

July 31, 2006

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 TRIENNIAL FIRE PROTECTION BASELINE INSPECTION  
INSPECTION REPORT 05000254/2006002(DRS); 05000265/2006002(DRS)

Dear Mr. Crane:

On May 12, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed a triennial fire protection baseline inspection at your Quad Cities Nuclear Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed at the end of the on-site activities on May 12, 2006, and during a re-exit meeting held by telephone at the conclusion of the inspection on June 29, 2006, with Mr. T. Tulon and other members of your staff.

The inspection examined activities conducted under your license, as they relate to safety and to compliance with the Commission's rules and regulations, and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, six NRC-identified findings of very low safety significance, all of which involved violations of NRC requirements were identified. However, because these violations were of very low safety significance, and because the findings were entered into the licensee's corrective action program, the NRC is treating these findings as Non-Cited Violations in accordance with Section VI.A.1 of the NRC's Enforcement Policy. Additionally, two licensee identified violations are listed in Section 4OA7 of this report.

If you contest the subject or severity of a Non-Cited Violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, U. S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Quad Cities Nuclear Power Station facility.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any), 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/

Julio F. Lara, Chief  
Engineering Branch 3  
Division of Reactor Safety

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

Enclosure: Inspection Report 05000254/2006002(DRS); 05000265/2006002(DRS)  
w/Attachment: Supplemental Information

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  
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Assistant Attorney General  
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State Liaison Officer, State of Illinois  
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Chairman, Illinois Commerce Commission  
D. Tubbs, Manager of Nuclear  
MidAmerican Energy Company

C. Crane

-2-

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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: 05000254/2006002(DRS); 05000265/2006002(DRS)

Licensee: Exelon Generation Company, LLC

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

Location: Cordova, IL

Dates: April 24, 2006 through May 12, 2006

Inspectors: G. Hausman, Senior Reactor Inspector, Lead  
A. Dahbur, Reactor Inspector  
D. Schrum, Reactor Inspector

Approved by: Julio F. Lara, Chief  
Engineering Branch 3  
Division of Reactor Safety

Enclosure

## TABLE OF CONTENTS

SUMMARY OF FINDINGS .....	1
REPORT DETAILS .....	4
1. REACTOR SAFETY .....	4
1R05 <u>Fire Protection (71111.05T)</u> .....	4
.1 <u>Systems Required to Achieve and Maintain Post-Fire SSD</u> .....	4
a. <u>Inspection Scope</u> .....	5
b. <u>Findings</u> .....	5
b.1 <u>Safe Shutdown Makeup Pump</u> .....	5
b.2 <u>RHR Service Water Cross-tie</u> .....	8
.2 <u>Fire Protection of SSD Capability</u> .....	11
.3 <u>Post-Fire SSD Circuit Analysis</u> .....	11
.4 <u>Alternative SSD Capability</u> .....	12
.5 <u>Operational Implementation of SSD Capability</u> .....	13
a. <u>Inspection Scope</u> .....	13
b. <u>Findings</u> .....	13
b.1 <u>Fuse Repair</u> .....	13
.6 <u>Communications</u> .....	15
.7 <u>Emergency Lighting</u> .....	15
.8 <u>Cold Shutdown Repairs</u> .....	16
.9 <u>Fire Barriers and Fire Zone/Room Penetration Seals</u> .....	16
.10 <u>Fire Protection Systems, Features, and Equipment</u> .....	18
a. <u>Inspection Scope</u> .....	18
b. <u>Findings</u> .....	18
b.1 <u>Fire Pre-Plans</u> .....	18
b.2 <u>Standpipes with Hose Connections</u> .....	20
b.3 <u>Class A Fire Extinguishers</u> .....	22
.11 <u>Compensatory Measures</u> .....	26
4. OTHER ACTIVITIES .....	26
4OA5 <u>Other Activities</u> .....	26
4OA6 <u>Meetings</u> .....	27
4OA7 <u>Licensee-Identified Violations</u> .....	27
.1 <u>Appendix R SSD Battery Loads</u> .....	27
.2 <u>Post-Fire Operator Manual Actions</u> .....	28
SUPPLEMENTAL INFORMATION .....	A-1
KEY POINTS OF CONTACT .....	A-1
LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED .....	A-2
LIST OF DOCUMENTS REVIEWED .....	A-3
LIST OF ACRONYMS USED .....	A-7

## SUMMARY OF FINDINGS

IR 05000254/2006002(DRS), 05000265/2006002(DRS); 04/24/06 - 05/12/06; Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2; Triennial Fire Protection Baseline Inspection.

This report covers an announced triennial fire protection baseline inspection. The inspection was conducted by Region III inspectors. Based on the results of this inspection, six Green findings associated with six non-cited violations were identified. 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.

### **A. Inspector-Identified and Self-Revealed Findings**

#### **Cornerstone: Mitigating Systems**

- Green. The inspectors identified a Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix R, Section III.G.2, having very low safety significance (Green) involving the licensee's failure to ensure, in the event of a severe fire, that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage. Specifically, the licensee failed to ensure, in the event of a fire in any of the III.G.2 fire areas, that one redundant train of reactor coolant inventory makeup water remained free of fire damage. Instead the licensee credited the dedicated safe shutdown makeup pump (SSMP) for reactor coolant inventory makeup water in the III.G.2 fire areas. This finding was entered into the licensee's corrective action program as Issue Report (IR) 00502702, "NRC Inspection Finding Concerning App R Redundant Trains," dated June 22, 2006. The licensee plan to review the options for resolving this issue, and pursue the appropriate resolution.

The finding was more than minor because this failure could have affected the mitigating systems cornerstone objective and safe shutdown (SSD). Specifically, the licensee failed to ensure one redundant train of reactor coolant inventory makeup water was available, and instead relied on an alternate shutdown system without an analyses and procedures that demonstrated full compliance with all of the requirements of 10 CFR Part 50, Appendix R, Section III.G.3, and Section III.L, or requesting prior NRC approval. The finding was not suitable for SDP evaluation, but has been reviewed by NRC management and was determined to be a finding of very low safety significance. (Section 1R05.1b.1)

- Green. The inspectors identified a NCV of 10 CFR Part 50, Appendix R, Section III.G.2, having very low safety significance (Green) involving the licensee failure to ensure, in the event of a severe fire, that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage. Specifically, the licensee failed to ensure, in the event of a fire in Fire Areas TB-III, 13-1 or 24-1, that one redundant train of residual heat removal service water (RHRSW) remained free of fire damage. Instead the opposite unit's RHRSW train was cross-tied (i.e., an alternative SSD activity) and credited for torus cooling during hot shutdown for a III.G.2 fire area.

In addition, the licensee failed to have an analyses and procedures that demonstrated full compliance with all of the requirements of 10 CFR Part 50, Appendix R, Section III.G.3, and Section III.L. This finding was entered into the licensee's corrective action program as IR 00502702, "NRC Inspection Finding Concerning Appendix R Redundant Trains," dated June 22, 2006. The licensee plan to review the options for resolving this issue, and pursue the appropriate resolution.

The finding was more than minor because the failure to ensure one redundant train of RHRSW was available for torus cooling for hot shutdown could have affected the mitigating systems cornerstone objective and SSD. The finding was not suitable for SDP evaluation, but has been reviewed by NRC management and was determined to be a finding of very low safety significance. (Section 1R05.1b.2)

- Green. The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," having very low safety significance (Green) involving inadequate procedure steps. Specifically, The licensee failed to provide adequate procedure steps in-accordance with Appendix R requirements for hot shutdown and allowed the replacement (i.e., a repair) of breaker fuses prior to attaining hot shutdown. Specifically, QCNPS's Procedure QOP 6500-10 "Local Control of 4160 and 480 Volt Motor Operated Circuit Breaker," Revision 8, included a hot shutdown repair to replace any circuit breaker's control fuses that were believed to be blown due to a fire-induced failure. This fuse replacement constituted a hot shutdown repair which was not allowed by 10 CFR Part 50, Appendix R. Once identified, the licensee revised procedure QOP 6500-10 and added steps to manually close breakers using a local pushbutton. This finding was entered into the licensee's corrective action program as IR 00485702, "Required SSDA Actions Not Contained in QCARP 0030-01," dated May 2, 2006. The licensee revised procedure QOP 6500-10.

The finding was more than minor because the failure to include adequate procedure steps could have affected the mitigating systems cornerstone objective and SSD. Performing the repair activities could have delayed and/or complicated shutdown of the plant. The finding was of very low safety significance because the licensee could have manually charged the breaker's spring and closed the breaker using the pushbutton located at the breaker. (Section 1R05.5b.1)

- Green. The inspectors identified a NCV of QCNPS's license condition for fire protection, having very low safety significance (Green) involving the lack of complete and accurate information in the QCNPS's fire pre-plans for various plant fire areas. Specifically, the licensee failed to include important information in the fire pre-plans, such as hydrogen and electrical hazards, to assist the fire brigade to fight a fire within those plant fire areas. This finding was entered into the licensee's corrective action program as IR 00489175, "Quality of Fire Preplans (2006 FP Triennial)," dated May 11, 2006.

The finding was more than minor because the failure to provide adequate warnings and guidance related to hydrogen and electrical hazards in the fire pre-plans could have adversely impacted the fire brigade's ability to fight a fire, thereby, increasing the likelihood of a fire which would challenge SSD and could have affected the mitigating systems cornerstone objective. The inspectors determined that this issue also affected the cross-cutting area of Problem Identification and Resolution because the licensee



failed to identify the presence of hydrogen and oxygen hazards in Fire Areas RB-7 and RB-19 during their review as part of the fire pre-plan improvement effort conducted as a result of previously identified corrective action (IR 00221528). The finding was of very low safety significance because of the extensive training provided to the fire brigade members to deal with unexpected contingencies. (Section 1R05.10b.1)

- Green. The inspectors identified a NCV of QCNPS's license condition for fire protection, having very low safety significance (Green) involving adequacy of water pressure and flow rate at standpipes with hose connections. Specifically, the licensee failed to provide calculations to ensure that an adequate water pressure and flow rate were available to meet the QCNPS's FPP requirements. Once identified, the licensee entered the finding into their corrective action program as IR 00489160, "Justification of Fire Hose Pressure and Flow Meeting NFPA," dated May 11, 2006, and planned to perform calculations to verify water flow at all affected standpipes with hose connections.

The finding was more than minor because the failure to provide an adequate water pressure and flow rate at standpipes with hose connections could hamper the fire brigades ability to fight a fire, thereby, increasing the likelihood of a fire which would challenge SSD and could have affected the mitigating systems cornerstone objective. The finding was of very low safety significance because other defense-in-depth fire protection elements remained unaffected in all fire areas. (Section 1R05.10b.2)

- Green. The inspectors identified a NCV of QCNPS's license condition for fire protection, having very low safety significance (Green) involving adequacy of number of Class A fire extinguishers. Specifically, the licensee failed to have an adequate number of Class A fire extinguishers available where significant fire hazards existed to meet the NFPA 10 Code requirements to suppress and/or extinguish Class A fire hazards. This finding was entered into the licensee's corrective action program as IR 00489426, "Class A Fire Extinguisher Placement Improvements," dated May 12, 2006. The licensee planned to evaluate putting more Class A fire extinguishers into the plant.

The finding was more than minor because failure to have an adequate number of Class A fire extinguishers available could potentially escalate a small fire into a larger fire since only standpipes with hose connections were available and their use required a trained fire brigade to extinguish the fire. As a result, non-fire brigade personnel would be prevented from moving quickly to suppress and/or extinguish a small fire and the potential for an escalated fire could have affected the mitigating systems cornerstone objective. The finding was of very low safety significance because most fire areas and zones have fire detectors that would alarm in the control room and the fire brigade would respond to a fire in these areas. In addition, other defense-in-depth fire protection elements remained unaffected and a fire in these areas would not result in a loss of dedicated SSD systems. (Section 1R05.10b.3)

## **B. Licensee-Identified Violations**

Two violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and the licensee's corrective action tracking numbers are listed in Section 4OA7 of this report.

## REPORT DETAILS

### 1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

#### 1R05 Fire Protection (71111.05T)

The purpose of this inspection was to review the QCNPS's Fire Protection Program (FPP) for selected risk-significant fire areas. Emphasis was placed on determining that the post-fire safe shutdown (SSD) capability and the fire protection (FP) features were maintained free of fire damage to ensure that at least one post-fire SSD success path was available. The inspection was performed in accordance with the Nuclear Regulatory Commission's (NRC's) regulatory oversight process using a risk-informed approach for selecting the areas and attributes to be inspected. The inspectors with assistance from a senior reactor analyst used the QCNPS's Individual Plant Examination for External Events (IPEEE) to choose several risk-significant areas for detailed inspection and review. The inspectors' review of the following fire areas and/or zones represented completion of four samples for the triennial FP inspection:

<b>Fire Area</b>	<b>Fire Zone</b>	<b>Description</b>
TB-III	8.2.6.A	Unit 1 Turbine Building Ground Floor (South)
TB-III	8.2.7.A	Unit 1 Turbine Building Mezzanine Floor (South)
13-1	8.2.8.B	Unit 1 4-kV Bus 13-1 Switchgear Area (North)
24-1	8.2.8.C	Unit 2 4-kV Bus 24-1 Switchgear Area (South)

For each of the selected fire areas and/or fire zones, the inspectors focused on the fire protection features, the systems and equipment necessary to achieve and maintain safe shutdown conditions, determination of licensee commitments, changes to the FPP, and evaluated the licensee's FPP against applicable NRC requirements.

#### .1 Systems Required to Achieve and Maintain Post-Fire SSD

Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix R, Section III.G.1, required the licensee to provide FP features that were capable of limiting fire damage to structures, systems, and components (SSCs) important to SSD. The SSCs that were necessary to achieve and maintain post-fire SSD were required to be protected by FP features that were capable of limiting fire damage to the SSCs so that:

- one train of systems necessary to achieve and maintain hot shutdown conditions from either the CR or emergency control station(s) was free of fire damage; and
- systems necessary to achieve and maintain cold shutdown from either the CR or emergency control station(s) could be repaired within 72-hours.

Specific design features for ensuring this capability were specified by 10 CFR Part 50, Appendix R, Section III.G.2.

a. Inspection Scope

The inspectors reviewed the plant systems required to achieve and maintain post-fire SSD to determine if the licensee had properly identified the components and systems necessary to achieve and maintain SSD conditions for each fire zone selected for review. Specifically, the review was performed to determine the adequacy of the systems selected for reactivity control, reactor coolant inventory makeup, reactor heat removal, process monitoring, and support system functions. This review included the FP Safe Shutdown Analysis (SSA).

The inspectors also reviewed the operators' ability to perform the necessary manual actions for achieving SSD by reviewing procedures, the accessibility of SSD equipment, and the available time for performing the actions.

The inspectors reviewed the QCNPS's Updated Final Safety Analysis Report (UFSAR) and the licensee's engineering and/or licensing justifications (e.g., NRC guidance documents, license amendments, technical specifications, safety evaluation reports (SERs), exemptions, and deviations) to determine the licensing basis.

b. Findings

b.1 Safe Shutdown Makeup Pump

Introduction: The inspectors identified a Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix R, Section III.G.2, having very low safety significance (Green) involving the licensee's failure to ensure, in the event of a severe fire, that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage. Specifically, the licensee failed to ensure, in the event of a fire in any of the III.G.2 fire areas, that one redundant train of reactor coolant inventory makeup water remained free of fire damage. Instead, the licensee credited the dedicated safe shutdown makeup pump (SSMP) for reactor coolant inventory makeup water in these fire areas without having an analysis that demonstrated full compliance with all of the requirement of 10 CFR Part 50, Appendix R, Section III.G.3, III.L or requesting prior NRC approval.

Description: During the inspectors' review of the licensee's Appendix R analysis for the selected fire zones, the inspectors identified that contrary to the NRC approved licensing bases, as discussed in the SER dated December 1981, the licensee was relying upon the SSMP as a redundant train for the reactor coolant inventory makeup in the event of a severe fire in III.G.2 fire areas. Specifically, the SER dated December 1981, for the QCNPS, Section 2.2, "Areas Where Alternate Safe Shutdown Capability is Required," stated ". . . for those areas where a fire results in loss of the RCIC system, the licensee has proposed to provide a new safe shutdown makeup pump as an alternate." Section 2.3, (Section III.G.2 of Appendix R), stated ". . . the licensee also indicated that all other areas of the plant not required to have an alternate safe shutdown system will comply with the requirements of Section III.G.2 of Appendix R, unless an exemption

request has been approved by the staff.” Section 2.4, “Alternate Safe Shutdown System,” stated “. . . the alternate safe shutdown system required for those areas not meeting Section III.G.2 or included in the exemption requests consists of a new safe shutdown makeup pump and its associated support systems and instrumentation.” Section 3.1.2, “Reactor Coolant Inventory,” stated “The RCIC and shutdown makeup pump initially take suction from the CCST. Additional supply for the RCIC pump is provided by the suppression pool and for the makeup pump by the service water system.” However, the NRC in April of 1988 revised Section 3.1.2 of this SER and stated that “Backup water supply source for the safe shutdown makeup pump will be provided by the fire water system instead of the service water system as originally indicated in the earlier SER Section 3.1.2.” The inspectors could not find any other documents from the NRC to the licensee indicating that the NRC had accepted the use of the SSMP as a redundant system for Appendix R.

Prior to November 2000, the fire areas which were selected during this triennial FP inspection, TB-III, 13-1 and 24-1, were classified as alternate shutdown areas because of the potential fire damage to redundant RCIC system and the use of the alternate SSMP system. As a result of the FP Optimization Project at QCNPS, in November of 2000, the licensee completed safety evaluation SE-00-098. Part of the objectives of the optimization project were to reduce the number of the areas that require leaving the main control room and reduce reliance on 10 CFR Part 50, Appendix R exemptions. In order to accomplish these objectives, the licensee reclassified several fire areas from “Alternate” to “Redundant” by reclassifying the SSMP from “Dedicated” to “Redundant” per safety evaluation SE-00-098. The reclassification was based primarily on the functional equivalence between RCIC and SSMP. The licensee concluded that this change had no adverse impact on SSD and, therefore, did not require prior NRC approval. The licensee also modified the control for the SSMP system, where injection could be manually initiated from either the control room or remotely. This was changed from the initial installation of the pump. After the change, all of the circuitry needed to operate the SSMP was included in the SSA.

In Generic Letter (GL) 86-10 “Implementation of Fire Protection Requirements,” the NRC’s response to Question 3.8.3 “Redundant Trains/Alternates Shutdown,” stated, in part, if the system is being used to provide its design function, it generally is considered redundant. If the system is being used in lieu of the preferred system because the redundant components of the preferred system do not meet the separation criteria of Section III.G.2, the system is considered an alternate shutdown capability.

The inspectors’ review of SE-00-098 concluded that the licensee’s basis for the reclassification was not appropriate, in that, based on the response to Question 3.8.3 in GL 86-10, and that the backup water supply source for the SSMP was from the fire water system, which was not a preferred source for reactor coolant inventory makeup water, the SSMP met the criteria for an alternate and not a redundant system to RCIC. The licensee response was that based on General Electric (GE) Nuclear Energy (NE) document GE-NE-T43-00002-00-03-R01, “BWROG [Boiling Water Reactor Owners Group] Position on the Use of Safety Relief Valves and Low Pressure Systems as Redundant Safe Shutdown Paths,” a system was considered to be “redundant” when it is used to provide its design function. The GE-NE document also indicated that based on the information provided in NRC GL 81-12, the BWROG sees no requirement or

basis for limiting the systems that may be used as redundant SSD systems. The inspectors reviewed the GE documents and could not find any justification in these documents that considered the use of the SSMP, with the FP system as a backup source, a redundant system for reactor coolant inventory makeup.

In addition, Subsection 3 of Section III.L “Alternative and Dedicated Shutdown Capability” to 10 CFR Part 50 Appendix R required, in part, that the shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72-hours. Procedures shall be in effect to implement this capability. During the inspection, the licensee did not have analyses or procedures that satisfied these requirements. Instead, the licensee depended on offsite power supplied from the opposite unit equipment. Therefore, the inspectors also concluded that the change made by SE-00-098 was not appropriate and had adversely affected safe shutdown, because the licensee did not have the required analyses and procedures. The licensee entered this finding into the QCNPS’s corrective action program as IR 00502702, “NRC Inspection Finding Concerning App R Redundant Trains,” dated June 22, 2006. The licensee plan to review the options for resolving this issue and pursue the appropriate resolution.

Analysis: The inspectors determined that failure to ensure that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage resulted in a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, “Power Reactor Inspection Reports,” Appendix B, “Issue Screening,” issued on September 30, 2005. The finding involved the attribute of protection against external factors (i.e., Fire) and could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the licensee’s failure to ensure, in the event of a fire in any of the III.G.2 fire areas, that one redundant train of reactor coolant inventory makeup water remained free of fire damage and instead credited the dedicated SSMP without demonstrating compliance with Appendix R, Sections III.G.3 and III.L, did not provide the adequate level of safety required per Appendix R to ensure SSD capability.

Since, the SSD path using the SSMP system did not meet the requirement of Appendix R, Section III.G.2, but the SSD path was approved by the NRC as alternate, the inspectors determined that the finding was not suitable for SDP evaluation. The finding was reviewed by NRC management and was determined to be of very low safety significance (Green).

Enforcement: 10 CFR Part 50.48, “Fire Protection,” and 10 CFR Part 50, Appendix R, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979,” established specific FP features required to satisfy 10 CFR Part 50, Appendix A, General Design Criterion 3, “Fire Protection.” Appendix R applies to licensed nuclear power electric generating stations that were operating prior to January 1, 1979, which included QCNPS. Section III.G.2 of Appendix R to 10 CFR Part 50 required, in part, that where cables or the equipment of a redundant train of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area

outside of primary containment, one of a specified means of ensuring that one of the redundant trains is free of fire damage shall be provided. Section III.G.3 of Appendix R to 10 CFR Part 50 required, in part, that alternative of dedicated shutdown capability should be provided where the protection of systems whose function is required for hot shutdown does not satisfy the requirement of paragraph III.G.2. Subsection 3 of Section III.L. "Alternative and Dedicated Shutdown Capability" to 10 CFR Part 50, Appendix R required, in part, that the shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72-hours. Procedures shall be in effect to implement this capability.

Contrary to the above, in the event of a fire in any of these fire areas (TB-III, 13-1 or 24-1), the licensee failed to ensure that one of the redundant trains of reactor coolant inventory makeup water remained free of fire damage. Instead, the licensee credited the use of the dedicated SSMP for reactor coolant inventory makeup without having analyses and procedures that demonstrated their full compliance with III.G.3 and III.L, or requesting prior NRC approval. Once identified, the licensee entered the finding into their corrective action program as IR 00502702, "NRC Inspection Finding Concerning App R Redundant Trains," dated June 22, 2006. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-01(DRS); 05000265/2006002-01(DRS)).

b.2 RHR Service Water Cross-tie

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix R, Section III.G.2, having very low safety significance (Green) involving the licensee's failure to ensure, in the event of a severe fire, that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage. Specifically, the licensee failed to ensure, in the event of a fire in any of these Fire Areas TB-III, 13-1 or 24-1 (III.G.2 Fire Area), that one redundant train of the residual heat removal service water (RHRSW) system remained free of fire damage. Instead the licensee credited the cross-tie of the RHRSW train from the opposite unit for torus cooling during hot shutdown.

Description: The RHRSW system at QCNPS for each unit, consisted of two independent and redundant subsystems (A Loop and B Loop). Each subsystem is made of a header, two pumps, a suction source, valves, piping heat exchanger and associated instrumentation. Each loop provided cooling water flow to the respective loop of the RHR heat exchangers in the torus cooling and shutdown modes. The "A" subsystems for Unit 1 and Unit 2 could be connected by a normally locked, isolated cross-tie line. Similarly, the "B" subsystems could be connected by another normally isolated cross-tie line. These lines could be used to supply RHRSW from Unit 1 to Unit 2 and vice-versa when required.

The inspectors reviewed QCNPS's SSA which indicated that, in the event of a severe fire in Fire Area 13-1, a redundant shutdown method and/or systems would be utilized for SSD of Unit 1. The analysis also indicated that, in the event of a fire in Fire Area 13-1, Unit 1 4KV Switchgear 13-1 (Division I) and/or both divisions of 480 V

Switchgear (18 and 19) would be exposed. Division II of the Unit 1 RHR system would be available for torus cooling and alternate shutdown cooling. However, the Unit 1 Division II RHRSW system was unavailable for a fire in Fire Area 13-1. This was due to the 480V power feeds for the pump cubicle coolers being routed in this area. Therefore, the analysis stated that "Unit 1 RHRSW pumps may not be available for decay heat removal. However, Unit 1 Division II RHRSW can be supplied by Unit 2 RHRSW Pump via a Division II mechanical cross-tie." The analysis also verified that cubical coolers for Unit 2, Division II RHRSW pumps were free of fire damage. The inspectors also identified a similar issue in the event of a fire in Unit 2 Fire Area 24-1, in that the shutdown method for this area used the Unit 1 RHRSW to shutdown Unit 2.

In addition, the inspectors noticed that the analysis also showed that, in the event of a severe fire in Fire Area TB-III, Division I of the RHR system would be available for torus cooling and alternate shutdown cooling. However, the AC power for RHR system would have been provided from offsite power via the opposite unit (Unit 2 Bus 23) and cross-tied to Unit 1 Bus 13-1. Similarly, the analysis also indicated that the Unit 1 Division I RHRSW system may not be available for a fire in TB-III. This was due to the 4KV power feeds for the pumps being routed in TB-III. Therefore, the analysis indicated that Unit 1 RHRSW pumps may not be available for decay heat removal. However, the analysis credited Unit 2 Division I RHRSW via a Division I mechanical crosstie valve.

Prior to November of 2000, Fire Areas TB-III, 13-1 and 24-1 were classified as an alternate shutdown areas. As a result of the FP Optimization Project at QCNPS, the licensee reclassified these fire areas from "Alternate" to "Redundant" when they reclassifying the SSMP from "Dedicated" to "Redundant" per Safety Evaluation SE-00-098. However, the licensee failed to evaluate whether RHRSW cross-tie from the opposite unit met the requirement of 10 CFR Part 50, Appendix R, Section III.G.2.

10 CFR Part 50.48 "Fire Protection" required, in part, that each operating nuclear power plant must have a fire protection plan that satisfies Criterion 3 of appendix A of 10 CFR Part 50. 10 CFR Part 50, Appendix R establishes fire protection features required to satisfy Criterion 3 of appendix A with respect to certain generic issues for nuclear power plants licensed to operate before January 1, 1979. 10 CFR Part 50, Appendix R, also required, in part, that a fire protection program be established at each nuclear power plant. Section III.G.2 of Appendix R stated, in part, that where cables or equipment that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of three means of ensuring that one of the redundant trains is free of fire damage shall be provided. The inspectors determined that the licensee's shutdown method in the event of a fire in any of these Fire Areas TB-III, 13-1 or 24-1, did not meet the requirement of 10 CFR Part 50, Appendix R, Section III.G.2. Specifically, the licensee's shutdown methods in Fire Areas TB-III, 13-1 and 24-1 which used the RHRSW system from the opposite unit instead of ensuring one of the redundant trains of RHRSW from the respective unit with fire Unit 1 RHRSW was available. In addition, Subsection 3 of Section III.L "Alternative and Dedicated Shutdown Capability" to 10 CFR Part 50, Appendix R required, in part, that the shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures

shall be in effect to implement this capability.” During the inspection, the licensee did not have analyses or procedures that satisfied these requirements for Appendix R III.L.

The licensee justification was that Fire Areas TB-III,13-1 and 24-1 were alternate shutdown areas based on the reliance on SSMP and not due to the RHRSW cross-tie. The licensee also indicated that this method for SSD, which credited the RHRSW cross-tie, was previously communicated to the NRC staff by letter dated December 18, 1984. The inspectors reviewed the licensee’s submittal and noticed that the RHRSW cross-tie was only credited in alternate shutdown fire areas.. Therefore, the inspectors concluded that the use of RHRSW cross-tie was only permitted for alternate shutdown areas (i.e., Section III.G.3), and would not meet the requirements of 10 CFR Part 50, Appendix R, Section III.G.2. See Section 1R05.1b.1 of this inspection report for further discussion of SSMP reclassification.

Analysis: The inspectors determined that failure to ensure that one redundant train of systems necessary to achieve and maintain hot shutdown conditions was free of fire damage resulted in a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, “Power Reactor Inspection Reports,” Appendix B, “Issue Screening,” issued on September 30, 2005. The finding involved the attribute of protection against external factors (i.e., Fire) and could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the licensee’s failure to ensure, in the event of a fire in any of these Fire Areas TB-III, 13-1 or 24-1, that one redundant train of RHRSW remained free of fire damage and instead credited the RHRSW from the opposite unit, did not provide the adequate level of safety required per Appendix R to ensure SSD capability.

Since, the SSD path using the RHRSW system from the opposite unit did not meet the requirement of Appendix R, Section III.G.2, but it was credited in alternate shutdown areas at Quad Cities plant, the inspectors determined that the finding was not suitable for SDP evaluation. The finding was reviewed by NRC management and was determined to be of very low safety significance (Green).

Enforcement: 10 CFR Part 50.48, “Fire Protection,” and 10 CFR Part 50, Appendix R, “Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979,” establish specific FP features required to satisfy 10 CFR Part 50, Appendix A, General Design Criterion 3, “Fire Protection.” Appendix R applies to licensed nuclear power electric generating stations that were operating prior to January 1, 1979, which includes QCNPS. Section III.G.2 of Appendix R to 10 CFR Part 50 required, in part, that where cables or equipment of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of a specified means of ensuring that one of the redundant trains is free of fire damage be provided.

Contrary to the above, in the event of a fire in any of these Fire Areas TB-III, 13-1 or 24-1 (i.e., a III.G.2 area), the licensee failed to meet the requirement of Section III.G.2 of 10 CFR Part 50, Appendix R. Specifically, in the event of a fire in any of these areas, the licensee credited the opposite Unit RHRSW system instead of ensuring one of the



redundant trains of RHRSW from the respective unit with fire was available. Once identified, the licensee entered the finding into their corrective action program as IR 00502702, "NRC Inspection Finding Concerning App R Redundant Trains," dated June 22, 2006. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-02(DRS); 05000265/2006002-02(DRS)).

.2 Fire Protection of SSD Capability

Title 10 CFR Part 50, Appendix R, Section III.G.2, required separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3 hour rating. If the requirements cannot be met, then alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided in accordance with 10 CFR Part 50, Appendix R, Section III.G.3.

a. Inspection Scope

For each of the selected fire areas, the inspectors reviewed the licensee's Safe Shutdown Capability Analysis (SSCA) and Safe Shutdown Systems Analysis (SSSA) to ensure that at least one post-fire SSD success path was available in the event of a fire. This included a review of manual actions required to achieve and maintain hot shutdown conditions and make the necessary repairs to reach cold shutdown within 72-hours. The inspectors also reviewed procedures to verify that adequate direction was provided to operators to perform these manual actions. Factors, such as, timing, access to the equipment, and the availability of procedures were considered in the review.

The inspectors also evaluated the adequacy of fire suppression and detection systems, fire area barriers, penetration seals, and fire doors to ensure that at least one train of SSD equipment was free of fire damage. To accomplish this, the inspectors observed the material condition and configuration of the installed fire detection and suppression systems, fire barriers, and construction details and supporting fire tests for the installed fire barriers. In addition, the inspectors reviewed license documentation, such as, deviations, detector placement drawings, fire hose station drawings, carbon dioxide pre-operational test reports, smoke removal plans, fire hazard analysis reports, SSD analyses, and National Fire Protection Association (NFPA) codes to verify that the fire barrier installations met license commitments.

b. Findings

No findings of significance were identified.

.3 Post-Fire SSD Circuit Analysis

Title 10 CFR Part 50, Appendix R, Section III.G.1, required that SSCs important to SSD be provided with FP features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions is free of fire damage. Options for providing this level of FP were delineated in 10 CFR Part 50,

Appendix R, Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability and its associated circuits, was required to be provided that was independent of the cables, systems, and components in the area. For such areas, 10 CFR Part 50, Appendix R, Section III.L.3, specifically required the alternative or dedicated shutdown capability to be physically and electrically independent of the specific fire areas and capable of accommodating post-fire conditions where offsite power was available and where offsite power was not available for 72-hours.

a. Inspection Scope

On a sample basis, the inspectors evaluated the adequacy of separation provided for the power and control cabling of redundant trains of shutdown equipment. This investigation focused on the cabling of selected components in systems important for SSD. The inspectors' review also included a sampling of components whose inadvertent operation due to fire may adversely affect post-fire SSD capability. The purpose of this review was to determine if a single exposure fire, in one of the fire areas selected for this inspection, could prevent the proper operation of both SSD trains.

The inspectors evaluated selected portions of licensee's fuse/breaker coordination analysis for ground faults on the 4160 Volt alternating current (Vac) and 480Vac systems and the vital low-voltage ac and direct current (dc) power sources to determine whether fire-induced faults on distribution system cables or buses could degrade post-fire SSD capability. Specifically, the inspectors determined if selective coordination existed between branch circuit protective devices and the upstream distribution panel fuse/breaker feeders to ensure that in the event of a fire-induced short circuit, the fault would be isolated before the upstream feeder fuse/breaker tripped.

b. Findings

No findings of significance were identified.

.4 Alternative SSD Capability

Title 10 CFR Part 50, Appendix R, Section III.G.1, required that SSCs important to SSD be provided with FP features capable of limiting fire damage to ensure that one train of systems necessary to achieve and maintain hot shutdown conditions is free of fire damage. Options for providing this level of FP were delineated in 10 CFR Part 50, Appendix R, Section III.G.2. Where the protection of systems whose function was required for hot shutdown did not satisfy 10 CFR Part 50, Appendix R, Section III.G.2, an alternative or dedicated shutdown capability independent of the area under consideration was required to be provided. Additionally, alternative or dedicated shutdown capability must be able to achieve and maintain hot standby conditions and achieve cold shutdown conditions within 72-hours and maintain cold shutdown conditions thereafter. During the post-fire SSD, the reactor coolant process variables must remain within those predicted for a loss of normal alternating current power, and the fission product boundary integrity must not be affected (i.e., no fuel clad damage, rupture of any primary coolant boundary, or rupture of the containment boundary).

a. Inspection Scope

The inspectors reviewed the licensee's systems required to achieve alternative SSD to determine if the licensee had properly identified the components and systems necessary to achieve and maintain SSD conditions. The inspectors also focused on the adequacy of the systems to perform reactor pressure control, reactivity control, reactor coolant inventory makeup, decay heat removal, process monitoring, and support system functions.

b. Findings

No findings of significance were identified.

.5 Operational Implementation of SSD Capability

Title 10 CFR Part 50, Appendix R, Section III.L.2.d, required that the process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the functions necessary to achieve reactivity control, reactor coolant inventory makeup, and decay heat removal.

a. Inspection Scope

The inspectors reviewed a sample of the actions defined in procedures QCOA 0010-12, "Fire/Explosion," Revision 27, QCARP 0050-01, "SB-1-1 Injection with SSMP and Bring the Unit to Cold Shutdown," Revision 10, and other procedures which were referenced by procedure QCOA 0010-12. Procedure QCARP 0050-01 was the procedure for performing a plant alternative shutdown from outside the Unit 1 CR. The inspectors reviewed, on a sample bases, the ability of operators to perform procedure actions within applicable plant shutdown time requirements. The inspectors also focused on the feasibility of the actions described in the procedure.

The inspectors' reviews of the adequacy of communications and emergency lighting associated with these procedures are documented in Sections 1R05.6 and 1R05.7 of this report.

b. Findings

b.1 Fuse Repair

Introduction: The inspectors identified a NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," having very low safety significance (Green) involving inadequate procedure steps. Specifically, the inspectors identified that Procedure QOP 6500-10, "Local Control of 4160 and 480 Volt Motor Operated Circuit Breaker, Revision 8, included repair steps to replace fuses for hot shutdown in the event of a fire. This fuse replacement constituted a hot shutdown repair which did not meet 10 CFR Part 50, Appendix R requirements.

Description: The breakers for Unit 1's Division 1 RHR pumps and Bus 13-1/23-1 cross-tie are required to be opened and closed to safely shutdown the unit in the event of a fire in Fire Area TB-III. Each breaker had a cable routed in Fire Area TB-III, which

had the potential to cause the breaker's control power fuses to be blown. This would have prevented the electrical operation of the breakers but would not have prevented local manual operation as documented in QCNPS's Appendix R analysis. During the inspectors review of Procedure QCARP 0030-01 "TB-III Injection With SSMP and Bringing the Unit to Cold Shutdown," Revision 8, the inspectors noted that in Steps D.11.e (e.g, closes Bus 23-1 and 13-1 cross-tie breaker) and D.11.f (e.g, closes one of the RHR pumps 1A or 1B) the operator(s) were required to close the circuit breaker per procedure QOP 6500-10. Procedure QOP 6500-10 included a step to replace any fuses believed to be blown prior to operating the breaker from a local control box. The inspectors determined that since one train of RHR system was required for torus cooling, the fuse replacement specified in this step constituted a hot shutdown repair.

Title 10 CFR Part 50, Appendix R, Section III. G.1.a, stated "One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; . . ." and Section III.G.1.b, stated "Systems necessary to achieve and maintain cold shutdown from either the control or emergency station(s) can be repaired within 72-hours." Based on the above, the inspectors determined that the breaker's fuse replacement did not meet Appendix R requirements, because it constituted a hot shutdown repair, and repair is only allowed for systems necessary to achieve and maintain cold shutdown. As a result, the licensee entered this finding into the station's corrective action program as IR 00485702, "Required SSDA Actions Not Contained in QCARP 0030-01," dated May 2, 2006. The licensee revised Procedure QOP 6500-10 and added steps to manually charge breaker's spring and close the breaker using a pushbutton if the fuses are not available due to fire damage.

Analysis: The inspectors determined that the failure to include adequate steps in Procedure QOP 6500-10 that did not meet Appendix R requirements was a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," issued on September 30, 2005. The finding involved the attribute of "Procedure Quality" and could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events (fire) to prevent undesirable consequences (i.e., core damage). Specifically, the failure to include adequate steps in the procedure to manually operate switchgear breakers and instead included a repair to achieve and maintain hot shutdown in the event of a fire could have delayed and complicated shutdown of the plant.

The inspectors completed a significance determination of this finding using IMC 0609, "Significance Determination Process (SDP)," dated November 22, 2005, Appendix F, "Fire Protection Significance Determination Process," dated February 28, 2005. The inspectors assigned a degradation rating of low safety significance (Green) because the licensee's R analysis did not require the repair, and the operator(s) could have manually closed the breaker instead of replacing the fuses. Therefore, this finding screened out as having very low safety significance (Green).

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, stated, in part, that activities affecting quality shall be prescribed by documented instructions, procedures,

or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Title 10 CFR Part 50, Appendix R, Section III. G.1.a, stated “One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; . . .” and Section III.G.1.b, stated “Systems necessary to achieve and maintain cold shutdown from either the control or emergency station(s) can be repaired within 72-hours.”

Contrary to the above, Procedure QOP 6500-10, “Local Control of 4160 and 480 Volt Motor Operated Circuit Breaker, Revision 8, included steps that were not appropriate to the circumstances. Specifically, Procedure QOP 6500-10, included steps to replace the switchgear breaker’s fuses prior to operation of the breaker from a local control box. This fuse replacement constituted a hot shutdown repair which did not meet the requirement of 10 CFR Part 50, Appendix R and could have delayed SSD of the plant in the event of a fire. Once identified, the licensee entered the finding into their corrective action program as IR 00485702, “Required SSDA Actions Not Contained in QCARP 0030-01,” dated May 2, 2006. Because this violation was of very low safety significance and it was entered into the licensee’s corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-03(DRS); 05000265/2006002-03(DRS)).

.6 Communications

For a fire in an alternative shutdown fire area, CR evacuation may be required and a shutdown is performed from outside the CR. Radio communications are relied upon to coordinate the shutdown of both units and for fire fighting and security operations. Title 10 CFR Part 50, Appendix R, Section III.H., required that equipment provided for the fire brigade include emergency communications equipment.

a. Inspection Scope

The inspectors reviewed, on a sample bases, the adequacy of the communication system to support plant personnel in the performance of alternative SSD functions and fire brigade duties.

b. Findings

No findings of significance were identified.

.7 Emergency Lighting

Title 10 CFR Part 50, Appendix R, Section III.J., required that emergency lighting units with at least an 8-hour battery power supply be provided in all areas needed for operation of SSD equipment and in access and egress routes thereto.

a. Inspection Scope

The inspectors performed a plant walkdown of areas in which a sample of the actions would be performed as described in procedure QCARP 0050-01, "SB-1-1 Injection with SSMP and Bring the Unit to Cold Shutdown," Revision 10, and other procedures which were referenced by procedure QCARP 0050-01. As part of the walkdowns, the inspectors focused on the existence of sufficient emergency lighting for access and egress to areas and for performing necessary equipment operations.

b. Findings

No findings of significance were identified.

.8 Cold Shutdown Repairs

Title 10 CFR Part 50, Appendix R, Section III.L.5, required that equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72-hours. Materials for such repairs shall be readily available onsite and procedures shall be in effect to implement such repairs.

a. Inspection Scope

The inspectors reviewed the licensee's procedures to determine if any repairs were required to achieve cold shutdown. The inspectors determined that the licensee did require repair of some equipment to reach cold shutdown based on the SSD methods used. The inspectors reviewed the procedures for adequacy. The inspectors also reviewed completed surveillances of the tools and equipment needed to reach cold shutdown.

b. Findings

No findings of significance were identified.

.9 Fire Barriers and Fire Zone/Room Penetration Seals

Title 10 CFR Part 50, Appendix R, Section III.M, required that penetration seal designs be qualified by tests that are comparable to tests used to rate fire barriers.

a. Inspection Scope

The inspectors reviewed the test reports for three-hour rated barriers installed in the plant and performed visual inspections of selected barriers to ensure that the barrier installations were consistent with the tested configuration. In addition, the inspectors reviewed the fire loading for selected areas to ensure that existing barriers would not be challenged by a potential fire.



b. Findings

No findings of significance were identified.

.10 Fire Protection Systems, Features, and Equipment

a. Inspection Scope

The inspectors reviewed the material condition, operations lineup, operational effectiveness, and design of fire detection systems, fire suppression systems, manual fire fighting equipment, fire brigade capability, and passive FP features. The inspectors reviewed deviations, detector placement drawings, fire hose station drawings, carbon dioxide system pre-operational test reports, and fire hazard analysis reports to ensure that selected fire detection systems, sprinkler systems, portable fire extinguishers, and hose stations were installed in accordance with their design, and that their design was adequate given the current equipment layout and plant configuration.

b. Findings

b.1 Fire Pre-Plans

Introduction: The inspectors identified a NCV of QCNPS's Operating Licenses DPR-29 and DPR-30, Section h.3.F, having very low safety significance (Green) involving the lack of pertinent information in the QCNPS's fire pre-plans for various plant fire areas. Specifically, the licensee failed to include important information in the fire pre-plans, such as, hydrogen and electrical hazards, to assist the fire brigade to fight a fire within those plant fire areas.

Description: The inspectors reviewed the licensee's corrective action documents IR 00221528, "Fire Brigade Turnout Gear /SCBA Location," dated May 12, 2004, and IR 00478821, "Fire Pre-plans [Fire Area] RB-19 and [Fire Area] TB-71 Have Incorrect Information," dated April 14, 2006. Both issue reports were initiated as a result of the NRC resident inspector identified problems associated with the QCNPS's fire pre-plans. One of the licensee's corrective actions associated with IR 00221528 was the implementation of a plan to improve the fire pre-plans over a four year period. Each cycle would be six-months with the first cycle beginning July 2004 thru December 2004. The licensee maintained a log of the fire pre-plans reviewed during each cycle. The licensee's review of IR 00478821 noted that Fire Areas RB-7 and RB-19 needed hydrogen and oxygen hazards added to the fire pre-plans.

The inspectors observed that Fire Area RB-7 was previously reviewed on July 8, 2004, and Fire Area RB-19 was previously reviewed on December 20, 2005, as part of the fire pre-plan improvement effort. The inspectors' review identified that the licensee's corrective actions to improve the QCNPS's fire pre-plans were not adequate. Major fire hazards, such as, hydrogen and oxygen hazards were missed during the licensee's review. In addition, the inspectors identified additional concerns regarding fire pre-plans as follows: 1) pre-plans did not identify all potential hazards (e.g., the location of electrical panels that could be a risk to the fire brigade); 2) pre-plans lacked adequate



information on damper and ventilation controls (e.g., which damper and/or ventilation controls needed to be isolated or turned off and which must be left on to cool SSD equipment); 3) some pre-plan drawings contained errors (e.g., the quantity of fire fighting equipment available); 4) pre-plans failed to identify the electrical panels that were not sealed (e.g., to prevent water, if used during fire fighting, from entering unsealed electrical panels to eliminate potential damage to both trains of equipment; 5) pre-plans did not identify which hose reels were primary or secondary hose reels to ensure that the correct hose reel was used in a fire area (e.g., correct nozzle, length of hose, etc.); 6) pre-plans listed transient combustibles as a hazard, when transient combustibles may no longer be in the fire area and should have been removed from the fire pre-plan; 7) pre-plans listed cable insulation as a hazard when cable insulation is normally located in most fire areas; and 8) pre-plans allowed a person with a radio to be positioned at a sprinkler control valve, where in many cases the control valve located in the fire area .

Fire pre-plan requirements were identified in the licensee's, "Fire Protection Report Volume 1," Revision 17, dated October 2005, in Section 2.0, "Fire Protection Program", Paragraph 2.5.4, "Fire Fighting Strategies," which stated "Pre-fire plans are provided for all safety-related areas of the plant. The fire pre-plans provided necessary information, including a diagram showing where fire equipment is located to aid the fire brigade in executing manual fire fighting operations." In addition, in procedure CC-AA-211, "Fire Protection Program," Paragraph 4.9, "Fire Pre-Plans," the licensee stated, "The plans are designed to provide as much useful information as possible in a short amount of time, . . ." and ". . . they provide useful information for quickly determining the emergency response strategies based on hazards and equipment in the area."

Analysis: The inspectors determined that failure to maintain complete and accurate fire pre-plans was a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports, Appendix B, "Issue Screening," issued on September 30, 2005. The finding involved the attribute of protection against external factors (i.e., fire), where failure to provide adequate warnings and guidance related to hydrogen and electrical hazards in the fire pre-plans could have adversely impacted the fire brigade's ability to fight a fire. This would increase the likelihood of a fire which would challenge SSD and could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors determined that this issue also affected the cross-cutting area of Problem Identification and Resolution because the licensee failed to ensure that issues potentially impacting nuclear safety were identified and fully evaluated. The licensee failed to identify and revise the presence of hydrogen and oxygen hazards in Fire Areas RB-7 and RB-19 during their review as part of the fire pre-plan improvement effort conducted as a result of previously identified corrective action (IR 00221528).

The inspectors completed a significance determination of this finding using IMC 0609, "Significance Determination Process," **dated November 22, 2005**, Appendix F, "Fire Protection Significance Determination Process," dated February 28, 2005. The finding affected the Fire Prevention and Administrative Controls Category in the area of

compliance documentation. The inspectors assigned a degradation rating of low safety significance because extensive training was provided to fire brigade members to deal with unexpected contingencies. In addition, other defense-in-depth FP elements remained unaffected and fire in this area would not result in a loss of dedicated SSD systems. The inspectors review of the "Initial Qualitative Screening" concluded that this finding was considered to be of very low safety significance (Green).

Enforcement: The QCNPS's Operating Licenses DPR-29 and DPR-30, Section h.3.F, stated that the licensee shall implement and maintain in effect all provisions of the approved QCNPS's FPP as described in the UFSAR for the facility and as approved in the SER dated July 27, 1979, and subsequent SER supplements. Section h.3.F, also stated that the licensee may make changes to the approved QCNPS's FPP without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain SSD in the event of a fire. The licensee's procedure CC-AA-211, "Fire Protection Program," Paragraph 4.9, "Fire Pre-Plans" stated "The plans are designed to provide as much useful information as possible in a short amount of time, . . . ." and ". . . they provide useful information for quickly determining the emergency response strategies based on hazards and equipment in the area."

Contrary to the above, on May 11, 2006, the licensee's fire pre-plans failed to provide useful information for quickly determining the emergency response strategies based on hazards and equipment in the area for effective fire fighting. Specifically, the licensee failed to maintain acceptable fire pre-plans by not providing accurate and complete and guidance related to hydrogen and electrical hazards in the fire pre-plans which could have adversely impacted fire brigade's ability to fight a fire. The inspectors concluded this was a violation of the QCNPS's License Condition, Section h.3.F. Once identified, the licensee entered the finding into their corrective action program as IR 00489175, "Quality of Fire Preplans (2006 FP Triennial)," dated May 11, 2006. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-04(DRS); 05000265/2006002-04(DRS)).

## b.2 Standpipes with Hose Connections

Introduction: The inspectors identified a NCV of Operating Licenses DPR-29 and DPR-30, Section h.3.F, having very low safety significance (Green) involving adequacy of water pressure and flow rate at standpipes with hose connections. Specifically, the licensee failed to provide calculations to ensure that an adequate water pressure and flow rate were available to meet the QCNPS's FPP requirements.

Description: The inspectors were concerned that standpipes with hose connections had the potential for an inadequate water pressure and flow rate to effectively fight a fire. The licensee stated that calculations had been made to ensure that an adequate water pressure and flow rate were available, however, the licensee could not locate the supporting calculations.

In NFPA 14, "Standpipe and Hose Systems," Revision 1974, the requirements for standpipe systems in Class II service required that each standpipe shall be sized for a minimum flow of 100 gallons per minute and that standpipes in excess of 50 feet in height shall be at least 2½ inches in size.

The inspectors' review of the licensee's NFPA Code Deviation 14-06, indicated that a few standpipes serving multiple hose connections were less than four inches in diameter and several connections to single hose stations were less than 2½ -inch diameter. The licensee's justification stated that calculations had been completed to verify the adequacy of the water supply from these small pipes. In addition, the inspectors noted that in the QCNPS's Fire Protection Report comparison against NRC Branch Technical Position 9.5.1, Appendix A to 9.5-1 "Guidelines for Fire Protection," Paragraph E.3.(d), the licensee stated that several standpipes serving single hose connections were less than 2½ inch in diameter and that calculations had been completed to verify the adequacy of the water supply from the smaller pipes.

During this inspection, the licensee completed Calculation QDC-4100-M1534, "Fire Protection Hose Reel Supply Piping Pressure Drop," dated May 11, 2006, for one of the more limiting two inch FP supply pipelines to demonstrate that the NFPA Code requirements were met. However, the inspectors concluded that this calculation failed to account for the more limiting 1½ inch piping to the standpipes with hose connections used in the QCNPS's turbine building. The inspectors' review revealed that the calculation did not account for the water supply pressure drop that would occur at either the fire area sprinklers or the standpipes with hose connections when a concurrent actuation was initiated. The inspectors' review of the two inch piping calculation also revealed that there was little or no margin in water flow rate in the 1½ inch piping. As a result, the licensee initiated IR 00489160, "Justification of Fire Hose Pressure and Flow Meeting NFPA," dated May 11, 2006, to include in their corrective actions a plan to perform more extensive calculations to verify water pressure and flow rate at all effected standpipes with hose connections.

Analysis: The inspectors determined that failure to provide supporting calculations to demonstrate adequate water pressure and flow rate at standpipes with hose connections was a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports, Appendix B, "Issue Screening," issued on September 30, 2005. The finding involved the attribute of protection against external factors (i.e., fire), where the lack of water pressure and flow rate at standpipes with hose connections could hamper the fire brigades ability to fight a fire, thereby, increasing the likelihood of a fire which would challenge SSD and could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage).

The inspectors completed a significance determination of this finding using IMC 0609, "Significance Determination Process," dated November 22, 2005, Appendix F, "Fire Protection Significance Determination Process," dated February 28, 2005. The finding affected the Fire Prevention and Administrative Controls Category in the area of compliance documentation. The inspectors assigned a degradation rating of low safety significance because other defense-in-depth FP elements remained unaffected in all fire

areas. The inspectors review of the “Initial Qualitative Screening” concluded that this finding was considered to be of very low safety significance (Green).

Enforcement: The QCNPS’s Operating Licenses DPR-29 and DPR-30, Section h.3.F, stated that the licensee shall implement and maintain in effect all provisions of the approved QCNPS’s FPP as described in the UFSAR for the facility and as approved in the SER dated July 27, 1979, and subsequent SER supplements. Section h.3.F, also stated that the licensee may make changes to the approved QCNPS’s FPP without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain SSD in the event of a fire. In addition, the licensee stated in Appendix A to 9.5-1 “Guidelines for Fire Protection,” Paragraph E.3.(d) that several standpipes serving single hose connections were less than 2½ inch in diameter and that calculations had been completed to verify the adequacy of the water supply from these smaller pipelines.

Contrary to the above, on May 11, 2006, the licensee failed to provide calculations to ensure adequate water pressure and flow rate were available at standpipes with hose connections for effective fire fighting. The inspectors concluded this was a violation of the QCNPS’s License Condition, Section h.3.F. Once identified, the licensee entered the finding into their corrective action program as IR 00489160, “Justification of Fire Hose Pressure and Flow Meeting NFPA,” dated May 11, 2006, and planned to perform calculations to verify water flow at all effected standpipes with hose connections. Because this violation was of very low safety significance and it was entered into the licensee’s corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-05(DRS); 05000265/2006002-05(DRS)).

### b.3 Class A Fire Extinguishers

Introduction: The inspectors identified a NCV of QCNPS’s Operating Licenses DPR-29 and DPR-30, Section h.3.F, having very low safety significance (Green) involving Class A fire extinguishers. Specifically, the QCNPS’s FPP did not have an adequate number of Class A fire extinguishers available where significant fire hazards existed to meet the NFPA 10 Code requirements to suppress and/or extinguish Class A fire hazards.

Description: The inspectors reviewed Design Analysis WDC-4100-0691, “Combustible Loading Calculation for the Power Block, SBO Building, and Cribhouse,” dated February 18, 2005. This document showed large quantities of Class A combustibles located in many areas of the plant. For example, Fire Zones 1.1.1.5, 1.1.1.6, and 8.2.7.A contained greater than 1000 pounds of Class A combustible materia..

During the inspectors plant walkdown, the inspectors observed that there were an inadequate number of Class A fire extinguishers located throughout QCNPS where

significant fire hazards existed to meet the NFPA 10 Code requirements. For example, fire zones 1.1.1.5, 1.1.1.6, and 8.2.7.A did not have Class A fire extinguishers present. The NFPA 10 Code requirements were endorsed by the QCNPS's FPP. Specifically, there were substantial amounts of Class A combustibles located in many areas of the plant that would require a Class A fire extinguisher to suppress and/or extinguish this type of fire hazard.

In Amendment Number 52 to the Facility Operating License (SER dated July 27, 1979), Paragraph 4.3.3, "Portable Fire Extinguishers," the SER stated in part, that portable dry chemical and carbon dioxide extinguishers have been distributed throughout the plant. The fire extinguishers meet the NFPA 10 Code requirements. The fire extinguisher selections were made in accordance with the type of fire hazards to be protected against at the QCNPS. In addition, the licensee's responses to the "Guidelines of Appendix A to APCS 9.5-1," Section E.6, "Portable Extinguishers," stated in part, that QCNPS complied with the NFPA 10 Code requirements for fire extinguishers. The NRC originally approved the licensee's statement of compliance with the NFPA Code during the NRC's review of the licensee's response to APCS 9.5.1. The licensee subsequently revised their statement of compliance with the APCS 9.5-1 section for Class A fire extinguishers and instead took credit for standpipes with hoses in lieu of the Class A fire extinguishers. However, when the inspectors requested the licensee's evaluation that made this change to the QCNPS's FPP, the licensee could not locate the associated documentation.

The inspectors' noted during a review of NFPA 10, "Portable Fire Extinguishers," Revision 1975, that up to one-half of the complement of fire extinguishers may be replaced by uniformly spaced small hose stations for use by the building occupants. In addition, Section 1-1, "Standard for Portable Fire Extinguishers," stated in part, that portable fire extinguishers were intended as a first line of defense to cope with fires of limited size. The fire extinguishers were needed even though the property is equipped with automatic sprinklers, standpipes and hose, and other fixed fire protection equipment. The NFPA Code further stated that Class A fires were fires of ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics. In Section 2-2.1, the NFPA Code required that fire extinguishers shall be selected for the specific class or classes of fire hazards. Fire extinguishers for protecting Class A fire hazards shall be selected from among water types, foam, loaded stream, and multipurpose dry chemical.

The inspectors' review of the QCNPS's NFPA Code Deviation 10-01 revealed that fire extinguishers for Class A fire hazards were not distributed in accordance with the NFPA Code. The licensee's justification, for the NFPA Code deviation, stated that at QCNPS the quantity of Class A combustibles was limited primarily to cable insulation and/or transient combustibles, that proper distribution of standpipes with hose connections were provided, and since trained on-site fire brigade personnel were present that the limited distribution of Class A fire extinguishers was considered acceptable. As a result of the inspectors' review of Design Analysis WDC-4100-0691, the inspectors concluded that the licensee's NFPA Code Deviation 10-01, as stated above, contained an inadequate justification for the number of Class A fire extinguishers in the plant.

Analysis: The inspectors determined that failure to have an adequate number of Class A fire extinguishers available where significant fire hazards existed to meet the NFPA 10 Code requirements to suppress and/or extinguish Class A fire hazards was a performance deficiency warranting a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports, Appendix B, "Issue Screening," issued on September 30, 2005. The finding involved the attribute of protection against external factors (i.e., Fire), where failure to have an adequate number of Class A fire extinguishers available could potentially escalate a small fire into a larger fire since only standpipes with hose connections were available and their use required a trained fire brigade to extinguish the fire. As a result, non-fire brigade personnel would be prevented from moving quickly to suppress and/or extinguish a small fire and the potential for an escalated fire could have affected the mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage).

The inspectors completed a significance determination of this finding using IMC 0609, "Significance Determination Process," dated November 22, 2005, Appendix F, "Fire Protection Significance Determination Process," dated February 28, 2005. The finding affected the Fire Prevention and Administrative Controls Category in the area of compliance documentation. The inspectors assigned a degradation rating of low safety significance because most fire areas and fire zones have fire detectors that would alarm in the control room. In addition, other defense-in-depth FP elements remained unaffected and fire in this area would not result in a loss of dedicated SSD systems. The inspectors review of the "Initial Qualitative Screening" concluded that this finding was considered to be of very low safety significance (Green).

Enforcement: The QCNPS's Operating Licenses DPR-29 and DPR-30, Section h.3.F, stated that the licensee shall implement and maintain in effect all provisions of the approved QCNPS's FPP as described in the UFSAR for the facility and as approved in the SER dated July 27, 1979, and subsequent SER supplements. Section h.3.F, also stated that the licensee may make changes to the approved QCNPS's FPP without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain SSD in the event of a fire. Amendment Number 52 to the Facility Operating License (SER dated July 27, 1979), required the QCNPS to maintain Class A fire extinguishers in accordance with NFPA 10 Code requirements and that Class A fire extinguishers would be available for the type of fire hazard present.

Contrary to the above, from May 24, 1985, to May 12, 2006, the licensee failed to maintain Class A fire extinguishers in accordance with NFPA 10 Code requirements and that Class A fire extinguishers were not available for the type of fire hazard present. Specifically, no Class A fire extinguishers were located within Fire Zone 1.1.1.5, 1.1.1.6 and 8.2.7.A even though the fire zones contained more than 1000 ponds of Class A combustible materials. Additionally, the licensee's code evaluation 10-01 was not consistent with the results in Design Analysis WDC-4100-0091. The inspectors concluded this was a violation of the QCNPS's License Condition, Section h.3.F. Once identified, the licensee entered the finding into their corrective action program as IR 00489426, "Class A Fire Extinguisher Placement Improvements," dated May 12, 2006. Because this violation was of very low safety significance and it was entered into

the licensee's corrective action program, this violation is being treated as a NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 05000254/2006002-06(DRS); 05000265/2006002-06(DRS)).

.11 Compensatory Measures

a. Inspection Scope

The inspectors conducted a minimal review to verify that adequate compensatory measures were put in place by the licensee for out-of-service, degraded or inoperable FP and post-fire SSD equipment, systems, or features. The inspectors also conducted a minimal review on the adequacy of short term compensatory measures to compensate for a degraded function or feature until appropriate corrective actions were taken.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed the corrective action program procedures and samples of corrective action documents to verify that the licensee was identifying issues related to the FPP at an appropriate threshold and entering them in the corrective action program. The inspectors reviewed these issues to verify an appropriate threshold for identifying issues and to evaluate the effectiveness of corrective actions related to the FPP. In addition, corrective action documents written on issues identified during the inspection were reviewed to verify adequate problem identification and incorporation of the problem into the corrective action system. The specific corrective action documents that were sampled and reviewed by the team are listed in the attachment to this report.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

(Closed) Unresolved Item 05000254/2003012-01(DRS); 05000265/2003012-01(DRS): Cable Ampacity Calculation Methodology

A Unresolved item (URI) was opened during the 2003 triennial FP inspection regarding Calculation QDC-0000-E-0853, "SLICE Cable Ampacity Multiplying Factors for Quad Cities," Revision 0, dated December 2, 1999. Specifically, the inspectors were concerned that the calculation's methodology used to account for cable derating and/or cable tray loading was correctly applied to potential overpowered cables. The URI was opened pending further NRC review of the licensee's calculation.

During this inspection, the inspectors reviewed the licensee's activities associated with cable ampacity derating and cable tray ampacity loading. The results of the inspectors' review indicated that the QCNPS's Calculation QDC-0000-E-0853 was not utilized at the



QCNPS. As a result, no further inspector concerns were identified with this calculation at the present time. Since the calculation was not utilized at QCNPS, the inspectors considered this URI closed.

#### 4OA6 Meetings

##### .1 Exit Meeting

On May 12, 2006, at the end of the on-site inspection activities, the inspectors presented the inspection results to Mr. T. Tulon and other members of licensee management. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On June 29, 2006, at the conclusion of the inspection, a re-exit meeting conference call was with Mr. T. Tulon and other members of licensee management to present the inspection findings.

##### .2 Interim Exit Meetings

No interim exits were conducted.

#### 4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as NCVs.

##### **Cornerstone: Mitigating System**

##### .1 Appendix R SSD Battery Loads

Criterion III "Design Control," of 10 CFR Part 50, Appendix B, requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, the licensee did not have a design basis calculation to verify that the 125Vdc battery/system can support the SSD loads during an Appendix R fire for the period of 72 hours. Specifically, the licensee did not consider the additional loads lineup to battery 2 as a result of a fire in Fire Area 13-1. During normal plant operating conditions, the 125Vdc battery 1 supplied Bus 1A (Unit 1 Division I) and Bus 2B (Unit 2 Division II), battery 2 supplied Bus 2A (Unit 2 Division I) and Bus 1B (Unit 1 Division II). In the event of a fire in Fire Area 13-1, both battery chargers for battery 1 were considered unavailable. Procedure QCARP 0040-01 "13-1 Injection with SSMP and Bringing the Unit to Cold Shutdown" included steps connected the Unit 2 Division II, 125Vdc Bus 2B, to battery 2. These steps in the procedure would have lined-up all three 125Vdc divisions to battery 2. A calculation was not performed to ensure that the 125Vdc battery/charger could have provided power to three divisions simultaneously. The inspectors determined that the finding was more than minor because it was associate with the Mitigating System Cornerstone attribute of "Design

Control” and affected the cornerstone objective of ensuring the capability of systems needed to respond to initiating events to prevent undesirable consequences. Specifically, the failure of the fuse or the battery/charger to supply the necessary loads for 72-hours could potentially have complicated shutdown during a fire event. The licensee discovered this finding during their Focus Area Self Assessment (FASA) and tracked it through Action Tracking AT 426687-15. The licensee also entered this finding into the station’s corrective action program as IR 00492546. The inspectors determined that the finding was of very low safety significance because the licensee completed technical evaluation EC 360895 which ensured that the battery, main fuse and charger number 2 were adequate to supply the loads lineup included in procedure QCARP 0040-01.

## .2 Post-Fire Operator Manual Actions

On March 6, 2006, the NRC published a Federal Register Notice (FRN, Vol. 71, No. 43, Page 11169, 10 CFR Part 50, RIN 3150 AH54) that announced the withdrawal of a proposed rule to 10 CFR Part 50, Appendix R, Paragraph III.G.2. The proposed rule would have revised Paragraph III.G.2 of Appendix R to allow licensees to implement acceptable operator manual actions combined with fire detectors and automatic fire suppression capability as an acceptable method for ensuring the capability of a licensee to bring a reactor to, and maintain it in, a hot shutdown condition. The NRC withdrew the proposed rule stating that 10 CFR Part 50, Appendix R, Paragraph III.G.2, cannot be reasonably interpreted to permit reliance upon operator manual actions in lieu of the specific methods provided in the subparagraphs of Paragraph III.G.2, to ensure that one of the redundant SSD trains in the same fire area is free of fire damage. Therefore, any pre-1979 licensee (i.e., QCNPS) that is using operator manual actions instead of the specific methods provided in the subparagraphs of Paragraph III.G.2, without an NRC-approved exemption, is not in compliance with the regulations.

Contrary to the requirements of 10 CFR Part 50, Appendix R, Paragraph III.G.2, the QCNPS’s FPP permitted reliance upon operator manual actions in lieu of the specific methods provided in the subparagraphs of Paragraph III.G.2, to ensure that one of the redundant SSD trains in the same fire area is free of fire damage. The licensee recognized that many of the QCNPS’s FPP operator manual actions were without NRC-approved exemptions. As a result, the licensee generated Issue Report 00464665, “NRC Terminates Fire Protection Manual Action Rulemaking,” date March 10, 2006, to acknowledge withdrawal of the proposed rule and QCNPS’s nonconformance to the regulatory requirements. Since the licensee did not dispute that a violation of regulatory requirements had occurred, enforcement discretion has been exercised in accordance with EGM 98-002, Revision 2, dated February 2, 2000. The licensee has initiated corrective actions to resolve this finding within a reasonable time frame in accordance with the published EGM and FRN. Therefore, this finding is of very low safety significance.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

W. Beck, Regulatory Assurance Manager  
D. Boyles, Operations  
D. Bucknell, FP Engineer  
J. Burkhead, Quad Cities Nuclear Oversight  
R. Buttke, Design Engineering  
T. Fuhs, Regulatory Assurance  
J. Garrity, Outage Control  
L. Geerts, Fire Marshal  
R. Gideon, Plant Manager  
D. Gullott, Corporate Licensing  
T. Hanley, Dresden Director of Site Engineering  
K. Moser, Quad Cities Director of Site Engineering  
C. Pragman, Corporate Fire Protection  
J. Rathman, Design Engineering  
S. Reynolds, Fire Protection System Engineer  
T. Scott, Operations  
P. Simpson, Corporate Licensing  
M. Taylor, Corporate Fire Protection  
T. Tulon, Site Vice President  
M. Wagner, Regulatory Assurance  
D. Wolf, Design Engineering

#### NRC

L. Kozak, RIII Senior Reactor Analyst  
M. Kurth, Resident Inspector  
J. Lara, RIII Engineering Branch 3 Chief  
K. Stoedter, Senior Resident Inspector

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

05000254/2006002-01(DRS); 05000265/2006002-01(DRS)	NCV	SSMP Credited as a Redundant System for an Appendix R III.G.2 Fire Area (Section 1R05.1b.1)
05000254/2006002-02(DRS); 05000265/2006002-02(DRS)	NCV	Failure to Ensure One Redundant Train of RHRSW Free of Fire Damage (Section 1R05.1b.2)
05000254/2006002-03(DRS); 05000265/2006002-03(DRS)	NCV	Procedure Included Unapproved Fuse Repair for Appendix R (Section 1R05.5b.1)
05000254/2006002-04(DRS); 05000265/2006002-04(DRS)	NCV	Failure to Maintain Acceptable Pre-Fire Plans (1R05.10b.1)
05000254/2006002-05(DRS); 05000265/2006002-05(DRS)	NCV	Failure to Have a Calculation for Hose Stations That Did Not Meet Code Requirements to Ensure Adequate Water Pressure and Flow Rate (1R05.10b.2)
05000254/2006002-06(DRS); 05000265/2006002-06(DRS)	NCV	Failure to Meet NFPA Code Requirements for Class A Fire Extinguishers (1R05.10b.3)

### Closed

05000254/2006002-01(DRS); 05000265/2006002-01(DRS)	NCV	SSMP Credited as a Redundant System for an Appendix R III.G.2 Fire Area (Section 1R05.1b.1)
05000254/2006002-02(DRS); 05000265/2006002-02(DRS)	NCV	Failure to Ensure One Redundant Train of RHRSW Free of Fire Damage (Section 1R05.1b.2)
05000254/2006002-03(DRS); 05000265/2006002-03(DRS)	NCV	Procedure Included Unapproved Fuse Repair for Appendix R (Section 1R05.5b.1)
05000254/2006002-04(DRS); 05000265/2006002-04(DRS)	NCV	Failure to Maintain Acceptable Pre-Fire Plans (1R05.10b.1)
05000254/2006002-05(DRS); 05000265/2006002-05(DRS)	NCV	Failure to Have a Calculation for Hose Stations That Did Not Meet Code Requirements to Ensure Adequate Water Pressure and Flow Rate (1R05.10b.2)
05000254/2006002-06(DRS); 05000265/2006002-06(DRS)	NCV	Failure to Meet the NFPA Code Requirements for Class A Fire Extinguishers (1R05.10b.3)
05000254/2003012-01(DRS); 05000265/2003012-01(DRS)	URI	Cable Ampacity Calculation Methodology (Section 4OA5)

### Discussed

None.

## LIST OF DOCUMENTS REVIEWED

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

### CALCULATIONS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
9198-13-19-1	Calc for SLICE Cable Ampacity Multiplying Factors for the Dresden and Quad Cities Stations, Rev 0	August 24, 1994
DQAMPAC Ver 1.1	Revised Cable Tray Power Cable Ampacities (S-141A)	April 24, 2006
QDC-0000-E-0853	SLICE Cable Ampacity Multiplying Factors for QCNPS, Rev 0	December 2, 1999
QDC-3300-M-0542	Determine Usable Volume in CCSTs for SSMP or RCIC following an App R Fire Event	1
WDC-4100-0691	Combustible Load Calc for Pwr Block, SBO Bldg and Crib Hse	February 18, 2005

### CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED DURING INSPECTION

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
00483345	FP Report Volume 1 Part 2.1-2 Needs Correction	April 26, 2006
00483355	Inconsistent Information in the SSSDR	April 26, 2006
00483752	Discrepancies Have Been Identified in the FHA Table 2.1-2	April 27, 2006
00485387	NFPA Code Deviations Improvement	May 1, 2006
00485413	Measure Currents Flowing in Cables	May 1, 2006
00485702	Required SSDA Actions Not Contained in QCARP 0030-01	May 2, 2006
00487902	SLICE Program Cable Ampacity Issues	May 8, 2006
00488593	Update FP NFPA Deviations	May 10, 2006
00489145	Missing Reference Letter for FP NFPA Code Deviations	May 11, 2006
00489160	Justification of Fire Hose Pressure and Flow Meeting NFPA	May 11, 2006
00489175	Quality of Fire Preplans (2006 FP Triennial)	May 11, 2006
00489285	Relay Setting Changed Without Revising Calculation	May 11, 2006
00489426	Class A Fire Extinguisher Placement Improvements	May 12, 2006
00492546	No Calc for 125Vdc QCARP Lineup	May 22, 2006
00502702	NRC Inspection Finding Concerning App R Redundant Trains	June 22, 2006

### CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED PRIOR TO INSPECTION

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
00040209	Q2000-04344 Certain FP Commitments in the 1979	December 12, 2000
00113343	Incomplete App R Revisions to Tray Routing Numbers	June 26, 2002
00180384	Cable Ampacity Input Discrepancies in SLICE Database	October 10, 2003
00182702	Deficiency Identified in Calculation QDC-0000-E-0853	October 24, 2003

**CORRECTIVE ACTION PROGRAM DOCUMENTS ISSUED PRIOR TO INSPECTION**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
00218683	Existing Cables Not Populated in the SLICE Database	May 4, 2004
00221528	Fire Brigade Turnout Gear/SCBA Location	May 12, 2004
00230758	Wrong Unit Designation on Fire Pre-Plan TB-71	June 23, 2004
00293853	Discrepancy On Fire Pre-plan TB 112 Information	January 25, 2005
00464665	NRC Terminates FP Manual Action Rulemaking	March 10, 2006
00478821	Fire Pre-plans RB-19 and TB-71 Have Incorrect Information	April 14, 2006

**DRAWINGS**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
4E-7573C	S/D ATWS Recirc Pump Trip Sys Div I and II - Part 3	0
4E-6613A	S/D MOVs ½-2901-6 and 7 SSD System	F
4E-1344	S/D 4160V Buses 13-1 and 14-1 Main Feed Breakers	J
M-3	General Arrangement Main Floor Plan	K
M-4	General Arrangement Mezzanine Floor Plan	H
M-6	General Arrangement Basement Floor Plan	C
M-70	Diagram of SSMP System	W
QDC-0000-E-1038, Attach F	App R AC Distribution Diagram	0
QDC-0000-E-1038, Attach F, Pg 2 of 3	App R 250Vdc Distribution Diagram, Rev 0	November 14, 2000
QDC-0000-E-1038, Attach F, Pg 3 of Final	App R 125Vdc Distribution Diagram, Rev 0	November 13, 2000

**ENGINEERING ACTION PLANS**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
00-00-24, Rev 0	SLICE Program and Backlog Reduction	February 19, 2001
00-00-24, Rev 1	SLICE Program and Backlog Reduction	March 28, 2001
00-00-24, Rev 2	SLICE Program and Backlog Reduction	October 15, 2004

**ENGINEERING CHANGES (ECs)**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
354100 001	Abandonment of CO <sub>2</sub> Hose Reels	December 9, 2005
0000360804	Address Triennial Fire Inspection Tray Ampacity Issues Related to Tray Nodes 261M1, 320B, 323M, 325B, and 329B	May 9, 2006
0000360805	Evaluate SLICE Cable Ampacity Issues in Response to Triennial FP Inspection Request	May 8, 2006

**EVALUATIONS**

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
-----	Portable Fire Extinguishers (NFPA 10 and 10A)	May 24, 1985

## EVALUATIONS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
-----	Std for Installation of Standpipe and Hose Systems (NFPA 14)	June 19, 1985
-----	Fire Doors in Nuclear SR Areas	April 9, 1987
-----	FP Survey of HVAC Systems in Computer/Nuclear SR Areas	8

## IMPAIRMENT/REMOVAL PERMITS

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
-----	List of Plant FP Impairments	April 26, 2006

## PROCEDURES

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
CC-AA-211	Fire Protection Program	2
CC-AA-302	Control of the Cable Management Database	2
QCOA 0010-12	Fire/Explosion	27
QCARP 0030-01	TB-III Injection with SSMP and Bringing the Unit to Cold SD	8
QCARP 0040-01	13-1 Injection with SSMP and Bringing the Unit to Cold SD	7
QCARP 0040-02	24-1 Injection with SSMP and Bringing the Unit to Cold SD	9
QCARP 0050-01	SB-1-1 Injection with SSMP and Bring the Unit to Cold SD	10
QCMMS 4100-61	Fire Door Inspection	11
QCOP 2900-02	SSMP System Start Up	18
QOP 6500-10	Local Control of 4160 and 480V MOV Circuit Breakers	8 and 9

## REFERENCES

<u>Number</u>	<u>Description or Title</u>	<u>Date or Revision</u>
-----	Pre-fire Strategies for Reactor Bldg and Turbine Bldg	April 26, 2006
FPR Vol 1 and 2	QCNPS's Fire Protection Report	October 2005
GE Spec 22A2501	GE Specification for Domestic Turnkey Projects	0
GE-NE-T43-00002 -00-01-R01	Original SSD Paths for the BWR	1
GE-NE-T43-00002 -00-03-R01	BWROG Position on the Use of Safety Relief Valves and Low Pressure Systems as Redundant SSD Paths	1
NFPA 14	Standpipe and Hose Systems	1974
NFPA 10	Portable Fire Extinguishers	1975
Q-ECDS-960134	QCNPS Cable Ampacity Report	July 30, 1996
SandL LTR D-3477E	ComEd SLICE Discrepancy Resolution Project	December 23, 1999
SandL LTR Q-2148E	ComEd QCNPS Ampacity Evaluation Info	July 2, 1996
NUREG/CR-6681 (SAND2000-1825)	Ampacity Derating and Cable Functionality for Raceway Fire Barriers	August 2000
SandL Program No. 03.7.528-1.1	DQAMPAC User's Manual - Revised SLICE Ampacity Software	August 31, 1995





## LIST OF ACRONYMS USED

AC or ac	Alternating Current
ADAMS	Agency-Wide Document Access and Management System
App	Appendix
ATTN	Attention
BWROG	Boiling Water Reactor Owners Group
CFR	Code of Federal Regulations
CR	Control Room
DC or dc	Direct Current
DPR	Demonstration Power Reactor
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
FP	Fire Protection
FPP	Fire Protection Program
GL	Generic Letter
FRN	Federal Register Notice
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IPEEE	Individual Plant Examination of External Events
IR	Inspection Report
k	kilo
LLC	Limited Liability Company
MOV	Motor Operated Valve
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NUREG	NRC Technical Report Designation
PARS	Publicly Available Records
QCNPS	Quad Cities Nuclear Power Station
RIII	Region III
RHRSW	Residual Heat Removal Service Water
S/D	Schematic Diagram
SandL	Sargent and Lundy
SD	Shutdown
SDP	Significance Determination Process
SER	Safety Evaluation Report
SLICE	Sargent and Lundy Interactive Cable Engineering
SR	Safety Related
SSA	Safe Shutdown Analysis
SSCA	Safe Shutdown Capability Assessment
SSCs	Structures, Systems and Components
SSD	Safe Shutdown
SSMP	Safe Shutdown Makeup Pump
SSSA	Safe Shutdown System Analysis
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item

