



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 19, 2012

LICENSEE: Exelon Generation Company, LLC

FACILITY: LaSalle County Station, Units 1 and 2

SUBJECT: SUMMARY OF DECEMBER 7, 2011, PUBLIC MEETING WITH EXELON GENERATION COMPANY, LLC REGARDING THE PROPOSED EXTENDED POWER UPRATE LICENSE AMENDMENT REQUEST FOR LASALLE COUNTY STATION, UNITS 1 AND 2 (TAC NOS. ME7495 AND ME7496)

On December 7, 2011, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Exelon Generation Company, LLC (EGC, the licensee) at the NRC Headquarters, Two White Flint North, 11545 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss a planned Extended Power Uprate (EPU) licensee amendment request (LAR) for LaSalle County Station, Units 1 and 2 (LaSalle). A list of attendees is provided as Enclosure 1.

During the meeting, EGC informed the NRR staff of their plans to submit a LAR for a 12.5 percent increase in licensed thermal power for LaSalle in the 3rd Quarter of 2012. The meeting discussion focused on review standards for annulus pressurization loads and emergency core cooling system (ECCS) net positive suction head (NPSH) analysis. The licensee presented slides contained in Enclosure 2 and discussed a pre-application checklist enclosed in the public meeting notice (Agencywide Documents Access and Management System (ADAMS) Accession No. ML113200075).

The meeting piloted the use of the Nuclear Energy Institute (NEI) developed pre-application checklist. The purpose of the pre-application meeting using the NEI checklist is for NRC staff and the licensees to reach common understanding of the regulatory criteria and standards to be applied in the review of significant licensing actions with a goal of enhancing the effectiveness and efficiency of the review process. A series of LaSalle EPU pre-application meetings are being planned for additional technical area topics. During each subsequent pre-application meeting, the NEI checklist will be used to support discussions. Additional information about the NEI checklist pilot process may be found in public meeting summary from November 2, 2011 (ADAMS Accession No. ML113210594).

The following actions were agreed to between the NRC and the EGC prior to submission of the LaSalle EPU LAR.

Summary of Follow-up Actions

- EGC and the NRC achieved an understanding of the methodology being proposed for use for determination of break Mass and Energy release and annulus pressurization calculations. The NRC acknowledged that the use of the Transient Reactor Analysis Code – G (TRACG) methodology was an acceptable approach.
- The TRACG evaluation for use in break Mass and Energy release and annulus pressurization calculations should also have a description identifying the differences in application of TRACG at LaSalle compared to its application in the economic simplified boiling-water reactor safety analysis and Grand Gulf's EPU application. EGC agreed to

provide a summary of the differences along with a justification for use of the methodology in the EPU application.

- Based on recent Advisory Committee on Reactor Safeguards comments associated with the use of American National Standards Institute and American Nuclear Society (ANSI/ANS) 58.2-1988 for evaluating jet impingement loads, the NRC staff noted that the use of this standard as it applies to the proposed EPU may be inappropriate. The NRC staff also noted that ANSI/ANS 58.2-1988 is a withdrawn standard.
- EGC and the NRC achieved an understanding regarding the proposed methodology used to determine the ECCS NPSH. EGC's approach and use of current guidance was considered to be acceptable.
- Agreement was achieved regarding the use of 21 percent uncertainty when performing EPU ECCS NPSH calculations. It was noted that the uncertainty value may be impacted by Boiling-Water Reactor Owner's Group (BWROG) evaluations currently underway for non-containment accident pressure plants. Also, there may be an elimination of the "Maximum Erosion Zone" requirement. EGC agreed to address any final results of the BWROG evaluation prior to submittal in the application.
- EGC and the NRC achieved an understanding that the EPU application would address mixed core analysis or provide justification for excluding.

The meeting notice and agenda are available under ADAMS Accession No. ML113200075. The public was invited to observe the meeting. No members of the public were in attendance. Public Meeting Feedback forms were not received.

Please direct any inquiries to me at 301-415-1115, or Nicholas.DiFrancesco@nrc.gov.

Sincerely,



Nicholas DiFrancesco, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosures:

1. List of Attendees
2. Licensee Handout

cc w/encl: Distribution via ListServ

LIST OF ATTENDEES

DECEMBER 7, 2011, PUBLIC MEETING WITH EXELON GENERATION COMPANY, LLC

REGARDING THE PROPOSED EXTENDED POWER UPRATE LICENSE AMENDMENT

REQUEST FOR LASALLE COUNTY STATION, UNITS 1 AND 2

NRC

Jake Zimmerman
Nicholas DiFrancesco
Araceli T. Billoch Colòn
William Jessup
John Huang
Ogbonna Hopkins
John Tsao
Tom Alexion
Sheldon Stuchell
Greg Casto
Rick Plasse
Rick Stattel
David Rahn
Tai Huang
Ahsan Sallman
Tony Ulses
Garry Armstrong
Muhammad Razzaque
Nageswara Karipineni

Exelon

Kenneth Ainger
Kevin Borton
John Rommel
Harold Vinyard
Tim Byam
Vikram Shah
Terry Simpkin
Faramarz Pournia
Stevie Du Pont

GE-Hitachi

Curt Robert
Bruce Hagemeier
Sara Ruddy

Exelon®

Nuclear

LaSalle County Station

**Pre-Application Meeting
Extended Power Uprate**

December 7, 2011

Exelon Team

- **Kenneth Ainger – Project Management Director, EPU**
- **Kevin Borton – Power Uprate Licensing Manager**
- **John Rommel – Power Uprate Engineering Director**
- **Harold Vinyard – LaSalle Engineering Director**
- **Tim Byam – Power Uprate Lead Licensing Engineer**
- **Vikram Shah – Power Uprate Senior Engineering Manager**
- **Terry Simpkin – LaSalle Regulatory Assurance Manager**
- **Faramarz Pournia – Power Uprate Project Manager**
- **Stevie Du Pont – Power Uprate Licensing Engineer**

Agenda and Meeting Purpose

- **Introduce LaSalle EPU Staff**
- **Describe NEI Pre-Submittal Meeting Pilot**
- **Present LaSalle Extended Power Uprate Schedule and Approach**
- **Describe Key Aspects of Technical Evaluations and Obtain Feedback**
 - **Annulus Pressurization Loads**
 - **ECCS NPSH Analysis**
- **Discuss Potential Topics for Future Meetings**

NEI Pilot – Pre-submittal Meetings

- **Purpose is to enhance License Amendment Request pre-submittal meetings**
 - Reach a common understanding on the regulatory criteria and standards to be applied during the NRC review of the proposed changes
 - Identify potential application issues that can be addressed during the application conceptual phase that will reduce acceptance review time, requests for additional information, and application review time

- **Process**
 - Pilot Checklist is used to focus on applicable review criteria, codes, standards, justification required for use of a new analytical method, applicability of a precedent, or feasibility of a desired schedule in order to reach alignment with the NRC
 - NRC meeting notice and meeting summary will docket the expectations and outcomes of the alignment in order to greatly reduce the risk and uncertainty associated with future application acceptance and NRC review

- **LaSalle specific checklist focus**
 - Verify methodology and approach used for analyses of Annulus Pressurization Load
 - Verify current NRC expectations and approach regarding ECCS NPSH calculations

- **LaSalle Original License**
 - Unit 1 licensed 1982 / Unit 2 licensed 1983
 - Original Licensed Thermal Power (OLTP) of 3323 MWt per unit

- **LaSalle Previous Uprates**
 - Stretch Power Uprate of 5% in 2000 to 3489 MWt
 - MUR Uprate of 1.6% in 2010 to 3546 MWt
 - Current Licensed Thermal Power (CLTP) of 3546 MWt

- **EPU**
 - Projected Power Uprate level of 3988 MWt (increase ~12.5% of current licensed power or 120% of original licensed power)

Schedule Overview

NRC Communication Schedule

- 2nd Pre-Submittal Meeting: Target February 2012
- 3rd Pre-Submittal Meeting: Target April 2012
- Final Pre-Submittal Meeting: Target June 2012

EPU Implementation Schedule

- Submit LAR: Target 3rd QTR 2012
- LAR Approval: Target 1st QTR 2014 (20 months)

- Unit 2 Implementation: 2nd QTR 2015 (Outage L2R15)
- Unit 1 Implementation: 1st QTR 2016 (Outage L1R16)

Steam Dryer Evaluation could impact above schedule

- LAR will meet criteria in NRC RS-001, “Review Standard for Extended Power Upgrades”
- Evaluations supporting the LAR were performed using Constant Pressure Power Upgrade (CPPU) Licensing Topical Report (NEDC – 33004P-A) (commonly called CLTR)
 - Fuel related evaluations were performed to the guidance in NRC-approved NEDC-32424P-A (commonly called ELTR1)
 - Safety issues identified in ELTR1 that should be addressed in a plant-specific EPU license amendment request are addressed in the LaSalle Specific Power Upgrade Safety Analysis Report (PUSAR) (NEDC-33603P)
 - For generically evaluated issues – the PUSAR references the NRC-approved generic evaluations in either ELTR1 or ELTR2 (NEDC-32523P-A)
- No Submittals Linked to Proposed EPU Submittal
- Incorporated Past RAIs

Exelon's submittal will include

- **Cover Letter and Amendment Request**
- **Attachments**
 - Description/Evaluation of Proposed Changes including No Significant Hazards Consideration
 - Markup of Operating License and Technical Specifications
 - Markup of Technical Specifications Bases and Technical Requirements Manual (Information Only)
 - Power Uprate Safety Analysis Report (PUSAR) (non- proprietary, proprietary, and affidavit)
 - Regulatory Commitments
 - Supplemental Environmental Report
 - List of Modifications
 - EPU Startup Test Plan
 - Grid Stability Study
 - PRA Report
 - Flow Induced Vibration (FIV) Piping and Component Evaluation
 - Instrument Setpoint Calculations Affected by EPU
 - Steam Dryer Evaluation (High Cycle Fatigue Report) (non-proprietary, proprietary, and affidavit)

Annulus Pressurization Loads Analysis

Vikram Shah

Annulus Pressurization (AP) Loads Analysis

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Purpose

- **Verify methodology and approach used for analyses of Annulus Pressurization Load**
 - Perform the EPU break mass and energy release (M&E) and pressurization calculations for the annulus pressurization using the GEH TRACG computer code
 - TRACG based M&E release methodology for the AP loads will address GEH corrective action of the Safety Communication SC09-01

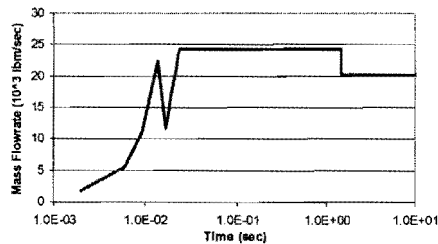
Methodology

- **Current CLTP Methodology**
 - NEDO-24548, Annulus Pressurization Load Adequacy Evaluation
 - Computer Code: RELAP4/ MOD 3
- **EPU Methodology**
 - NEDE-32176P, Revision 4, TRACG Model Description
 - NEDE-32177P, Revision 3, TRACG Qualification
 - NEDE-33083P-A, TRACG Application for ESBWR, October 2005
 - NEDE-33440P, Revision 2, TRACG ESBWR Safety Analysis – Additional Information, March 2010
 - Computer Code: TRACG V.04
- Same computer code was used in the Grand Gulf EPU Submittal to address AP loads

Annulus Pressurization (AP) Loads Analysis Overview

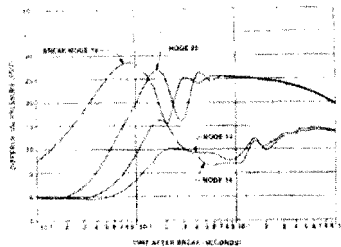
Pipe Whip
Jet Reaction
Jet Impingement

High Energy
line break
analysis



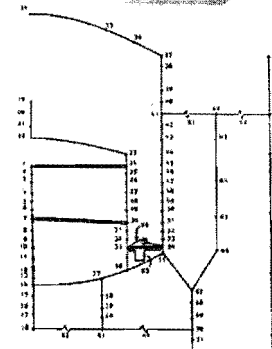
Mass / energy
release vs. time

Sub-
compartment
analysis



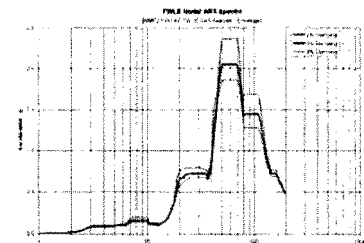
Annulus pressure
vs. time

Integrated
dynamic
analysis



Displacements,
accelerations,
forces, stresses,
moments and
response spectra

Structures &
attached
piping
analysis



Piping and
component
loads, stress,
fatigue, and
accelerations

Annulus Pressurization Loads Analysis Methods Comparison

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Evaluation	CLTP Method	EPU Method	Comparison / Comments
Mass and Energy Release	Generic NEDO-24548	TRACG 04	Note 1
Annulus Pressurization Loads	RELAP4/MOD 3	TRACG 04	Note 2
Jet Loads	ANSI 176 (draft)	ANSI/ANS 58.2-1988	Same method, Old standard superseded.
Pipe Whip Restraint	PDA	PDA	Same
Dynamic Structural Analysis	SAP4G07	SAP4G07	Same

- Note 1 - The TRACG 04 allows the calculation of mass and energy (M&E) release rates to include the physical attributes of the piping system for both rated and off-rated conditions. TRACG eliminates unphysical and artificially imposed jumps in mass and energy. Providing estimates of M&E at off-rated and rated conditions addresses the concerns identified in GEH Safety Communication SC 09-01, Annulus Pressurization Loads Evaluation, dated June 8, 2009
- Note 2 - The use of the TRACG 04 vessel component together with a fine mesh model (336 nodes) of the LaSalle annulus provides a more detailed annulus pressurization response than the analysis of record, which uses a coarse node (35 node) RELAP 4/MOD 3 model.

Summary

- The application of TRACG for both the mass and energy release analysis and the annulus pressurization analysis is appropriate to provide a response frequency used in all downstream load analyses
- SC 09-01 will be addressed by analyzing the pipe breaks considered in the LaSalle design and licensing basis at various rated and off-rated operating conditions with bounding conditions being used in the downstream analysis
- Confirm NRC agreement that the above approach to calculation of AP Loads is acceptable

ECCS NPSH Analysis

Vikram Shah

Purpose:

Verify methodology and Exelon's approach to perform NPSH analysis for a non-CAP credit plant is in accordance with NRC's expectations, and draft regulatory guidance

Methodology

- **SECY 11-0014, Use of Containment Accident Pressure in Analyzing Emergency Core Cooling System and Containment Heat Removal System Pump Performance in Postulated Accidents**
 - Event-specific analyses determine containment response
 - Suppression Pool Temperature
 - Event-specific $NPSH_a$ determined for each applicable event/pump
 - $NPSH_a$ compared to $NPSH_{r_{eff}}$ for each applicable pump
 - Time in Maximum Erosion Zone

Key Assumptions

- No Containment Accident Pressure
- Deterministic analysis with conservative inputs for DBA-LOCA, ASDC and Small Break LOCA.
- Nominal inputs for non-design basis events (SBO, Appendix R, ATWS) analyses
- Vendor supplied NPSHr 3% curves
- 21% uncertainty for $NPSH_{r_{eff}}$ for DBA-LOCA, ASDC and Small Break LOCA events
- 0% uncertainty for non-design basis events (ATWS, SBO, Appendix R)
- Assumes minimum Suppression Pool Inventory (level) for all events
- All events are evaluated at 102% of EPU power

Preliminary Results

Event	Pump	NPSH _a (Feet)	NPSH _{r,eff} (Feet)	Margin (Feet)
DBA-LOCA	RHR	18.8	16.9	1.9
DBA-LOCA	HPCS	19.7	6.1	13.6
DBA-LOCA	LPCS	19.0	2.4	16.6
ASDC	RHR	17.8	16.9	0.9
ASDC	HPCS	17.5	6.1	11.4
ASDC	LPCS	18.0	2.4	15.6
SBO	RHR	19.2	14.0	5.2
SBO	RCIC	Analysis in Progress		
SBO	HPCS	18.9	5.0	13.9
ATWS	RHR	32.4	14.0	18.4
App R	RHR	25.9	14.0	11.9
App R	HPCS	25.7	5.0	20.7
App R	LPCS	26.1	2.0	24.1

NPSH_{r,eff} values consistent with draft guidance ($NPSH_{r,eff} = NPSH_{r3\%} + \text{uncertainties}$) including 21% uncertainty for Design Basis Events and 0% uncertainty for non-Design Basis Events

No modifications are required to achieve the above results

Summary

- **Exelon's approach to perform NPSH analysis is in accordance with NRC expectations and draft guidance**
 - **Demonstrates that adequate positive margin exist for ECCS/RCIC pumps**
 - **Demonstrates that ECCS/RCIC pumps will perform their safety functions**
- **Confirm NRC agreement that the above approach to determine ECCS NPSH is acceptable**

- **Follow-up EPU Meetings**
 - **Proposed Topics**
 - **Steam Dryer Strategy and FIV Analysis**
 - **Impact and Changes to Human Factors**
 - **Impact on Primary Containment internal pressure (P_a)**
 - **Ultimate Heat Sink Analysis**
 - **Setpoint Calculations**
 - **Alternate Source Term Analysis**

- **Next meeting target February 2012**

- **Pilot Alignment and Outcome**
 - Discussion
 - Checklist Mark-up

- **Critique**

Acronym List

- ASDC – Alternate Shut Down Cooling
- ATWS – Anticipated Transient Without Scram
- CAP – Containment Accident Pressure
- CLTP – Current Licensed Thermal Power
- DBA – Design Basis Accident
- ECCS – Emergency Core Cooling System
- EPU – Extended Power Uprate
- ESBWR – Economic Simplified Boiling Water Reactor
- FIV – Flow Induced Vibration
- GEH – General Electric – Hitachi
- HPCS – High Pressure Core Spray
- LAR – License Amendment Request
- LOCA – Loss of Coolant Accident
- LPCS – Low Pressure Core Spray
- LTR – Licensing Topical Report
- MUR – Measurement Uncertainty Recapture power uprates
- MWt – Mega Watts thermal
- NEI – Nuclear Energy Institute
- NPSH – Net Positive Suction Head
- NPSHa – Net Positive Suction Head available
- NPSHr – Net Positive Suction Head required
- NPSH_{eff} – Effective Net Positive Suction Head required
- PRA – Probabilistic Risk Assessment
- PUR – Power Uprate
- RAI – Request for Additional Information
- RHR – Residual Heat Removal
- SBO – Station Black Out
- SC – GEH Safety Communication
- SECY – Commission Papers (Written issues papers the NRC staff submits to the Commission to inform them about policy, rulemaking, and adjudicatory matters)

provide a summary of the differences along with a justification for use of the methodology in the EPU application.

- Based on recent Advisory Committee on Reactor Safeguards comments associated with the use of American National Standards Institute and American Nuclear Society (ANSI/ANS) 58.2-1988 for evaluating jet impingement loads, the NRC staff noted that the use of this standard as it applies to the proposed EPU may be inappropriate. The NRC staff also noted that ANSI/ANS 58.2-1988 is a withdrawn standard.
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Sincerely,

/RA/

Nicholas DiFrancesco, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosures:

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2. Licensee Handout

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Package Accession No. ML120030332 Meeting Notice ML113200075 Meeting Summary ML120030321 NRC-001

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DATE	1/17/12	1/17/12	1/18/12	1/19/12

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