

March 21, 2004

MEMORANDUM TO: Gloria J. Kulesa, Chief
Steam Generator Tube Integrity and
Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

FROM: Andrew B. Johnson, Materials Engineer */RA/*
Steam Generator Tube Integrity and
Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE FEBRUARY 19, 2014, CATEGORY 2 PUBLIC
MEETING WITH THE NUCLEAR ENERGY INSTITUTE AND
INDUSTRY TO DISCUSS STEAM GENERATOR ISSUES

The industry's Steam Generator Task Force (SGTF) met with U.S. Nuclear Regulatory Commission (NRC) staff on February 19, 2014, at NRC Headquarters in Rockville, MD. The purpose of the meeting was to discuss a variety of steam generator issues. The topics are shown in the industry's slides, which are available in the Agencywide Documents Access and Management System (ADAMS) under Accession No. ML14050A018. The enclosure to this letter provides a list of people who attended the meeting in person and by phone. This meeting was noticed as a public meeting and the agenda is available in ADAMS under Accession No. ML14034A345. Members of the public attended the meeting, as noted in the meeting attendance list. A written copy of comments made by a member of the public was provided to the NRC staff after the meeting. These comments are included at the end of the summary section.

During the meeting, industry and NRC participants made presentations following the meeting agenda. At various points in the meeting, there were additional discussions about what is contained in the agenda topics. These discussions are summarized below:

Divider Plate Crack Propagation

- Industry indicated it would submit a final technical report summarizing the technical work that has been completed on the potential for crack propagation in the area in and around the divider plate, in the summer of 2014.
- The industry clarified that an automated process is used for cladding almost all of the tubesheet with Alloy 82, except for a portion in the center of the tubesheet. The center portion is about 17 inches in diameter and the cladding is applied with a manual process in this location, typically using Alloy 182.

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- The industry indicated it would submit the information to the NRC staff for its review, so that licensees can modify their license renewal commitments if the NRC staff agrees with the report's conclusion.

Guidance for Auto Analysis

- The industry stated that they would consider all the results from performance assessment project on the 600 mill annealed tubing in providing guidance to industry.
- The industry indicated that it believed there were no flaws reported in the final field results for the rotating probe data for the low row U-bends and the auto-analysis project work scope did not include analysis of rotating probe U-bend data.

Assessment of Steam Generator Tube Plugs

- The industry clarified that the technical report published in August 2013 covered plugs made from both Alloy 600 and Alloy 690.

Public Comments/Questions

Subsequent to the public meeting, the following comments were provided to the NRC staff by Mr. Arnie Gundersen. These comments appear to reflect accurately what Mr. Gundersen stated at the end of the meeting, during the portion of the agenda dedicated to addressing questions and comments from the public. Some of the items mentioned were beyond the scope of the meeting, so the staff did not address these items. In addition, the comments contain some factual inaccuracies. The staff addressed some of these factual inaccuracies during the meeting, and others are addressed below, after the public comments.

Mr. Gundersen:

I wanted to memorialize my comments on the SG meeting today. I have two comments:

FIRST: Basically, the focus of today' meting seems to be looking for steam generator leaks after the SG replacements have been installed. At that point, the horse is already out of the barn. Industry slide #58 hits the crux of my argument when it states:

"All operating replacement OTSGs [Once-through Steam Generators] have significant numbers of wear indications

- *Last planned replacement included improvements to address lessons learned"*

But what the industry considers an "improvement" would better be considered a Part 50.59 licensing issue.

May I remind you that the seminal paper on the changes to the San Onofre Steam Generators, published one month before the tube failures at Unit 3 by Edison and Mitsubishi was entitled "Improving Like-for-Like Steam Generator Replacement". My point is that Edison made huge steam generator changes and avoided 50.59 scrutiny by calling them "improvements".

The three most damaged steam generators in the US are San Onofre 3, San Onofre 2, and St. Lucie 2. All are Combustion Engineering RSG's, but two were built by Mitsubishi and one by AREVA, ruling out a manufacturing problem. All three removed the stay cylinders and all added additional tubes where the stay cylinder used to be. Yet these huge changes were considered "improvements" and managed to avoid the scrutiny of the 50.59 licensing process.

Clearly there is something broken not only in the steam generators but also in the licensing process that has led to severely damaged tubes in these three plants.

SECOND: May I remind all the participants that San Onofre Unit 2 had already undergone a complete SG tube inspection and was planning to start back up when San Onofre Unit 3 had a tube failure. U2's tubes were considered acceptable before the Unit 3 failure. This failure at Unit 3 caused a reevaluation of the data on Unit 2 that led to the plugging of over 300 tubes in Unit 2. Yet before the failure at Unit 3, Unit 2 was considered acceptable.

How can the NRC consider ANY steam generator crack/dent acceptance criteria to be meaningful when on January 29, 2012, San Onofre Unit 2 was ready to run for 120 months and on February 2, 2012, the very same Unit 2 was suddenly damaged beyond repair? What was wrong with the January 29, 2012 criteria that it did not detect the damage that suddenly became evident after the Unit 3 tube failure on January 31, 2012? If Unit 2 had started back up before the Unit 3 failure, would the NRC have forced the immediate shutdown of Unit 2? I frankly doubt that Edison would have self-reported and made a decision to shut down Unit 2, based on Edison's long history of claiming that Unit 2 was somehow different than Unit 3.

How San Onofre 2's tubes escaped thorough analysis before the tube failure at Unit 3 is a problem the NRC has yet to ask, let alone answer.

Now St. Lucie 2 is approaching its first refueling outage since a 12 percent power uprate. Yet before that power uprate, St. Lucie had the worst SG denting record in the nation. I am pleased to hear that St. Lucie will do a complete 100 percent tube inspection in March 2014 and, based on San Onofre 2, I firmly believe that the tube inspection data will be made publicly available before it restarts. And, to wait an additional 120 months for another reinspection is unconscionable.

Thank you again for allowing the public to listen in.

In response to the comments made by Mr. Gundersen, the NRC staff stated the following:

- Many of the tubes that were plugged in the San Onofre Unit 2 steam generators, after discovery of damaged tubes in the steam generators of San Onofre Unit 3, were plugged as a preventative measure. All those tubes met the structural and leakage integrity requirements of the plant's technical specifications. Many of these tubes were plugged to remove tubes that may have been susceptible to fluid elastic instability under certain conditions.

- Regarding the tube wear in the steam generators at St. Lucie Unit 2, it is not the number of wear indications that determines the safety significance of tube wear, but rather the size (e.g., depth) of the wear indications.
- If San Onofre Unit 2 had restarted and then received the San Onofre Unit 3 results, the NRC staff's expectation is that the licensee would have entered this information into their corrective action program and taken the appropriate action. The NRC staff would have also engaged the licensee on the implications of the Unit 3 results to Unit 2.

Although not discussed during the meeting, the NRC staff notes the following:

- No steam generators are allowed to run for 120 months between inspections. All plants must inspect their steam generators at a frequency that will ensure tube integrity is maintained. In addition, for plants with Alloy 690 tubing, no steam generator shall operate for more than 72 effective full power months or 3 refueling outages (whichever is less) without being inspected. Refueling outages typically occur every 18 months for pressurized water reactors.
- Denting is a unique phenomenon that is different from wear and St. Lucie Unit 2 does not have any significant denting occurring in their steam generators.
- There is no requirement for the licensee to submit for approval, the results of their steam generator tube inspections before restart; however, they are required to submit the inspection results to the NRC for information, and the NRC staff monitors the results of the licensee's inspections as part of the regulatory oversight process for steam generators.
- Several units were identified as having the most damaged steam generators. Although many wear indications have been found at these units, there may be other units with more degradation (but still meet applicable safety standards).
- Discussion of the 50.59 process was outside the scope of the meeting and was not discussed.

Project No.: 689

Enclosure:
Attendance List

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OFFICE	NRR/DE/ESGB	NRR/DE	NRR/DE/ESGB
NAME	AJohnson	KKarwoski	GKulesa
DATE	03/21/2014	03/21/2014	03/21/2014

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Attendance List
February 19, 2014, NRC Public Meeting with the NEI SGTF and Industry

Note: The list of phone participants may not be all-inclusive.

SGTF/Industry Participants

Kent Colgan, Areva
Dan Mayes, Duke Energy
Steve Brown, Entergy
James Benson, EPRI
Helen Cothron, EPRI
Randy Stark, EPRI
Greg Kammerdeiner, First Energy
Ed Korkowski, FPL
Jim Stevens, Luminant
Phil Rush, MPR
Anthony Martin, SNOC
Dan Folsom, TVA
Clayton Webber, TVA
Rick Maurer, Westinghouse
Jay Smith, Westinghouse
Damian Testa, Westinghouse
Scott A. Redner, XCEL

NRC

Allen Hiser
Gloria Kulesa
Ken Karwoski
Emmett Murphy
Greg Makar
Charles Harris
Andrew Johnson
Marioly Diaz-Colon
Christopher Hunt
Seung Min

Phone Participants

Steve Fluit, B&W Canada
Ryan Wolfe, EPRI
Brent Capell, EPRI
Matt Featherston, NuScale Power
Tamas Liskai, NuScale Power
Matt Mallet, NuScale Power
Jasmin Lelvin, Platts Nuclear Publications
Christopher Hamilton, Westinghouse
Jesse Baron, Westinghouse
P. J. Prabhu, Westinghouse
Richard Smith, SIA

Members of the Public Phone Participants

Tom Clements, Sierra Club
Arnie Gundersen, Fairwinds Associates

NRC Phone Participants

Bart Fu
Aloysius Abodoako

ENCLOSURE