December 4, 2018. On March 7, 2019, the ASLB denied one

petition and granted the remaining petitions, admitting four contentions in total for litigation. The ASLB also referred one portion of its ruling to the Commission. On April 9, 2019, one of the petitioners withdrew from the proceeding, reducing the number of contentions to two. On July 8, 2019, the Board dismissed the two remaining contentions as moot, following issuance of the NRC staff's draft SEIS. On June 24, 2019, the Intervenor submitted two amended contentions and four new contentions. The applicant and the NRC staff responded to the filings on July 19, 2019, and the ASLB held oral arguments on September 9, 2019, in Rockville, MD. The Intervenor's new and amended contentions are pending before the ASLB.

#### *Peach Bottom Atomic Power Station, Units 2 and 3*

On July 10, 2018, Exelon Generation Company (Exelon) submitted its SLR application (ADAMS Accession No. ML18193A689). On August 27, 2018, the NRC staff accepted the SLR application for review.

Exelon supplemented its application on September 14, 2018 (ADAMS Accession No. ML18257A143); January 23, 2019 (ADAMS Accession No. ML19023A015); February 11, 2019 (ADAMS Accession No. ML19042A131); March 18, 2019 (ADAMS Accession No. ML19077A253); June 12, 2019 (ADAMS Accession No. ML19163A221); July 1, 2019 (ADAMS Accession No. ML19182A112); July 12, 2019 (ADAMS Accession No. ML19193A006); and July 25, 2019 (ADAMS Accession No. ML19206A180).

The staff is continuing work on the safety review. Specifically, on October 7, 2019, the staff issued its SER with one confirmatory item. The staff is scheduled to meet with the ACRS Subcommittee on Plant License Renewal on November 15, 2019.

The staff is continuing work on the environmental review. Specifically, on July 30, 2019, the staff issued its draft SEIS for public comment (ADAMS Accession No. ML19210D453). The staff held a public meeting to discuss the staff's findings in Delta, PA, on September 12, 2019, and the public comment period ended on September 23, 2019. The staff is currently addressing the public comments and finalizing the SEIS, which it plans to issue in January 2020.

A notice of opportunity to request a hearing and petition to intervene was published in the *Federal Register* on September 6, 2018. The NRC received one request for hearing/petition to intervene. On March 27, 2019, the ASLB held oral arguments on the petition in Rockville, MD. On June 20, 2019, the ASLB issued an order denying the petition. The petitioner filed an appeal before the Commission on July 15, 2019, and the NRC staff and Exelon responded to the appeal on August 9, 2019. On September 3, 2019, the petitioner filed new contentions based on the draft SEIS; and on September 22, 2019, the petitioner filed a motion to reopen the record in support of its new contentions. The NRC staff and Exelon filed answers to both filings on October 3, 2019.

#### *Surry Power Station, Units 1 and 2*

On October 15, 2018, Virginia Electric and Power Company (VEPCO) submitted its SLR application (ADAMS Accession No. ML18291A842). On December 3, 2018, the NRC staff accepted the SLR application for review. VEPCO supplemented its application on January 29, 2019 (ADAMS Accession No. ML19042A137); April 2, 2019 (ADAMS Accession No. ML19095A666); and June 10, 2019 (ADAMS Accession No. ML19168A028).



The NRC is continuing work on the safety review. Specifically, the staff is developing the SER, which it plans to issue in November 2019 to support a meeting with the ACRS Subcommittee on Plant License Renewal in February 2020.

The agency is continuing work on the environmental review. Specifically, the staff issued the draft SEIS for public comment in October 2019.

A notice of opportunity to request a hearing and petition to intervene was published in the *Federal Register* on December 17, 2018. The NRC did not receive any requests for a hearing/petition to intervene.

## **VI. Summary of Reactor Enforcement Actions**

The following tables present the reactor enforcement statistics by region, half FY, FY, and two previous FYs for comparison purposes. These tables provide both nonescalated and escalated reactor enforcement data, as well as the escalated enforcement data associated with traditional enforcement and the ROP. The severity level assigned to a violation (i.e., traditional enforcement) generally reflects the significance of a violation. However, for most violations, the NRC assesses the significance using the significance determination process under the ROP, which applies risk insights, as appropriate, to assist the NRC staff in determining the safety or security significance of inspection findings identified within the ROP.

Brief descriptions of the escalated reactor enforcement actions associated with traditional enforcement and the ROP (as well as any other significant actions) taken during the applicable fiscal half-year follow the tables.

**Table 2 Nonescalated Reactor Enforcement Actions\***

<b>NONESCALATED REACTOR ENFORCEMENT ACTIONS</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Cited Severity Level IV or Green	2 <sup>nd</sup> Half FY 19	1	0	0	0	1
	1 <sup>st</sup> Half FY 19	0	0	0	1	1
	FY 19 Total	1	0	0	1	2
	FY 18 Total	2	4	0	3	9
	FY 17 Total	2	5	2	2	11
Noncited Severity Level IV or Green	2 <sup>nd</sup> Half FY 19	42	39	34	53	168
	1 <sup>st</sup> Half FY 19	46	37	52	59	194
	FY 19 Total	88	76	86	112	362
	FY 18 Total	101	69	108	144	422
	FY 17 Total	116	120	146	179	561
<b>TOTAL Cited and Noncited Severity Level IV or Green</b>	2 <sup>nd</sup> Half FY 19	43	39	34	53	169
	1 <sup>st</sup> Half FY 19	46	37	52	60	195
	FY 19 Total	89	76	86	113	364
	FY 18 Total	103	73	108	147	431
	FY 17 Total	118	125	148	181	572

\* The nonescalated enforcement data above reflect the cited and noncited violations either categorized at Severity Level IV (the lowest level) or associated with Green findings during the indicated time periods. The numbers of cited violations are based on Enforcement Action Tracking System data that may be subject to minor changes following verification. These data do not include Green findings that do not have associated violations.

**Table 3 Escalated Reactor Enforcement Actions Associated  
with Traditional Enforcement\***

<b>ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH TRADITIONAL ENFORCEMENT</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Severity Level I	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	FY 19 Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Severity Level II	2 <sup>nd</sup> Half FY 19	0	1	0	0	1
	1 <sup>st</sup> Half FY 19	0	0	0	2	2
	FY 19 Total	0	1	0	2	3
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Severity Level III	2 <sup>nd</sup> Half FY 19	0	0	0	2	2
	1 <sup>st</sup> Half FY 19	0	0	0	2	2
	FY 19 Total	0	0	0	4	4
	FY 18 Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5
<b>TOTAL Violations Cited at Severity Level I, II, or III</b>	2 <sup>nd</sup> Half FY 19	0	1	0	2	3
	1 <sup>st</sup> Half FY 19	0	0	0	4	4
	FY 19 Total	0	1	0	6	7
	FY 18 Total	0	1	0	0	1
	FY 17 Total	1	3	0	1	5

\* The escalated enforcement data above reflect the Severity Level I, II, or III violations or problems cited during the indicated time periods.

**Table 4 Escalated Reactor Enforcement Actions Associated with the ROP\***

<b>ESCALATED REACTOR ENFORCEMENT ACTIONS ASSOCIATED WITH THE REACTOR OVERSIGHT PROCESS</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Violations Related to Red Findings	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	FY 19 Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Violations Related to Yellow Findings	2 <sup>nd</sup> Half FY 19	0	0	0	0	0
	1 <sup>st</sup> Half FY 19	0	0	0	0	0
	FY 19 Total	0	0	0	0	0
	FY 18 Total	0	0	0	0	0
	FY 17 Total	0	0	0	0	0
Violations Related to White Findings	2 <sup>nd</sup> Half FY 19	0	1	1	0	2
	1 <sup>st</sup> Half FY 19	1	0	0	0	1
	FY 19 Total	1	1	1	0	3
	FY 18 Total	0	1	3	0	4
	FY 17 Total	2	1	4	3	10
<b>TOTAL Related to Red, Yellow, or White Findings</b>	2 <sup>nd</sup> Half FY 19	0	1	1	0	2
	1 <sup>st</sup> Half FY 19	1	0	0	0	1
	FY 19 Total	1	1	1	0	3
	FY 18 Total	0	1	3	0	4
	FY 17 Total	2	1	4	3	10

\* The escalated enforcement data above reflect the violations or problems cited during the indicated time periods that were associated with either Red, Yellow, or White findings. These data do not include Red, Yellow, or White findings that do not have associated violations.

## **Reactor Escalated Enforcement Actions and Other Significant Actions**

### *Florida Power and Light Company (St. Lucie Plant) EA-18-066*

On September 12, 2019, the NRC issued a notice of violation and a proposed imposition of civil penalty in the amount of \$232,000 to FPL for a Severity Level II violation of NRC requirements involving employee protection. The violation involved a company executive deliberately discriminating against a contract employee for engaging in a protected activity in the spring of 2017. Specifically, a contract employee who raised safety concerns by submitting a condition report during the St. Lucie refueling outage had a scheduled work assignment to Turkey Point canceled shortly thereafter. The NRC determined that the actions of FPL management were, in part, based on the contractor's engagement in a protected activity.

### *Wolf Creek Nuclear Operating Corporation (Wolf Creek Generating Station) EA-18-165*

On July 18, 2019, the NRC issued a confirmatory order to Wolf Creek to formalize commitments made as a result of an alternative dispute resolution mediation session held on May 30, 2019. The commitments were made as part of a settlement agreement between Wolf Creek and the NRC based on evidence gathered during an investigation in which the NRC had identified an apparent violation. The violation involved a maintenance worker and a supervisor who willfully documented inaccurate information in a work order. Because licensees are responsible for the actions of their employees and contractors, the NRC concluded that the employee's actions placed Wolf Creek in violation of NRC requirements and licensee procedures. In response to the incident, Wolf Creek agreed to complete additional corrective actions and enhancements, as fully discussed in the confirmatory order. In consideration of the corrective actions and commitments outlined in the confirmatory order, the NRC agreed not to pursue any further enforcement action (including issuance of a civil penalty) relating to the apparent violation.

### *Entergy Operations, Inc. (River Bend Station) EA-18-174*

On April 19, 2019, the NRC issued a notice of violation to Entergy Operations, Inc. (Entergy) for violations of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Criterion V, "Instructions, Procedures, and Drawings," and 10 CFR 50.9, "Completeness and Accuracy of Information," at River Bend, associated with a Severity Level III problem identified through an investigation conducted by the NRC Office of Investigations. Contrary to the requirements, Entergy watchstanders, on numerous occasions, failed to tour all required areas of their watchstations, yet recorded completion in operations logs as if they had done so, resulting in the licensee's failure to maintain information required by the NRC's regulations that was complete and accurate in all material respects. The NRC credited the licensee for identification and corrective action, so it issued no civil penalty to the licensee.

### *Tennessee Valley Authority (Watts Bar Nuclear Plant) EA-18-182*

On April 15, 2019, the NRC issued a notice of violation to Tennessee Valley Authority (TVA) for a violation of 10 CFR 50.47, "Emergency Plans"; 10 CFR 50.54, "Conditions of Licenses;" and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," at Watts Bar associated with a White significance determination process finding. TVA's staff at Watts Bar failed to adequately maintain emergency action level

thresholds affecting emergency preparedness. Specifically, since each Watts Bar unit's initial plant startup, the licensee failed to adequately maintain radiation monitor effluent parameter calculations which resulted in nonconservative emergency action level thresholds.

*Entergy Operations, Inc. (Waterford Steam Electric Station) EA-18-138*

On April 5, 2019, the NRC issued a notice of violation to Entergy for violations of 10 CFR Part 50, Appendix B, Criterion V, and 10 CFR 50.9 at Waterford Unit 3 associated with a Severity Level III problem identified through an investigation conducted by the NRC Office of Investigations. Contrary to the requirements, Entergy nonlicensed operators, on numerous occasions, failed to tour all required areas of their watchstations, resulting in the licensee's failure to maintain information required by the NRC's regulations that was complete and accurate in all material respects. The NRC credited the licensee for identification and corrective action, so it issued no civil penalty to the licensee.

*Exelon Generation Company (Clinton Power Station) EA-18-104*

On April 1, 2019, the NRC issued a notice of violation to Exelon for a violation of 10 CFR Part 50, Appendix B, Criterion V, at Clinton, associated with a White significance determination process finding. Contrary to the requirements of numerous quality-related procedures, Exelon failed to properly restore an emergency diesel generator (EDG) during shutdown conditions and subsequently began maintenance on the other EDG. The resulting plant condition was that no EDG was immediately available to provide onsite backup electrical power for more than 3 days. Additionally, the unavailability of the EDG resulted in a violation of Technical Specifications Limiting Condition for Operation 3.8.2, "AC Sources—Shutdown," which requires at least one EDG to be operable in Mode 5 and that actions be initiated immediately to restore at least one EDG when it is determined that none is operable.

## **VII. Security and Emergency Preparedness and Incident Response Activities**

The NRC continues to maintain an appropriate regulatory infrastructure to ensure adequate protection of public health and safety and promote the common defense and security while implementing risk-informed strategies, reducing unnecessary licensee burden, and improving the realism of NRC licensing and oversight activities. The NRC's security and emergency preparedness and incident response programs contribute to this.

### **Security**

The NRC continues to conduct force-on-force (FOF) inspections at each nuclear power reactor and Category I fuel cycle facility on a regular 3-year cycle. Each FOF inspection at a nuclear power reactor includes both tabletop drills and exercises that simulate combat between a mock adversary force and the licensee's security force. These inspections assess the ability of power reactor and Category I fuel cycle facility licensees to defend against the design-basis threat (DBT) for radiological sabotage. For Category I fuel cycle facilities, the NRC uses FOF inspections to evaluate the effectiveness of licensees' protective strategies against an additional DBT—theft or diversion of special nuclear material. FOF inspections, along with the other inspections that comprise NRC's security baseline inspection program, provide valuable insights that enable the NRC to evaluate the effectiveness of licensees' security programs.

Currently, FOF inspections are composed of two exercises for both power reactors and Category I fuel cycle facilities. In "Staff Requirements—SECY-17-0100—Security Baseline

Inspection Program Assessment Results and Recommendations for Program Efficiencies,” dated October 9, 2018 (SRM-SECY-17-0010; ADAMS Accession No. ML18283A072), the Commission approved the staff’s recommendation to modify the FOF inspection program for power reactors to consist of one NRC-conducted FOF exercise and an enhanced NRC inspection of a licensee-conducted annual FOF exercise. The Commission also directed the staff to revise the baseline security inspection program framework that implements the revised program. In response on May 21, 2019, the staff provided COMSECY-19-0006, “Revised Security Inspection Program Framework (Option 3) in Response to SRM-SECY-17-0100” (ADAMS Accession No. ML19038A485), to the Commission for review and approval. The Commission also directed the staff in SRM-SECY-17-0010 to identify options to provide credit for operator actions; the use of FLEX equipment; and response by Federal, State, and local law enforcement in the security framework. On May 23, 2019, the staff provided SECY-19-0055, “Crediting Options for Operator Actions and Law Enforcement Response” (ADAMS Accession No. ML19080A274), to the Commission for review and approval.

To evaluate a licensee’s protective strategy, mock adversary forces are used to replicate DBT adversary attributes in simulated attacks during FOF inspections. Since 2004, the Nuclear Energy Institute (NEI) has provided an adversary force (Composite Adversary Force, or CAF) for use in power reactor FOF inspections, and the NRC has provided oversight of that adversary force both to ensure its capability to replicate DBT adversary attributes and to provide assurance that any potential conflicts of interest are mitigated. In early 2018, Entergy and NextEra ended their memberships in NEI; as a result, the NEI-managed CAF was not available for use in NRC-conducted FOF inspections by these two utilities and their facilities. Entergy and NextEra submitted a joint proposal to the NRC for providing a mock adversary force (the Joint Composite Adversary Force, or JCAF) to support NRC-conducted FOF inspections.

In April 2018, the Commission approved the use of the proposed JCAF to support NRC-conducted FOF inspections in CY 2018 and CY 2019 only. In CY 2018, the NRC provided oversight of the JCAF to verify adequate training for JCAF personnel and to mitigate the potential for conflicts of interest during exercises that could inappropriately influence the exercise outcome. In CY 2018, the NRC completed seven FOF inspections at Entergy and NextEra facilities using the JCAF. In CY 2019, one FOF inspection at an Entergy facility will use the JCAF. The staff has also completed an assessment of the JCAF and determined that it was effective. On May 6, 2019, the staff provided SECY-19-0046, “Options for a Long-Term Alternative to the Nuclear Energy Institute Composite Adversary Force” (ADAMS Accession No. ML19074A078), to the Commission for review and approval.

Separately, the Commission is considering a draft final rule that would, in part, amend the security requirements in 10 CFR Part 73, “Physical Protection of Plants and Materials,” to implement the statutory authority provided to the Commission under Section 161A of the Atomic Energy Act of 1954, as amended. This authority allows the Commission to designate the classes of facilities eligible to apply for NRC authorization to use various types of enhanced weapons and large-capacity ammunition-feeding devices, notwithstanding State and local and certain Federal firearms laws and regulations prohibiting such possession and use. The draft final rule would establish requirements that licensees must meet when applying for this authority. In developing the rulemaking, the NRC has worked closely with the U.S. Department of Justice, Office of the Attorney General; the Federal Bureau of Investigation (FBI); the Bureau of Alcohol, Tobacco, Firearms and Explosives; and other interested stakeholders.

In addition, to improve consistency and clarity, the draft final rule would revise the mandatory physical security event notification requirements for different classes of facilities and the

transportation of radioactive material. The draft final rule would also add mandatory event notification requirements for the theft or loss of enhanced weapons and imminent or actual hostile acts, as well as new reporting requirements for suspicious activities.

The Commission approved a draft proposed rule that would amend the drug testing requirements of 10 CFR Part 26, "Fitness for Duty Programs," to better align NRC drug-testing requirements with those of the U.S. Department of Health and Human Services' "Mandatory Guidelines for Federal Workplace Drug Testing Programs," which was issued on October 1, 2017. The NRC published a proposed rule on September 16, 2019, for public comment; the comment period is open until December 2, 2019. The proposed changes would broaden the panel of drugs used to test individuals during required drug testing; lower cutoff levels for certain types of drug testing; improve the testing methods to identify subversion attempts; and improve the clarity, organization, and flexibility of the rule language.

The NRC continues to support the FBI's efforts to improve the tactical responses of Federal, State, and local law enforcement to beyond-DBT events at nuclear power plant sites.

## **Cybersecurity**

Under 10 CFR 73.54, "Protection of Digital Computer and Communication Systems and Networks," the NRC requires nuclear power plant licensees and new license applicants to provide high assurance that digital computer and communication systems and networks are adequately protected against cyberattacks. These licensees must implement a cybersecurity program to ensure that safety, important-to-safety, security, and emergency preparedness functions are protected from cyberattacks. Because of the extensive work and lead time required to fully implement the provisions called for in licensees' NRC-approved cybersecurity plans, the agency established interim milestones to focus efforts on the highest priority activities. Licensees had taken measures to protect their highest priority digital assets by December 31, 2012.

The NRC has developed an oversight program for cybersecurity that includes an inspection program, inspector training, and a process for evaluating the significance of inspection findings. The agency developed this program in collaboration with stakeholders, including members of industry and representatives from the U.S. Department of Homeland Security, the Federal Energy Regulatory Commission, and the National Institute of Standards and Technology. The NRC completed inspection activities related to the interim milestones in CY 2015. In July 2017, the NRC began the inspection activities for full implementation; as of the end of August 2019, the agency has completed 35 inspections. This initial round of inspections will continue through CY 2020.

The NRC staff proposed several options to the Commission in SECY-14-0147, "Cyber Security for Fuel Cycle Facilities," dated December 30, 2014, for implementing cybersecurity requirements for fuel cycle facilities. In response, the Commission issued a staff requirements memorandum (SRM) for SECY-14-0147, dated March 24, 2015 (ADAMS Accession No. ML15083A175), which directed the staff to initiate a rulemaking. The Commission is currently considering a draft proposed rule on this subject.

In January 2019, the NRC initiated a program assessment to collect feedback and lessons learned from stakeholders on the power reactor cybersecurity rule, associated guidance, licensee implementation, and NRC inspections (interim, full implementation, and future). The data will be used to evaluate regulatory and guidance changes as appropriate and develop



options for the next phase of the cybersecurity inspection program. After completion of the assessment, the staff is tasked with developing an action plan that consolidates the short-term and long-term improvements to the power reactor cybersecurity oversight program. The staff developed the results into a draft action plan in late September 2019. This action plan addresses several high-level areas: program definitions and terms; risk-informing critical digital asset determination, assessment, and protection; and the post-full-implementation power reactor cybersecurity inspection oversight program.

## **Emergency Preparedness and Incident Response**

The NRC and the Federal Emergency Management Agency (FEMA) are revising NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," issued in November 1980. This is one of the key guidance documents for developing and evaluating onsite and offsite emergency plans for nuclear power plants and for the State and local government emergency response organizations. On July 10, 2018, the NRC and FEMA individually submitted the revised guidance to the Office of Management and Budget (OMB) for review in accordance with the Congressional Review Act. Subsequently, FEMA submitted the guidance to OMB for review under Executive Order 12866; that review is still ongoing.

The NRC continues to work with States to replenish potassium iodide supplies for use as a supplement to public protective actions within the 10-mile emergency planning zones around nuclear power plants.

All licensing reviews for new power reactor applications under the physical security and emergency preparedness program remain on schedule. The NRC staff is using its established licensing process to ensure that the safety and environmental reviews meet all milestones and provide appropriate opportunities for stakeholder input.

## **VIII. Power Upgrades**

Since the 1970s, licensees have applied for and implemented power upgrades as a way to increase the output of their plants. The NRC staff has reviewed and approved 164 power upgrades to date. Existing plants have gained approximately 23,769 megawatts thermal or 7,923 megawatts electric (MWe) in electric generating capacity (the equivalent of about seven large nuclear power plant units) through power upgrades.

Currently, the NRC has no power upgrade applications under review. Three licensees of nuclear power plants have indicated that they plan to request power upgrades over the next 5 years. This would constitute an additional increase in electric generating capacity of approximately 91 MWe.

## **IX. New Reactor Licensing**

The NRC's new reactor program is focusing on licensing and construction oversight activities that support applicants and licensees of large light-water reactors (LWRs) and small modular LWRs and is enhancing the regulatory framework and infrastructure for advanced reactors (non-LWRs). In addition, the NRC is actively engaged in several international cooperative initiatives focused on addressing safety reviews of new reactor designs and improving the effectiveness and efficiency of inspections and the collection and sharing of construction experience.

## **Reviews of Applications for Large and Small Modular Light-Water Reactors**

The NRC is currently reviewing applications for design certifications and small modular LWRs that have been submitted under the provisions of 10 CFR Part 52, “Licenses, Certifications, and Approvals for Nuclear Power Plants.”

### *Early Site Permit Reviews*

#### Tennessee Valley Authority Clinch River Early Site Permit Application

On May 12, 2016, TVA submitted an early site permit (ESP) application for the Clinch River Nuclear Site near Oak Ridge, TN. This application is based on a plant parameter envelope characterizing several small modular LWR designs. By December 30, 2016, TVA had submitted all supplemental information to the NRC in support of its application, and by letter dated January 5, 2017, the staff informed TVA that the agency had accepted its application, as supplemented, for docketing and detailed technical review.

The NRC staff began its detailed technical review of the ESP application in January 2017 and issued a full review schedule with public milestones on March 17, 2017. The staff completed the safety review for all chapters of the application and issued the final SER on June 14, 2019. For the environmental review, the NRC staff issued the final environmental impact statement on April 3, 2019. The agency completed both the safety and environmental reviews more than 2 months ahead of schedule.

The Commission conducted the mandatory hearing for the Clinch River ESP application on August 14, 2019. This was the first mandatory hearing on an ESP involving a small modular LWR. If the Commission votes to approve the ESP, the staff would issue the permit to TVA within 10 days of the Commission’s decision.

### *Design Certification Reviews*

#### NuScale Power, LLC, Small Modular Reactor Design Certification Application

On January 6, 2017, NuScale submitted the first SMR design certification application for NRC review. On March 15, 2017, the NRC staff completed its acceptance review and docketed the application. The staff issued the acceptance review letter to NuScale on March 23, 2017, and developed a full review schedule with public milestones, which it sent to NuScale on May 22, 2017. On April 11, 2018, the staff completed Phase 1 of the review.

On May 16, 2019, the NRC staff issued a letter to NuScale Power, LLC (NuScale), communicating the status of Phase 2 of the design certification (DC) application review. This letter is a followup to the January 17, 2019, DC application review status letter. Specifically, the May 2019 letter conveyed that the NRC staff has met the Phase 2 public milestone for most of the 21 DC application chapters through the completion and issuance of safety evaluations with open items and has completed Phase 3 actions for many of these chapters with presentations made to the ACRS.

On July 12, 2019, the staff closed Phases 2 and 3 of the review, noting that because of some unresolved issues, the safety SERs for Chapters 15 and 20 will remain preliminary, and the NRC will not issue a final Phase 2 SER for these chapters. The review is currently in Phase 4. The staff is diligently working toward resolving a few issues, including two highly challenging

issues, to support the December 12, 2019, Phase 4 milestone. The staff remains confident it can complete the review within the established 42-month schedule.

#### Advanced Power Reactor 1400

On December 23, 2014, Korea Electric Power Corporation and Korea Hydro & Nuclear Power Company, Ltd., submitted an application to the NRC for certification of the Advanced Power Reactor 1400 (APR1400) standard plant design for use in the U.S. domestic energy market. The NRC staff developed a six-phase milestone schedule for completing the application review within 42 months. On September 28, 2018, the staff issued the final SER, completing its review within the 42-month schedule. The NRC also issued a standard design approval for the APR1400 to Korea Hydro & Nuclear Power Company, Ltd., on September 28, 2018.

The NRC staff submitted a direct final rule to certify the APR1400 standard plant design to the Commission for review and approval in March 2019. The Commission affirmed the direct final rule on April 30, 2019. The NRC published it in the *Federal Register* on May 22, 2019, and confirmed the effective date in the *Federal Register* on August 16, 2019. The final rule became effective on September 19, 2019.

#### U.S. Advanced Pressurized-Water Reactor

On December 31, 2007, Mitsubishi Heavy Industries, Ltd., submitted its application to the NRC for certification of the U.S. Advanced Pressurized-Water Reactor design. On November 5, 2013, the company issued a letter informing the NRC of its plans to slow down licensing activities related to the application review. Given this request, the NRC staff has been performing this review at a reduced pace with limited use of resources since March 24, 2014, and will continue in this manner until further notice from the applicant or until the review is completed.

#### U.S. Evolutionary Power Reactor

On December 11, 2007, AREVA, Inc. (AREVA), submitted its application to the NRC for certification of the U.S. Evolutionary Power Reactor design. On February 25, 2015, AREVA asked the NRC to suspend the application review until further notice. The NRC staff's review remains suspended at this time.

#### *Design Certification Renewals*

##### Advanced Boiling-Water Reactor Renewal (General Electric-Hitachi)

On December 7, 2010, General Electric-Hitachi (GEH) submitted an application for renewal of the advanced boiling water reactor (ABWR) design certification. By letter dated January 8, 2016, GEH submitted proposed changes to the ABWR design control document to redesign the containment overpressure protection system piping. On February 19, 2016, GEH submitted a revised application to incorporate changes in the design control document. The staff issued a milestone schedule letter to GEH on August 30, 2016, which was based on resolving all open items by January 2017. However, some open items associated with the review of the application remained unresolved. As a result, on August 3, 2017, the staff issued a letter to GEH indicating that the NRC would not be able to complete its review on the original schedule. In a letter dated January 21, 2019, GEH provided its final response to the NRC staff's request for additional information.

In March 2019, the NRC staff closed the remaining open items associated with the review. The staff issued a final schedule letter to GEH on May 31, 2019. The ACRS held a subcommittee meeting on August 23, 2019, and the ACRS Full Committee met on October 2, 2019. The NRC plans to complete its final SER for this renewal application in Spring 2020.

### **Construction Oversight under 10 CFR Part 52**

The NRC is implementing activities to oversee the safe construction and operational readiness of the two Advanced Passive 1000 units under construction at the Vogtle site. The NRC's Region II office coordinates, plans, schedules, and implements the construction inspections in coordination with the licensee's construction schedules to verify compliance with the agency's regulations and to ensure that the new plants are built in accordance with their combined licenses (COLs). NRC inspections continue to focus on all activities in support of inspections, tests, analyses, and acceptance criteria (ITAAC), including, but not limited to, welding, module installation, and civil and structural engineering activities, as well as any associated system tests. The NRC is finalizing guidance in support of the planning and inspection activities for the licensee's initial test programs. Communications with Vogtle management to assess the scope of construction and operational activities continue to inform NRC inspections.

The NRC has enhanced its public websites for the new Vogtle units under construction to provide easy access to information related to ITAAC closure. The website includes links to the ITAAC hearing procedures, guidance on ITAAC closure, status reports for ITAAC notifications, and other upgrades for faster access to information such as departure reports and license amendments.

The NRC has implemented the Construction ROP (cROP) at the site of the two new Vogtle reactor units. The cROP ensures safety and security through objective, risk-informed, transparent, and predictable NRC oversight during new reactor construction. Using practices similar to those of the ROP for operating reactors, the NRC continues to meet periodically with interested stakeholders to collect feedback on the effectiveness of the process, which the agency then considers in enhancing the cROP. The agency's most recent performance assessments demonstrate that the reactors are being constructed safely and both units are performing well against the cROP criteria. Plant assessments and the latest cROP-related information are publicly available on the NRC website.

Also, in anticipation of the final phase of construction, the NRC created the Vogtle Readiness Group (VRG), with the primary objective to identify and resolve any licensing, inspection, or regulatory challenges or gaps that could affect the schedule for completion of Vogtle Units 3 and 4. The VRG Charter, originally issued in March 2018 and revised in May 2019, identifies the steps that the NRC is taking (including reviewing inspection results, assessing construction activities, reviewing system tests, and completing the transition to operations activities) to ensure that the plants will meet the regulatory requirements in the COLs. The NRC is implementing an integrated project plan to ensure coordination of key NRC activities based on the licensee's construction and startup schedule. The VRG ensures management attention to the timely implementation of the integrated project plan.

Highlights of the NRC licensing and oversight of construction activities at Vogtle Units 3 and 4 include the following

- The NRC has provided a timely review of all license amendment requests for Vogtle Units 3 and 4 such that the construction schedule was not affected.
- To date, all construction inspection findings for Vogtle Units 3 and 4 are of low safety significance, and the licensee has addressed these issues appropriately.
- The NRC is prepared to effectively and efficiently confirm the operational readiness of these new units.

Additionally, on January 21, 2019, the staff issued LIC-114 (NRR) / REG-106 (NRO), "Title 10 of the *Code of Federal Regulations* (10 CFR) Section 52.103(g) Finding and Communication Process." This office instruction describes the steps that will be taken and provides templates for memoranda informing the Commission of the status of regulatory activities in the final year of construction for a facility licensed under 10 CFR Part 52 and for taking the actions necessary to make the 10 CFR 52.103(g) finding that all ITAAC are met. The staff's finding is required before operations could begin.

### *Vendor Inspections*

The NRC staff uses the Vendor Inspection Program (VIP) to confirm that reactor applicants and licensees are fulfilling their regulatory obligations to provide oversight of the supply chain. The NRC staff conducts inspections to verify the implementation of vendor quality assurance programs to ensure the quality of materials, equipment, and services supplied to the commercial nuclear industry. These inspections ensure that vendors maintain an effective system for reporting defects under 10 CFR Part 21, "Reporting of Defects and Noncompliance," and verify the use of commercial-grade dedication programs for safety-related materials, equipment, and services. Other activities of the vendor inspection staff include ensuring that counterfeit items are removed and prevented from use in safety-related applications, participating in international cooperation efforts, and developing industry consensus standards. VIP focus areas for new reactors include integrated system validation for the control room simulators, digital instrumentation and control systems, modular fabrication, safety-related valves, and reactor coolant pumps. For FY 2020, the NRC plans to perform approximately 20 vendor inspections. The annual VIP self-assessment showed that the NRC met its goal of completing 20 inspections in FY 2019. The VIP also completes inspections as part of license renewal reviews for operating plants as well as inspections for other designs currently under review, such as NuScale.

### **Operator Licensing**

The NRR staff supports and provides programmatic oversight for Region II implementation of operator licensing training, procedure inspections, and licensee examinations for new reactors.

NRR and Region II implemented the lessons learned from operator licensing activities for the plants under construction at Vogtle and previously under construction at Virgil C. Summer Nuclear Station (also referred to as "cold licensing activities"). The lessons learned from these activities will continue to inform examinations to be administered at Vogtle until the transition to operation and will also be used during the NuScale application review.

The staff continued preparations for operator licensing examinations for the NuScale SMR technology. These preparations included an observation of main control room simulator scenarios at a NuScale facility and continued development of the knowledge and abilities catalog, from which the licensing examinations are generated.

## Non-Light-Water Reactors

The staff has a number of ongoing activities to support licensing non-LWRs, many of which support the activities required by Section 103 of the Nuclear Energy Innovation and Modernization Act (NEIMA). These included submitting two reports to Congress in July 2019 regarding (1) expediting and establishing stages in the licensing process for commercial advanced nuclear reactors and (2) increasing, where appropriate, the use of risk-informed and performance-based evaluation techniques and regulatory guidance in licensing commercial advanced nuclear reactors within the existing regulatory framework (ADAMS Accession No. ML19128A289). The staff has enhanced its advanced reactor technical readiness in accordance with Section 103(a)(5) of NEIMA, which requires the NRC to provide staff training or the hiring of experts to support activities required under Section 103(a)(1)–(4) of the Act and preparations for preapplication interactions and commercial advanced reactor license application reviews. Finally, consistent with Section 103 of NEIMA, the staff has begun efforts to establish a “technology-inclusive regulatory framework” for optional use by applicants for new commercial advanced nuclear reactor licenses. The NRC plans to complete this rulemaking by December 31, 2027.

The staff issued SECY-19-0009, “Advanced Reactor Program Status,” on January 17, 2019 (ADAMS Accession No. ML18346A075). This paper provides the status of the staff’s activities related to advanced reactors, including the progress and path forward on each of the implementation action plan (IAP) strategies. It also summarizes the various external factors affecting the staff’s preparations for possible licensing and deployment of advanced reactors, including current preapplication interactions.

On December 21, 2017, the NRC issued Regulatory Issue Summary 2017-08, “Process for Scheduling and Allocating Resources for FYs 2020 Through 2022 for the Review of New Licensing Applications for Light-Water Reactors and Non-Light-Water Reactors,” and asked potential applicants to provide design, licensing, construction, and preapplication plans and schedules for the period FY 2020 through 2022. Six non-LWR developers have notified the staff of their intent to begin regulatory interactions. The developers are in different stages of design development and, based on their responses, the staff started formal preapplication interactions, including participation in meetings and reviews of topical reports, with Oklo, Inc., in November 2016 on its micro fast-reactor design; X-Energy, LLC, in September 2018 on its pebble bed high-temperature gas-cooled reactor; and Kairos Power in October 2018 on its pebble-fueled, molten-fluoride-cooled reactor. The staff is also engaged with X-Energy, LLC, on preapplication interactions for a fuel fabrication facility to produce tristructural isotropic fuel. The staff anticipates starting additional preapplication interactions in FY 2020 and beginning the review of one license application in CY 2020.

To prepare to review and regulate a new generation of non-LWRs, the NRC staff developed a vision and strategy to ensure the agency’s readiness to effectively and efficiently conduct its mission for these technologies, as described in “NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness,” issued December 2016 (ADAMS Accession No. ML16356A670).

The NRC’s non-LWR vision and strategy includes three strategic objectives—(1) enhancing technical readiness, (2) optimizing regulatory readiness, and (3) optimizing communication. The NRC prepared IAPs to identify the specific activities that it will conduct in the near-term (0–5 years), mid-term (5–10 years), and long-term (beyond 10 years) time frames to achieve non-LWR readiness. To obtain stakeholder feedback, the NRC released the draft near-term

IAPs in 2016 and the draft mid-term and long-term IAPs in February 2017. The NRC staff updated and finalized its IAPs to reflect stakeholder feedback in July 2017.

As part of near-term IAP Strategy 1, the NRC is acquiring and developing sufficient knowledge, technical skills, and capacity to perform non-LWR regulatory activities. The agency contracted with Argonne National Laboratory to develop sodium-cooled fast reactor training, which it provided to the NRC staff on March 26–27, 2019, and high-temperature gas-cooled reactor training, which it provided to NRC staff on July 16–17, 2019. The NRC previously contracted with Oak Ridge National Laboratory to develop a training course on molten salt reactors that approximately 90 NRC staff members attended between May and November 2017. All three courses are now available on video for additional NRC staff to take in the future.

As part of near-term IAP Strategy 2, the NRC is acquiring and developing sufficient computer codes and tools to perform non-LWR regulatory reviews. In the near term, these efforts focus on reactor kinetics and criticality, fuel performance, thermal-fluid phenomena, severe accident phenomena, offsite consequence analysis, materials and component integrity, and probabilistic risk assessment (PRA). An initial screening of analysis codes for design-basis and beyond-design-basis event simulation, completed in 2017, identified a suite of tools for further examination and consideration. The code suite comprises both NRC-developed codes and codes developed by the U.S. Department of Energy (DOE). On November 16, 2018, the NRC staff briefed the ACRS on the role of confirmatory calculations in regulatory decisionmaking, and non-LWR developers discussed their plans for modeling and simulation tools. In FY 2019, the staff continued to engage with stakeholders, including the ACRS, on its code development plans. The staff drafted reports that provide a coherent basis and technical rationale for selection of the computer codes, and related development activities, in support of safety reviews of non-LWR designs. The reports describe the factors used to select the codes, the work necessary to achieve readiness to support the safety reviews, and the approach taken to prioritize resources for code development activities. The staff briefed the ACRS Future Plant Design subcommittee on the draft reports on May 1, 2019, and September 17, 2019. The staff engaged stakeholders in a public meeting on August 15, 2019, and met with the ACRS Full Committee on October 3, 2019. The reports will be finalized in late 2019.

As part of near-term IAP Strategy 3, the NRC is working to optimize the regulatory framework for non-LWR reviews and licensing processes. On December 26, 2017, the NRC issued “A Regulatory Review Roadmap for Non-Light Water Reactors,” which describes potential examples of flexibility, including the use of staged review processes and conceptual design assessments during the preapplication period (ADAMS Accession No. ML17312B567).

Also, as part of IAP Strategy 3, the NRC has engaged with the Licensing Modernization Project (LMP), a cost-shared initiative led by Southern Company, coordinated by NEI, and supported by DOE. The LMP’s objective is to develop technology-inclusive, risk-informed, and performance-based regulatory guidance for licensing non-LWRs for the NRC’s consideration and possible endorsement. The NRC staff reviewed four LMP white papers and sent a letter to the industry on February 21, 2018, concluding its review of the white papers (ADAMS Accession No. ML18047A149). On March 29, 2018, the industry submitted a working draft of a consolidated guidance document titled, “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development,” to support discussions during a public meeting on April 5–6, 2018. The NRC also held public meetings on June 5–6, 2018; August 21, 2018; and September 13, 2018, to discuss the updated draft LMP document and to obtain stakeholder feedback on potential endorsement of the LMP document. The NRC staff and industry also briefed the ACRS Future Plant Designs Subcommittee on June 19 and

October 30, 2018, and the ACRS Full Committee in February 2019. The NRC published a draft regulatory guide (RG) in the *Federal Register*, on May 3, 2019, for public comment (ADAMS Accession No. ML18312A242). The draft RG endorses, with clarifications, the principles and methodology in NEI 18-04, “Risk-Informed Performance-Based Guidance for Non-Light Water Reactor Licensing Basis Development” as one acceptable method for determining the appropriate scope and level of detail for parts of applications for licenses, certifications, and approvals for non-LWRs. The methodology described in NEI 18-04 and the DG also provide a general methodology for identifying an appropriate scope and depth of information to be provided in applications to the NRC for licenses, certifications, and approvals for non-LWRs. NEI submitted NEI 18-04, Revision 1, on August 26, 2019, and requested NRC endorsement in a final RG. The NRC plans to address public comments on DG-1353 and issue a final regulatory guide in FY 2020. The staff also plans to send a SECY paper to the Commission discussing associated policy issues in 2019.

The staff is developing several additional guidance documents under IAP Strategy 3, including interactions with the Technology Inclusive Content of Application Project (TICAP). TICAP is a DOE cost-shared initiative led by Southern Company and coordinated through the NEI Advanced Reactor Regulatory Taskforce. TICAP will build on the LMP licensing approach to develop a methodology and guidance to inform the appropriate scope and level of detail for non-LWR applications. Another area of focus is the development of guidance for environmental reviews for microreactors that appropriately scales the depth and scope of content of the staff’s environmental documentation. The staff is developing this guidance based on an acknowledgement of the expected design features and smaller size of advanced microreactors (e.g., reduced radionuclide inventories and enhanced safety features) when compared to large LWRs, as well as a recognition that environmental impacts of microreactors could reduce the documentation needed for impacted areas. The NRC staff is also exploring whether the development of a generic environmental impact statement for advanced reactors would provide an adequate environmental review and yield sufficient benefit to support taking this approach.

As part of near-term IAP Strategy 4, the NRC is working to facilitate the development of industry codes and standards to support the non-LWR life cycle. The staff is actively participating in subgroups and working groups associated with the development of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section III, Division 5. It provides rules for the design, construction, testing, certification, and quality assurance of high-temperature reactors and covers the use of metallic, graphite, and composite materials. The NRC has identified the 2017 Edition of this standard for potential endorsement to improve the efficiency and effectiveness of the agency’s review process, provide the non-LWR designers a stable set of rules for reactor development, and facilitate the certification of non-LWR component vendors.

The NRC staff continues to participate in the Task Group on ASME/NRC Liaison for Division 5, which seeks NRC, DOE, and industry input in identifying gaps in ASME B&PV Code, Section III, Division 5, that need to be resolved before the NRC considers endorsing it in 10 CFR 50.55a, “Codes and Standards.” ASME sent a letter to the staff confirming that advanced reactor developers support NRC endorsement of the 2017 Edition of ASME B&PV Code, Section III, Division 5. Therefore, the staff is initiating the endorsement process. ASME also plans to submit a technical basis document for the 2017 Edition. The staff discussed its plans for endorsing ASME B&PV Code, Section III, Division 5, during the NRC’s annual standards forum on September 11, 2018, and during a periodic advanced reactor stakeholders meeting on September 13, 2018. The staff updated stakeholders on this topic again during a June 27, 2019, public meeting.



The staff is also actively participating on several American Nuclear Society (ANS) standards working groups and consensus committees related to non-LWR safety standards and the joint ASME/ANS non-LWR PRA standard. On February 7, 2019, the NRC Standards Executive issued a letter to the ASME Board Chair and ANS Standards Board Chair (ADAMS Accession No. ML19031C904), communicating the priority of various PRA standard development activities. The NRC identified completion of the non-LWR PRA standard as a high priority consistent with the requirements of NEIMA. The staff discussed its plan for endorsing the standard during public meetings on June 27 and August 15, 2019.

As part of near-term IAP Strategy 5, the NRC is identifying and resolving technology-inclusive (i.e., not specific to a particular non-LWR design or category) policy issues that affect regulatory reviews, siting, permitting, and licensing of non-LWR nuclear power plants. The technology-inclusive policy issues that the NRC staff has discussed with stakeholders include the following

- Siting—In November 2017, the NRC staff issued the draft white paper, “Siting Considerations Related to Population for Small Modular and Non-Light Water Reactors.” The purpose of the paper was to facilitate stakeholder engagement in a potential policy issue involving siting considerations for SMRs and non-LWRs related to population distribution and density. SECY-16-0012, “Accident Source Terms and Siting for Small Modular Reactors and Non-Light Water Reactors,” dated February 7, 2016, had previously identified this issue. During a public meeting on May 3, 2018, NEI provided feedback on behalf of its nuclear industry members, stating that the NRC should update RG 4.7, Revision 3, “General Site Suitability Criteria for Nuclear Power Stations,” issued March 2014, to scale the population density guidance based on the smaller source term and lower probability of release anticipated for SMRs and advanced reactors. In June 2019, Oak Ridge National Laboratory completed a technical report, ORNL/TM-2019/1197, “Advanced Reactor Siting Policy Considerations,” identifying potential alternative siting criteria for SMRs and non-LWRs, recognizing the possible reduced offsite releases for advanced reactor designs (ADAMS Accession No. ML19192A102). The report provides insights to inform the staff’s plans to develop additional regulatory guidance for SMR and non-LWR siting. On June 13, 2019, the NRC staff released a second draft white paper, “Population-Related Siting Considerations for Advanced Reactors” (ADAMS Accession No. ML19163A168), to facilitate stakeholder discussions at a public meeting on June 27, 2019. The staff addressed stakeholder feedback and issued a draft SECY paper with that title on July 19, 2019 (ADAMS Accession No. ML19203A219), to support meetings with the ACRS Future Plant Design subcommittee on August 23, 2019, and with the ACRS Full Committee on September 4, 2019. The staff plans to send its recommendation to the Commission in late 2019.
- Offsite Emergency Planning—Consistent with the Commission’s direction in 2015 to initiate a rulemaking, the NRC staff developed a draft proposed rule that would provide optional, alternative emergency preparedness requirements for SMRs and other new technologies. The alternative emergency preparedness requirements, proposed by staff, would adopt a consequence-oriented, risk-informed, and performance-based approach. In part, this rulemaking would potentially reduce requests for exemptions from the current emergency preparedness requirements and promote regulatory stability, predictability, and clarity in the licensing process for these future facilities. The NRC published the regulatory basis on November 15, 2017. The staff provided the

proposed rule to the Commission for its consideration in SECY-18-0103, “Proposed Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies,” on October 12, 2018 (ADAMS Accession No. ML18134A086).

- Insurance and Liability—In SECY-11-0178, “Insurance and Liability Regulatory Requirements for Small Modular Reactor Facilities,” dated December 22, 2011, the NRC staff identified a potential inequity between the insurance requirements for facilities with power reactors that produce electrical power equal to or greater than 100 MWe per unit, and multimodule facilities with SMR designs that individually produce less than 100 MWe but, in combination, produce more than 100 MWe. Specifically, the staff raised the question of whether, under the Price-Anderson Act and associated regulatory language, insurance and indemnity coverage would be sufficient to pay all public claims in the case of an insurable event at a multimodule facility with an individual module sized at less than 100 MWe. Since then, the NRC has prepared a comparative analysis of different SMR designs to further explore the potential inequity. The staff is also evaluating the differences in potential consequences for postulated accidents for non-LWR designs in relation to insurance and liability requirements. The staff is using these analyses, and other inputs, to determine whether to recommend any changes to the Price-Anderson Act for SMRs and non-LWRs. In accordance with the latest version of the Price-Anderson Act, by December 31, 2021, the NRC will submit a report to Congress, concerning the need for continuation or modification of the provisions of the Price-Anderson Act. The staff plans to provide the Commission, for its consideration, with a SECY paper associated with this report to Congress. The SECY paper will address any changes that the staff recommends for non-LWRs and SMRs. The staff engaged stakeholders on this topic during a public meeting on November 2, 2017, and it will continue to keep stakeholders informed as it prepares the report to Congress.
- Security and Safeguards Requirements—On December 14, 2016, NEI submitted a white paper, “Proposed Consequence-Based Physical Security Framework for Small Modular Reactors and Other New Technologies.” This paper “proposes an approach to security that considers the enhanced safety and security incorporated into these designs and provides a more effective and efficient means to protect the public health and safety.” In the transmittal letter, NEI asked that “the NRC establish regulatory positions on this approach and the associated policy and technical issues.” The staff considered stakeholder input and submitted SECY-18-0076, “Options and Recommendation for Physical Security for Advanced Reactors,” to the Commission on August 1, 2018. On November 19, 2018, the Commission directed the staff to initiate a limited-scope revision to regulations and guidance related to physical security for advanced reactors and approved, subject to edits, a related rulemaking plan. At a public advanced reactor stakeholder meeting on December 13, 2018, participants discussed the scope of potential changes to physical security requirements. The staff prepared a regulatory basis, which it published in the *Federal Register* on July 16, 2019, for public comment (ADAMS Accession No. ML19099A017). The staff discussed the regulatory basis with stakeholders during an August 8, 2019, public meeting and will consider comments on the regulatory basis as it prepares the draft proposed rule.
- Functional Containment Performance—On November 30, 2017, the NRC issued the draft white paper, “Functional Containment Performance Criteria.” The purpose of the paper was to facilitate stakeholder engagement on a policy issue related to the use of a functional containment approach for non-LWRs. The staff discussed the draft white paper with stakeholders on December 14, 2017, and February 1, 2018, and with the

ACRS Future Plant Designs Subcommittee on February 22, 2018, and with the ACRS Full Committee on April 5, 2018. The ACRS provided a letter to the staff on May 10, 2018. After considering ACRS and stakeholder feedback, the NRC staff provided SECY-18-0096, “Functional Containment Performance Criteria for Non-Light-Water Reactors,” to the Commission on September 28, 2018. In this paper, the staff recommended Commission approval of a proposed methodology for establishing functional containment performance criteria for non-LWRs in a manner that is technology inclusive, risk informed, and performance based. In SRM-SECY-18-0096, dated December 4, 2018, the Commission approved the staff’s proposed methodology for establishing functional containment performance criteria for non-LWRs. The Commission directed the staff to continue to keep it informed as the licensing framework for non-LWRs is developed and to notify the Commission if future policy issues arise as this work progresses. The staff is incorporating the methodology for functional containment performance criteria in ongoing work, such as the preparation of DG-1353; “Guidance for a Technology-Inclusive, Risk-Informed, and Performance-Based Methodology to Inform the Licensing Basis and Content of Applications for Licenses, Certifications, and Approvals for Non-Light Water Reactors;” future revisions of RG 1.232, “Guidance for Developing Principal Design Criteria for Non-Light-Water Reactors,” issued in April 2018; and interactions with specific designers.

- Microreactors—The NRC staff has met with individual designers, DOE, and the U.S. Department of Defense on “microreactors,” which are generally small and described by DOE as able to produce 1-20 megawatts of thermal energy. Microreactors are envisioned to perform nontraditional roles for nuclear power, such as providing power for defense sites and remote areas or used directly as heat. Microreactors are anticipated to have reduced reliance on complex safety systems, more inherent safety features, and potentially lower consequences as a result of any postulated accidents. The NRC staff has identified a number of potential policy and licensing issues that may need to be addressed for microreactors, including security requirements, emergency preparedness, staffing requirements, remote operation, aircraft impact, oversight, annual fee structure, manufacturing licenses, transportable reactors, siting, and environmental reviews. The staff discussed these issues with the ACRS Future Plant Design Subcommittee on August 23, 2019, and engaged stakeholders on these topics during a public meeting on October 17, 2019. Following these interactions, the NRC staff plans to prepare a Commission paper in FY 2020 to address these issues.

As part of near-term IAP Strategy 6, the NRC is optimizing communications. The agency conducts public meetings with stakeholders every 4 to 6 weeks. It continues to meet with potential applicants upon request and to share information with various international groups, including the Organisation for Economic Co-operation and Development’s Nuclear Energy Agency, the International Atomic Energy Agency, the Generation IV International Forum, and the NRC’s international regulatory counterparts. The NRC chairs the Nuclear Energy Agency’s Working Group on the Safety of Advanced Reactors for international regulators of non-LWRs. The purpose of the group is to bring interested regulators together to discuss common interests, practices, and problems and to address both the regulatory interests and research needs in support of nuclear safety and security. In August 2019, the NRC entered into a memorandum of cooperation with the Canadian Nuclear Safety Commission to further expand cooperation on activities associated with advanced reactor and SMR technologies. This may include cooperation in the development of shared advanced reactor and SMR technical review approaches; collaboration on preapplication activities; and collaboration on research, training,

and cooperation in the development of regulatory approaches to address unique and novel technical considerations for ensuring the safety of advanced reactors and SMRs.

Also, in support of IAP Strategy 6, the NRC has frequent interactions with DOE, including the following:

- On November 10, 2016, the NRC and DOE signed a memorandum of understanding (MOU) describing the roles, responsibilities, and processes related to the implementation of the DOE Gateway for Accelerated Innovation in Nuclear (GAIN) initiative. GAIN is intended to provide the nuclear energy community with increased access to the technical and regulatory information and financial support necessary to move new or advanced nuclear reactor designs toward commercialization while ensuring the continued safe, reliable, and economic operation of the existing nuclear fleet. As described in the MOU, the NRC is responsible for providing DOE and the nuclear energy community with accurate and current information on the NRC's regulations and licensing processes. DOE is responsible for then sharing that information with the prospective applicants, as appropriate.
- The NRC and DOE conduct monthly calls to discuss mutual areas of interest related to the GAIN initiative. In addition to the specific activities identified in the GAIN MOU, the NRC actively participates in GAIN-sponsored non-LWR workshops to provide an opportunity for it to gather information, develop technical expertise, and discuss NRC requirements and non-LWR readiness activities.
- The NRC and DOE also conduct quarterly management meetings to share information about advanced reactor readiness activities. For example, the NRC and DOE have discussed areas of future cooperation, including DOE piloting RG 1.232 and DG-1353 during the DOE authorization process for the proposed versatile test reactor. The NRC and DOE also discussed opportunities for the NRC to observe or participate in the authorization process to gain knowledge about non-LWR technology and to build staff capability for future NRC licensing activities for non-LWR designs. The NRC and DOE established an MOU on September 18, 2019, to outline these interactions (ADAMS Accession No. ML19266A003).
- On October 7, 2019, the NRC and DOE entered into an MOU to implement provisions of the Nuclear Energy Innovation Capability Act of 2017, relating to sharing technical expertise and knowledge on advanced nuclear reactor technologies and nuclear energy innovation.
- The NRC provided technical and regulatory information to support DOE's preparation of its report to Congress on microreactors as required by the John S. McCain National Defense Authorization Act for FY 2019.

## **Regulatory Infrastructure**

The NRC continues to enhance its regulatory infrastructure with the goals of improving the planning, licensing, and oversight of future new reactor applications; making timely and effective policy decisions; and enhancing and updating regulatory guidance for large LWRs, SMRs, and non-LWRs. In addition to updating regulatory guidance, the NRC continues to review its internal processes to enhance the effectiveness and efficiency of its application review process. The NRC provides several opportunities for external stakeholder input as part of these

enhancements. In addition, the agency rigorously assesses licensing and oversight performance and uses the results to inform these regulatory infrastructure activities.

The previous section discussed infrastructure activities that are largely aimed at non-LWRs. The sections below describe other infrastructure activities conducted during the reporting period.

#### *Revision to Regulatory Guide 1.206*

The NRC has revised RG 1.206, “Combined License Applications for Nuclear Power Plants,” issued June 2007, to include applicants for all licensing processes under 10 CFR Part 52, including DCs and ESPs. In May 2017, the staff issued a draft of the proposed revision, DG-1325, “Applications for Nuclear Power Plants,” for formal public comment. This DG captured important lessons learned from recent licensing actions on large LWRs and was informed through discussions in a series of public meetings. The NRC received comments on DG-1325 in September 2017 and issued the revised guide on October 12, 2018.

#### *NUREG-0800*

The NRC staff began an effort to modernize NUREG-0800, “Standard Review Plan [SRP] for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition.” The SRP is used to support the staff’s reviews of applications for COLs, DCs, and ESPs; limited work authorization requests; and license amendment requests. The SRP is focused on large LWR design reviews. The NRC staff recognized the need to modernize the SRP to support transformational change in the NRC’s licensing process for current and future light-water applications. The SRP modernization effort will improve efficiency and streamline the SRP by focusing the staff’s review on the regulatory requirements and associated acceptance criteria. In addition, the SRP will leverage the improved use of risk insights to inform the scope of the staff’s review.

#### *Environmental Guidance Updates*

The NRC staff noticed issuance of Revision 3 of RG 4.2, “Preparation of Environmental Reports for Nuclear Power Stations,” in the *Federal Register* on September 24, 2018. The agency had issued the previous revision (Revision 2) of RG 4.2 in July 1976. The staff is currently updating NUREG-1555, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan,” last revised in July 2007. The revisions will incorporate lessons learned from the first set of environmental reviews for new reactors and address reviews of SMRs, greenhouse gas emissions, and issues related to climate change. The NRC expects to publish a draft of the revised NUREG-1555 for public comment in December 2019. The revised guidance will improve the effectiveness of the staff’s reviews of applications for ESPs, DCs, and COLs; limited work authorization requests; and license amendment requests.

### **X. Response to Lessons Learned from the Fukushima Accident in Japan Throughout FY 2019**

The NRC staff continues to make significant progress toward the completion of the regulatory actions undertaken following the accident at Fukushima. Licensees have completed all safety improvements associated with the orders for mitigating strategies, spent fuel pool instrumentation, and severe-accident-capable hardened containment vent systems (HCVS).

The NRC and licensees have completed over 80 percent of the activities associated with the reevaluation of the potential seismic and flooding hazards under 10 CFR 50.54(f). The NRC expects to receive all remaining licensee responses by the end of 2019 and remains on track to complete all remaining reviews and inspections by the end of 2020. Details of these accomplishments are described below.

In FY 2019, the NRC completed the final six onsite inspections to verify licensees' compliance with the orders for mitigating strategies and spent fuel pool instrumentation. All operating power reactors are in compliance with these two orders. The last four of the applicable sites<sup>1</sup> informed the NRC that they are in full compliance with the HCVS order. The NRC staff continued to review licensees' documentation and performed onsite inspections to verify compliance with the HCVS order. The staff expects to complete the 4 remaining safety evaluations by the end of 2019 and the remaining 10 onsite inspections in 2020.

The NRC also put into effect a new regulation (10 CFR 50.155, "Mitigation of Beyond-Design-Basis Events") that, in part, makes the requirements of the orders for mitigating strategies and spent fuel pool instrumentation applicable to future license applicants (in addition to the current operating fleet). The NRC published the final rule in the *Federal Register* on August 9, 2019, with an effective date of September 9, 2019.

One year after the Fukushima accident, the NRC issued a formal request under 10 CFR 50.54(f) to each operating power reactor licensee to reevaluate the potential seismic and flooding hazards at its site, using present-day methods and guidance, and to identify any actions planned or taken to address plant-specific vulnerabilities. In FY 2019, the staff completed five flooding assessments and four seismic assessments. To date, 48 of 58 sites have completed flooding hazard reevaluation activities and 48 sites have completed seismic hazard reevaluation activities. The NRC expects to receive the remaining submittals, with the exception of two seismic reevaluations and one flooding reevaluation from licensees that have been granted extensions, by the end of 2019 and to complete all remaining regulatory reviews by the end of 2020.

## **XI. Planned Rulemaking Activities**

The attached report lists the status of NRC rulemaking activities as of October 4, 2019, including their priorities and schedules. Of a total of 89 rulemaking activities, 63 rulemakings are planned activities. The NRC is reviewing 26 petitions for rulemaking. The 63 planned rulemaking activities include 8 rulemakings in response to industry requests, 14 rulemakings that could reduce or clarify existing requirements, 26 rulemakings that are required by statute or are needed to conform NRC regulations to other agency requirements or to international treaties or agreements, and 15 rulemakings that could establish new requirements. The NRC uses a single tracking and reporting system to provide real-time updates on all NRC rulemaking activities. Members of the public can access the NRC's rulemaking activity information at <https://www.nrc.gov/about-nrc/regulatory/rulemaking/rules-petitions.html>.

At the time of publication, each proposed and final rule includes a statement that addresses actions taken to adhere to applicable backfitting and issue finality requirements. This includes discussing which, if any, backfitting and issue finality requirements apply and how the NRC staff evaluated the rule with respect to those requirements. In an effort to improve consistency in applying these requirements, the agency provides training on backfitting and issue finality to the

---

<sup>1</sup> This order only applies to boiling-water reactors with Mark I or Mark II containment designs, or 17 sites total.

staff who engage in activities where these topics arise. The NRC's Committee To Review Generic Requirements also reviews all rulemakings that meet defined criteria to provide additional confirmation that the agency applies backfitting and issue finality requirements to rulemakings appropriately and consistently.