Reactor Oversight Process Program Area Evaluations

The U.S. Nuclear Regulatory Commission (NRC) staff performed the Reactor Oversight Process (ROP) self-assessment for calendar year (CY) 2016 in accordance with specific elements of the redesigned process, as governed by Inspection Manual Chapter (IMC) 0307, "Reactor Oversight Process Self-Assessment Program," dated November 23, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15307A023) and its appendices. The revised self-assessment approach consists of three distinct elements designed to: (1) measure the effectiveness of, and adherence to, the current ROP; (2) monitor ROP revisions and assess recent program changes for effectiveness; and (3) perform focused assessments of specific program areas as well as peer reviews of regional offices.

The staff evaluated the key program areas of the ROP in accordance with Element 1 of the revised self-assessment process. This review is consistent with the scope given in Appendix C, "Planned Program Reviews," to NUREG-1614, Volume 6, "Strategic Plan: Fiscal Years 2014–2018," issued August 2014 (ADAMS Accession No. ML14246A439). The sections below describe assessments of: (1) "Performance Indicator Program" reviewing the usefulness of current performance indicators (PIs) for enhancing agency planning and response, (2) "Inspection Program" determining the efficiency of the agency's baseline inspection program, (3) "Significance Determination Process" determining the effectiveness of the significance determination process (SDP), and (4) "ROP Assessment Program" reviewing the effectiveness of the assessment program in prescribing appropriate regulatory oversight to those plants with performance deficiencies.

The staff's evaluation used objective metrics and other relevant feedback from both internal and external stakeholders. The annual ROP performance metrics report, which also was produced in accordance with Element 1 of the revised process, provides data and a staff analysis for all the objective performance metrics (ADAMS Accession No. ML17046A093). The program area evaluations also summarize changes to the program, current and future focus areas, and potential recommendations for improvement. The ROP evaluations met the scope requirements in NUREG-1614, and achieved the two objectives described in NUREG-1614.

Performance Indicator Program

The PI program continued to provide insights into plant safety and security in CY 2016. The staff and industry continue to improve the PI program guidance through ROP Working Group meetings and feedback from stakeholders. As noted in the annual ROP performance metrics report referenced above, the ROP metrics related to the PI program met or exceeded performance expectations, including the timeliness of the reporting, dissemination, and accurate posting of the PI data to the external Web pages.

In SECY-14-0047, "Reactor Oversight Process Self-Assessment for Calendar Year 2013," dated April 18, 2014 (ADAMS Accession No. ML14066A365), the staff noted that it had been working with industry on how best to address PI validity during and following extended shutdowns and had developed an approach for such a transition. The staff is using this approach following the initial startup of Watts Bar Nuclear Plant, Unit 2, during its transition to the ROP and is coordinating with the Tennessee Valley Authority and the Nuclear Energy Institute (NEI) through the ROP Working Group to update NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," to incorporate these lessons learned.

With the inclusion of hostile-action-based drill scenarios into licensee's emergency preparedness programs, the NRC clarified NEI 99-02 guidance for when and how licensees can credit drill participation for the PI program.

The staff clarified PI requirements for tornado missile protection issues discovered as a result of Regulatory Issue Summary 2015-06, "Tornado Missile Protection," dated June 10, 2015 (ADAMS Accession No. ML15020A419). Enforcement Guidance Memorandum 15-002, "Enforcement Discretion for Tornado-Generated Missile Protection Noncompliance," dated June 10, 2015 (ADAMS Accession No. ML15111A269), provided for enforcement discretion for operability issues discovered but did not address reportability or the safety system functional failure (SSFF) PI. The industry was concerned that, although the NRC granted enforcement discretion, the number of tornado missile issues identified at some sites, if all reported separately, would result in crossing the white threshold for the SSFF PI. Through Frequently Asked Question 16-03, "Tornado Missile Protection (TMP) Potential Safety System Functional Failure," dated September 21, 2016, the ROP Working Group clarified that the NEI 99-02 guidance that a single event or condition that affects several systems counts as one failure applies to tornado missile issues as well. A revision was also made to Enforcement Guidance Memorandum 15-002 (ADAMS Accession No. ML16355A286) that addresses enforcement discretion for the reporting requirements for multiple occurrences of issues.

The industry's ROP Task Force has submitted a white paper about the updating of critical hours in the Mitigating Systems Performance Index (MSPI) when updating planned unavailability as a result of changing maintenance philosophy (e.g., additions or deletions of maintenance activities, changes to periodicities). This paper was first introduced and discussed during the ROP Working Group public meeting on January 12, 2017 (ADAMS Accession No. ML17037D288). Current guidance is silent on whether and how to update the critical hours, which were originally based on the period between 2002 and 2004, as were the original planned unavailability for operating plants. Staff communicated concerns with oversimplified guidance that fails to take into account how a change to maintenance philosophy might affect critical hours and whether that should be taken into account when making updates, while industry was concerned with overcomplicated guidance. The ROP Working Group is discussing the proposed solution and hopes to incorporate it into the next revision to the NEI 99-02 guidance.

Consistent with the staff requirements memorandum (SRM) dated September 17, 2007, associated with SECY-07-0136, "Recommendation to Discontinue Two of Three Performance Indicators Associated with the Security Reactor Oversight Process," the staff continued to evaluate the possible addition of PIs for the security cornerstone.[1] By a non-publicly available (security-related) letter dated February 24, 2015 (ADAMS Accession No. ML15112A790), NEI submitted a white paper about the potential use of "performance metrics" in lieu of PIs by power reactor licensees. This letter detailed NEI's plan to implement a phased pilot program with some licensees, using the performance metrics. After considerations related to NEI's proposal related to performance metrics in lieu of PIs, the staff determined that without a direct link to the ROP assessment program, the metrics would not be considered. As part of its oversight responsibility, the staff plans to continue to evaluate additional PIs for the security cornerstone.

The staff revised Inspection Procedure (IP) 71151, "Performance Indicator Verification," to address the rebaselining direction contained in SRM-SECY-16-0009, "Staff

[1] SECY-07-0136 and the associated SRM are withheld from public disclosure because they contain sensitive unclassified nonsafeguards information.

Requirements—SECY-16-0009—Recommendations Resulting from the Integrated Prioritization and Re-Baselining of Agency Activities" dated April 13, 2016 (ADAMS Accession No. ML16104A158). The staff will continue to monitor the implementation of IP 71151 through the ROP self-assessment process to ensure that inspectors are expending the appropriate amount of effort and focus on PI verification. The staff also updated the procedure to clarify requirements versus guidance as recommended in the Office of the Inspector General (OIG) Audit Report 16-A-12, "Audit of NRC's Reactor Oversight Process: Reactor Safety Baseline Procedures," dated April 6, 2016 (ADAMS Accession No. ML16097A515).

In SRM-SECY-13-0137, "Staff Requirements—SECY-13-0137—Recommendations for Risk-Informing the Reactor Oversight Process for New Reactors," dated June 30, 2014 (ADAMS Accession No. ML14181B398), the Commission approved the staff's recommendation to develop appropriate PIs and thresholds for new reactors, specifically those PIs in the initiating events and mitigating systems cornerstones, or develop additional inspection guidance to address any identified shortfalls to ensure that all cornerstone objectives are adequately met. With this direction, the staff began discussions with internal and external stakeholders through the ROP Working Group to attempt to either develop new PIs within the mitigating systems cornerstone or modify the existing MSPI to be able to monitor new reactor designs. The industry developed white papers analyzing potential risk-informed indicators within the mitigating systems cornerstone (ADAMS Accession Nos. ML16189A414 and ML16189A418). The industry analysis indicated that the MSPI PI could not be effectively applied to new reactor designs, namely, the AP1000 reactors under construction at Virgil C. Summer Nuclear Station and Vogtle Electric Generating Plant. Specifically, there are insufficient performance data on passive systems and components to develop meaningful industry-averaged performance baselines that are a key aspect of the MSPI formulation. Nonsafety-related "front line" systems, including systems subject to regulatory treatment of non-safety systems (RTNSS), were considered; however, their risk worth is so low that it would take a large number of component failures to cross a threshold, and unavailability would most likely never cross a threshold.

The NRC's staff's own white paper, "Mitigating Systems Performance Indicators for New Reactors," dated September 2, 2016 (ADAMS Accession No. ML16251A018), agreed with industry conclusions about the use of MSPI and evaluated possible new risk-informed indicators that could be applied to the passive safety systems. The staff did evaluate a new risk-informed valve unreliability indicator that would monitor explosive squib, air-operated, motor-operated, and solenoid-operated valves relied upon by the passive systems for successful operation. As observed by the industry papers, sufficient industry data on the active components within the passive safety systems do not currently exist. However, with the limited available data, the staff determined that, because of the low numbers of expected demands for these components along with their variable risk worths, a risk-informed PI focused on unreliability could change by several orders of magnitude as a result of minimal effects such as adding extra demands or changing the risk worth through plant modifications or probabilistic risk assessment (PRA) updates. The staff concluded that the volatility of the resultant indicator would be inappropriate for licensee performance monitoring, in that it would not be either reliable or predictable.

In its paper on recommendations for modifying the ROP for new reactors that is due to the Commission by the end of CY 2017, the staff intends to propose that the ROP maintain the other 12 PIs that were previously confirmed to be easily applicable to new reactor designs with minimal revisions to the NEI 99-02 PI guidelines. This means there will only be the SSFF PI for the mitigating systems cornerstone. The staff is working to determine the needed adjustments to the baseline inspection program to ensure that cornerstone performance is fully monitored. Given the overall reduction in risk for new reactor designs, coupled with the anticipated

reduction in the number of online surveillances and maintenance activities, the staff expects that there will be a minimal effect on inspections as a result of the lack of MSPI.

Inspection Program

NRC inspectors independently verified that plants were operated safely and securely. All inspection program metrics met or exceeded performance expectations for CY 2016, including the completion of the baseline inspection program and multiple metrics related to inspector objectivity, qualifications, and site staffing. Throughout the year, the staff made changes to various ROP IPs based on feedback and the comprehensive baseline IP assessment discussed below.

For CY 2016, all regions and the Office of Nuclear Security and Incident Response completed 100 percent of their baseline inspections within the allocated resources. The inspection program independently verified that licensees operated plants safely and securely and identified and corrected performance issues in a timely manner, all in accordance with IMC 2515, "Light-Water Reactor Inspection Program—Operations Phase" dated February 1, 2016 (ADAMS Accession No. ML16006A284), and IMC 2201, "Security and Safeguards Inspection Program for Commercial Power Reactors," dated September 22, 2015 (ADAMS Accession No. ML13234A497). Each region documented completion of the baseline inspection program in a memorandum available at ADAMS Accession Nos. ML17046A240 for Region I, ML17048A429 for Region II, ML17058A436 for Region III, and ML17073A097 for Region IV. Additionally, the Office of Nuclear Security and Incident Response completed all security baseline inspections, as documented in ADAMS Accession No. ML17026A211, a memorandum that is not publicly available.

In CY 2015, the staff completed a comprehensive rewrite of IMC 0307 Appendix B, "Reactor Oversight Process Baseline Inspection Procedure Assessments and Reviews" (ADAMS Accession No. ML15187A398). The first assessment of the baseline inspection program using the revised IMC 0307, Appendix B, took place in CY 2016. The assessment generated many recommendations for improvements to the inspection program. The staff summarized the results of the assessment in the December 21, 2016, memorandum, "Reactor Oversight Process Baseline Inspection Program Assessment Results—Calendar Year 2016" (ADAMS Accession No. ML16285A346). After completion of the assessment, the staff gathered feedback from participants on both the assessment process and the resources expended in performing the assessment. Generally, the feedback stated that the assessment process was more resource intensive than anticipated. Participants also felt that performing such an assessment annually is too frequent to allow recommended changes to take effect and produce measurable changes in the inspection program, especially when some IPs operate on cycles with a periodicity in excess of 1 year. For these reasons, the staff intends to revise Appendix B to IMC 0307, so that the baseline inspection procedure assessments would be performed on a biennial rather than annual frequency. This will reduce staff resources expended in performing a yearly assessment without affecting inspection program quality. Revision of IMC 0307, Appendix B, to a biennial frequency will result in performance of the next assessment in CY 2018 and every 2 years thereafter.

NRC staff completed incorporation of recommendations from the CY 2013 ROP enhancement effort and from the ROP Independent Assessment (ADAMS Accession No. ML14035A571) related to performing periodic inspections of licensee engineering programs developed to address generic issues. The incorporation of these recommendations and additional feedback from external stakeholders resulted in bifurcation of the Component Design Bases Inspection

(CDBI) procedure, IP 71111.21 into two independent inspections, IP 71111.21M, "Design Bases Assurance Inspection (Team)" (ADAMS Accession No. ML16340B000), and IP 71111.21N, "Design Bases Assurance Inspection (Program)" (ADAMS Accession No. ML16340B001). These inspections would be performed in different years. The changes were initially piloted by the NRC staff during CYs 2015 and 2016, and feedback from internal stakeholders, industry, and members of the public were incorporated, as appropriate, into the revised inspection procedures. IP 71111.21M is similar to the previous CDBI inspection procedure but now contains sample requirements to inspect modifications being made to the mitigation systems. The staff created IP 71111.21N to verify licensee's implementation of their key engineering programs. Equipment qualification (EQ) was selected as the first engineering program for inspection. The staff will inspect licensee implementation of their EQ program one time at all U.S. facilities during this ROP triennial cycle (CY 2017 – CY 2019). The staff also reduced the scope of IP 71111.17T, "Evaluations of Changes, Tests and Experiments" (ADAMS Accession No. ML16340A998) and moved the modification samples to the new design-basis accident IP. The inspection resources needed to support the new program implementation inspection were obtained from existing inspection resources as described above. The changes to all three inspections became effective on January 1, 2017.

Although no significant revisions to other baseline engineering IPs were made, the staff recognizes the need to consider continued stakeholder feedback regarding the effectiveness and efficiency of engineering inspections. Therefore, the staff is performing a more holistic review of all engineering inspections during CY 2017 to evaluate their basis, including a review of the effectiveness of the CDBI-related changes described in the paragraph above. This review will include analysis of the appropriate inspection frequency and whether there is a more effective and efficient manner than the current inspection program for performing these types of engineering inspections. The nuclear industry is also planning to perform a similar, independent review during CY 2017.

In CY 2016, OIG conducted an audit to evaluate the effectiveness of how IPs are written, understood, and performed by agency managers and inspection staff. OIG Report 16-A-12 (ADAMS Accession No. ML16097A503) was completed in April 2016. OIG recommended that the Executive Director for Operations (1) develop and implement controls to ensure that mandatory and discretionary language used in IPs is clear and consistent and (2) notify staff and managers of controls developed to ensure that mandatory and discretionary language used in IPs is clear and consistent. The OIG recommendations supported ROP governance language inconsistencies previously identified by the staff and that were in process for resolution. In "Response to Audit of NRC's Reactor Oversight Process: Reactor Safety Baseline Inspection Procedures (OIG-16-A-12)," dated May 6, 2016 (ADAMS Accession No. ML16104A081), the staff noted its plans to implement and close the two recommendations. In a letter dated June 6, 2016 (ADAMS Accession No. ML16158A058), OIG noted that the two recommendations were resolved based on the staff's response and would be considered closed after OIG reviews the staff actions. Since that letter, the staff has revised and issued IMC 0040, "Preparing, Revising and Issuing Documents for the NRC Inspection Manual," effective January 2017, which contains explicit instruction on the use of mandatory and discretionary language providing clarity on expectations for IP implementation.

The transition working group (TWG) developed an integrated plan that identifies all regulatory functions necessary to support the transition of new reactors from construction to operation as summarized in the report, "Assessment of the Staff's Readiness to Transition Regulatory Oversight and Licensing as New Reactors Proceed from Construction to Operation," dated September 9, 2014 (ADAMS Accession No. ML14031A387). The group identified several

readiness issues related to the ROP, including the baseline inspection program. During ROP development, the staff developed risk information matrices (RIMs) based on the in-plant examination, in-plant examination of external events, and risk achievement worth for most pressurized-water reactors (PWRs) and boiling-water reactors (BWRs) to help inform the inspectable areas, frequency, sample sizes, and hours. Because the existing ROP baseline IPs may not be entirely applicable to new reactors, the TWG recommended that the staff (1) determine whether the NRC should develop a RIM for AP1000 inspection scope and effort, to help decide whether the NRC needs to reconstruct the cornerstone charts, and (2) use the risk models for the AP1000s to identify the risk importance of structures, systems, and components. The TWG further recommended that the staff review the ROP baseline IPs to determine whether existing IPs and other guidance documents are practical and adequate for new reactors.

The staff created two RIMs (importance and procedure) and shared them during a public meeting on September 21, 2016. The importance RIM lists the importance level (i.e., high, intermediate, or low) for AP1000 systems, the reason for importance, and the affected cornerstones. The procedure RIM lists the same attributes developed for the ROP. The staff is conducting a gap analysis of the IP 71111, "Reactor Safety-Initiating Events, Mitigating Systems, Barrier Integrity," series to determine whether the IPs could be implemented for inspecting AP1000 and new reactor designs. The other cornerstones are not expected to change and are not included in this gap analysis. To date, the gap analyses continue to confirm that IPs were written at a level such that few changes are required; however, there may be adjustments of sample sizes and inspection hours. The staff will also address the inspection of RTNSS systems and components, as applicable. Headquarters staff is working with staff from the Region II office on whether the level of detail described in the IPs is sufficient for AP1000 and new reactor designs and on the appropriate level of resources, inspection hours, and samples needed to implement the inspections. The staff will include its recommendations for adjustments to the baseline inspection program to address new reactors in a comprehensive Commission paper that will also address the PI and SDP changes that is due to the Commission by the end of CY 2017.

Significance Determination Process

The SDP continued to be an effective, risk-informed process for determining the safety and security significance of inspection findings identified in the ROP. In 2016, over 500 inspection findings were identified nationwide, with 99 percent determined to be of very low safety or security significance (Green). In this respect, the SDP is an efficient and effective risk-informed process in focusing staff resources on more risk-significant issues. In 2016, the staff met the SDP timeliness metric at 100 percent of greater-than-Green (GTG) inspection findings being finalized in less than or equal to 90 days from the time the inspection finding is documented in an inspection report or other formal correspondence to the time a final significance decision is made. In addition, the metric that tracks the repeatability and predictability of GTG inspection findings was met at 100 percent. However, the staff continued to experience challenges in timely completion of the GTG inspection findings from initial identification until a final decision on significance is made. Therefore, as part of an ongoing initiative, the staff made strides to improve the efficiency and effectiveness of the SDP through an initiative known as Inspection Finding Resolution Management (IFRM). In addition, the staff undertook several initiatives to improve existing SDP tools and procedures and developed one new SDP to address lessons learned from the Fukushima Dai-ichi accident.

The IFRM initiative was begun, in part, due to NRC Commission direction to the staff to develop a plan to streamline the SDP (ADAMS Accession No. ML14262A078) subsequent Commission direction to pilot proposed revisions to the SDP by holding public meetings or workshops regarding the recommended changes (ADAMS Accession No. ML15231A108) and recommendations from the internal business process improvement initiative (ADAMS Accession No. ML14318A512). In November 2016, a trial period began to examine the effectiveness of changes made to the SDP to address potentially GTG inspection findings identified in the initiating events, mitigating systems, and barrier integrity cornerstones. The remaining ROP cornerstones were not selected for the trial period because significantly fewer staff resources have been historically expended for these cornerstones to reach a final SDP decision. The trial period is expected to last until December 2017 or until sufficient experience is gained using the trial period procedures across all four regional offices.

The IFRM initiative focuses on: (1) improved management oversight and project planning of GTG inspection findings, (2) improved interactions with licensees as potentially GTG inspection findings are identified, (3) a more efficient Significance and Enforcement Review Panel (SERP) process, and (4) improved metrics to track the timeliness of inspection findings once they are identified as an issue of concern until a final decision is made on the safety significance of the finding. Improving the use of integrated risk-informed decision-making, which was originally part of the IFRM initiative, was separated into its own project and is discussed below as part of the improvements being made to IMC 0609, “Significance Determination Process,” Appendix M, “Significance Determination Process Using Qualitative Criteria.”

The staff developed and issued a new trial period manual chapter, IMC 0609, Attachment 5TP, “Inspection Finding Review Board.” This IMC institutionalizes a process that aims to improve discipline and accountability for all staff and managers involved in reaching a final decision on potentially GTG inspection findings. The Inspection Finding Review Board (IFRB) is a regional activity through which the involved inspectors, branch chief, senior reactor analyst, enforcement specialist, division director, and others reach alignment on the performance deficiency and the scope and schedule for completing the preliminary safety significance before the inspection finding is presented to the SERP for resolution. The involved division director is the designated IFRB chairman. The IFRB also addresses, in a more formal way, improving interactions with licensees. After each IFRB meeting, the IFRB chairman is required to communicate with licensee senior management at the involved plant to ensure the licensee understands the staff’s preliminary position as early as possible in the decision-making process such that a more efficient and effective dialogue occurs. The staff made several changes to the SERP process to improve its efficiency, highlighted by: (1) assigning a facilitator for each SERP meeting to ensure the SERP process is followed; (2) allowing the SERP to make a decision via e-mail if all SERP members agree; (3) making the final decision at the post regulatory conference, if possible, thus avoiding an additional meeting; and (4) requiring only one independent review of the SERP package, which contains all the relevant information needed to determine significance.

The 90-day SDP timeliness metric (from inspection report to final significance decision) remained unchanged. However, the staff added a 120-day inspection metric in January 2016 tracking the time from identification of an issue of concern until the final exit is conducted on the inspection finding. The staff expects this focus to result in significant improvements in the overall time to reach a final decision. The new combined timeframe, which includes a 45-day metric to issue the inspection report, is 255 days. This time period, which the staff views as the longest time to reach a final decision in most cases, would be a notable improvement over past performance. In the past, on average for the initiating events, mitigating systems, and barrier

integrity cornerstones, it has taken the staff more than 365 days to reach a final decision in about 30 percent of the GTG inspection findings since 2000 and more than 255 days in 40 percent of the inspection findings for the same time period. In CY 2016, all inspection findings met the SDP 90-day timeliness metric, while 75 percent of inspection findings subject to this metric were finalized within the 120-day timeframe. No region had more than two untimely occurrences and all offices met the 75-percent timeliness expectation. The staff also notes that the new IFRM process was not yet in place at the time of these performance deficiencies and that this new process should further improve timeliness. Additionally, the staff is currently revising this metric to clarify confusion over the identification date. Once the IFRM trial period is completed, the staff will perform an effectiveness review to ensure that the intended results have been realized and to evaluate any unintended consequences, and will address lessons learned and incorporate necessary changes to the SDP program for full implementation.

The staff is preparing SERP training as a result of the two internal self-assessment initiatives described above, as well as recommendations resulting from the review of Differing Professional Opinion (DPO) 2014-002 (ADAMS Accession No. ML14344A291) involving use of conditional core damage probability to evaluate performance deficiencies that cause initiating events. This updated training will enable members of the SERP to better understand better PRA principles and basic modeling information, PRA model uncertainty, and their roles and responsibilities as decision makers in the SERP process. The goal of the training is to enable SERP decision makers to make more efficient and effective risk-informed decisions by better understanding the influential assumptions made in detailed risk evaluations. The training will be required for all new SERP members and will be available for refresher training. The staff expects to develop the training and have all SERP members take the training in 2017. In addition, the staff is evaluating a means to have all SERP members continually share lessons learned on decision-making for GTG inspection findings, with a trial lessons-learned session completed in February 2017.

OIG finalized its audit of the SDP in September 2016. The audit report, OIG-16-A-21, “Audit of NRC’s Significance Determination Process for Reactor Safety,” dated September 26, 2016 (ADAMS Accession No. ML16270A359), made the following four recommendations: (1) assess SDP workflow and establish, communicate, and document clear and consistent expectations for staff and managers to complete their roles in the SDP; (2) clarify questions in IMC 0612, “Power Reactor Inspection Reports,” Appendix B, “Issue Screening,” so that they are readily understood and easily applied; (3) implement controls to ensure that independent audits of GTG inspections findings are performed; and (4) document independent audits of GTG inspection findings. In its October 26, 2016, memorandum, “Staff Response to the Office of the Inspector General’s Audit of U.S. Nuclear Regulatory Commission’s Significance Determination Process for Reactor Safety (OIG-16-A-21)” (ADAMS Accession No. ML16281A220), the staff noted its plans to address the four recommendations by CY 2018. Notably, the staff’s planned actions to implement the IFRM initiative, which is specific to the SDP, met the intent of Recommendation 1. In OIG’s letter dated December 1, 2016 (ADAMS Accession No. ML16336A775), OIG noted that the four recommendations were resolved based on the staff’s response and would be considered closed after the OIG reviews the staff actions.

The staff began initiatives to enhance IMC 0609, Appendix F, “Fire Protection Significance Determination Process,” in June 2015 and IMC 0609, Appendix G, “Shutdown Operations Significance Determination Process,” and its associated basis documents and attachments in July 2016. The enhancement of IMC 0609, Appendix F, focuses on simplifying the qualitative and quantitative screening processes and updating the fire-protection-related information in the document to improve the staff’s ability to make significance determinations in a timely manner.

In CY 2016 the staff received feedback from regional inspectors and other stakeholders to support areas for improvement, identify ways to simplify the screening process, and develop the draft revisions of the document and its attachments. The staff expects to complete the revisions to IMC 0609, Appendix F, and its associated technical basis document by the end of CY 2017.

The update of IMC 0609, Appendix G, will improve the usability of Attachment 2, "Phase 2 Significance Determination Process Template for PWR during Shutdown," and Attachment 3, "Phase 2 Significance Determination Process Template for BWR during Shutdown," and incorporate suggestions from ROP feedback forms that had been submitted. The update will also include revising the document to reflect guidance for AP1000 plants in Appendix G. Completed actions include development of a project plan, review of all open ROP feedback items, and discussion of the planned update with internal stakeholders. The revisions will commence in CY 2017.

In October 2016 the NRC issued IMC 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation," dated October 7, 2016 (ADAMS Accession No. ML16277A415). This SDP evaluates the significance of inspection findings associated with plant changes made by licensees to meet NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated March 12, 2012 (ADAMS Accession No. ML12056A045), and Order EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," dated March 12, 2012 (ADAMS Accession No. ML12056A044), which were promulgated following the accident at Fukushima Dai-Ichi. The procedure uses a qualitative approach to screen inspection findings to Green (i.e., very low safety significance) if functions to cool the reactor core, spent fuel pool, and the containment are not lost. The procedure also addresses operator training, procedure quality, and the effectiveness of program attributes (e.g., equipment design, equipment storage, maintenance and testing, configuration control) for mitigating strategies and spent fuel pool instrumentation. If inspection findings do not screen to Green, IMC 0609, Appendix M, is used to determine significance. During much of 2016 Appendix O was used in its draft form in conjunction with Appendix M during performance of Temporary Instruction (TI) 2515/191, "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans." In 2016, TI 2515/191 was performed 12 times, with 4 inspection findings identified. None of these findings was determined to be of GTG significance. Feedback from the staff indicated that the new Appendix O is an efficient and effective SDP tool.

In May 2016 the NRC began an initiative to revise IMC 0609, Appendix M, to support the objectives of the IFRM initiative. The current version of IMC 0609, Appendix M, gives instructions for making SDP decisions using a deterministic framework of a small set of qualitative factors. The effort to revise IMC 0609, Appendix M, is focused on (1) clarifying its usage (e.g., its entry conditions) with other SDP tools to support efficient risk-informed decision-making and (2) developing a holistic framework to help decision makers assess and integrate qualitative decision-making attributes, when appropriate, to produce more objective, reliable, and predictable risk-informed decisions.

Since May 2016 the NRC staff has made two draft documents publicly available to support the key objectives of the IMC 0609, Appendix M revision project. These two draft documents are (1) IMC 0609, Appendix M, "Non-Quantitative Significance Determination Process Using Integrated Risk-Informed Decision-Making," issued July 2016 (ADAMS Accession No. ML16188A010), and (2) IMC 0308, "Reactor Oversight Process Basis Document,"

Attachment 3, “Significance Determination Process Technical Basis Document,” Appendix M, “Technical Basis for Non-Quantitative Significance Determination Process (SDP) Using Integrated Risk-Informed Decision-Making,” issued September 2016 (ADAMS Accession No. ML16251A037). The staff has also interacted with internal and external stakeholders to seek views and comments on the two draft documents. Industry representatives have actively participated in public meetings, and NEI has coordinated industry comments for NRC staff review. The NRC staff has evaluated the feedback from both internal and external stakeholders. Feedback indicated that the proposed schedule for the issuance of the revised manual chapter was too aggressive and the introduction of several qualitative decision-making attributes was concerning. In response, the staff is revising its planned Appendix M update to focus on developing more explicit entry conditions and applying the decision-making attributes presented in Regulatory Guide 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis.” The staff will engage appropriately with the Commission before implementing the revised IMC 0609, Appendix M, and finalizing its associated technical basis document.

The staff evaluated whether the assessment of inspection findings involving independent spent fuel storage installation (ISFSI) dry cask storage activities at operating reactor facilities should be conducted under the ROP, in lieu of continuing with the current practice of dispositioning ISFSI-related inspection findings via the traditional enforcement process. The staff initiated this evaluation based on a recommendation from the ROP enhancement project in 2013. In 2015, as part of this initiative, the staff developed a SDP, specifically, Appendix N, “Independent Spent Fuel Storage Installation Significance Determination Process,” to IMC 0609. After considering industry feedback and upon further evaluation in 2016 (and into 2017), the staff concluded that the traditional enforcement process has been effective, and the benefit of providing an integrated assessment of licensee performance in terms of ISFSI-related dry cask storage activities and other activities currently under the ROP, did not justify additional expenditure of staff resources to finalize the process (i.e., create the SDP technical basis document and train additional staff in the application of the SDP). Consequently, the staff is discontinuing any further efforts with respect to this initiative.

As a result of DPO-2014-002, the staff evaluated necessary changes to IMC 0308, Attachment 3. The DPO recommended that the technical guidance provided in the Risk Assessment Standardization Project (RASP) Handbook be consistent with higher tier program documents (e.g., IMC 0308, Attachment 3) in situations in which a licensee performance deficiency causes an initiating event to occur. For these situations, there has been extensive discussion between the staff and industry representatives on how to model the initiating event frequency in the licensee PRA models and the agency’s Standardized Plant Analysis Risk (SPAR) models. The industry perspective was that the initiating event frequency should be a Bayesian updated frequency value which would result in a significantly lower frequency. However, this approach would result in the inspection finding being assessed as significantly less important. The staff’s view was that because the SDP assesses the change in risk caused by the performance deficiency, a more direct impact on the initiating event frequency should be used. Therefore, the staff revised IMC 0308, Attachment 3, to be consistent with the RASP Handbook by instructing risk analysts to revise the affected initiating event frequency using a value of 1.0 (i.e., the event actually occurred). This change will appropriately result in an increase in the safety significance of performance deficiencies that actually cause an initiating event to occur. This change is not expected to result in a notable increase in GTG inspection findings because it is not common that performance deficiencies result in complicated reactor transients and trips.

In CY 2016, the staff updated RASP Handbook, Volume 2, "External Events," as part of ongoing efforts to improve guidance on PRA methods and best practices for assessing the significance of inspection findings and reactor incidents. Specifically, the update provided guidance to improve consistency in significance determination of inspection findings and incidents related to external flooding by documenting methods, datasets, and references for risk analyst use. The guidance also presented lessons learned from post-Fukushima SDP analyses related to external flooding issues. For guidance on seismic risk assessments, the staff updated plant-specific seismic hazard information based on licensees' seismic hazard reevaluations. The updated handbook also documented assessment methods addressing issues such as human reliability analysis in seismic scenarios, as well as the correlated response of components when modeling seismic events.

In 2015, following Risk-Informed Steering Committee (RISC) direction, the staff was tasked to evaluate the costs and benefits associated with using licensees' PRA models in lieu of the SPAR models. The staff evaluated the technical, regulatory, cost, and other related factors pertinent to use of licensees' PRA models in lieu of the SPAR models. These evaluation activities included, but were not limited to, analyses of fixed and variable costs, ease of use for NRC staff (including training costs), potential legal issues (including loss of the ability to perform independent confirmatory analysis), and licensee willingness to participate. Results from the cost analyses indicated a significant burden for transition to using licensee PRA models, with a potential for longer term small cost savings once full transition was complete. Additionally, the NRC staff interacted with NEI to gauge licensees' willingness to submit licensee PRA models to the NRC for their use (which are not normally submitted to the NRC under the current regulatory framework). While some licensees supported the proposal, others expressed reluctance to submit their PRA models to the NRC for use by agency risk analysts for regulatory decision making. Based on these insights, the staff recommended that the NRC should continue to rely on using SPAR models for independent confirmatory risk assessments in SDP implementation. Therefore, the RISC recommended the continued use of NRC SPAR models for operating reactor oversight programs, but encouraged the Office of New Reactors staff to consider the use of licensees' PRA models in lieu of the SPAR models for new reactor oversight programs.

In SRM-SECY-13-0137, the Commission directed the staff to enhance the SDP to accommodate new reactor designs by developing a structured qualitative assessment for events or conditions that are not evaluated in the supporting plant risk models. The Commission further noted that the SDP should continue to emphasize the use of existing quantitative measures of the change in plant risk, and the staff should develop guidance to address circumstances that are unique to new reactors. With this direction, the staff has begun discussions with internal and external stakeholders about the ROP for new reactors, to include necessary changes to the PI and inspection programs as well as the SDP.

In 2016 the staff began an initiative to review and enhance IMC 0609 and its appendices and attachments to ensure that they addressed the AP1000 design appropriately. This effort will also review the associated design basis found in IMC 0308. Preliminary analysis indicates that most appendices are adequate and appropriate as written. However, this conclusion may change as the initial review is completed. Once the review is completed, the staff will develop a detailed project plan with a timeline to complete all revisions, reviews, and approvals by the end of CY 2018. This plan will update the guidance to incorporate the design features found in the AP1000, including its passive ones, and the staff will consider changes concurrently with some of the ongoing SDP efforts discussed above for the current fleet.

ROP Assessment Program

The staff's implementation of the ROP assessment program ensured that the staff and licensees took appropriate actions to address licensee performance issues in CY 2016 commensurate with their safety significance. All applicable assessment metrics met their established criteria in CY 2016. The staff closed the only open Action Matrix deviation in CY 2016. The deviation had been implemented to move the Monticello Nuclear Generating Plant to the Regulatory Response Column (Column 2) rather than move it to the Multiple/Repetitive Degraded Cornerstone Column (Column 4). During the fourth quarter of 2014, Monticello received a GTG finding in the Security Cornerstone, and the licensee met the criteria for a repetitive degraded cornerstone as defined in IMC 0305. Because of the successful completion of the IP 95002 supplemental inspection and successful completion of the biennial Problem Identification and Resolution Inspection, and no evidence of broad or systemic performance issues across plant organizational areas, the staff concluded that placement of Monticello in Column 4 of the Action Matrix and the subsequent regulatory actions were not warranted. The deviation was closed upon the successful completion of the NRC staff review of the licensee's safety culture assessment. There were no new deviations in CY 2016.

The staff implemented the revised definition of a degraded cornerstone in CY 2016, requiring three White inputs in a single cornerstone, one Yellow input, or three White inputs in a strategic performance area. No licensees met the revised criteria for a degraded cornerstone, nor did any licensee meet the previous criterion for a degraded cornerstone of two White inputs in the same cornerstone during the year. Therefore, the staff concluded that the change to the definition had no effect on the oversight of licensee performance for CY 2016.

The staff drafted a set of guidelines for what constitutes a substantive change to the ROP and when and how to engage the Commission for major ROP changes. The staff submitted the draft guidelines to the Commission for approval in COMSECY-16-0022, "Proposed Criteria for Reactor Oversight Process Changes Requiring Commission Approval and Notification," dated October 17, 2016 (ADAMS Accession No. ML16223A728). When the Commission issues the SRM for that document, the staff will incorporate the Commission's direction into Management Directive 8.13, "Reactor Oversight Process" dated October 3, 2010. Until the Commission provides direction to the staff on those recommendations, the staff will continue to use its existing practices to ensure the Commission is appropriately engaged in and aware of significant changes to the ROP being considered.

During CY 2016, Arkansas Nuclear One, Units 1 and 2, and Pilgrim Nuclear Power Station remained in the Multiple/Repetitive Degraded Cornerstone (Column 4) of the ROP Action Matrix. The staff will discuss the status of Arkansas Nuclear One's and Pilgrim's performance during the Agency Action Review Meeting (AARM) in May 2017 and the subsequent Commission meeting on the results of the AARM.