Inspection Program Evaluation

Scope and Objectives - The staff of the U.S. Nuclear Regulatory Commission (NRC) performed an evaluation of the inspection program in accordance with Inspection Manual Chapter (IMC) 0307, "Reactor Oversight Process Self-Assessment Program." The staff used self-assessment metrics and other pertinent information to provide insights regarding the effectiveness of the Reactor Oversight Process (ROP) in fulfilling the regulatory principles of being predictable, understandable, objective, and risk-informed, and in supporting the NRC's 2004 performance goals of maintaining safety, enhancing public confidence, making regulatory activities more effective, efficient, and realistic, and reducing unnecessary regulatory burden. The staff also obtained input from internal stakeholders through an internal survey, counterpart meetings, focus groups, and the internal feedback process. In addition, the staff obtained external feedback through a *Federal Register* notice (FRN) solicitation for comments and through periodic meetings with the industry and other stakeholders.

Based on the metric results, stakeholder feedback, and other lessons learned through ongoing program monitoring, the staff identified certain issues and actions to further improve the inspection program. These issues are discussed in further detail below and the status of implementation issues is summarized in Attachment 5. In addition, the annual ROP performance metric report provides the data and staff analysis for each of the program area metrics (reference ADAMS Accession No. ML050670162).

Program Evaluation per Strategic Plan - The staff committed in Appendix B to the fiscal year (FY) 2004–2009 Strategic Plan to perform a program evaluation of the ROP in FY 2005. One aspect of the program specifically noted in the scope of the evaluation was the efficiency of the baseline inspection program. The efficiency of the baseline inspection program was evaluated as part of the calendar year (CY) 2004 annual self-assessment of the ROP and the results of this evaluation are discussed below. Therefore, the CY 2004 self-assessment of the inspection program constitutes one of the three FY 2005 program evaluations of the ROP as delineated in the Strategic Plan, and the staff considers this action completed.

Summary of Previous Self-Assessment - In SECY-04-0053, "Reactor Oversight Process Self-Assessment for Calendar Year 2003," the staff noted that the inspection program continued to improve in CY 2003. The staff had implemented several changes to the inspection program to address recommendations from the Davis-Besse Lessons Learned Task Force (DBLLTF) and other stakeholders. In particular, these changes included significant revisions to Inspection Procedure (IP) 71152, "Problem Identification and Resolution (PI&R)," and IP 71111.05, "Fire Protection." In addition, the staff made minor adjustments to several other IPs regarding procedure scope, frequency, and level of effort as a result of the annual review of the inspection procedures, the survey results, and the feedback process. The regions had completed the required baseline inspection program for CY 2003, though resource challenges continued, prompting the staff to revise the resident inspector staffing policy and increase the budgeted regional resources. The staff also planned additional improvements for the inspection program to reflect lessons learned from the Davis-Besse reactor vessel head degradation, as well as continuing feedback from the regions through their implementation of the ROP.

Completion of the Baseline Inspection Program and Site Coverage Issues - All four regions completed their baseline inspections in CY 2004 in accordance with IMC 2515, "Light-Water Reactor Inspection Program — Operations Phase." Each region documented their completion of the baseline inspection program in CY 2004 via memoranda. These memoranda can be found in ADAMS under ML050630303 (Region I), ML050620589 (Region II), ML050610305 (Region III), and ML050620177 (Region IV). In CY 2004, the baseline inspection program was completed using existing regional resources without the coping measures that were necessary the previous two inspection cycles. The resource challenges in CY 2002 and CY 2003 were addressed by increasing the regional budget, revising the resident inspector policy to allow early assignment of resident and senior resident inspectors to a site, and aggressively recruiting, hiring, and qualifying new inspectors. These initiatives improved the site staffing levels in CY 2004 and alleviated the previous resource issues in completing the baseline inspection program.

The staff committed in NRR's Management Control Plan to monitor the impact and effectiveness of actions taken in FY 2004 to increase the availability of fully qualified inspectors as discussed above. The effectiveness evaluation was completed as part of this annual self-assessment, and is discussed in further detail in the resource discussions in Attachment 8.

Changes to Inspection Guidance - In CY 2003, the staff made significant revisions to two baseline inspection procedures to change the respective scope and/or level of effort. Specifically, the staff revised the PI&R procedure (IP 71152) in response to recommendations and feedback from the DBLLTF, the PI&R focus group, and inspectors. The changes included enhanced requirements regarding the routine PI&R reviews conducted by resident inspectors, biennial reviews of longstanding issues, and biennial reviews of operating experience issues.

In addition, the staff revised the fire protection procedure (IP 71111.05) to provide additional inspection requirements and guidance for evaluating licensees' manual actions in lieu of full implementation of Section III.G.2, "Associated Circuits," of Appendix R to Part 50 of Title 10 of the *Code of Federal Regulations*. The suspension of associated circuits inspections continued throughout CY 2004. In support of the fire protection improvement plan initiated by the NRC's Office of Nuclear Reactor Regulation (NRR), the staff lifted the inspection moratorium on associated circuits and revised the inspection guidance in December 2004. Specifically, the staff added guidance for identifying circuits that could prevent a plant from achieving and maintaining hot shutdown conditions after a fire. Inspection of these circuits was suspended in 2000, pending fire tests and the assessment of the test results in order to gain risk insights into the phenomena of fire-induced electrical cable failures.

In CY 2004, the staff revised the plant status procedure (IMC 2515, Appendix D) to provide guidance to ensure that the licensee properly monitors for reactor coolant pressure boundary leakage or potential unidentified leakage that exceeds technical specification (TS) limits. Additional guidance was provided to monitor licensee's actions when the licensee is operating with multiple, repetitive, or unplanned TS action statement entries and to review licensee's corrective action summary reports.

The staff committed in NRR's Management Control Plan to evaluate the effectiveness of the revisions to the PI&R and fire protection IPs and adjustments to several other IPs regarding procedure scope, frequency, and level of effort, and to continue to improve major program

guidance as a result of stakeholder feedback and lessons learned. This effectiveness evaluation and improvement effort will be completed in FY 2005.

Analysis of Inspection Procedures - The staff performed its annual review of each baseline inspection procedure in CY 2004. The period assessed was from October 2003 through September 2004. The focus of the review was to identify potential areas for improvement in the baseline inspection program and to identify any notable changes in inspection results. The staff evaluated each inspection procedure against the requirements in IMC 0307, and performed additional analyses of inspection findings. Based on this review, the staff did not identify any significant changes to the inspection program, although the staff is making minor adjustments to some inspection procedures and plans to do a more detailed analysis and resource adjustment in CY 2005.

It is difficult to make assessments of the effectiveness of inspection procedures for a number of reasons. Among the variables that influence inspection findings are:

- The level of performance of the licensee in the area being inspected.

- The quality of the inspection tools and training provided to the inspector in the area under inspection.

- The fact that the inspection process is a small sampling of the total activities in the area under inspection, and the uncertainty of whether our inspections are focused on the correct activities in an area.

- The experience and inspection abilities of the inspector doing the inspection.

Recognizing these uncertainties, the staff's self-assessment of the inspection findings, internal and external feedback forms, and other independent reviews of the ROP indicate that the inspection program had been generally successful in identifying the risk significance of performance deficiencies in many of the areas inspected. In some areas, there were few inspection findings compared to the amount of resources expended. Additionally, there was a large variation with respect to the number of findings identified per 1000 hours of inspections performed across all the baseline inspection procedures.

Internal feedback from inspectors and regional management also indicated the need for some adjustment to be made to the inspection program. Specifically, the inspectors believed that inspection scope and level of effort may need to be adjusted as appropriate for some inspection procedures. The staff intends to perform similar analyses of inspection data for FY 2003 and FY 2002 and based on these analyses, the staff will modify the baseline inspection program. The purpose of these improvements will be to better align inspection resources to inspected areas where there is an indication of risk-significant performance deficiencies. The staff plans to perform a more detailed analysis of the scope and level of effort of the inspection procedures in CY 2005. As a result of this systematic analysis, the staff plans to adjust existing resources within the baseline inspection program for CY 2006.

Analysis of Inspection Findings - The staff noted an increase in the total number of findings identified during FY 2004. This could be an early indication of a declining performance trend in the industry, however the Industry Trends Program does not yet support this possible

conclusion. There were 881 green findings, 12 white findings, and no yellow or red findings. Comparisons to previous years are provided in Table 1.

Table 1

	10/01/2001-09/30/2002	10/01/2002-09/30/2003	10/01/2003-09/30/2004
Green	696	716	881
White	26	14	12
Yellow	2	2	0
Red	3	1	0
Total:	727	733	893

Reviews by the regions indicated that this increased trend appeared to be caused, in part, by several other factors. First, the regions increased their focus on facilities operating in the degraded or multiple degraded cornerstone columns, which contributed to some of the increase in the number of green findings. Second, more performance deficiencies were identified as a result of the increased number of events. Additionally, more effective and efficient implementation of the ROP, in part resulting from lessons learned from the Davis-Besse vessel head degradation and from more effective training, appeared to result in increased identification of performance deficiencies. The staff will evaluate the number of findings identified during FY 2005 to determine whether the trend continues to increase and to identify potential contributors.

Engineering Design Inspections - In response to direction from the Commission, the staff developed a pilot inspection program designed to improve the effectiveness of inspections in the design/engineering area. The details regarding the pilot program are contained in SECY-04-0071, “Proposed Program to Improve the Effectiveness of the Nuclear Regulatory Commission Inspections of Design Issues,” dated April 29, 2004. During Phase 1 of the pilot program, the staff reviewed the results of previous design inspections and reviewed existing and previous inspection guidance. During Phase 2 of the pilot program, the staff developed a prototype inspection procedure, Temporary Instruction 2515/158, “Functional Review of Low Margin/Risk Significant Components and Human Actions,” to focus inspection resources on areas of higher risk importance. The temporary instruction was implemented at one pilot site in each region. During Phase 3 of the pilot program, beginning in March 2005, the staff will assess the results of the pilot inspections and will develop recommendations for Commission consideration. As part of its assessment, the staff will solicit feedback from internal and external stakeholders. Based on an initial review of the pilot inspection results, the staff’s preliminary view is that the revised approach appears to be an improvement over previous inspection efforts.

Licensee Self-Assessments - As part of the staff’s ongoing efforts to improve the effectiveness and efficiency of the ROP, the staff began evaluating a process that would allow licensees to

receive credit for certain self-assessments. The staff is considering allowing licensees to substitute a self-assessment for specific, predetermined baseline inspections, as long as the self-assessment is conducted in accordance with an NRC-approved industry self-assessment process. The staff would still monitor these self-assessments, but the staff anticipates that resource savings to the NRC and its licensees could be significant for these inspectable areas. The staff plans to conduct a pilot program to ascertain the feasibility of a licensee self-assessment process. However, these efforts were deferred until completion of the design/engineering pilot program. After completing the pilot inspections and assessing the results, the staff will evaluate the proposed policy of granting licensee credit for their self-assessment activities.

Commission SRM on Safety Culture - In response to a DBLLTF recommendation to provide more structured and focused inspections to assess licensee's employee concerns programs and safety-conscious work environment (SCWE), the staff provided recommendations and options to the Commission in SECY-04-0111, "Recommended Staff Actions Regarding Agency Guidance in the Areas of Safety Conscious Work Environment and Safety Culture," dated July 1, 2004. On August 30, 2004, the Commission issued a staff requirements memorandum (SRM) that directed the staff to enhance the ROP treatment of cross-cutting issues to more fully address safety culture. The SRM stated that the staff should rely on inspector observations and other indicators already available, should develop tools that allow inspectors to rely on more objective findings, should consider including enhanced problem identification and resolution initiatives, and should ensure that the inspectors are properly trained in the area of safety culture. The Office of Enforcement is the lead office on this issue, with support from NRR, the Office of Research, and the regions.

Status of DBLLTF Items for the Inspection Program - Numerous improvements were made to the inspection program in CY 2004 as a result of DBLLTF recommendations. Eight specific recommendations were incorporated and closed in 2004. Only two related to the inspection program remain open. The following items were closed in 2004:

- Develop inspection guidance pertaining to reactor coolant system unidentified leakage (DBLLTF item 3.2.1.2)

- Ensure that licensee procedures provide adequate guidance for the identification of reactor coolant pressure boundary leakage (DBLLTF item 3.2.1.3)

- Develop inspection guidance for the verification of the implementation of owners groups' commitments (DBLLTF item 3.2.3.2)

- Develop inspection guidance to ensure the adequacy of PWR plant boric acid corrosion control programs (DBLLTF item 3.2.2.1)

- Develop inspection guidance to assess repetitive or multiple technical specification action statement entries (DBLLTF item 3.3.1.2)

- Evaluate inspection guidance pertaining to refueling outage activities (DBLLTF item 3.3.4.1)

- Strengthen inspection guidance for reviewing operating experience

(DBLLTF item 3.3.4.2)

- Provide more structured and focused inspections to assess licensee employee concerns programs and safety-conscious work environment (DBLLTF item 3.3.4.5)

- Establish program expectations and metrics to satisfy minimum resident inspector staffing levels (DBLLTF item 3.3.5.3)

Two additional DBLLTF items remained opened at the end of calender year 2004:

- *Inspect the adequacy of PWR plant boric acid corrosion control programs* (DBLLTF item 3.2.2.1)

  The evaluation of responses to Bulletin 2002-01, which included audits of boric acid corrosion control (BACC) programs at five plants, determined that plants appeared to be complying with requirements at the programmatic level. The results of the evaluation were summarized in Regulatory Issue Summary (RIS) 2003-13. Temporary Instruction (TI) 2515/150 provided guidance for inspecting licensees' reactor pressure vessel (RPV) head inspections pursuant to Order EA-03-009, and included instructions for followup on findings of boric acid accumulation. Inspection Procedure (IP) 71111.08, "Inservice Inspection Activities," was revised in May 2004 to add periodic inspection requirements and guidance for boric acid corrosion control.

  In addition, training modules on BACC and stress corrosion cracking were included in a Web-based training course. A training module on the "Effects of Corrosion" was completed by all current inspectors. IMC 1245, "Qualification Program for the Office of Nuclear Reactor Regulation Programs," was revised to include an individual study activity requiring all qualifying inspectors to review the technical subject Web-based training as well as future Web-based training items. The target date to close this item was extended to May 2005 to allow time to conduct more inspections in this area.

- *Reassess the basis for the cancellation of the inspection procedures that were deleted by Change Notice 01-017* (DBLLTF item 3.3.4.7)

  In March 2005, a review of all IPs cancelled by IMC Change Notice 01-017 was completed and recommended reactivations were restored to the IMC 2515 Supplemental Inspection Program (Appendix B). This made the IPs available to inspectors for use during any supplemental inspections required as a result of poor licensee performance.

Effectiveness reviews are currently in process for several of the aforementioned DBLLTF items and others that were closed during the previous year. The staff has specifically solicited feedback from inspectors who have actually implemented these IPs following the specified changes, from both the regional IP leads and from resident inspectors at two to three sites in each region. The status and details on the DBLLTF recommendations are available in the Director's Quarterly Status Report (reference ADAMS Accession No. ML043480034) and on the NRC's public Web page.

Office of Inspector General's (OIG's) Audit of the Baseline Inspection Program - The staff received the final report of the OIG's audit of the baseline inspection program in December of 2004 (OIG-05-A-06). The staff agreed with nine of the ten recommendations and plans to improve the effectiveness and efficiency of the baseline inspection program by making changes to the program during CY 2005. The staff disagreed with Recommendation 3 in the OIG report that the staff develop and implement guidance for documenting, tracking, and trending informal inspection issues. A fundamental principle of the ROP is the use of risk information to focus both NRC and licensee attention on issues of greatest significance, and to minimize the level of effort focused on minor issues. Although minor findings are not documented in inspection reports, the ROP explicitly allows minor findings to be conveyed to a licensee verbally for appropriate resolution. The feedback received from NRC regional managers and licensees indicates that this communication process is working well.

Inspection Program Performance Metrics - All inspection program metrics met their established criteria in CY 2004. These metrics are: (1) percentage of inspection findings documented in accordance with requirements, (2) number of baseline inspection procedures significantly changed, (3) number of feedback forms per document, (4) completion of the baseline inspection program, (5) inspection reports are timely, (6) temporary instructions are completed timely, (7) public communication is timely, (8) public communication is accurate, and (9) analysis of inspection hours. Two other metrics, which are discussed below, evaluate feedback received from internal and external stakeholders.

During CY 2004, the staff reduced the number of inspection reports reviewed because of improvement observed during CY 2003. The staff reviewed an integrated inspection report from each regional branch and team inspection reports from each region. About 97 percent of the findings were documented in accordance with IMC 0612 requirements. The staff received 114 feedback forms during CY 2004, comparable to previous years, and has improved responsiveness.

Internal Survey Results - Most responses indicated that the baseline inspection program appropriately inspects for and identifies risk-significant issues, and provides appropriate coverage of plant activities and operations important to safety. About half of the respondents (43 percent) disagreed that the level of effort for conducting each inspection is consistent with that estimated in the inspection procedure.

Most responses (73 to 83 percent) agreed that the baseline inspection procedures were adequate to address intended cornerstone attributes, were clearly written, adequately sampled risk important aspects of each inspectable area, and were conducted at an appropriate frequency.

Some of the more prevalent comments on the inspection program were:

- Inspection procedure scope and level of effort need to be reviewed and adjusted as appropriate.

- Issues which screen out as minor should be monitored.

- More time is needed for plant status, walking around the plant, and other nonspecific activities to let inspectors follow their instincts.

External Survey Results - Participants in the external ROP survey included 11 industry representatives, 6 State or local government agencies, and 4 private citizens or public interest groups. The majority of those who provided feedback to the question on whether the information in the inspection reports is useful to them responded that the inspection reports were clearly written and provided a better understanding of plant operations. Other comments included:

- The information contained in the inspection report is very useful and overall, the quality of these reports has improved.

- The most useful information is the analysis of findings because it has consequences for the licensee.

- By the time we receive an NRC inspection report, the information is old.

- The organization of the inspection reports with the ties to cornerstones helps provide better definition and focus in problem areas. The listing in the reports of inspection scope is duplicative of the inspection procedures and should be eliminated.

- Information in the inspection reports is useful and acceptably formatted. The reports should continue to focus on risk and safety significance issues, leaving any suggestions for improvements to be discussed at the inspection exit meeting.

More detail on the results of the internal and external surveys is provided in Attachment 6. Further staff analysis of the survey responses is included in the annual ROP performance metric report (reference ADAMS Accession No. ML050670162).

Self-Assessment Conclusions - In conclusion, the inspection program met its established goals during CY 2004. The staff made several improvements to the program to address DBLLTF recommendations. The regions completed the required baseline inspection program for CY 2004, and the increases in the regional inspection budget in 2004 and action by regional offices in filling open inspector positions prevented the staffing shortages experienced in 2002 and 2003 from extending into the 2004 inspection cycle. The annual IP evaluation did not result in any significant changes to the inspection procedures, but the staff plans to further evaluate the effectiveness of the baseline inspection procedures in CY 2005 and make the necessary changes to the inspection program.