

NRC DISTRIBUTION FOR PART 50 DOCKET MATERIAL

FILE NUMBER
INCIDENT REPORT

TO:

Mr. J. G. Keppler

FROM:

Indiana & Michigan Power Company
Bridgman, Michigan
R. W. Jurgensen

DATE OF DOCUMENT

2/11/77

DATE RECEIVED

2/16/77

☒ LETTER
☒ ORIGINAL
☒ COPY☐ NOTORIZED
☒ UNCLASSIFIED

PROP

INPUT FORM

NUMBER OF COPIES RECEIVED

One signed copy

DESCRIPTION

Ltr. trans the following:

PLANT NAME:

(4-P)

Cook Unit No. 1

ENCLOSURE

Licensee Event Report (RO 50-315/77-04) on
1/28/77 concerning failure of cooling coil
on CPN-4.....

ACKNOWLEDGED

DO NOT REMOVE

NOTE: IF PERSONNEL EXPOSURE IS INVOLVED
SEND DIRECTLY TO KREGER/J. COLLINS

FOR ACTION/INFORMATION 2/16/77

RJL

<input checked="" type="checkbox"/> BRANCH CHIEF:	Ziemann
<input type="checkbox"/> W/3 CYS FOR ACTION	...
<input checked="" type="checkbox"/> LIC. ASST.:	Diggs
<input type="checkbox"/> W/... CYS	
<input checked="" type="checkbox"/> ACRS 16 CYS HOLDING/SENT:	Car B. (2/16/77)

INTERNAL DISTRIBUTION

<input checked="" type="checkbox"/> REG FILE	
<input checked="" type="checkbox"/> NRC PDR	
<input checked="" type="checkbox"/> I & E (2)	
<input checked="" type="checkbox"/> MIPC	
<input checked="" type="checkbox"/> SCHROEDER/IPPOLITO	
<input checked="" type="checkbox"/> HOUSTON	
<input checked="" type="checkbox"/> NOVAK/CHECK	
<input checked="" type="checkbox"/> GRIMES	
<input checked="" type="checkbox"/> CASE	
<input checked="" type="checkbox"/> BUTLER	
<input checked="" type="checkbox"/> HANAUER	
<input checked="" type="checkbox"/> TEDESCO/MACCARY	
<input checked="" type="checkbox"/> EISENHUT	
<input checked="" type="checkbox"/> BAER	
<input checked="" type="checkbox"/> SHAO	
<input checked="" type="checkbox"/> VOLLMER/BUNCH	
<input checked="" type="checkbox"/> KREGER/J. COLLINS	

EXTERNAL DISTRIBUTION

<input checked="" type="checkbox"/> LPDR: St. Joseph, Mich.	
<input checked="" type="checkbox"/> TIC:	
<input checked="" type="checkbox"/> NSIC:	

CONTROL NUMBER

1676 *WJR*

17.2.2

17.2.2

17.2.2

(1 - 17.2.2) 17.2.2
 17.2.2 17.2.2

 17.2.2

17.2.2 17.2.2

(1)

17.2.2 17.2.2

17.2.2

17.2.2

17.2.2 17.2.2



INDIANA & MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT
P.O. Box 458, Bridgman, Michigan 49106

February 11, 1977

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement
United States Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Operating License DPR-58
Docket No. 50-315

Dear Mr. Keppler:

Pursuant to the requirements of Appendix A Technical Specifications
and the United States Nuclear Regulatory Commission Regulatory Guide
1.16, Revision 4, Section 2.a, the following report is submitted:

RO 50-315/77-04

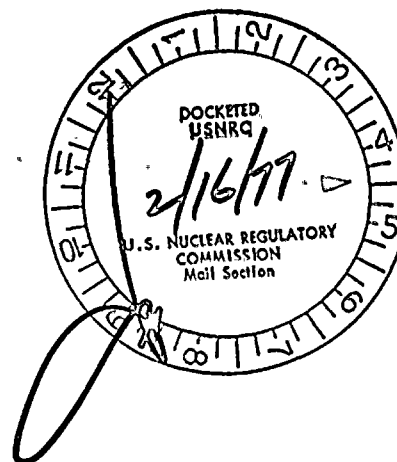
Sincerely,

For R. W. Jurgensen
Plant Manager

RWJ/mj

cc: R. S. Hunter
J. E. Dolan
G. E. Lien
R. J. Vollen BPI
R. C. Callen MPSC
K. R. Baker RO: III
R. Walsh, Esq.
P. W. Steketee, Esq.
G. Charnoff, Esq.
G. Olson
J. M. Hennigan
PNSRC
R. S. Keith
Dir., IE (40 copies)
Dir., MIPC (4 copies)

Regulatory Docket File



1676

LICENSEE EVENT REPORT

CONTROL BLOCK:

(PLEASE PRINT ALL REQUIRED INFORMATION)

LICENSEE NAME														LICENSE NUMBER												LICENSE TYPE				EVENT TYPE	
01	M	I	D	C	C	I	0	0	-	0	0	0	0	0	0	-	0	0	4	1	1	1	1	0	1						
7	8	9				14	15												25	26			30	31	32						

CATEGORY		REPORT TYPE	REPORT SOURCE	DOCKET NUMBER						EVENT DATE				REPORT DATE									
01	CONT	T	L	0	5	0	-	0	3	1	5	0	1	2	8	7	7	0	2	1	1	7	7
7	8	57	58	59	60	61					68	69			74			75					80

EVENT DESCRIPTION

02	See Attachment																								80
03																									80
04																									80
05																									80
06	(LER R0-50-315/77-04)																								80

SYSTEM CODE		CAUSE CODE	COMPONENT CODE				PRIME COMPONENT SUPPLIER	COMPONENT MANUFACTURER				VIOLATION			
07	Z	Z	e	H	T	E	X	C	H	A	T	3	3	0	N
7	8	9	10	11	12				17	43	44			47	48

CAUSE DESCRIPTION

08	See Attachment																								80
09																									80
10																									80

FACILITY STATUS	% POWER	OTHER STATUS		METHOD OF DISCOVERY		DISCOVERY DESCRIPTION				
11	H	0	0	0	NA	b	Coil Was Leaking			
7	8	9	10	12	13	44	45	46		80

FORM OF ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY		LOCATION OF RELEASE				
12	Z	NA		NA				
7	8	9	10	11	44	45		80

PERSONNEL EXPOSURES

NUMBER	TYPE	DESCRIPTION					
13	0	0	0	Z	NA		
7	8	9	11	12	13		80

PERSONNEL INJURIES

NUMBER	DESCRIPTION					
14	0	0	0	NA		
7	8	9	11	12		80

OFFSITE CONSEQUENCES

15	NA																								80
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LOSS OR DAMAGE TO FACILITY

TYPE	DESCRIPTION				
16	Z	NA			
7	8	9	10		80

PUBLICITY

17	NA																								80
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ADDITIONAL FACTORS

18	NA																								80
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19																									80
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NAME: David G. Wizner

PHONE: (616) 465-5901

FAILURE OF COOLING COIL ON CPN-4

Investigation Report

Leakage had been detected in May, 1976, from the #3 steam generator main steam line containment penetration (CPN-4) cooling coil on the containment side of the penetration. The cooling coil water supply was valved out and the coil was then examined during the refueling outage. Examination showed that the cooling coil was cracked in the first pass in several locations between 6 o'clock and 8 o'clock. The cooling coil was removed in February, 1977 by grinding the attachment welds. Areas of the carbon steel penetration head adjacent to and underneath the austenitic stainless steel cooling coil were magnetic particle examined. Cracks in the head were found in the same relative location as the cooling coil cracks, that is, along the attachment seam and adjacent plug welds. Subsequent grinding to remove the cracks indicated that they were less than one half inch in depth.

Examination indicated that the cracking of the cooling coil was typical of stress corrosion, and this was subsequently confirmed by metallographic examination. Cracking in the penetration was first thought to be due to cracks propagating from the cooling coil through the attachment welds. However, subsequent magnetic particle examination showed that some of the cracks were outside the plug welds and would not have propagated from the cracks in the cooling coil. A boat sample containing a magnetic indication was removed from the penetration for metallographic examination. This indication was found to be composed of several intergranular cracks. It was readily apparent that these cracks were not due to fatigue, but were typical of stress corrosion.

Under normal cooling water flow, stress corrosion cracking of the cooling coil could not occur. Component cooling water supplied to these coils is demineralized and inhibited with technical grade sodium nitrate. For the corrodant to have become sufficiently concentrated, the cooling water flow must have been reduced so that alternate wetting and drying occurred in the cooling coil. Stress cracking of the cooling coil permitted water to enter the space between the cooling coil and penetration head. Similar wetting and drying is believed to have occurred in this annulus and caused concentration of a corrodant which initiated cracking in the penetration head. Cracking occurred at the attachment welds which would have higher stresses than the surrounding material which is an annealed forging.

Neither corrodant which caused cooling coil failure and cracks in the penetration head has been identified. Stress cracking of austenitic stainless steel is relatively common and easily explained. Stress cracking of low strength carbon steel is unexpected and we are attempting to identify the corrodant. The most likely culprit is sodium nitrate formed by oxidization of sodium nitrite, which is added to the cooling water as a corrosion inhibitor. Intergranular stress corrosion cracking has been reported by nitrates in low carbon steels with carbon less than .22%.

The reduction in water flow in the cooling coil was most likely due to blockage in the line that existed when the unit was started. There are two cooling coils on each penetration head. The cooling water to the coils is supplied in parallel, with a common inlet valve and outlet check valve. Although these systems were flushed, the flushing procedure that was used would not indicate blockage of one of the two coils.

The cooling coil on CPN-3 is fed by the same inlet valve as the failed cooling coil, and could have been subject to the same concentration mechanism. The line was flushed before plant operation and therefore it is apparent that this line was originally clean. Cooling water flow through the two coils on CPN-3 have been subsequently checked and both coils have been found to be satisfactory. Peretrant examination has been performed and no indications were found. There is reasonable assurance that this coil was not subject to the same alternate wetting and drying and is still satisfactory

It is our intention, however, to remove the cooling coil on CPN-3 and examine the underlying penetration at a subsequent major outage and when a replacement cooling coil is available, but no later than our next refueling outage.

Stress analysis of the penetration head has been reviewed with the manufacturer. Analysis indicates that stresses in the area where cracks occurred are low, and that they decrease substantially beneath the surface.

Analysis of chips taken from the cracked head area indicate that the material conforms to the specified material, SA350, Grade LF1. Test reports from the material supplier were verified and in accordance with the specification.

Continued operation of the plant without examining the surface of the CPN-3 penetration head does not have an adverse effect on the safety of the plant or public. CPN-3 has performed satisfactorily with the same cooling water for an additional 6 1/2 months after failure of the coil on CPN-4.



INDIANA & MICHIGAN POWER COMPANY

DONALD C. COOK NUCLEAR PLANT
P.O. Box 458, Bridgman, Michigan 49106

KD. Larkham

February 11, 1977

Mr. J. G. Keppler, Regional Director
Office of Inspection and Enforcement
United States Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Operating License DPR-58
Docket No. 50-315

Dear Mr. Keppler:

Pursuant to the requirements of Appendix A Technical Specifications and the United States Nuclear Regulatory Commission Regulatory Guide 1.16, Revision 4, Section 2.a, the following report is submitted:

RO 50-315/77-04

Sincerely,

For R. W. Jurgensen
Plant Manager

RWJ/mj

cc: R. S. Hunter
J. E. Dolan
G. E. Lien
R. J. Vollen BPI
R. C. Callen MPSC
K. R. Baker RO: III
R. Walsh, Esq.
P. W. Steketee, Esq.
G. Charnoff, Esq.
G. Olson
J. M. Hennigan
PNSRC
R. S. Keith
Dir., IE (40 copies)
Dir., MIPC (4 copies)

FEB 14 1977

(PLEASE PRINT ALL REQUIRED INFORMATION)

01		CONT		CATEGORY		REPORT TYPE		REPORT SOURCE		DOCKET NUMBER					EVENT DATE					REPORT DATE					
7	8	57	58	59	60	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98		
				T	L	0	5	0	-	0	3	7	5	0	1	2	8	7	7	0	2	1	1	7	7

02	See Attachment	80
03		80
04		80
05		80
06	(LER R0-504315/77-04)	80

7 8 9 SYSTEM CODE CAUSE CODE COMPONENT CODE PRIME COMPONENT SUPPLIER COMPONENT MANUFACTURER VIOLATION

07 Z Z e H T E X C H A T 3 3 0 N

7 8 9 10 11 12 13 14 15 16 17 43 44 45 46 47 48

08	See Attachment	80
08		80
10		80

FACILITY STATUS		% POWER			OTHER STATUS		METHOD OF DISCOVERY		DISCOVERY DESCRIPTION	
11	H	0	0	0	NA	b	Coil Was Leaking			

FORM OF ACTIVITY RELEASED		CONTENT OF RELEASE		AMOUNT OF ACTIVITY		LOCATION OF RELEASE	
1	2	Z		NA		NA	
7	8	9	10	11	44	45	80

NUMBER			TYPE	DESCRIPTION
13	0	00	Z	NA

NUMBER				DESCRIPTION	
1	4	0	0	0	NA

[illegible]

TYPE		DESCRIPTION
18	Z	NA

17	NA	80
----	----	----

18	NA	80
----	----	----

19 7 8 9 80

PHONE: (616) 465-5901

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