February 10, 2006

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

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2
NRC SUPPLEMENTAL INSPECTION REPORT NO. 05000373/2006002;
05000374/2006002(DRS)

Dear Mr. Crane:

On January 5, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection pursuant to Inspection Procedure 95001 at your LaSalle County Station, Units 1 and 2. This inspection was conducted in response to a White inspection finding associated with the Single Point Vulnerability (SPV) of the 4160 volts AC (Vac) system common metering circuit. This SPV involved a condition wherein a single failure could cause a loss of all onsite and offsite power sources to both 4160 Vac Division 1 and Division 2 safety-related buses of either units. This finding was determined to impact both the Initiating Events and Mitigating Systems Cornerstones. The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on January 5, 2006, with the Site Vice President, Ms. Susan Landahl, and other members of your staff. The NRC was informed of your readiness for the inspection on December 5, 2005.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspector reviewed selected documents and procedures, root cause evaluation, and discussed the issue with engineering staff, and performed field walkdown. The inspector focused on assessing the adequacy of your root cause evaluation and corrective actions taken and planned to address the SPV issue of the 4160 Vac system common metering circuit and your actions to prevent recurrence.

Based on the results of this supplemental inspection, no findings of significance were identified. We determined that comprehensive root cause evaluation, and appropriate corrective actions had been implemented to identify and address the root and contributing causes associated with the failures. Consistent with the guidance in NRC Inspection Manual Chapter 0305, the NRC is treating the White finding associated with the SPV as an “old design issue,” as discussed in our letter to you dated September 7, 2005.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

/RA/

Cynthia D. Pederson, Director
Division of Reactor Safety

Docket Nos. 50-373; 50-374
License Nos. NPF-11; NPF-18

Enclosure: LaSalle Supplemental Inspection Report
05000373/2006002; 05000374/2006002(DRS)

cc w/encl: Site Vice President - LaSalle County Station
Plant Manager - LaSalle County Station
Regulatory Assurance Manager - LaSalle County Station
Chief Operating Officer
Senior Vice President - Nuclear Services
Senior Vice President - Mid-West Regional
Operating Group
Vice President - Mid-West Operations Support
Vice President - Licensing and Regulatory Affairs
Director Licensing - Mid-West Regional
Operating Group
Manager Licensing - Clinton and LaSalle
Senior Counsel, Nuclear, Mid-West Regional
Operating Group
Document Control Desk - Licensing
Assistant Attorney General
Illinois Emergency Management Agency
State Liaison Officer
Chairman, Illinois Commerce Commission

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Manager Licensing - Clinton and LaSalle
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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-373; 50-374
License Nos:	NPF-11; NPF-18
Report No:	05000373/2006002; 05000374/2006002(DRS)
Licensee:	Exelon Generation Company, LLC
Facility:	LaSalle County Station, Units 1 and 2
Location:	2601 N. 21st Marseilles, IL 61341
Dates:	January 3 through January 5, 2006
Inspectors:	M. Munir, Reactor Engineer
Approved By:	J. Lara, Chief Engineering Branch 3 Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000373/2006002; 05000374/2006002(DRS); 01/03/2006 - 01/05/2006; LaSalle County Station, Units 1 and 2; Supplemental Inspection - Initiating Events and Mitigating Systems Cornerstones.

The supplemental inspection was conducted by a regional inspector in accordance with Inspection Procedure 95001, “Inspection for One or Two White Inputs in a Strategic Performance Area.” No findings of significance were identified. 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.

Cornerstone: Initiating Events and Mitigating Systems

The U. S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to follow up on a White inspection finding related to the single point vulnerability (SPV) of the 4160 Vac system common metering circuit (Reference NRC Inspection Report 05000373/2005010; 05000374/2005010). A design deficiency in a metering circuit for the site’s normal 4160 Vac offsite power supply induced a vulnerability whereby a single fault in the common metering circuitry, for a given unit, could have resulted in the loss of all Division 1 and Division 2 safety-related 4160 Vac power. This finding was determined to impact both the Initiating Events and Mitigating Systems Cornerstones. This inspection assessed the licensee’s root and contributing cause evaluation, extent of condition and extent of cause, and completed and proposed corrective actions relating to the SPV of the 4160 Vac system common metering circuitry. Based on the results of this supplemental inspection, the inspector concluded that the licensee had performed a comprehensive root cause evaluation and developed corrective actions to address the concerns associated with SPV. Consistent with the guidance in NRC Inspection Manual Chapter 0305, the NRC is treating the White finding as an “old design issue” as documented in September 7, 2005 letter to Exelon.

A. **<u>Inspector-Identified and Self-Revealed Findings</u>**

None.

B. **<u>Licensee-Identified Violations</u>**

None.

REPORT DETAILS

01 INSPECTION SCOPE

The U.S. Nuclear Regulatory Commission performed this supplemental inspection to assess the adequacy of the licensee's root cause and contributing cause evaluation, the extent of condition and extent of cause, and the completed and proposed corrective actions relating to the single point vulnerability (SPV) of the 4160 Vac system common metering circuitry. This SPV could result in a loss of all onsite and offsite power sources to both the 4160 Vac Division 1 and Division 2 safety-related buses at either unit impacting both the Initiating Events and Mitigating Systems Cornerstones.

01.01 Background Information

On January 27, 2005, a single failure vulnerability, which could prevent both Emergency Diesel Generators (EDGs) and both offsite power sources from supplying power to their respective engineered safeguards (ES) buses, was discovered at Crystal River Unit 3. This was a condition reportable under 10 CFR 50.72 (b)(3)(ii)(B), for a plant being in an unanalyzed condition that significantly degraded plant safety (ENS 41362).

On February 1, 2005, LaSalle Station Electrical System Engineering personnel were informed of the Crystal River event by the NRC. Subsequently, the Station engineers reviewed the 4160 Vac safety related buses relaying and metering circuits to determine whether a similar vulnerability existed at LaSalle. Plant engineers determined that a single failure vulnerability existed at LaSalle between the current transformer (CT) circuits of the divisional safety related buses (e.g., 141Y, 142Y, 241Y, and 242Y). The CT circuits that supply the overcurrent relay scheme for each divisional bus were connected to a common point that supplied control room indication for the total system auxiliary transformer (SAT) Y winding power (wattmeter) and current (ammeter). An open circuit condition on any of the CT phases downstream of the common point in the circuit would result in an unbalanced current condition. The unbalanced current condition would initiate a trip of the associated SAT feed breakers for the applicable buses (i.e., 141Y and 142Y, 241Y and 242Y). Following a trip of the bus feed breakers, the lockout relay for the respective bus would initiate a trip of the other bus breakers and prevent any closure of these breakers. The result is a loss of all onsite and offsite AC power sources to both Division 1 and Division 2 safety related buses, because no emergency diesel generator (EDG) or offsite power source would be permitted to close onto the respective Division 1 and Division 2 safety buses. This condition was communicated to the NRC via a Licensee Event Report (LER) 2005-001 as required by 10 CFR 50.72 (b)(3)(ii)(B), for a plant being in an unanalyzed condition that significantly degraded plant safety.

A finding with a low to moderate safety significance (White) was identified following the review of the LER that communicated to the NRC a design deficiency in the 4160 Vac SAT common metering circuitry. An associated violation of the requirements of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," was also identified. The violation was cited as modifications to the emergency diesel generator (EDG) output circuit breakers that were not subjected to design control measures commensurate with those applied to the original design.

On September 7, 2005, the NRC documented the final significance determination of the issue. The LaSalle SPV was determined to be a White finding.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determine that the evaluation identifies who (i.e., licensee, self-revealing, or NRC), and under what conditions the issue was identified.

   The issue of SPV at LaSalle was identified by the licensee upon performing an applicability review of the Crystal River ENS 41362.

b. Determine that the evaluation documents how long the issue existed, and prior opportunities for identification.

   The root cause evaluation indicated that this issue existed since the initial design and construction phase. It also indicated that this condition was compounded by a modification to the emergency diesel generator output breaker circuitry in the late 1980s. The root cause evaluation included in its report a section titled 'Discovery Opportunities' that discussed in detail the opportunities that were missed to discover this design deficiency.

c. Determine that the evaluation documents the plant specific risk consequences (as applicable) and compliance concerns associated with the issue.

   A risk assessment was performed to provide an estimate of Core Damage Probability associated with LaSalle Units 1 and 2 operating for greater than one year with an identified single failure vulnerability in 4160 Vac bus metering circuitry. The increase in base core damage frequency was determined using the PRA models of record. Dominant scenarios for LaSalle included those with success of initial injection but loss of decay heat removal. The Core Damage Probability calculated for LaSalle was 2E-6. At LaSalle, both divisions of ECCS are lost (only High Pressure Core Spray (HPCS) and Reactor Core Isolation Cooling (RCIC) are available), as well as all decay heat removal (including emergency containment venting).

   Based upon the licensee's analysis and actions, the inspector concluded that the licensee appropriately addressed the risk consequences and compliance concerns associated with this issue. No compliance issues were identified.

02.02 Root Cause and Extent of Condition and Extent of Cause Evaluation

a. Determine that the problem was evaluated using a systematic method(s) to identify root cause(s) and contributing cause(s).

   The licensee used the following methods for performing this investigation: performance of interviews, review of applicable design documents, related Condition Reports, Event and Causal Factor Charting, Barrier Analysis; and Failure Modes and Effects Analysis methodology. The licensee's root cause evaluation results and conclusions were based upon the outcome of these root cause evaluation tools.

The inspector determined that the methods used to evaluate the root and contributing causes were adequate and commensurate with the significance of the SPV issue.

b. Determine that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem.

The inspector concluded that the root cause evaluation was sufficiently self-critical and conducted to a level of detail commensurate with the significance of the SPV issue. The root cause explored the associated design and human performance issues that contributed to the existence and continuation of the design deficiency.

The root cause evaluation noted that this design deficiency at LaSalle could result in an increased likelihood of a transient without power conversion system and a loss of offsite power. In both cases, all alternating current (AC) power will be unavailable to support mitigation systems such as both divisions of ECCS and decay heat removal (including emergency containment venting) with the exception of HPCS, powered by the Division 3 EDG and RCIC, which is supported by station batteries with no dedicated battery chargers.

c. Determine that the root cause evaluation included a consideration of prior occurrences of the problem and knowledge of prior operating experience.

The root cause evaluation has a dedicated section entitled, "Previous Events." This section considered prior occurrences. A review was performed of relevant previous site and industry events to determine if any corrective actions to prevent recurrence or industry experience recommendations were ineffective, and to determine if this was a repeat event. An extensive search was conducted of both Internal (Exelon) and External (INPO, NRC websites). A review of Historical Exelon Incident Reports, Nuclear Event Reports, and Nuclear Operations Notifications did not identify any previous similar occurrences or events. The above searches identified events related to single failure criteria, but none would have prompted a review of protective relaying for the 4160 Vac buses. As a result, the review that was performed of relevant previous site and industry events determined that there were no effective corrective actions to prevent recurrence or related ineffective industry experience recommendations. In addition, this event was determined to not be a repeat event.

d. Determine that the root cause evaluation addresses the extent of condition and the extent of cause of the problem.

A comprehensive extent of condition and extent of cause was performed across the Exelon fleet. Each station performed the extent of condition and extent of cause review and forwarded the results and conclusions to Corporate Engineering for second level review. An oversight review by the Corporate was performed to confirm the results of the second level review. LaSalle performed a comprehensive extent of condition and extent of cause review covering both AC and DC systems, safety and non safety electrical systems. A review of the fire safe shutdown analysis was also done to ensure that the potential to trip/lockout and/or prevent closure of the breaker for the fire safe shutdown load has been identified in the fire safe shutdown analysis.

02.03 Corrective Actions

e. Determine that appropriate corrective action(s) are/were specified for each root/contributing cause or that there is/was an evaluation that no actions are/were necessary.

The corrective actions were determined to be appropriate for the items addressed in the root cause evaluations. The licensee addressed the root cause of the SPV in the 4160 Vac common metering circuit by implementation of a permanent modification to the common metering circuit on Unit 2 and a temporary modification on Unit 1. A permanent modification on Unit 1 is scheduled to be performed in the next 2006 refueling outage.

The corrective action to prevent recurrence is currently in place in the Configuration Change Procedures used to install new changes at Exelon facilities. Separation and SPV reviews, and failure mode and effect conditions are part of the preparation and review process contained in existing Exelon procedures. The existing Human Performance Technical standards would also prevent the recurrence of the design deficiency.

The licensee also conducted a training for their engineering staff to emphasize the issue of SPV.

Overall, the inspector concluded that the licensee took appropriate and adequate corrective actions to address the issues identified in the root cause evaluation.

f. Determined that the corrective actions have been prioritized with consideration of the risk significance and regulatory compliance.

While it was not clear if specific risk information was used in prioritizing the corrective actions, it appears that the licensee scheduled and performed the corrective actions based upon overall plant conditions and vulnerabilities. The licensee identified corrective actions to address the root causes and contributing cause identified in the evaluations. Corrective actions that addressed the root causes and contributing causes were prioritized higher than corrective actions not directly associated with the root and contributing causes.

g. Determine that a schedule has been established for implementing and completing the corrective actions.

The inspector determined that the licensee had completed essentially all of the corrective actions identified in the root cause evaluation. The only exceptions to having all actions complete were the implementation of a permanent modification on Unit 1 and the effectiveness reviews.

A field verification of modification EC 0353705 relating to Unit 2 and the temporary modification for Unit 1 was performed by the inspector.

Based upon review of the root cause evaluations and the completed and proposed corrective action items, the corrective actions were being properly assigned, scheduled and implemented.

h. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

Effectiveness reviews were put in place by the licensee to evaluate how effective the corrective actions for the root and contributing causes have been in preventing the recurrence of the SPV in new designs. The effectiveness reviews were not completed when this supplemental inspection was performed. These reviews are scheduled to be performed by the end of the first quarter of 2006.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

On January 5, 2006, the inspector presented the inspection results to the Site Vice President, Ms. Susan Landahl, and other members of licensee staff. The licensee acknowledged the issues presented.

The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

S. Landahl, Site Vice President
D. Enright, Plant Manager
P. Holland, Regulatory Assurance Coordinator
T. Simpkin, Regulatory Assurance Manager
W. Kirchoff, Design Engineering
E. Seckinger, Design Engineering
F. Gogliotti, Site Engineering Director

Nuclear Regulatory Commission

D. Kimble, Senior Resident Inspector

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.

Documents Reviewed During Inspection

Root Cause Evaluation (ATI No. 00299641-03); Single Failure Vulnerability of Safety Related Division 1 & 2 Protective Relay Circuitry Root Cause Analysis

Extent of Condition AR 299641-08; AR 299641-68

Operability Evaluation No. OE05-001; Revision 0

AR 00299188 Report; Lack of Minimum 6" Physical Separation in Division 1 and 2 CT's

AR No. 00357793; Safe Shutdown System CT Circuit Disposition for Hot Shorts

AR No. 00357766; HP Cables Not Identified in Fire Protection Plan

AR No. 00304048; Post Fire Safe Shutdown Procedures LOA-FX-101/201 Not Update; dated February 22, 2005

Engineering Change No. 0000353705; Modify Metering Circuit Common to 241Y and 242Y; Revision 0

CC-AA-102; Design Input and Configuration Change Impact Screening; Revision 11

CC-AA-103; Configuration Change Control; Revision 10

ER-AA-2004; System Vulnerability Review Process; Revision 2

HU-AA-1212; Technical Task Rigor/Rigor Assessment, Pre-Job Brief, Independent Third Party Review, and Post-Job Brief; Revision 0

LOA-FX-101; Unit 1 Safe Shutdown with a Loss of Offsite Power and a Fire in the Control Room or AEER; Revision 7

LOA-FX-201; Unit 2 Safe Shutdown with a Loss of Offsite Power and a Fire in the Control Room or AEER; Revision 8

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CT	Current Transformer
DRS	Division of Reactor Safety
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
ENS	Emergency Notification System
ESS	Engineered Safeguards
HPCS	High Pressure Core Spray
INPO	Institute of Nuclear Power Operations
IR	Inspection Report
NRC	Nuclear Regulatory Commission
RCIC	Reactor Core Isolation Cooling
SPV	Single Point Vulnerability
Vac	Volt Alternating Current