



*Protecting People and the  
Environment*

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SEMIANNUAL STATUS REPORT ON THE  
LICENSING ACTIVITIES AND REGULATORY DUTIES OF THE  
UNITED STATES NUCLEAR REGULATORY COMMISSION

**April–September 2016**

Note: The period of performance covered by this report includes activities that occurred from the first day of April 2016 to the last day of September 2016. 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

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## **I. Reactor Oversight Process**

The U.S. Nuclear Regulatory Commission (NRC) continues to use the Reactor Oversight Process (ROP) at all nuclear power plants to assess the performance of reactor licensees and to guide the assignment of inspection resources. Using inputs from both self-assessments and independent evaluations, the NRC continuously assesses the ROP to enhance the effectiveness and efficiency of the program. The NRC staff meets with interested stakeholders periodically to collect feedback on the effectiveness of the process, which is also considered when making future refinements to the ROP.

The agency's most recent performance assessments show that all plants continue to operate safely. The NRC issued a press release on September 2, 2016, summarizing the 2016 midyear assessment of nuclear power plant performance and the associated mid-cycle assessment letters sent to each licensee, which are publicly available on the NRC Web site. The NRC has also updated the Web site to reflect the latest performance assessments as of the end of the second quarter of calendar year 2016.

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

Currently, 46 operating nuclear power reactors have committed to transition 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), also known as National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants." Of these 46 reactor units, 34 have already transitioned to an NFPA 805 licensing basis and the NRC staff is currently reviewing 10 others. The NRC anticipates completing its evaluation of 9 of the 10 submitted transition plans by the end of the second quarter of fiscal year (FY) 2017 and the tenth one by December 31, 2017. The agency expects to receive one license amendment application for the remaining two reactor units in FY 2018.

Six licensees have submitted proposals to implement 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors." The staff is reviewing these submittals, and the NRC staff and industry are clarifying guidance needed to complete the related safety evaluations.

Following the March 2011 event at the Fukushima Dai-ichi nuclear power plant in Japan, the NRC developed and issued orders to implement a comprehensive set of recommendations that would enhance the mitigating strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities following a beyond-design-basis external event. While the equipment and strategies were specifically intended to mitigate the effects of a beyond-design-basis external event, the equipment can also be used for other functions and could help mitigate some design-basis events as well. The NRC staff is evaluating how mitigating strategies equipment (referred to as FLEX) may be credited in various risk-informed regulatory decisions. In December 2015, the Nuclear Energy Institute (NEI) submitted two white papers on this topic for staff review. In August 2016 the NRC issued a letter explaining how use of the industry white papers could affect the NRC's evaluation of licensees' requests to credit FLEX equipment in risk-informed decisionmaking. The letter also discussed the NRC staff's plans to develop additional guidance on this topic.

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

During this reporting period (April–September 2016) the staff progressed in reviewing, assessing, and implementing, as appropriate, two proposed generic issues (GIs) and three GIs that are in the implementation stage. During the period, the staff also began a screening evaluation of a potential issue involving high-energy arcing faults at nuclear power plants. In addition, the staff posted a new dashboard on the status of GIs on the NRC’s public Web site at <http://www.nrc.gov/about-nrc/regulatory/gen-issues/dashboard.html>.

The two proposed GIs are (1) GI-193, regarding the potential for air binding of the emergency core cooling system (ECCS) pumps from a blowdown of the containment atmosphere into the torus following a large-break loss-of-coolant accident (LOCA), and (2) PRE-GI-017 on the possible adverse effects of seiches on maintaining suction to the service water pumps for nuclear power plants on the Great Lakes. The staff concluded, based on its assessment of the safety significance of both GIs, that the GIs did not warrant further regulatory actions. Therefore, these proposed GIs were screened out of the GI process. The staff documented its conclusions in issue closure letters dated June 16, 2016, and September 8, 2016, respectively.

The other three GIs that the staff is currently monitoring are GI-191, GI-199, and GI-204. These GIs are currently in the implementation stage of the resolution process. The subsections below summarize the actions associated with these three open GIs.

#### GI-191, “Assessment of Debris Accumulation on Pressurized-Water Reactor (PWR) Sump Performance”

This GI concerns the possibility that, after a LOCA in a PWR, debris accumulating on the ECCS sump screen may result in clogging and restrict water flow to the pumps. Because of this GI and the related 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, all PWR licensees increased the size of their containment sump strainers, which has significantly reduced the risk of the strainers clogging.

A related issue to GI-191 is the potential for debris to bypass the sump strainers and enter the reactor core. In 2008, the NRC staff determined that additional testing was necessary to resolve this issue. The industry completed additional testing and submitted topical report WCAP-16793-NP, “Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid.” In 2013, the NRC staff issued its safety evaluation based upon Revision 2 of this topical report as an acceptable model for assessing the effects on core cooling from fibrous particulate and chemical debris that have bypassed the sump strainers. The Pressurized-Water Reactor Operating Group submitted a new topical report, WCAP-17788, “Comprehensive Analysis and Test Program for GSI-191 Closure (PA-SEE-1090)—Cold Leg Break Evaluation Method for GSI-191 Long-Term Cooling,” intended to justify higher fiber limits than previously approved by the NRC. The Advisory Committee on Reactor Safeguards (ACRS) discussed this topical report at a meeting on October 20, 2015. The NRC staff will brief ACRS again once the staff completes its review in the spring of 2017.

Based on the interactions with stakeholders and the results of industry testing, in 2012, the NRC staff developed three options for licensees to resolve GI-191 and proposed them to the Commission. The Commission approved the closure options on December 14, 2012. Licensees have since notified the NRC of the option that they have selected. In addition, the NRC staff has developed a risk-informed draft final rulemaking, 10 CFR 50.46c, “Performance-

Based Emergency Core Cooling System Acceptance Criteria,” which includes provisions to allow licensees to use a risk-informed alternative to address the effects of debris on long-term core cooling. The Commission is currently evaluating the draft final rule.

As of September 2016, all plants with the smallest challenges have successfully resolved GI-191. The staff issued GL 2004-02 closeout documentation to these licensees. The remaining plants anticipate completing their actions by December 2018.

#### GI-199, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States for 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 values used in their original designs and previous evaluations. The scope was expanded later to include plants in the western United States. Following collaboration with the Electric Power Research Institute, the NRC issued a safety/risk assessment report to licensees and other stakeholders through Information Notice 2010-18, “Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plant.”

After the nuclear event at Fukushima, the NRC incorporated GI-199 into the work being performed in response to the accident, which is discussed further in Section X, “Response to Lessons Learned from the Fukushima Accident in Japan,” of this report.

#### 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. This GI is being addressed as part of the efforts associated with the NRC response to the Fukushima nuclear accident, which is discussed further in Section X, “Response to Lessons Learned from the Fukushima Accident in Japan,” of this report.

### **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. The FY 2016 NRC Congressional Budget incorporated two output measures related to licensing actions—the number of licensing actions completed per year and the age of the licensing action inventory.

Other licensing tasks for operating power reactors include the following:

- licensee responses to NRC requests for information through GLs or bulletins;
- NRC responses to petitions filed for enforcement action under 10 CFR 2.206, “Requests for Action under This Subpart;”
- NRC review of generic topical reports;

- responses by the NRC Office of Nuclear Reactor Regulation to requests for assistance from the agency's regional offices;
- NRC inspection of licensee analyses under 10 CFR 50.59, "Changes, Tests and Experiments;"
- updates to final safety analysis reports; and
- other licensee actions not requiring NRC review and approval before licensees can carry them out.

The FY 2016 NRC Congressional Budget incorporates two output measures related to other licensing tasks—the number of other licensing tasks completed each year and the age of the other licensing task inventory.

Table 1 shows the actual FY 2013, FY 2014, FY 2015, and FY 2016 results and the FY 2016 goals for the NRC Congressional Budget performance indicators for operating power reactor licensing actions and other licensing tasks. The NRC continues to work on the Fukushima Tier 1 activities under aggressive schedules that require close monitoring to ensure that the implementation of the activities is successful. The agency prioritizes all licensing action reviews in accordance with their safety significance; however, because of Fukushima-related work competing for the same critical skill sets, the backlog inventory of operating reactor licensing actions increased. In late FY 2014 the staff redistributed resources to support the stabilization and reduction of the licensing action backlog. As a result, the NRC saw the backlog inventory stabilize in FY 2015. The backlog has further reduced in FY 2016 to within performance standards. To improve the agency's projections, manage workload, and identify needed skills, the NRC issued a regulatory information summary to request that licensees supply information on their plans to submit licensing actions over the next 3 years. The agency also has undertaken or planned a number of additional initiatives, including enhancing workload management processes, providing more effective management attention, piloting an issue resolution process, and upgrading workload management tools. The agency continues to communicate with licensees to maintain the information as relevant. The NRC's senior management remains heavily engaged in monitoring the licensing action workload towards maintaining target performance goals.

**Table 1 Results and FY 2016 Goals for Congressional Budget Performance Indicators**

<b>CONGRESSIONAL BUDGET PERFORMANCE INDICATORS</b>					
<b>Output Measure</b>	<b>FY 2013 Actual</b>	<b>FY 2014 Actual</b>	<b>FY 2015 Actual</b>	<b>FY 2016 Goals</b>	<b>FY 2016 Actual</b>
Licensing actions completed per year	668	607	792	730 <sup>1</sup>	837
Age of inventory of licensing actions	95% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 99% ≤ 2 years	88% ≤ 1 year and 99% ≤ 2 years	95% ≤ 1 year and 100% ≤ 2 years	95% ≤ 1 year and 100% ≤ 2 years
Other licensing tasks completed per year	529	402	461	500	641
Age of inventory of other licensing tasks	97.6% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 100% ≤ 2 years	87% ≤ 1 year and 97% ≤ 2 years	90% ≤ 1 year and 100% ≤ 2 years	90% ≤ 1 year and 99% ≤ 2 years
2% Improvement in timeliness indicators				≥ 90% for 1-year licensing action indicator ≥ 89% for 1-year other licensing task indicator	95%  90%

**V. Status of License Renewal Activities**

The NRC has issued renewed licenses to 83 power reactor units licensed to operate. Two units with a renewed license have since permanently shut down. The NRC has 8 license renewal applications (LRAs) for 12 reactor units under review.

**Applications Currently under Review**

The following is the status of each application under review during the reporting period.

*Indian Point Nuclear Generating Units 2 and 3*

On April 30, 2007, Entergy Nuclear Operations, Inc. (“Entergy”), submitted an LRA for Indian Point Nuclear Generating Units 2 and 3, to extend the operating licenses for 20 years beyond the current license periods. In December 2015 the staff issued for public comment a draft second supplement to the December 2010 final supplemental environmental impact statement (SEIS) to address new information and other developments since Supplement 1 to the final SEIS was issued in June 2013. The comment period closed in March 2016; the staff expects to

<sup>1</sup> The Congressional Budget performance indicator is limited by the number of licensing action requests submitted or accepted the previous FY.

issue the final SEIS supplement in January 2017. On November 6, 2014, the staff issued Supplement 2 to the safety evaluation report (SER). The staff briefed ACRS on SER Supplement 2 on April 23, 2015. Additionally, activities related to the Atomic Safety and Licensing Board (ASLB) hearing process continued. Several adjudicatory issues remain outstanding. The NRC staff continues to review relevant new information and will supplement its existing evaluations, as necessary. The current schedule for a final licensing decision is to be determined pending the resolution of adjudicatory matters.

The operating license for Indian Point Nuclear Generating Unit 2 was set to expire on September 28, 2013, and the operating license for Unit 3 was set to expire on December 12, 2015. Given the timely submittal of the LRA for both units, continued operation is permitted under NRC regulations and the Administrative Procedure Act until the NRC determines whether to issue renewed licenses. A final determination will be made once the staff's review is complete and the hearing process is concluded. Entergy has implemented aging management programs for both Units 2 and 3, as described in the LRA, and the NRC continues normal reactor oversight to ensure safe operations.

#### *Diablo Canyon Nuclear Power Plant, Units 1 and 2*

On November 24, 2009, Pacific Gas and Electric Co. submitted an LRA for Diablo Canyon Nuclear Power Plant, Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. In June 2016, the applicant announced that it had reached an agreement with interested parties not to seek license renewal for Units 1 and 2, and requested that the staff suspend its review of the LRA, pending approval of the agreement by the California Public Utilities Commission. The applicant further stated that should the California Public Utilities Commission approve the agreement, Pacific Gas and Electric Co. would withdraw its LRA. In July 2016 the staff informed the applicant that it had suspended its review of the LRA.

#### *Seabrook Station, Unit 1*

On June 1, 2010, NextEra Energy Seabrook, LLC, submitted an LRA for Seabrook Station, Unit 1, to extend the operating license for 20 years beyond the current license period. In April 2013 the staff issued a second draft SEIS, which included a revised severe accident mitigation alternatives analysis and updates to comply with the NRC's revised environmental protection regulations. During the reporting period, the staff also worked toward resolution of the open items identified in the staff's June 2012 SER. In July 2015, the staff issued the final SEIS. Additionally, the staff completed activities related to the ASLB hearing process. The safety review remains in progress to resolve a technical issue regarding the alkali-silica reaction (ASR) affecting some concrete structures; all other open items are closed. The NRC staff also performed onsite inspections in February and March 2016 related to license renewal. The NRC staff continues to work with the applicant to ensure it properly addresses technical issues for closure of the SER ASR open item. The current schedule for remaining milestones is to be determined.

#### *South Texas Project, Units 1 and 2*

On October 28, 2010, South Texas Project (STP) Nuclear Operating Co. submitted an LRA for STP Units 1 and 2, to extend the operating licenses for 20 years beyond the current license periods. The staff issued the final SEIS in November 2013 and the license renewal SER with open items in January 2013. One item that remains open involves the selective leaching of



aluminum bronze piping and components. The NRC staff continues to work with the applicant to resolve the issue. All other open items have been resolved, and the staff is working to document their closure. The current schedule for remaining milestones is to be determined.

#### *Grand Gulf Nuclear Station, Unit 1*

On November 1, 2011, Entergy submitted an LRA for Grand Gulf Nuclear Station, Unit 1, to extend the operating license for 20 years beyond the current license period. During the current reporting period, the staff completed its work toward resolution of the open items identified in the staff's January 2013 SER. The staff issued its final SER in April 2016. In May 2016 the ACRS subcommittee conducted its meeting on Grand Gulf Nuclear Station. The full ACRS committee meeting is scheduled for October 2016 and a final decision is expected in December 2016.

#### *Fermi Unit 2*

On April 30, 2014, DTE Electric Co. submitted an LRA for Fermi Unit 2 to extend the operating license for 20 years beyond the current license period. During the reporting period, the staff continued work on the environmental and safety reviews of the application. The staff published the draft SEIS for comment in October 2015. The comment period on the draft SEIS closed in December 2015. Activities related to the ASLB hearing process are complete. The staff issued the SER with open items in January 2016 and the final SER in July 2016. A final license renewal decision is expected in November 2016.

#### *LaSalle County Station, Units 1 and 2*

On December 9, 2014, Exelon Generation Company, LLC (Exelon), submitted an LRA for LaSalle County Station, Units 1 and 2, to extend the operating licenses for an additional 20 years beyond the current license periods. During the reporting period, the staff continued work on the environmental and safety reviews of the application. The staff published the draft SEIS for comment in February 2016 and the final SEIS in August 2016. The staff issued the final SER in June 2016. The NRC renewed the operating licenses on October 19, 2016.

#### *Waterford Steam Electric Station, Unit 3*

On March 30, 2016, Entergy submitted an LRA for Waterford Steam Electric Station, Unit 3, to extend the operating license for 20 years beyond the current license period. During the reporting period, the staff completed the acceptability review and issued the project schedule.

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

The reactor enforcement statistics in Tables 2–4 below are arranged by region, half-year, most recent half-year, FY to date, and two previous FYs for comparison purposes. Table 2 provides the nonescalated reactor enforcement data. Table 3 provides escalated reactor enforcement data associated with traditional enforcement, while Table 4 provides this information for actions associated with the ROP. The severity level assigned to the violation (i.e., traditional enforcement) generally reflects the significance of a violation. However, for most violations, the significance of a violation is assessed using the significance determination process under the ROP. The ROP uses risk insights, where appropriate, to assist the NRC in determining the safety or security significance of inspection findings identified within the ROP.

These tables are followed by 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 calendar half-year.

**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	1 <sup>st</sup> Half FY 16	2	5	2	2	11
	2 <sup>nd</sup> Half FY 16	2	1	0	1	4
	FY 16 YTD Total	4	6	2	3	15
	FY 15 Total	4	7	1	10	22
	FY 14 Total	8	5	3	2	18
Noncited Severity Level IV or Green	1 <sup>st</sup> Half FY 16	81	74	87	97	339
	2 <sup>nd</sup> Half FY 16	88	63	84	93	328
	FY 16 YTD Total	169	137	171	190	667
	FY 15 Total	137	103	182	224	646
	FY 14 Total	124	147	223	257	751
<b>TOTAL Cited and Noncited Severity Level IV or Green</b>	1 <sup>st</sup> Half FY 16	83	79	89	99	350
	2 <sup>nd</sup> Half FY 16	90	64	84	94	332
	FY 16 YTD Total	173	143	173	193	682
	FY 15 Total	141	110	183	234	668
	FY 14 Total	132	152	226	259	769

**NOTE:** The nonescalated enforcement data in Table 2 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. The monthly totals generally lag by 30 days because of the time needed for inspection report and enforcement development. 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	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	0	0	0	0	0
	FY 16 YTD Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
	FY 14 Total	0	0	0	0	0
Severity Level II	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	0	0	0	0	0
	FY 16 YTD Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
	FY 14 Total	0	0	0	0	0
Severity Level III	1 <sup>st</sup> Half FY 16	0	0	1	1	2
	2 <sup>nd</sup> Half FY 16	2	0	0	0	2
	FY 16 YTD Total	2	0	1	1	4
	FY 15 Total	3	2	0	1	6
	FY 14 Total	1	0	0	0	1
<b>TOTAL Violations Cited at Severity Level I, II, or III</b>	1 <sup>st</sup> Half FY 16	0	0	1	1	2
	2 <sup>nd</sup> Half FY 16	2	0	0	0	2
	FY 16 YTD Total	2	0	1	1	4
	FY 15 Total	3	2	0	1	6
	FY 14 Total	1	0	0	0	1

**NOTE:** The escalated enforcement data in Table 3 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 ROP</b>						
		Region I	Region II	Region III	Region IV	TOTAL
Violations Related to Red Findings	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	0	0	0	0	0
	FY 16 YTD Total	0	0	0	0	0
	FY 15 Total	0	0	0	0	0
	FY 14 Total	0	0	0	0	0
Violations Related to Yellow Findings	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	0	0	0	0	0
	FY 16 YTD Total	0	0	0	0	0
	FY 15 Total	1	0	0	2	3
	FY 14 Total	0	0	0	2	2
Violations Related to White Findings	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	2	0	0	0	2
	FY 16 YTD Total	2	0	0	0	2
	FY 15 Total	4	1	5	0	10
	FY 14 Total	1	2	3	4	10
<b>TOTAL Related to Red, Yellow, or White Findings</b>	1 <sup>st</sup> Half FY 16	0	0	0	0	0
	2 <sup>nd</sup> Half FY 16	2	0	0	0	2
	FY 16 YTD Total	2	0	0	0	2
	FY 15 Total	5	1	5	2	13
	FY 14 Total	1	2	3	6	12

**NOTE:** The escalated enforcement data in Table 4 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 Taken**

The list below includes security-related actions and confirmatory actions not included in the tables above. The NRC does not make details of security-related violations publicly available.

*Exelon Generation Company, LLC (Ginna Nuclear Power Plant), EA-16-128*

On September 20, 2016, the NRC issued a notice of violation with a white significance determination process finding to Exelon for a violation identified during an inspection of the

R.E. Ginna Nuclear Power Plant (Ginna). The white finding, an issue of low to moderate safety significance, will require additional NRC inspections. The finding involves an inadvertent change Exelon made that introduced an error to the Ginna emergency plan. Specifically, Exelon implemented a revision to the emergency action level table for the fission product barrier matrix that was incorrect with respect to the emergency action level threshold associated with a potential loss of containment barrier. This could have resulted in an untimely declaration of a general emergency or a failure to declare a site area emergency during an actual event. A notice of violation was issued based on Exelon's failure to meet 10 CFR 50.54(q)(2), which requires that a holder of a license under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," shall follow and maintain the effectiveness of an emergency plan that meets the requirements in Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50 and, for nuclear power reactor licensees, the planning standards of 10 CFR 50.47(b).

*FirstEnergy Nuclear Operating Company (Davis-Besse Nuclear Power Station), EA-16-022*

On September 1, 2016, the NRC issued a confirmatory order to Davis-Besse Nuclear Power Station (Davis-Besse) to formalize commitments made as a result of an alternative dispute mediation session. The agreement resolves the apparent deliberate failure of a licensed operator to comply with a condition of his license and the operator's failure to provide Davis-Besse with information that was complete and accurate in all material respects for the submittal of required updates on the operator's medical condition. Davis-Besse agreed to a number of corrective actions, including (1) a management discussion with each licensed operator in regard to this event, (2) revisions to operator requalification training materials to incorporate facts and lessons learned from this event, (3) management communications on expectations and requirements for complete and accurate medical reporting to operations personnel subject to those requirements, (4) training to address the provisions of 10 CFR 50.9, "Completeness and Accuracy of Information," (5) revisions to existing fleet procedures governing licensed operator medical reports, (6) a presentation at the Nuclear Medical Resources Professionals User Group on the facts of this case, and (7) submission of an article to a widespread trade publication based on the facts and lessons learned from this event. In consideration of these commitments, the NRC agreed to refrain from issuing a notice of violation and will consider the confirmatory order as an escalated enforcement action for a period of 1 year from its effective date.

*Exelon Generation Company, LLC (Oyster Creek Nuclear Generation Station), EA-16-057*

On July 6, 2016, the NRC issued a notice of violation with a white significance determination process finding to Exelon for a violation of Criterion V, "Instructions, Procedures, and Drawings," of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 and of Technical Specification 3.7.C.2. The violation was for failing to appropriately prescribe an activity affecting quality, in documented instructions, associated with maintenance of the Oyster Creek Nuclear Generation Station emergency diesel generators (EDGs). Specifically, since 2002, Exelon did not have appropriate work instructions for replacement of the EDG cooling flexible hose every 12 years as specified by Exelon's procedure and vendor information. As a result, a flexible coupling hose remained in service for approximately 22 years and was subject to thermal degradation and aging that eventually lead to the failure of EDG No. 1 during a surveillance test on January 4, 2016. In addition, based on an analysis of hose failure and a review of past operability, the NRC determined that EDG No. 1

was inoperable for a period greater than its technical specification allowed outage time of 7 days.

*Wolf Creek Nuclear Operating Corporation (Wolf Creek Generating Station), EA-15-224*

On June 9, 2016, the NRC issued a notice of violation to Wolf Creek Nuclear Operating Corporation for an escalated enforcement action. The details of the finding have been withheld from the public because they are security-related information.

*Entergy Nuclear Operations, Inc. (Palisades Nuclear Plant), EA-15-039*

On May 16, 2016, the NRC issued a confirmatory order to Palisades Nuclear Plant (Palisades) to formalize commitments made as a result of an alternative dispute mediation session. The confirmatory order memorializes the resolution of the apparent violations identified during an investigation into a leaking safety injection refueling water tank (SIRWT) at Palisades. Palisades agreed to a number of corrective actions, including but not limited to (1) ensuring that site personnel understand lessons learned from this matter, (2) sharing lessons learned from this matter with other reactor licensees, (3) reviewing the applicable procedures in light of the lessons learned from events associated with leakage of the SIRWT and revising these procedures as appropriate, and (4) modifying its current program of public outreach. In consideration of these commitments, the NRC has agreed to refrain from issuing a civil penalty and a notice of violation.

*Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station), EA-15-247*

On April 11, 2016, the NRC issued a notice of violation to Entergy for a Severity Level III problem involving two related violations of NRC requirements. The first violation involved the failure to conduct compensatory fire watches as required by Pilgrim Nuclear Power Station's corporate procedures and 10 CFR 50.48, "Fire Protection." Specifically, on multiple occasions between June 1, 2012, and June 26, 2014, fire watch personnel failed to examine the areas involved in the hourly fire watch postings for evidence of fire or conditions that may lead to a fire. The second violation involved the failure to maintain complete and accurate records as required by 10 CFR 50.9(a). Specifically, on multiple occasions during the same timeframe, log sheets for hourly fire watches were falsified when an individual initialed that fire watches were completed when, in fact, these fire watches had not been performed.

*Entergy Nuclear Operations, Inc. (Waterford Steam Electric Station, Unit 3), EA-15-100*

On April 6, 2016, the NRC issued a confirmatory order to Entergy to formalize commitments made as a result of an alternative dispute resolution mediation session held on February 19, 2016. Entergy made the commitments as part of a settlement agreement between Entergy and the NRC about the deliberate violations of requirements under 10 CFR 50.9, 10 CFR 50.48, and 10 CFR 73.56(f)(3) (related to personnel access authorization requirements for nuclear power plants). The violations involved seven individuals at Waterford Steam Electric Station, Unit 3, who deliberately failed to conduct compensatory hourly fire watch inspections and falsified their fire watch tour logs, a licensee supervisor who deliberately failed to identify and take corrective actions when provided with information of suspected wrongdoing by fire watch individuals, and a licensee manager who deliberately provided incomplete and inaccurate information to an access authorization reviewing official about the trustworthiness and reliability of a contract fire watch individual. Entergy agreed to a number corrective actions, including

(1) conducting an Entergy nuclear fleet common-causes evaluation, and, if general industry insights are identified, sharing them at an industry forum, (2) revising or issuing fleetwide procedures to enhance Entergy's management and oversight of supplemental workers, (3) providing the common requirements for fire watch programs, and (4) providing a process to address requests for the reinstatement of unescorted access authorization for workers whose authorization has been temporarily suspended. In consideration of the commitments outlined in the confirmatory order, the NRC agreed to not issue a civil penalty or a notice of violation.

## **VII. Power Reactor Security and Emergency and Incident Response Activities**

The NRC continues to maintain an appropriate regulatory infrastructure and to perform its licensing and oversight functions to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. NRC security and emergency preparedness and incident response programs contribute to fulfilling this mission.

### **Security**

The NRC continues to conduct force-on-force inspections at each nuclear power reactor and Category I fuel cycle facility on a regular 3-year cycle. Each force-on-force inspection 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 licensees to defend against the design-basis threat (DBT) of radiological sabotage. Force-on-force exercises also provide valuable insights that enable the NRC to evaluate the effectiveness of licensee security programs. Category I fuel cycle facilities use a similar process to assess the effectiveness of the licensees' protective strategy against two DBTs—one for radiological sabotage and another to prevent the theft or diversion of special nuclear material.

The NRC is developing a final rule that would amend 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. Section 161A preemption authority allows the Commission to designate classes of facilities eligible to apply for NRC authorization to use various types of weapons and large-capacity ammunition-feeding devices, notwithstanding State, local, and certain Federal firearms laws and regulations prohibiting such possession and use. The final rule being developed by the NRC sets forth the requirements that licensees must meet when applying for this authority. The NRC has worked closely with the U.S. Department of Justice's Office of the Attorney General; the Federal Bureau of Investigation; and the Bureau of Alcohol, Tobacco, Firearms, and Explosives and other interested stakeholders in developing the rulemaking. In advance of the final rulemaking, the NRC has designated, through orders, seven power reactor licensees, one Category I strategic special nuclear material licensee, and one "at-reactor" independent spent fuel storage installation licensee as being eligible to apply for Section 161A preemption authority to address the site-specific needs of these facilities. In addition, the final rule will revise the regulations in 10 CFR Part 73 to include enhancements that were identified through a comprehensive review of the emergency event notification regulations.

The NRC plans to publish a proposed rule in 2017 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' 2008 version of "Mandatory Guidelines for Federal Workplace Drug Testing Programs." Specifically, the proposed changes will broaden the panel of drugs to be tested 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 be an active participant in the Integrated Response Program, which is a partnership between Federal Government agencies and the nuclear industry to improve the tactical responses of Federal, State, and local law enforcement to beyond-DBT events at nuclear power plant sites.

## **Cyber Security**

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

The NRC has developed an oversight program for cyber security that includes an inspection program, inspector training, and a process for evaluating the significance of inspection findings. The agency accomplished this collaboratively with stakeholders, including members of industry and representatives from the U.S. Department of Homeland Security (DHS), the Federal Energy Regulatory Commission, and the National Institute of Standards and Technology. The NRC completed inspection activities related to the interim milestones in calendar year 2015. In 2016, the NRC, along with industry, is preparing for full implementation inspection activities that will begin in calendar year 2017.

The agency amended 10 CFR Part 73 by adding timely notification requirements for certain operating reactor cyber security events. The new regulation (10 CFR 73.77, "Cyber Security Event Notification") requires cyber security event notifications that will contribute to the NRC's analysis of the reliability and effectiveness of licensees' cyber security programs, playing an important role in the continuing effort to provide high assurance that digital computer and communication systems and networks are adequately protected against cyber-attacks, up to and including the DBT. This requirement also increases the NRC's ability to respond to emergencies, monitor ongoing events, assess trends and patterns, and identify precursors of more significant events. This rulemaking also enhances the NRC's ability to inform other licensees, DHS, and Federal intelligence and law enforcement agencies of events related to cyber security.

The NRC staff proposed several options to the Commission in SECY-14-0147 for implementing cyber security for fuel cycle facilities. In response, the Commission issued a staff requirements memorandum related to SECY-14-0147 that directed the staff to initiate a high-priority, expedited rulemaking. The NRC staff completed the regulatory basis for the proposed rulemaking in March 2016. The proposed and draft final rule packages are scheduled to be submitted to the Commission in March 2017 and October 2018, respectively.

The NRC is implementing a cyber security roadmap (SECY-12-0088, "The Nuclear Regulatory Commission Cyber Security Roadmap," dated June 25, 2012), to evaluate the need for cyber



security requirements for other NRC license holders, including nonpower reactors, independent spent fuel storage installations, and byproduct materials licensees. Implementation of the roadmap will help the NRC to determine and ensure that appropriate levels of cyber security protection are implemented promptly and efficiently at all NRC-licensed facilities.

### **Emergency Preparedness and Incident Response**

Previous status reports provided updates on the NRC's path forward with regard to emergency preparedness communications and staffing issues identified in the NRC's assessment of the accident at Fukushima. In addition, during this reporting period, all 62 power reactor sites implemented multiunit/multisource dose assessment capabilities. The NRC staff incorporated these enhancements related to emergency preparedness into the proposed rulemaking package on the mitigation of beyond design-basis events (MBDBEs). The NRC is in the process of addressing the public comments received on the MBDBE rule in support of preparing a final rulemaking package.

In April 2012, the NRC and the Federal Emergency Management Agency (FEMA) began a multiyear initiative to revise NUREG-0654/FEMA-REP-1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, issued November 1980, 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 response organizations whose personnel would respond to the plant sites. In FY 2014, the joint NRC/FEMA working group completed initial drafts of the introductory information and the emergency plan evaluation criteria. NRC and FEMA staff jointly conducted a series of public meetings in FY 2014 to solicit feedback from stakeholders and members of the public on the initial drafts. A final draft of this document was completed in FY 2015 and issued for a 90-day public comment period on May 29, 2015. The comment period was extended to October 13, 2015, in response to requests from stakeholders. As of September 30, 2016, the NRC and FEMA completed jointly adjudicating the comments and are currently conducting their internal reviews to finalize the document.

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 physical security and emergency preparedness program licensing reviews for new power reactor applications 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 Uprates**

Licensees have applied for and implemented power uprates since the 1970s as a way to increase the power output of their plants. The NRC staff has reviewed and approved 157 power uprates to date. Approximately 22,037 megawatts thermal (MWt) or 7,346 megawatts electric (MWe) in electric generating capacity (the equivalent of about seven large nuclear power plant units) have been gained through power uprates at existing plants. The NRC currently has one power uprate application under review.

In December 2015, NRC staff conducted its most recent survey of nuclear power plant licensees' plans to submit power uprate applications over the next 5 years. This survey and

additional more recent information indicate that licensees plan to request power uprates for 10 nuclear power plants during the next 5 years.

## **IX. New Reactor Licensing**

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

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

The NRC is currently reviewing applications for new, large LWRs that have been submitted under the provisions of 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." The NRC has received a submittal for one new early site permit (ESP) application and expects to receive its first small modular reactor design certification (DC) application in December 2016.

#### *Early Site Permit Reviews*

##### Public Service Electric Gas (PSEG) Power, LLC, and PSEG Nuclear, LLC

PSEG Power, LLC, and PSEG Nuclear, LLC, submitted an ESP application on May 25, 2010. This application uses the plant parameter envelope approach, which includes design parameter information from four reactor designs, namely the U.S. EPR (formerly the U.S. Evolutionary Power Reactor), the Advanced Boiling-Water Reactor (ABWR), the U.S. Advanced Pressurized-Water Reactor (US-APWR), and the Advanced Passive 1000 (AP1000®).

On September 25, 2015, the NRC staff issued the final SER for the PSEG ESP application, completing the final milestone for the staff's safety review. The NRC staff issued the final environmental impact statement (FEIS) for the application on November 13, 2015.

On March 24, 2016, the ASLB conducted the mandatory hearing for the PSEG ESP application. The NRC staff and the applicant provided oral testimony in response to ASLB questions. On April 26, 2016, the ASLB released its decision recommending that the NRC issue the ESP, which the agency did on May 5, 2016.

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

Tennessee Valley Authority (TVA) submitted an ESP application in May 2016 for the Clinch River site near Oak Ridge, TN. This application is based on a plant parameter envelope characterizing several small modular LWR designs. Based on feedback received during the staff's acceptance review, TVA sent a letter dated August 11, 2016, proposing to provide supplemental information to the NRC in support of its application. The NRC has accepted TVA's proposal and in the interim, their application remains in a tendered status until the supplemental information is received and the application is accepted by the staff.

## *Design Certification Reviews*

### U.S. EPR

AREVA, Inc., submitted the U.S. EPR DC application on December 11, 2007. On February 25, 2015, AREVA, Inc., requested that the NRC suspend the application review until further notice. The NRC staff's review of the U.S. EPR DC application remains in suspension.

### US-APWR

Mitsubishi Heavy Industries, Ltd. (MHI), submitted its US-APWR DC application on December 31, 2007. On November 5, 2013, MHI issued a letter informing the NRC of its plans to implement a coordinated slowdown of licensing activities related to the application review. The NRC staff has been performing a limited-scope review of the US-APWR DC application since March 24, 2014, and will continue with this limited review until further notice from the applicant.

### Advanced Power Reactor 1400 (APR1400)

On December 23, 2014, Korea Electric Power Corp. and Korea Hydro & Nuclear Power Co., Ltd., submitted to the NRC their application for the certification of the 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 a 42-month timeframe and has completed Phase 1 of its technical review (issuing requests for additional information (RAIs) and developing a preliminary SER) on schedule. The NRC staff continues to implement its review strategy by addressing many of the RAIs early in the review process to ensure that the review milestones can be achieved within the schedule. The Phase 2 review (issuing a SER with open items) has been completed for many chapters in the DC application. In addition, the NRC staff completed ACRS subcommittee meetings (Phase 3) in September and October 2016 for SER Chapters 2, 5, 11, and 10.

### NuScale Small Modular Reactor Design Certification Application

On May 28, 2014, NuScale and the U.S. Department of Energy (DOE) completed a cooperative agreement in which DOE will award up to \$217 million to support NuScale's DC application for its small modular reactor. By letter dated June 17, 2015, NuScale announced that it would submit a DC application by December 2016.

On June 30, 2015, the NRC staff issued in the *Federal Register* the draft design-specific review standard for the NuScale design for public notice and comment. The NRC staff has reviewed the 680 public comments received and issued the final design-specific review standard sections between June and August 2016.

NuScale began submitting topical reports on various aspects of the reactor design for NRC staff review. The staff has accepted and started the technical review on several reports on topics including instrumentation and control, and electrical systems. NuScale plans to submit additional reports later in 2016.

The NRC staff recently completed a readiness assessment of the NuScale DC application. As described in the agency's letter to NuScale dated October 7, 2016, the staff concluded that, while portions of the planned application appear to be proceeding according to NuScale's

internal schedule, work remained for NuScale to address technical information and completeness deficiencies before the application would be acceptable for docketing. The staff expects to receive NuScale's DC application in December 2016.

### *Design Certification Renewals*

#### ABWR Renewal (Toshiba)

On November 2, 2010, Toshiba submitted an application for renewal of the ABWR DC; it submitted Revision 1 of its application on June 22, 2012. By letter dated May 25, 2015, Toshiba requested that NRC staff postpone further review of its application until July 2016. Subsequently, in a letter dated June 9, 2016, Toshiba withdrew its DC renewal application for the ABWR design.

#### ABWR Renewal (General Electric-Hitachi)

On December 7, 2010, General Electric-Hitachi (GEH) submitted an application for renewal of the ABWR DC. The NRC staff issued a letter to GEH on July 20, 2012, describing certain design changes (28 items) that should be considered for inclusion in the application. On May 7, 2015, the NRC staff met with the applicant to discuss how GEH intends to address the 28 items and several RAIs issued on other topics. By letter dated January 8, 2016, GEH submitted proposed changes to the ABWR design control document (DCD) to redesign the containment overpressure protection system (COPS) piping in order to meet the COPS flow rate requirement established in the DCD Tier 1 information. The NRC staff has communicated to GEH that eight items remain open, and the agency plans to issue supplemental RAIs or conduct public meetings to resolve these items. GEH submitted its revised application on February 19, 2016, to incorporate changes to the DCD. The staff issued a milestone schedule letter to GEH on August 30, 2016, projecting the completion of the staff's safety review in March 2018.

### *Combined License Application Activities*

The NRC staff has received a total of 18 COL applications to date. The NRC has issued combined licenses (COLs) for four sites (Vogtle Units 3 and 4; V.C. Summer Units 2 and 3; Fermi Unit 3; and STP Units 3 and 4). Three COL application reviews are currently suspended at the request of the applicants because of changes in the applicants' business plans (Bellefonte, Harris, and Comanche Peak). Seven COL applications have been withdrawn (River Bend, Bell Bend<sup>2</sup>, Victoria County, Nine Mile Point, Callaway, Calvert Cliffs, and Grand Gulf).

During the reporting period, the NRC staff was actively reviewing four COL applications for a total of seven units, as discussed below.

#### Levy County COL Application

On July 30, 2008, Progress Energy Florida, Inc., submitted a COL application for two AP1000 units to be located at its site in Levy County, FL. Duke Energy Florida, LLC took over as the

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<sup>2</sup> On August 30, 2016, Talen Energy submitted a letter to the NRC requesting the withdrawal of its COL application for the Bell Bend Nuclear Power Plant. By letter dated September 22, 2016, the NRC approved Talen Energy's request to withdraw the Bell Bend COL application.

applicant following a corporate merger between Progress Energy, Inc. and Duke Energy Corporation. The NRC staff issued its FEIS for the Levy County COL application on April 27, 2012, and its final SER on May 31, 2016.

The Commission held the mandatory hearing for the Levy COL on July 28, 2016. On October 20, 2016, after the close of the reporting period, the Commission authorized the issuance of the licenses and the licenses were issued to Duke Energy Florida, LLC on October 26, 2016.

#### William States Lee III COL Application

On December 13, 2007, Duke Energy Carolinas, LLC, submitted a COL application for two AP1000 units at its Lee site near Charlotte in Cherokee County, SC. The NRC issued the FEIS on December 27, 2013, and the final SER on August 1, 2016.

The Commission held the mandatory hearing for the Lee COL on October 5, 2016, shortly after the close of the reporting period. The Commission expects the issue an order on the hearing in December.

#### Turkey Point COL Application

On June 30, 2009, Florida Power & Light submitted a COL application for two AP1000 units at the existing Turkey Point Nuclear Generating Station site in Miami-Dade County, FL.

The NRC staff completed its safety review and presented the advance final SER to ACRS on August 19, 2016. On February 27, 2015, the NRC staff submitted the draft environmental impact statement (DEIS) for the COL application for Turkey Point, Units 6 and 7, to the U.S. Environmental Protection Agency (EPA). The staff developed the DEIS in cooperation with the U.S. Army Corps of Engineers (USACE) Jacksonville District and the National Park Service. The NRC received approximately 11,000 comments on the DEIS; a majority of those comments are identical form letters. The NRC received comments from other Federal agencies, including EPA, National Park Service, U.S. Department of the Interior, and the U.S. Fish and Wildlife Service. To respond to and resolve some of the issues raised in the comments, the NRC staff performed further technical analysis and conducted multiple Federal inter-agency meetings. The NRC met with other Federal agencies in late April 2016 to discuss the resolution of the comments and expects to complete the environmental and safety reviews in November 2016. The mandatory hearing will be scheduled shortly thereafter. Additionally, activities related to the ASLB hearing process continued.

#### North Anna, Unit 3, COL Application

On November 27, 2007, Dominion Virginia Power (Dominion) submitted a COL application for an Economic Simplified Boiling-Water Reactor (ESBWR) at its North Anna Power Station site near Richmond in Louisa County, VA. The NRC issued the FEIS in February 2010.

On June 28, 2010, Dominion submitted a revised application to cite a different design, the US-APWR. However, on April 25, 2013, Dominion notified the NRC of its intent to revert to the ESBWR design. Dominion submitted its partially revised COL application in July 2013 to reflect its revised design decision and submitted all remaining application sections to the NRC in December 2013.

On October 22, 2014, Dominion submitted a seismic closure plan that described a modified approach to certain aspects of its seismic analysis to address exceedances of the ESBWR seismic design limitations. The schedule that Dominion outlined in its closure plan included issuing technical reports and responses to staff questions through calendar year 2015. On December 16, 2015, Dominion provided its third and final submittal to the NRC, which included RAI responses and COL application markups. The NRC staff completed the safety review for the North Anna, Unit 3, COL application and exceeded the public milestone schedule by about 3 months. The agency sent a revised schedule letter to Dominion on August 31, 2016, that projected issuance of the final SER in January 2017. A mandatory hearing will then be scheduled.

## **Regulatory Infrastructure**

The NRC continues to enhance its regulatory infrastructure to support the planning, licensing, and oversight of new and advanced reactor applications by carrying out timely and effective policy decisions and by enhancing and updating regulatory guidance for LWRs, small modular reactors, and non-LWRs. In addition to updating regulatory guidance, the NRC continues to review its internal processes to enhance the efficiency and effectiveness of its application review process. The NRC conducts these regulatory infrastructure enhancements openly and transparently with several opportunities for external stakeholder input. In addition, the NRC rigorously assesses licensing and oversight performance and uses the results to inform these regulatory infrastructure activities.

Examples of infrastructure activities conducted during the reporting period are described below.

### *Revision to Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," Issued June 2007*

The NRC staff continues its work on revising Regulatory Guide (RG) 1.206, "Applications for Nuclear Power Plants." The revision will clarify the guidance to encompass applicants for all licensing processes under 10 CFR Part 52, including DCs and ESPs. The revision will also capture important lessons learned from recent licensing actions on large LWRs, but it has general applicability to all applications under 10 CFR Part 52. The revision is being informed by ongoing interactions with stakeholders and the public. During the period covered by this report, the staff conducted a public meeting (on May 3, 2016), to solicit stakeholder input on the development of guidance on select regulatory topics to be included in the revised RG 1.206, and a final public meeting (September 26, 2016), to solicit stakeholder feedback on the remaining regulatory topics before the draft guide is made available for public comment through a *Federal Register* notice.

### *Standard Review Plan (NUREG-0800) Updates*

The NRC staff continues its systematic update of NUREG-0800 to support reviews of COL, DC, and ESP applications; limited work authorization applications; and license amendment requests. During this reporting period, the staff published two notices in the *Federal Register* requesting public comment on proposed revisions to the review guidance for (1) steam generator materials and design and (2) structural and systems engineering inspections, tests, analyses, and acceptance criteria (ITAAC). In addition, the staff published several notices in the *Federal Register* making available the final review guidance for 50 sections of NUREG-0800 previously issued as proposed guidance. The final review guidance includes sections on severe accidents, instrumentation and controls, steam generator materials and design, radioactive waste

management, conduct of operations, seismic qualification, and system quality group classification.

### *Environmental Guidance Updates*

The NRC staff continues to work on updating RG 4.2, "Preparation of Environmental Reports for Nuclear Power Stations" (last revised in 1976), and NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan" (last revised in 2007), to support reviews of ESP, DC, and COL applications; limited work authorization requests; and license amendment requests. The staff is incorporating lessons learned from the first set of environmental reviews for new reactors. In addition, it is updating the guidance to address reviews of small modular reactors, greenhouse gas emissions, and issues related to climate change. The staff expects to issue a draft of RG 4.2 for public comment towards the end of calendar year 2016. The staff expects to issue a draft of the revised NUREG-1555 for public comment in mid- to late 2017. Additionally, the staff is carrying out other guidance development and knowledge management activities in the areas of (1) updating NUREG-KM-0001 on Three Mile Island accident cleanup lessons learned, (2) implementation of new Council on Environmental Quality guidance and staff guidance on greenhouse gas emissions, and (3) development of a new RG 4.24, "Aquatic Environmental Studies for Nuclear Power Stations."

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

The NRC issued COLs to Southern Nuclear Operating Co. and several co-owners on February 10, 2012, for two AP1000 units at the Vogtle site near Augusta, GA, and to South Carolina Electric & Gas Co. on March 30, 2012, for two AP1000 units at the V.C. Summer site near Columbia, SC. As construction progresses, the NRC has increased the pace of construction inspections to verify compliance with the agency's regulations and to ensure that the new plants are constructed in accordance with their COLs. Recent NRC inspections have focused on activities such as concrete placement, welding, module fabrication, and civil or structural engineering activities. NRC inspection activities will continue to increase as licensees broaden the scope of construction activities.

The NRC staff continues to apply lessons learned from the review of submitted ITAAC closure notifications and to improve the processes that support ITAAC closure. The staff has facilitated several public workshops to solicit input, exchange views, and reach consensus on emerging issues, including the reviews of uncompleted ITAAC notifications that should lessen the resources that will be required during the surge of ITAAC Closure Notifications at the later stages of construction.

The NRC has established the Construction Reactor Oversight Process (cROP) at the sites of the four new Vogtle and V.C. Summer reactor units. Using practices similar to those of the ROP, the NRC continues to meet periodically with interested stakeholders to collect feedback on the effectiveness of the process, which is then considered in making future refinements to the cROP. The agency's most recent performance assessments demonstrate that reactor construction is being conducted safely and all four units are performing well against the cROP criteria. Plant assessments and the latest cROP-related information are publicly available on the NRC Web site.

### *Vendor Inspections*

The NRC staff is implementing an inspection program for vendors supporting operating plants and plants under construction. Focus areas for new reactors include integrated system validation for the control room simulators, digital instrumentation and control systems, modular fabrication, and reactor coolant pumps. As issues are identified, the staff follows up with the vendors to ensure that corrective actions are being implemented and that the quality of components supplied to the operating plants is consistent with their safe use, in accordance with the NRC's regulations.

### *Operator Licensing*

During the reporting period, the NRC administered operator licensing examinations for Southern Nuclear Operating Co.'s Vogtle Units 3 and 4. Of the 19 candidates, 18 passed. The NRC administered similar examinations at South Carolina Electric & Gas Co.'s V.C. Summer, Units 2 and 3. Those results are not yet available.

### **Non-Light-Water Reactors**

As the NRC prepares to review and regulate a new generation of non-LWRs, the agency developed a vision and strategy to assure NRC readiness to conduct its mission for these technologies effectively and efficiently. The staff described the vision and strategy in "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness," Revision 1, which was published in the *Federal Register* on July 21, 2016, for stakeholder input. The public comment period closed on September 19, 2016.

The NRC's approach under this non-LWR vision and strategy consists of two phases. Phase 1 is the conceptual planning phase used to lay out the vision and strategy, gather public feedback, and finalize the NRC's approach. Phase 2 includes detailed internal work planning efforts, development, and task execution. Both phases began in 2016. Phase 1 is expected to be completed in 2016, and Phase 2, which has multiple activities, has a target completion date of not later than 2025.

The NRC's non-LWR vision and strategy has three strategic objectives—enhancing technical readiness, optimizing regulatory readiness, and optimizing communication. Technical readiness activities will seek to evaluate, clarify, and resolve critical technical and policy issues that need to be addressed for effective and efficient non-LWR reviews. Among other things, the NRC recently renewed an existing interagency agreement with DOE that includes exploring regulatory issues and research needs for novel fuel designs. Additionally, the NRC will work with its stakeholders to facilitate proposed revisions to industry codes and standards to address certain non-LWR designs and develop related requirements.

As part of its activities related to the regulatory readiness strategic objective, the NRC will seek to optimize the regulatory framework for non-LWR reviews and licensing processes. In the near term (0–5 years), the staff will examine opportunities for flexibilities within the existing regulatory framework. Potential examples of these flexibilities include the use of a staged-review process and the use of conceptual design assessments during the preapplication period.

The NRC will also complete development of advanced reactor design criteria in the near term. As part of that effort, DOE completed a report entitled, "Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors," and submitted it to the NRC in



December 2014. The NRC reviewed the report and plans to issue an RG on design criteria for advanced non-LWRs. To support that goal, the NRC published draft design criteria for advanced reactors on the NRC's public Web site on April 7, 2016, and opened a 60-day public comment opportunity on that draft. The informal public comment period closed on June 8, 2016. A public meeting took place October 11, 2016, shortly after the reporting period, where the NRC presented the proposed resolution to the public comments. The agency will schedule additional opportunities for the public to comment after it issues a draft RG in 2017.

Over the longer term, the NRC will examine whether a new risk-informed, performance-based regulatory framework for non-LWRs would be beneficial, effective, and efficient.

As part of its activities related to the communications strategic objective, the NRC will continue to conduct public meetings with stakeholders. The NRC will also continue to share information with various national and international groups, including DOE, the Organisation for Economic Co-operation and Development's Nuclear Energy Agency (NEA), the International Atomic Energy Agency (IAEA), the Generation IV International Forum, and the NRC's international regulatory counterparts. The NRC chairs NEA's ad hoc group for international regulators of non-LWRs known as the Group on the Safety of Advanced Reactors. The purpose of the Group is to bring interested regulators together to discuss common interests, practices, and problems and address both the regulatory interests and research needs. The NRC also chairs the IAEA Small Modular Reactor Regulators' Forum. The purpose of the Forum is to identify, understand, and address key regulatory challenges that may emerge in future regulatory discussions on small modular reactors.

The NRC and DOE hosted the second 2-day Advanced Non-Light-Water Reactors Workshop on June 7–8, 2016. The focus of this series of workshops is to open a dialogue between key stakeholders to discuss challenges in the commercialization of non-LWR technologies and to discuss possible solutions. The second workshop included presentations and discussions on strategies for non-LWR development and deployment and reactor fuel development and qualification. The staff is planning a third workshop with DOE for the spring of 2017.

In addition, the NRC continues to meet with potential applicants upon request and, as part of its activities related to the technical readiness strategic objective, the agency participates in the work of numerous standards development organizations. Examples include the American Nuclear Society and American Society of Mechanical Engineers standards development working groups for non-LWR designs and related topics.

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

The NRC's response to the lessons learned from the Fukushima accident in Japan during the reporting period has focused on implementation of the highest priority (Tier 1) activities and on completing evaluations of the lower priority (Tier 2 and 3) activities that have not already been addressed. The agency continued to assign resources to address these activities while ensuring a balance between putting lessons learned from Fukushima into place and the need to ensure that those efforts do not displace ongoing work of greater safety benefit, work that is necessary to maintain safety, or other higher priority work.

The NRC continues to review nuclear power plant licensee plans to achieve compliance with the mitigation strategies and spent fuel pool instrumentation orders issued in March 2012. The NRC has issued interim staff evaluations and has finished auditing licensee implementation of these important safety improvements. As of September 30, 2016, approximately 70 percent of

all units have fully implemented the mitigating strategies order and more than 90 percent of units have implemented the spent fuel pool instrumentation order. By the end of calendar year 2016 the NRC expects all operating units to have substantially implemented the mitigation strategies order, and nearly all units will be in compliance with the spent fuel pool instrumentation order.

In June 2013, the NRC issued a revised order requiring the installation of a severe-accident-capable hardened containment vent for boiling-water reactors with Mark I and II containments. Licensees are implementing this order in two phases. The NRC received the licensees' integrated plans for compliance with Phases 1 and 2 of that order by June 2014 and December 2015, respectively. The NRC has issued interim staff evaluations for Phase 1 and has issued the majority of the interim staff evaluations for Phase 2. Licensees will begin coming into compliance with this order in fall 2017, with full implementation for all sites by June 2019.

The NRC also requested that nuclear power plant licensees reevaluate flooding and seismic hazards that could affect their sites. If these newly reevaluated hazards are not bound by the current design basis, licensees are required to determine whether interim protective measures are needed while they complete a longer term evaluation of the hazard's impact on the plant.

Following Commission direction, the NRC staff is now implementing the closure plan for the flooding hazard reevaluations. As part of this plan, the NRC staff is reviewing flooding hazard reevaluation reports submitted by licensees and is issuing an interim assessment of those reports. As of September 2016, all but two sites have completed their flooding hazard reevaluation reports (FHRRs) and submitted them to the NRC for review. The remaining two sites have been granted extensions and are awaiting data from the USACE. The staff will establish the due dates for these two sites when the licensee or the NRC receives the data from USACE. The NRC has issued staff assessments for 23 of the FHRRs, and the NRC staff expects to complete the technical assessment of the remaining FHRRs by the end of 2017. Licensees are expected to use the information in the assessment letters to ensure that their mitigating strategies can be implemented under the reevaluated hazard conditions. Most licensees are expected to complete their mitigation strategies assessment by December 2016. Depending on site-specific considerations, other evaluations may be required, beyond those associated with mitigating strategies. The staff will determine the need for any other evaluations using a graded approach to ensure that plants are appropriately protected against the reevaluated flooding hazards. This graded approach focuses on areas with the most potential safety benefit. Those sites that had flood-causing mechanisms that exceeded their current design basis are required to perform additional analysis (e.g., focused evaluation or integrated assessment) to evaluate the site response to the updated flood hazard. The focused evaluations are due in mid-2017, and the integrated assessments are due by the end of 2018. The NRC staff issued guidance on the graded evaluation approach in July 2016.

In October 2015, the NRC issued a letter establishing the final list of operating reactor sites that will be required to perform a full seismic probabilistic risk assessment (SPRA) and other seismic evaluations. As discussed in that letter, 20 sites (36 units) will be required to perform an SPRA. For the remaining reactors, the NRC staff concluded that sufficient margin exists such that a detailed SPRA is not needed. The first SPRAs are due to the NRC in March 2017, and all SPRAs will be received by December 2019. Of the remaining sites, 32 will perform limited-scope evaluations (i.e., a high-frequency evaluation, low-frequency evaluation, or spent fuel pool evaluation). Eleven sites have screened out and will not need any further seismic evaluations. As of September 30, 2016, the NRC staff has completed its assessment and closed out all required actions concerning seismic hazard reevaluations for 17 sites.

Sites that are required to conduct an SPRA submitted interim actions or evaluations in December 2014 or January 2016 as part of the expedited seismic evaluation process. These evaluations assessed systems and components used to shut down a plant safely under certain accident conditions to (1) confirm that a plant has sufficient margin to continue with a longer term evaluation without any plant modifications or (2) identify the need to enhance the seismic capacity of the plant. The NRC staff has completed its review of the expedited seismic evaluation process submittals and found them to be acceptable.

The Commission previously approved consolidating the station blackout mitigation strategies rulemaking with the onsite emergency response capabilities rulemaking, as well as including portions of the emergency planning recommendations. The consolidation enables the NRC to use resources more efficiently to produce an integrated and coherent set of requirements for addressing beyond-design-basis events. In August 2015, the Commission approved the draft proposed rule, which was made available for public comment in November 2015. The public comment period closed in February 2016. The NRC received 20 public comment letters. The NRC staff is reviewing the public comments and will revise the rulemaking package accordingly. The staff will deliver the final rule package to the Commission by the end of 2016.

The NRC has moved forward with resolving the lower priority Tier 2 and 3 recommendations that have not already been addressed and provided a proposed resolution for each recommendation to the Commission in late 2015. The Commission approved the staff's proposals, including closure of a number of the recommendations. The staff will provide its evaluations for the final three open Tier 2 and 3 recommendations to the Commission by the end of 2016.

The NRC continues to place a high level of importance on public interaction for all of the activities stemming from the Fukushima lessons learned. The NRC held dozens of public meetings in FY 2016 discussing Fukushima lessons learned, and these opportunities for collaboration with the public, industry, and other stakeholders have improved the effectiveness and efficiency of the NRC's actions. In addition, the NRC continues to actively engage with the international community on the evaluation and response to lessons learned from the accident.

The Fukushima activities described above demonstrate consistent progress in completing safety enhancements at U.S. facilities in response to lessons learned from the accident. The NRC expects that the majority of the safety benefit from the post-Fukushima enhancements will be in place by December 31, 2016. The work remaining past 2016 is primarily associated with completing the severe-accident-capable hardened vents order, activities associated with reevaluated flooding and seismic hazards, postorder compliance inspections, and implementation of long-term NRC oversight.

## **XI. Planned Rulemaking Activities**

As of October 14, 2016, the NRC is working on a total of 81 rulemaking activities. Of these, 62 are planned rulemaking activities, 2 are approved by the Commission for discontinuation (the NRC staff is developing the required documentation to inform the public that the rulemakings are discontinued), and 17 are petitions for rulemaking that the NRC is reviewing. The 62 planned rulemaking activities include 9 rulemakings in response to industry requests, 7 rulemakings that could reduce or clarify existing requirements, 26 rulemakings that would comply with congressional statute or conform NRC regulations to other agency requirements or to international treaties or agreements, and 20 rulemakings that could establish new requirements. The attachment provides the most current information available as of

October 14, 2016, for all planned rulemaking activities, including their priority and schedule. By May 2017, the NRC will implement a single tracking and reporting system that will provide real-time updates to the public on all NRC rulemaking activities.