

January 29, 2007

Mr. Christopher M. Crane
President and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
Quad Cities Nuclear Power Station
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION
REPORT 05000254/2006017; 05000265/2006017

Dear Mr. Crane:

On December 15, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of problem identification and resolution at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed inspection report documents the inspection findings which were discussed on December 15, 2006, with Mr. Gideon and other members of your staff.

This inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, compliance with the Commission's rules and regulations and with the conditions of your operating license. Within these areas, the inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, the team concluded that, in general, problems were properly identified, evaluated, and corrected. One finding of very low safety significance (Green) was identified during this inspection associated with the effectiveness of the corrective action program. The finding involved the failure to develop actions to correct conditions adverse to quality identified during root cause investigation activities. This finding was also determined to be a violation of NRC requirements. However, because of its very low safety significance and because it has been entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV), in accordance with Section VI.A.1 of the NRC's Enforcement Policy.

If you contest the subject or severity of an NCV in this report, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Quad Cities Nuclear Power Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Mark A. Ring, Chief
Branch 1
Division of Reactor Projects

Docket Nos. 50-254; 50-265
License Nos. DPR-29; DPR-30

Enclosure: Inspection Report No. 05000254/2006017; 05000265/2006017

cc w/encl: Site Vice President - Quad Cities Nuclear Power Station
Plant Manager - Quad Cities Nuclear Power Station
Regulatory Assurance Manager - Quad Cities Nuclear Power Station
Chief Operating Officer
Senior Vice President - Nuclear Services
Senior Vice President - Mid-West Regional
Operating Group
Vice President - Mid-West Operations Support
Vice President - Licensing and Regulatory Affairs
Director Licensing - Mid-West Regional
Operating Group
Manager Licensing - Dresden and Quad Cities
Senior Counsel, Nuclear, Mid-West Regional
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Vice President - Law and Regulatory Affairs
Mid American Energy Company
Assistant Attorney General
Illinois Emergency Management Agency
State Liaison Officer, State of Illinois
State Liaison Officer, State of Iowa
Chairman, Illinois Commerce Commission
D. Tubbs, Manager of Nuclear
MidAmerican Energy Company

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-254; 50-265
License Nos: DPR-29; DPR-30

Report No: 05000254/2006017; 05000265/2006017

Licensee: Exelon Nuclear

Facility: Quad Cities Nuclear Power Station, Units 1 and 2

Location: Cordova, Illinois

Dates: November 27, 2006, through December 15, 2006

Inspectors: A. Barker, Project Engineer - Team Lead
M. Kurth, Resident Inspector
D. Jones, Reactor Engineer
R. Ganser, Illinois Emergency Management Agency

Approved by: Mark A. Ring, Chief
Branch 1
Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000254/2006017, 05000265/2006017; 11/27/2006 - 12/15/2006; Quad Cities Nuclear Power Station, Units 1 & 2; Identification and Resolution of Problems.

The inspection was conducted by region-based inspectors and the resident inspector at the Quad Cities Nuclear Power Station. One finding of very low safety significance (Green) was identified which involved an associated non-cited violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

Identification and Resolution of Problems

In general, the station identified issues and entered them into the corrective action program (CAP) at the appropriate level. In addition, issues that were identified from operating experience reports and instances where previous corrective actions were ineffective or inappropriate were also entered into the CAP. The inspectors concluded that issues were properly prioritized and generally evaluated well. The inspectors determined that conditions at the Quad Cities station were conducive to identifying issues. The licensee staff at Quad Cities was aware of and generally familiar with the CAP and other station processes, including the Employee Concerns Program, through which concerns could be raised. One finding of very low safety significance (Green) was identified associated with the effectiveness of the corrective action program. The finding originated from the review of a root cause investigation conducted for the Unit 1 standby liquid control tank through-wall leak.

A. Inspector-Identified and Self-Revealed Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for failure to assure that conditions adverse to quality were promptly corrected. Specifically, the inspectors concluded that the licensee failed to develop actions to correct conditions adverse to quality identified during root cause investigation activities for a Unit 1 standby liquid control tank leak identified in October 2006. This finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee failed to thoroughly evaluate conditions identified during its root cause investigation for the SLC tank leakage which resulted in the failure to develop appropriate corrective actions. The licensee entered this performance deficiency into the CAP for resolution.

This finding is associated with the Mitigating Systems Cornerstone. The finding was more than minor because if left uncorrected, future conditions adverse to quality would not be fully evaluated or corrected. The inspectors assessed the significance of this finding as very low safety significance because the finding did not represent an actual loss of safety function of the standby liquid control tank. (Section 40A2.a)

B. Licensee-Identified Violations

No findings of significance were identified.

REPORT DETAILS

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution

a. Assessment of the Corrective Action Program

(1) Inspection Scope

The inspectors reviewed documentation for the past 2 years including: NRC inspection report findings, selected corrective action documents, licensee self-assessments, Nuclear Oversight (NOS) audits, operating experience reports and human performance initiatives to determine if problems were being identified and entered into the corrective action program (CAP) at the proper threshold. CAP implementation, metrics, and status, and departmental performance indicators were also reviewed and discussed with the station staff.

The inspectors also reviewed procedures, inspection reports, and corrective action documents to verify that identified issues were appropriately characterized and prioritized in the CAP. Evaluations documented in condition reports (CRs) or issue reports (IRs) were evaluated for appropriateness of depth and thoroughness relative to the significance or potential impact of each issue. Inspectors attended management meetings to observe the assignment of CR categories for current issues and to observe the review of root, apparent, and common cause analyses, and corrective actions for existing CRs.

In addition, the inspectors reviewed past inspection results, selected CRs and IRs, root cause reports, and common cause evaluations to verify that corrective actions, commensurate with the safety significance of the issues, were specified and implemented in a timely manner. The inspectors evaluated the effectiveness of corrective actions. The inspectors also reviewed the licensee's corrective actions for NCVs documented in NRC inspection reports in the past 2 years.

(2) Assessment

Identification of Issues

The inspectors concluded, in general, that the station identified issues and entered them into the CAP at the appropriate level. The inspectors' review of operating experience reports identified that the licensee was appropriately including the issues into the CAP. The licensee has also used the CAP to document instances where previous corrective actions were ineffective or were inappropriately closed.

The licensee performed Common Cause Analysis (CCA) 512702-02 in response to four station event free clock reset events that occurred over a 5 month period. The CCA evaluation period was January 1, 2006, through July 31, 2006. The CCA was directed by the plant manager to identify the underlying human performance aspects of the four

station event free clock reset events and the balance of human performance issues that have occurred in the first 7 months of 2006. The CCA was also chartered to look for any underlying latent organizational weaknesses that may have set the stage for the unacceptable level of human performance events. The CCA employed multiple investigative tools and a cross-departmental team that included corporate and industry participants. The CCA identified two common causes and two organizational weaknesses. The two common causes were: 1) the misinterpretation of and perceived requirements of level 3 "reference use" procedures, and 2) human performance events were occurring in all areas, crossing plant operating conditions, work groups and employee levels. The two organizational weaknesses were: 1) oversight and management challenges along with coding issues for trending and predictive actions, and 2) human performance events were not "emotional" to the site. At several Management Review Committee (MRC) meetings, the inspectors observed the members' sensitivity to identify any issues that could be procedure adherence related from the review of apparent cause, CCA, or root cause investigation reports. For one apparent cause, the MRC concluded that the cause was procedure adherence and directed that the investigation be updated to address procedure adherence. The reasons for this direction were to document procedure adherence applicability and heighten staff awareness of station human performance issues. In addition, the inspectors attended two review/challenge board meetings held on a root cause investigation and a CCA. The review/challenge board initiative was a corrective action implemented for the organizational weakness of oversight and management challenge. At each meeting, an appropriate level of challenge was offered to the presenter of the investigation. The review/challenge board evaluated the alignment of the proposed corrective action with the causes that were determined. The review/challenge board is conducted prior to selected investigative reports being presented for MRC approval.

An expanded 5 year review was conducted by the inspectors on station electrical cable issues. The initial scope of the licensee's search of the corrective action program database for a 5-year period was approximately 1200 issue reports. From the inspectors' screening, approximately 150 issue reports were selected for further review and subdivided into specific categories. Through the inspectors' review of the screened issue report categories and discussion with licensee engineers, approximately 20 issue reports were selected. The issue statement that was developed for the review was, electro-hydraulic control (EHC) fluid intrusion, primarily into the Unit 2 cable tunnel, and the subsequent EHC fluid migration into various cable trays and onto power cables.

In April 2002, the licensee identified conditions through IR 102044 associated with EHC fluid migration into the Unit 2 cable tunnel. In September 2002, EHC fluid was identified through IR 122749 as being present in the Unit 2 cable tunnel, in cable trays and on cables lying within those trays. The licensee identified the intrusion pathway as seepage through concrete defects and ceiling cracks within the Unit 2 cable tunnel. The proposed resolutions were installation of drip pans and/or use of a sealing method to repair the ceiling cracks. The licensee addressed the potential affects of EHC fluid on cables, and identified that the EHC fluid could severely degrade cable insulation over time. Electric cables, such as those installed at the station, are typically manufactured with outer protective jacket covers. The outer jackets are more susceptible to EHC fluid degradation and were identified as being degraded in a number of station incidents. All but the most recently identified damaged outer cable jackets have been repaired. The

licensee had implemented a yearly cable tunnel inspection predefine activity 166312-01 to monitor for additional cable jacket deterioration and other potential degraded conditions associated with EHC fluid intrusion.

In January 2003, an EHC fluid leak occurred above the Unit 2 turbine building 595' elevation that was identified through IR 139980. The licensee questioned the potential long-term effect of EHC fluid on equipment and structures. The licensee evaluated that there was no degradation of concrete or structural steel from EHC fluid exposure. The inspectors concluded that in October 2004, the licensee augmented their focus to resolve EHC fluid leaks, and re-analyze the effect of EHC fluid on cables. Additional IRs were generated to further identify areas of EHC fluid intrusion and initiate work orders to address intrusion sites and cable jacket repairs. No EHC fluid was found to have come in direct contact with the cable insulation. There was no degradation identified beyond the protective outer jacket material around any of the affected cables.

The licensee has increased the frequency for cable tunnel inspection predefine 166312-01 to quarterly through service request 48525. In subsequent licensee inspections, additional intrusion or seepage into cable trays and/or onto cables has been identified. IRs were promptly initiated to correct the deficient conditions identified by the inspections. In addition, the licensee has made the necessary cable repairs in a timely manner. The inspectors verified that the licensee's cable repairs and drip pan installations were completed as documented during station walkdowns.

Prioritization and Evaluation of Issues

The inspectors' observations of the Station Ownership Committee (SOC) concluded that for some IRs, additional follow-up activities were assigned that extended the time period for issue disposition within the organization. None of the issues that were assigned the additional follow-up resulted in an inappropriate prioritization based on significance. Examples of SOC action taken were to assign work requests, evaluations, and/or corrective action to specific departmental groups. The inspectors observed the MRC function in an oversight role of the SOC. For example, the MRC changed the SOC recommended action of some issues based on committee dialogue and additional station awareness of the issue. The MRC performed grading of investigative CAP products to provide feedback on product quality to the sponsoring manager.

The IRs that were observed being reviewed by the SOC were also observed being reviewed by the MRC in their oversight role. Both of the committees functioned well to appropriately characterize and prioritize issues in the CAP. The MRC member dialogue in the review of root, apparent, and common causes was informative, and provided feedback to the staff on implementing the CAP. The inspectors concluded that issues were properly prioritized and generally evaluated well.

Effectiveness of Corrective Action

In general, the licensee corrective actions for the samples reviewed were appropriate, and appeared to have been effective. The inspectors determined that the licensee generated IRs when a corrective action was identified which was either inadequate or inappropriate. However, the inspectors developed observations regarding corrective

actions that were not properly supported by the documented basis or narrowly focused. The following paragraphs provide examples of these observations.

Improper Valve Line-up Results in 1A RHRSW Header Leak

The inspectors noted that for the corrective actions for IR 261135, "Improper Valve Line-up Results in 1A RHRSW Header Leak," a number of extensions were proposed with no documented basis. The inspectors subsequently determined that the extensions were appropriate, however, the lack of documentation made the basis for decision making difficult to understand. In addition, the inspectors identified that little documentation existed when one of the corrective actions to prevent recurrence was canceled. The corrective action involved a change to procedure OP-MW-109-101, "Clearance and Tagging." Again the actions were appropriate, however, the lack of documentation made the basis for decision making difficult to discern.

Code Case N-513 Requires Full Circumferential NDE

The inspectors noted that the corrective actions to prevent recurrence, requested by the SOC, for IR 369760, "Code Case N-513 Requires Full Circumferential NDE," were narrowly focused. The licensee considered the issue a human performance circumstance, shared the example with the engineering staff, and focused the corrective action on the misapplication of the particular code case (N-513). The licensee did not provide a more general view of misapplication of NDE codes with the engineering staff.

Battery Room Heater Backup

IR 433852, "Battery Room HVAC Concerns Provided By NRC," identified that portable pan heaters were currently staged in the battery rooms in the event that battery room temperature approaches the 65 degree F limit. The station had not yet employed the use of these portable pan heaters to control battery room temperature. The inspectors' review of QCOP 0010-02, "Required Cold Weather Routines," revealed that the station did not consider what would occur from the use of a resistance heater in the potential presence of hydrogen. The licensee generated IR 568479 to clarify QCOP 0010-02.

(3) Finding

Failure to Develop Corrective Action

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for failure to assure that conditions adverse to quality were promptly corrected. Specifically, the inspectors concluded that the licensee failed to develop actions to correct conditions adverse to quality identified during root cause investigation activities for a Unit 1 standby liquid control tank leak identified in October 2006.

Background: On October 12, 2006, Quad Cities Station staff identified a small leak in the Unit 1 standby liquid control (SLC) tank which resulted in both SLC trains being declared inoperable. Quad Cities requested enforcement discretion for this issue which was verbally granted by the NRC on October 13, 2006, and a formal Notice of

Enforcement Discretion (NOED) was issued on October 18, 2006. The leak was repaired by October 15, 2006. During the discussions for the NOED, Quad Cities staff noted that potential indications of the leak had been identified in 2004, but the indications were not recognized as a leak through an American Society of Mechanical Engineers (ASME) Code Class 2 boundary until October 2006. The licensee conducted a root cause investigation of this issue.

Description: The inspectors reviewed root cause investigation report 543422-05, "Standby Liquid Control Unit 1 Declared Inoperable Due to Through Wall Leak," dated November 20, 2006, to determine if the licensee fully evaluated and corrected the causes which led to the inoperability of the Unit 1 SLC tank for approximately 2.5 years. The primary scope of this root cause investigation focused on the programmatic and technical issues related to the origin of the SLC tank leak identified in IR 543422 initiated in October 2006. The scope of the investigation also included IR 224131, "Boron Crystals Forming Near Unit 1 SLC Tank Base Support," initiated in May 2004, and a determination of what programmatic reviews could have identified this condition earlier including why these reviews failed.

The licensee concluded that the programmatic root cause for the incorrect operability determination of the Unit 1 SLC tank leak was an incomplete application of technical rigor resulting in incorrect assumptions regarding the ASME code applicability to the Unit 1 SLC tank. These incorrect assumptions were not adequately challenged during the condition identification and review process. The licensee also concluded that the technical root cause of the Unit 1 SLC tank leak was the grout material used during original installation of the SLC tank supports contained leachable halogens, that when wetted, allowed stress corrosion cracking to develop at the grout/tank interface.

The root cause investigation report was "approved as amended" at PORC meeting 06-33 on December 1, 2006. The inspectors' review of root cause investigation report 543422-05 was completed after PORC approval, and also after an Exelon corporate challenge had been held. The inspectors concluded that the licensee did not fully evaluate several conditions adverse to quality that were identified during the investigation. The licensee's decision to not fully evaluate these conditions resulted in the failure to develop appropriate corrective actions. The identified conditions were as follows:

Fundamental Practice of Not Validating Assumptions

Although the root cause team considered this as part of technical rigor, the team failed to evaluate and develop corrective actions for the behaviors that led to failure to validate the assumption that the tank was not a code component during the prompt operability process. The validation of assumptions during the prompt operability process is critical to ensuring continued plant safety and the effectiveness of the corrective action program.

Shift Manager Inappropriate Action

The investigation focused on the shift manager who inappropriately declared the SLC tank operable in May 2004 rather than evaluating the implementation of the prompt operability process by all shift managers. As such, the licensee did not fully determine the extent of condition of inappropriate operability determinations using the prompt operability process. Because the licensee did not fully analyze the implementation of this process by the end users (the shift managers), the licensee was unable to identify and correct potential problems in this area.

Shift Manager Recommendation Results in "C" Priority Work

The root cause investigation report identified that the shift manager recommended additional NDE to be performed during the next work week as part of his May 2004 operability review of IR 224131. The root cause investigation report also identified that the NDE related work order was still in planning as of October 2006. However, no evaluation was provided as to whether the decision to not perform the work requested by the shift manager was appropriate. In addition, there was no evaluation regarding the process used in determining that the work recommended by the shift manager was not needed.

System Engineer Decision After Communicating With Dresden Peer

During conversations on October 11, 2006, the Dresden system engineer discussed with the Quad Cities system engineer that the SLC tank may be an ASME Class 2 system boundary. The fact that the SLC tank leakage compromised an ASME Code Class 2 boundary was not identified by the Quad Cities system engineer until the following day, October 12, 2006. The root cause investigation developed a time line of events that described the communications that occurred between the Quad Cities and Dresden system engineers. The inspectors discussed with the Quad Cities engineer the information that was exchanged and the reasons for not pursuing any action the night it was provided. The Quad Cities system engineer provided two reasons for not pursuing the code related information. First, he believed that the SLC system would have performed its function during an ATWS event. Second, he believed that there was a very low probability that the Dresden system engineer was correct regarding the fact that the SLC tank was a code component. The root cause investigation did not evaluate the system engineer's decision to determine whether or not it was appropriate.

Chapter 16 of the licensee's Quality Assurance Topical Report defined conditions adverse to quality as failures, malfunctions, adverse trends, deficiencies, deviations, defective material, design errors, equipment, and nonconformance to specified requirements. Based upon the examples provided in the licensee's Topical Report, the inspectors concluded that the deficiencies in the root cause evaluation process discussed above constituted a failure to properly evaluate and resolve identified deficiencies. This issue was determined to be a performance deficiency.

Analysis: The inspectors concluded that the performance deficiency was more than minor because if left uncorrected, future conditions adverse to quality would not be fully evaluated or corrected. The inspectors reviewed Appendix B to Inspection Manual Chapter 0612 and determined that this finding was required to be evaluated by the Significance Determination Process due to its impact on the Mitigating Systems Cornerstone objective of ensuring the operability, availability, reliability, or function of a system that responds to initiating events to prevent undesirable consequences. The inspectors assessed the significance of this finding as very low safety significance (Green) because the finding did not represent an actual loss of safety function of the SLC tank. This finding had a cross-cutting aspect in the area of problem identification and resolution because the licensee failed to thoroughly evaluate conditions identified during its root cause investigation for the SLC tank leakage which resulted in the failure to develop appropriate corrective actions.

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," states, in part, measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, the licensee failed to promptly correct several deficiencies identified in root cause investigation report 543422-05. Because this failure to comply with 10 CFR Part 50, Appendix B, Criterion XVI, is of very low safety significance and has been entered into the licensee's corrective action program as IR 569581, this violation is being treated as an NCV, consistent with Section VI.A of the Enforcement Policy (**NCV 05000254/2006017-01; 05000265/2006017-01**). Corrective actions for this NCV include licensee review of the NRC issues and the root cause investigation report, and a determination as to whether to revise the root cause investigation. The licensee subsequently prepared a supplement to the root cause investigation report. In addition, the corrective action program will review this NCV for lessons learned.

b. Assessment of the Use of Operating Experience

(1) Inspection Scope

The inspectors reviewed the licensee's program for handling operating experience (OPEX). Specifically, the inspectors reviewed the implementing procedure, attended corrective action program meetings to observe the use of OPEX, reviewed OPEX evaluated by the station and reviewed selected 2006 monthly assessments of the OPEX composite performance indicators.

The inspectors conducted a NRC OPEX search on EHC events resulting in the collection and review of IE Circular No. 77-06, "Effects of Hydraulic Fluid on Electrical Cables," licensee event reports, inspection report findings and international incident reports. In addition, vendor information was used to support the review of station IRs.

(2) Assessment

No findings of significance were identified.

In general, OPEX information was being well utilized at the station. The inspectors observed that Exelon fleet internal and industry OPEX on several occasions was discussed by SOC and MRC members to support review activities and corrective action program investigations. During licensee staff interviews, the inspectors identified that the use OPEX was being consider during daily activities.

The licensee performed Nuclear Oversight (NOS) Audit NOSA-QDC-05-01 of the CAP in May 2005. The audit was performed to meet the audit requirements of 10 CFR Part 50, Appendix B, and the Exelon/AmerGen Quality Assurance Topical Report. The audit team incorporated industry OPEX by reviewing issues that have been recently identified as a result of NRC problem identification and resolution inspections. In addition, fleet-wide issues identified by audits at other Exelon sites (i.e., lessons learned OPEX), resulted in five common deficiencies and five common enhancements being identified during this audit.

However, the inspectors developed observations regarding some OPEX that was not reviewed or properly screened for applicability. The following paragraphs provide examples of these observations.

IE Circular No. 77-06, "Effects of Hydraulic Fluid on Electrical Cables"

The NRC Office of Inspection and Enforcement document, IE Circular No. 77-06, "Effects of Hydraulic Fluid on Electrical Cables," issued in April 1977, advised licensees of the potential affects of EHC Fluid when in contact with specific types of insulated electrical cables. The IE Circular stemmed from detailed correspondence from the licensee to the NRC in April 1976 in response to NRC Inspection Report No. 050-265/76-04. The report described in detail the migration of EHC fluid to the Unit 2 Cable Tunnel and onto electrical cables that were located within the cable trays. The report also described actual degradation of nuclear instrumentation cables and the resultant cable splice repairs. The EHC fluid manufacturers that were consulted stated that cables jacketed with Polyvinylchloride (PVC) were severely affected by EHC fluid. Therefore, such cables were not recommended for use around EHC fluid. If the station staff would have conducted a review of this IE Circular in 2002, the station would have gained a valuable historical perspective from their own OPEX information. This would have supported a more informed recognition and response to EHC fluid intrusion events.

Corrective Action Program Investigation OPEX Applicability

The inspectors reviewed the use of OPEX in root cause investigation report 543422-05, "Standby Liquid Control Unit 1 Declared Inoperable Due to Through Wall Leak." There were two NRC findings reported during 2005 that were discounted as being applicable during the root cause investigation. The first was the misapplication of an ASME code case in evaluating a RHRSW pump through wall piping leak. This was discounted because the event involved ASME Class 3 piping instead of ASME Class 2. The second was the failure to document assumptions and engineering judgment as part of an operability evaluation. This was discounted because the event documented a deficiency that occurred on an operability evaluation rather than a prompt operability decision. The

decisions made to discount the NRC 2005 findings were narrowly focused, and resulted in the failure to evaluate station OPEX to identify barriers that could impact prompt operability decisions.

c. Assessment of Self-Assessments and Audits

(1) Inspection Scope

The inspectors reviewed selected focused area self-assessments (FASA), check-in self-assessments and NOS audits of the corrective action program, engineering design control, maintenance and engineering programs. The inspectors evaluated whether these audits were being effectively managed, were adequately covering the subject areas, and were properly capturing identified issues in the CAP. In addition, the inspectors also interviewed licensee staff regarding the implementation of the audit and self-assessment programs.

(2) Assessment

No findings of significance were identified.

The inspectors concluded that the self-assessments and NOS audits were generally critical and probing. Outside resources were utilized, when appropriate, to gain an independent perspective and to include non-site OPEX in the process review. There were a number of deficiencies, recommendations and strengths identified across the spectrum of performance, including issues of improper CAP implementation. As appropriate, the self-assessment and NOS audit deficiencies were documented in the CAP.

The licensee performed Check-In Self-Assessment 328946, "Corrective Action Closure Review," in May 2006. The self-assessment conducted a review of 33 corrective actions (CA) out of a total of 343 CAs that were completed in October or November 2005. The CAs were reviewed using the criteria of LS-AA-125, "Corrective Action Program Procedure," Revision 9. The self-assessment determined if the assignment was adequately written, if the response would stand alone, and if the closure guidance was met. Seven CAs were considered to have inadequate closure. These inadequate closures involved four departments. The self-assessment documented the CA deficiencies in the CAP through IR 491685.

The licensee performed Check-In Self-Assessment 445362-03, "Operator Workaround Program," in February 2006. Over the past 3 years, the Quad Cities station had the highest average number of operator workarounds (OWAs) Exelon fleet-wide. The station implemented various strategies to improve OWA closure. In June 2003, the expectation was established that IRs would be initiated any time an OWA or operator challenge (OC) schedule milestone date was extended or not met. The number of IRs written for extended or missed milestone dates were 18 in 2003, 14 in 2004 and 5 in 2005. The self-assessment concluded that the data showed there had been a significant increase in accountability for meeting scheduled commitment dates of OWAs and OCs.

d. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

The inspectors interviewed the Quad Cities station staff to determine if there were any impediments to the establishment of a safety conscious work environment. In addition, the inspectors discussed the implementation of the Employee Concerns Program (ECP) with the ECP Coordinators. Licensee programs to publicize the CAP and ECP programs were also reviewed. In addition, FASA 513091 conducted on the corrective action program in October 2006, was reviewed for ECP issues.

(2) Assessment

No findings of significance were identified.

The inspectors determined that the conditions at the Quad Cities station were conducive to identifying issues. The staff was aware of and generally familiar with the CAP and other station processes, including the ECP, through which concerns could be raised. Staff interviews identified that issues can be freely communicated to supervision, and that several of the individuals interviewed had previously initiated IRs. In addition, a review of the types of issues in the ECP indicated that site personnel were appropriately using the corrective action and employee concerns programs to identify issues. The inspectors interviewed the ECP Coordinators, and concluded that the individuals were focused on ensuring all site individuals were aware of the program, comprehensive in their review of individual concerns, and used the corrective action and employee concerns programs to appropriately resolve issues.

The corrective action program FASA, 513091, identified an ECP deficiency. The specific deficiency was that the communication of the ECP needs to be refreshed, particularly among new engineers. The licensee generated IR 545057 to document this deficiency. The staff identified that previously, a signature line existed on the station's orientation checklist for all newly hired employees to meet with an ECP representative to discuss the program. However, the station adopted a corporate generated orientation procedure which eliminated the ECP signature line item. In November 2006, HR-AA-4000, "Employees Entering Or Transferring Within Nuclear Stations," was revised to include a signature line on the employee checklist for the new hire to meet with an ECP representative. Along with this corrective action, the ECP coordinators are conducting face-to-face meetings with new hires, new informational posters have been generated and displayed, ECP coordinators are conducting group communications through tailgate meetings, and have also scheduled a tailgate meeting with the new employees in the engineering department.

4OA6 Management Meetings

Exit Meeting Summary

The inspectors presented the inspection results to Mr. Gideon and other members of the staff at an exit meeting on December 15, 2006. Mr. Gideon acknowledged the finding presented, and indicated that no proprietary information was provided to the inspectors.

ATTACHMENT: SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Alguire, Design Engineering Supervisor
D. Barker, Work Management Director
W. Beck, Regulatory Assurance Manager
D. Boyles, Operations Support Manager
M. Bridges, Site Engineering
D. Craddick, Maintenance Director
T. Fuhs, Regulatory Assurance
J. Gentz, Nuclear Oversight
R. Gideon, Plant Manager
D. Kallenbach, Radiation Protection
G. Kimmel, System Engineer
D. Moore, Nuclear Oversight Manager
K. Moser, Site Engineering Director
V. Neels, Chemistry Manager
J. O'Neil, CAP Manger
T. Petersen, Regulatory Assurance
K. Snowden, Engineering CAPCO
B. Stedman, Plant Engineering Supervisor
B. Svaleson, Operations Manager
D. Tubbs, MidAmerican Energy
T. Wojcik, Engineering/Programs Supervisor

Nuclear Regulatory Commission

M. Ring, Chief, Branch 1, Division of Reactor Projects

Illinois Emergency Management Agency

R. Ganser, IEMA Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Items Opened

05000254/2006017-01 NCV Failure to Develop Corrective Actions
05000265/2006017-01

Items Closed

05000254/2006017-01 NCV Failure to Develop Corrective Actions
05000265/2006017-01

Items Discussed

None

LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection. Inclusion of a document on this list does not imply that NRC inspectors reviewed the entire document, but, rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. In addition, inclusion of a document on this list does not imply NRC acceptance of the document, unless specifically stated in the body of the inspection report.

Issue Reports Related to NRC Findings

247298; Error Discovered in Safety Relief Valve Discharge Flange Calculation; August 25, 2004
261135; Improper Valve Line-up Results in an 1A RHRSW Header Leak; October 7, 2004
215874; Target Rock Safety Relief Valve As Found Lift Pressure High; April 19, 2004
240494; Out of Tolerance 1-263-111A, 1-263-111C, Trend Code B2; July 30, 2004
261523; Entered Surveillance Requirement 3.0.3 for Missed Control Room Emergency Ventilation Technical Specification Surveillance Requirement 3.7.4.4; October 8, 2004
238434; Quad Cities Main Steam Safety Valve Tolerance Parallel Dresden Activities; July 23, 2004
223815; Potential to Drain the Torus on a Failure of the Reactor Core Isolation Cooling System Line; May 26, 2004
287242; Incorrect Sampling of Interim Spent Fuel Storage Concrete Pad; December 21, 2004
287245; Interim Spent Fuel Storage Area Signature Concerns; December 21, 2004
210347; Insulation Sample Taken Without Radiation Protection Group's Knowledge; May 23, 2004
311612; NRC Concerns Related to Operational Determination - Operational Decision Making Process; March 11, 2005
304538; Incorrect Application of "Available" to Abnormal Lineup; February 23, 2005
345003; Revision Needed for Parker Hannifin Operability Evaluation for Issue Report 328851; June 17, 2005
348206; Extent of Condition Not Addressed for Issue Report 328437; June 28, 2005
339884; Final Drywell Closeout Deficiencies During Q1M18; May 31, 2005
317820; Plant Startup Issue Bus 18 480 Volt Feed Breaker Trip; March 27, 2005
321351; 3 Main Steam Safety Valves in Q1R18 Test Outside of Technical Specifications, Inside of Code Tolerance; April 5, 2005
369760; Code Case -513 Requires Full Circumferential Non-Destructive Evaluation; August 31, 2005
275607; MO 1-1001-26A Would Not Open During QCOS 1000-09; November 22, 2004
315350; MO 2-1001-26B Inboard Drywell Spray Isolation Valve Will Not Close; March 21, 2005
297548; 4160 Volt Metering Current Transformer Single Failure Vulnerability; February 3, 2005
448773; Organizational Issues and Behaviors for Extended Power Uprate Need Review; February 1, 2006
437638; 2-0203-3D Electromatic Relief Valve Inspection; December 30, 2005
440773; Unit 1 3D Electromatic Relief Valve Actuator Shows Tilt Pivot Plate Bolt Wear; January 10, 2006
451822; Management Decision on Plant Walkdowns Needs Review; January 14, 2006
435858; Unit 2 ERV Declared Inoperable; December 21, 2005
502702; NRC Inspection Finding Concerning Appendix R Redundant Trains; May 12, 2006
485702; Required Safe Shutdown Analysis Not Contained in QCARP 0030-01; May 1, 2006
489175; Quality of Fire Preplans; May 10, 2006

489160; Justification of Fire Hose Pressure and Flow Meeting NFPA; May 10, 2006
489426; Class A Fire Extinguisher Placement Improvements; May 11, 2006
482166; RHRSW Vault Sump Discharge Check Valve Failed to Seat; April 22, 2006
438650; 1B Core Spray Pump Breaker Tripped Immediately When Starting; January 4, 2006
456929; Unit 1 Reactor Scram on load Reject; February 22, 2006

EHC Fluid Intrusion Documents

Issue Reports:

102044; EHC oil in the Unit 2 Cable Tunnel; April 2, 2002
122749; Oil leaking into Unit 2 Cable Tunnel cable trays; September 13, 2002
139980; EHC oil leaks dripping through ceiling to 595' level; January 17, 2003
268086; Potential EHC Leak Extent of Condition; October 28, 2004
270005; Residual Oil From EHC Leaks in Trays of Unit 2 Cable Tunnel; November 3, 2004
269868; Unit 2 Extent of Condition – Follow up to CR 268086; November 3, 2004
277328; EHC leak degrading cables; November 29, 2004
281051; Oily fluid in Electrical Junction Boxes on Panel 2251-14B; December 9, 2004
282427; Cable tray K1046 Repair cables damaged by EHC; December 14, 2004
290211; Predefine 166312-01 deferred due to lack of resources; January 12, 2005
300125; Additional EHC oil found during walk down of Unit 2 Cable Tunnel; February 10, 2005
302071; Drip pans at ceiling cracks/joints needed for EHC oil leaks; February 16, 2005
302218; Install drip pans – Unit 2 Cable Tunnel for EHC fluid leaks; February 16, 2005
314459; Failed Cable Tunnel inspection of cables PMID 166312-01; March 18, 2005
342796; Repair cracks in ceiling of Unit 2 Cable Tunnel to stop EHC oil; June 10, 2005
381824; Flex conduit routing subjects it to wetting with EHC fluid; October 4, 2005
478809; Cables in Unit 2 Cable Tunnel with EHC oil damage not repaired; April 14, 2006
491593; New oil leakage into cable tray of Unit 2 Cable Tunnel; May 19, 2006
493063; EHC Leak at Control Valve #1; May 24, 2006
564373; EHC fluid and other deficiencies observed in Unit 2 Cable Tunnel; December 1, 2006

Supporting Information:

Material Safety Data Sheet to ISO/DIS 11014 Rev. 1; (MSDS for Trade Name "FYRQUEL")
manufactured by Supresta, Ardsley, NY; December 29, 2005
EPRI Document, 1011823; Electro-hydraulic Control Fluid and Elastomer Compatibility Guide;
December 2005
EC 352773; Evaluation of Cable Jackets exposed to EHC fluid; December 10, 2004
EC 360207; Document Engineering Position on Dried EHC Oil Residue on Cables; April 3, 2006
EC 352224; Drip Pans for Leaking EHC Oil Into Cable Trays Reference RP-AA-502;
November 9, 2004
Work Order 529436; Inspect Cable Tunnel Trays for oil; January 9, 2003
Work Order 536234; Inspect Cable Tunnel Trays for oil; January 8, 2004
Work Order 654752; Inspect Cable Tunnel Trays for oil; November 1, 2004
Work Order 753275; Inspect Cable Tunnel Trays for oil; March 18, 2005
Work Order 782953, Task 02; ES Inspect Cables in cable pan after cleaned and repaired;
December 13, 2006

OPEX Search:

Conducted NRC OPEX search on EHC events resulting in the collection and review of IE Circular No. 77-06 entitled, "Effects of Hydraulic Fluid on Electrical Cables," licensee event reports, inspection report findings and international incident reports.

Procedures

EI-AA-1; Employee Issues; Revision 1
EI-AA-101; Employee Concerns Program; Revision 6
EI-AA-100-1003; Employee Issues Advisory Committee Notification; Revision 0
EI-AA-101-1001; Employee Concerns Program Process; Revision 4
EI-AA-101-1002; Employee Concerns Program Trending Tool; Revision 3
LS-AA-115; Operating Experience; Revision 9
LS-AA-120, Issue Identification and Screening Process, Revision 6
LS-AA-125, Corrective Action Program Procedure, Revision 10
LS-AA-125-1001; Root Cause; Revision 5
LS-AA-125-1002; Common Cause; Revision 4
LS-AA-125-1003; Apparent Cause; Revision 6
LS-AA-125-1004; Effectiveness Review; Revision 2
LS-AA-126; Self-Assessment Program; Revision 5
LS-AA-126-1001; Focused Area Self-Assessments; Revision 4
MA-AA-716-040, "Control of Portable Measurement and Test Equipment Program," Revision 3
OP-AA-201-006, "Control of Temporary Heat sources," Revision 3
QCOP 0010-02, "Required Cold Weather Routines," Revision 22
QCOP 3900-06, "Flushing Heat Exchanger Temperature Control Valve Bypass Lines,"
Revision 0
OP-AA-108-115; Operability Determinations; Revision 0
OP-AA-106-101-1006; Operational and Technical Decision Making Process; Revision 3
LS-AA-110; Commitment Management; Revision 4
QCOP 1000-31; RHR Service Water Venting; Revision 12
HU-AA-1101; Change Management; Revision 1
CC-MW-101; Engineering Change Requests; Revision 0
LS-AA-125-1005; Coding and Analysis Manual; Revision 5
WC-AA-101; On-Line Work Control Process; Revision 13
TIC 1583; QCGP 2-1 - Normal Unit Shutdown; dated October 12, 2006
OU-AA-101-1005; Exelon Nuclear Outage Scheduling; Revision 2

Issue Reports

561089; Lost M&TE Not Verified; November 22, 2006
388756; UT Exam For 2006 Raw Water Piping Program; October 21, 2005
287183; M&TE Out of Tolerance Identified; January 3, 2005
309858; M&TE Out of Tolerance Identified; March 7, 2005
364701; M&TE Out of Tolerance Identified; August 19, 2005
450440; Lost M&TE; February 6, 2006
508553; Lost M&TE; July 12, 2006
556136; M&TE Out of Tolerance Identified; November 10, 2006
277260; Hydrometer Tube (FME) Found in Cell #87 of 250VDC Battery; November 29, 2004

346534; Retrieve FME In New Spare Battery Cell; June 22, 2005
508747; FME In Battery #1 Cell #53; July 12, 2006
538218; FME in 2A1 24/48 V Battery Cell #10; September 29, 2006
301534; Need WR To Replace U2 Battery Room HVAC Heaters; February 15, 2005
314083; Battery Room Heater Un-Timely Corrective Actions; March 17, 2005
365936; EC For Battery HVAC Heater Mod Inadequate; August 23, 2005
366250; U-1 Battery Room Heaters Not Drawing Proper AMPS; August 24, 2005
366296; U-2 Battery Room Heaters Not Drawing Proper AMPS; August 24, 2005
372532; U2 Battery Room HVAC Unit Is Dripping Water Onto Floors; September 12, 2005
373609; U1 SBO Battery Room Thermostat Not Set Correctly; September 14, 2005
373614; U2 SBO Battery Room Thermostat Set Incorrectly; September 14, 2005
430589; NRC Identified Concerns With Battery Room Ventilation; December 5, 2005
433852; Battery Room HVAC Concerns Provided By NRC; December 14, 2005
440946; Summary Of NRC Questions On Battery Room Temperatures; January 11, 2006
455559; Battery Room HVAC Inadequate; February 18, 2006
506151; U-1 And U-2 250 VDC Battery Rooms Are Too Hot; July 3, 2006
514664; Elevated Room Temperature In The U-2 Battery Room; July 30, 2006
327137; Relay Chatter At Low Power During S/U And S/D; April 21, 2005
345374; Relay Chatter During Unit Start Up; June 19, 2005
345372; Relay Chatter During Unit Start Up; June 19, 2005
453580; RPS Relay Chatter; February 14, 2006
464325; Relay Chatter During Startup And Shutdown; March 9, 2006
481012; Relay Chatter During Power Increase; April 20, 2006
381666; MA-QC-736-100 Incorrect Fire Diesel Day Tank Capacity; October 4, 2005
359788; ½-5205-A Diesel Fire Pump Day Tank Level Is Not Accurate; August 3, 2005
445504; FP Day Tank Fill Level Indicator Reading Incorrect; January 24, 2006
539135; B Fire Diesel Day Tank Lit Reads Hi Out of Band; October 2, 2006

Root, Apparent and Common Cause Reports

Root Cause Investigation Report 543422-05; Standby Liquid Control Unit 1 Declared Inoperable Due to Through Wall Leak; November 20, 2006
Root Cause Investigation Report 345152; EHC Malfunction Causes Reactor Pressure Excursion and resultant SCRAM; July 25, 2005
Root Cause Investigation Report 456929-04; Unit 1 Main Generator Trip and Reactor SCRAM on Differential Overcurrent Trip Due to Degraded Main Power Transformer CT Wiring; March 30, 2006
Root Cause Investigation Report 438650; 1B Core Spray Pump Breaker Failed to Close After Start Attempt; June 6, 2006
Apparent Cause Report 506315; Received A Channel ½ Scram From APRM 3 Failing Upscale; (prior to MRC review)
Common Cause Analysis 512702-02; 2006 Quad Cities Human Performance Events; January 1 - July 31, 2006

Self-Assessments and NOS Audits

Check-In Self-Assessment 499858-04; Maintenance Human Performance Review; September 25, 2006
Check-In Self-Assessment 445362-03; Operator Workaround Program; February 6, 2006

Check-In Self-Assessment 328946; Corrective Action Closure Review; May 19, 2006
Focused Area Self-Assessment 513091; Problem Identification and Resolution;
October 27, 2006
Focused Area Self-Assessment 489422; Quad Cities Human Reliability Analysis; July 31, 2006
Nuclear Oversight Audit NOSA-QDC-05-01; Corrective Action Program; May 18, 2005
Nuclear Oversight Audit NOSA-QDC-05-05; Engineering Design Control; August 31, 2005
Nuclear Oversight Audit NOSA-QDC-06-01; Maintenance; February 22, 2006
Nuclear Oversight Audit NOSA-QDC-06-05; Engineering Programs; July 11, 2006

Issue Reports generated for the inspection included:

568435; HPCI Room Cooler Strainer Drain Valve Packing Leak; December 12, 2006
568479; P&IR NRC Identified Procedure Clarification Needed; December 12, 2006
568886; Addition to Exelon Issues Resolution Programs Tri-fold; December 13, 2006
569581; Issues With SBLC Root Cause; December 14, 2006

Other

Exelon Nuclear's Learning Programs Report (February 2006) - Corrective Action Process and OPEX composite performance indicators
Exelon Nuclear's Learning Programs Report (March 2006) - Corrective Action Process and OPEX composite performance indicators
Exelon Nuclear's Learning Programs Report (April 2006) - Corrective Action Process and OPEX composite performance indicators
Exelon Nuclear's Learning Programs Report (August 2006) - Corrective Action Process and OPEX composite performance indicators
Exide Vendor Information on Battery Room Standards and Ventilation
Lisega Installation Procedure on Series 30 Hydraulic Snubbers
EC 378388; Lost M&TE Not Verified; December 11, 2006
Exelon Power Labs Calibration of Torque Wrench 2688649 completed March 7, 2006
PORC Meeting 06-33 Minutes
Quick Human Performance Investigation Report 562706; Minor Adjustment Made to the Unit 1 Refuel Platform Without a Work Order; Event Date: November 27, 2006
Measurement and Test Equipment Evaluation 04-0159; December 22, 2004
Measurement and Test Equipment Evaluation 05-0040; February 25, 2005
Measurement and Test Equipment Evaluation 05-0098; August 18, 2005
Measurement and Test Equipment Evaluation 06-0119; February 6, 2006
Measurement and Test Equipment Evaluation 06-0068; July 8, 2006
Measurement and Test Equipment Evaluation 06-0112; November 8, 2006

LIST OF ACRONYMS

ACE	Apparent Cause Evaluation
CCA	Common Cause Evaluation
DP	Differential Pressure
EPRI	Electric Power Research Institute
FME	Foreign Material Exclusion
HVAC	Heating, Ventilation, and Air Conditioning
NCV	Non-Cited Violation
OE	Operating Experience
RCR	Root Cause Report
SBGT	Standby Gas Treatment
SRV	Safety Relief Valve
SSD	Safe Shutdown
TRM	Technical Requirements Manual
UFSAR	Updated Final Safety Analysis Report