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SUBJECT: Forwards response to NRC Bulletin 89-001, "Failure of Westinghouse Steam Generator Tube Mechanical Plugs."

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AEP:NRC:1096

Donald C. Cook Nuclear Plant Units 1 and 2
License Nos. DPR-58 and DPR-74
Docket Nos. 50-315 and 50-316
RESPONSE TO NRC BULLETIN 89-01; FAILURE OF
WESTINGHOUSE STEAM GENERATOR TUBE MECHANICAL PLUGS

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Attn: T. E. Murley

June 20 1989

Dear Dr. Murley:

This letter provides our response to NRC Bulletin 89-01, entitled "Failure of Westinghouse Steam Generator Tube Mechanical Plugs," as it applies to the Cook Nuclear Plant. The bulletin discusses problems with stress corrosion cracking of steam generator tube plugs supplied by Westinghouse and manufactured from four Inconel heats.

The specific information requested in the bulletin is provided in the attachment to this letter. In summary, Unit 2 is operating with new steam generators and therefore has no mechanical-type plugs in service. Unit 1 has 538 plugs from one of the suspect Inconel heats, divided evenly between the hot and cold legs. The plugs installed in the hot legs have a lifetime estimate, as conservatively determined by Westinghouse, less than the length of the upcoming Cycle 11. However, the Unit 1 steam generator tubes are partially depth expanded within the tube sheet and, per Action 3 of the bulletin, remedial actions may be deferred until the next refueling outage. The plugs will be repaired or replaced as necessary at the next refueling outage, which is presently scheduled to begin in late 1990.

Our response to NRC Bulletin 89-01 was requested to be made under oath or affirmation according to the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). As such, an oath is included with this letter.

Sincerely,

A handwritten signature in dark ink, appearing to read "M. P. Alexich".

M. P. Alexich
Vice President

8906290111 890620
PDR ADDOCK 05000315
Q PNU

TEI
11

Dr. T. E. Murley

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AEP:NRC:1096

ldp

Attachments

cc: D. H. Williams, Jr.
W. G. Smith, Jr. - Bridgman
R. C. Callen
G. Charnoff
A. B. Davis
NRC Resident Inspector - Bridgman
NFEM Section Chief

ATTACHMENT TO AEP:NRC:1096
INFORMATION REQUESTED IN NRC BULLETIN 89-01

This attachment provides the information requested by NRC Bulletin 89-01. The responses are applicable to Unit 1 of the Cook Nuclear Plant. Unit 2 is operating in its first cycle following replacement of all steam generators, and therefore has no mechanical plugs installed.

1. Item 1

Summary of Request

Verify that information contained in WCAP-12244, Rev. 1 and Westinghouse letter No. NS-NRC-89-3432 is correct. Specifically, verify the number of Westinghouse mechanical plugs installed in the hot and cold legs broken down by steam generator, heat number, and date of installation.

Response

The information contained in Westinghouse Report WCAP-12244, Revision 1 and the Westinghouse NRC letter dated May 1, 1989, was reviewed for each steam generator to verify the number of Westinghouse mechanical plugs installed in the hot and cold legs by number, heat number and date of installation. No inconsistencies were found.

Our review identified discrepancies in the May 1, 1989 Westinghouse letter regarding power operation history and temperatures. Westinghouse has recalculated the remaining effective full power days (EFPDs) for the Heat 4523 plugs using the revised data, as well as other refinements to the original analysis. The new data and calculation results for the Heat 4523 plugs are provided in the attached table, which is of the same form as the tables from the May 1, 1989 letter. (Information considered proprietary to Westinghouse has been deleted from the table.) The revised calculation results were factored into the response to item 2.a, below.

2. Item 2.a

Summary of Request

Estimate steam generator tube plug lifetime for plugs from Heats 3279, 3513, 3962, and 4523 based on the Millstone Unit 2 benchmark.

Response

There are no installed plugs from Heats 3279, 3513, or 3962.

Steam generator tube plug lifetime for Heat 4523 was evaluated

by Westinghouse using the methodology from WCAP-12244, Revision 1 and adjusted to reflect the Millstone Unit 2 benchmark. The results indicate that the plugs installed in the steam generator hot legs have a remaining lifetime of 353 EFPDs and the plugs installed in the cold legs have a remaining lifetime of 9099 EFPDs.

3. Item 2.b

Summary of Request

Implement appropriate remedial actions (i.e., repair and/or replacement) for all plugs whose estimated lifetimes in Item 2.a do not extend to the next refueling outage.

Response

Unit 1 completed Cycle 10, has been refueled, and is currently preparing for start-up. The remaining lifetime for the hot leg plugs of 353 EFPDs is less than the length of the next fuel cycle, which has an estimated duration of 428 EFPDs. However, under the provisions of item 3, below, remedial actions will be planned for implementation during the refueling outage at the end of Cycle 11, which is currently scheduled for late 1990.

4. Item 2.c

Summary of Request

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.

Response

Since repair or replacement actions are not necessary until fall 1990, specific plans for the activity have not been made. However, ALARA considerations will be addressed when formulating plans for the repair or replacement activity.

5. Item 2.d

Summary of Request

Installation of Westinghouse mechanical plugs from Heats 3279, 3513, 3962, and 4523 should be discontinued.

Response

On May 7, 1989, steam generator eddy current tube examinations and pluggings were completed. Westinghouse mechanical plugs from qualified Inconel 600 heats were used for plugging. During the above-mentioned plugging, no plugs were used from the heats referenced by the bulletin (Heats 3279, 3513, 3962, and 4523). Mechanical plugs from qualified material heats only will be used in the future, in either unit, to minimize susceptibility to primary water stress corrosion cracking (PWSCC)..

6. Item 2.eSummary of Request

Westinghouse mechanical plugs removed from steam generators, regardless of heat numbers should be examined for PWSCC on a sample basis for each heat.

Response

Should Westinghouse mechanical plugs be removed, a sample will be made available to Westinghouse to examine for the presence of PWSCC in order to facilitate Westinghouse in maintaining a data base concerning the susceptibility of plugs to PWSCC.

7. Item 3Summary of Request

Remedial actions at plants where the steam generator tubes are partially depth-expanded within the tube sheet 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

The Unit 1 steam generator tubes are expanded for approximately 2.5 inches in the bottom of the tube sheet. Remedial actions are therefore subject to the one-time deferral offered by this item.

8. Item 4Summary of Request

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

This item is not applicable. Sentinel plugs are not in service at the Cook Nuclear Plant.

Alloy 600 Mechanical Plug

Date Revised: 6/14/89

INSTALLATION DATA										Previous		New		Temperature		EPFD to minimum ligament				Remaining EPFD to minimum lig			
										Cycle		Cycle		Scaling		Plug Min.		Previous cycle rate		Based on new cycle rate			
Std	Plug	HL	Temperature	Temperature	Factor (A)	Size	Lig.	CHIL	Other	Applicable Rates	EPFD	CHIL	Other	Applicable Rates	JOINT	TUBESHEET							
Plant Inst # of Heat S/G or	(Deg. F)	(Deg. F)	-----	-----	-----	(in)	(mils)	Rate	APR	VGB	CHIL	to	Rate	APR	VGB	CHIL	PROCESS						
Alpha Date Plug No. # CL	HL	CL	HL	CL	Prev.	New		(B)	(C)	(D)	(E)	Date	Rate	APR	VGB	CHIL							
AEP 7-87 69 4523 11 CL	600.0	536.0	582.0	518.0				4928	5506			434	9099	10269			Part.Roll						
AEP 7-87 90 4523 14 HL	600.0	536.0	582.0	518.0				663	740			434	353	473			Part.Roll						
AEP 7-87 86 4523 12 HL	600.0	536.0	582.0	518.0				663	740			434	353	473			Part.Roll						
AEP 7-87 90 4523 14 CL	600.0	536.0	582.0	518.0				4928	5506			434	9099	10269			Part.Roll						
AEP 7-87 69 4523 11 HL	600.0	536.0	582.0	518.0				663	740			434	353	473			Part.Roll						
AEP 7-87 24 4523 13 CL	600.0	536.0	582.0	518.0				4928	5506			434	9099	10269			Part.Roll						
AEP 7-87 24 4523 13 HL	600.0	536.0	582.0	518.0				663	740			434	353	473			Part.Roll						
AEP 7-87 86 4523 12 CL	600.0	536.0	582.0	518.0				4928	5506			434	9099	10269			Part.Roll						

NOTES :

(A) Based on T-hot = 622.5 deg F

(B) Growth rate based on Hillstone 2 data = 0.073 mils/EPFD, for microstructure factor = 1

(C) Growth rate based on Farley 2 data = 0.0922 mils/EPFD, for microstructure factor = 1

(D) Growth rate based on North Anna 2 data = 0.115 mils/EPFD, for microstructure factor = 1

(E) Growth rate based on Hillstone 2 data = 0.073 mils/EPFD, for microstructure factor = 4 or 16.

(1) EPFD for heat 4523, for plugs installed 7-87 at AEP was calculate based on 15 EPFD at 90% power and 419 EPFD at 100% power. T-hot for 90% power = 595 F. T-hot for 100% power = 600 F.

STATE OF OHIO)
COUNTY OF FRANKLIN)

Milton P. Alexich, being duly sworn, deposes and says that he is the Vice President of licensee Indiana Michigan Power Company, that he has read the forgoing Response to NRC Bulletin 89-01; Failure of Westinghouse Steam Generator Tube Mechanical Plugs and knows the contents thereof; and that said contents are true to the best of his knowledge and belief.

M P Alexich

Subscribed and sworn to before me this 20th
day of June, 1989.

W H B...
NOTARY PUBLIC

Commission expires 3-9-91