

Reactor Oversight Process Program Area Evaluations

In accordance with Inspection Manual Chapter (IMC) 0307, "Reactor Oversight Process Self-Assessment Program," dated March 23, 2009, the U.S. Nuclear Regulatory Commission (NRC) staff evaluated all four key program areas of the Reactor Oversight Process (ROP). The four areas are the performance indicator (PI) program, the inspection program, the significance determination process (SDP), and the assessment program. The annual ROP performance metric report provides data and a staff analysis for all of the program area metrics (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12037A175). The results of the staff's review are provided below.

Performance Indicator Program

The PI program continued to provide insights to help ensure plant safety and security. The ROP met all of its PI program metrics for calendar year (CY) 2011, and feedback from the external stakeholder survey was generally positive. The staff and industry made several improvements to the PI program guidance and implementation in 2011 using feedback from internal and external stakeholders.

Based on industry stakeholder feedback, the staff developed an automatic e-mail tool to notify public and internal stakeholders of the availability of recently approved PI-related frequently asked questions (FAQs). These FAQs include changes to the PI reporting guidance document, Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, issued October 2009, and resolutions to PI guidance interpretation issues. To facilitate knowledge transfer, the staff added inspection tips and descriptions of PI reporting issues that inspectors identified to the program's internal SharePoint Web site. The staff and industry also clarified PI reporting guidance for the feedwater system in the Unplanned Scrams with Complications PI and for power changes to restore equipment in the Unplanned Power Changes per 7,000 Critical Hours PI.

The staff and industry completed changes to Mitigating System Performance Index (MSPI) guidance in NEI 99-02. These changes incorporated emergency diesel generator (EDG) fuel oil transfer pump failures into the MSPI and modified EDG failure mode definitions. The staff and industry clarified MSPI guidance for cascading unavailability and system boundaries. The staff revised Inspection Procedure (IP) 71151, "Performance Indicator Verification," dated December 23, 2011, to enhance MSPI inspection guidance in response to feedback from internal stakeholders. The staff also developed an internal SharePoint Web site for the MSPI that includes MSPI background material and training presentation slides. The staff plans to explore developing an MSPI training class for inspectors in 2012.

NEI 99-02 currently does not address PI validity during extended shutdown and startup conditions for some PIs. Therefore, to improve openness and predictability in NRC staff decision making and oversight, the staff proposed new guidance for NEI 99-02 on how to consider the validity of PIs under these conditions. The staff continues to discuss the proposed guidance and related information technology support with industry representatives at public ROP working group meetings. The staff plans to revise ROP inspection manual chapters and procedures, as necessary, when it finalizes the approach for determining PI validity and displaying PI status on the public Web site. The staff and industry also continue to explore any potential effects to the Safety System Functional Failure PI resulting from potential changes to

NUREG-1022, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," Revision 2, issued October 2000.

The staff continued efforts to improve and enhance the emergency preparedness (EP) PIs. The staff revised the Drill/Exercise Performance (DEP) PI to clarify the specific actions required to demonstrate successfully a DEP opportunity. The staff also revised the Emergency Response Organization (ERO) Drill Participation PI to allow data from multiple sites' ERO drill participations to be applied to ERO members serving in emergency response roles common to multiple sites. Staff and industry currently are working on clarifying the Alert and Notification System Reliability PI guidance for sirens intentionally removed from service in an area deemed uninhabitable by State or local agencies because of a natural disaster. The staff also revised inspection procedures to incorporate enhancements identified from the performance of Temporary Instruction (TI) 2515/175, "Emergency Response Organization, Drill/Exercise Performance Indicator, Program Review," dated June 5, 2008. The enhancements included using the results of the DEP PI to improve the effectiveness of EP inspection resources.

The staff continues to evaluate the need for new security PIs because of new requirements under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 73, "Physical Protection of Plants and Materials;" 10 CFR Part 26, "Fitness for Duty Programs;" and the resultant changes to the baseline inspection program. The staff plans to reassess the effectiveness of the security PIs in 2013 as informed by the experience gained during the latest ROP realignment and the completion of one full security baseline inspection cycle.

Most external ROP survey respondents indicated that the PI program helped ensure plant safety and security, provided an appropriate overlap with the inspection program, was clearly defined and understandable, and contributed to the identification of performance outliers. Some respondents expressed concern about the PI performance-band thresholds, the NRC's enforcement response to PI reporting violations, exceptions allowed through the FAQ process, and the lack of safety culture PIs. The staff will evaluate this feedback and consolidate all responses to the external survey into a separate document.

Inspection Program

NRC inspectors independently verified, through the agency's baseline inspection program, that licensees operated plants safely and securely in CY 2011. All inspection program metrics met their established criteria during CY 2011, and the external feedback received was generally positive. Additionally, the staff promptly developed and completed two inspection activities in response to the Fukushima Daiichi accident in March 2011 to ensure that there were no immediate safety issues and to help determine the capability of each licensee site to respond to Fukushima-like accidents. Inspection results from these two inspections, TI 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event," and TI 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)," were also used by the staff to inform the Agency's licensing and oversight processes. The implementation of these TIs demonstrated the ROP's responsiveness and flexibility to perform inspections as needed to verify compliance with requirements and address potential safety vulnerabilities.

Each NRC Region documented its CY 2011 completion of the baseline inspection program in a memorandum available under ADAMS Accession No. ML12039A276 for Region I, Accession No. ML120470605 for Region II, Accession No. ML12047A364 for Region III, and Accession No. ML12053A346 for Region IV. The agency completed all security baseline inspections in CY 2011, as required and documented in a memorandum from the Office of Nuclear Security and Incident Response (NSIR) (ADAMS Accession No. ML12037A094). However, this memorandum contains security-related information and is not publicly available.

The staff performed an in-depth effectiveness review of all baseline inspection activities through the ROP realignment process. The purpose of this activity was to ensure the most effective application of inspection resources used in the baseline inspection program. The ROP realignment working group consisted of staff from the Office of Nuclear Reactor Regulation (NRR), NSIR, and all four NRC Regions. The staff considered inspection results over a 3-year period, from January 2008 through December 2010. Areas of focus for the CY 2011 ROP realignment included lessons learned from the H.B. Robinson Augmented Inspection Team and findings identified during force-on-force (FOF) exercises that may be identifiable during security baseline inspections. The staff revised nine baseline inspection procedures, which became effective beginning in CY 2012. Additional details on the results of the 2011 ROP realignment process are provided in "Reactor Oversight Process (ROP) Inspection Program Realignment Results—Calendar Year 2011," dated July 12, 2011 (ADAMS Accession No. ML11178A329).

To further integrate operating experience into inspection program guidance and to address a previous ROP self-assessment commitment, the inspection staff developed and issued IMC 2523, "NRC Application of Operating Experience in the Reactor Oversight Process," dated November 16, 2011. Its objectives were (1) to implement the applicable policies of Management Directive (MD) 8.7, "Reactor Operating Experience Program," dated September 28, 2006, (2) to emphasize the availability and applicability of the operating experience program for use within the NRC's inspection and assessment activities, and (3) to provide guidance on integrating operating experience into the ROP. Additionally, the staff recently issued two Operating Experience Smart Samples (OpESSs)—OpESS FY2012/01, "High Wind Generated Missile Hazards," dated December 29, 2011, and OpESS FY2012/02, "Technical Specification Interpretation and Operability Determination," dated January 6, 2012. The OpESS program provides inspectors with information on selected industry operating events that have generic applicability, have potential risk significance, and can be inspected readily through the baseline inspection program. In addition, the Operating Experience Branch continued to provide a summary of operating experience during the monthly ROP teleconference with the regional offices. The Operating Experience Branch also prepares a summary of notable operating experience—with a focus on the most recent 6 months of operating experience—to inform regional mid-cycle and end-of-cycle reviews of licensee performance.

The resident inspector (RI) and senior resident inspector (SRI) turnover rates have stabilized since 2008. RI and SRI turnover rates during CY 2011 were 19 percent and 12 percent, respectively. These rates represent an improvement over CY 2007. The staff informed the Commission of its assessment of the effectiveness of the agency's actions to enhance the relocation and retention of RIs and SRIs in SECY-11-0180, "Effectiveness Review of Actions To Enhance Relocation and Retention of Employees," dated December 21, 2011. This Commission paper contains sensitive information and is not publicly available. The staff

continues to monitor the attraction and retention of RIs and SRIs to ensure experienced and stable RI and SRI programs.

The staff continued to improve the initial and continuing inspector training programs to produce and maintain well-qualified, competent inspectors. The NRC reviewed recommendations the staff identified in accordance with the ROP feedback process and incorporated the improvements into inspector training standards, as appropriate. The staff developed and implemented training in CY 2011 to ensure that the inspectors remain efficient and effective in determining the safety and security significance of identified performance issues. Specifically, the staff developed a new advanced-level qualification standard for electrical inspectors, implemented training on the Maintenance Rule, and conducted refresher training on writing power-reactor inspection reports and the use of regulatory guides. In addition, the NSIR staff continues to develop a cyber-security training program for NRC inspectors and plans to conduct a more advanced training course late in CY 2012.

In general, external stakeholders stated that the inspection program was effective in ensuring that areas important to safety and security are addressed appropriately. Some respondents commented on the need to create more flexibility in the baseline inspection program to allow additional inspection samples in areas where licensee programs had weaknesses. Other comments included the need to revise current ROP treatment of nonsafety modifications that could affect safety systems and how the ROP conducts and documents safety culture assessments. The staff will address these comments in its consolidated response to the external survey.

Significance Determination Process

The SDP continues to be an effective tool for determining the safety and security significance of inspection findings. In CY 2011, several SDP guidance improvements were implemented, and other initiatives made significant progress. The staff met the SDP timeliness metric for a sixth consecutive year, and no findings exceeded the 90-day goal. All other SDP performance metrics were met.

In response to ROP feedback and suggestions collected through the Risk Tools Enhancement (RTE) Program, the staff revised IMC 0609, "Significance Determination Process," dated June 2, 2011, along with several attachments and appendices. These documents focused on incorporating feedback, improving and clarifying the process where needed, and aligning guidance documents to reduce redundancy. The staff continued to develop and refine a new SDP for spent fuel pool (SFP) findings. The SDP currently is in draft form and requires additional internal review. Overall, the draft SDP focuses on findings involving SFP cooling and water inventory, fuel handling errors, and maintaining subcritical conditions.

The staff is evaluating development of a new or revised appendix to IMC 0609 to address licensed operator performance issues. Some recent plant events point to lapses in operator fundamentals, so the staff is examining ways to assess operator performance deficiencies using SDP tools. The current licensed operator requalification inspection (IP 71111.11, "Licensed Operator Requalification Program and Licensed Operator Performance," dated December 6, 2011) and accompanying SDP (Appendix I, "Licensed Operator Requalification Significance

Determination Process,” dated December 6, 2011) mainly focus on requalification examinations, maintenance of license conditions, and identification and correction of operator performance issues through requalification training. A new or revised SDP could be used to evaluate actual operator performance in controlling the reactor, covering impact on overall plant operations and safety, including shutdown and low power events and reactivity management.

The staff made significant progress incorporating the Systems Analysis Programs for Hands-on Integrated Reliability Evaluation (SAPHIRE), Version 8, and the associated Standardized Plant Analysis Risk (SPAR) models into the at-power SDP Phase 2 guidance in Appendix A, “Determining the Significance of Reactor Inspection Findings for At-Power Situations,” dated January 10, 2008, to IMC 0609. As part of the initiative, the staff created a pilot program that included approximately three sites per region. In spring CY 2011, the staff held several Webinar training sessions with regional pilot participants. These training sessions focused on the draft revisions to the IMC 0609 guidance as well as the use of risk tools in SAPHIRE 8 and the plant-specific SPAR models. Once they completed the training, pilot participants exercised the new guidance and tools for 3 months during the summer. After incorporating feedback and lessons learned from the pilot, the staff plans to issue revisions in CY 2012 to Attachment 4, “Phase 1—Initial Screening and Characterization of Findings,” dated January 10, 2008, and Appendix A to IMC 0609.

As committed to in last year’s self-assessment and requested in Commission Staff Requirements Memorandum (SRM) M100112, “Briefing on Office of Nuclear Security and Incident Response—Programs, Performance, and Future Plans,” dated February 12, 2010, the staff reported its results to the Commission on how the proposed enhancements to the FOF physical protection SDP would improve on the CY 2009 FOF exercise findings in a memorandum dated June 6, 2011. The NSIR staff has reviewed data on the impact of the proposed changes to the significance of findings and comments from internal and external stakeholders. The staff incorporated these data and comments into the proposed enhancements to the FOF SDP. The staff plans to begin briefing senior NRC management during the first quarter of CY 2012 and expects to brief external stakeholders and publish the final draft of the revised FOF SDP in July 2012. Additionally, the staff has evaluated the baseline security SDP and is enhancing the screening tools for safeguards information and physical protection findings first introduced in CY 2010. The staff is developing new guidance and processes for evaluating findings involving target set issues.

The NSIR staff has prepared a revision of Appendix B, “Emergency Preparedness Significance Determination Process,” to IMC 0609. This revision incorporates changes (1) to address the amended emergency preparedness (EP) regulations that became effective on December 23, 2011, (2) to address lessons learned since the last revision in 2006, (3) to incorporate provisions related to the use of the SDP for performance deficiencies associated with traditional enforcement violations, and (4) to reformat the document to increase clarity and usability. The NSIR staff has addressed regional comments and prepared a final version that the NRC plans to issue in the near future. Regional EP personnel have already been trained on the draft document.

Respondents to the external survey generally agreed that the SDP results in an appropriate regulatory response to performance issues. However, some stakeholders felt that the SDP did

not always result in an appropriate regulatory response, particularly for those inspection findings that rely on a more deterministic evaluation. Several respondents provided recommendations for improving the SDP guidance, which the staff plans to consider and incorporate as appropriate. The staff will provide detailed responses to the external survey in a consolidated response. The staff believes that the SDP focuses on safety issues, contributes to effective communications with the licensee and the public, and expends an appropriate level of resources.

Assessment Program

Staff implementation of the assessment program ensured that staff and licensees took appropriate actions to address performance issues in CY 2011, commensurate with their safety significance. All eight of the assessment metrics met their established criteria in CY 2011, and the responses to the external ROP survey were generally positive. The staff closed the one remaining open deviation related to ground water issues at Vermont Yankee and did not open any new deviations in CY 2011.

On July 6, 2011, the staff issued a revision to IMC 0305, "Operating Reactor Assessment Program," to improve its usability, incorporate stakeholder feedback and lessons learned from implementation issues, and simplify guidance for identifying substantive cross-cutting issues. The staff plans to continue to update and modify the assessment program's SharePoint Web site, which contains schedules, assessment-related documents, links, and announcements to improve the infrastructure for communicating assessment program information and more current plant assessment results.

The staff observed a decrease in the number of plants in the Degraded Cornerstone Column (Column 3) of the ROP Action Matrix in CY 2011 as compared to CY 2010. Furthermore, the number of plants in Column 3 is more in line with previous years. The number of plants in the Regulatory Response Column (Column 2) also decreased from the previous 2 years. The staff also observed a corresponding jump for the number of plants in the Licensee Response Column (Column 1). However, one plant entered the Multiple/Repetitive Degraded Cornerstone Column (Column 4) and another plant transitioned to the oversight process of IMC 0350, "Oversight of Reactor Facilities in a Shutdown Condition Due to Significant Performance and/or Operational Concerns," dated December 15, 2006. The staff plans to continue to monitor the performance of these and other operating reactors in CY 2012.

As was committed to in the CY 2010 ROP self-assessment, the staff issued SECY-11-0073, "Staff Proposal to Reintegrate Security into the Action Matrix of the Reactor Oversight Process Assessment Program," dated June 5, 2011, proposing to include the Security Cornerstone in the assessment program governed by IMC 0305. In the resultant SRM, the Commission approved the staff's proposal to reintegrate the Security Cornerstone into the ROP assessment program. The staff intends to implement this reintegration in CY 2012, and the staff plans to continue to update external stakeholders on the implementation status during the ROP monthly meetings. IMC 0320, "Operating Reactor Security Assessment Program," dated April 9, 2009, currently provides guidance for assessing licensee performance in the Security Cornerstone. Once the reintegration goes into effect, the staff plans to suspend the use of IMC 0320 and revise IMC 0305 to reflect that the ROP assessment process is solely governed by IMC 0305.

Based on the ROP Gap Analysis performed in CY 2010 and the staff commitment in the CY 2010 ROP self-assessment, the staff prepared SECY-11-0076, "Improving the Public Radiation Safety Cornerstone of the Reactor Oversight Process," dated June 9, 2011, to request Commission direction on possible enhancements to emphasize defense in depth in preventing, detecting, and mitigating ground water contamination. The Commission approved the staff's commitment to work with internal and external stakeholders on potential enhancements to the ROP, but it did not approve changes to the ROP related to ground water contamination control. The staff plans to engage various stakeholders in CY 2012 to explore possible enhancements in the Public Radiation Safety Cornerstone. As directed in the SRM, the staff will inform the Commission in a notation paper of any proposed revisions to the NRC's regulatory program in this area.

The NRC issued its "Final Safety Culture Policy Statement" in the *Federal Register* (FR) in June 2011 (76 FR 34773; June 14, 2011). This policy statement outlines the Commission's expectation that all licensees maintain a positive safety culture at their facilities. After publication of the policy statement, NRR restarted an initiative to develop a common language on safety culture. NRR held a joint public workshop, December 13–14, 2011, with a panel consisting of members from the NRC, NEI, the Institute for Nuclear Power Operations (INPO), and members of the public. The purpose of this workshop was to develop a common language, using current NRC, INPO, and International Atomic Energy Agency language, for use in the NRC's ROP and INPO's assessment processes. The NRR staff continues to lead an internal working group with members from each regional office and other NRC offices to develop common language terminology (where possible) and training materials that are consistent with the Commission's Final Safety Culture Policy Statement and common language initiative. This common terminology can then be adopted for use in various programs, including the ROP. NEI and INPO also have tested a broad initiative to monitor and improve their nuclear safety culture through an industry pilot program. The NRC staff has observed these pilot applications to become familiar with the initiative and to evaluate associated tools that it could potentially use to gain ROP efficiencies.

Based on the results from the 2011 external survey, the perception of the assessment program was generally positive. Most respondents indicated that the assessment program is objective and predictable and the information contained in the assessment reports is relevant, useful, and written in plain English. Several respondents noted that assessment language could be clearer. The staff plans to address this issue in its consolidated response to the external survey.