Public Service
Electric and Gas
Company

Stanley LaBruna

Vice President - Nuclear Operations

Public Service Electric and Gas Company P.O. Box 236, Hancocks Bridge, NJ 08038 609-339-4800

JUN 21 1989

NLR-N89124

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

NRC BULLETIN 89-01
FAILURE OF WESTINGHOUSE STEAM GENERATOR
TUBE MECHANICAL PLUGS
SALEM GENERATING STATION UNITS 1 AND 2
DOCKET NOS. 50-272 AND 50-311

Public Service Electric and Gas Company (PSE&G) has received NRC Bulletin 89-01 regarding failure of Westinghouse steam generator tube mechanical plugs. The subject bulletin requires that each addressee submit a letter which includes (1) the results of actions taken to verify the accuracy of plant-specific information contained in WCAP-12244/12245 and the May 1, 1989 Westinghouse letter to the NRC and (2) either a commitment to the action plan outlined in the NRC bulletin or proposed alternative actions with supporting justification. In addressing the first requirement, we reviewed the information in the WCAP and the Westinghouse letter and determined that the information provided for Salem was incorrect. The information has been corrected and the revised information is included in Enclosure 1. With regard to the second requirement, we hereby commit to the action plan outlined in Items 2-4 of the Actions Requested section of the NRC bulletin. The detailed information regarding our compliance with the action plan is included in Enclosure 2.

Should you have any questions concerning this transmittal, please do not hesitate to contact us.

Sincerely,

STANLEY LABRUNA

Enclosures

IE11
1/1

JUN 21 1989

C Mr. J. C. Stone
Licensing Project Manager

Ms. K. Halvey Gibson
Senior Resident Inspector

Mr. W. T. Russell, Administrator
Region I

Mr. Kent Tosch, Chief
New Jersey Department of Environmental Protection
Division of Environmental Quality
Bureau of Nuclear Engineering
CN 415
Trenton, NJ 08625

ENCLOSURE 1
VERIFICATION OF PLANT SPECIFIC INFORMATION
CONTAINED IN WCAP-1224/12245

The NRC bulletin requested that we verify the accuracy of plant specific information contained in WCAP-12244/12245 and the May 1, 1989 Westinghouse letter. We reviewed the information and determined that some of the information was incorrect. The information has been corrected and the revised information is provided below.

SALEM UNIT 1 DATA

INSTALLATION DATA											TIME TO MINIMUM LIGAMENT			REMAINING EFPD TO MINIMUM LIGAMENT		
Std Plant Alpha	Inst Date	# of Plug	Plug Heat No.	S/G #	HL or CL	TEMPERATURE (FAHRENHEIT) H/L	C/L	TEMP SCALE FACTORS (A)	PLUG SIZE (IN)	MIN LIG (MILS)	CMIL RATE (B)	APR (C)	EFPD to date	CMIL RATE (B)	APR (C)	TUBESHEET JOINT PROCESS
PSE	4/88(D)	1	4523	13	HL	599.0	533.0	2.1	7/8	5.9	585	654	231	354	423	Wextex
PSE	4/88	1	4523	13	CL	599.0	533.0	20.5	7/8	5.9	5699	6367	231	5468	6136	Wextex
PSE	10/87	3	4523	13	CL	599.0	533.0	20.5	7/8	5.9	5699	6367	357	5342	6010	Wextex

SALEM UNIT 2 DATA

INSTALLATION DATA											TIME TO MINIMUM LIGAMENT			REMAINING EFPD TO MINIMUM LIGAMENT		
Std Plant Alpha	Inst Date	# of Plug	Plug Heat No.	S/G #	HL or CL	TEMPERATURE (FAHRENHEIT) H/L	C/L	TEMP SCALE FACTORS (A)	PLUG SIZE (IN)	MIN LIG (MILS)	CMIL RATE (B)	APR (C)	EFPD to date	CMIL RATE (B)	APR (C)	TUBESHEET JOINT PROCESS
PNJ	11/87	5	4523	24	CL	596.0	533.0	20.5	7/8	5.9	5699	6367	336	5363	6031	Wextex
PNJ	11/87	5	4523	24	HL	596.0	533.0	2.3	7/8	5.9	645	721	336	309	385	Wextex
PNJ	10/88	2	4523	24	CL	596.0	533.0	20.5	7/8	5.9	5699	6367	105	5594	6262	Wextex
PNJ	10/88	81	4523	21	CL	596.0	533.5	20.1	7/8	5.9	5595	6251	105	5490	6146	Wextex
PNJ	10/88	2	4523	23	CL	597.0	534.0	19.7	7/8	5.9	5493	6138	105	5388	6033	Wextex
PNJ	10/88	53	4523	22	CL	602.0	530.5	22.4	7/8	5.9	6249	6982	105	6144	6877	Wextex
PNJ	10/88	84	4523	23	HL	597.0	534.0	2.2	7/8	5.9	625	698	105	520	593	Wextex
PNJ	10/88	7	4523	21	HL	596.0	533.5	2.3	7/8	5.9	645	721	105	540	616	Wextex
PNJ	10/88	51	4523	24	HL	596.0	533.0	2.3	7/8	5.9	645	721	105	540	616	Wextex
PNJ	10/88	2	4523	24	HL	596.0	533.0	2.3	7/8	5.9	645	721	105	540	616	Wextex
PNJ	10/88	23	4523	22	HL	602.0	530.5	1.9	7/8	5.9	531	594	105	426	489	Wextex

(A) Based on T-hot = 622.5 deg F
(B) Growth rate based on Millstone 2 data = 0.073 mils/EFPD, for microstructure, factor = 1
(C) Growth rate based on Farley 2 data = 0.0922 mils/EFPP, for microstructure, factor = 1
(D) Repaired with plug-in-plug

ENCLOSURE 2
DETAILED INFORMATION REGARDING
COMPLIANCE WITH NRC ACTION PLAN

This enclosure provides information regarding our compliance with the action plan described in Items 2-4 of the Actions Requested section of the NRC bulletin.

Action Plan Items 2a and 2b

2a) Steam generator tube plug lifetime for plugs from heats 3279, 3513, 3962 and 4523 should be estimated using the methodology from References 1 and 2 and should be based on the Millstone Unit 2 benchmark subject to any corrections per item 1 above. Lifetime estimates in Farley Unit 2 benchmark. These estimates should be adjusted to reflect the Millstone Unit 2 benchmark using the methodology described in Section 4.1.2 of Reference 1.

2b) Addressees should implement appropriate remedial actions (i.e., repair and/or replacement) for all plugs whose estimated lifetimes in 2a, above do not extend to the next refueling outage. If operation is planned beyond a refueling outage that represents the last outage before any plug exhausts and predicted lifetime, an alternative schedule with the appropriate technical justification should be submitted to the NRC at least 30 days before the end of this refueling outage.

Response to Item 2a and 2b

When the Westinghouse information on the plug concerns became available, Unit 1 was in a refueling outage and all four steam generators were accessible; as a result, Public Service Electric and Gas Company (PSE&G) took immediate actions to address the plug concerns for Unit 1. Steam Generator 13 contained eight plugs from heat 4523. Three of the hot leg plugs (R9C49, R44C62, and R34C78) were removed during the outage and replaced with Category 16 plugs. The fourth hot leg plug (R1C78) could not be easily removed and was repaired using the plug-in-plug (PIP) technique which is the repair technique recommended by Westinghouse in WCAP-12244. The lifetimes of the four corresponding cold leg plugs were estimated using the algorithm in WCAP-12244, Revision 1. The remaining lifetimes of the four cold leg plugs are in excess of 4000 days. These plugs will be either replaced or repaired using the PIP technique prior to exhausting their remaining lifetime. Steam Generator 14 contained one hot leg plug (R27C84) from heat 9357. Plugs from this heat have not been available for microstructural analysis and are therefore considered unanalyzed; as a precaution, the hot leg 9357 plug was repaired using the PIP technique. All other plugs installed in Unit 1 are Category 16 plugs.

Salem Unit 2 has a significantly larger population of plugs from heat 4523. The lifetimes of all plugs were estimated using the algorithm in WCAP-12244, Revision 1. All plugs have an estimated lifetime which extends beyond the expected beginning of the next Unit 2 refueling outage (April 1990). During the next Unit 2 refueling outage, all hot leg Category 1 and Category 4 plugs will be either replaced with the thermally treated Inconel-690 plugs expected to become available later this year or repaired using the PIP technique. These actions will be implemented for the cold leg Category 1 and Category 4 plugs before these plugs exhaust their expected lifetimes. The remaining lifetime for all cold leg plugs is in excess of 5000 days.

Action Plan Item 2c

2c) Prior to any plug repairs or replacement, addressees are reminded that their responsibilities under ALARA require analysis of the various plug repair or replacement methods available to determine which method will result in the lowest overall personnel radiation exposure while still remaining cost-effective. In choosing a plug repair or replacement method, the licensee should consider the accessibility of the plugs and the dose reduction benefit of using robotic manipulators. Prior to plug repair or replacement, the licensee should consider steam generator decontamination and/or local shielding to reduce working area dose rates.

Response to Item 2c

ALARA evaluations have been/will be conducted for all plug replacement/repair activities and will take into account the availability of robotic manipulators, the number of plugs to be replaced, and impact on schedule and cost. Since there are a large number of plugs to be replaced during the next Unit 2 refueling outage, steps will be taken to reduce working area dose rates.

Action Plan Item 2d

2d) Installation of Westinghouse mechanical plugs from heats 3279, 3513, 3962 and 4523 should be discontinued.

Response to Item 2d

Installation of Westinghouse mechanical plugs from heats 3279, 3513, 3962 and 4523 will be discontinued.

Action Plan Item 2e

2e) Westinghouse mechanical plugs removed from steam generators, regardless of heat number, should be examined for PWSCC on a sample basis for each heat. Addressees should maintain a record of these examinations and the results should be provided to Westinghouse to improve the database concerning the susceptibility of plugs to PWSCC.

Response to Item 2e

Westinghouse mechanical plugs removed from the Salem steam generators will be shipped to Westinghouse for examination to determine the susceptibility of plugs to Primary Water Stress Corrosion Cracking (PWSCC).

Action Plan Item 3

3) Remedial actions at plants where the steam generator tubes are partially-depth-expanded within the tubesheet as described above may be deferred on a one time basis to the next scheduled refueling outage if the outage that immediately follows receipt of this bulletin ends before October 1, 1989.

Response to Item 3

Salem does not have steam generator tubes which are partially-depth-expanded within the tubesheet.

Action Plan Item 4

Remedial actions for "sentinel related" mechanical plugs described above may be deferred on a one time basis to the next refueling outage if the outage that immediately follows receipt of this bulletin ends before October 1, 1989.

Response to Item 4

Salem does not have "sentinel-related" mechanical plugs in any of its steam generators.

Additional Information

Salem is actively participating with Westinghouse in the investigation, evaluation, and corrective actions regarding PWSCC in steam generator mechanical plugs. The plug top release scenario is considered bounded by the analysis of the steam generator tube rupture event described in Section 15.4.4 of the Salem UFSAR. Emergency operating procedures and the related training is considered adequate and no further actions are planned in this area.