



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

February 13, 2012

LICENSEE: Exelon Generation Company, LLC (Exelon) and Entergy Operations, Inc. (Entergy)

FACILITY: Three Mile Island, Unit 1 and Arkansas Nuclear One, Unit 1

SUBJECT: SUMMARY OF JANUARY 26, 2012, MEETING WITH EXELON AND ENTERGY TO DISCUSS RECENT ONCE-THROUGH STEAM GENERATOR INSERVICE INSPECTION RESULTS (TAC NOS. ME7700 AND ME7701)

On January 26, 2012, a Category 1 public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of licensees Exelon Generation Company, LLC (Exelon), and Entergy Operations, Inc. (Entergy). Representatives from AREVA also participated in the meeting. The purpose of the meeting was to discuss recent inservice inspection results at Three Mile Island, Unit 1 (TMI-1) and Arkansas Nuclear One, Unit 1 (ANO-1). Specifically, the meeting was held to discuss tube-to-tube wear indications in the replacement once-through steam generators at TMI-1 and ANO-1.

Both licensees assessed the significance of the wear indications and concluded their units could safely operate until the next scheduled inspection. Exelon presented the detailed inspection results from their most recent refueling outage in the fall of 2011, where the tube-to-tube degradation mechanism was first detected. This refueling outage was the first inspection opportunity after the replacement of the steam generators in the fall of 2009. Entergy presented an analysis of past tube inspection results at ANO-1, which were re-examined in light of the TMI-1 operating experience. The Entergy presentation included an explanation of why the tube-to-tube wear was mischaracterized in previous refueling outages between 2007 and 2011. AREVA presented the status of the root cause investigation, which has an estimated completion date of May 31, 2012. Detailed handout material from the meeting may be found at Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML120250105 (TMI-1 slides), ML120250111 (ANO-1 slides) and ML120250116 (AREVA slides). The NRC staff plans to continue to monitor and evaluate this new wear mechanism, including the results of the root cause investigation.

More specifically, during the meeting, several items were discussed/clarified by the participants, including the following:


- No loose parts or potential loose part indications were detected during the TMI-1 outage.
- The conclusion at TMI-1 that the indications faced each other was based on examinations of six pairs of tubes.
- On slide 13 of the TMI-1 presentation, the presenter clarified that the difference between the number of tubes with indications identified by "either the Primary or Secondary" analyst and the total number of tubes with indications, is the number

of additional calls made by the resolution analyst as a result of a more detailed review of the data once an indication was identified (e.g., in the "A" steam generator, 33 additional tubes were identified by the resolution analysts that were not identified by either the primary or secondary analysis ($74 - 41 = 33$)).

- The licensee for TMI-1 clarified that the +Point sizing method for flat wear was determined to be the correct technique for tube-to-tube wear in once-through steam generators based on the profiles and sizes of the indications.
- At TMI-1, there was one tube that had tube-to-tube wear between both the 7th and 8th, and the 8th and 9th, tube support plate. The licensee clarified after the meeting that, including this tube, there were 5 tubes with wear between the 7th and 8th tube support plate, and 2 tubes with wear between the 4th and 5th tube support plate. All other tube-to-tube wear indications were between the 8th and 9th tube support plate.
- Regarding slide 18 of the ANO-1 presentation, the presenter clarified, in response to an NRC staff question, that similar plots had not been performed for the new indications identified in refueling outages 1R20 and 1R21.
- The voltages reported on slide 19 of the ANO-1 presentation are bobbin voltages.
- Regarding slide 19 of the ANO-1 presentation, the presenter clarified that the "Total Present" column represents the results of the re-analysis while the other values represent the results of the original analysis. Looking at the data from refueling outage 1R23 in the "A" steam generator, it was explained that there are a total of 48 tube-to-tube wear indications. Of those 48 indications, 25 were not reported by the analysts (23 had voltages less than or equal to 0.49 volts and 2 had voltages greater than or equal to 0.50 volts). As a result, 23 indications were not reported by either the primary or secondary data analysts (i.e., $48 - 25 = 23$). Since only 17 indications were retained by the resolution analysts, this means that the resolution analysts eliminated 6 of the indications during their review of the data ($23 - 17 = 6$).
- Regarding slide 36 of the ANO-1 presentation, the experience cited is with the X-probe.
- The licensee for ANO-1 (Entergy) indicated it would consider performing more bobbin probe inspections within the area where tube-to-tube wear has been observed to provide confidence that the conditions are bounded.
- The voltage normalization for the eddy current probes is slightly different at ANO-1 than at TMI-1. At ANO-1, the absolute channel (channel 6) is set to 5 volts whereas at TMI-1 it is set to 4 volts.
- Both ANO-1 and TMI-1 have tubing fabricated by Sumitomo.

No proprietary information was discussed at the meeting. Several members of the public were in attendance, including two representatives from the Bureau of Radiation Protection, Nuclear Safety Division, Pennsylvania Department of Environmental Protection (PADEP). The PADEP made two comments: (1) international operating experience should be considered in the investigation of this issue, and (2) the root cause should explain why it appears that the "B" steam generator at both sites appears to have more wear indications attributed to this mechanism than the "A" steam generator. The NRC staff responded that there would not likely be any relevant international operating experience because, to the staff's knowledge, the once-through steam generator design is not used outside of the U.S. The NRC and AREVA acknowledged the comment about the "B" versus "A" steam generator, and AREVA indicated that it would be addressed in the root cause investigation. No other comments from members of the public were received. A list of attendees is provided in the Enclosure.

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 Nos. 50-289 and 50-313

Enclosure:
List of Attendees

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LIST OF ATTENDEES

JANUARY 26, 2012, MEETING WITH EXELON GENERATION COMPANY, LLC AND

ENTERGY OPERATIONS COMPANY, INC

ONCE-THROUGH STEAM GENERATOR INSERVICE INSPECTION RESULTS

AT THREE MILE ISLAND, UNIT 1 AND ARKANSAS NUCLEAR ONE, UNIT 1

Exelon

Mark Torborg
Jay Smith
Greg Ciraula
William Garsky
Steven Queen
Wendi Croft
Ralph DeSantis
David Atherholt (via teleconference)

AREVA

Jeff Fleck
Jim Begley
Jeff Grigsby
Mike Boudreaux
John Remark
Michael Street
Kendall Johnson
Jeff Brown (via teleconference)

PUBLIC (via teleconference)

Dennis Dyckman, PA state
Rich Janati, PA State
Eric Epstein, TMI Alert
David Goetcheus, TVA
Tim Thulien, Duke Energy
Dan Gilliland, Patriot-News
Jeff Millman, B&W
Peter King, B&W
Richard Klarner, B&W
Revi Kizhatil, B&W
Daniel Gammage, B&W
Steve Fluit, B&W
Dave Garren, FENOC

Entergy

Jamie McCoy
Danny Hughes
Dan Meatheany
Bob Clark
Steve Brown

NRC

Peter Bamford, NRR
Kenneth Karwoski, NRR
Andrew Johnson, NRR
Emmett Murphy, NRR
Kaly Kalyanam, NRR
Michael Markley, NRR
Meena Khanna, NRR
Jeffrey Whited, NRR
Charles Harris, RES
James Drake, RIV (via teleconference)
Thomas Burns, RI (via teleconference)
Abin Fairbanks, RIV (via teleconference)
Scott Bussey, HRTD (via teleconference)

Public (in-person)

Dan Mays, Duke Energy

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/ra/

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ADAMS Accession Nos.: Package ML120270400; Meeting Notice ML120050036; Meeting Handouts ML1120250105, ML120250111, ML120250116; Meeting Summary ML120270416

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