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Proprietary Information – Withhold from Public Disclosure Under 10 CFR 2.390

RS-16-193 10 CFR 50.90

October 27, 2016

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

LaSalle County Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: License Amendment Request to Revise Suppression Pool Swell Design Analysis

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC (EGC) requests an amendment to Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. The proposed changes revise the suppression pool swell design analysis. The new analysis utilizes a different computer code and incorporates different analysis assumptions than the current analysis. The changes are necessary because the current design analysis determining the suppression pool swell response to a Loss of Coolant Accident (LOCA) was determined to be non-conservative.

The attached request is subdivided as follows:

- Attachment 1 provides a description and evaluation of the proposed changes.
- Attachment 2 provides the GE Hitachi Nuclear Energy (GEH) Report for Pool Swell Response.
- Attachment 3 provides the GEH affidavit supporting the proprietary nature of the information in Attachment 2.
- Attachment 4 provides the non-proprietary version of Attachment 2.

Attachment 2 contains proprietary information as defined by 10 CFR 2.390. GEH, as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was

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provided to EGC in a GEH transmittal that is referenced by the affidavit. The proprietary information has been faithfully reproduced in the enclosed document such that the affidavit remains applicable. Accordingly, it is respectfully requested that the enclosed proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390 and 10 CFR 9.17.

The proposed changes have been reviewed by the LSCS Plant Operations Review Committee in accordance with the requirements of the EGC Quality Assurance Program.

EGC requests approval of the proposed license amendment request by October 27, 2017, to enable resolution of a non-conforming condition and support closeout of an open operability evaluation. Once approved, the amendments will be implemented within 60 days.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this application for license amendment by transmitting a copy of this letter and its attachments to the designated State Official.

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Ms. Lisa A. Simpson at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 27th day of October 2016.

Respectfully,

Patrick R Simpson

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1) Evaluation of Proposed Changes
2) GE Hitachi Nuclear Energy Report 003N9278-R0-P, "Exelon Nuclear LaSalle County Generating Station Units 1 & 2 Pool Swell Response," October 2016 (Proprietary)
3) GE Hitachi Affidavit Supporting Proprietary Nature of Information in Attachment 2
4) GE Hitachi Nuclear Energy Report 003N9278-R0-NP, "Exelon Nuclear LaSalle County Generating Station Units 1 & 2 Pool Swell Response," October 2016 (Non-Proprietary)

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector, LaSalle County Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1
Evaluation of Proposed Changes

SUBJECT: License Amendment Request to Revise Suppression Pool Swell Design Analysis

1.0 SUMMARY DESCRIPTION

This evaluation supports a request to amend Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. The proposed changes revise the suppression pool swell design analysis. The new analysis utilizes a different computer code and incorporates different analysis assumptions than the current analysis. The changes are necessary because the current design analysis determining the suppression pool swell response to a Loss of Coolant Accident (LOCA) was determined to be non-conservative.

Approval of this amendment application is requested by October 27, 2017. Once approved, the amendments will be implemented within 60 days.

2.0 DETAILED DESCRIPTION

The revision to the LSCS suppression pool swell design analysis resulted in four changes. This license amendment request (LAR) describes and provides the technical justification to support each change. The four changes addressed in this LAR are as follows:

1) The analysis of record (AOR) conservatively uses downcomer vent flow consisting of air; the new analysis initially uses air flow and transitions to a realistic air/steam mixture.

2) The new analysis uses the GE Hitachi Nuclear Energy (GEH) TRACG computer code to determine break mass and energy release.

3) The new analysis does not account for drywell downcomer vent back pressure for drywell pressurization.

4) The calculated suppression pool swell profiles are modified to meet the U.S. Nuclear Regulatory Commission (NRC) acceptance criteria for swell height.

These changes to the suppression pool swell design analysis do not require any changes to the LSCS Technical Specifications. Changes to the LSCS UFSAR related to changes to the suppression pool swell design analysis will be made in accordance with 10 CFR 50.71(e) following NRC approval of the proposed changes.

3.0 BACKGROUND

On July 15, 2016, a meeting was held between the NRC and representatives of LSCS and GEH to discuss the plans to submit this LAR to revise the suppression pool swell design analysis (Reference 1). During this meeting, each of the proposed changes was discussed in detail. The background and issue overview is presented below, and a detailed technical analysis and justification for each of the four issues is provided in Section 4.0.

3.1 LSCS Suppression Pool Swell Phenomena

Following the DBA LOCA (i.e., double guillotine break of a reactor recirculation suction line), the drywell pressurizes. This causes non-condensable gas and steam to flow into the suppression pool through 98 downcomer vent lines. The non-condensable gas and steam form bubbles at the exit of each downcomer vent line, which combine into a single large bubble blanket extending across the suppression pool. The differential pressure between the drywell and wetwell continues to feed the bubble with non-condensable gas and steam. As the size of the blanket bubble increases, it causes a slug of water located above it to rapidly rise upwards. This phenomenon is known as suppression pool swell.

The rapidly rising slug of water imposes drag and impact loads on structures and components located in the suppression pool swell zone. The pressure in the bubble depressurizes as it expands. The rising slug of water compresses the wetwell airspace resulting in an increase in wetwell pressure. The pool continues to accelerate upwards until it is slowed by the increasing wetwell pressure. The reduction in driving pressure difference between the bubble and wetwell airspace causes the water slug to decelerate and break up. The suppression pool swell phenomenon continues with a short period of froth activity and then free fall of the water mass back into the suppression pool. The effluent flowing through the downcomer vents into the suppression pool is initially the non-condensable gas in the upper portion of the 98 downcomer vents (principally nitrogen, due to the containment being inerted). The vent flow then becomes a mixture of gas and steam, where the mixture concentration increasingly becomes more steam as the blowdown from the pipe break progresses. (Reference Figure 1 shown to the right and UFSAR Sections 3.9.1.1.2.2, 6.2.1.1.2, and 6.2.1.1.10 (References 2-4))

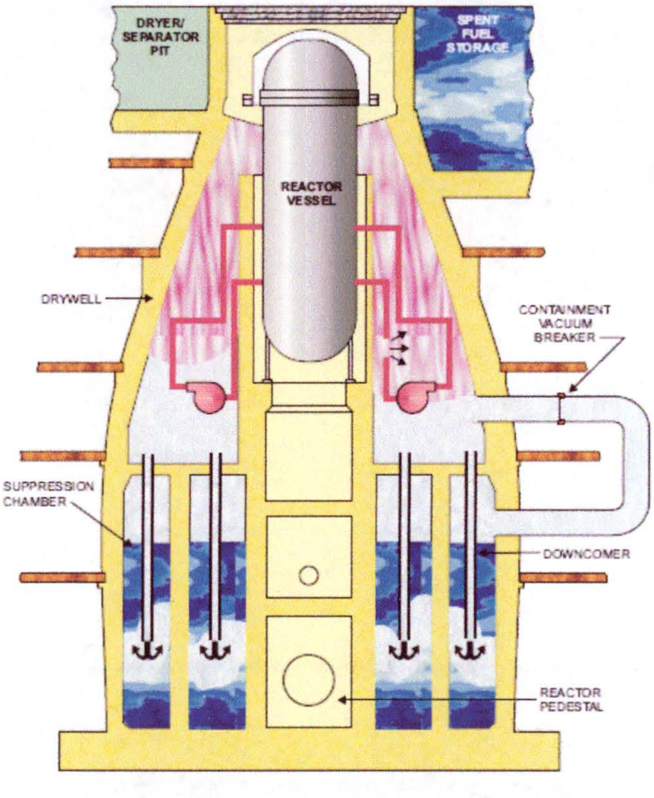

Figure 1: DBA LOCA Downcomer Clearing

3.2 LSCS Issue Overview

On October 23, 2012, it was identified that the design analysis determining the suppression pool swell response to a LOCA did not use the proper reactor water temperature. Specifically, the analysis was based upon saturated reactor water blowdown through the design basis pipe break. Since the postulated design basis break is the largest pipe (i.e., reactor recirculation suction piping) that draws water from the annulus area of the reactor, the break effluent is not saturated but is actually subcooled. The consequence of this is that the design analysis is non-conservative as the use of subcooled water increases the mass being released into the drywell. The increase in mass being released increases the drywell accident pressure, which increases the suppression pool swell loads acting upon structures and components located in the wetwell within the suppression pool swell zone. The issue was entered into the corrective action program. Subsequently, an operability evaluation concluded the condition was nonconforming but operable. Administrative controls have been implemented until the nonconforming condition is resolved.

Original Design Analysis and Discrepancy

The original design analysis determining the mass and energy released from the break and the associated containment pressure response was performed for LSCS by General Electric (GE) in 1975. The results of this original design analysis were used as input to a design analysis that determined the suppression pool swell loads.

It was subsequently determined that this original design analysis had a non-conservative deficiency regarding reactor water temperature and the blowdown flow area. The design analysis was corrected by 1981. The corrected analysis then became the AOR for the containment response to the DBA LOCA.

Impact on Suppression Pool Swell Loads

Since the original GE analysis results were used as input for the calculation determining the suppression pool swell loads, a review evaluating the impact of the corrected GE analysis upon suppression pool swell loads was performed (around 1975). This review found that the corrected GE analysis resulted in faster drywell pressurization, which in turn increased the suppression pool swell loads. This conclusion rendered the original design analysis from 1975 and subsequent analyses evaluating components and structures affected by the suppression pool swell phenomenon non-conservative. An assessment determined that correcting the non-conservatism would have a significant impact upon already completed work of evaluating items (e.g., piping, supports, and equipment) subjected to suppression pool swell loads.

Updated Suppression Pool Swell Design Analysis and Supplemental Calculations

In 1983, an updated suppression pool swell design analysis evaluated the corrected GE analysis, concluding that it was conservative, particularly during the early phases of the transient during which the suppression pool swell phenomenon occurs. To avoid revisions to design analyses and costly design modifications, this updated suppression pool swell design analysis performed supplemental calculations that were intended to correct the errors in the original GE analysis, remove conservatisms, and determine an updated suppression pool swell response. The suppression pool swell response determined by the supplemental calculations was compared against the original suppression pool swell response curves. The results of the comparison showed that the original suppression pool swell response curves determined in 1975 enveloped the revised curves of the updated suppression pool swell design analysis.

Therefore, it was concluded that the previously calculated suppression pool swell loads were acceptable, and no revision was required to the already completed work evaluating components (i.e., piping, supports, and equipment) affected by the suppression pool swell phenomena.

EPU Review of Suppression Pool Swell

During the station's review of the impact of a planned Extended Power Uprate (EPU) upon existing design analyses in 2012, it was discovered that the updated suppression pool swell design analysis did not correctly address the effect of subcooling. Even though the intent of the updated design analysis was to address the non-conservative deficiency in the original GE analysis issued in 1975 (i.e., the use of saturated instead of subcooled reactor water and the blowdown flow area), it did not correctly address subcooling. Therefore, the adequacy of the original GE design containment response analysis issued in 1975, the updated suppression pool swell design analysis, and subsequent analyses evaluating the suppression pool swell phenomenon were called into question. The suppression pool swell loads used are not bounding; therefore, items located in the suppression pool swell zone may be subjected to higher loads than currently considered. Affected items include downcomers and supports, safety relief valve (SRV) discharge lines, emergency core cooling system (ECCS) and reactor core isolation cooling (RCIC) piping and supports, and pool monitoring instrumentation. On June 11, 2013, EGC announced the cancellation of its LSCS EPU project; even though EPU was cancelled, the issue still affects the current licensing basis.

GEH Safety Concern Letters

Reviews of GEH legacy design record files indicate that the use of subcooled versus saturated break flow was a subject of discussion with BWR plant owners and with the NRC during the mid-to-late 1970s as part of on-going discussions regarding the containment loads programs and also for discussions of BWR FSAR containment analyses. However, it does not appear that a safety concern letter or equivalent document was issued by GE to address this issue at the time.

It should be noted that the short-term DBA-LOCA Recirculation Suction Line Break (RSLB) response has been analyzed with the effects of subcooling inventory included for all US BWR plants with Mark I, Mark II and Mark III containments. These include re-analyses performed after recognition of the effects of subcooling, new analyses performed in support of the containment loads programs of the late 1970s and early 1980s, and most recently, re-analyses for performance improvements such as Extended Load Line Limit (ELLLA), Maximum Extended Load Line Limit (MELLLA and MELLLA+), Power Uprate (PU) and Extended Power Uprate (EPU).

4.0 TECHNICAL EVALUATION

4.1 Evaluation for Changes in New Analysis

A new analysis was performed by GEH that properly addresses subcooling and determines a new suppression pool swell profile. The results of the new analysis, documented in Revision 0 of GEH Report 003N9278-R0-P (Reference 5) are provided in Attachment 2 to this letter. A description of the analytical methods, applicable standards, inputs and assumptions, data, and results regarding the new analysis are provided in the GEH Report.

The new analysis includes the following four changes:

1) The AOR for the pool swell response conservatively used the downcomer vent flow consisting of air only; the new analysis initially uses air flow (until the air mass contained in the non-submerged portion of the downcomer vent is purged) and then transitions to a realistic air/steam mixture.
    - Full scale testing performed by the Japan Atomic Energy Research Institute (JAERI) documents that the suppression pool swell model using 100% air yields results that are significantly greater than those found during full scale testing. The margins are significant and are greater than the differences between calculations using 100% air and those using the air/steam mixture.

2) The new analysis uses a different computer code (TRACG) to determine the break mass and energy release. The drywell pressure input to the pool swell response AOR in 1975 used mass and energy release based on the models of NEDM-10320 (Reference 7).
    - The suppression pool swell time frame is 0 to 2 seconds following the Design Basis Accident (DBA) LOCA. During this time frame, a comparison of the results shows little difference.

3) The calculation for post-LOCA drywell pressure used as input to the suppression pool swell AOR accounted for the effect of downcomer vent back pressure upon vent flow; the new analysis for drywell pressure does not.
    - NUREG-0487 (Reference 11) accepted the use of the predicted drywell pressure based on the GEH containment models for input to the suppression pool swell model without accounting for LOCA bubble formation backpressure effects on vent flow. As described in NUREG-0487, this acceptance was based on a greater calculated pool swell response with the drywell pressure prediction from the GEH containment model relative to the calculated pool swell response obtained with measured test drywell pressures.

4) The results of the analysis determining the pool swell response are adjusted to ensure that the peak swell height (18.5 ft) is equal to 1.5 times downcomer vent submergence.
    - Even though the full scale testing performed by the Japan Atomic Energy Research Institute (JAERI) documents that the suppression pool swell height criteria are conservative, Exelon modified the calculated swell profiles to ensure the swell heights used comply with the NRC acceptance criteria.

The proposed changes do not affect how any systems are operated or controlled. The impact upon analyses is limited to those associated with the pool swell phenomena.

4.2 Description of New Analysis, Assumptions, Requirements, and Conservatisms

There are a number of analyses involved in the analysis of the suppression pool swell phenomena. These include the following:

- The analysis that determines the mass and energy released from postulated DBA LOCA and the analysis that determines the containment response to the postulated DBA LOCA. The GE/GEH M3CPT methodology (NEDM-10320, Reference 7) was used for the AOR, and TRACG is used in the new analysis to determine the mass and energy released. The later programs provide a better, more accurate representation of the blowdown. The GE/GEH M3CPT methodology was used in the AOR and the new analysis to determine the containment pressurization response. The M3CPT methodology with respect to the containment response calculation is consistent with the models of NEDM-10320 as accepted in NUREG-0487.

- The analysis that determines the suppression pool swell response associated with the DBA LOCA. The AOR used the Sargent & Lundy (S&L) Mark II Swell program and the new analysis uses the GEH PICSM program. Both the S&L Mark II Swell and GEH PICSM are consistent with the models of NEDE-21544-P (Reference 9), which was accepted by the NRC for use in predicting the Mark II suppression pool swell in NUREG-0487 and NUREG-0808 (Reference 12).

- The analysis that determines the suppression pool swell loads acting upon affected components and structures and the analyses evaluating affected components and structures. The analysis utilizes the methodology of NEDE/NEDO-21601, which was accepted in NUREG-0487 and NUREG-0808.

Included in Table 1 is a description of the various methodologies that comprise the revised suppression pool swell analysis.

Table 1: Description of Methodologies

Task		Computer Code	
1	Mass and energy released from postulated DBA LOCA Determination	TRACG	The TRACG break flow model and qualification basis are described in NEDE-32176P (Reference 8) and NEDE-32177P (Reference 13), respectively. As described in GEH Report 003N9278-R0-P (Reference 5), the TRACG mass and energy release analysis models the entire reactor system producing accurate pressure and enthalpy conditions for the break and also accounts for the flow inertia in the piping that provides a more realistic evaluation of transient dynamics for downstream containment analysis. The ability of the TRACG code to accurately model critical flow and the mechanisms that control flashing within the ruptured pipe are demonstrated by critical flow model test comparisons documented in Section 3.4 of NEDE-32177P. Section 3.4.1 of NEDE-32177P presents comparison to Marviken Critical Flow Tests. Section 3.4.2 of NEDE-32177P presents comparisons to PSTF Critical Flow Tests. Section 3.4.3 of NEDE-32177P presents comparisons to the Edwards Pipe Blowdown Tests. The comparisons to the Marviken and PSTF tests show that TRACG is capable of accurate modeling of critical flow for a range of initial conditions ranging from subcooled water to saturated steam for pressures consistent with BWR vessel pressures. When taken in total, the comparisons documented in Section 3.4 of NEDE-32177P support the conclusion that the TRACG code can be used to generate more realistic mass and energy release rates than that from other codes, such as LAMB. The NRC has reviewed TRACG in several applications, including the approved Economic Simplified Boiling Water Reactor (ESBWR) containment analysis design basis, MELLLA+ ATWS-instability applications (for Nine Mile Point Unit 2, and Grand Gulf), Annulus Pressurization and Acoustic Loads analyses, Stability analyses (DSS-CD, and GS3), and transient analyses (NEDE-32906P-A, Reference 14). Furthermore, application of TRACG for ECCS LOCA evaluations (NEDE-33005P, Reference 15), with direct applicability of the blowdown model, is in the final stages of NRC review, with the Safety Evaluation Report expected by the end of 2016. Incorporated into these NRC reviews are applicable portions of the TRACG Model Description (NEDE-32176P) and TRACG Model Qualification Report (NEDE-32177P).
2	Containment response determination	M3CPT	The M3CPT methodology with respect to the containment response calculation is consistent with the models of NEDM-10320 as accepted in NUREG-0487. The code version utilized (M3CPT05A) is functionally equivalent to the GE containment model described NEDM-10320.

3	Suppression pool swell response determination	PICSM	The PICSM models are described in NEDE-21544-P, which was accepted by the NRC for use in predicting the Mark II suppression pool swell in NUREG-0487 and NUREG-0808 (Reference 12). Note: the NUREGs discuss the General Electric Swell Analytical Model. PSAM is not the name of a GE computer Code. Rather it is an acronym for Pool Swell Analytical Model (PSAM). The name of GE computer Code is PICSM. PICSM is based upon the model described in NEDE-21544-P that has been approved by the NRC.
4	Suppression pool swell loads determination	N/A	
5	Impact of new loads upon affected components and structures evaluation	N/A	

Table 2 provides additional methodology details, comparing the AOR to the new analysis.

Table 2: Methodology Details

Task		Program or Methodology	AOR	New Analysis
1	Mass and energy released from postulated DBA LOCA determination	Program	M3CPT	TRACG
		Methodology	NEDM-10320	NEDE-32176P
2	Containment response determination	Program	M3CPT	M3CPT
		Methodology	NEDM-10320	NEDM-10320
3	Suppression pool swell response determination	Program	MK II Swell	PICSM
		Methodology	NEDE-21544P	NEDE-21544P
4	Suppression pool swell loads determination	Program	N/A	N/A
		Methodology	NEDO-21061	NEDO-21061
5	Impact of new loads upon affected components and structures evaluation		N/A	N/A

Table 3 describes the assumptions included in the GEH Analysis calculating the DBA LOCA drywell pressure response.

Table 3: Assumptions in GEH Analysis Calculating the DBA LOCA Drywell Pressure Response

Assumption		Justification	Change from AOR (Y/N)
1	Minimum initial drywell temperature is assumed to maximize drywell pressure response and maximum initial dryfwell non-condensable gas.	Conservative: Maximizing drywell pressure and initial drywell non-condensable gas maximizes suppression pool swell response.	Yes
2	Suppression pool is at the maximum level allowed during normal plant operation.	Conservative: Maximizes suppression pool swell height and pressure below diaphragm floor.	No

3	Wetwell airspace is saturated with an initial relative humidity of 100%.	Conservative: Maximizes suppression pool swell.	No
4	Drywell airspace relative initial humidity is at the minimum value (20%).	Parameter selected by GEH to achieve conservative pressure response.	No
5	The vent flow consists of a homogeneous mixture of the fluid in the drywell.	Consistent with NRC approved suppression pool swell analytical model. See NUREG-0487, Appendix C.	No
6	No heat loss from fluids in the drywell to the structure (heat sinks).	Conservative: Maximizes drywell pressure maximizing suppression pool swell.	No
7	The effect of back pressure on vent flow is not simulated.	Approved by NRC. See Table 5 regarding Conservatisms for further explanation.	Yes

Table 4 describes the assumptions included in the GEH Analysis for the suppression pool swell response.

Table 4: Assumptions in GEH Analysis Determining the Suppression Pool Swell Response

Assumptions		Justification	Change from AOR (Y/N)
1	The air is assumed to behave as an ideal gas.	Consistent with the suppression pool swell analytical model approved by the NRC.	No
2	Following vent clearing, the vent flow feeding the bubble beneath the pool consists of air flow for the time necessary to purge the air mass in the non-submerged portion of the downcomer vent, followed by an air/vapor (steam) mixture for the remainder of the transient.	The mixed flow more realistically represents the actual vent flow. The mixture used (39% steam and 61% air) is conservative. The NRC calculated a mixture of 65% steam and 35% air. (Ref: Section II.A.3 of NUREG-0487, Supplement 1 (page II-9)). See Table 5 regarding Conservatisms for additional justification.	Yes
3	The mass flow rate of non-condensables into the air bubble is calculated assuming adiabatic flow through the duct with friction.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
4	The air in the drywell is isentropically compressed and heat transfer to the walls is neglected.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
5	A variable bubble temperature equal to the current drywell temperature throughout the transient.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
6	Following vent clearing, the water above the exit of the vent accelerates as a slug of constant thickness.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
7	Frictional losses between the water and confining walls are negligible.	Conservative: Maximizes suppression pool swell.	No
8	Viscous forces are negligible compared to the inertial and pressure forces.	Conservative: Maximizes suppression pool swell.	No

9	The suppression pool air space is isentropically compressed by the upward moving water slug. Heat transfer to the walls is neglected.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
10	The air velocity in the drywell is sufficiently small so that static and stagnation conditions are equivalent.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No
11	The entire pool surface rises as a uniform ligament of constant thickness.	Consistent with the suppression pool swell analytical model approved by the NRC. See NUREG-0487, Appendix C.	No

Table 5 describes conservatisms that were changed (either introduced or reduced) for each of the four changes in this LAR and why the conservatisms are acceptable.

Table 5: Conservatisms

Changed Conservatisms		**Acceptability Basis**
1	The original drywell pressure response analysis considered downcomer back pressure, the new analysis does not.	This difference between the original and the new analysis does affect the drywell pressure during the suppression pool swell period. A study performed in support of a planned Extended Power Uprate (EPU) showed that neglecting downcomer vent back pressure yields a lower drywell pressure, which will result in a small reduction in suppression pool swell loads. This difference is considered to be acceptable and not a significant reduction in margin of safety as it has been previously accepted by the NRC. NUREG-0487 accepted the use of the predicted drywell pressure based on the GEH containment models (Ref: NEDM-10320) for input to the suppression pool swell model (Ref: NEDE-21544-P), without accounting for LOCA bubble formation backpressure effects on vent flow. This was based upon suppression pool swell model-to-test data comparisons which are discussed in NUREG-0487.
2	The original suppression pool swell response analysis used a downcomer vent effluent flow consisting of all (100%) air. The new analysis initially uses a downcomer vent flow consisting of air until the air in the downcomer vents has been purged. Then an air/steam mixture with a constant air fraction of 0.61 (61% air, 39% steam) is used.	The use of a vent effluent flow consisting of an air/steam mixture versus a 100% air vent effluent flow yields a smaller swell velocity and a lower swell height. The mixture was selected because it represents the air fraction in the drywell when the downcomer vents have been purged (vent clearing occurs at approximately 0.7 sec, vent purging occurs at approximately 0.9 sec). A constant air fraction of 0.61 is conservative because the air fraction in the drywell is not constant. It decreases from a value of near 1.00 (near 100% air) when the DBA LOCA occurs and decreases to 0.40 (40% air, 60% steam) at 2 sec, when the suppression pool swell phenomena is over. This is considered to be acceptable due to the following reasons: • As documented in GEH 003N9278-R0-P, a comparison of the predicted swell velocities with a 1.1 multiplier against the best estimate predictions of the Mark I 4T test results, including the assumptions of an air/steam mixture in the vent flow, shows that the predicted swell velocities are conservative. • As discussed in NUREG-0808, the Japan Atomic Energy Research Institute (JAERI) conducted full scale testing of a 20 degree sector of Mark II containment. Section 2.1.2.3 compares the actual pool velocities against calculated values (Note: the calculations were based upon the downcomer vent flow being all air). The comparison between the measured maximum center-pool velocities shows the calculated values 10% to 40% larger and an even greater margin to the average pool-surface velocities. As discussed in the NUREG the comparison between test results and calculated results was

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<p>very conservative. This is because not all of the data necessary to calculate the swell response was available. Specifically, the calculations are dependent upon drywell pressures calculated using the NRC acceptance criteria. But calculated drywell pressures were not available so pressures measured during the JAERI tests were used. The calculated drywell pressures are significantly higher than the measured JAERI test pressures. Hence, the real margins are significantly greater than the 10% to 40% identified.</p>
The mixture used is conservative. Section II.A.3 of NUREG-0487, Supplement 1 (page II-9) regarding Asymmetric LOCA Pool Boundary Loads states:
"Using values for drywell volume and blowdown rate for a typical Mark II facility, the steam/air mixture was calculated by the staff to be 65% steam (or water) and 35% air."
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<td>The new analysis modifies (increases) the suppression pool swell height.</td>
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<p>As explained in Section 4.2.3 of NEDO-21601, Revision 3, the suppression pool swell height criteria of 1.5 times vent submergence is based upon 4T test data. The 4T test data shows that the criterion of 1.5 times downcomer vent submergence envelopes all of the results with one exception. The one exception involved a low submergence test (9 ft) and a blowdown orifice with 60% greater area than the nominal design base accident. The BWR Owners Group dismissed this exception because it was not representative of Mark II conditions. The NRC disagreed, which resulted the BWR Owners Group developing an alternative that was accepted.</p>
<p>The NRC acceptance criteria defined in NUREG-0487 and NUREG-0808 specifies that the swell height is to be the greater of the following:</p>

1.5 times downcomer vent submergence;
or
The elevation corresponding to the time of drywell floor uplift ΔP = 2.5 psid. The pool surface elevation corresponding to the maximum wetwell-airspace compression will be calculated using a polytropic coefficient of 1.2.

<p>For LSCS, 1.5 times downcomer submergence corresponds to 18.5 ft. The later criterion is not applicable as the calculated drywell floor uplift ΔP is < 2.5 psid.</p>
<p>As discussed, LSCS determined the suppression pool swell response for two different downcomer vent flow scenarios: one using 100% air vent flow and the other using an air/steam mixture. Exelon has elected to use Case 3 of GEH Report 003N9278-R0-P (Reference 5) with an air/steam vent flow mixture as it better simulates the actual conditions and is less conservative. A comparison is provided in the following table between the AOR and Cases 1 and 3 of Reference 5.</p>
<table>
<tr><th>Scenario</th><th>Vent Flow</th><th>Peak Swell Velocity</th><th>Peak Swell Height</th></tr>
<tr><td>AOR</td><td>100% air</td><td>20.14 ft/sec</td><td>18.5 ft</td></tr>
<tr><td>Case 1</td><td>100% air</td><td>26.91 ft/sec</td><td>20.1 ft</td></tr>
<tr><td>Case 3</td><td>Air/Steam Mix</td><td>20.68 ft/sec</td><td>16.44 ft</td></tr>
</table>
<p>As previously mentioned, Exelon has elected to utilize Case 3 of Reference 5; however, to ensure compliance with the NRC criteria, Exelon has modified the suppression pool swell velocity and acceleration profiles to ensure the suppression pool swell height is 18.5 ft. The modification to the suppression pool swell velocity profile and the suppression pool swell acceleration profile is shown in the following figures.</p>
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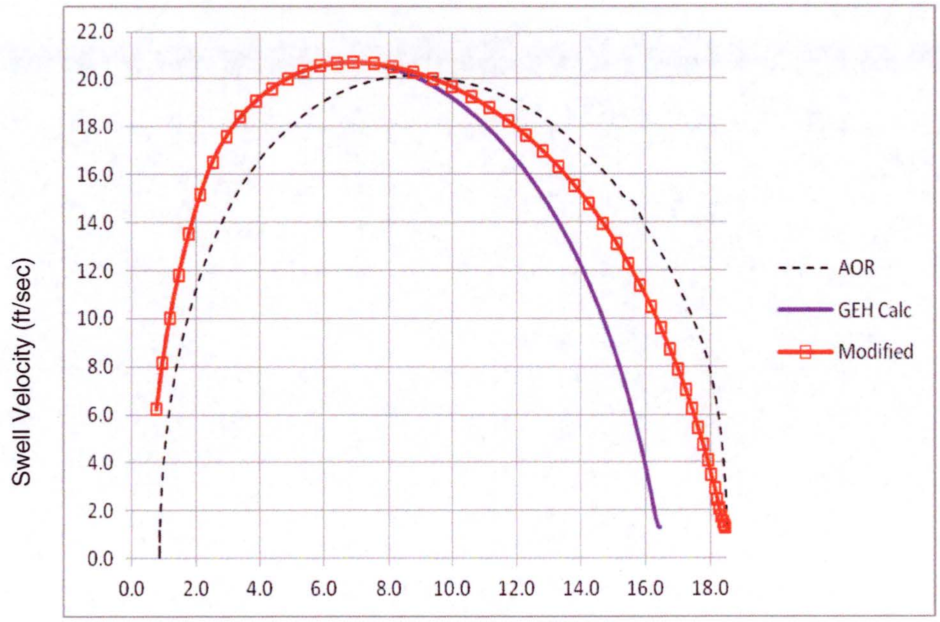
Comparison of Velocity Profiles

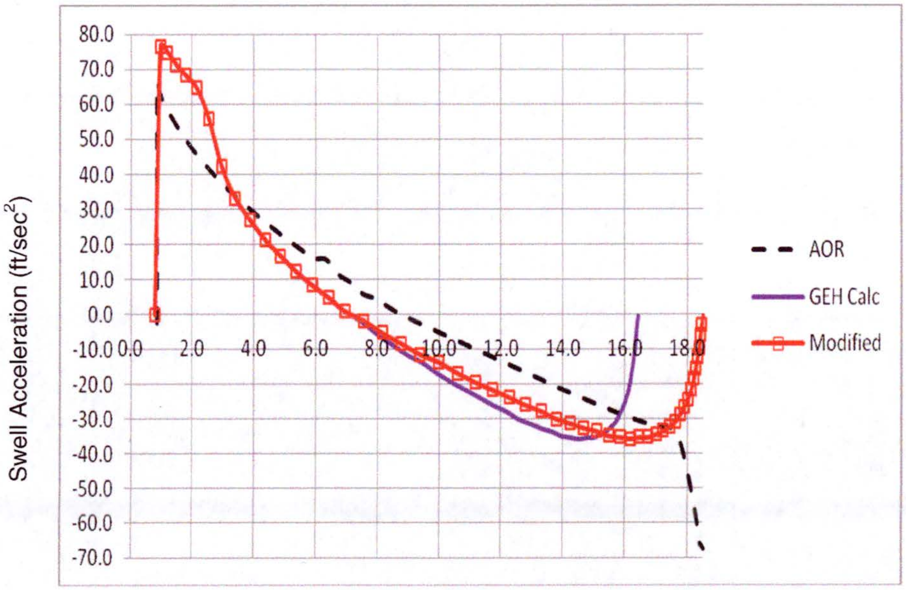
(Swell velocity vs Swell Height)



Swell Height (ft) *[elevation above initial pool level]*

Comparison of Acceleration Profiles

(Swell acceleration vs Swell Height)



Swell Height (ft) *[elevation above initial pool level]*

		The NRC acceptance criteria yield a swell height that is known to be conservative. However, based upon the available test data it is difficult to quantify the margins and the costs to perform new testing are prohibitive. Therefore, Exelon has elected to modify the calculated profiles to comply with the NRC acceptance criteria.
4	TRACG vs. M3CPT	TRACG represents a change in methodology, it does not change conservatisms. See discussion regarding Methodologies for discussion on TRACG.

4.3 Compliance with NRC Acceptance Criteria

Table 6 identifies the applicable NRC acceptance criteria for each of the issues associated with this LAR along with a description of how LSCS complies.

<table>
<tr><th colspan="3">Table 6: Compliance with NRC Acceptance Criteria</th></tr>
<tr><th colspan="2">NRC Acceptance Criteria
(NUREG-0808, Appendix A)</th><th>LSCS Compliance with
NRC Acceptance Criteria</th></tr>
<tr>
<td>1</td>
<td>

Pool-Swell Elevation

The Maximum pool-swell height shall be taken as the greater of (a) or (b) as follows:

a) 1.5 times vent submergence;

b) The elevation corresponding to a drywell floor uplift ΔP = 2.5psid. The pool surface elevation corresponding to the maximum wetwell air compression will be calculated assuming a polytropic process with an exponent of 1.2.

</td>
<td>

LaSalle Complies

For LaSalle

- 1.5 times vent submergence = 1.5(12.33 ft) = 18.5 ft
- The wetwell to drywell ΔP never reaches 2.5 psid.

Therefore, the maximum suppression pool swell height = 18.5 ft

The suppression pool swell heights calculated by GEH Report 003N9278-R0-P (Reference 5) are shown in the following table:

<table>
<tr><th></th><th>Swell Height</th><th>Reference</th></tr>
<tr><td>Case 1 vent flow:
100% air
Polytropic Coeff = 1.2</td><td>20.1 ft</td><td>(Table 6.1 of GEH Report only identifies values up to 18.5 ft)</td></tr>
<tr><td>Case 3 vent flow:
air/steam mix
Polytropic Coeff = 1.2</td><td>16.438 ft.</td><td>Table 6-3 of GEH Report</td></tr>
</table>

Exelon has elected to use Case 3 as it is more representative of the actual conditions. Exelon has modified the Case 3 results to ensure that the swell velocity profile (plot of swell velocity vs swell height) the suppression pool swell acceleration profile used in subsequent calculations is based upon a swell height of 18.5 ft. The portion of the curve up to the maximum swell velocity was not changed (maximum swell velocity occurs when swell height is 6.912 ft). Only the later portion of the curve was modified. This modification was accomplished by stretching the later portion of the curve.

</td>
</tr>
</table>

2	**Pool-Swell Velocity** The pool-swell velocity used to determine the impact and drag loads on wetwell components shall consist of the velocity predicted by the suppression pool swell analytical model described in NEDE-21544-P multiplied by a factor of 1.1.	***LaSalle Complies*** The pool-swell velocity was determined by GEH Report 003N9278-R0-P (Reference 5) using their computer code PICSM multiplied by a factor of 1.1. To account for the increase in the initial LOCA pool elevation associated with vent clearing, 0.7 ft was added to the PICSM elevation prediction. The PICSM models are described in NEDE-21544-P and were accepted by the NRC for use in predicting the Mark II suppression pool swell in NUREG-0487, NUREG-0487 Supplement 1, and NUREG-0808.
3	**Impact/Draft Loads on Grating** The static drag load on grating in the pool-swell zone of the wetwell shall be calculated for grating with open area greater than or equal to 60% by forming the product of the pressure differential as given in Figure 4-40 of NEDO-21061, Revision 2, (Reference 10) and the total area of the grating. To account for the dynamic nature of the initial loading, the load shall be increased by a multiplier given as follows: $F_{SE}/D = 1 + SQRT[1 + (0.0064Wf)^2]$	**Not Applicable** LaSalle has no grating in the suppression pool swell zone.
4	**Asymmetric Bubble Load** A load equal to 20% of the maximum LOCA vent-clearing bubble pressure is to be applied to ½ of the submerged boundary. This load is to be applied statically together with normal hydrostatic pressure to the submerged portion of the containment.	***LaSalle Complies*** A vent clearing over pressure of 33 psi was applied to the basemat and wetwell wall below the vent exit with a linear attenuation up to the pool surface. *Note: the original basis for this 33 psi load is NEDO-21061, Rev 2, which was accepted by the NRC (Ref: NUREG-0487, Section III.B.3.b, page III-24) The Mark II Owners deemed this load too conservative and based upon Mark II 4T test data proposed an alternative of 24 psi. As documented in NUREG-0487, Supplement 1, Section II.A.1 (page II-2) the NRC accepted the alternative load.* An asymmetric load of 22 psi was applied to a 180° sector of the wetwell wall; this asymmetric load was applied in addition to the normal hydrostatic pressure to the submerged portion of the containment.

5	**Impact Loads on Small Structures** The hydrodynamic loading function that characterizes pool impact on small horizontal structures shall have the versed sine shape: $P(t)P = P_{max} \frac{1}{2} (1-\text{Cos}2\pi t/\tau)$ For both cylindrical and flat structures, the maximum pressure P_{max} and pulse duration τ will be determined as follows: (a) The hydrodynamic mass per unit area for impact loading will be obtained from the appropriate correlation for a cylindrical or flat target in Figure 6-8 of NEDE-13426P (Reference 6). (b) The impulse will be calculated using the following equation: $Ip = (M_H/A)V [(1)/(32.2)(144)]$ (c) The pulse duration will be obtained from the equation: For cylindrical Target $\tau = (0.0463D)/V$ For Flat Target ($V \geq 7$ ft/sec) $\tau = (0.011W/V)$ For Flat Target ($V < 7$ ft/sec) $\tau = (0.0.0016W)$ (d) The value of P_{max} will be obtained from the following equation $P_{max} = 2Ip/\tau$ For both cylindrical and flat structures, a margin of 35%will be added to P_{max} values (as specified above) to obtain conservative design margins.	***LaSalle Complies*** LaSalle used the same loading function. The design analysis that determined the pool swell loads does not address the use of the NEDE reference. Rather, it references an ASME publication dated Sept 1, 1966, "Tables of Hydrodynamic Mass Factors for Translational Motion." The ASME publication provides the same M_H/A (hydrodynamic mass factors). The equations in the design analysis for determining the impulse of pipes and flat surfaces are equivalent to those identified in NUREG-0808. The equations in the design analysis incorporate the hydrodynamic mass factors. Table 1 identifies: For pipes $Ip = 2.07 \times 10^{-3}\ VD$ Where: V = impact velocity (ft/sec) D = diameter (ft) For flat surfaces $Ip = 6.47 \times 10^{-3} VW$ Where: V = impact velocity (ft/sec) W = width (ft) LaSalle used the same pulse durations. The equations in the design analysis that determined the pool swell loads for determining P_{max} are equivalent to those identified in NUREG-0808. The equations in 3C7-1075-001 incorporate the Impulse (Ip) and pulse duration (τ). Table 1 identifies: For pipes $P_{max} = 0.12074V^2$ For flat surfaces, where $V < 7$ ft/sec $P_{max} = 10.9181V$ For flat surfaces, where $V \geq 7$ ft/sec $P_{max} = 1.5881V^2$

4.4 Potential for Structural Changes

As previously stated EGC engaged GEH to provide a corrected suppression pool swell response and engaged S&L to determine new suppression pool swell loads and assess the impact of these loads upon affected components and structures. S&L did not assess all affected components and structures but assessed a representative sample of the low margin system, structures, and components (SSC) consisting of the following:

- Piping subsystems
- Piping penetrations associated with the piping subsystems
- Pipe supports associated with the piping subsystems
- Temperature monitor supports
- Vent line downcomers and downcomer bracing

Based on the evaluations performed on the lowest margin SSC, it is currently concluded that no structural modifications will be required. Upon approval of the LaSalle Suppression Pool Swell LAR, EGC intends to update the design bases documents.

4.5 Comparison to Other Plants

EGC has reviewed the Design Attribute Report (DAR) and UFSAR/FSAR relative to suppression pool swell for three other stations selected for comparison because they also have BWR-Mark II containments. No specific lessons learned that are applicable to the current LSCS suppression pool issue were identified.

Included in Table 7 is a comparison of key suppression pool swell input parameters and the results.

Table 7: Comparison of Suppression Pool Swell Input Parameters

Parameter	LaSalle	Plant 1	Plant 2	Plant 3
Drywell free air volume	229,538 ft^3	200,540 ft^3	248,950 ft^3	302,275 ft^3
Wetwell free air volume	164,800 ft^3	144,184 ft^3	149,425 ft^3	194,530 ft^3
Suppression pool water volume	131,900 ft^3	107,850 ft^3	134,600 ft^3	150,470 ft^3
# Vent downcomers	98	99	87	121
Downcomer size (inside diameter)	1.958 ft	2.0 ft nominal	1.94 ft	1.938 ft
Downcomer submergence	12.333 ft	12.0 ft	12.25 ft	11.0 ft max
Max suppression pool swell velocity	20.68 ft/sec	28.7 ft/sec	30.5 ft/sec (scaled from fig)	28.83 ft/sec
Max suppression pool swell height	18.5 ft (See Note)	18.0 ft	18.88 ft	19.44 ft

Note: The 18.5 ft maximum suppression pool swell height represents the adjusted swell height. The unadjusted height is 16.4 ft. See Table 5 regarding Conservatisms for further explanation.

As identified in Table 7, the new LSCS analysis yields a suppression pool swell peak velocity that is less than that determined for the other sites. As discussed within this LAR, using a downcomer effluent ventilation flow consisting of a mixture of air and steam rather than 100% air represents a deviation from the conservative approach initially used. Therefore, the difference in suppression pool swell peak velocity between LSCS and the other stations is postulated to be due to the composition of the downcomer effluent ventilation flow. The new LSCS analysis uses a mixture of air and steam while it is presumed that the other sites use all (100%) air.

5.0 REGULATORY EVALUATION

5.1 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met.

The regulatory requirements and criteria that are applicable to the changes to the suppression pool swell design analysis include the following:

- General Design Criterion 4, "Environmental and Dynamic Effects Design Bases"
- General Design Criterion 50, "Containment Design Basis"
- Standard Review Plan (SRP) 6.2.1.1.C, "Pressure-Suppression Type BWR Containments"
- NUREG-0487, Supplement 2, "MARK II Containment Lead Plant Program Load Evaluation and Acceptance Criteria," published February 1981
- NUREG-0808, "MARK II Containment Program Load Evaluation and Acceptance Criteria," Appendix A, published August 1981

General Design Criterion 4, "Environmental and Dynamic Effects Design Bases," states that:

> Structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, and discharging fluids, that may result from equipment failures and from events and conditions outside the nuclear power unit. However, dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

General Design Criterion 50, "Containment Design Basis," states that:

> The reactor containment structure, including access openings, penetrations, and the containment heat removal system shall be designed so that the containment structure and its internal compartments can accommodate, without exceeding the design leakage rate and with sufficient margin, the calculated pressure and temperature conditions resulting from any loss-of-coolant accident. This margin shall reflect consideration of (1) the effects of potential energy sources which have not been included in the determination of the peak conditions, such as energy in steam generators and as required by § 50.44 energy from metal-water and other chemical reactions that may result from degradation but not total failure of emergency core cooling functioning, (2) the limited experience and experimental data available for defining accident phenomena and containment responses, and (3) the conservatism of the calculational model and input parameters.

As described in Standard Review Plan (SRP) 6.2.1.1.C, "Pressure-Suppression Type BWR Containments," the acceptability of LOCA related pool dynamic loads for plants with Mark II containments is based on conformance with the generic loads previously reviewed and found acceptable by the NRC and NRC acceptance criteria. The LOCA related pool dynamic loads and criteria are as discussed in NUREG-0808, and Appendix B to SRP 6.2.1.1.C.

NUREG-0808 and NUREG-0487 state, in part, as follows:

> The NRC specification for maximum pool swell height stipulates the greater of (1) or (2) as follows:
>
> (1) 1.5 times vent submergence
>
> (2) The elevation corresponding to the time of drywell floor uplift $\Delta P = 2.5$ psid. The pool surface elevation corresponding to the maximum wetwell-airspace compression will be calculated assuming a polytropic process with an exponent of 1.2.
>
> For LSCS, the maximum pool swell height based on 1.5 times vent submergence is 18.5 ft, and the calculated wetwell to drywell ΔP never reaches 2.5 psid.

In conclusion, EGC has determined that the proposed changes do not require any exemptions or relief from regulatory requirements and do not affect conformance with any regulatory requirements or criteria.

5.2 No Significant Hazards Consideration

This evaluation supports a request to amend Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2. The proposed changes revise the suppression pool swell design analysis. The new analysis utilizes a different computer code and incorporates different analysis assumptions than the current analysis. The changes are necessary because the current design analysis determining the suppression pool swell response to a Loss of Coolant Accident (LOCA) was determined to be non-conservative.

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendments would not:

1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or
2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or
3) Involve a significant reduction in a margin of safety.

EGC has evaluated the proposed changes for LSCS, using the criteria in 10 CFR 50.92, and has determined that the proposed changes do not involve a significant hazards consideration. The following information is provided to support a finding of no significant hazards consideration.

Criteria

1) Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed changes involve the reanalysis of the suppression pool swell phenomenon that results from the postulated DBA LOCA. The proposed changes resolve a non-conforming condition involving historical design analyses performed to demonstrate the adequacy of items subject to loads resulting from the suppression pool swell phenomena. The proposed changes do not affect plant operations or any design function. The probability of the DBA LOCA or any other accident occurring is not altered as the pool swell phenomenon occurs after a design basis accident or transient and therefore does not impact any accident initiators.

   The changes revising the suppression pool swell design analysis will not affect radiological dose consequence analyses. The consequences of accidents previously evaluated will not be increased by the proposed changes. The consequences of the pool swell event remain within acceptable margins.

   Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2) Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated because they do not involve the addition of any new components or systems. The proposed changes do not alter the design function of components or systems that could initiate a new or different kind of accident. The proposed changes do not alter how components or systems are controlled or utilized.

The suppression pool swell phenomenon is one transient that results from the postulated LOCA event, which has previously been evaluated. The impact upon analyses is limited to those associated with the pool swell phenomena.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3) Do the proposed changes involve a significant reduction in a margin of safety?

Response: No.

The changes revising the suppression pool swell design analysis do not represent a significant change in a margin of safety:

Following main vent clearing, an air/steam bubble forms at the vent exit. This causes a hydrostatic pressure increase in the pool water resulting in a loading condition on the pool boundaries. The steam condenses in the pool. However, the continued addition and expansion of the drywell air causes the pool volume to swell, resulting in the rise of the pool surface and associated drag and impact loads on surrounding structures.

The proposed changes to the suppression pool swell design analysis do not alter any design basis or safety limit established in the license. The proposed changes to the suppression pool swell design analysis were evaluated to the NRC acceptance criteria, and the changes comply with established criteria and do not significantly reduce a margin of safety.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Based on the above evaluation, EGC concludes that the proposed amendments do not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

5.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

EGC has evaluated the proposed amendments for environmental considerations. The review has resulted in the determination that the proposed amendments would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendments do not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendments.

7.0 REFERENCES

1) Letter from B. K. Vaidya dated July 27, 2016, "Summary of July 15, 2016, Meeting with LaSalle County Station, Units 1 and 2, on Pre-Application for Amendment Regarding Suppression Pool Swell (CAC Nos. MF8063 and MF8064)," ADAMS Accession No. ML16202A058

2) LaSalle UFSAR Section 3.9.1.1.2.2, "Loss-of-Coolant Accident (LOCA) Loads"

3) LaSalle UFSAR Section 6.2.1.1.2, "Containment Systems, Design Features"

4) LaSalle UFSAR Section 6.2.1.1.10, "Containment Systems, Drywell-to-Wetwell Vacuum Breaker Valves Evaluation for LOCA Loads"

5) GE Hitachi Nuclear Energy 003N9278-R0-P, "Exelon Nuclear LaSalle County Generating Station Units 1 & 2 Pool Swell Response," dated October 2016

6) NEDE-13426P, "Mark III Confirmatory Test Program, One-Third Scale Pool Swell Impact Tests, Test Series 5805," dated August 1975

7) NEDM-10320, "The GE Pressure Suppression Containment Analytical Model," dated March 1971

8) NEDE-32176P, Revision 4, "TRACG Model Description," dated January 2008

9) NEDE-21544P, "Mark II Pressure Suppression Containment Systems: An Analytical Model of the Pool Swell Phenomenon," dated December 1976

10) NEDO-21061, Revision 2, "Mark II Containment Dynamic Forcing Functions Information Report," dated September 1976, and Proprietary Supplement NEDE-21061-P, Revision 2, dated September 1976

NEDO-21061, Revision 3, "Mark II Containment Dynamic Forcing Functions Information Report," June 1978. Proprietary Supplement NEDE-21061-P , dated June 1978

NEDO-21061, Revision 4, "Mark II Containment Dynamic Forcing Functions Information Report", dated November 1981

11) NRC NUREG-0487, "Mark II Containment Lead Plant Program Load Evaluation and Acceptance Criteria," Supplement 1, September 1980 and USNRC NUREG-0487, "Mark II Containment Lead Plant Program Load Evaluation and Acceptance Criteria," October 1978

12) NRC NUREG-0808, "Mark II Containment Program Load Evaluation and Acceptance Criteria," dated August 1981

13) NEDE-32177P, Revision 3, "Licensing Topical Report, TRACG Qualification," dated August 1981

14) NEDE-32906P-A, Revision 3, "Licensing Topical Report, TRACG Application for Anticipated Operational Occurrences (AOO) Transient Analyses," dated September 2006

15) NEDE-33005P, Revision 1, "Licensing Topical Report, TRACG Application for Emergency Core Cooling Systems/Loss-of-Coolant Accident Analyses for BWR/2-6," dated July 2016

ATTACHMENT 3

GE Hitachi Affidavit Supporting Proprietary Nature of Information in Attachment 2

LASALLE COUNTY STATION
UNITS 1 AND 2

Docket Nos. 50-373 and 50-374

Facility Operating License Nos. NPF-11 and NPF-18

3 pages follow

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, Lisa K. Schichlein, state as follows:

(1) I am a Senior Project Manager, NPP/Services Licensing, Regulatory Affairs, GE-Hitachi Nuclear Energy Americas LLC (GEH), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in GEH proprietary report 003N9278-R0-P, "Exelon Nuclear LaSalle County Generating Station Units 1 & 2 Pool Swell Response," Revision 0, dated October 2016. GEH proprietary information in 003N9278-R0-P Revision 0 is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]]. GEH proprietary information in figures and large objects is identified by double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the *Freedom of Information Act* ("FOIA"), 5 U.S.C. §552(b)(4), and the *Trade Secrets Act*, 18 U.S.C. §1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F.2d 871 (D.C. Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F.2d 1280 (D.C. Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without a license from GEH constitutes a competitive economic advantage over other companies;

b. Information that, if used by a competitor, would reduce its expenditure of resources or improve its competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information that discloses trade secret or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions for proprietary or confidentiality agreements or both that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary and/or confidentiality agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains detailed results and conclusions regarding supporting evaluations pertaining to the pool swell response for a GEH Boiling Water Reactor ("BWR").

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience and information databases that constitute major GEH assets.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply

the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 17th day of October 2016.

Lisa K Schichlein

Lisa K. Schichlein
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Regulatory Affairs
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