Exelon
Nuclear

Clinton Power Station
8401 Power Road
Clinton, IL 61727

U-603949
March 25, 2010

SRRS 5A.108

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Licensee Event Report 2010-001-00

Enclosed is Licensee Event Report (LER) No. 2010-001-00: Unanalyzed Leakage Pathway Affecting Residual Heat Removal A Pump Room Flooding Analysis. This report is being submitted as a voluntary LER as provided in NUREG 1022.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this report, please contact D. J. Kemper, at (217)-937-2800.

Respectfully,

P. A. Kearney
Site Vice President
Clinton Power Station

JLP/blf

Enclosures: Licensee Event Report 2010-001-00

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Clinton Power Station
Office of Nuclear Facility Safety – IEMA Division of Nuclear Safety

IE22
NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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**4. TITLE**
Unanalyzed Leakage Pathway Affecting Residual Heat Removal A Pump Room Flooding Analysis

| 5. EVENT DATE | | | 6. LER NUMBER | | | 7. REPORT DATE | | | 8. OTHER FACILITIES INVOLVED | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REV NO. | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| | | | | | | | | | | 05000 |
| 10 | 07 | 2009 | 2010 | - 001 - | 00 | 03 | 25 | 2010 | FACILITY NAME | DOCKET NUMBER 05000 |

**9. OPERATING MODE**
1

**10. POWER LEVEL**
97

**11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:** *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- x OTHER

Specify in Abstract below or in NRC Form 366A

**12. LICENSEE CONTACT FOR THIS LER**

| FACILITY NAME | TELEPHONE NUMBER *(Include Area Code)* |
|---|---|
| D. J. Kemper, Regulatory Assurance Manager | (217) 937-2800 |

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

**14. SUPPLEMENTAL REPORT EXPECTED**

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* x NO

**15. EXPECTED SUBMISSION DATE**

| MONTH | DAY | YEAR |
|---|---|---|
| | | |


ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

This is a voluntary LER to address certain aspects of the flooding analysis associated with a postulated piping break in the Residual Heat Removal (RHR) A pump room. Upon discovery of a drain line connecting the RHR A pump room to the radwaste pipe tunnel leading outside secondary containment, immediate actions were taken to permanently plug the line to eliminate this pathway.

An apparent cause evaluation was performed following the discovery of this condition and a review of the plant safety analysis was performed to determine that, in the event of a break in the suction line of the RHR A suction line causing the RHR A pump room to flood, there is sufficient time to safely shut down the plant and mitigate the event before any loss of safety function would occur.

This condition has been reviewed and evaluated regarding whether this condition was a serious degradation of a plant safety barrier, an unanalyzed condition that significantly degraded plant safety, or an event or condition that could have prevented fulfillment of a safety function. NUREG-1022, Sections 3.2.4 and 3.2.7, were reviewed and the station found the guidance to support not reporting the event, however, it was determined that sufficient ambiguity existed to support reporting this event as a voluntary LER.

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NARRATIVE

EVENT DESCRIPTION

A review of plant drawings on October 7, 2009, revealed a potential issue with a floor drain [DRN] in Residual Heat Removal (RHR) [BO] A Pump [P] Room (located on the 707' - 6 elevation). Plant drawings indicated that floor drain piping was connected to floor drains in the Radwaste Pipe Tunnel via a 4-inch diameter pipe embedded in the floor that is located along the western wall of the adjacent Control Building [NA] at elevation 720' – 6".

Most of the floor drain piping in this area is embedded in the concrete base mat of the Auxiliary Building or in the concrete floor of the Radwaste Pipe Tunnel at top of concrete elevation 720'-6". There is about a 10 foot long section of drain piping exposed in the Low Pressure Core Spray (LPCS) [BM] pump room. Attempts to determine if the floor drains were interconnected were inconclusive; therefore, as a conservative measure, the floor drains were assumed to be interconnected, and an isolation plate was welded into the exposed 4-inch pipe in the LPCS pump room on October 8, 2009, in accordance with Work Order 1274884-01. As a result of the plate installation, there is no longer a potential for the floor drains to communicate.

The floor drain piping was originally installed prior to the concrete pours in the lower elevations of the plant. This installation pre-dates startup of the plant, and as such, it is a historical legacy issue. An apparent cause evaluation was performed under Issue Report (IR) 976295 which determined that the cause was inadequate design. This evaluation was completed on November 9, 2009.

The evaluation concluded that with respect to internal flooding as required by General Design Criteria (GDC) 4, Environmental and Dynamic Effects Design Basis, safe shutdown is assured as required by the licensing basis and all functional design requirements were met.

It was questioned whether this condition was a serious degradation of a plant safety barrier or an unanalyzed condition that significantly degraded plant safety. While it could be postulated that the RHR pump room would flood up to the elevation of the drain line, the suppression pool volume would decrease by the same amount. This condition contradicted Updated Safety Analysis Report (USAR) Section 3.8.4.1.1 auxiliary building design which states that in the event of a pipe rupture, the flooding in one compartment will not result in the flooding of any other compartment, and the failure of a pump suction line will not drain the suppression pool.

USAR Section 3.6 describes the acceptability of effects associated with the postulated rupture of piping. This section states that coincident with the piping failure, the functional failure of any single active component, a seismic event the level of a safe shutdown earthquake and a loss of offsite power are assumed to occur. The USAR states that the safety function will not be impaired beyond that required to bring the plant to a safe shutdown.

A moderate energy break of the RHR A suction piping has been calculated to result in a leakage rate of 206 gallons per minute (gpm) into the RHR A pump room. Assuming that the motor-operated RHR pump suction valve, 1E12F004A, fails to close (i.e., failure of single active component), a seismic event and a loss of offsite power occur at the same time, the plant must be brought to a safe shutdown.

GDC 34, Residual Heat Removal, is satisfied through the use of redundant components and features assuming a single failure. (Reference USAR 3.1.2.4.5).

Leakage into the RHR A Pump Room is assumed to occur. Using the 206 gpm leakage rate, the room will fill up at a rate of 0.031 ft/min or 1.86 ft/hr.

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The elevation of the RHR A Pump Room floor is 707"-6" and the room is designed to be watertight up to elevation 731'-5". The elevation of the line that connects to the RHR A pump room is 720'-6", or 13'-0" off the floor. Based on the leakage rate into the room, it will take approximately 7 hours to reach the elevation of 720'-6". The room will continue to fill.

The suppression pool design parameters, such as level and volumes, are shown in USAR Table 6.2-1. The suppression pool water volume at low suppression pool water level (730"-11") is 135,220 $ft^3$ (containment) plus 10,707 $cuft^3$ (drywell). The minimum suppression pool water level is 727'-1" (minimum vent coverage) per USAR 6.2.4.3.3 and mechanical design drawing M05-1069. This volume of water is approximately 224,000 gallons. Upper pool dump, which adds 14,748 $ft^3$ (110,000 gallons), provides an additional 2'-0" (approx.) to the suppression pool, if needed. If suppression pool level were to approach the minimum suppression pool water level, Emergency Operating Procedures would direct the Control Room operators to dump the upper pool prior to reaching 727'-1". At a rate of 206 gpm, without upper pool dump, the suppression pool could lower to the minimum vent coverage level in approximately 18 hours. If the upper pool dump volume is considered, this would add 9 hours, for a total of 27 hours, to reach the minimum design level irrespective of any flooding issues in the RHR A pump room. Additionally, operators can add water to the suppression pool from the Cycled Condensate Storage Tank (CST) [KA] using CPS Procedure 3208.01, "Cycled/Makeup Condensate". This procedure provides a means of gravity draining of the CST to the suppression pool. The CST has a usable volume of 312,000 gallons and provides additional several hours of water inventory.

Assuming that a loss of offsite power occurs at the time of the piping failure in the RHR A pump room, a reactor scram will occur accompanied with an isolation of the main steam isolation valves. The Reactor Core Isolation Cooling (RCIC) [BN] system will initiate on low water level and will inject automatically. RCIC system operation will continue to occur until reactor pressure is reduced to 150 psig. No credit is taken for water additions to the suppression pool from the RCIC tank due to RCIC operations. However, the volume of the RCIC tank contains several hours of RCIC operation (about 125,000 gallons) prior to switching to the suppression pool.

High Pressure Core Spray [BG], Low Pressure Core Spray, and RHR C system are available to continue the cooldown to cold shutdown and RHR B can be operated in the Shutdown Cooling mode to maintain the unit in cold shutdown. Cold shutdown can be achieved in about 11 hours with only one heat exchanger in operation (reference USAR Fig. 5.4-12). This is well within the time before the suppression pool would lower to the minimum suppression pool water level of concern.

CAUSE OF EVENT

The cause of this event was determined to be a historical design oversight during plant construction that allowed the RHR A pump room floor drains to be connected to the radwaste pipe tunnel.

SAFETY ANALYSIS

This event did not result in any safety system functional failure.

A flooding event due to a moderate energy break concurrent with a loss of offsite power is not likely to occur.

This event is considered to have no safety significance since there was no actual loss of a safety function.

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NARRATIVE

Based on the above, significant margin exists to achieve cold shutdown well within the time required before minimum vent coverage would be reached, or well before any loss of safety function.

In summary, based on an analysis of a postulated piping break coincident with a single active failure of the pump suction valve does not result in loss of safety function, degradation of plant safety barriers, or unanalyzed condition.

CORRECTIVE ACTIONS

The original design issue was corrected with the installation of a welded plate in the floor drain line. An Engineering Change 377321 was initiated to capture the welded plate into plant design documents.

PREVIOUS OCCURRENCES

None

COMPONENT FAILURE DATA

None