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SUBJECT: Forwards results of wear insps of bottom-mounted
 instrumentation thimble tubes performed during 1992
 refueling outages. Total of 15 thimble tubes will be
 replaced during current Unit 1 refueling outage.

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AEP:NRC:1059D

Donald C. Cook Nuclear Plant Units 1 and 2
License Nos. DPR-58 and DPR-74
Docket Nos. 50-315 and 50-316
BOTTOM MOUNTED INSTRUMENTATION THIMBLE TUBE
WEAR INSPECTION RESULTS

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

Attn: T. E. Murley

September 4, 1992

Dear Dr. Murley:

This letter is to inform the NRC staff of the results of wear inspections of the bottom mounted instrumentation thimble tubes that were performed during the 1992 refueling outages at Donald C. Cook Nuclear Plant Units 1 and 2.

Thimble tube wear was initially identified as a problem at the Cook Nuclear Plant during the Unit 2 Cycle 6-7 refueling outage. Subsequently, the NRC staff has been kept informed of developments in this area through meetings with the NRC staff in Rockville, Maryland and through the following letters:

AEP:NRC:1059, dated October 26, 1988;
AEP:NRC:1059A, dated October 19, 1990;
AEP:NRC:1059B, dated November 27, 1990; and
AEP:NRC:1059C, dated July 15, 1991.

Included with this letter are summaries of the wear results from eddy current inspections of all thimble tubes that were examined during each unit's refueling outage in 1992. Attachment 1 contains the wear summary from the eddy current inspection of the Unit 1 thimble tubes. The Unit 1 inspection was performed on July 4, 1992. Attachment 2 contains the wear summary from the eddy current inspection of the Unit 2 thimble tubes. The Unit 2 inspection was performed on March 7, 1992.

As a result of the inspections, a total of 15 thimble tubes will be replaced during the current Unit 1 refueling outage and a total of 22 thimble tubes were replaced during the recent Unit 2 refueling outage. As committed to in letter AEP:NRC:1059C, these thimble tubes were or will be replaced with thimble tubes with a chrome plated coating at axial locations corresponding to the lower core

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plate and fuel assembly lower nozzle area. This area of the thimble tube typically receives the largest amount of wear.

The number of thimble tubes to be replaced was determined based on two criteria. First, all thimble tubes with active wear greater than or equal to 40% through-wall wear were replaced. Second, all previously repositioned thimble tubes with active wear greater than or equal to 30% through-wall were replaced. Active wear is defined as wear in an axial location that has changed since the last inspection. Repositioned thimble tubes after at least one operating cycle may contain active and inactive wear. Inactive wear is identified as a wear scar that has been repositioned away from a wear surface.

These criteria were chosen in order to allow significant conservative margin to wear based on previous analyses and, secondly, to place a reasonable amount of chrome plated thimble tubes in each unit to evaluate chrome plating effectiveness against wear. Concerns about significantly degraded thimble tubes were balanced with concerns regarding installation of a previously proven product in a new application. Specifically, although mock-up testing of the installed chrome plated thimble tube configuration indicated that thimble tube wear should be mitigated without introducing potential hot particles from the chrome plating, this application has yet to be proven in practice. In response to these concerns, the full complement of thimble tubes (58 each unit) is not being replaced during the 1992 refueling outages. Replacing only 15 thimble tubes in Unit 1 and 22 thimble tubes in Unit 2 with chrome plated thimble tubes results in a limited number of thimble tubes being installed to in turn reduce the potential for chrome particles being introduced into the coolant. However, this number of thimble tubes also represents a reasonable number of thimble tubes to evaluate the effectiveness of the chrome plated thimble tube product in its intended application to mitigate wear.

Evidence of the success of a chrome plating application to mitigate wear has been witnessed at Cook Nuclear Plant Unit 1 on rod cluster control assemblies (RCCAs). During the current Unit 1 refueling outage, a wear inspection was performed on all 53 Unit 1 RCCAs. Eleven of these RCCAs are chrome plated and were installed for the first time during the previous refueling outage. Preliminary results from the wear inspection showed no indications of wear after one cycle of operation. There is also no indication of increased concentrations of chrome particles in the reactor coolant.

Dr. T. E. Murley

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AEP:NRC:1059D

After one cycle of operation, during the 1994 refueling outages, we will eddy current inspect each thimble tube in each unit, including the chrome plated tubes, to quantify the benefit of the chrome plating and to determine if additional hardware changes to further mitigate thimble tube wear are required. As we have in the past, we plan to keep the NRC staff informed of any developments in this area.

Sincerely,



E. E. Fitzpatrick
Vice President

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Attachments

cc: D. H. Williams, Jr.
A. A. Blind - Bridgman
J. R. Padgett
G. Charnoff
NFEM Section Chief
A. B. Davis - Region III
NRC Resident Inspector - Bridgman

ATTACHMENT 1 TO AEP:NRG:1059D

COOK NUCLEAR PLANT UNIT 1 CYCLE 12
THIMBLE TUBE WEAR SUMMARY

Donald C. Cook Nuclear Plant Unit 1 Cycle 12 Thimble Tube Wear Summary						
			Maximum		Previously	Replaced
Thimble	Core		Active Wear	Cycles of	Repositioned	for
Tube No.	Location		% Thru-Wall	Operation	Thimble?	Cycle 13?
2	J-7		84	2	Yes	Yes
21	E-11		45	2	Yes	Yes
28	C-7		38	2	Yes	Yes
45	N-13		38	2	Yes	Yes
8	K-6		36	2	Yes	Yes
43	H-15		35	2	Yes	Yes
46	J-1		34	2	Yes	Yes
49	D-14		33	2	Yes	Yes
1	J-8		32	2	Yes	Yes
34	H-2		31	2	Yes	Yes
55	N-14		30	2	Yes	Yes
53	R-11		27	2	Yes	No
20	E-5		26	2	Yes	No
4	H-6		24	2	Yes	No
6	J-10		24	2	Yes	No
7	F-7		23	2	Yes	No
54	A-11		22	2	Yes	No
52	L-15		22	2	Yes	No
50	R-6		20	2	Yes	No
35	B-8		18	2	Yes	No
11	G-5		18	2	Yes	No
39	B-6		17	2	Yes	No
36	J-14		12	2	Yes	No
17	G-12		10	2	Yes	No
27	C-8		< 5	2	Yes	No
14	H-4		< 5	2	Yes	No
10	L-8		0	2	Yes	No
33	C-5		0	2	Yes	No
26	H-3		0	2	Yes	No
47	A-9		88	2	No	Yes
48	P-4		53	2	No	Yes
5	F-8		48	2	No	Yes
29	N-6		44	2	No	Yes
56	N-2		35	2	No	No
16	M-7		35	2	No	No
30	F-3		34	2	No	No
37	P-9		34	2	No	No
22	K-12		30	2	No	No
24	H-13		29	2	No	No
57	B-3		29	2	No	No
3	G-9		28	2	No	No
31	D-12		28	2	No	No
9	H-11		27	2	No	No
18	L-11		26	2	No	No
19	L-5		26	2	No	No
12	E-9		25	2	No	No
58	B-13		24	2	No	No
13	L-10		23	2	No	No
23	D-10		22	2	No	No
41	N-4		19	2	No	No
38	K-2		19	2	No	No
40	F-14		19	2	No	No
32	L-13		12	2	No	No
25	N-8		< 5	2	No	No
15	D-8		< 5	2	No	No
42	D-3		< 5	2	No	No
44	R-8		0	2	No	No
51	F-1		0	0	Capped	No

ATTACHMENT 2 TO AEP:NRG:1059D

COOK NUCLEAR PLANT UNIT 2 CYCLE 8
THIMBLE TUBE WEAR SUMMARY

Donald C. Cook Nuclear Plant Unit 2 Cycle 8 Thimble Tube Wear Summary						
Thimble	Core		Maximum		Previously	Replaced
Tube No.	Location		Active Wear % Thru-Wall	Cycles of Operation	Repositioned Thimble?	for Cycle 9?
34	H-2		69	2	Yes	Yes
21	E-11		63	2	Yes	Yes
35	B-8		61	2	Yes	Yes
20	E-5		61	2	Yes	Yes
25	N-8		53	2	Yes	Yes
54	A-11		53	2	Yes	Yes
42	D-3		52	2	Yes	Yes
4	H-6		43	2	Yes	Yes
30	F-3		39	2	Yes	Yes
51	F-1		32	2	Yes	Yes
7	F-7		31	2	Yes	Yes
3	G-9		31	2	Yes	Yes
18	L-11		28	2	Yes	No
44	R-8		18	2	Yes	No
15	D-8		< 5	2	Yes	No
40	F-14		0	2	Yes	No
23	D-10		0	2	Yes	No
22	K-12		0	2	Yes	No
12	E-9		0	2	Yes	No
48	P-4		67	2	No	Yes
45	N-13		55	2	No	Yes
24	H-13		51	2	No	Yes
26	H-3		47	2	No	Yes
49	D-14		45	2	No	Yes
8	K-6		44	2	No	Yes
6	J-10		42	2	No	Yes
46	J-1		42	2	No	Yes
39	B-6		41	2	No	Yes
36	J-14		39	2	No	No
52	L-15		33	2	No	No
57	B-3		32	2	No	No
11	G-5		32	2	No	No
9	H-11		27	2	No	No
53	R-11		24	2	No	No
58	B-13		24	2	No	No
43	H-15		24	2	No	No
13	L-10		21	2	No	No
56	N-2		20	2	No	No
17	G-12		18	2	No	No
27	C-8		16	2	No	No
55	N-14		16	2	No	No
29	N-6		< 5	2	No	No
41	N-4		0	2	No	No
16	M-7		0	2	No	No
32	L-13		0	2	No	No
37	P-9		0	2	No	No
50	R-6		0	2	No	No
5	F-8		0	2	No	No
19	L-5		42	1	N/A	Yes
14	H-4		27	1	N/A	No
10	L-8		16	1	N/A	No
33	C-5		13	1	N/A	No
2	J-7		0	1	N/A	No
28	C-7		0	1	N/A	No
31	D-12		0	1	N/A	No
47	A-9		0	1	N/A	No
38	K-2		0	1	N/A	No
1	J-8		0	1	N/A	No