



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

October 9, 2015

Mr. Jon A. Franke
Site Vice President
Susquehanna Nuclear, LLC
769 Salem Boulevard
NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2 - REVIEW OF
REPLACEMENT STEAM DRYER 17th RIO INSPECTION REPORT
(CAC NO. MF6505)

Dear Mr. Franke:

On January 30, 2008, the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 246 to Renewed Facility Operating License No. NPF-14 and Amendment No. 224 to Renewed Facility Operating License No. NPF-22 for Susquehanna Steam Electric Station (SSES), Units 1 and 2. The amendments increased the maximum steady-state reactor core power level from 3,489 megawatts thermal (MWt) to 3,952 MWt, which is an increase in thermal power of approximately 13 percent. The increase in power level is considered an extended power uprate (EPU).

The NRC staff approval of the EPU was based, in part, on certain license conditions requiring the licensee to inspect the steam dryer during two successive outages following the implementation of full EPU (also known as constant pressure power uprate), verifying the continued structural integrity of the replacement steam dryer (RSD).

By letter dated July 16, 2015, Susquehanna Nuclear, LLC (the licensee) submitted the results of the SSES, Unit 2, RSD 17th Refueling and Inspection Outage (RIO) visual inspection report to the NRC, as required by SSES, Unit 2, license conditions. The NRC staff has reviewed the information in the licensee's RSD 17th RIO inspection report and determined that it is acceptable and meets the license conditions. The enclosure provides a summary of the NRC staff's review and completes the review associated with CAC No. MF6505.

J. Franke

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If you have any questions, please contact me at 301-415-4090 or Jeffrey.White@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey A. White". The signature is fluid and cursive, with the first name "Jeffrey" written in a larger, more prominent script than the last name "White".

Jeffrey A. White, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-388

Enclosure
NRC Review of SSES, Unit 2 RSD 17th RIO Report

cc w/enclosure: Distribution via Listserv



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OFFICE OF NUCLEAR REACTOR REGULATION
REVIEW OF THE REPLACEMENT STEAM DRYER
17th REFUELING AND INSPECTION OUTAGE REPORT
SUSQUEHANNA NUCLEAR, LLC
SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2
DOCKET NO. 50-388

1.0 INTRODUCTION

On January 30, 2008,¹ the U.S. Nuclear Regulatory Commission (NRC) issued Amendment No. 246 to Renewed Facility Operating License No. NPF-14 and Amendment No. 224 to Renewed Facility Operating License No. NPF-22 for Susquehanna Steam Electric Station (SSES), Units 1 and 2. The amendments increased the maximum steady-state reactor core power level from 3,489 megawatts thermal (MWt) to 3,952 MWt, which is an increase in thermal power of approximately 13 percent. The increase in power level is considered an extended power uprate (EPU).

The NRC staff approval of the EPU was based, in part, on certain license conditions requiring the licensee to inspect the steam dryer during two successive outages following the implementation of full EPU (also known as constant pressure power uprate (CPPU)), verifying the continued structural integrity of the replacement steam dryer (RSD). SSES, Unit 2, License Condition 2.C.(20)(e) requires that, "During the first two scheduled refueling outages after reaching full CPPU conditions, a visual inspection shall be conducted of all accessible, susceptible locations of the steam dryer in accordance with BWRVIP-139 and General Electric inspection guidelines." SSES, Unit 2, License Condition 2.C.(20)(g) requires that, "This license condition shall expire upon satisfaction of the requirements in License Conditions 2.C.(20)(e) and 2.C.(20)(f) provided that a visual inspection of the steam dryer does not reveal any new unacceptable flaw or unacceptable flaw growth that is due to fatigue."

By letter dated July 16, 2015,² Susquehanna Nuclear, LLC (the licensee) submitted the results of the SSES, Unit 2, RSD 17th Refueling and Inspection Outage (RIO) visual inspection report to the NRC, as required by the License Conditions 2.C.(20)(e), and 2.C.(20)(g). A summary of the NRC staff's review of the 17th RIO inspection report is below.

The SSES, Unit 2, steam dryer visual inspection results provided in the July 16, 2015, letter from the licensee are for the second full operating cycle at full CPPU conditions. The licensee

¹ Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML080020201.

² ADAMS Accession No. ML15198A276.

determined that there was no unacceptable flaw or flaw growth due to fatigue identified from visual inspections of the steam dryer.

2.0 SUMMARY OF 17th RIO REPORT

The licensee inspected the SSES, Unit 2, steam dryer in accordance with the requirements of BWRVIP-139 and General Electric's recommendations.

In total, 379 separate welds and components of the steam dryer were examined. The licensee used VT-1 and VT-3 inspection methods for the inspection of the steam dryer.

The VT-1 visual examination is utilized to visually determine the condition of a part, component, or surface, and to reveal such conditions as cracks, wear, corrosion, and erosion and/or physical damage to such parts, especially welded joints.

The VT-3 visual examination is utilized to determine structural integrity, the measurement of clearances, detection of physical displacement, determination of the structural adequacy of supporting elements, the soundness of connections between load carrying structural members, and tightness of bolting.

There was no newly identified unacceptable flaw or unacceptable flaw growth due to fatigue.

2.1 New Intergranular Stress Corrosion Cracking Indications

The following newly discovered, nonconforming conditions were identified and were dispositioned to use-as-is:

- Minor, newly discovered intergranular stress corrosion cracking (IGSCC) on top and bottom of bracket on 140 degree lifting lug lower bracket and documented in Condition Report (CR) 2015-11569. These indications have been dispositioned as use-as-is.
- Minor, newly discovered IGSCC on 40 degree lifting lug to eye fillet welds and documented in CR 2015-12913. These indications have been dispositioned as use-as-is.
- Minor, newly discovered IGSCC on 220 degree lifting lug to eye fillet welds and documented in CR 2015-11569. These indications have been dispositioned as use-as-is.
- Minor, newly discovered IGSCC on 320 degree lifting lug to eye fillet welds and documented in CR 2015-11569. These indications have been dispositioned as use-as-is.
- Minor, newly discovered IGSCC on dryer seismic ring lug C and documented in CR 2015-12547. These indications have been dispositioned as use-as-is.

2.2 New Other Indications

- Minor pitting observed at 140 degree dryer lifting lug eye to fillet welds and documented in CR 2015-11569. These indications have been dispositioned as use-as-is.
- Minor additional indications, gouges, and surface anomalies at 90-180 degree location of dryer skirt documented in CR 2015-12545. These indications have been dispositioned as use-as-is.

2.3 Previous Indications Experiencing Growth

The following locations with previous indications have experienced growth:

- Slight change contact pattern on dryer seismic ring lug A and documented in CR 2015-12818. These indications have been dispositioned as use-as-is.
- Minor growth in previously identified IGSCC in dryer skirt weld at 135 degrees and documented in CR 2015-12559. These indications have been dispositioned as use-as-is.

All locations listed above in Sections 2.1, 2.2, and 2.3 have been rescheduled for examination and followup during the SSES, Unit 2, 18th RIO (2017) to determine if defect growth has occurred.

2.4 Previous Indications Not Experiencing Growth

Areas identified in the 16th RIO (2013) as containing defects but with no change in condition are listed below:

- Minor IGSCC in dryer lifting lugs 220 degree lower bracket and 320 degree middle bracket.
- Dryer seismic lugs B, C, and D wear patterns.
- Discoloration and whirl patterns in dryer hood A and dryer hood F.
- Minor surface anomalies and gouges in dryer skirt at 00-90 degrees, 180-270 degrees, and 270-00 degrees.
- Minor IGSCC at weld DC-C-2 and skirt panel 0 degrees left side.
- Seismic lug A stop drill holes and remaining fatigue crack.

The NRC staff notes that the licensee will implement a sampling program starting in the next outage for SSES, Unit 2, 18th RIO (2017) to ensure that all previous indications will continue to be inspected until they are shown to be nonactive. All of the new indications are minor IGSCC or other and not fatigue-related. The NRC staff also noted that one fatigue crack was identified during the SSES, Unit 2, 15th RIO in 2011. This condition was repaired using the stop-drilling-hole method in 2011 to stop future crack growth. Subsequent inspections have revealed no growth in this indication.

Based on the review of the SSES, Unit 2, 17th RIO inspection report provided by the licensee, the NRC staff noted that there was no unacceptable flaw or unacceptable flaw growth due to fatigue.

The primary concern for steam dryer structural integrity is the high cycle fatigue, and the SSES, Unit 2, steam dryer inspections revealed no fatigue cracking at full EPU operation. Minor IGSCC and other indications are manageable based on inspections.

3.0 CONCLUSION

In accordance with License Conditions 2.C.(20)(e), and 2.C.(20)(g), the licensee performed steam dryer examinations during the post-EPU second RIO in accordance with BWRVIP-139 and General Electric guidelines. Based on the review of the SSES, Unit 2, 17th RIO inspection report provided by the licensee, the NRC staff noted that there was no unacceptable flaw or unacceptable flaw growth due to fatigue. The primary concern for steam dryer structural integrity is the high cycle fatigue, and the SSES, Unit 2, steam dryer inspections revealed no fatigue cracking at full EPU operation. Minor IGSCC and other indications are manageable based on inspections. Therefore, the NRC staff concludes that the licensee has an acceptable program to ensure the structural integrity of the SSES, Unit 2, steam dryer, and the licensee provided adequate information to satisfy License Conditions 2.C.(20)(e) and 2.C.(20)(g).

J. Franke

- 2 -

If you have any questions, please contact me at 301-415-4090 or Jeffrey.White@nrc.gov.

Sincerely,

/RA/

Jeffrey A. Whited, Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-388

Enclosure
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