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 SENDER NAME: TUCKER, H. B. AUTHOR AFFILIATION: Duke Power Co.
 RECIP. NAME: NRC - No Detailed Affiliation Given

SUBJECT: Responds to NRC 870312 ltr re notice of violation & proposed imposition of civil penalty as noted in Insp Repts 50-269/86-16, 50-270/86-16 & 50-287/86-16. Alleged violation denied. Proposed civil penalty should be fully rescinded.

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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

April 13, 1987

Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

By letter dated March 12, 1987, the NRC transmitted a Notice of Violations and proposed imposition of Civil Penalty for a violation as reported in Inspection Reports 50-269/86-16, 50-270/86-16 and 50-287/86-16. This letter provides Duke Power's response to both of these documents. A summary response to the proposed imposition of civil penalty is provided in the subsequent paragraph with additional details provided in Attachment 1. Duke's response to the Notice of Violations is provided by Attachment 2.

Within the Notice of Violation and proposed imposition of civil penalty, the NRC asserts that measures to assure that regulatory requirements and design bases are correctly translated into specifications, drawings, procedures and instructions were not properly established for the installation of the Motor Driven Emergency Feedwater (MDEFW) pumps, in that pump runout was not documented or accounted for. Duke Power contests this alleged violation and the proposed imposition of a civil penalty for the violation for the following reasons:

- (1) The Post-TMI modifications were commensurate with the original plant design.
- (2) Duke had identified the situation and had initiated steps to address the concern associated with the potential for pump runout in the EFW system.
- (3) The modified EFW system, including credit for operator action, was an adequate and reasonable design.

In addition to transmitting a Notice of Violations and proposed imposition of civil penalty, the March 12, 1987 NRC letter had identified additional Staff concerns regarding the schedule for the long term corrective actions for the specific problem concerning EFW pump runout. The following paragraph provides Duke's response to this Staff concern.

Duke initiated a study to recommend specific solutions for EFW runout protection. The study was completed on March 5, 1987 and a specific solution was recommended. The design of this modification has been initiated; however, a specific schedule

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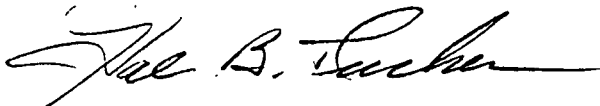
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for installation has not been established. The reason for this is that in January 1986 the NRC Staff initiated a reassessment of the overall safety of Babcock and Wilcox (B&W) designed reactors. In response, the Babcock and Wilcox Owners Group (B&WOG) has undertaken a comprehensive program, Safety and Performance Improvement Program (SPIP), to further enhance the overall performance of B&W designed reactors. Duke anticipates pursuing the implementation of the recommendations identified by this effort. A schedule for implementation of the specific solution recommended for the EFW pump runout concern will be integrated into the implementation of the recommendations identified by the SPIP efforts.

A final NRC Staff concern identified within the March 12, 1987 letter involved Duke's management control systems (i.e., design control process and communication between the site and design engineering). Attachment 3 provides a detailed response. Briefly, Duke had initiated prior to the Safety System Functional Inspection (SSFI) at Oconee Nuclear Station several task forces to review, in great detail, the design control process. These task forces were formed in response to internal reviews and INPO audits which indicated the need for enhancements to the design process. A review of these recommendations, combined with the valuable lessons learned from the SSFI at Oconee, has resulted in a number of design-related initiatives. The actions discussed within Attachment 3, although motivated by wider inputs than solely the SSFI at Oconee, bear directly on improving the effectiveness of the design control process and the communication of design information.

Duke, as discussed in Attachment 2, has denied the alleged violation assessed a civil penalty. Accordingly, Duke requests that the alleged violation be withdrawn and the proposed civil penalty be fully rescinded.

Very truly yours,



Hal B. Tucker

PFG/20/sbn

Attachments

xc: Dr. J. Nelson Grace, Regional Administrator
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Mr. J. C. Bryant
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ATTACHMENT 1
DUKE POWER COMPANY
OCONEE NUCLEAR STATION

RESPONSE TO PROPOSED CIVIL PENALTY

In accordance with 10 CFR 2, §2.205, Duke Power Company hereby protests the proposed imposition of the Civil Penalty in its entirety, in that the Violation assessed a civil penalty is denied by Duke Power. The basis for this denial is set forth below as well as provided in Duke's response to the Alleged Violations (Attachment 2).

- (1) 10 CFR Part 50, Appendix B, Criterion III requires that "Design changes ... shall be subject to design control measures commensurate with those applied to the original design". As described in Attachment 2 the design control process in place for the Post-TMI modification which added motor driven EFW pumps assured the new EFW system design and analysis clearly were commensurate with the original design.
- (2) The situation regarding the potential for pump damage in the short-term was identified by Duke and appropriate corrective actions to address the concern were taken commensurate with the findings. Attachment 2 provides a more detailed discussion of this matter. Duke personnel had noted that the Oconee simulator was modeling undesirably high EFW flow rates and that calculations concerning this were initiated. No apparent credit was given for this identification. The analysis indicated that the potential for pump runout in the EFW system for certain design basis transients was possible. Further evaluation of this situation determined that pump damage due to operation of pumps at runout condition could occur. This situation was reported to the NRC on September 29, 1986 by Licensee Event Report 269/86-10.

Further, the evidence provided by the NRC Staff in support of the alleged violation appear to be inconsistent with Duke's response to IE Bulletin 80-04. First, there appears to be a misunderstanding by the Staff of what Duke stated in the response to IE Bulletin 80-04. A detailed discussion of the misunderstanding is provided in our response to Violation I provided in Attachment 2 to this letter. Secondly, Duke's response to IE Bulletin 80-04 does indicate that the impact of pump runout was considered and adequate protection was provided. This was based on what was known at that time about the impact of runout conditions on the pumps. As discussed in Duke's responses to IE Bulletin 80-04, the EFW level control system, in conjunction with operator action, was determined to be adequate protection of the EFW pumps from the impact of operating at runout conditions. This conclusion was concurred with by the NRC as provided by a NRC letter dated October 14, 1982 which transmitted the Staff's Safety Evaluation Report of Oconee's response to IE Bulletin 80-04. This conclusion, however, is based on what was known at that time. It was not known until much later that pump failure could occur in the short term due to bearing failure. As discussed above, this failure mechanism was identified and reported to the NRC by Duke and appropriate corrective actions were promptly implemented.

As a side note, if this incident was indeed a violation, the imposition of a civil penalty appears to be inconsistent with the Enforcement Policy as promulgated in 10 CFR 2, Appendix C, Section V.B. The Enforcement Policy is designed to encourage licensees to identify, correct, and report problems expeditiously and effectively. In this regard the policy states as follows:

"NRC attaches great importance to comprehensive licensee programs for detection, correction, and reporting of problems that may constitute, or lead to, violation of regulatory requirements. This is emphasized by giving credit for effective licensee audit programs when licensees find, correct, and report problems expeditiously and effectively. To encourage licensee self-identification and correction of violations and to avoid potential concealment of problems of safety significance, application of the adjustment factors set forth below may result in no civil penalty being assessed for violations which are identified, reported (if required), and effectively corrected by the licensee."

- (3) The post-TMI EFW upgrade improved the Oconee EFW system in ways far beyond the norm for the time period and for plants of Oconee vintage. Unit cross-connects, numerous pumps, redundant power supplies, separation from ICS, and redundant flow paths all contributed to the design of a system that has proven to be one of the most reliable and problem-free of its kind. Further evaluation of the specific concern of potential EFW pump runout confirmed that operator action would be expected to preclude loss of EFW function. Duke maintains that the design control process, though much improved today, assured at the time of the post-TMI upgrade that the modified EFW system would perform reliably and was designed commensurately with the original plant design. The safety margin of the plant was improved by the EFW modifications, yet the simplicity and diversity of the EFW system was retained.

Duke considers that the proposed civil penalty is wholly unsubstantiated and requests that it be rescinded in its entirety.

ATTACHMENT 2
DUKE POWER COMPANY
OCONEE NUCLEAR STATION

RESPONSE TO NOTICE OF VIOLATIONS
IE INSPECTION REPORT 50-269/86-16, 50-270/86-16, 50-287/86-16

Violation I

10 CFR Part 50, Appendix B, Criterion III, requires that measures be established to assure that applicable regulatory requirements and the design basis, as defined in §50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies, are correctly translated into specifications, drawings, procedures, and instructions.

Contrary to the above, measures had not been established to assure that regulatory requirements and design bases were correctly translated into specifications, drawings, procedures, and instructions in that the design changes for the installation of the motor driven emergency feedwater (EFW) pumps in 1979 did not document and account for pump runout or adequate net positive suction head (NPSH) which were part of the design bases of the equipment. This lack of pump runout/NPSH protection in the EFW system design could result in the loss of EFW function during certain design basis transients.

This is a Severity Level III violation (Supplement I). (Civil Penalty - \$25,000).

Response to Violation I

(1) Admission or denial of the violation:

Duke Power Company denies the alleged violation.

(2) Reasons for denial of the violation:

The violation cited concerns the design changes to install the motor driven emergency feedwater (MDEFW) pumps that was performed in 1979. The identified regulatory requirement for which Duke was cited of being in noncompliance with was 10 CFR 50, Appendix B, Criterion III. Duke notes that Criterion III also explains that "Design changes... shall be subject to design control measures commensurate with those applied to the original design...".

The design control process in place for the post-TMI modification which added motor driven EFW pumps assured the new EFW system design and analysis clearly were commensurate with the original design. Specific protection for EFW pump runout to guard against postulated short-term pump bearing failure was not a criterion of the original nor the modified EFW design. Duke believes this is typical of most industry auxiliary or emergency feedwater systems, where the desire to limit EFW flow is due to overcooling concerns rather than postulated rapid pump bearing failures. NRC IE Bulletin

80-04 also indicated this, with the NRC's question: "If the AFW pumps can be damaged by extended operation at runout flow...".

"Runout" was only determined to be a separate issue after the pump vendor, at Duke's request, reviewed the capability of the pump bearings to withstand vibration associated with low NPSH and high flow. The vendor could not give assurance the pumps would withstand indefinite operation at excessive flow rates. Excessive flow in most utility pump application results in cavitation but not in bearing failure. Cavitation wear itself is not generally a concern except over a long period of time, and is certainly not a concern for the duration of anticipated transients. As with the original turbine driven EFW pumps, the added motor driven pumps were considered capable of withstanding the wear due to cavitation throughout any design basis scenario.

Secondly, Duke had identified the situation and had taken steps to address the concern. As indicated by the March 12, 1987 NRC letter, Duke personnel had noted that the Oconee simulator was modeling undesirably high EFW flow rates and that calculations concerning this were initiated by Duke; however, no apparent credit was given for this identification in the determination of the violation or the assessment of the violation for imposition of a civil penalty.

The analysis was in progress when the NRC Safety System Functional Inspection (SSFI) was performed. As a result of discussions with the SSFI team members, the analysis was expedited. Based on the analyses performed by Duke, it was concluded that the potential for pump runout in the EFW system for certain design basis transients could occur. This conclusion was reached by Duke personnel independent of the NRC Inspection team. Following the team's departure, further evaluation of this situation was undertaken by Duke personnel, which determined that pump damage due to operation of pumps at runout condition was possible. Licensee Event Report 269/86-10 submitted by a Duke letter dated September 29, 1986 documented this situation.

Additionally, there appears to be a misunderstanding by the Staff of what Duke stated in the response to IE Bulletin 80-04. Within the March 12, 1987 letter, the NRC states that the pump runout problem was initially identified by Duke's response to IE Bulletin 80-04. The NRC states, "that emergency feedwater runout was not explicitly addressed by their analysis and that the level control system would be used to mitigate the transient". Duke's response, however, states that the impact to the containment pressure response following a steam line break due to EFW runout flow from the emergency feedwater system was not explicitly considered. Duke goes on to say that the reason why it was not considered was "because [the] continued feedwater addition to the affected steam generator by means of the main feedwater system is considered to be more limiting with respect to containment pressure response than the case involving auxiliary feedwater flow".

In regard to the statement about the level control system being used to mitigate the transient, the discussion on that was provided by a Duke letter

dated July 23, 1982, in response to a NRC Staff request for additional information relative to IE Bulletin 80-04. Duke's response about the ability of the EFW level control system to preclude the occurrence of the EFWs operating at runout flow rates was limited to the main steam line break inside containment transient.

For other transients; however, the level control system, in conjunction with operator action, was considered to be adequate in precluding pump damage. This assessment was predicated on what was known at that time about pump behavior at runout flow conditions. Accordingly, sufficient time would exist for the operator and the EFW level control system to modulate the flow. However, further investigation by Duke did determine a failure mode, not previously known, that could result in loss of the pump in the short term when operating at runout flow conditions. This discovery was promptly reported to the NRC and appropriate corrective measures were implemented.

Finally, the post-TMI EFW upgrade improved the Oconee EFW system in ways far beyond the norm for the time period and for plants of Oconee vintage. Unit cross-connects, numerous pumps, redundant power supplies, separation from ICS, and redundant flow paths all contributed to the design of a system that has proven to be one of the most reliable and problem-free of its kind. Further evaluation of the specific concern of potential EFW pump runout confirmed that operator action, in conjunction with the EFW level control system, would be expected to preclude loss of EFW function. Duke maintains that the design control process, though much improved today, assured at the time of the post-TMI upgrade that the modified EFW system would perform reliably and was designed commensurately with the original plant design. The safety margin of the plant was improved by the EFW modifications, yet the simplicity and diversity of the EFW system was retained.

Violation II.A

Technical Specification 6.4.1 requires that the station be operated and maintained in accordance with approved procedures and that written procedures with appropriate check-off lists and instructions be provided for preventive or corrective maintenance which could affect nuclear safety or radiation exposure to personnel.

Contrary to the above, prior to May 1986, adequate procedures were not available to control maintenance on safety-related motor operated valves. As a result, motor operated valve torque switch and limit switch settings were not adequately controlled to ensure that valves functioned as designed.

Response to Violation II.A

(1) Admission or denial of the violation:

Duke Power Company admits the alleged violation, with reservation. A comprehensive program addressing MOVs was initiated in late 1985. The outcome of the program will result in torque switch settings checked, verified and documented to be between the maximum and minimum settings required; the limit switch settings verified to be appropriate and the as-found and as-left value documented; testing with MOVATS equipment to ensure proper operation at differential pressure; upgraded procedures to document all work performed; and a preventive maintenance program implemented to maintain proper condition to all MOVs. Recognition of this effort was not acknowledged as it should have been. As such, citing Duke for a violation in this area, while Duke is implementing this comprehensive program to correct deficiencies identified and reported to the NRC is unwarranted and contrary to the enforcement policy.

(2) Reasons for the violation; if admitted:

Duke acknowledges that records of selected torque switch settings for motor operated valves (MOVs) were not available, that the technical basis for the torque switch settings could not be demonstrated, and that additional enhancements to procedures to control maintenance and testing of safety-related motor operated valves were warranted. However, deficiencies had been previously identified by Duke to the NRC and corrective action was already in progress before the SSFI. An extensive program was implemented to refurbish all motor operators and to test all motor operators using MOVATS equipment to ensure proper setting of torque and limit switches. The program also addressed the upgrading of procedures, testing and documentation.

(3) The corrective steps that have been taken and the results achieved:

IE Bulletin 85-03 was issued by a November 15, 1985 letter. The purpose of the bulletin was to request licensees to develop and implement a program to ensure that switch settings on certain safety-related MOVs are selected, set and maintained correctly to accommodate the maximum differential pressures expected on these valves. Duke's initial response to the Bulletin was provided by a letter submitted to the NRC/Region II dated May 16, 1986. As a result of Duke's initial investigation initiated in 1985, a large scale effort

was initiated and the scope of the MOV improvement program was greatly expanded and went well beyond what was required by the IE Bulletin 85-03. Duke's commitment to expand the scope of effort has been documented in supplemental responses to the IE Bulletin and at various meetings with the Staff. Specifically, Duke's original response to the Bulletin was supplemented by Duke's letters to the NRC/Region II dated November 20, 1986 and February 18, 1987. Details of Duke's MOV comprehensive program was also discussed with the NRC Staff in Atlanta on August 1, 1986 and again in Atlanta on October 10, 1986. In addition, Duke's response (provided by Duke letter dated October 1, 1986) to the NRC report of the SSFI (provided by NRC letter dated August 1, 1986) also discussed the MOV program at Oconee.

- (4) The corrective steps which will be taken to avoid further violations:

All corrective steps necessary to ensure future compliance have already been taken, as discussed in Item 3 of this response.

- (5) The date when full compliance will be achieved:

This comprehensive program will be fully completed by 1991.

Violation II.B

10 CFR Part 50, Appendix B, Criterion III, requires that measures be established to assure that applicable regulatory requirements and the design basis for those structures, systems, and components to which this appendix applies are correctly translated into Specifications, drawings, procedures, and instructions.

Contrary to the above, design requirements were not properly translated into specifications, drawings, procedures, and instructions in that the drawings did not specify the appropriate end gap for the Keowee station batteries. As a result, the batteries were installed with end gaps which exceeded the $\frac{1}{2}$ inch requirement specified on the manufacturer's installation drawing.

This is a Severity Level IV violation (Supplement I).

Response to Violation II.B

(1) Admission or denial of violation:

Duke Power Company admits the alleged violation.

(2) Reasons for the violation if admitted:

The root cause of this violation has been determined to be a personnel error in the drawing transmittal process. Although there was discussion between the Design Engineering responsible engineer and field personnel regarding the need for spacer material to maintain end stringer clearance, the responsible engineer failed to properly transmit the installation drawing. The personnel error is considered an isolated incident.

Nuclear station modification drawing release procedures require that drawings related to a modification be transmitted to the station accompanied by a Design Summary. Contrary to this requirement, a revised drawing containing installation information pertaining to the end stringer clearance was released without an associated Design Summary. This drawing release was not identified as containing additional information related to the Keowee station battery installation modification. Therefore, the end stringer spacers were not installed.

(3) The corrective steps that have been taken and the results achieved:

The immediate corrective action was to install the appropriate spacer material between the end stringer and the end cell to bring the Keowee battery installation into conformance with the manufacturer's installation drawing. This corrective action was completed during the audit on the same day that the discrepancy was discovered.

As a followup to the immediate corrective action, Duke evaluated the installation discrepancy to determine the seismic qualification acceptability of the Keowee batteries during the time the discrepancy existed. The evaluation considered the seismic capability of the batteries and racks as

provided in the manufacturer's seismic test report and analyses, the battery rack anchoring, the Keowee seismic response spectra, and the various effects of possible cell movement in a seismic event. Based on the evaluation, Duke has concluded that the Keowee batteries, although not initially installed in the manner prescribed on the design drawing, would have survived an MHE event without loss of function.

In addition to the technical corrective action noted above, the employee involved in this incident was counselled regarding proper drawing transmittal procedures.

- (4) The corrective steps which will be taken to avoid further violations:

The Notice of Violation including this response will be reviewed by Electrical Division personnel involved in the nuclear station modification drawing transmittal process.

- (5) The date when full compliance will be achieved:

The corrective action identified above will be fully completed by May 15, 1987.

ATTACHMENT 3
DUKE POWER COMPANY
OCONEE NUCLEAR STATION

RESPONSE TO NRC STAFF CONCERN
REGARDING MANAGEMENT CONTROL SYSTEM

(A) Plan Summary

Duke's overall plan is intended to address significant issues confronting the Design Engineering Department as it completes a transition from new nuclear plant design to design work in support of operating station modifications. The plan contains some major enhancements to the nuclear station modification process. Design Engineering recognized the significant differences between new plant design and plant modification design several years ago, and began a deliberate program to accomplish the transition. This has been tempered by changes in regulatory focus, industry initiatives to enhance the performance of nuclear plants, and observations by the Institute for Nuclear Power Operations (INPO). Duke Power Design Engineering is committed to continuing its standard of excellence in this environment.

(B) Station Interface

This element of the program is intended to improve communication between departments during the nuclear station modification process. The program provides specific interface activities regarding scope reviews, constructability reviews, and design reviews. The department procedure covering this program was published February 16, 1987.

(C) Project File System

A project file for each nuclear station modification will be added to the existing subject files in Central Records. The project file (by station, unit and modification number) will provide a place to accumulate the modification request, proposals, documentation of reviews, project correspondence, a list of affected drawings and calculations, and the final scope document, and will provide a roadmap to locate drawings and calculations from those files as they currently exist. The project file includes a retrievable record of background information developed during the modification design process.

(D) Input Documentation

Improvements are being made so that Design Inputs are clearly documented for each nuclear station modification. The applicable department Quality Assurance (QA) procedure has been modified to provide overall requirements concerning the determination and documentation of design inputs. This change more clearly illustrates compliance with the requirements of ANSI N45.2.11, Section 3. Each design discipline is also establishing guidelines for determining design inputs. Examples will be included that illustrate situations specific to the division (Civil, Electrical, Mechanical).

(E) Test Acceptance Criteria

For modifications, the functional operability of the design will be demonstrated. Lead responsibility for testing has been in the past, and remains, with the Station engineers. Under a new program, post modification test acceptance criteria developed by Design Engineering are documented and summarized in a form which can be readily communicated to the nuclear station engineer for use in developing post-modification test procedures. The program is described in department QA Procedure.

(F) Final Scope Document

Previously, detailed design information was provided by Design Engineering for each modification via individually approved and issued design documents, consistent with practices for new plant construction. A final scope document will be developed for each nuclear station modification to consolidate/summarize design information such that Station personnel can readily understand the modification and develop an effective implementation plan. The final scope document is released to the station as part of the Design Completion Notice transmittal. Guidance on final scope documents was added February 16, 1987 to the Scope, Schedule and Cost Management Manual.

(G) Design Completion Notice

The Design Completion Notice (DCN) has served as the mechanism to alert the station that Design Engineering has completed all work associated with a nuclear station modification. The DCN also provides a listing of all transmittals from Design Engineering associated with the nuclear station modification. The Design Completion Notice now also includes the final scope document and the completed 10 CFR 50.59 evaluation form, and is filed in the central project file system.

(H) INPO Document Review

The Institute for Nuclear Power Operations (INPO) develops and publishes industry good practice documents based on experience gained from audits. These documents contain useful ideas which have worked well at one or more utilities, and the document becomes an unofficial INPO audit criteria. It benefits Design Engineering to have an established, well communicated position on INPO good practices related to nuclear plant design. A procedure now provides for central receipt and review of good practices for design-related activities.

(I) Integrated Design Reviews

For the more complicated modifications, a formal Integrated Design Review is being added to the design process, after design documents have been completed. The Integrated Design Review provides a mechanism to assess the effectiveness of the established verification process on complex modifications, and a means of developing improved design techniques for application to subsequent work.

A new department procedure contains guidance to identify nuclear station modifications requiring this review and assigns responsibility for this determination. The Integrated Design Review procedure draws heavily from INPO Good Practice TS-415.

(J) Safety Reviews

As an enhancement to the nuclear station modification design process, safety reviews and associated documentation will be performed by an oversight group within the department. The elements of a safety review were previously considered in the design process; however, under the new procedure, each nuclear station modification is systematically reviewed and documented to assure that the modification will not have an unacceptable effect on plant systems or equipment. Safety Review documentation is completed prior to the scheduled Design Completion Notice for the NSM and filed in the project file.

(K) 10 CFR 50.59 Evaluations

In order to assure all proposed plant modifications receive a consistent review, a new evaluation form is being used by Design Engineering and Nuclear Production Departments. A single, training program has also been presented to both departments. The 10 CFR 50.59 evaluation process will be conducted for all nuclear station modifications by a single group, prior to the Design Completion Notice.

(L) Self-Initiated Audits

Design Engineering has conducted technical audits in the past on an as-needed basis. All were valuable exercises. A Task Force recently reviewed Oconee SSFI lessons learned by all departments and focused on the effectiveness of QA audit in technical areas. An approach, similar to that used for the NRC SSFI, was adopted. The result, implemented on February 2, 1987, is a program to conduct self-initiated technical audits with the team lead provided by the QA department and staffed with technical experts from Design Engineering and other departments. These periodic audits will assess a plant system or specific area of concern as identified by department management.