



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

November 29, 2010

LICENSEE: Exelon Generation Company, LLC

FACILITY: Byron Station, Unit Nos. 1 and 2, (Byron) and Braidwood Station, Units 1 and 2 (Braidwood)

SUBJECT: SUMMARY OF NOVEMBER 4, 2010, MEETING WITH EXELON GENERATION COMPANY, LLC, PRE-APPLICATION DISCUSSION ON FORTHCOMING BYRON AND BRAIDWOOD MEASUREMENT UNCERTAINTY RECAPTURE (MUR) LICENSE AMENDMENT REQUEST (LAR) (TAC NOS. ME4815, ME4816, ME4817, AND ME4818)

On November 4, 2010, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Exelon Generation Company, LLC (the licensee) at the NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss the planned LAR currently forecast for submittal in April 2011, for a MUR power uprate of approximately 1.63 percent to 3645 megawatts thermal. A meeting summary follows.

The licensee's presentation (see Enclosure 2) summarized the regulatory and technical bases for the planned application, as well as key analyses and potential modifications planned for inclusion in the planned application. Key discussion points between the NRC staff and the licensee:

1. The licensee plans to provide revised dose and margin-to-overfill analyses for the steam generator tube rupture accident (see Slide 9). The NRC stated that the review of these analyses could not be performed within the target 6-month review schedule for a MUR, and would likely require 12 months. The licensee noted that they anticipate a 12-month review.
2. The NRC staff reinforced the need for the licensee to address the specific limitations and conditions vs. approved Topical Reports for any new or updated analysis methodologies.
3. The NRC staff noted that its approval of the prerequisite ASTRUM/BELOCA amendment (see Slide 7) would likely occur before the April 2011, MUR application submittal.

Two members of the public were in attendance. Public Meeting Feedback forms were not received.

Please direct any inquiries to me at 301-415-1457, or marshall.david@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Marshall J. David". The signature is fluid and cursive, with the first name "Marshall" being more prominent than the last name "David".

Marshall J. David, Senior Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN-456, STN-457,
STN 50-454, and STN 50-455

Enclosures:

1. List of Attendees
2. Licensee Handout

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LIST OF ATTENDEES

NOVEMBER 4, 2010, PUBLIC MEETING WITH EXELON GENERATION COMPANY, LLC.

PRE-APPLICATION DISCUSSION ON FORTHCOMING BYRON AND BRAIDWOOD

MEASUREMENT UNCERTAINTY RECAPTURE LICENSE AMENDMENT REQUEST

Name	Affiliation	Phone
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M. David	NRC/NRR	301-415-1547
A. Billoch	NRC/NRR	301-415-3302
S. Sun	NRC/NRR	301-415-2868
P. Chung	NRC/NRR	301-415-2473
B. Parks	NRC/NRR	301-415-6472
T. Alexion	NRC/NRR	301-415-1326
S. Gardocki	NRC/NRR	301-415-1023
T. Mossman	NRC/NRR	301-415-3647
A. Attard	NRC/NRR	301-415-2876
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R. Alvarado	NRC/NRR	301-415-6808
A. Obodoako	NRC/NRR	301-415-1502
J. Rommel	Exelon	630-657-3351
D. Benyak	Exelon	630-657-2811
M. Jesse	Exelon	610-765-5528
J. Wilson	Exelon	630-657-3353
D. Gudger	Exelon	815-406-2800
L. Dworakowski	Exelon (by phone)	815-417-2810
J. Bauer	Exelon	630-657-3376
V. Gloria	Exelon	630-657-3736
D. Baran	Exelon	630-657-3360
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M. Murphy	Commonwealth of PA (by phone)	717-303-9774
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LICENSEE HANDOUT

NOVEMBER 4, 2010, PUBLIC MEETING WITH EXELON GENERATION COMPANY, LLC,
PRE-APPLICATION DISCUSSION ON FORTHCOMING BYRON AND BRAIDWOOD
MEASUREMENT UNCERTAINTY RECAPTURE LICENSE AMENDMENT REQUEST

Byron and Braidwood Stations

NRC Pre-Application Meeting

**License Amendment Request
for
Measurement Uncertainty Recapture
(MUR) Power Uprate**

November 4, 2010

Introductions

2

Exelon Participants

- ✓ John Rommel – Engineering Director, Power Uprate
- ✓ Darin Benyak – Licensing Director, Corporate
- ✓ Michael Jesse – Licensing Manager, Power Uprate
- ✓ Jeff Wilson – Manager of Projects, Power Uprate
- ✓ David Gudger – Byron Station, Regulatory Assurance
- ✓ Ron Gaston – Braidwood Station, Regulatory Assurance
- ✓ Joe Bauer – Principal Regulatory Engineer, Power Uprate
- ✓ Vic Gloria – Principal Regulatory Specialist, Power Uprate
- ✓ Dave Baran – Lead Engineer, Power Uprate
- ✓ Annie Wong – Lead Analyst, Power Uprate

Agenda

3

- ✓ MUR License Amendment Request (LAR) Objective
- ✓ Regulatory Basis
- ✓ Background
- ✓ LAR Development
- ✓ LAR Technical Basis
- ✓ Key Analyses
- ✓ Potential Modifications
- ✓ Submittal and Power Ascension Schedule
- ✓ Questions and Feedback

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MUR LAR Objective

4

- ✓ Submit a license amendment request to the NRC to increase the reactor licensed thermal power level for Byron and Braidwood Stations, Units 1 and 2
 - Increase the reactor licensed thermal power level by ~1.63%
 - Current licensed thermal power (CLTP): 3586.6 MWth
 - Requested MUR power level: 3645 MWth
 - This power increase will be accomplished by decreasing the core thermal power measurement uncertainty by utilization of the Cameron Check-Plus Leading Edge Flow Meter (LEFM)
 - The LAR will be a combined submittal for both Byron and Braidwood Stations
 - Any station differences will be clearly addressed in the LAR

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- ✓ 10 CFR 50 Appendix K, ECCS Evaluation Models
 - Requires analyses assuming reactor is “operating continuously at 1.02 times the licensed power level to allow for instrument error”
 - Appendix K was revised in July 2000 to allow an assumption that the reactor is operating at a power level lower than 1.02 if it can be demonstrated that instrument uncertainties are <2%
- ✓ Regulatory Issue Summary (RIS) 2002-03, “Guidance on the Content of Measurement Uncertainty Recapture Power Uprate Applications”
- ✓ Caldon Check-Plus Leading Edge Flow Meter Licensing Topical Reports (ER-80P, ER-157P)
 - NRC approved methodology for establishing measurement uncertainty for Caldon CheckPlus LEFM
- ✓ NRC LIC-109, “Acceptance Review Procedures”
 - LAR will be developed to meet the specified criteria

- ✓ Byron and Braidwood Stations – Nearly Identical Design
 - Each station consists of two units; Westinghouse 4-loop PWRs
 - Minor design differences (e.g., Essential Service Water System)
- ✓ Commercial Operation Dates
 - Byron U1 – 09/85; Byron U2 – 08/87
 - Braidwood U1 – 07/88; Braidwood U2 – 10/88
- ✓ Original Licensed Thermal Power (OLTP): 3411 MWth
- ✓ Current Licensed Thermal Power (CLTP): 3586.6 MWth
 - A 5% Stretch Uprate was previously implemented at Byron and Braidwood Stations; NRC approval obtained May 4, 2001
 - Increased the licensed core thermal power from 3411 MWth to 3586.6 MWth

- ✓ LAR will be formatted similar to the North Anna and Prairie Island MUR submittals (follow the RIS 2002-03 guidance and format/structure)
- ✓ Previous NRC MUR Requests for Additional Information (RAI)
 - Industry responses to previous NRC RAIs will be reviewed and incorporated into the LAR as applicable
- ✓ Related Submittal Impact Consideration
 - ASTRUM BELOCA (Automated Statistical Treatment of Uncertainty Method; Best Estimate LOCA) LAR is currently under NRC review
 - LAR submitted 12/16/09
 - ASTRUM BELOCA model is needed to regain adequate PCT margin
 - LAR is linked to MUR; i.e., must be approved prior to MUR submittal
 - Ultimate Heat Sink LAR is currently under NRC review
 - LAR submitted 06/30/09
 - Modifies single failure assumption used in the design basis analysis
 - LAR is not linked to MUR as both the current UHS analysis and the analysis in UHS LAR are performed at 102% of CLTP and bounding

- ✓ Basis for the ~1.63% Power Increase (3586.6 MWth to 3645 MWth)
 - Current SBLOCA and LBLOCA analyses (assuming ASTRUM BELOCA) are performed at 102% of CLTP (i.e., 3658.3 MWth)
 - Some current non-LOCA analyses are performed at CLTP (i.e., 3586.6 MWth)
 - MUR evaluations/analyses which are not bounded by current analyses are evaluated in accordance with the RIS guidance
- ✓ Operating Margin Reviews and Reconciliation
 - MUR evaluations identify margin impacts
 - Margin items will be entered in the site margin management process as appropriate
 - Operational Technical Decision Making (OTDM) process will be utilized to document margin reconciliation

Key Analyses

9

- ✓ VIPRE Computer Code; ABB-NV and WLOP Correlations
 - These NRC-approved codes will be used to demonstrate adequate DNB margin under MUR conditions
 - VIPRE is a thermal-hydraulic code used by Westinghouse for DNBR analysis
 - ABB-NV is a critical heat flux correlation applicable to the non-mixing vane grid region
 - WLOP is a critical heat flux correlation for low pressure applications
- ✓ Steam Generator Tube Rupture (SGTR) Revised Analysis
 - Analysis addresses design differences between Unit 1 and Unit 2 SGs: Unit 1 – BWI; Unit 2 – Westinghouse Model D5
 - LAR will present revised Margin to Overfill (MTO) results as the SGTR MTO calculation has insufficient margin
 - LAR will present revised dose consequences (based on AST methodology)
 - NRC-approved methods utilized for analysis (WCAP 10698-P-A and Supplement 1)
 - Potential modifications may be required to satisfy MTO considerations
 - Add AFW valve instrument air accumulators (Unit 1 and Unit 2)
 - Replace SG PORV trim to increase steam flow (Unit 1 only)

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Potential Modifications

10

- ✓ Modifications Supporting MUR
 - Potential SGTR/MTO-Related Modifications
 - Add AFW valve instrument air accumulators (Unit 1 and Unit 2)
 - Replace SG PORV trim to increase steam flow (Unit 1 only)
 - HP Turbine Modifications – potential replacement of nozzle blocks
 - BOP Modifications – potential heater drain valve replacement
 - LEFM Modification
 - Initial calibration at Alden Research Laboratory using site specific piping model
 - Final commissioning on site after installation confirms system performance
 - NRC criteria for utilizing LEFM technology will be addressed in the LAR
 - Response similar to LaSalle County and Limerick Generating Station submittals

<u>Site/Unit</u>	<u>Install LEFM</u>
BYR U1	03/11 (B1R17)
BYR U2	09/11 (B2R16)
BRW U1	04/12 (A1R16)
BRW U2	04/11 (A2R15)

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- ✓ LAR Submittal Target Date: April 2011
- ✓ LAR Approval Target Date: April 2012
- ✓ LEFM Installation and Power Ascension Schedule

<u>Site/Unit</u>	<u>Install LEFM</u>	<u>Power Ascension</u>
BYR U1	03/11 (B1R17)	10/12 (after B1R18)
BYR U2	09/11 (B2R16)	mid-cycle (after NRC approval)
BRW U1	04/12 (A1R16)	05/12 (after A1R16)
BRW U2	04/11 (A2R15)	11/12 (after A2R16)

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Two members of the public were in attendance. Public Meeting Feedback forms were not received.

Please direct any inquiries to me at 301-415-1457, or marshall.david@nrc.gov.

Sincerely,

/RA/

Marshall J. David, Senior Project Manager
Plant Licensing Branch III-2
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