



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

July 17, 2013

LICENSEE: Exelon Generation Company, LLC (Exelon)
FACILITY: Three Mile Island, Unit 1
SUBJECT: SUMMARY OF JUNE 17, 2013, MEETING WITH EXELON TO DISCUSS
RECENT ONCE-THROUGH STEAM GENERATOR TUBE-TO-TUBE WEAR AT
THREE MILE ISLAND, UNIT 1 (TAC NO. MF1787)

On June 17, 2013, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives from Exelon Generation Company, LLC (Exelon, the licensee). Representatives from AREVA (the vendor) also participated in the meeting. The purpose of the meeting was to discuss recent steam generator inservice inspection results at Three Mile Island, Unit 1 (TMI-1). Specifically, the meeting was held to discuss the results of the root cause investigation regarding tube-to-tube wear indications in the replacement once-through steam generators at TMI-1. This meeting was a follow-up to a meeting held on January 26, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML120270416), which discussed inspection results both at TMI-1 and Arkansas Nuclear One (ANO), Unit 1.

The licensee presented background information regarding the inspection results from the fall of 2011, which was when the issue was discovered at TMI-1. The NRC staff asked if there were three wear indications at any elevation on any of the tubes. After the meeting, the licensee confirmed that there are two tubes in the 'A' steam generator that have three wear indications at one elevation. There are none in 'B' steam generator. The licensee provided trend data, updated since the previous meeting held on January 26, 2012, with data from the most recent refueling outage at ANO, Unit 1. The data generally shows that the growth rate tends to decrease as operating time accrues. The NRC staff questioned two instances where that did not seem to be the case. The licensee indicated that some differences would be expected in the observed data. The NRC staff also noted that it is apparent that the wear can initiate in cycles beyond the first operating cycle. The licensee and vendor postulated that this could happen due to variances in local conditions, including the actual heatup and cooldown process, at those specific tube locations, and/or inspection variability.

The licensee explained that when hot, the steam generator tubes are in compression and when cold, the tubes are in tension. The licensee stated that the root cause of the tube-to-tube wear was a combination of four contributing causes:

1. Margin to buckling was non-conservative in the design,
2. The outside shell of the steam generator is cooler than the design value,
3. The tube preload is less tensile than the value used in the design analysis, and
4. Lateral loads/accelerations are sufficient to cause the observed wear.

The first three contributing causes all tend to result in tube bowing, sufficient to cause tube-to-tube contact. Excitation forces created by either random turbulence or "flutter" (contributing cause number 4) are then sufficient to result in wear.

The licensee does not plan to implement any operational restrictions as a result of this root cause analysis, however, further evaluation is planned in the upcoming refueling outage, including a full tube inspection and possibly performing field testing to measure the in-generator tube axial pre-load.

The licensee provided handouts that guided the meeting discussion. A non-proprietary version of the handouts can be found at ADAMS Accession No. ML13178A360. A list of attendees is provided in the Enclosure. Members of the public that participated in the meeting provided questions and comments that were addressed during the meeting. Meeting feedback forms were made available to the attendees, however, none were filled out and submitted to the NRC meeting contact.

Please direct any inquiries to me at 301-415-2833 or peter.bamford@nrc.gov.



Peter Bamford
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure:
List of Attendees

cc w/encl: Distribution via ListServ

LIST OF ATTENDEES

JUNE 17, 2013, MEETING WITH EXELON GENERATION COMPANY, LLC

ONCE-THROUGH STEAM GENERATOR TUBE-TO-TUBE WEAR

ROOT CAUSE INVESTIGATION RESULTS AT THREE MILE ISLAND, UNIT 1

Exelon

Jay Smith
Mark Torborg
James Barstow
Stephanie Hanson
John Piazza
Wendy Croft
Michael Fitzwater
Randy Stewart

AREVA

Jeff Fleck
Tim Wiger
Dan Bauer
Hasan Charkas
John Remark
Michael Street
Craig Kelley

PUBLIC (via teleconference)

Dennis Dyckman, PA state
Scott Portzline, TMI Alert
Dan Meatheany, Entergy
Bob Clark, Entergy

NRC

Peter Bamford, Office of Nuclear Reactor
Regulation (NRR)
Kenneth Karwoski, NRR
Gloria Kulesa, NRR
Veronica Rodriguez, NRR
Gregory Makar, Office of New Reactors
David Werkheiser, Region I (RI)
James Trapp, RI
Timothy O'Hara, RI
Aloysius Obodoako, NRR
Neil Sheehan, Office of Public Affairs

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/ra/
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ADAMS Accession Nos.: Package ML13178A358; Meeting Notice ML13136A203; Meeting Handouts ML13178A360 and ML13179A086; Meeting Summary ML13179A093 *Via email

OFFICE	DORL/LPLI-2/PM	DE/SLS	DORL/LPLI-2/LA	DORL/LPLI-2/BC	DORL/LPLI-2/PM
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DATE	6/28/13	7/8/13	07/16/13	7/17/13	7/17/13