



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

November 29, 2010

EA-10-185

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION – CLINTON POWER
STATION NRC INSPECTION REPORT 05000461/2010-003**

Dear Mr. Pacilio:

On September 1, 2010, Mr. F. A. Kearney, Exelon Generation Company, LLC (Exelon) Clinton Power Station Site Vice President, provided a response to U.S. Nuclear Regulatory Commission (NRC) Inspection Report No. 05000461/2010-003 issued on August 3, 2010, concerning activities conducted at your facility. Specifically, Mr. Kearney's letter stated that Exelon contested non-cited violation (NCV) 05000461/2010003-01, regarding the failure to meet the requirements of Title 10 of the Code of Federal Regulations (10 CFR) 50.72, "Immediate notification requirements for operating nuclear reactors," and 10 CFR 50.73, "Licensee event report system". To further explain the basis for contesting the violation, your staff provided a white paper to the NRC on October 26, 2010. A copy of the paper can be found in the NRC's Agencywide Documents Access and Management System (ADAMS) (under Accession Number ML103010333).

On September 22, 2010, the NRC acknowledged the September 1, 2010 letter. We have completed our review and determined that the violation occurred as stated in the inspection report. The finding and NCV will remain as documented in the inspection report.

Mr. Kearney's September 1, 2010, letter stated that there was no violation of NRC reporting requirements in 10 CFR 50.72 and 50.73. The following points summarize the main basis for contesting the violation:

- The violation did not take into account that the level of the suppression pool will not decrease below minimum net positive suction head (NPSH) requirements of the emergency core cooling systems (ECCS) described in the CPS Updated Safety Analysis Report (USAR).
- The minimum suppression pool water level to support minimum vent coverage per USAR 6.2.4.3.3 is 727'-1" (or 15'-1" suppression pool level).
- Given the elevation of the embedded drain line in the Residual Heat Removal (RHR) Pump Room, the lowest elevation to which the suppression pool could be drained is 720'-6" (or 8'-6" suppression pool level).

- Given the assumed leakage rate, the plant could be in cold shutdown prior to the suppression pool level decreasing below the minimum suppression pool level required for minimum vent coverage.
- The USAR describes the minimum required NPSH requirement for all of the ECCS pumps to be 5 feet.
- The center line elevations of the ECCS pumps range from 710'-0" to 710'-6 ¾", yielding approximately 10' of NPSH for the ECCS pumps, if the suppression pool was drained to 720'-6". This is greater than the minimum required NPSH of 5' described in the CPS USAR.

The white paper provided on October 26, 2010, discussed several additional details regarding the basis for contesting the finding:

- The top of the RHR suction line is at 720'-10" (or 8'-10" suppression pool level).
- The denial letter used the term "NPSH" rather than "elevation head available" for the ECCS pumps. All of the "elevation head available" values would ensure that the minimum NPSH requirements of the pumps would be met.
- In the postulated scenario there would be sufficient time to identify a suppression pool leak and take actions.

NRC Staff's Review:

We reviewed the information Exelon provided to determine if the NCV was properly characterized. The NRC staff members who reviewed your basis for contesting the NCV were independent of the initial inspection effort. After careful consideration, we have concluded that the violation occurred as stated in the inspection report.

We have evaluated the information that formed your basis that the condition described in the inspection report did not result in the plant being in an unanalyzed condition that significantly degraded plant safety and could have prevented fulfillment of the safety function of ECCS. Our conclusions were based on the requirements of 10 CFR 50.72 and 10 CFR 50.73. The following documents were reviewed to complete our independent evaluation:

- Clinton Power Station NRC Integrated Inspection Report No. 05000461/2010-003, August 3, 2010;
- U-603981, Letter from Kearney, F.A., Response to NRC Integrated Inspection Report No. 05000461/2010-003, September 1, 2010;
- Technical Specification 3.6.2.2 Suppression Pool Water Level;
- Technical Specification 3.5.2 ECCS-Shutdown;
- RS-01-250, Letter from Jury, K. R, Request for Amendment to Appendix A, Technical Specifications to Revise Suppression Pool Water Level and Upper Containment Pool Water Level Requirements in Mode 3, November 16, 2001;

- Safety Evaluation – Clinton Power Station Unit 1, Proposed Amendment to Change the Technical Specifications to Revise the Water Levels in the Upper Containment Pool and the Suppression Pool (TAC No. MB 3578), April 29, 2003;
- Licensee Event Report 2010-001, Unanalyzed Leakage Pathway Affecting Residual Heat Removal A Pump Room Flooding Analysis, March 25, 2010;
- NUREG-1022, revision 2, Event Reporting Guidelines, 10 CFR 50.72 and 10 CFR 50.73, October 2000;
- NRC Inspection Manual Part 9900 Technical Guidance, Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety, April 16, 2008;
- Clinton Power Station Updated Safety Analysis Report; and
- White paper titled, “Interconnecting Floor Drain Impact on ECCS Safety Function,” (ML103010333).

The inspection report describes an unanalyzed condition that was identified by NRC inspectors where the floor drains in the RHR A Pump Room were interconnected with the Radwaste Pipe Tunnel. The as-found condition had the potential, given a postulated pipe rupture of the pump suction line, to drain the suppression pool until the level was below the Control Building floor drain level (720'6", or 8'6" suppression pool level). The inspection report documents an NCV of the NRC's reporting requirements in 10 CFR 50.72(a)(1) and 10 CFR 50.73(a)(1) for failing to make a required 8-hour non-emergency notification call and for failing to submit a required Licensee Event Report within 60 days after discovery on October 7, 2009, of a condition that resulted in the plant being in an unanalyzed condition that significantly degraded plant safety and could have prevented the fulfillment of the safety function of the emergency core cooling system.

A review of the Clinton UFSAR indicates that an unisolable moderate energy pipe break of the ECCS suction line in the RHR A Pump Room is a postulated initiating event that is analyzed concurrent with a loss of offsite power, safe shutdown earthquake, and a single active failure. The safety analysis concludes that such an event will not drain the suppression pool and will not impact the operability of the RHR B, RHR C, or RCIC systems. Upon discovery of the interconnection between the floor drains in the RHR A Pump Room and the Radwaste Pipe Tunnel, the UFSAR safety analysis of the moderate energy pipe break was no longer bounded by the evaluation contained in Section D 3.6.3.2.1 of the UFSAR. The potential for draining the suppression pool and impacting the other ECCS systems was an unanalyzed condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded safety which required an 8-hour report to the NRC under 10 CFR 50.72(b)(3)(ii)(B). Although the condition was immediately corrected by installing floor drain plugs, a 60 day licensee event report was also required under 10 CFR 50.73 (a)(2)(ii)(B).

Regarding your position that the violation did not take into account that the suppression pool will not decrease below minimum ECCS NPSH requirements, the inspection report indicates that this was considered by reviewing the TS requirements for suppression pool level and comparing those minimum levels to the lowest level that the suppression pool could potentially drain to in the postulated scenario. Minimum suppression pool water level is governed by several

Technical Specification requirements. The TS 3.6.2.2, which is applicable in Modes 1, 2, and 3, requires suppression pool water level to be above 18'-11". The TS surveillance requirement 3.5.2.1, which is applicable in Modes 4 and 5, requires suppression pool level to be above 12'-8". The TS bases for 3.6.2.2 focus on having adequate level to condense steam released from safety relief valves or from the RCIC turbine exhaust. The TS bases for 3.5.2.1 specifically state that the water level is to ensure that the suppression pool will provide adequate net positive suction head for the ECCS pumps, recirculation volume, and vortex prevention. In summary, the TS provide various minimum suppression pool levels depending on plant mode, the highest minimal level being 18'-11" and the lowest minimum level being 12'-8". Since the postulated lowest level the suppression pool could drain to is 8'-6", which is below any of the levels described in the TS, we could not conclude that the ECCS pumps would have adequate NPSH in the postulated scenario.

Mr. Kearney's September 1, 2010, letter used the comparison of center line elevations of the ECCS pumps to the projected minimum suppression pool level in the event of a pipe break in the RHR A Pump Room to provide a justification that available NPSH would be greater than the 5' required ECCS NPSH specified in the UFSAR. Further explanation was provided that this was "elevation head" rather than an NPSH calculation. However, the conclusion was unchanged in that, adequate "elevation head" would provide adequate NPSH and that virtually any pool depth will provide adequate NPSH. The comparison of elevations to conclude that adequate NPSH would be available is not consistent with UFSAR calculations for NPSH and is not adequate to justify that the safety function of the ECCS was maintained. The UFSAR Sections 5.4.7.2.2, 6.3.2.2.1, and 6.3.2.2.3 describe the method for calculating available NPSH which requires the consideration of suppression pool temperature, containment pressure, pump flow, suppression pool level, suction piping losses, and suction strainer loading. Additional specific information about the calculation of adequate NPSH for shutdown conditions was provided in License Amendment 156. In the NRC's SER approving this TS change, the minimum suppression pool level at which adequate NPSH is available is stated to be 9 feet above the bottom of the suppression pool. The SER further states that this level is also sufficient to eliminate concerns such as vortexing, flashing, and cavitation. It was not evident that any of these factors were considered in your evaluation that adequate NPSH would be maintained with suppression pool level at 8'-6".

Regarding your staff's statement that the plant could be in cold shutdown prior to the suppression pool level decreasing below the minimum level required for vent coverage, we reviewed various sections of the UFSAR and the guidance provided in NUREG-1022. The UFSAR Section 3.6.1.1.5 states that the systems required to shut down the plant and maintain it in a safe shutdown condition are identified in Table 3.6-1. This table identifies many systems, including all ECCS systems and the residual heat removal system, indicating that any of these systems may be used to achieve and maintain safe shutdown. Your staff's evaluation demonstrates that safe shutdown may still be achieved by utilizing other safe shutdown systems in the event the suppression pool level decreases below the minimum level required for ECCS operability. However, NUREG-1022 guidance indicates that an event report is required for events or conditions where a safety system could have failed to perform its intended function regardless of whether or not an alternate safety system could have been used to perform the safety function.

Although it is possible that operators could take some actions to stop the leak and suppression pool level decrease, these actions are not described in the UFSAR and cannot be credited in determining if ECCS can perform its function in the postulated event.

Given that in the postulated event, the suppression pool level could have drained to a level lower than what is analyzed in the TS and UFSAR as adequate to support ECCS operability, we have confirmed that this condition also was required to be reported as a condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to shutdown the reactor and maintain it in a safe shutdown condition, pursuant to 10 CFR 50.72 (a)(2)(v)(A) and 10 CFR 50.73(a)(2)(v)(A). Note that this citation is different than the original inspection report that focused on the use of the ECCS systems to mitigate the consequences of an accident rather than the ECCS safe shutdown function in response to moderate energy line breaks concurrent with loss of offsite power, safe shutdown earthquake, and a single active failure.

NRC Conclusion:

We have concluded that the violation documented in NRC Inspection Report No. 05000461/2010-003 is valid. You discovered a condition that resulted in the plant being in an unanalyzed condition that significantly degraded plant safety and could have prevented fulfillment of the safety function of the ECCS on October 7, 2009, and failed to make a required 8-hour non-emergency notification call to the NRC and also failed to submit a required LER within 60 days after the discovery of the condition.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and your September 1, 2010, response will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA by Steven West Acting for/

Cynthia D. Pederson
Deputy Regional Administrator

Docket No. 50-461
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Sincerely,
/RA by Steven West Acting for/
 Cynthia D. Pederson
 Deputy Regional Administrator

Docket No. 50-461
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¹ Concurrence from OE received via e-mail from C. Hott on November 26, 2010.

Letter to Michael J. Pacilio from Cynthia D. Pederson dated November 29, 2010

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STATION NRC INSPECTION REPORT 05000461/2010-003

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