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

November 14, 2014

LICENSEE: Exelon Generation Company, LLC

FACILITY: Three Mile Island Nuclear Station, Unit 1

SUBJECT: PUBLIC MEETING WITH THE U.S. NUCLEAR REGULATORY COMMISSION AND EXELON GENERATION COMPANY, LLC REGARDING GENERIC LETTER 2004-02 (TAC NO. MC4724)

On October 30, 2014, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Exelon Generation Company, LLC (Exelon) at NRC Headquarters, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. The purpose of the meeting was to discuss planned testing for Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," associated with Three Mile Island Nuclear Station, Unit 1 (TMI-1). The meeting notice and agenda, dated October 1, 2014, is available in the Agencywide Documents Access and Management System (ADAMS) under Accession No. ML14301A322.

The meeting began at 9:00 a.m. Eastern Daylight Time (EDT) with opening remarks by the NRC staff followed by introductions of the attendees. A list of attendees is provided in Enclosure 1.

Exelon presented information (See Enclosure 2 or ADAMS Accession No. ML14300A545). Exelon selected Option 2a to close-out GL 2004-02 for TMI-1. Option 2 is the "mitigative measures and alternative methods;" Option 2a is the "deterministic resolution path." By letter dated May 16, 2013 (ADAMS Accession No. ML13137A309), TMI-1 stated it would complete modifications and pursue refinements to evaluation methods and acceptance criteria. TMI-1 committed to:

- Replace the NUKON® currently installed on the pressurizer with Metallic Reflective Insulation (MRI) in the fall 2015 refueling outage (RFO).
- Complete strainer head loss testing based on the reduced strainer debris load by December 31, 2015.
- Re-evaluate strainer bypass by July 31, 2016.
- Submit a final updated supplemental response to support closure of GL 2004-02 for TMI-1 by June 1, 2017.

The current Exelon plan/schedule for TMI-1 is to:

- Conduct strainer head loss and bypass testing at Alden Research Laboratory (Holden, MA) in 2014.
- Based on strainer head loss test results, replace NUKON® blanket insulation on the pressurizer with MRI during the fall 2015 RFO.
- Submit final updated supplemental response to the NRC in 2016 pending completion of the Pressurized-Water Reactor Owners' Group efforts.

Exelon proposed the following strainer test sequence: (1) single top hat bypass test in November 2014, (2) strainer head loss testing in December 2014, and (3) strainer bypass test in December 2014.

The single top hat bypass test will evaluate the effect of debris concentration/mixture and water chemistry on the strainer bypass. The results of this "sensitivity" test will be factored into a large scale bypass test.

The strainer head loss test sequence will consist of a thin bed test followed by one or two full load head loss tests, as required, to determine the limiting debris quantity. A test plan has been developed to evaluate several options for insulation replacement on the pressurizer. The final decision for the scope of the insulation replacement during the fall 2015 RFO will be determined by the test results.

The information gained in the single top hat bypass test will be used to develop the test plan/procedures for the final strainer bypass test.

The TMI-1 pressurizer is currently insulated entirely with NUKON® blanket insulation. Exelon is investigating two options for replacing NUKON® with MRI:

- Option A: replace NUKON® insulation above the support region with the exception of the upper head, and
- Option B: replace NUKON® insulation in all locations with the exception of the upper head and inside the support.

Exelon will use the head loss test sequence results to determine which option will result in acceptable net positive suction head for the emergency core cooling system pumps and acceptable maximum strainer differential pressure.

Exelon has estimated the debris reduction for TMI-1:

- Option A results in approximately 46-percent reduction in the volume of blanket insulation on the pressurizer,

- Option B results in approximately 81-percent reduction in the volume of blanket insulation on the pressurizer, and
- If necessary, a further reduction in the volume of fiber debris at the strainer can be achieved by removing the insulation currently included in Option B as "margin" and crediting the pressurizer support as a robust barrier (Option C).

TMI-1 is continuing to follow the PWROG efforts to establish the allowable debris limits for in-vessel effects.

The Exelon current calculated TMI-1 bypass of 34 grams fiber per fuel assembly is based on bypass testing that was performed for another utility with an Enercon top hat strainer similar to TMI-1.

Exelon expects that the TMI-1 specific bypass test will provide a lower bypass fraction.

Exelon has proposed debris preparation protocol for head loss and final bypass tests to include the following: fine debris added to the tank first, insulation torn into 1"-4" pieces by hand, torn insulation to be wetted using garden hose nozzle, wetted debris will be mixed using a paddle to ensure even moisture penetration, additional water spray applied to ensure small pieces are separated from each other, and preparation ends when it has been confirmed that the pieces readily separate within the slurry and no pieces remain floating.

The NRC staff queried the licensee and vendor about the strainer test, questioning if it will include multiple top hats and chemical effects. Exelon and Enercon responded that the strainer test would include 9 top hats in a 3 by 3 array and it would include chemical effects. The NRC staff questioned if insulation had been changed at TMI-1. Exelon stated that during the steam generator (SG) replacement in 2007, that NUKON® insulation was replaced with MRI on the SGs and some hot leg piping NUKON® insulation was replaced with MRI. The NRC staff queried Exelon regarding if velocity sensitivity was going to be performed for the testing. Exelon responded that velocity sensitivity would not be performed. The NRC staff questioned what temperature and range would the testing be performed. Exelon responded that the testing would be performed at 120 degrees Fahrenheit (°F) with a range of plus or minus 5°F. The NRC queried whether the testing included bypass eliminators, and Exelon responded that it does. The NRC questioned Exelon and Enercon if the fines are made according to the Nuclear Energy Institute (NEI) protocol, and the licensee responded yes. The NRC staff queried Exelon and Enercon if settling would be allowed during the testing, and Enercon responded that settling would not be allowed. The NRC staff asked Exelon to provide the exact dates for the testing, so the NRC staff could witness the testing, if desired. The NRC staff stated that they would look at the guidance for making small debris for the testing.

No members of the public were in attendance. Public Meeting Feedback forms were not received.

At this meeting, the NRC staff made no regulatory decisions regarding the merits of the proposed close-out of GL 2004-02 at TMI-1.

The meeting was adjourned at 9:54 a.m. EDT.

Please direct any inquiries to me at 301-415-3100, or John.Lamb@nrc.gov.

John G. Lamb, Senior Project Manager
Plant Licensing Branch 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No.: 50-289

Enclosures:
1. List of Meeting Attendees
2. Exelon Presentation Slides

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LIST OF ATTENDEES

PUBLIC MEETING BETWEEN EXELON GENERATION COMPANY LLC (EXELON) AND THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF

THURSDAY, OCTOBER 30, 2014
9:00 a.m. - 11:00 a.m.
ONE WHITE FLINT NORTH, ROOM O-8B6

NAME	ORGANIZATION
John Stang	NRC
Paul Klein	NRC
Steve Smith	NRC
John Lamb	NRC
Matt Yoder	NRC
Andrea Russell	NRC
Ashley Guzzetta	NRC
Robert Gladney	NRC
Dave Werkheiser	NRC
Frank Mascitelli	Exelon
Dave Reese	Exelon
Richard Sievers	Exelon
Pat Bennett	Exelon
Mike Fitzwater	Exelon
Caitlin Keane	Exelon
Kip Walker	Enercon
Tim Sande	Enercon
Ludwig Haber	Alden Lab

Enclosure 1

Enclosure 2

GL 2004-02 CLOSE OUT

FOR

THREE MILE ISLAND UNIT 1

MEETING WITH NRC

OCTOBER 30, 2014

Exelon

GL 2004-02 Close Out for TMI

Purpose of Meeting:

- **Communicate current TMI plan for closure of GL 2004-02 .**
- **Provide updated schedule of activities related to closure of GL 2004-02 for TMI.**
- **Identify any areas of concern that can be addressed during the TMI strainer testing program.**
- **Identify areas where additional discussion/review may be required to ensure successful closure of GL 2004-02 for Three Mile Island Unit 1.**

GL 2004-02 Close Out for TMI

In July, 2012, NRC provided three options for closure of GSI-191*:

Option 1: Compliance based on approved models

- Plants must meet "clean plant criteria" or
- Have sufficiently low strainer bypass and
- Meet the 15 gram per fuel assembly limit

Option 2: Mitigative measures and alternative methods

2a – Deterministic Resolution Path

2b – Full Risk-Informed Resolution Path

Option 3: Different regulatory treatments for strainer and in-vessel effects

- Use deterministic approach for strainer and a risk-informed approach to in-vessel.
- This option only conceptually defined in 2012 and is still under development.

* SECY-12-0093

Exelon

GL 2004-02 Close Out for TMI

TMI selected Option 2a – complete additional modifications and pursue refinements to evaluation methods and acceptance criteria.*

{TMI previously applied a 7D ZOI for Nukon insulation. The updated analyses and testing will apply the 17D ZOI.}

TMI committed to:

- Replace the NUKON insulation currently installed on the pressurizer with Metallic Reflective Insulation (MRI) in T1R21 (Fall 2015).
- Complete strainer head loss testing based on the reduced strainer debris load by 12/31/15
- Re-evaluate strainer bypass by 7/31/16
- Submit a final updated supplemental response to support closure of GL 2004-02 for TMI Unit 1 by 6/1/17.

*TMI Letter (TMI-12-148) to USNRC dated May 16, 2013.

GL 2004-02 Close Out for TMI

Current TMI plan/schedule:

- Conduct strainer head loss and bypass testing @ Alden Research Laboratory (Holden, MA) in 2014
- Based on strainer head loss test results, replace Nukon blanket insulation on the pressurizer with MRI in fall 2015 refueling outage (T1R21).
- Submit final updated supplemental response to the NRC in 2016 pending completion of the PWROG efforts.

GL 2004-02 Close Out for TMI

Strainer test sequence:

Single Top Hat Bypass Test – November 2014

This testwill evaluate the effect of debris concentration/mixture and water chemistry on strainer bypass. The results of this 'sensitivity' test will be factored into a large scale bypass test.

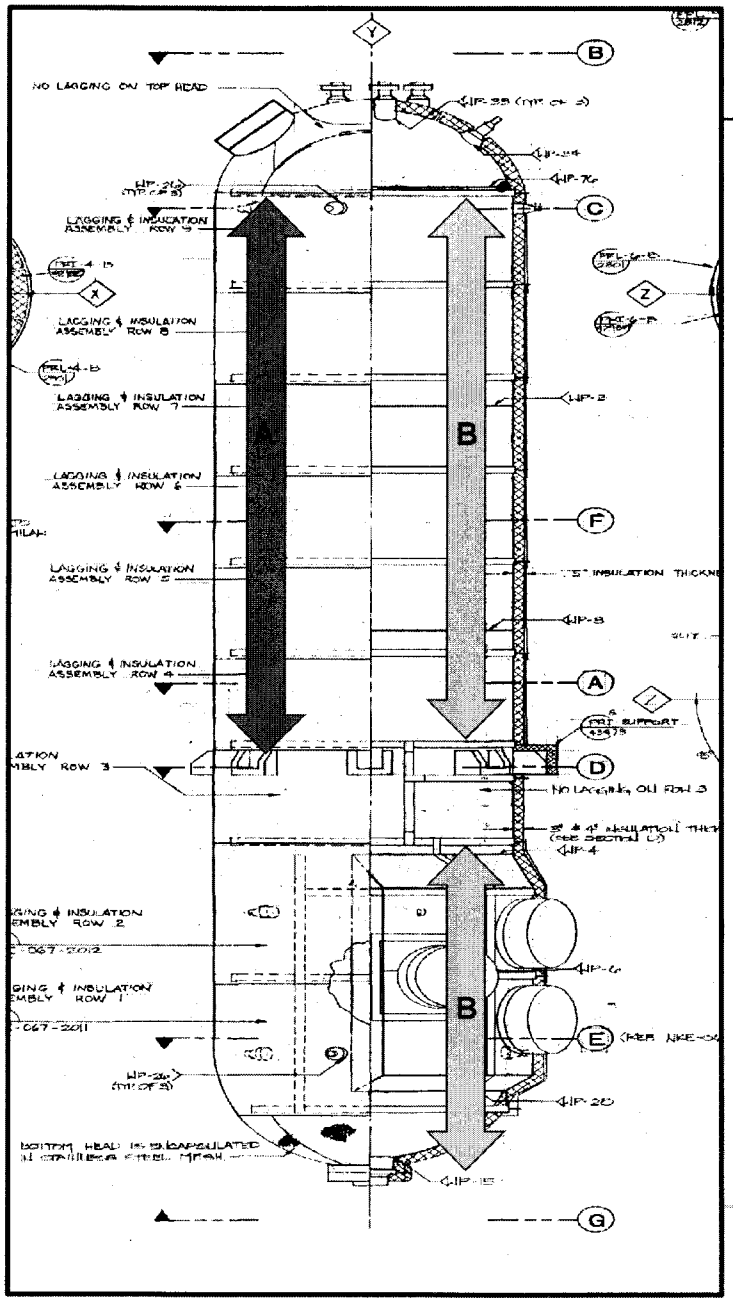
Strainer Head Loss Testing – December 2014

This test sequence will consist of a thin bed test followed by one or two full load head loss tests as required to determine the limiting debris quantity. A test plan has been developed to evaluate several options for insulation replacement on the pressurizer. The final decision for the scope of insulation replacement in T1R21 will be determined by the test results.

Strainer Bypass Test – December 2014

The information gained in the single top hat bypass test will be used to develop the test plan/procedures for the final bypass test.

Test plans and procedures are currently being developed.



GL 2004-02 Close Out for TMI

TMI pressurizer is currently insulated entirely with Nukon blanket insulation. Two options for replacing Nukon with MRI will be investigated:

- Option A: replace Nukon insulation above the support region with the exception of the upper head.
- Option B: replace Nukon insulation in all locations except upper head and inside the support.

The head loss test sequence will determine which option will result in acceptable NPSH for the ECCS pumps and acceptable maximum strainer DP.

Exelon

GL 2004-02 Close Out for TMI

Estimated debris reduction:

- Option A results in approximately 46% reduction in the volume of blanket insulation on the pressurizer
- Option B results in approximately 81% reduction in the volume of blanket insulation on the pressurizer
- If necessary, a further reduction in the volume of fiber debris at the strainer can be achieved by removing the insulation currently included in Option B as 'margin' and crediting the pressurizer support as a robust barrier (Option C).

{Following insulation replacement on the pressurizer, some small amounts of blanket insulation will remain on piping and components within the ZOI.}

GL 2004-02 Close Out for TMI

TMI is continuing to follow PWROG efforts to establish the allowable debris limits for in-vessel effects.

The current calculated TMI bypass of 34 grams fiber/fuel assembly is based on bypass testing that was performed for another utility with an Enercon top hat strainer similar to TMI's.

The TMI specific bypass test is expected to provide a lower bypass fraction.

GL 2004-02 Close Out for TMI

Proposed Debris Preparation Protocol for Head Loss and Final Bypass Tests*

- Debris categorized as small or large pieces and intact blankets will be prepared as follows:
  - Insulation torn into 1"-4" pieces by hand
  - Torn insulation will be wetted using garden hose nozzle
  - Wetted debris will be mixed using a paddle to ensure even moisture penetration
  - Additional water spray applied to ensure small pieces are separated from each other
  - Preparation ends when it has been confirmed that the pieces readily separate within the slurry and no pieces remain floating
- Fine debris will be added to the tank first

*Fiber will be prepared only as 'fines' for the single top hat bypass test.

Please direct any inquiries to me at 301-415-3100, or John.Lamb@nrc.gov.

/RA/

John G. Lamb, Senior Project Manager
Plant Licensing Branch 1-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No.: 50-289

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1. List of Meeting Attendees
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ADAMS Accession No.: Package: ML14304A784, Summary: ML14304A783, Slides: ML14300A545

OFFICE	LPL1-2/PM	LPL1-2/LA	LPL1-2/BC	LPL1-2/PM
NAME	JLamb	ABaxter	MKhanna	JLamb
DATE	10/30/14	11/10/14	11/12/14	11/14/14

Official Agency Record