July 7, 2003

Mr. Lew W. Myers
Chief Operating Officer
FirstEnergy Nuclear Operating Company
Davis-Besse Nuclear Power Station
5501 North State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION
NRC SPECIAL INSPECTIONS - ADEQUACY OF SAFETY SIGNIFICANT PROGRAMS - REPORTS NO. 50-346/02-11 and 50-346/03-09

Dear Mr. Myers:

On June 27, 2003, the NRC completed two special inspections at your Davis-Besse Nuclear Power Station. This inspections reviewed your actions to resolve Restart Checklist Item 3, associated with the adequacy of your safety significant programs. Specifically, the first inspection evaluated your process for assessing the adequacy of safety significant programs and application of the process to accomplish detailed assessments of the Corrective Actions, Quality Audits and Self Assessments, and Boric Acid Corrosion Management Programs, Restart Checklist Items 3.a., 3.c. and 3.d., respectively. The inspection included a review of a sample of activities as described in the "Davis-Besse Return to Service Plan" and specifically your "Davis-Besse Program Technical Compliance Plan." This plan described your activities to review, evaluate, and disposition program weaknesses to ensure that programs were fulfilling required obligations and included effective interfaces. The enclosed report documents the inspection results which were discussed on June 27, 2003, with members of your staff.

Report No. 50-346/02-11 discusses our first inspection of your safety significant programs. Based on our inspection, we have determined that your Return to Service Plan and Program Compliance Review Processes provided a reasonable method for determining if the selected programs correctly implemented regulatory and other requirements, effectively interfaced with other supporting plant programs, appropriately considered industry experience, were properly staffed by qualified individuals, and resolved identified weaknesses or deficiencies in a timely manner. We also determined that your detailed reviews of the Corrective Action, Boric Acid Corrosion Control, and Quality Assurance Audit Programs were conducted in accordance with the governing processes.

Report No. 50-346/03-09 discusses our second inspection of your safety significant programs. Specifically, the inspection focused on your Phase 2, in-depth efforts on the Boric Acid Corrosion Control, Inservice Inspection, Plant Modification, Corrective Action, Operating Experience, and Quality Assurance Programs. Our review also included your development of an integrated Reactor Coolant System Leakage Program.

Based on the results of both inspections, we have concluded that your reviews for those programs appeared thorough. Also, the corrective actions sampled were considered effective. Restart Checklist Items No. 3.b., 3.e., 3.f., and 3.g. are closed based on the completed inspections. Item 3.a, “Corrective Action Program,” will remain open pending further inspection of the effectiveness of your corrective action program that will be documented in Inspection Report No. 50-346/03-010. Although the program is considered sufficient, the Corrective Action Team Inspection plans to review several specific Condition Reports to assess the implementation of your recently revised program. Item 3.c, “Quality Audits and Self-Assessment of Programs,” is partially complete. Further inspection of the Self-Assessment area will be conducted in the future. Item 3.d, “Boric Acid Corrosion Management Program,” will remain open pending resolution of corrective action program documentation of engineering evaluations as discussed in the enclosed report. The enclosed report documents the inspection results which were discussed on May 23, 2003 with members of your staff.

Based on the results of the two inspections, no findings of significance were identified.

In accordance with 10 CFR Part 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

John A. Grobe, Chairman
Davis-Besse Oversight Panel

Docket No. 50-346
License No. NPF-3

Enclosures:
1. NRC Special Inspection Report No. 50-346/02-11
2. NRC Special Inspection Report No. 50-346/03-09

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REGION III

Docket No:	50-346
License No:	NPF-3
Report No:	50-346/02-11
Licensee:	FirstEnergy Nuclear Operating Company
Facility:	Davis-Besse Nuclear Power Station
Location:	5501 North State Route 2 Oak Harbor, OH 43449
Dates:	September 9, 2002 through June 27, 2003
Inspectors:	K. O'Brien, Branch Chief and Team Leader L. Kozak, Project Engineer N. Shah, Resident Inspector, Braidwood
Approved by:	Christine Lipa, Chief Branch 4 Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000346-02-11; FirstEnergy Nuclear Operating Company; on 09/09/2002 - 06/27/2003, Davis-Besse Nuclear Power Station. Special Inspection - Programs Part 1

This report covers a special inspection of licensee activities associated with reviewing and evaluating the adequacy of safety significant programs. This inspection was conducted by Region III based inspectors. This inspection evaluated your program assessments for the Corrective Action Program, Boric Acid Corrosion Control Program, and the Quality Assurance Oversight Program.

The inspectors determined that the licensee's Return to Service Plan and Program Compliance Review Processes provided a reasonable method for determining if a plant program correctly implemented regulatory and other requirements, effectively interfaced with other supporting plant programs, appropriately considered industry experience, was properly staffed by qualified individuals, and resolved identified weaknesses or deficiencies in a timely manner. The processes also included an appropriate method for evaluating and characterizing newly identified issues.

REPORT DETAILS

Background

On March 6, 2002, Davis-Besse staff notified the NRC of degradation (corrosion) of the reactor vessel head material adjacent to a control rod drive mechanism (CRDM) nozzle. This condition was caused by coolant leakage and boric acid corrosion of the head material induced by an undetected crack in the adjacent CRDM nozzle. The degraded area covered in excess of 20 square inches where the low-alloy structural steel was corroded away, leaving the thin stainless steel cladding layer. This condition represented a loss of the reactor vessel's pressure retaining design function, since the cladding was not considered as pressure boundary material in the structural design of the reactor pressure vessel. While the cladding did provide a pressure retaining capability during reactor operations, the identified degradation represented an unacceptable reduction in the margin of safety of one of the three principal fission product barriers at the Davis-Besse Nuclear Power Station (reference NRC report 50-346/02-03(DRS)).

As part of the corrective actions resulting from the reactor vessel head degradation, the licensee established a Return to Service Plan to identify, monitor, and control all actions necessary for the safe and reliable return to service of Davis-Besse. The Plan consists of seven Building Blocks designed to support safe and reliable restart of the plant and to ensure sustained performance improvements. One of the Building Blocks, Program Compliance Plan, was tasked with performing reviews of selected plant programs to ensure that the programs were fulfilling required obligations, including effective interfaces and handoffs. The NRC inspectors' review of these activities included an assessment of the overall process and a focused review of three licensee program reviews.

4. OTHER ACTIVITIES

4OA3 Event Follow-up (93812)

.1 Restart Action Plan and Program Compliance Review Processes

a. Inspection Scope

The inspectors reviewed the licensee's Restart Action Plan and Program Compliance Review Processes. The inspectors also reviewed the licensee staff's implementation of the discovery phase evaluations for the Corrective Action, Boric Acid Corrosion Control, and Quality Assurance Audit Programs.

The inspectors reviewed the applicable procedures and attended licensee meetings, including the Program Review Board, Restart Station Review Board, Restart Senior Management Team, and the Management Review Board. The inspectors also conducted individual interviews.

b. Findings

The licensee documented the Restart Action Plan Process in Procedure NG-VP-00100, "Restart Action Plan Process." The process included three phases of work: planning, discovery, and implementation. The planning phase consisted of approving the "Building Block" Plans and associated procedures. The discovery phase included an evaluation of the specific programs and an identification of issues requiring resolution. The process included a requirement that certain types of corrective actions shall be completed prior to restart of the plant; while some corrective actions could be completed after restart of the plant. The implementation phase encompassed the development and completion of corrective actions which were to be completed prior to restart of the plant.

The licensee documented the program compliance review process in Procedure NG-EN-00385, "Program Compliance Review." The procedure outlined a structured and systematic process by which to determine if the plant programs properly implemented requirements, including interfaces and obligations, necessary to support restart and operation of the plant. The process included two levels, Phase 1 and Phase 2, of program reviews. Phase 1 level reviews were a baseline screening evaluation of selected programs. Phase 2 level reviews were a detailed, systematic evaluation of those plant programs associated with the degraded reactor vessel head. Programs scheduled for a Phase 2 level review included the Boric Acid Corrosion Control (BACC), the Inservice Inspection (ISI), the Plant Modification (MOD), the Corrective Action (CAP), the Reactor Coolant Unidentified Leakage, and the Operating Experience (OE) Programs.

The program compliance review procedure directed that Phase 1 level reviews would be completed by the program owner using a program readiness baseline assessment questionnaire. The licensee staff intended to conduct Phase 1 level reviews for approximately 50 programs.

Phase 2 level reviews were to be performed by a group of licensee and non-licensee staff. The Phase 2 level review process included:

- Identification of the program basis documents and commitments, and a determination of the programmatic elements necessary to fulfill the basis documents.

- Comparison of the basis document requirements against the program implementing procedures, including consideration of industry guidance on alternate approaches to the basis documents.

- Verification that the program goals and scope were appropriate.

- Identification of previous program issues and verification that appropriate corrective actions were implemented based upon a review of condition reports, self-assessments, quality assurance audits, peer reviews, and NRC inspections for the past 3 years.

- Identification of key program interfaces to ensure that required supporting processes and procedures are properly developed and implemented.

- Verification that program roles and responsibilities were properly identified and implemented, and that the program includes an appropriate level of management involvement.

- Determination that a sufficient number of qualified personnel existed to manage, implement, and interface with the program.

- Review of external operating experience for applicability and potential impact on the program, including effective implementation of industry lessons learned related to the program.

- Documentation in condition reports of all weaknesses and recommendations for program changes or upgrades necessary to restore compliance or correct other deficiencies.

Results from the Phase 1 and Phase 2 level reviews were presented to a Program Review Board (PRB), consisting of an independent chairman, two members of the Engineering Assessment Board, and the Program Compliance Review Owner. The PRB was chartered to evaluate the Phase 1 and Phase 2 level review-documented findings and associated corrective action recommendations. Based upon information in the Phase 1 questionnaire and the Phase 2 level review results, the Program Review Board determined the adequacy of the reviews and those actions necessary for the program to support a plant restart. The licensee staff considered the restart action plan discovery phase process complete following the PRB's review and approval of the Phase 1 and Phase 2 reports. The PRB also reviewed completed restart action items in accordance with the program review process procedure.

The inspectors reviewed the licensee's process against similar program review outlines included in NRC inspection procedures and determined that the licensee's process provided a reasonable outline from which to perform an overall program review. Specifically, the inspectors determined that the outlined approach and multiple independent reviews would result in a thorough assessment. The inspectors also attended several PRB meetings to observe the review process. Both the Corrective Action Program and Boric Acid Corrosion Control Program Phase 2 review reports were initially rejected by the PRB. After revisions and a second PRB, both reports were accepted. The inspectors observed that the review board performed a very detailed review of the submitted reports and determined that the board provided a critical and thorough assessment of the program review reports.

The licensee staff documented issues, identified during the discovery phase, in condition reports. The condition reports were screened and classified by the Restart Station Review Board (RSRB) into one of four categories. The four categories included items for which corrective actions: 1) were necessary to address NRC Manual Chapter 0350 issues; 2) were necessary to address Davis-Besse Restart expectations; 3) could be implemented following plant restart (Post-Restart), and; 4) could be addressed at a time unrelated to plant restart (Not Restart). Once the licensee staff developed

corrective actions to address the issues documented in the condition reports, the RSRB screened the proposed corrective actions to ensure that the underlying issues were fully addressed. The RSRB also screened maintenance work orders associated with the corrective actions.

During the inspection, the discovery phase was well underway for both the Program Compliance and the System Health Building Blocks. The inspectors observed the RSRB classification of condition reports and observed that the majority of condition reports were classified as requiring evaluation prior to restart.

The Restart Action Plan Process also described the responsibilities of the Restart Senior Management Team (RSMT). With regards to the Program Compliance Review, the RSMT was responsible for review and approval of the discovery and restart implementation action plans and for reviewing reports generated from the discovery action plan for Manual Chapter 0350 related restart items.

c. Conclusions

The inspectors determined that the licensee's Restart Action Plan and Program Compliance Review Processes provided a reasonable method for determining if a plant program correctly implemented regulatory and other requirements, effectively interfaced with other supporting plant programs, appropriately considered industry experienced, was properly staffed by qualified individuals, and resolved identified weaknesses or deficiencies in a timely manner. The inspectors also concluded that the processes included an appropriate method for evaluating and characterizing newly identified issues.

.2 Corrective Action Program Compliance Review

a. Inspection Scope

The inspectors evaluated the licensee's review of the Corrective Action Program (CAP), as documented in Discovery Action Plan Report PR-DAP-3-01, Revision 0, "Corrective Action Program Review." Specifically, the inspectors evaluated whether the licensee's program review was consistent with the licensee's Program Compliance Review process as defined in procedures NG-VP-00100, Revision 1, "Restart Action Plan Process," and NG-EN-00385, Revision 0, "Program Compliance Review."

The inspection consisted of reviewing applicable licensee, industry and regulatory documents; interviewing those licensee personnel responsible for the CAP program reviews and implementation; observing the presentation of the Discovery Action Plan to the Restart Senior Management Team; and reviewing some of the corrective actions developed.

b. Findings

b.1 Corrective Action Program Discovery Action Plan Results

The licensee's Phase 2 level review of the CAP identified a number of concerns in almost every program attribute including programmatic elements, program implementation, interfaces and handoffs, roles and responsibilities, knowledge base, and external operating experience. A total of 43 CRs were issued documenting these concerns and recommendations. The majority of the CRs were classified by the RSRB as requiring evaluation prior to restart. The overall conclusion of the report was that the CAP was not consistently implemented and needed to be strengthened prior to restart of the plant.

The licensee indicated that CAP implementation (execution) problems were the most significant issues identified during the review. However, given the extent of the implementation problems identified, the licensee determined that changes to the program documents were necessary to restoring an effective CAP. Specific implementation problems documented as a result of the Phase 2 review included: 1) a recurring trend of less than adequate corrective actions; 2) less than adequate CR evaluations; 3) a hesitancy by the staff to document certain types of conditions adverse to quality; 4) management review board deficiencies; 5) a need for improvement in the trending program, and; 5) untimely supervisory and senior reactor operator reviews. These and other findings were determined to be consistent with the Root Cause Analysis Report of the degraded pressure vessel head.

The Phase 2 level review comparison of the program documents to the applicable regulatory and other basis documents resulted in the identification of two programmatic elements that were not adequately incorporated. One element was a Quality Assurance Program Manual (QAPM) requirement for management encouragement of the staff to identify conditions that are adverse to quality. The second element was related to an Institute of Nuclear Power Operations (INPO) principle to provide prompt feedback on corrective actions to the CR initiator. The CAP Phase 2 level review team found that there was no specific program guidance for either of these elements. A number of programmatic elements, particularly those related to the implementation of the QAPM, were rated as marginal. The programmatic elements related to the requirements of 10 CFR 50, Appendix B, were determined to be either marginal or fully adequate.

b.2 Assessment Of The Corrective Action Program Compliance Review

Overall, the inspectors determined that the program review team had appropriately implemented the process developed for conducting a Phase 2 level review. As discussed above, the Phase 2 level review team determined that the CAP generally met regulatory requirements and that the identified problems were primarily associated with program implementation. The inspectors independently reviewed CRs associated with the CAP that were reviewed by the Phase 2 review team and also reviewed CAP program regulatory requirements and concurred with the assessment that the identified problems were mainly with program implementation. The inspectors also determined that the recommended program infrastructure improvements could improve the overall program effectiveness.

To resolve the identified deficiencies and to improve program implementation, the licensee generated two CRs to roll up all of the issues identified during the Phase 2 level review. The program implementation problems were captured under CR 02-4884 and the program infrastructure problems were captured under CR 02-04885. The licensee chartered two separate teams to evaluate the issues associated with each CR and recommend corrective actions. The results of these efforts will be reviewed during the NRC's assessment of the licensee's implementation of corrective actions.

The CAP Phase 2 level review results did not include a required review of technical issues that had been previously closed in the corrective program to ensure that issues were appropriately evaluated and corrected. However, Corrective Action Number 51 to CR 00-0891, which was the root cause evaluation for the failure to identify the degradation of the reactor vessel head, did require a review of longstanding issues in the CAP for possible re-categorization as significant conditions adverse to quality (SCAQ). The inspectors viewed this corrective action, as an important "extent of condition" review of the corrective action program implementation, to ensure that no other unrecognized safety-significant equipment or technical issues existed in the plant. However, at the time of the inspection, this corrective action had not been implemented. A further review of this corrective action will be completed during the NRC's assessment of the licensee's implementation of the corrective actions.

c. Conclusions

The inspectors determined the licensee's Phase 2 level review of the CAP was thorough and in accordance with NG-EN-00385, "Program Compliance Review." The corrective actions scheduled for completion prior to restart were found to be appropriate. The CAP, prior to this review, appeared to contain the programmatic elements for a successful program; however, station personnel did not consistently identify, aggressively pursue, and effectively resolve plant issues. The inspectors determined that the reviews, conducted to evaluate the CAP issues and the associated matrix of issues and corrective actions, were considered an excellent effort. Restart Checklist Item 3.a., "Corrective Action Program," remains open pending completion of the Corrective Action Team Inspection (NRC Inspection Report 50-346/03-10).

.3 Boric Acid Corrosion Control Program Compliance Review

a. Inspection Scope

The inspectors evaluated the licensee's review of the BACC program, as documented in Discovery Action Plan Report PR-DAP-3-01, Revision 0, "Boric Acid Program Review." Specifically, the inspectors evaluated whether the program review was consistent with the program compliance review process as defined in procedures NG-VP-00100, Revision 1, "Restart Action Plan Process" and NG-EN-00385, Revision 0, "Program Compliance Review."

The inspectors also compared the licensee's BACC program to applicable industry guidance, primarily NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in Pressurized Water Reactors," and Electric

Power Research Institute (EPRI) Project Report 100975, "Boric Acid Corrosion Guidebook," Revision 1.

This inspection consisted of a review of applicable licensee, industry and regulatory documents; interviews with licensee personnel responsible for the BACC program reviews and implementation; observation of the review team's presentation of the discovery action plan report to the RSMT; evaluation of some of the corrective actions developed in response to the BACC program review; and observation of ongoing plant inspections.

b. Findings

b.1 Boric Acid Corrosion Control Discovery Action Plan Results

The licensee's Phase 2 level review of the BACC program focused on the key elements included in the program compliance review procedure, described in Section .1.b above. Additionally, the licensee reviewed lessons learned from past boric acid control events to determine whether these related issues were properly addressed. In particular, the licensee reviewed the lessons learned from the boric acid corrosion of pressurizer spray valve RC-2 and its failure to identify the boric acid corrosion on the reactor pressure vessel head.

The licensee identified several significant weaknesses with the BACC program. These included a lack of effective program self-assessments; inconsistent oversight by the program owner; poor oversight and control of program deviations; poor identification and management of boric acid issues; program procedure deficiencies; and inadequate program interfaces with other departments and work groups. Each of these deficiencies were documented in CRs which were then coded as requiring resolution either prior to or after restart. The final Discovery Plan Phase 2 report, including the associated CRs, was reviewed and approved by the RSMT on September 11, 2002.

The inspectors verified that the program compliance review had appropriately considered past BACC events and, except as described below, had identified the significant issues affecting the BACC program. Additionally, the inspectors concluded that the corrective actions reasonably addressed the licensee-identified significant weaknesses.

However, the inspectors identified several examples where some of the above mentioned key elements of the Phase 2 level review were not met. These included:

- The review did not identify and/or clearly state the interfaces between the BACC program and the chemistry, work control, and reactor leakage monitoring groups.

- The review did not identify that the station commitments to NRC Bulletin 82-02, "Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants" were not met.

- The review did not evaluate why some of the past licensee technical evaluations for BACC were inadequately performed. Specifically, whether the correct information was available to and/or understood by those staff performing the evaluations.

- The review did not evaluate whether the CAP was effective in coding and trending past boric acid issues.

The inspectors noted that these issues were not identified during the RSMT review. In particular, the inspectors observed that the RSMT review was somewhat limited in that the RSMT did not effectively challenge either the scope or the conclusions of the discovery phase report.

The inspectors discussed the above observations with those staff who had conducted the BACC program Phase 2 level review. The reviewers stated that some of these issues were considered during the program review, but were either not clearly documented in the report or were assumed to be addressed by other, concurrent program reviews. For example, the reviewers were aware of past issues with the BACC program related to the CAP and QA program, but believed that these issues would be addressed by the concurrent, respective program reviews. However, the inspectors determined that this was not occurring, in part, because there was no formal communication between the various, respective program review groups. The licensee initiated CR 02-06824, 02-06825 and 02-06823 to document the inspectors' concerns.

b.2 Assessment of the Boric Acid Control Program Implementation

The BACC program was defined in corporate Procedure NOP-ER-2001, Revision 00, "Boric Acid Control Program," and station Procedure NG-EN-00324, Revision 5, "Boric Acid Corrosion Control." Each of these procedures had been recently revised to address the issues being identified through the Phase 2 level review. The inspectors noted that these procedures acceptably addressed most of the weaknesses identified during the Phase 2 level review. Specifically, the procedures:

- Defined roles and responsibilities for the BACC program owner and those personnel performing BACC inspections;

- Defined clear interfaces between the BACC program and the operations, radiation protection and engineering work groups;

- Required that a CR be implemented for any observed case of boric acid leakage on susceptible components, whether inside or outside containment;

- Defined specific actions to be performed by the BACC program owner for management oversight;

- Required that the BACC program owner perform quarterly program reviews and triennial self-assessments; and

- Contained BACC implementing guidance that was consistent with industry standards.

The inspectors also noted that the licensee had limited the use of the word “should” in the procedural requirements. The inspectors determined that the use of the word “should” was a significant weakness with the prior program procedures. The presumed procedural latitude permitted by use of the word “should,” led, in part, to a failure by the staff to effectively implement the program and to identify and prevent the subsequent reactor pressure vessel head corrosion.

The inspectors observed that ongoing boric acid inspections were conducted consistent with the revised BACC program procedures. Specifically, the inspectors noted that the BACC inspectors were qualified, as required, and performed the inspections as stated in the procedures. The inspectors did identify one item of concern associated with how the overall results of these inspections would be documented for future reference. At the time of this inspection, the licensee was in the process of developing a specific BACC database to track BACC inspection results. In the interim, the licensee intended to track all BACC program related issues in the CAP. While this method could be effective, the inspectors could not discern how these issues would be coded in the CAP to allow the BACC program owner to identify and track the items. The licensee staff acknowledged the inspectors’ concern and initiated CRs 02-06620 and 02-07344 to track resolution of the concern.

The inspectors also identified several critical areas where the revised BACC program procedural guidance was lacking. These weaknesses could permit boric acid concerns to be inappropriately resolved without the knowledge of the BACC program owner. There was also an example where a clear interface between the BACC program and another applicable work group had not been established. Collectively, the inspectors were concerned that these issues may seriously affect the efficacy of the BACC program. Some of the issues identified by the inspectors included:

- Allowing BACC inspections to be deferred by line supervision without the approval of the BACC program owner;

- Allowing BACC-related CRs to be closed or have related commitments (such as due dates) changed without the concurrence of the BACC program owner; and

- Allowing BACC observations/evaluations regarding pressure boundary components to be resolved without being reviewed by the ISI program owner.

The inspectors also noted that in some cases, the procedural requirements for critical areas of the BACC program were unclear. For example, the inspectors could not determine if the engineering staff was required to undergo refresher training on BACC mechanisms. The inspectors identified that a concurrent licensee Phase 1 level review of the auxiliary chemistry program had identified that some engineers were not fully cognizant of corrosion water chemistry (CR 02-05552). However, this issue was not addressed in the BACC procedures. Additionally, the inspectors determined that the interface between the BACC and work control programs was not clearly defined. For

example, it appeared that BACC issues could be closed to work orders without having the BACC program owner verify that the required actions were taken.

The licensee addressed some of the above issues in existing CRs. For the other issues, the licensee initiated CRs 02-06824, 02-07344, 02-06771, and 02-06619.

b3. Quality Assurance Oversight of the Boric Acid Corrosion Program

Previously, the licensee identified that past quality assurance oversight of the BACC program was limited and was not effective in identifying the problems that led to the reactor vessel head corrosion. The inspectors reviewed the current BACC program quality assurance audit outline and determined that implementation of the current outline may not ensure an adequate level of future QA oversight. Specifically, the inspectors noted that the current evaluation criteria were very generic and if applied in the past, would not have identified the issues which led to the reactor vessel head corrosion. The inspectors identified the following additional concerns:

- The quality assurance auditors were not required to be qualified as BACC inspectors. The inspectors questioned whether this allowed the auditors to effectively evaluate BACC inspection activities.

- The quality assurance master assessment plan did not include a requirement to perform BACC audits during appropriate intervals, such as outages, when the majority of BACC activities occurred. This essentially allowed a program audit to consist solely of a document review with little to no observation of boric acid inspections.

The inspectors also noted that the current quality assurance program did not require a review of corrective actions for issues identified by the BACC program. In addition, the inspectors determined that the licensee had not developed controls for the site BACC implementing procedures to ensure they remained consistent with the governing corporate procedure. The licensee initiated CRs 02-06611, 02-07660, and 02-06771 to address the concerns.

c. Conclusions

The inspectors concluded that the licensee's overall review of the boric acid corrosion control program was adequate and was consistent with the requirements of Procedure NG-EN-00385, Revision 0, "Program Compliance Review." However, the inspectors identified several critical areas where the revised boric acid corrosion control program procedural guidance was lacking which could permit boric acid concerns to be inappropriately resolved. The licensee documented these issues in condition reports for resolution as a part of the Implementation Action Plan for the Boric Acid Corrosion Control program. Restart Checklist Item 3.d, "Boric Acid Corrosion Management Program," remains open pending further inspection.

.4 Quality Assurance Program Compliance Review

a. Inspection Scope

As an independent assessment of the scope of the licensee's program compliance review process, the inspectors evaluated the licensee's initial decision not to perform a program compliance review of the quality assurance (QA) oversight program. As a part of this effort, the inspectors reviewed a licensee root cause analysis report entitled, "Failure in Quality Assurance Oversight to Prevent Significant Degradation of the Reactor Pressure Vessel Head," and a separate licensee evaluation of the Company Nuclear Review Board. In addition, the inspectors conducted independent reviews of the quality assurance audit program, procedures, and recent work products.

The inspectors also evaluated a subsequent licensee program compliance review of the QA audit program, as documented in Discovery Action Plan Report PR-DAP-3C-01, Revision 0, "Quality Assurance (QA) Audit Program Review." Specifically, the inspectors evaluated whether the licensee's program review was consistent with the program compliance review process as defined in Procedures NG-VP-00100, Revision 1, "Restart Action Plan Process," and NG-EN-00385, Revision 0, "Program Compliance Review."

b. Findings

b.1 Assessment of the Quality Assurance Program Related Root Cause Analyses

Quality Assurance Program Root Cause Analysis

Following discovery of the degraded reactor vessel head condition, the licensee conducted a number of evaluations, including a root cause analysis of the quality assurance program's failure to identify the condition (CR 2002-02578). The results of this effort were documented in a report entitled, "Failure of Quality Assurance Oversight to Prevent Significant Degradation of Reactor Pressure Vessel Head," dated September 10, 2002. Based upon this analysis, the licensee identified one root and three contributing causes for the quality assurance organization's failure to prevent the observed head degradation. The root cause was characterized as a failure of the quality assurance organization to set itself apart, in terms of expectations and performance standards, from the balance of the plant. This failure was viewed as having negatively affected quality assurance organization's ability to identify problems and effect needed positive change in station operations. The three contributing causes were associated with ineffective training for a previous boric acid corrosion event, ineffective oversight of the quality assurance function, and, for a period of time, a lack of independence of the quality assurance organization from the corrective action process. The root cause analysis report included several corrective actions to address each of the identified causes. With few exceptions, the proposed corrective actions focused on changing the culture of the quality assurance organization.

The inspectors reviewed the root cause results and noted that the analysis was predicated on three assumptions. Of significance was the third assumption, which was that the quality assurance oversight organization had two distinct opportunities to

significantly alter the degraded head condition. The first opportunity involved assuring, through proper oversight functions, that the processes used by the line organization were sufficiently robust and effective to detect and mitigate the degrading head condition. The second was the opportunity Quality Assurance had to perform direct observations of the vessel head condition. The root cause analysis investigation team also concluded that, although the quality assurance oversight program underwent substantial change during the period 1986 to 2002, no data was found to indicate that the program itself contributed to a lack of success by the oversight organization.

The inspectors reviewed information regarding the quality assurance audit process from the early 1990s, when the NRC issued numerous generic communications regarding boric acid corrosion, until 2002. The inspectors noted that the quality assurance audit process did not include, until minor changes were made associated with a 1998 boric acid corrosion event, specific inspection guidance or requirements relative to the BACC program. In addition, the inspectors noted that both the current and past inspection criteria, used by licensee auditors to assess the BACC program, were very generic. During discussions with licensee staff, the inspectors were informed that the QA audit process did not include the BACC, in part, because the licensee staff was not aware of any specific regulatory requirement or commitment that required an audit of the BACC program. The licensee staff further indicated that the BACC program was only recently added to the audit review process based on a perceived need to conduct a review of the corrective actions developed for a 1998 event associated with packing leakage of Pressurizer Spray Valve RC-2, and based upon comparisons of the Davis-Besse QA audit program with those at other nuclear plants.

The inspectors noted that the QAPM required the program to apply to all activities associated with safety-related structures, systems, and components. The QAPM further clarified that the manual requirements, including audits, also applied to activities associated with the safety-related structures, systems, and components. Using this guidance, the inspectors concluded that the QA audit process should have included the BACC program due to the potential impacts a failure to properly define or implement this program could have on the reactor coolant system and associated systems. The licensee staff further indicated that the current QA master assessment plan was developed as a refinement to the previous program, but was not developed assuming that other programs or processes should be added. Therefore, the inspectors concluded that other activities, affecting safety-related structures, systems, and components, may not be included in the current QA audit program.

The inspectors also reviewed the quality assurance audits conducted during the previous refueling outage, RFO 12. The inspectors noted that the RFO 12 audit scope included a review of the licensee staff's implementation of Procedure NG-EN-00324, "Boric Acid Corrosion Control." However, the inspectors determined that neither the audit plan, the identified method of verification, nor the narrative comments from the audit included a review of the BACC program. In addition, while the audit conclusions included a discussion of reactor vessel head cleaning, these conclusions were not supported by any information in the narrative comments. Based upon the planned audit scope and the stated methods of verification, the inspectors concluded that the quality assurance auditor, assigned to review implementation of the BACC program during RFO 12, was not likely to have personally observed or evaluated the reactor vessel

head cleaning efforts or to have assessed overall adequacy of the BACC program as a part of this audit. The Quality Assurance area root cause analysis was also reviewed by the Management and Human Performance Inspection, which is documented in IR 50-346/02-18.

Therefore, while the licensee's root cause analysis provided useful information and insights, the inspectors determined that root causes, in addition to those identified in the report, likely were associated with the quality assurance oversight function's failure to identify the degraded reactor vessel head.

Evaluation of the Company Nuclear Review Board

Concurrent with, but separate from the previous root cause analysis, the licensee commissioned an independent evaluation of the Company Nuclear Review Board's (CNRB's) effectiveness. The evaluation was focused on the CNRB's current and past oversight role as it related to the missed opportunity for identifying the reactor vessel head degradation.

The independent evaluation determined the CNRB's charter and assigned functions based upon a review of the Updated Final Safety Analysis Report, company policies and procedures, and the NRC-approved quality assurance program. Significant among the assigned CNRB functions were requirements to provide independent review and audit of quality assurance practices and to advise the Company Vice President on those items reviewed and audited.

Based upon a review of materials routinely provided to the CNRB, past CNRB meeting minutes, discussions with CNRB members, and observation of a CNRB meeting, the independent evaluator developed several significant conclusions, including:

- The CNRB may not be meeting its charter to provide an independent safety audit function.

- The CNRB did not adequately review the health or effectiveness of the Quality Assurance Program.

- It was not apparent that the CNRB was effectively overseeing the quality assurance audits that were performed under the cognizance of the CNRB.

The independent evaluator also included recommended corrective actions to address each report conclusion. The licensee staff entered these items into its corrective action program as CR 02-07485.

The inspectors conducted an independent assessment of the performance of the CNRB over the past 2 years relative to its responsibilities for oversight of the quality assurance function. The inspectors reviewed information provided to the CNRB, and minutes of past meetings. Based upon a review of the these materials, the inspectors independently validated that the licensee finding that the CNRB provided inadequate oversight of the quality assurance function and the other significant conclusions documented in the evaluation report. The inspectors noted that the CNRB, based upon

meeting minutes, seldom discussed the quality or effectiveness of quality assurance audit activities, seldom offered new or expanded areas for quality assurance auditing, or determined that the scope of quality assurance activities were appropriate to the circumstances.

Finally, the inspectors determined that the licensee identified findings of inadequate oversight of the quality assurance function, as documented in the root cause analysis and the independent CNRB evaluation, indicated that problems within the quality assurance oversight program directly contributed to the quality assurance program's failure to prevent significant degradation of the reactor pressure vessel head. The CNRB root cause assessment was also reviewed by the Management and Human Performance Inspection, which is documented in IR 50-346/02-18.

b.2 Quality Assurance Audit Program Discovery Action Plan Results

Subsequent to the beginning of this inspection, the licensee performed an informal reassessment of the results of the quality assurance root cause report and the independent evaluation of the CNRB, and a review of the inspectors' findings relative to the quality assurance audit process. As a result of the review and reassessment, the licensee determined that a program compliance review of the quality assurance audit program was appropriate.

As a result of the licensee's Phase 2 level program compliance review of the quality assurance audit program, numerous issues were identified that required resolution, including:

- The current audit program does not fully encompass some programs or activities affecting safety-related structures, systems, and components and does not include adequate measures or tools to ensure that emergent issues, lessons learned, or program expansions are evaluated for inclusion in audit program.

- Implementing procedures do not adequately incorporate programmatic requirements or tools to ensure effective interfacing among some groups, escalation of unresolved issues, and adequate self-assessment and oversight of the audit program.

Over 90 CRs were developed to document the issues identified during the review, including four written by the quality assurance organization based upon its review of the reported results. The program review team recommended that approximately 25 percent of the CRs should be classified as items requiring the development of corrective action plans, for review and appropriate action, prior to the licensee's restart of the plant.

The program review team also determined that the quality assurance program was staffed with capable individuals and that the program owner and supervisors were actively involved in the program. However, some issues with personnel qualification and training of these individuals were identified.

Upon completion of the corrective actions for the identified issues documented in the compliance plan review report, the PRB concluded that the quality assurance audit program would be ready to support restart of the plant.

b.3 Assessment Of The Quality Assurance Audit Program Compliance Review

The inspectors reviewed the program compliance review results to determine if the review was conducted in accordance with the requirements outlined in Section .1.b.1 above and was effective in identifying issues. Four areas of the review were evaluated to include: 1) identification of basis documents and comparison against program requirements; 2) program interfaces and adequate management oversight; 3) integration of operating experience, and; 4) documentation of issues in the licensee's corrective action program.

The inspectors determined that the licensee's identification and correlation of regulatory requirements and program guidelines, as documented in Table 3.1 of the report, was comprehensive and well annotated. The inspectors noted that several issues, developed as a result of a previous licensee root cause analysis associated with the quality assurance oversight function and an evaluation of the CNRB, were appropriately included in the table. The inspectors also identified that the licensee's review had captured an inconsistency in the quality assurance organization's "stop work" authority, as specified in plant procedures and the governing quality assurance program manual.

The inspectors determined that the licensee's assessment of program interfaces and management oversight correctly identified issues documented in the previous root cause analysis and evaluation of the CNRB. In addition, the program compliance review identified a generic quality assurance audit program weakness associated with a failure to properly integrate operating experience results, a specific example of which was the licensee's failure to include the BACC program as an area requiring auditing by the quality assurance program. During a previous independent review of the quality assurance program manual requirements and plant procedures, the inspectors determined that the licensee's failure to include the BACC program in the quality assurance audit process was most likely a result of this program weakness. The program compliance review resulted in the identification of 17 additional examples of safety programs that were not included in the quality assurance audit program. Similar examples of incomplete incorporation of quality assurance audit criteria for other programs were identified as a result of other Phase 2 level program compliance reviews.

Using the results of previous NRC reviews of the corrective action and BACC programs, the inspectors determined that the program review team had appropriately assessed inadequacies in the documentation of some issues developed as a result of quality assurance audits and the implementation of ineffective correction actions to some audit findings.

c. Conclusions

The inspectors determined that the licensee's overall assessment of the quality assurance audit process, including the root cause analysis, the independent evaluation of the Company Nuclear Review Board, and the program compliance review were

comprehensive. These efforts appropriately identified programmatic weaknesses associated with the quality assurance audit program, and the Company Nuclear Review Board oversight function of the quality assurance audit program. In addition, the root cause analysis identified management and cultural issues which could inhibit effective functioning of the quality assurance audit program. The inspectors further determined that the licensee had appropriately entered issues, identified as a result of these efforts, into its corrective action program. Restart Checklist Item 3.c, "Quality Audits and Self-Assessments of Programs," remains open pending further inspection.

4OA6 Meetings

.1 Exit Meeting

The NRC inspectors presented the inspection results to Mr. J. Powers and other members of licensee management at the conclusion of the inspection on June 27, 2003. The NRC inspectors asked the licensee whether any materials discussed as potential report material should be considered proprietary. No proprietary information was identified.

KEY POINTS OF CONTACT

Licensee
L. Myers, Chief Operating Officer
J. Cunnings, Acting Boric Acid Program Coordinator
D. Gudger, Manager, Performance Improvement
B. Hennesy, Corrective Action Program Supervisor
P. McCloskey, Manager Regulatory Affairs
N. Morrison, Program Planner Owner
C. Price, Restart Action Plan Owner
R. Geiger, Program Compliance
W. Pearce, Vice President Oversight
S. Loehlein, Nuclear Quality Assurance Manager
D. Poole, Senior Management Consultant
R. Tadych, Senior Staff Engineer

Nuclear Regulatory Commission
C. Thomas, Senior Resident Inspector
D. Simpkins, Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

None

LIST OF ACRONYMS USED

ASME	American Society of Mechanical Engineers
BACC	Boric Acid Corrosion Control
CAP	Corrective Action Program
CAQ	Condition Adverse To Quality
CFR	Code of Federal Regulations
CNRB	Company Nuclear Review Board
CR	Condition Report
CRDM	Control Rod Drive Mechanism
INPO	Institute of Nuclear Power Operations
ISI	Inservice Inspection
MOD	Modification
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PRB	Program Review Board
QA	Quality Assurance
QAPM	Quality Assurance Program Manual
RCS	Reactor Coolant System
RSMT	Restart Management Team
RSRB	Restart Review Board
SCAQ	Significant Condition Adverse to Quality

LIST OF DOCUMENTS REVIEWED

General Documents

Number or Type	Title
A04411	Degradation of RC pressure Boundary from Boric Acid Corrosion; dated August 10, 1987
A04413	Degradation of RC pressure Boundary from Boric Acid Corrosion; dated June 5, 1987
A04416	Degradation of RC pressure Boundary from Boric Acid Corrosion; dated February 11, 1987
A08408	Live Load Valve Packing Program
A14332	Initiate Program to Remove Boron Build Up from Equipment
A14434	CRD Flange Leakage Inspection Every RFO Will Be Incorporated into PM Program
A15467	Review Open Item on Failure to Clean up Boric Acid Buildup
A17765	Boric Acid Corrosion of Charging Pump Casing Caused by Cladding Cracks
A17920	Degradation of RCS Pressure Boundary Result From Boric Acid Corrosion
A20140	Implement Performance of Visual Exams in Future Refueling Outages and Inclusion of Industry Experience
AR-99-JUMAA-01	Joint Utilities Management Assessment of Davis-Besse Quality Assurance Functions
AR-01-JUMAA-01	Joint Utilities Management Assessment of Davis-Besse Quality Assurance Functions
AR-00-OUTAG-01	Specific to Ops Evaluation of Boric Acid Corrosion Control Program (Checklist 8, 9); dated July 7, 2000
AR-00-OUTAG-00	Audit of 12 RFO
AR-02-OUTAG-01	Audit of 13 RFO; dated May 31, 2002
Bulletin 82-02	Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants; Response
Bulletin 2001-01	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles
Bulletin 2002-01	Reactor Pressure Vessel Head Degradation an Reactor Coolant Pressure Boundary Integrity
Bulletin 2002-02	Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs
Generic Letter 88-05	Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants/Responses
Generic Letter 97-0	Degradation of control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations/Responses
IN-80-27	Degradation of Reactor Coolant Pump Studs
IN 82-06	Failure of SG Primary Side Manway Closure Studs
IN 86-108	Supplements 1-3; Degradation of Reactor Coolant System Pressure Boundary Resulting from Boric Acid Corrosion
IN 90-10	Primary Water Stress Corrosion Cracking of Inconel 600

LIST OF DOCUMENTS REVIEWED (Continued)

IN 94-63	Boric Acid Corrosion of Carbon Steel Components in Nuclear Plants
IN 2000-17	Crack in Weld Area of Reactor Coolant System Hot Leg Piping at V.C. Summer
IN 2001-05	Through-Wall Circumferential Cracking of Reactor Pressure Vessel Head Control Rod Drive Mechanism Penetration Nozzles at Oconee Nuclear Station, Unit 3
IN 2002-11	Recent Experience with Degradation of Reactor Pressure Vessel Head
IN 2002-13	Possible Indicators of Ongoing Reactor Pressure Vessel Head Degradation
ISE 87-10049	ISE Inspection of Pressurizer for Possible BA Corrosion; dated May 28, 1987
Lesson Plan	Boric Acid Corrosion Control Extent of Condition Inspection Procedures Tabletop Review; Revision 1; dated August 13, 2002
Lesson Plan	QCT-MET-1201; VT-2 System Pressure Testing; Revision 3, dated August 9, 2002
Letter	R. P. Crouse, V.P. Nuclear (Toledo Edison) to NRC (Serial #1-204) Re: Davis-Besse Response to IE Bulletin 82-02; dated August 4, 1982
Letter	D.C. Shelton, V.P. Nuclear (Toledo Edison) Re: Davis-Besse Response to Generic Letter-88-05; dated May 27, 1988
Letter	L. W. Worley, Director DB Nuclear Assurance, to NRC RE: NRC Request for Additional Information Re: Response to GENERIC LETTER 97-01; dated January 14, 1999
Letter	First Energy to NRC; Response to NRC Bulletin 2001-01; Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles; dated September 4, 2001
Letter	First Energy to NRC; Supplemental Information in Response to NRC Bulletin 2001-01; Cracking of Reactor Pressure Vessel Head Penetration Nozzles; dated October 17, 2001
Letter	First Energy to NRC; Davis-Besse Nuclear Power Station Unit 1 - Request for Additional Information Re: Response to Bulletin 2001-01; dated October 30, 2001
Letter	First Energy to NRC; Responses to Requests for Additional Information Re: Response to Bulletin 2001-01; Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles; dated October 30, 2001
Letter	First Energy to NRC; Transmittal of Results of Reactor Pressure Vessel Head Control Rod Drive Mechanism Nozzle Penetration Visual Examination for the Davis-Besse Nuclear Power Station; dated October 30, 2001
Letter	First Energy to NRC; Transmittal of Davis-Besse Nuclear Power Station Risk Assessment of Control Rod Drive Mechanism Nozzle Cracks; dated November 1, 2001
Letter	NRC to First Energy; Meeting Summary of October 24, 2002, to Discuss the Licensee's Response to Bulletin 2001-01; dated November 6, 2001
Letter	NRC to First Energy; Meeting Summary of November 14, 2001, to Discuss the License's Response to Bulletin 2001-01; dated November 19, 2001

LIST OF DOCUMENTS REVIEWED (Continued)

Letter	NRC to First Energy; Boric Acid Corrosion Control Besse Nuclear Power Station Unit 1 - Documentation of conference Call of November 15, 2001, Re: Response to Bulletin 2001-01; dated November 19, 2001
Letter	NRC to First Energy; Meeting Summary of November 8, 2001, to Discuss the Licensee's Response to Bulletin 2001-01; dated November 26, 2001
Letter	NRC to First Energy; Meeting Summary of November 9, 2001, to Discuss the Licensee's Response to Bulletin 2001-01; dated November 29, 2001
Letter	First Energy to NRC; Supplemental Information in Response to November 28, 2001 Meeting Regarding Davis-Besse Nuclear Power station Response to NRC Bulletin 2001-01; dated November 30, 2001
Letter	H. W. Bergendahl, V.P. Nuclear, FEMOC (to NRC) Re: Davis-Besse Commitment for Resolution of Reactor Pressure Vessel Head Degradation Issue; dated March 12, 2002
Letter	First Energy to NRC; Seven Day Response to NRC Bulletin 2002-01; Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity; dated March 25, 2002
Letter	NRC to First Energy; GENERIC LETTER 97-01 - Review of the Responses for the Davis-Besse Nuclear Power Station; dated November 29, 1999
NUREG/CR-0943	Threaded Fastener Experience in Nuclear Power Plants
NUREG/CR-2827	Boric Acid Corrosion of Ferritic Reactor Components
NUREG/CR-5576	Survey of Boric Acid Corrosion of Carbon Steel Components in Nuclear Plants
NUREG-1095	Evaluation of Responses to IE Bulletin 82-02
O08402	Leakage Management Program
O08403	Containment Valve Walkdown List for RCS Leakage Program (Closed; superseded by O14997)
O08404	Procedure to Verify Integrity for Class 1, 2 & 3
O08405	Control Rod Drive Flanges Inspected for Leakage
O08407	Thermographic Inspection Steam Leaks (Closed; no longer applicable to Boric Acid Corrosion Control Program)
O14997	Implement Specific Boric Acid Corrosion Program
O15041	Initiate Program to Remove Build Up from Equipment
O19614	Revise Boric Acid Control Program & Work Process Guidelines
P00067	Evaluate Possible Change to the Boric Acid Corrosion Control Program (RC2 Stud Issue)
P00263	SOER 81-12 Reactor Coolant Pump Closure Stud Corrosion
Report	PCAQR 89-0058; Ops Standby Order SO87-015 Evaluation of Boric Acid Corrosion Control; dated January 27, 1989 (Ref CR 02-02578)
Report	PCAQR 96-551; Boric Acid Accumulator on Reactor Vessel Head; dated April 21, 1996
–	Restart Action Plan; Revision 2; dated August 6, 2002
Report	Failure in Quality Assurance Oversight to Prevent Significant Degradation of Reactor Pressure Vessel Head; dated September 10, 2002
Report	Multi-Disciplined RCR on the Roll-up of Issues Related to RC-2 (Per Spray Valve) Since the 11th RFO; dated December 15, 2998

LIST OF DOCUMENTS REVIEWED (Continued)

Report	Special Inspection Report 50-346/98021(DRS); dated June 4, 1999
–	Davis-Besse Condition Report Process Programmatic Guideline, Revision 1, 10/23/2001
SA 2002-0077	Boric Acid Corrosion Control Program Self-Assessment; March 18-22, 2002
–	Quality Assurance Surveillance of Plant Activities 2000-2002
–	Company Nuclear Review Board Meeting Minutes, 2000-2002
–	Corrective Action Program Reference Guide, Revision 9, 05/15/2001
–	Perry CR Reference Guide, Revision 1, 07/18/2002
–	Beaver Valley Condition Report Reference Guide, Revision 8, 10/04/2002
–	Root Cause Analysis Reference Guide, Revision 3
–	Program Compliance Discovery Action Plan, Revision 1
–	Davis-Besse Program Compliance Plan, Revision 4
–	Root Cause Analysis Report, "Failure to Identify Significant Degradation of the Reactor Pressure Vessel Head," August 13, 2002
–	Davis-Besse Nuclear Quality Assessment Quarterly Assessment Report DB-C-02-02
PR-DAP-3C-D	Quality Assurance (QA) Audit Review, Revision 0
–	Updated Final Safety Analysis Report, Section 13, Revision 22
–	Quality Assurance Program Manual, Revision 3
–	Assessment of the FENOC Company Nuclear Review Board, August 13, 2002
–	Nuclear Quality Assurance Manual, Revision 50
–	Boric Acid Corrosion Control Program Effectiveness Review, dated May 8 and May 20, 2002

Condition Reports

92-072	Containment Air Cooler Fouling; dated February 24, 1992
96-0551	Patches of Boric Acid Accumulation Found on Reactor Head; dated April 21, 1996
98-0020	RC-2 Event Pressurizer Spray Valve; dated January 18, 1998
98-0767	Video Inspection of Reactor Vessel Head Reveals Clumps of Boric Acid; dated April 24, 1998
98-0824	CACs #2 and #3 Have Accumulation of Boric Acid; dated April 29, 1998
98-1980	Computer Point for containment Cooler Plenum Slowly Decreasing; dated November 13, 1998
98-2071	Coating of Boric Acid on Service Water Piping; December 2, 1998
99-0275	Electrical Conduits are Corroding Due to Boron; dated February 17, 1999
99-0662	Station Air Line with Severe Boric Acid Corrosion; dated April 26, 1999
99-0738	RC 38 Identified as Having Some Material Wastage; dated April 30, 1999
99-1306	Some Routine Condition Reports Completed With No Apparent Cause Determination
99-1429	Audit Finding - Extent of Condition Block Was Not Always Marked for Significant CRs

LIST OF DOCUMENTS REVIEWED (Continued)

99-1581	Boric Acid Crystals and Weepage Found; dated September 22, 1999
00-0574	Management Review Committee Assignment of CR Resolution
00-0995	CRDM Nozzle Flange at D-10 Has Extensive Pitting; dated April 6, 2000
00-1037	Inspection of Reactor Head Indicates Boron Accumulation; dated April 18, 2000
00-1191	Poor Implementation of the Corrective Action Program
00-1440	Self Assessment Finding - Weaknesses Identified in Trending of Problems
00-1584	CR Response Deficiencies and CATS Coding Errors
00-2474	Effectiveness Reviews Have Found Some Corrective Actions Were Inadequate
01-2012	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzle; dated August 7, 2001
01-2862	Potential Adverse Trend in Unidentified RCS Leakrate; dated October 25, 2002
01-3025	RCS Leakage (Closed to Evaluation Done per 01-2862); dated November 10, 2001
01-0391	CR Guide Not Updated To Reflect Changes in CARB Charter
01-0519	Condition Report/CREST Implementation Deficiencies
01-0677	Technical Evaluation documentation Adequacy Collective Significance
01-2368	Failures To Implement Approved Corrective Actions
01-2779	Omitted MRB Assigned Evaluations For Maintenance Rule and Operating experience
01-2962	Ineffective Corrective Actions for CR Program Deficiencies
01-2994	INPO 2001 Plant Evaluation AFI SE 1-3
01-3234	Ineffective Corrective Actions (CA Closure Prior to Completion)
02-00891	Control Rod Drive Nozzle Crack Indicator; dated February 27, 2002
02-00891	Control Rod Drive Nozzle Crack Indication
02-01449	CR Corrective Actions To Repack RCS Related Valves Not Performed or Scheduled
02-01516	Boric Acid Corrosion Control Program Implementation Issues; dated April 10, 2002
02-01882	Manager Involvement in Corrective Action Program Not in Literal Compliance
02-01930	Inspection Plan IP-M-028 Findings; dated May 7, 2002
02-02186	Inadequate Comment Closeout; dated May 20, 2002
02-02174	Results of Boric Acid Corrosion Control Program Self-Assessment; dated May 20, 2002
02-02348	PR/PSA: Ongoing Commitment O19094 Implementation
02-02419	Untimely Corrective Actions to Address Corrective Action Program Weakness
02-02578	NQA Effectiveness
02-02631	Lack of Guidance for Restart Station Review Board; June 13, 2002
02-02715	PR/CAP: Compensatory Actions Needed for Corrective Action Program
02-03163	PR/CAP: Ineffective Causal Analysis For CR 02-02715
02-03255	Generic Letter-88-05 Response Commitment Not Fully Carried Into Preventive Maintenance Program; dated August 6, 2002
02-03272	Multiple Failures To Comply With Regulatory Requirements
02-03288	PR/CAP: Almost Half of All Condition Reports in CREST Have Yet to be Closed
02-03319	PR/CAP: Internal Lessons Learned Program Doesn't Meet INPO 97-011
02-03389	PR/CAP: Ambiguity of Commitments Against the Corrective Action Program
02-03405	PR/CAP: Completed Corrective Actions From CATS Not Captured in Records

LIST OF DOCUMENTS REVIEWED (Continued)

02-03497	PR/CAP: Overall Failure to Take Action to Correct Identified Deficiencies in CAP
02-03525	PR/CAP: CARB Backlog and General Performance Issues
02-03535	PR/CAP: Management Review Board Deficiencies
02-03543	PR/CAP: Create Governing Corrective Action Program Document
02-03671	PR/CAP: Untimely Supervisory Reviews and Failure to Notify SRO
02-03672	PR/CAP: Hesitancy To Document Conditions Adverse to Quality
02-03673	PR/CAP: Recurring Trend of Less than Adequate CR Evaluations
02-03674	PR/CAP: Recurring Trend of Untimely and Ineffective Corrective Actions
02-03673	PR/CAP: Coding and Trending
02-03758	RC-2, Corrective Actions Different Than That Described in CR 98-2000; August 6, 2002
02-03784	Reinspection of Area PT-RC2A3T; dated August 5, 2002
02-03675	PR/CAP: Inconsistent and Inaccurate Effectiveness Reviews
02-03754	PR/CAP: Corrective Action Program (CAP) Procedural Deficiencies
02-03769	PR/CAP: NQA Failed to Elevate Deficiencies With CAP to Ensure Resolution
02-03817	PR/CAP: CAP Performance Indicators Do Not Provide Adequate Information
02-03818	PR/CAP: Provide/Restore Funding for EST Improvements
02-03820	PR/CAP: Transfer CR and CA Data from CATS Into CREST
02-03821	PR/CAP: Develop Means to Ensure Benchmarking Results in CAP Improvements
02-03831	PR/CAP: “Authorized” Causal Evaluator Discrepancies
02-03865	PR/CAP: DB-OP-00002 and DB-OP-00018 Require Revision
02-03867	PR/CAP: CAP Programmatic Guideline Requires Revision
02-03869	PR/CAP: Plant Engineering Procedures Require Revision
02-03870	PR/CAP: Security Procedures Require Revision
02-03871	PR/CAP: Regulatory Affairs Procedures Require Revision
02-03872	PR/CAP: NG-DB-00208, Radiation Protection Program, Requires Revision
02-03873	PR/CAP: NG-NA-00711, Quality Trending, Requires Revision
02-03874	PR/CAP: NG-NS-0400, Materials Management, Requires Revision
02-03868	PR/CAP: Maintenance Procedures Require Revision
02-03957	PR/BACC: Evaluate Linking Commitments in Terms to BACC Program
02-04292	PR/CAP: Inadequate Cause Evaluations and Corrective Actions
02-04716	PR/CAP: Recurring Trend of Procedural Non-Compliance
02-04742	PR/CAP: Integrating CAP and Work Order Processes May Provide Significant Benefit
02-04796	PR/CAP: Provide Corrective Action Development Training for CAP
02-04954	PR/CAP: CAP-Related Commitments Need to be Re-evaluated
02-05342	PR/CAP: Corrective Action PGM Guideline Not Approved IAW Regulatory Commitment
02-05436	PR/CAP: Generic Concern With the Incorporation of QAPM Requirements
02-05437	PR/CAP: Generic Concern With the Incorporation of AQAM Requirements
02-05559	PR/CAP: Inadequate CAP Review of Operating Experience
02-05666	Lack of Procedural Guidance for Phase 2 Detailed Program Reviews
02-06158	NQD Walkdown of Containment on September 17, 2002, dated September 17, 2002

LIST OF DOCUMENTS REVIEWED (Continued)

02-06296	Planned Inspections in Containment for Iron Oxides and Boric Acid Too Narrowly Focused; September 20, 2002
02-07485	Need to Include Changes in Corporate Oversight into Performance Improvement Plan
02-08895	Program Evaluation of the Internal Assessment Process
02-10066	PR/QA: OE Not Required for Inclusion into the Auditing Process
02-10069	PR/QA: Safety Programs Not Evaluated to be in QA Auditing Scope
03-00386	PR/QA: Internal Assessment Source Documents Missing and Incorrect
03-00389	PE/QA: Internal Assessment Master Assessment Process Auditing Attributes Are Weak

Procedures

DB 290-1	BA Inspection of PT-RC2A3T-RI/PT-RC2A3-RI Tubing; dated August 5, 2002
DB-0296-0	Program Readiness Baseline Assessment Questionnaire
EN-DP-01500	Reactor Vessel Inspection Procedure; Revision 02
EN-DP-0150	Inspection of RCS Alloy 600 Components/Welds, Threaded/Bolted Connections and Targets; Revision 01
EN-DP-1502	Containment Area Inspections; Revision 01
EN-OP-0156	Borated Water System Inspection Outside Containment; Revision 00
EPRI 1000975	Boric Acid Corrosion Guidebook; Managing Boric Acid Corrosion at PWR Power Stations; Revision 1
EPRI NP-5985	Boric Acid Corrosion of Carbon and Low Alloy Steel Pressure-Boundary Components in PWRs; dated August 1988
NOP-ER-2001	Boric Acid Corrosion Control Program; Revision 00
MM-09067	On-Line Leak Scoring; Revision 4
NG-DB-00018	Operability Determinations; Revision 2
NG-EN-00324	Boric Acid Corrosion Control; Revision 02
NG-EN-00324	Boric Acid Corrosion Control; Revision 05
NG-EN-00385	Program Compliance Review; Revision 00
NG-VP-00100	Restart Action Plan Process; Revision 01
NOP-LP-2001	Condition Report Process, Revision 1
NOP-LP-2001	Internal Assessment Process, Revision 0
NOP-LP-2004	Internal Assessment Process, Revision 1
DB-PF-00003	Maintenance Rule, Revision 2
NOP-ER-1001	Continuous Equipment Performance Improvement, Revision 0
NG-NS-00807	Regulatory Reports, Revision 00, 01/24/1996
NG-VP-00100	Restart Action Plan Process, Revision 1, 08/23/2002

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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SUMMARY OF FINDINGS

IR 05000346-03-09; FirstEnergy Nuclear Operating Company; on 03/03/03 - 05/23/03, Davis-Besse Nuclear Power Station. Special Inspection-Programs Part 2.

This report covers a special inspection of licensee activities associated with reviewing and evaluating the adequacy of several safety significant programs. This inspection was conducted by Region III based inspectors. This inspection evaluated the following programs: Plant Modification Program, Operating Experience Program, Inservice Inspection Program, Boric Acid Corrosion Control Program, Corrective Action Program, Reactor Coolant System Leak Detection Program, and Quality Assurance Audit Program.

The inspectors determined that the application of the licensee's program review process was thorough and resulted in an appropriate evaluation of the selected programs for necessary improvements. The corrective actions that were sampled were considered effective. Based on the results of the inspection, several Restart Checklist Items were closed and several remain open pending further inspection activity.

REPORT DETAILS

Background and Event Overview

On March 6, 2002, Davis-Besse personnel notified the NRC of degradation (corrosion) of the reactor vessel head material adjacent to a control rod drive mechanism (CRDM) nozzle. This condition was caused by coolant leakage and boric acid corrosion of the head material induced by an undetected crack in the adjacent CRDM nozzle. The degraded area covered in excess of 20 square inches where the low-alloy structural steel was corroded away, leaving the thin stainless steel cladding layer. This condition represented a loss of the reactor vessel's pressure retaining design function, since the cladding was not considered as pressure boundary material in the structural design of the reactor pressure vessel. While the cladding did provide a pressure retaining capability during reactor operations, the identified degradation represented an unacceptable reduction in the margin of safety of one of the three principal fission product barriers at the Davis-Besse Nuclear Power Station (reference NRC report 50-346/02-03(DRS)).

As a part of the corrective actions resulting from the vessel head degradation, the licensee established a Restart Action Plan to identify, monitor, and control all actions necessary for the safe and reliable return to service of Davis-Besse. This process chartered six Building Block Teams to identify those actions to be completed prior to restart. When viewed collectively, the Building Blocks address the causal factors identified in the Davis-Besse Root Cause Analysis Report. One of the Building Block Teams, Program Compliance Plan, was tasked with performing reviews of selected plant programs to ensure that the programs were fulfilling required obligations, including effective interfaces and hand-off. The NRC inspectors' review of these activities focused on the Phase 2, in-depth reviews. The inspectors also reviewed an integrated approach to identifying and evaluating reactor coolant system leakage developed by the licensee. Given the high public interest in this subject area at Davis-Besse, and therefore the need to clearly communicate the rationale for NRC staff conclusions regarding the effectiveness of licensee safety significant programs, this report documents the inspectors' observations.

4. OTHER ACTIVITIES

4OA3 Event Follow up (93812)

.1 Plant Program Review

a. Inspection Scope

The inspectors' review of the licensee's activities focused on their Phase 2, in-depth efforts on the Boric Acid Corrosion Control, Inservice Inspection, Plant Modification, Corrective Action, Operating Experience, and Quality Assurance Programs as described in the associated Program Compliance Plan, NG-EN-00385, "Program Compliance Review," Revision 0, and NG-VP-00100, "Restart Action Plan Process," Revision 3. The inspectors assessed the effectiveness and completeness of the licensee's evaluation, assessed the effectiveness of actions related to restart, and reviewed the licensee's evaluation to identify any potential generic safety concerns. The inspectors also

reviewed applicable industry and regulatory documents, as well as condition reports (CRs) and corrective actions associated with the licensee's program reviews. Items sampled are documented below and include a review of the applicable procedures, interviews with responsible individuals, and an independent sampling of items completed during the licensee's review process.

b. Observations and Findings

b.1 Assessment of the Plant Modification Program

b.1.1 Planning Phase

The licensee based their assessment plan on NG-EN-00385 which required a baseline assessment of the Modification Program and a detailed systematic review of the issues identified in the "Root Cause Analysis Report for the Reactor Pressure Vessel Head," dated April 15, 2002.

The inspectors sampled process inputs and hand-offs, program interfaces, and design inputs required by Step 6.2.2 of NG-EN-00385 for Procedure NOP-CC-2003, "Engineering Changes," Revision 1, and Procedure NG-EN-00313, "Control of Temporary Modifications," Revision 3. Relative to the procedures sampled, the licensee's review of program interfaces and design inputs appeared to be comprehensive and inclusive. Additionally, the inspectors found that corrective actions were initiated for process deficiencies that the licensee had identified.

The inspectors also reviewed the qualifications of the team members to ascertain if their qualifications met the requirements set forth in Procedure NG-EN-00385. The inspectors found that the program review board chairman and the designated review team members were qualified as required.

b.1.2 Discovery Phase

The Plant Modification Program review was documented in the "Plant Modification Program Review Summary Report," Revision 0, in accordance with Discovery Action Plan No. PR-DAP-3-01, Revision 1, Milestone No. 9. The licensee evaluated plant processes to identify if interfacing processes and hand-offs with the modification program were positively controlled and effectively implemented. The plant modification program review indicated that over 40 processes interfaced with the modification program. Each process element that the licensee evaluated was documented in the Summary Report. Documentation for each element evaluated indicated the element's acceptability or deficiency and associated corrective action. Issues requiring corrective action had a related condition report (CR), and when applicable, sub-tasks to track resolution. Because of the magnitude of interfacing processes, the inspectors elected to validate the discovery phase using the sample of elements selected for review in the implementation phase. The inspectors did not identify any deficiencies associated with the discovery of items selected for review in the implementation phase.

b.1.3 Implementation Phase

Procedure NG-VP-00100 established the requirements for implementation of items identified during the discovery phase. The basic process required that the Restart Station Review Board (RSRB) review and classify condition reports generated during the discovery phase. The RSRB evaluated recommendations made by the program review team for each condition report and either accepted or modified the recommendation as documented in Implementation Action Plan PR-IAP-3G-01, Revision 2. The RSRB assigned completion requirements and categories for each condition report. Completion requirements for any identified issues were placed into approximately 15 categories within three basic areas, IMC 0350 restart required, RSRB recommended restart required, or post restart. The licensee identified 66 issues requiring review and resolution. The licensee's evaluation reviewed the Davis-Besse specific program that was in place prior to August, 2002, and the corporate program that replaced the site specific program; these programs were referred to as the old and new programs.

Due to the large number of issues identified as either acceptable or requiring improvement, and due to the complexity of the program hand-offs, the inspectors elected to review a sample of issues to validate the acceptability of the licensee's process. The inspectors concluded that their review of these actions would sample: the licensee's evaluation of the issues, the latent impact of newly identified deficiencies relative to past modifications, and the effectiveness of the current corrective actions for the newly identified deficiencies. A summary of the observations related to each item reviewed is documented below.

- The licensee's evaluation of the corporate quality assurance manual requirements indicated that both the old and new programs were in compliance with ANSI N45.2.11 requirements for the design review process. One requirement stated that, "Quality Assurance audits shall include a review of the frequency and effectiveness of the use of the immediate supervisor for design reviews." The inspectors elected to validate this item because excessive use of non-independent reviews could impact the quality of modifications. The inspectors' review of Quality Assurance audits utilized for the assessment plan indicated no deficiencies. Because no deficiencies were identified, the inspectors reviewed the Quality Assurance Master Assessment Plan, E-EN, Revision 0, and the associated field observation report for "Review and Design Verifications," performed between May 13, and May 15, 2002, and found that the auditor had sampled eight modification packages to evaluate this element. The inspectors found no deficiencies with the licensee's assessment.

- The Plant Modification Program Review, Recommendation 9.2.59, indicated that the design verification process does not address the appropriateness of assumptions, input data, code or other calculational methods as required by ANSI N45.2.11 when using the alternate calculation option. The inspectors reviewed the closure documentation and found that the licensee had incorporated administrative barriers to correct this deficiency in Procedure NOP-CC-2001, "Design Verification," Revision 1. However, the closure

documentation did not contain a corrective action sub-task to evaluate the issue with respect to installed modifications.

The inspectors were concerned that this issue had the potential to impact past modifications installed in the plant and inquired about reviews related to this issue. The licensee indicated that the primary method used for performing design verification was the design review option and that they could not recall any verifications performed using the alternate calculation option. The inspectors selected six modifications as a random sample to check the licensee's verification method. The inspectors found that none of the samples selected utilized the alternate calculational method and therefore were unable to ascertain the impact of the deficiency on past modifications. Subsequently, the licensee performed additional reviews and concluded that Davis-Besse had not performed design verifications using the alternate calculation method.

- The Plant Modification Program Review, Recommendation 9.2.3, indicated that a commitment for an environmental qualification review at modification close out was not met and that the closure of this issue could be completed post restart. The licensee indicated that the problem was in the wording of the commitment which stated that it was to be completed at modification closure and that an environmental qualification review was being performed; however, it occurred during modification development. The inspectors reviewed the program requirements established by Procedure NOP-C-2004, "Design Interface Reviews and Evaluations," Revision 0, and confirmed that the commitment was required by the procedure. The inspectors concluded the intent of the commitment was met because the procedure appropriately referenced the elements of the commitment, and that location of the commitment in the process did not impact the results. The licensee had entered this issue into their corrective action program as CR 02-8418 which required an evaluation to modify or remove the commitment as appropriate.

- The Plant Modification Program Review, Recommendation 9.2.6, indicated that the modification procedures did not implement a commitment to identify and control unverified design data when design verification is deferred. The inspectors reviewed CR 02-08425 to assess the licensees closure of this item. Condition Report 02-08425 indicated that the associated procedure required revision to provide a barrier to prevent future occurrences. Because the licensee identified that the verification process was compromised, the inspectors were concerned about the design control of past modifications which were installed using the deficient processes. The licencee indicated that this deficiency was associated with the corporate design process which was implemented on August 26, 2002, and that the prior process did not contain this deficiency. Additionally, the licensee indicated that the deficiency in the new program was identified prior to any verifications being deferred. Also, a barrier was put in place to write a condition report for any modifications where deferral occurred until the procedure was corrected. The inspectors found that CR 02-08425 reflected this requirement.

- The Plant Modification Program Review, Recommendations 9.2.12, 9.2.14, 9.2.23, and 9.2.52, indicated that there were various deficiencies with deferred modifications or the associated process. All items originally had independent tracking and condition reports; however, due to commonalities the licensee decided to have the RSRB re-consider their original classifications and recommendations. The inspectors were concerned about the impact of modifications that were deferred on future plant operations. The inspectors reviewed closure documentation for these observations and found that corrective actions to provide administrative barriers to prevent future conditions had been established. Additionally, the acceptability of all modifications which remained deferred beyond the current outage had been assessed.

  Because these condition reports related to the deferral of the service structure inspection opening modification, the inspectors reviewed the licensee's process for prioritizing and deferring modifications. The licensee utilizes two processes which govern the modification approval and deferral process. The "Davis-Besse Integrated Long Range Plan Project Administration Guideline," established the process for obtaining approval of projects, including modifications, in excess of $50,000.00. The "Priority Management Policy Implementing Guideline," governed the prioritization of work, including modifications.

  Modifications under development are assigned a recommended priority as described in the Guideline by the assigned engineer. Modifications then are passed to the Project Review Committee or the Planning Committee depending on the projected cost. The project review committee, a team comprised of station management at the director level, confirms or revises the priority and approves implementation or deferral of the modification. The inspectors reviewed the process documentation and found that it included appropriate guidance to ensure that modifications were appropriately controlled and prioritized.

  Because the modification deferral process contained minimal changes, and because deferral of the service structure inspection opening modification was a contributing cause to the head degradation, the inspectors inquired about barriers to prevent recurrence. The licensee indicated that correction of the root causes, safety culture and lack of rigor, and strengthening the corrective action program should prevent recurrence. Because these attributes manifest themselves over periods of time, the inspectors concluded that future inspections would have to be sensitive to the effectiveness of these corrective actions.

- The Plant Modification Program Review, Recommendation 9.2.22, indicated that problems existed with the performance of 10 CFR 50.59 determinations, evaluations, or screenings, associated with the conduct of plant modifications. The inspectors reviewed this issue because the lack of adequate safety evaluations associated with the modification program, specifically installed modifications, had the potential to affect the facility design basis. The inspectors found that corrective actions relative to this issue were not complete. However, the licensee's recommended corrective action for CR 02-09677 stated that a statically based sample of relevant activities, including past modifications, should

be performed to assess the significance of the finding. The licensee indicated that the recommendation to sample past 10 CFR 50.59 determinations would be implemented if their review of the process yielded any observations that indicated a process breakdown which could impact the current licensing basis.

- The Plant Modification Program Review, Recommendation 9.2.56, indicated that there was a production over quality perception for the "At-Risk" modification process. The process was named the "At-Risk Modification Process" because any issues emanating from parallel engineering or final evaluations could require work already performed to be removed and a change instituted. The licensee interviewed over 80 individuals relative to this issue as part of the modification program assessment. The interviews revealed that the majority of personnel believed that the "At-Risk" process was being abused, and that the process created a perception of production over quality and safety.

  The inspectors interviewed the licensee relative to their observations, audits, and implementation of the process to assess the engineering rigor associated with modifications installed using the "At-Risk" process. The licensee indicated that they had conducted training and meetings to raise awareness of the process and emphasize that quality and safety were paramount. Also, Quality Assurance had audited many modifications, including "At-Risk" changes, and identified some findings which they believed were related to administrative aspects of the process. The licensee had not attempted to assess the perceptions related to production versus quality and safety, or if the process had resulted in any deficiencies with engineering rigor. The licensee considered this issue already contained within an existing condition report (CR 02-10196).

  The inspectors reviewed this item because they were concerned that the nature of the process could result in a lack of rigor for engineering associated with modifications installed using this process. The inspectors reviewed Procedure NOP-CC-2003, "Engineering Changes," Revision 1, Section 4.4.3, "At-Risk Change," and found that the procedure contained the proper barriers to ensure that the quality of modifications performed using the "At-Risk" process was equivalent to that of routine modifications.

b.1.4 Conclusions

The inspectors concluded that the licensee's evaluation of the modification program adequately identified administrative deficiencies in the program, and that reasonable corrective actions were established to correct identified deficiencies. However, the inspectors were unable to assess the latent impact of newly identified deficiencies relative to past modifications that were installed. The licensee indicated that the corrective action program provided multiple barriers to assess problematic issues and concerns similar to inspectors' concerns, and that any related deficiencies would be addressed through that program. The inspectors concluded that related assessments of the corrective action program would ascertain if the program was robust enough to capture these types of issues. Restart Checklist Item 3.g, "Modification Control Program," is considered closed.

b.2 Assessment of the Operating Experience Program

b.2.1 Discovery Phase

The licensee's detailed Phase II review evaluated the Operating Experience Assessment Program (OEAP) as documented in the "Operating Experience Program Summary Report," Revision 0, in accordance with Discovery Action Plan (DAP) Report PR-DAP-3-01, Revision 1. The review included self-assessments, Quality Assurance audits, peer reviews and NRC inspection reports for the previous 3 years to determine if identified corrective actions had been properly implemented. A review of the past 5 years of CRs related to operating experience identified 65 with inadequate or inappropriate corrective actions, 11 with open corrective actions and 24 with adequate evaluations and corrective actions. A review of the past 5 years of operating experience external to Davis-Besse was conducted to verify the effectiveness of implementation of industry lessons learned. Additional reviews of performance indicators; roles, responsibilities, qualifications, and training of OAEP personnel; and interviews of a cross-section of the organization and groups associated with interfaces and hand-offs to the OAEP program were also incorporated into the process.

The review identified deficiencies and provided recommendations for improvements in the areas of standards, ownership, and oversight. Under those three categories, the following key elements were considered:

- compliance of program attributes with those required by basis documents and commitments (standards);
- compliance of program attributes with the "spirit" as well as the letter of the basis documents and commitments (standards);
- appropriateness of program goals and scope (ownership);
- implementation of effective and positive controls for interfaces and hand-offs with other programs or work groups (ownership);
- appropriate implementation of operating experience (ownership);
- appropriate level of management involvement (oversight);
- proper program owner qualifications (oversight);
- clearly defined and appropriately implemented roles and responsibilities for program implementation (oversight).

The licensee identified significant weaknesses within the OAEP including:

- lack of onsite dissemination, screening, evaluation, and internalization of operating experience events;
- lack of rigor and attention to detail in capturing programmatic elements, commitments, numerous applicable industry guidance, and best practices into governing and implementation documents;
- failure of the program scope to achieve full compliance with basis documents and commitments, and to adequately address internal operating experience, promotion of operating experience usage, or provision of a method for consistently addressing operating experience affecting common processes within the company;

- non-compliance with implementation documentation including acceptance of deficient operating experience documentation evaluations and multiple failures to perform, identify, or correct deficient evaluations;
- lack of appropriate goals and performance indicators with established regular monitoring;
- inadequate and/or inaccurate cause analysis and improper selection, implementation, and timeliness of corrective actions for numerous CRs;
- unclear program guidance for hand-offs and interfaces with other workgroups resulting in reliance on informal knowledge;
- ineffective management oversight, support, and ownership for maintaining and improving standards of performance;
- inadequate initial and continuing training and specific qualification criteria for key program personnel including program owner, backup program owner, Operating Experience Review Committee members, and department operating experience coordinators;
- unclear definition of roles and responsibilities for program personnel;
- coordinators lacking program awareness and formal guidance for inclusion of operating experience into plant activities and performance of effective operating experience document evaluations.

b.2.2 Implementation Phase

The OEAP was defined in station procedure NG-NA-00305, Revision 3, “Operating Experience Assessment Program.” This procedure had been recently revised to address issues identified during the DAP review and as part of the Implementation Action Plan (IAP) PR-IAP-3B-01, Revision 1, “Operating Experience Program Implementation Action Plan.” The inspectors compared the licensee’s OEAP to applicable industry guidance, primarily NRC Generic Letter 82-04, “Use of INPO SEE-IN Program,” and NUREG-0737, “Clarification of TMI Action Plan Requirements,” Item I.C.5 - Procedures for Feedback of Operating Experience to Plant Staff.” The inspectors also reviewed applicable licensee, industry, and regulatory documents, as well as condition reports (CRs) and corrective actions associated with the OAEP. The inspectors reviewed this procedure and the referenced implementing procedures, and verified that the following attributes had been captured:

- defined roles and responsibilities for program and associated personnel;
- use of the CR and corrective action processes for evaluation of all operating experience documents;
- identification of operating experience documents to be reviewed by the Corrective Action Review Board and Senior Management Team;
- defined program interfaces with other workgroups;
- compliance with applicable basis documents and regulatory commitments;
- clarification for screening, evaluation, dissemination, and internalization of various operating experience documents.

The inspectors considered the licensee's review and corrective actions to be critical and thorough.

b.2.3 Conclusions

The inspectors verified that the Discovery Action Plan appropriately reviewed applicable regulatory, industry, and licensee guidance, as well as related CRs and corrective actions, and had identified significant issues affecting the OEAP. The inspectors concluded that the review was consistent with the licensee's Program Compliance Review process as defined in procedures NG-VP-00100, "Restart Action Plan Process," Revision 3 and NG-EN-00385, "Program Compliance Review" and considered the licensee's review to be critical and thorough. Furthermore, the inspectors concluded that the overall recommended corrective actions contained in the IAP report reasonably addressed significant program weaknesses identified by the licensee. Restart Checklist Item 3.b, "Operating Experience Program," is considered closed.

b.3 Assessment of the Inservice Inspection Program

b.3.1 Discovery Phase

The Inservice Inspection (ISI) Program review was documented in the "Inservice Inspection Program Review Summary Report," Revision 0, in accordance with Discovery Action Plan No. PR-DAP-3-01, Revision 1, Milestone No. 8. The licensee's efforts began with a review to determine if all necessary programmatic elements were in place to support full compliance with both the spirit and letter of all applicable regulatory bases and guidance. The review included 10 CFR 50.55a, NRC Regulatory Guides, Generic Letters, Information Notices, Bulletins, USAR, and Technical Specifications. The results included:

- The program was found to be in compliance with 10 CFR with one exception. The service structure surrounding the reactor vessel head penetrations was not designed to enable access to the penetrations for inservice examinations as required by 10 CFR 50.55a(g)(2).

- Regulatory Guide 1.65 provides ISI requirements for reactor vessel closure head bolting and references ASME Section III acceptance criterion. This Regulatory Guide is referenced in the ISI program; however, examinations are being performed in accordance with ASME Section XI. Furthermore, this Regulatory Guide is not listed in Appendix 3D of the USAR as applicable to Davis-Besse.

- While the ISI program was found to be in compliance with NRC generic communications (e.g., Generic Letters, Bulletins, Information Notices), specifically those related to Alloy 600 issues, Davis-Besse does not have a formal program or "owner" to evaluate and implement industry initiatives.

- The ISI program was found to be in compliance with the USAR with one exception. The service structure surrounding the reactor vessel head penetrations was not designed to enable access to the penetrations for inservice examinations as required by 3D.1.2.28, Criterion 32.

- The program "Purpose" missed the intent of Technical Specification 3.4.6.2 in that pressure boundary leakage of any magnitude requires the unit to be placed in Cold Shutdown.

A review of program compliance with industry guidance documents was conducted. The review included the Owner's responsibilities as contained in IWA of ASME Section XI, applicable Code Cases, and Electric Power Research Institute (EPRI) documents related to containment inspections and Material Reliability Project (MRP) recommendations.

- The program was found to be in compliance with the ASME Code and applicable Code Cases. While the ISI program was in compliance with EPRI Containment Inspection Program Guide, Davis-Besse did not have a formal program or "owner" to evaluate and implement MRP initiatives.

A review of ISI program related commitments was performed to evaluate whether all programmatic elements were captured and if the commitments were adequately implemented. The review determined that the ISI Group did not adequately identify ongoing commitments within the program documents; however, all commitments had been complied with. The review also identified that commitments were not adequately tracked within the plant tracking system.

A review was conducted to determine whether the program was adequately implemented in full compliance with the spirit and letter of governing and implementing documents. The reviews included program goals and scope, recent self assessments and QA audits, peer reviews, and NRC inspection reports.

- With respect to execution of the implementing documents, the licensee concluded that the ISI Pressure Test program was ineffective because Davis-Besse did not identify the source of the leakage and did not ensure appropriate corrective actions were taken. The VT-2 visual examination was specifically cited. There was an inadequate nuclear safety focus.

- The use of Lexan inspection covers installed on the service structure to inspect the CRD flanges was determined to be inadequate.

- The scope of the ISI program was found to be too narrowly focused on ASME Code requirements and missed the intent of 10 CFR 50.55a, the USAR, and Technical Specification 3.4.6.2 to protect the structural integrity of the reactor coolant pressure boundary.

- Performance indicators were not established for monitoring the effectiveness of the ISI program.

- Program self assessment frequency has been adequate and future assessments were adequately planned and scheduled. Corrective actions for programmatic findings were found to be timely and adequate. Attributes in the Master Assessment Plan were found to lack specific guidance to properly assess the ISI program and did not require that previously generated condition reports

documenting ISI concerns be sampled for acceptability. Audits should include field inspection and assessment of ISI implementation.

- From a population of 64 completed ISI related condition reports, seven were found to have inappropriate cause evaluations.

A review was conducted to evaluate the controls and effectiveness of interfaces and hand-off between the ISI program and other plant programs. In general, the interface was clearly defined and effective between the ISI program and Operations, Maintenance, Radiation Protection, Engineering, Quality Control, the Authorized Nuclear Inspector, Modifications, and Contractor Support. Five issues were identified:

- The interface between the ISI and the Boric Acid Corrosion Control programs was weak. When a boric acid leak was found, the Pressure Test Engineer was to be notified so that components impacted for future ISI inspections could be documented; however, no further actions were specified.

- The interface between ISI and the Babcox & Wilcox Owners Group needs to be strengthened.

- A formal interface between ISI and the EPRI MRP needs to be established.

- All Davis-Besse Alloy 600 applications should be identified.

- The ISI program has not been involved in all decision making activities related to the conduct of ISI type inspections (e.g., CRD nozzle inspection managed by the Reactor Services Project).

A review was performed to determine whether roles and responsibilities for ISI program oversight are clearly defined and implemented. The review also determined whether the program had an appropriate level of management involvement and effective program ownership.

- Management responsibilities for the ISI program were defined in NG-EN-00314 “Inservice Inspection,” Revision 2 and DB-PF-00104 “Inservice Inspection Program,” Revision 2. Plant Engineering line management involvement in the ISI program was generally acceptable. However, management’s direct involvement in the oversight of field activities was not apparent.

- The effectiveness of program ownership had been verified through both internal and external program assessments. Active industry participation had resulted in program improvements.

- The ISI roles and responsibilities for Plant Engineering, Quality Control, and external contractors were well defined and implemented in accordance with written procedures.

Reviews were conducted to determine if the site’s knowledge base (qualifications and training) for the ISI program was sufficient. The Program Owner and key personnel in

the ISI group had completed their required qualifications and had appropriate expertise to perform their job functions. Specific qualification criteria exist in ASME Section XI requirements and in site Job Familiarization Guidelines to support the ISI function at Davis-Besse. The Guidelines need to be revised to emphasize the responsibility of ISI to protect the structural integrity of the RCS. The initial and continuing training for ISI personnel was found to be appropriate.

Reviews were performed to verify effective implementation of applicable operating experience data external to Davis-Besse. The ISI group was found to demonstrate knowledge of industry standards, was aware of industry issues, and was involved in the development of improved practices. However, operating experience potentially related to ISI was often reviewed by Design and System Engineering, with the ISI group brought in for input only or when ISI actions were required.

b.3.2 Implementation Phase

The Restart Station Review Board (RSRB) reviewed and classified condition reports generated during the discovery phase. The RSRB evaluated recommendations made by the program review team for each condition report and either accepted or modified the recommendation as documented in Implementation Action Plan PR-IAP-3F-01, Revision 2. Completion requirements were classified as IMC 0350 restart required, RSRB recommended restart required, or post restart. The RSRB concluded that out of 27 CRs generated by the review, 14 were IMC 0350 restart required, six were RSRB recommended restart required, and seven were classified as post restart.

The inspector reviewed the completion classifications for the CRs as determined by the RSRB and found them to be in compliance with the requirements of NG-VP-00100 “Restart Action Plan Process,” Revision 3. Corrective actions were reviewed and verified for a sample of CRs classified as IMC 0350 restart required.

- One of the seven CRs found with inappropriate cause evaluations, discussed above, was reviewed for appropriate corrective actions. CR 02-2549 contained recommendations resulting from the licensee’s self assessment of the ISI program. CR 02-6467 was written to address the problems with the CR identified during the Program Compliance Review. Recommended changes were made to the ISI program regarding pre-job briefs, the RCS was walked down with a renewed focus to identify obstructions to performing visual examination during a pressure test, a review of industry experience was performed during the ISI Program Compliance Review, and the ISI group was tasked to develop an inspection procedure for CRDM nozzle visual examinations.

- Procedure DB-PF-03010 “RCS Leakage Test,” Revision 2 was revised to require leakage inspection of the CRD flanges from above, using remote viewing equipment instead of the inadequate Lexan inspection covers.

- With respect to access to the head penetrations for inservice examinations, the service structure was modified by installing access ports. These ports permit both inspection of the penetrations and cleaning of the head.

- To improve the interface between the ISI and the Boric Acid Corrosion Control programs, DB-PF-204 “ASME Section XI Pressure Testing,” Revision 4 was revised to include: 1) upon notification of boric acid leakage identified under the Boric Acid Corrosion Control program, the Pressure Test Engineer is required to evaluate any leakage to ensure compliance with ASME Section III, IWA-5250; 2) the ISI Pressure Test Engineer is required to issue a CR corrective action to review the defined corrective actions to ensure ASME Code compliance.

- With respect to management’s direct involvement in the oversight of field activities, an Observation Change Management Program was implemented in October 2002. In addition to management expectations, specific observation assignments were scheduled each week for training and field activities. Participation is monitored monthly and reported to members of management by the Plant Manager. The menu driven format provided specific attributes for focus and opportunity to record interactions with observed personnel.

- Procedure DB-PF-00204 “ASME Section XI Pressure Testing” was completely rewritten to address a number of enhancements. CR 02-6316 requested specific Code language be incorporated to further emphasize the importance of locating the leakage source. However, while the intent of the corrective action was implemented within the rewrite, the inspector noted that the specific corrective action documented on the CR was not completed. The licensee issued CR 03-03183 to revise the documented corrective action for CR 02-6316 to reflect actual corrective actions implemented.

b.3.3 Conclusions

The ISI Program review was considered a thorough, detailed, systematic review and identified several areas for program improvement. The review was found to be in accordance with NG-EN-00385 “Program Compliance Review”. Corrective actions scheduled for completion prior to restart were found to be acceptably implemented. While the ISI Program was not technically “broke” prior to this review, the identified enhancements should result in a more effective implementation. Restart Checklist Item 3.f, “Inservice Inspection Program,” is considered closed.

b.4 Assessment of the Boric Acid Corrosion Control Program

b.4.1 Discovery Phase

The inspectors reviewed the licensee’s BACC Discovery Phase efforts in September 2002. The results of this review were documented in Inspection Report 50-346/2002-11. Overall, the inspectors concluded that the licensee had performed an adequate review of the BACC program. The inspectors were concerned, however, whether the licensee had identified all the interfaces between the BACC program and other work groups; had determined if all the relevant NRC commitments were being met; and had evaluated why past BACC engineering evaluations were inadequately performed.

Additionally, the inspectors noted that recent revisions to the Quality Assurance (QA) program did not ensure future, effective oversight of the BACC program. For example, under the revised QA program, BACC audits may not be performed during periods such as outages, when the majority of BACC activities occurred. This essentially resulted in an audit consisting solely of a paper review without any direct observation of program activities. One of the significant issues leading to the reactor vessel head corrosion, was inadequate QA oversight of the BACC program. The licensee documented all of the inspectors' concerns in Condition Reports (CRs).

b.4.2 Implementation Phase

During this inspection, the inspectors reviewed an addendum to the Discovery Phase report which discussed the issues identified during the September 2002 inspection. The licensee had revised the BACC program procedures to address the identified weaknesses. For example, the procedures clearly defined the roles and responsibilities for the program owner and those implementing the program and the expectations for program oversight, including performing self-assessments. The inspectors also observed that boric acid inspections were being appropriately performed. Specifically, that the boric acid inspectors were qualified, conducted the inspections per the procedures, and issued CRs for any observed boric acid deposits.

The program procedures were revised to give the BACC program owner more control over the resolution of boric acid concerns. The inspectors reviewed Revision 3 of the "Boric Acid Corrosion Control Program Manual," which defined the BACC program and which superceded several of the procedures reviewed in September 2002. This manual was consistent with industry guidance, specifically, Revision 1 of the Electric Power Research Institute Technical Report No. 1000975, "Boric Acid Corrosion Guidebook; Managing Boric Acid Corrosion at PWR Power Stations."

The inspectors reviewed selected chemistry, operations, engineering and radiation protection procedures to verify that interfaces with the BACC program were properly addressed. The inspectors also determined whether these departments had received training in the BACC program requirements. Overall, the inspectors concluded that the BACC program interfaces were well documented and that the training appeared effective; however, some minor issues were identified. For example, the inspectors noted that while the chemistry staff was aware that boric acid on containment air filters indicated potential reactor system leakage, the associated station procedure DB-CH-04004, "Containment Atmospheric Sampling and Analysis," Revision 7, did not require that the BACC program be engaged. The licensee documented this issue in CR 03-03563.

The inspectors were unable to evaluate the licensee's corrective actions regarding future QA oversight of the BACC program, as this issue was classified as "post-restart." The inspectors discussed this issue with the licensee QA staff and concluded that the specific concerns were clearly understood. The QA staff stated that corrective actions were being developed for implementation prior to the next station outage. The inspectors also reviewed several QA field observation reports of the BACC program, performed since December 2002. These reports indicated that the QA group had addressed some of the inspectors' concerns regarding more direct observation of

program activities. The inspectors also selectively verified that QA findings/observations were documented in CRs and that corrective actions were appropriate.

The inspectors reviewed several engineering evaluations performed on components having boric acid deposits. The review focused on whether the evaluations identified the source of the deposits, addressed the operability of the affected components, and whether the identified issues were properly resolved. In several cases, the inspectors noted that the evaluations did not thoroughly disposition the issues of concern. Specifically, the inspectors found examples where:

- the source of the boric acid deposits was not supported (i.e., the deposits were attributed to overhead leakage without supporting evidence);

- potential operability (past or present) or generic technical issues were identified, but were apparently not resolved; and

- maintenance rule applicability (i.e., impact on system reliability or availability) was apparently not considered.

The inspectors were concerned that some boric acid issues may be improperly resolved, based on an incomplete evaluation. The licensee believed that these examples resulted from poor documentation rather than from a poor evaluation. However, the licensee acknowledged the inspectors' concerns and generated CRs 03-03609 and 03-04166 to address this issue. The inspectors plan to review the licensee's completed evaluation of CR 03-3609 and 03-04166 before closing Restart Checklist Item 3.d.

The inspectors also observed some licensee follow up inspections of components with known boric acid deposits. The purpose of these inspections was to verify if the identified deposits were removed or if left in place, that no further component degradation was occurring. Some of these inspections were in areas previously observed by the inspectors in September 2002. The inspectors reviewed the "as found" reports for each of the observed areas, the associated engineering evaluation and corrective actions, the inspection criteria defined in the BACC program manual, and interviewed licensee personnel performing the inspections. Overall, the inspectors observed that the deposits were appropriately handled and that the inspections were correctly performed by the licensee staff.

b.4.3 Conclusions

Overall, the licensee was effectively implementing the BACC program and had addressed those issues identified during the Discovery Phase review. Specifically, the program procedures were revised as required and were consistent with industry guidance. The inspectors also observed that areas having boric acid deposits were being handled appropriately. However, the inspectors did identify some concerns with the associated engineering evaluations for these areas. These concerns were being addressed by the licensee through the Corrective Actions Process. Restart Checklist Item 3.d, "Boric Acid Corrosion Management Program," remains open, pending further inspection as discussed above.

b.5 Assessment of the Corrective Action Program

b.5.1 Discovery Phase

The discovery phase portion of the Corrective Action Program (CAP) review was documented in NRC Inspection Report No. 50-346/02-11.

b.5.2 Implementation Phase

The RSRB evaluated recommendations made by the program review team for each condition report and either accepted or modified the recommendation as documented in Implementation Action Plan PR-IAP-3A-01, Revision 2. The focus of the corrective actions were to improve the procedures and supporting tools and ensure appropriate knowledge and behaviors in the Davis-Besse organization to evaluate and resolve conditions adverse to quality. The inspector reviewed and verified a sample of the corrective actions implemented to improve the CAP.

- In an effort to enforce higher standards for cause evaluations and corrective actions, the Corrective Action Review Board (CARB) described in Business Practice NOBP-LP-2008, Revision 1, was upgraded to require a Vice President or Director level chair and representatives from Operations, Performance Improvement, Engineering, and Maintenance, three of which must be managers, for a quorum.

- An extensive revision to NOP-LP-2001 (Revision 4) “Condition Report Process” was performed to strengthen the process. The following sample of revisions were reviewed and verified:
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    - Senior Management review and endorsement of all root cause evaluations was added.
    - Guidance for corrective action effectiveness reviews was improved.
    - Guidance on timeliness for condition resolution was added.
    - The use of a basic cause investigation was eliminated.
    - The closure of Mode Restraint corrective actions to work orders was eliminated.
    - Guidance for implementation of the Boric Acid Corrosion Control Procedure when boric acid leakage is identified was added.
    - Repeat component failures, design failures, and procedural failures are explicitly categorized as Significant Conditions Adverse to Quality.
    - Guidance was provided for proper performance of experience reviews.
    - All “shoulds” and “shalls” were reviewed for proper application.
    - A requirement for providing feedback to the CR initiator was added.

- In an effort to further sensitize and inform personnel a “Lessons Learned from CR Process Weaknesses” lesson plan (CAC-ECT-03-01) was developed. The training focused on lessons learned from past CR process implementation, expectations for behavior changes and an overview designed to enable managers and CR analysts to carry the information forward to their Section

personnel. This training was attended by directors, managers, CR analysts and department root cause mentors.

- A communication plan was developed to provide programmatic communications and feedback to support implementation of the corrective action program. Business Practice DBBP-PI-2000, "Condition Report Process Implementation Expectations," was issued and communicated to site personnel.

- Each organizational section was required to explore their commitment to the CAP and establish/implement those improvement actions necessary to achieve CAP program goals for their section. Performance Improvement worked with each section manager and CR Group Coordinator to provide recommended improvement actions and support necessary staff communications.

- Two CRs (02-0484 and 02-0485) were written to evaluate the aggregate effect of the CAP related issues generated from this review effort as well as those from the root cause evaluation performed as a result of the head degradation. One was written to address the process issues while the other was written to address the implementation related issues. An extensive correlation matrix of issues was created to assure that all issues associated with the CAP were adequately addressed.

b.5.3 Conclusions

The review was found to be thorough and in accordance with NG-EN-00385 "Program Compliance Review". Corrective actions scheduled for completion prior to restart were found to be acceptably implemented and the current program is considered sufficient. The CAP prior to this review appeared to contain the programmatic elements for a successful program; however, station personnel did not consistently identify, aggressively pursue, and effectively resolve plant issues. The reviews conducted to evaluate the CAP issues in the aggregate, along with the associated matrix of issues and corrective actions, was considered an excellent effort. The program enhancements, visibility, and associated training efforts should result in effective CAP implementation going forward. Restart Checklist Item 3.a, "Corrective Action Program," remains open pending completion of the Corrective Action Team Inspection (IR 50-346/03-10).

b.6 Assessment of the Quality Assurance Audit Program

b.6.1 Discovery Phase

The discovery phase portion of the Nuclear Quality Audit Program review was documented in NRC Inspection Report No. 50-346/02-11.

b.6.2 Implementation Phase

The RSRB evaluated recommendations made by the program review team for each condition report and either accepted or modified the recommendation as documented in Implementation Action Plan PR-IAP-3C-01, Revision 1. The focus of the corrective actions were to improve the procedures, processes, and training of audit personnel. The

inspector reviewed and verified a sample of the corrective actions implemented to improve the QA Audit Program.

- Internal self-assessments were not constructed to audit the core functions of NQA. This issue was communicated to applicable managers and a schedule for a comprehensive self-assessment program is being developed.

- Audit findings were closed to CRs, and guidance was lacking for escalating closure issues relating to timeliness or effectiveness. Guidance for escalating these issues was added to the Internal Assessment Process procedure NOP-LP-2004, Revision 1.

- Some Commitments were not properly implemented in the Internal Assessment Process procedure. Corrections were made in NOP-LP-2004, Revision1.

- Some "safety programs" initiated as a result of operating experience (OE) were not considered in the Master Assessment Plan (MAP). As the MAP is revised, known OE initiated "safety programs" are screened for applicability to the auditing scope.

- QA failed to include significant plant events in the quarterly audit plan as required by NOP-LP-2004. The first quarter 2003 assessment plan was revised to include significant plant events and the QA staff attended training on this aspect of the program.

- Several issues were identified with qualification of audit personnel. Procedure NA-QA-07006, "Qualification and Certification of Nuclear Quality Assessment Personnel" and associated qualification cards were revised to provide effective guidance for qualification of auditors.

- Source documents listed within the Master Assessment Plan (MAP), containing applicable regulations or commitments to regulatory requirements, were missing, incorrect, or inappropriate. Furthermore, Attributes, listed under Primary Elements within the MAP were found inadequate in some areas. This resulted in less than adequate assessments of some program areas. Internal Assessment Process Procedure NOP-LP-2004 was revised to ensure source documents are reviewed on a routine basis. Functional leads were instructed to review the MAP to ensure adequacy of attributes and source documents during quarterly assessment preparation. Collective improvements will be incorporated into the next formal revision of the MAP.

b.6.3 Conclusions

The QA Audit Program review was considered a thorough, detailed, systematic review and identified several areas for program improvement. The review was found to be in accordance with NG-EN-00385, "Program Compliance Review". Corrective actions scheduled for completion prior to restart were found to be acceptably implemented. Eighty-seven CRs were issued as a result of the licensee's review of the Audit Program. Improvements in the areas of audit scope and depth, training of QA audit personnel,

more aggressive involvement in the incorporation of industry operating experience, and more of a focus on field observations should result in improved effectiveness of the Audit Program. Restart Checklist Item 3.c, "Quality Audits and Self-Assessment of Programs," remains open pending review of the Self-Assessment area.

.2 Leak Detection Program Review

a. Inspection Scope

The inspectors reviewed the licensee's development of a plant engineering Reactor Coolant System (RCS) leakage program as documented in "RCS Integrated Leakage Program Manual," Revision 0. The inspectors evaluated the program requirements and administrative limits for monitoring, trending, and analyzing indicators of RCS leakage as implemented by engineering administrative procedures EN-DP-01171, "Engineering Implementation of the RCS Integrated Leakage Program," Revision 00, and NG-EN-00327, "RCS Integrated Leakage Program," Revision 00.

The inspectors compared the program to applicable industry and Electric Power Research Institute guidance, and NRC information and recommendations, including Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," dated May 1, 1973. The inspectors reviewed the January 2003 Davis-Besse assessment of historical data for instrument uncertainty, methodology analysis, and RCS inventory accuracy, DB-SP-003357, "RCS Water Inventory Balance." The inspectors also reviewed a January 2003 assessment for derivation of triggers and limits for the RCS Integrated Leakage Program and comparison against actual Davis-Besse leak rate data from Cycles 11 through 13 (1996-2002). Other related industry and NRC communications were referred to, as well as applicable portions of the Davis-Besse Updated Safety Analysis Report.

b. Observations and Findings

The RCS Integrated Leakage Program is addressed in Item 3.e of the licensee's Davis-Besse IMC 0350 Restart List (Adequacy of Safety Significant Programs - Develop a Reactor Coolant Unidentified Leakage Program under the Program Compliance Building Block). The program is defined in the station Plant Engineering Program Manual, Revision 0, "Reactor Coolant System (RCS) Integrated Leakage Program," and implemented by plant engineering administrative procedures EN-DP-01171, "Engineering Implementation of the RCS Integrated Leakage Program," Revision 0 and NG-EN-00327, "RCS Integrated Leakage Program," Revision 0.

The program consisted of six main phases including data collection, data analysis, triggers and adverse condition recognition, preliminary investigation, condition reports, and leakage impact evaluation. The inspectors verified that the program considered both direct as well as symptomatic indications of RCS leakage. Periodic scheduled walkdowns designed to identify and correct RCS leakage were included. The requirements for monitoring, trending, and analyzing indications of reactor coolant leakage were appropriately established.

The licensee plans to initially base the program administrative leakage limits, as well as early identification of sustained step and rate changes, on an analytical and numerical analysis of Davis-Besse historical leak rate data from Cycles 11 through 13 (1996-2002). The licensee also completed an assessment of both the methodology and uncertainty of instruments associated with DB-SP-03357, "RCS Water Inventory Balance," to verify accuracy of instruments and methodology used in the program. Four triggers and three administrative action levels, set at various steps and rates for both cumulative and maximum amounts of leakage, were conservatively set below Technical Specification requirements with increasing severity of actions. Upon reaching an action level or adverse trend recognition, a documented evaluation was required to determine, then minimize, the hazards associated with RCS leakage. The documented evaluations will specify recommendations for compensatory measures that may range from increased vigilance to reactor shutdown for inspection of pressure boundary components.

The inspectors verified that the program identified an owner with clearly defined qualifications and responsibilities. The program required that personnel implementing the program were appropriately trained and qualified. The roles and responsibilities for program implementation and the program interfaces with other workgroups were identified. Periodic assessments and management oversight of the program was included at critical points.

c. Conclusions

The program established four triggers and three administrative action levels, set at various steps and rates. Cumulative, and maximum amounts of leakage were conservatively set below Technical Specification requirements with increasing severity of actions. Upon reaching an action level or adverse trend recognition, a documented evaluation was required to determine, then minimize, the hazards associated with RCS leakage. The program considered both direct as well as symptomatic indications of RCS leakage. If properly implemented, the licensee's RCS leakage program represents a conservative and structured approach to detecting and responding to RCS leakage. Restart Checklist Item 3.e, "Reactor Coolant System Unidentified Leakage Monitoring Program," is considered closed.

4OA6 Meetings

.1 Exit Meeting

The NRC inspectors presented the inspection results to Mr. L. Myers and other members of licensee management at the conclusion of the inspection on May 23, 2003. The NRC inspectors asked the licensee whether any materials discussed as potential report material should be considered proprietary. No proprietary information was identified.

KEY POINTS OF CONTACT

Licensee
L. Myers, Chief Operating Officer
D. Gudger, Manager, Performance Improvement
B. Hennesy, Corrective Action Program Supervisor
C. Daft, ISI Program Owner
R. Pell, Radiation Protection Manager
R. Greenwood, Health Physicist
P. McCloskey, Manager Regulatory Affairs
W. Marini, Regulatory Affairs
M. Stevens, Director, Maintenance
M. Roder, Manager, Operations
N. Morrison, Program Planner Owner
C. Price, Restart Action Plan Owner
R. Geiger, Program Compliance
S. Osting, Program Owner

Nuclear Regulatory Commission
C. Thomas, Senior Resident Inspector
D. Simpkins, Resident Inspector

LIST OF ACRONYMS USED

ASME	American Society of Mechanical Engineers
BACC	Boric Acid Corrosion Control
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CFR	Code of Federal Regulations
CR	Condition Report
CRDM	Control Rod Drive Mechanism
DAP	Discovery Action Plan
DRP	Division of Reactor Projects
EPRI	Electric Power Research Institute
IAP	Implementation Action Plan
IR	Inspection Report
ISI	Inservice Inspection
MAP	Master Assessment Plan
MRP	Material Reliability Project
NRC	Nuclear Regulatory Commission
NQA	Nuclear Quality Assurance
OE	Operating Experience
OEAP	Operating Experience Assessment Program
QA	Quality Assurance
RCS	Reactor Coolant System
RSRB	Restart Station Review Board
SDP	Significance Determination Process
TMI	Three Mile Island

LIST OF DOCUMENTS REVIEWED

Condition Reports

03-01254; Non-conservative classification of condition reports by RSRB
02-09898; Training related deficiencies in Plant Modification Program
02-09613; Calculation procedures do not address status of calculations for mods
02-08413; Inadequate control of supplemental mod packages
01-03009; Ineffective corrective action related to the 10 CFR 50.59 process
02-09900; Poor use of industry lessons learned in the Plant Modification Program
03-00111; Indicated containment atmosphere radioactivity is not utilized properly
02-06530; Review of Fisher Information Notice of PCAQR 97-0982
02-06669; EDG: OE8753 and many other EDG OEs not evaluated
02-07038; Lack of positive reinforcement from leaders on effective uses of OE
02-07040; Lack of understanding of the administrative processing of OE evaluations
02-07041; Inconsistent and superficial rigor of OE evaluations
02-07129; Operating experience not documented
02-07547; NRC Information notices are not officially reviewed by the station
02-07580; Effects of Non-Tech Spec instrument errors on indicated reactor power
02-07655; ISI Group OE use is reactive instead of pro-active
02-07932; Industry OEAP lessons learned not used to improve program
02-07934; Inadequate management expectations for operating experience
02-07935; Inadequate cause evaluations and corrective actions for OEAP program
02-07937; Lack of qualification requirements for operating experience personnel
02-07938; Training related deficiencies in OEAP
02-07945; OERC acceptance of deficient OED evaluations
02-08009; Failures to perform, identify, and correct deficient OEAP evaluations
02-08010; EDG General Electric SPM switches failure (IN 98-19)
02-08050; AFW OE IN 2000-08 review
02-08255; Periodic aggregation of EPIX events to preclude similar DB events
02-08305; Mis-positioned check valve IN 2000-14 assigned applicability is limited to HPI
02-08340; Lack of qualification requirements for operating experience personnel
02-08497; Containment vessel system review of industry experience (OE Review)
02-08532; CR OEAP needs to expand scope of applicable documents
02-10274; RP program OE coordinator
02-10275; Operating experience review committee
03-00790; Operating experience related to valve manipulation needs review
02-02057; Incorrect evaluation for OE report issue for locked high rad area event
02-02374; IN 2002-5 evaluation returned
02-02375; SER 2-01 evaluation returned
02-02787; IN 2002-3 evaluation returned
02-02788; IN 12821 evaluation returned
02-03000; Containment liner OEs
02-03434; Apparent violations of NG-NA-00305, operating experience assessment
02-04278; Email used incorrectly as a substitute for training and other efforts
02-04355, Failure to periodically perform an OEAP effectiveness review
02-04356; Inadequate written guidance for oeap

02-04715; 125/250 VDC molded case switches
02-05015; Poor control of OE (Operating Experience) due date extensions
02-05017; Less than adequate resolution of CR 01-2918
02-05018, Lack of OED (Operating Experience Document) effectiveness review
02-05021; Limited dissemination of OE information
02-05265; Lack of qualification requirements for operating experience coordinator
02-05294; Electrolytic capacitors for battery chargers and inverters
02-05305; Evaluation of improvements to addressing industry experience
02-05380; Lack of requirements to evaluate OE for maintenance rule failures
02-05559; Inadequate CAP review of operating experience
02-05685; Lack of OE Reviews for MFPT (Motor Feed PumpTurbine) controller MDT-20
02-05837; Condensate / Condenser - OE10485
02-05838; Condensate / Condenser - OE13010
02-05840; Condensate / Condenser - OE 7524
02-05841; Condensate / Condenser - OE 9475
02-07037; Poor timeliness of incoming OE document evaluations
02-07930; OEAP related commitments need to be re-evaluated
02-07939; OEAP documents do not adequately incorporate NRC and INPO requirements
02-07941; OEAP does not fully incorporate guidance for processing in-house OE
02-07943; TERMS identification of closure and implementing document inadequate
02-06129; Lack of understanding of using OE for generic implications evaluations
02-06153; EDG: INPO SER 95-05
02-06311; RPS OE 12205 review
02-06341; SWS review of industry experience
02-06758; Post boric acid leak notification action not specified in DB-PF-00204
02-06426; Use of Lexan covered ports to inspect CRDM flanges ineffective
02-06316; Emphasize the importance of locating the source of leakage in DB-PF-00204
02-06467; Inappropriate corrective actions
02-06517; CR 01-0175 was closed to a pending NRC Relief Request
02-06758; Revise DB-PF-00204 to specify actions when notified of boric acid leak
02-08225; NQA assessments of ISI should include field implementation
02-08459; Less than adequate safety focus of the ISI group
02-08756; Lack of management oversight of ISI activities
02-08757; ISI Program is not involved in all activities related to ISI type inspections
02-08758; An all inclusive list of Alloy 600 components should be developed
02-03328; Add additional detail to NOP-LP-2001 for experience reviews
02-02637; Add direction for roll over of CR evaluations
02-00891; Eliminate basic cause analysis for SCAQ CRs
02-08933; Communicate to managers requirements for repair / use-as-is
02-04884; CR Analyst’s responsibilities to include feedback to evaluators
02-00891; Revise CAP to require Senior Management Team to review all root causes
02-00891; Revise CAP to prohibit closure of mode restraint CRs to work orders
02-04885; Revise NOP-LP-2001 to provide feedback to CR initiator and supervisor
02-00891; Revise NOP-LP-2001 to focus effectiveness reviews on corrective actions
02-04884; Publish a CAP Expectations document to the station
02-04884; Develop and implement an ongoing CAP communication plan
02-04885; Develop checklists to provide expectations for CR resolution
02-04884; Facilitate CAP implementation improvement plans within line organizations
02-04885; Revise all “should” statements in NOP to “shall” as appropriate

02-04884; Conduct case study training to communicate CAP root cause analysis
02-02174; Evaluator to comply with BACC procedure when boric acid leak identified
02-08933; Conduct CR miscatagorization lessons learned for the MRB

Procedures

NOP-CC-2003-01; Engineering Change Request; Revision 1
DB-OP-01200; Reactor Coolant System Leakage Management, Revision 03
DB-PF-00003; Revision 3, Maintenance Rule
NOBP-LP-2008; Revision 00, Corrective Action Review Board
EN-DP-01500; Reactor Vessel Inspection Procedure, Revision 4
NG-EN-00311; ASME Section XI Repair / Replacement Program

Other Documents

Davis-Besse Program Compliance Plan; Revision 4; September 24, 2002
Davis-Besse IMC 0350 Restart List; Revision 4; February 20, 2003
Self Assessment Report 2002-0081, Pressure Testing Program; May 6-17, 2002

Modifications

99-0051-00; Design , License, Fabricate, and Install High Density Fuel Storage Racks in the Spent Fuel Pool
82-0074-01; Relocation of the Pressurizer Relief Valves on the Pressurizer
90-0014-00; Abandon/Remove Chlorine Detectors
83-0049-00; Change Fittings on Pressurizer Safety and Relief System
97-0029-00; Fail Open Valve CC1471 & CC1474
00-0019-00; Abandonment of SFAS Containment