

# ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

ACCESSION NBR: 8810130119 DOC. DATE: 88/09/30 NOTARIZED: NO DOCKET #  
 FACIL: 50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana & 05000315  
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 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-007-00: on 880908, ice build-up in ice condenser flow passages due to sublimation.

W/8 ltr.

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 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

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NRR/DEST/CEB 8H	1 1	NRR/DEST/ESB 8D	1 1
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A104

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) D. C. Cook Nuclear Plant - Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 1 5 1					PAGE (3) 1 OF 1 5								
TITLE (4) Ice Build-Up in Ice Condenser Flow Passages Due to Sublimation																							
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)													
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES				DOCKET NUMBER(S)										
0	9	0	8	8	8	8	8	8	0	0	7	0	0	0	9	3	0	8	8	0 5 0 0 0 0			
OPERATING MODE (9) 4			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																				
POWER LEVEL (10) 0 0 0			20.402(b)				20.406(c)				50.73(a)(2)(iv)				73.71(b)								
			20.406(a)(1)(i)				50.36(c)(1)				50.73(a)(2)(v)				73.71(c)								
			20.406(a)(1)(ii)				50.36(c)(2)				50.73(a)(2)(vii)				<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)								
			20.406(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(viii)(A)												
			20.406(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(viii)(B)												
			20.406(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(ix)												
LICENSEE CONTACT FOR THIS LER (12)																							
NAME T. K. Postlewait - Technical Engineering Superintendent										TELEPHONE NUMBER AREA CODE 6 1 6 4 6 5 - 5 9 0 1													
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																							
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC													
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)							MONTH	DAY	YEAR				
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO													

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 8, 1988, with Unit 1 in Mode 4 (Hot Shutdown), flow passage inspections of the ice condenser revealed frost and ice buildup on the lattice frames of greater than 3/8 inch in a total of thirty-six flow passages in nine of the twenty-four ice condenser bays.

Technical Specification (T/S) 4.6.5.1.b.3 limits frost or ice buildup in flow passages to a nominal thickness of 3/8 inch. According to this T/S, buildup exceeding this limit in two or more flow passages per bay is evidence of abnormal degradation. Though our evaluation has concluded that the degradation is not serious, we believe issuance of this voluntary LER is appropriate since some degradation has been identified.

Actions taken to correct the abnormal degradation included manual cleaning of the flow passages. In addition an internal investigation of the event was conducted. The results of T/S Surveillances regarding frost and ice that forms in the flow passages is being monitored to ensure that any adverse trends in the amount of ice and frost buildup between surveillances will be identified. The impact of frost and ice buildup in the flow passages is also being studied in conjunction with the other utilities with ice condenser containments.

8810130119 880930  
PDR ADOCK 05000315  
S PNU

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104  
EXPIRES: 8/31/88

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   1   5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8   8	—   0   0   7	—   0   0	0   2	OF	1   5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

Conditions Prior to Occurrence

Unit 1 in Mode 4 (Hot Shutdown)

Description of Event

The as-found visual inspection of ice condenser (EIIS/COND) flow passages conducted on September 8, 1988, identified frost and ice accumulation greater than 3/8 inch in two flow passages in Bay 1, two flow passages in Bay 2, four flow passages in Bay 3, two flow passages in Bay 4, four flow passages in Bay 6, two flow passages in Bay 8, two flow passages in Bay 12, two flow passages in Bay 14 and two flow passages in Bay 15. Subsequently, the inspection was expanded to include at least twenty additional flow passages in each affected bay. This inspection revealed an additional two flow passages in Bay 2, six flow passages in Bay 3 and six flow passages in Bay 4 with more than 3/8 inch frost and ice buildup. A total of thirty-six flow passages were affected. There are a total of 3072 flow passages in the Ice Condenser. Attachments 1 through 11 graphically describe the geometry of the flow passages and the location of the ice/frost accumulation.

Technical Specification (T/S) 4.6.5.1.b.3 requires that the ice condenser be determined operable at least once per 9 months by verifying, via visual inspection of at least two flow passages per ice condenser bay, that accumulation of frost or ice on flow passages between ice baskets (EIIS/COND-BSKT), past lattice frames (EIIS/COND-FRM), through the intermediate and top deck floor grating, or past the lower inlet plenums support structures (EIIS/COND-SPT) and turning vanes is restricted to a nominal thickness of 3/8 inch. If one flow passage per bay is found to have an accumulation of frost or ice greater than this thickness, a representative sample of twenty additional flow passages from the same bay shall be visually inspected. If these additional flow passages are found acceptable, the surveillance program may proceed considering the single deficiency as unique and acceptable. More than one restricted flow passage per bay is evidence of abnormal degradation of the ice condenser.

The affected flow passages were manually cleaned to remove the accessible frost and ice buildup.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104  
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		8 8	0 0 7	0 0	0 3	OF	1 5

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Additional factors considered as possible contributors to the frost and ice accumulation included: 1) during the surveillance interval prior to the September 8, 1988 test, several of the 60 air handling units (AHU) (EIIS/AHU) (used to maintain ice condenser temperature) were intermittently inoperable for maintenance and/or repair. In addition, as the result of a personnel error, most of the AHU's were inoperable for a period of about four days at the end of July; however, it has been concluded that the inoperability of the AHU's did not significantly contribute to the frost and ice formation experienced; 2) during the Unit shutdown immediately preceding this surveillance, it was discovered that a secondary side steam leak had occurred inside containment, possibly affecting the humidity in the ice condenser; however, it has been concluded that the steam leakage did not significantly contribute to the frost and ice formation experienced, as the formation was very similar to that experienced in the past (the only apparent effect of the steam leak on the ice condenser was minor amounts of frost/ice formation on the intermediate deck doors).

With the exception of the AHU's, there were no inoperable structures, components or systems that contributed to this event.

Cause of Event

It is believed that sublimation of ice or high humidity in the containment air could have contributed to this problem. Further investigation of this event is ongoing.

Analysis of Event

The Westinghouse evaluation indicated that lattice frost/ice formation of up to 20 percent of the total flow passage area could be present without the peak Ice Condenser Compartment Pressure exceeding the design limit. Since the frost/ice buildup identified in Bays 1, 2, 3, 4, 6, 8, 12, 14 and 15 constitute a total flow blockage area which is less than 20 percent limit, this situation is bounded by the Westinghouse evaluation.

Our evaluation indicates that the amount of flow blockage due to frost and ice buildup noted in the Ice Condenser can be tolerated without adversely affecting the Ice Condenser function during a Loss of Coolant Accident.

Based on the above information and the Westinghouse evaluation, it is concluded that the abnormal degradation event does not constitute an unreviewed safety question as defined in 10CFR50.59(a)(2), nor does it adversely impact health and safety.

Though our evaluation has concluded that the degradation is not serious, we believe issuance of this voluntary LER is appropriate since some degradation has been identified.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
D. C. Cook Nuclear Plant - Unit 1	0 5 0 0 0 3 1 5	8 8	0 0 7	0 0	0 4	OF	1 5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

Corrective Actions

The corrective action was to manually clean the flow passages to remove the accessible frost and ice buildup.

The results of Technical Specification Surveillances regarding frost and ice that forms in the flow passages is being monitored to ensure that any adverse trends in the amount of ice and frost buildup between surveillances will be identified. The impact of frost and ice buildup in the flow passages is also being studied in conjunction with the other utilities with ice condenser containments.

Failed Component Identification

No component failures were identified during this event.

Previous Similar Events

LER 50-316/85-013  
LER 50-316/87-002  
LER 50-315/87-013  
LER 50-316/87-010  
LER 50-315/88-002  
LER 50-316/88-005

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   1   5	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

## ATTACHMENT 1

Description of Flow Passage Blockage by Category (affected Flow Passages are indicated by the boxed areas on the following attachments).

Category	Description*
A	Maximum Flow Passage Ice/Frost Blockage greater than 75 percent.
B	Maximum Flow Passage Ice/Frost Blockage between 50 and 75 percent.
C	Maximum Flow Passage Ice/Frost Blockage between 25 and 50 percent.
D	Maximum Flow Passage Ice/Frost Blockage less than 25 percent (but greater than 3/8" buildup).

\* NOTE: These are generalized categories which reflect the maximum ice/frost blockage found in a particular flow passage and in general was limited to one or two lattice frameworks in the flow passage. This does not indicate that the flow passage was blocked its entire length. Lattice Framework is located at the positions of cruciforms in the ice basket. Cruciforms are installed every six feet within the 48 foot ice basket (for convention the "top" lattice framework is referred to as number 1, etc.). The specific lattice frameworks affected are indicated on the individual Bay drawings (Attachments 3-11).

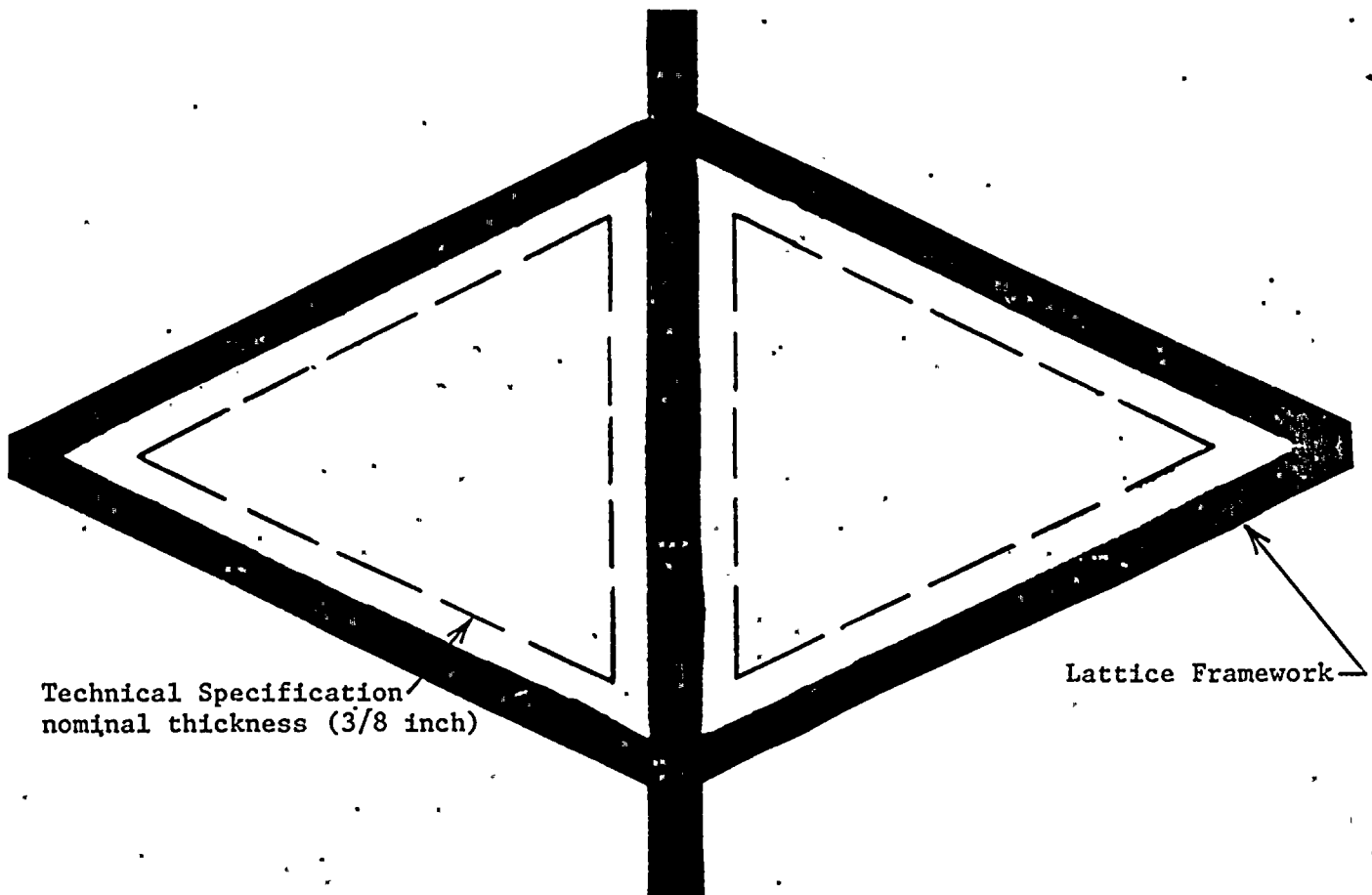
## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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## ATTACHMENT 2

## Representative Diagram of Ice/Frost Buildup in Two Flow Passages



Scale:

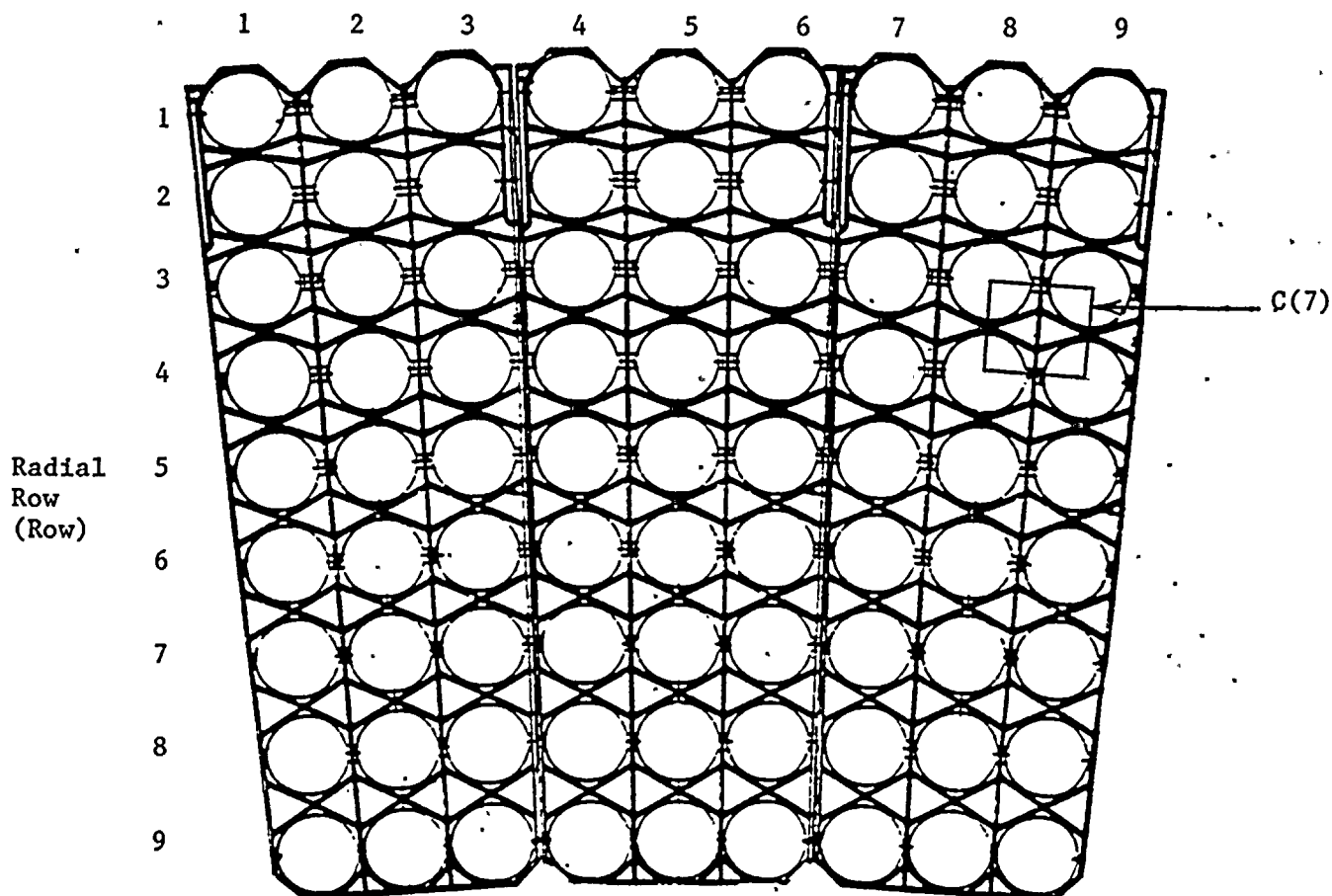
1/2 inch equals 1 inch

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0 5 0 0 0 3 1 5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 8	— 0 0 7	— 0 0	0 7	OF	1 5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

## ATTACHMENT 3

Bay 1 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

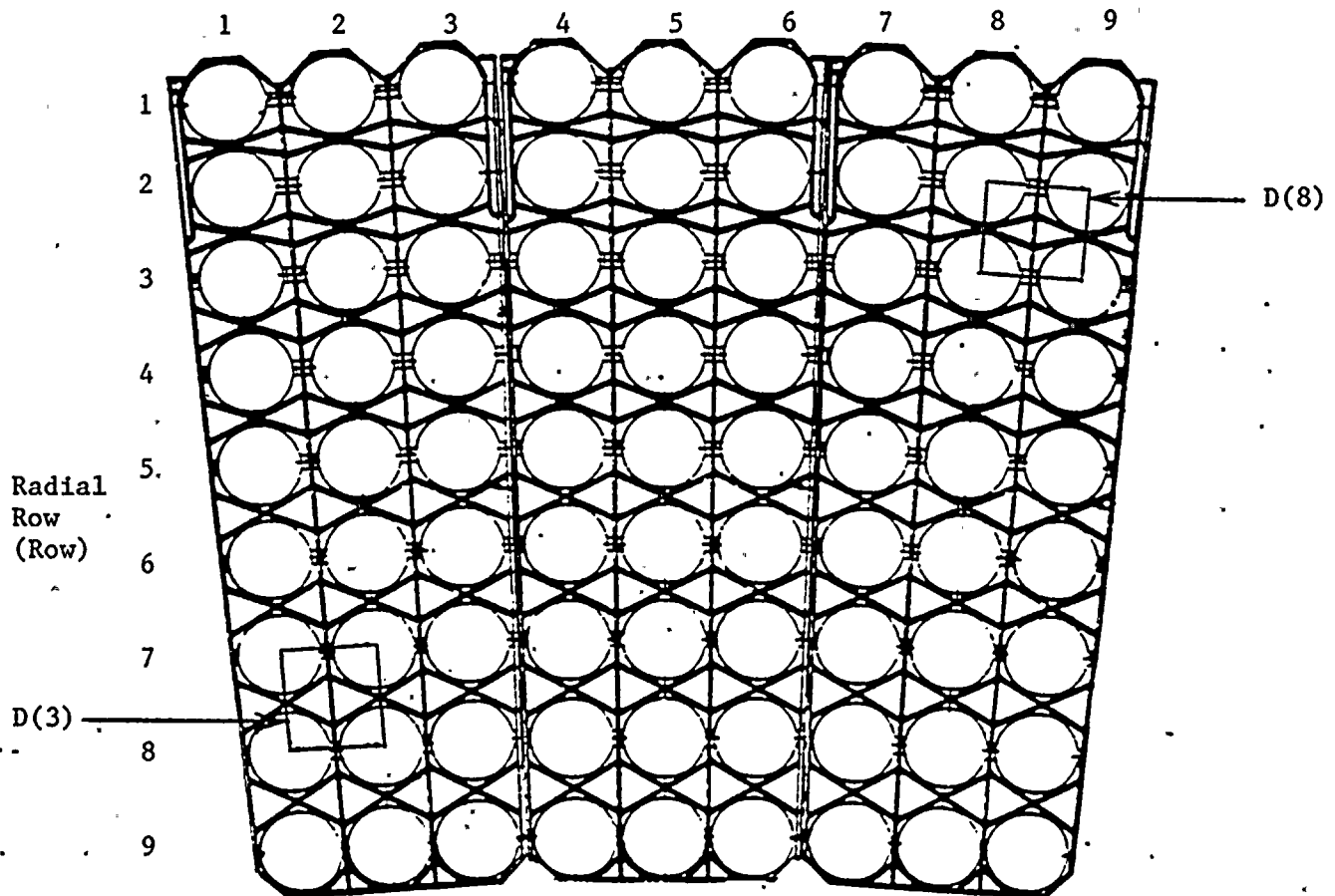


## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0 5 0 0 0 3 1 5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 8	— 0 0 7	— 0 0	0 8	OF	1 5

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## ATTACHMENT 4

Bay 2 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

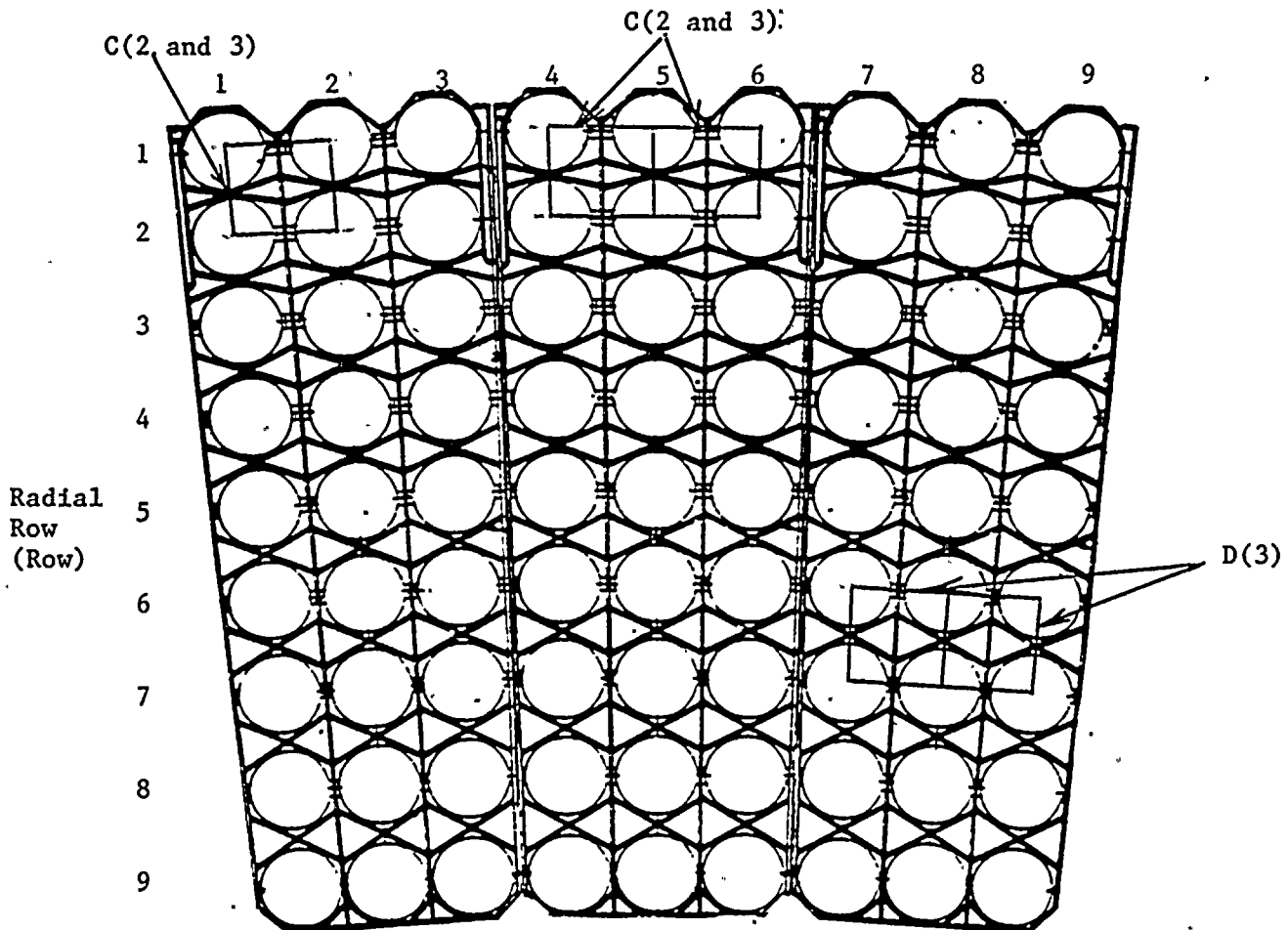
## LICENSEE EVENT REPORT (LER) TEXT. CONTINUATION

APPROVED OMB NO. 3150-0104  
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FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   1   5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8   8	—   0   0   7	—   0   0	0   9	OF	1   5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

## ATTACHMENT 5

Bay 3 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

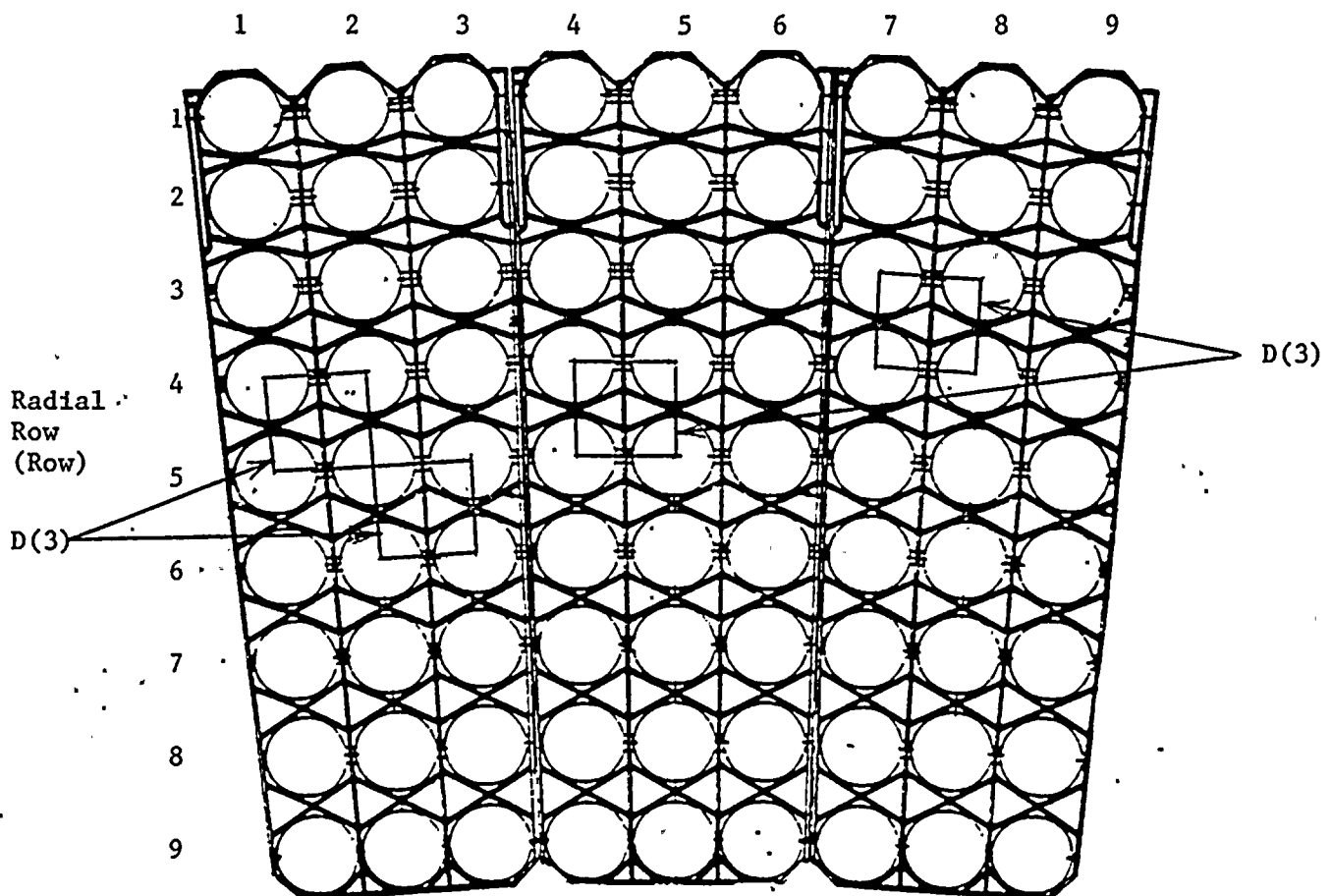
U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104  
EXPIRES: 8/31/88

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   1   5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8   8	— 0   0   7	— 0   0	1   0	OF	1   5

TEXT (If more space is required, use additional NRC Form 368A's) (17)

## ATTACHMENT 6

BAY 4 (OF 24 TOTAL)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

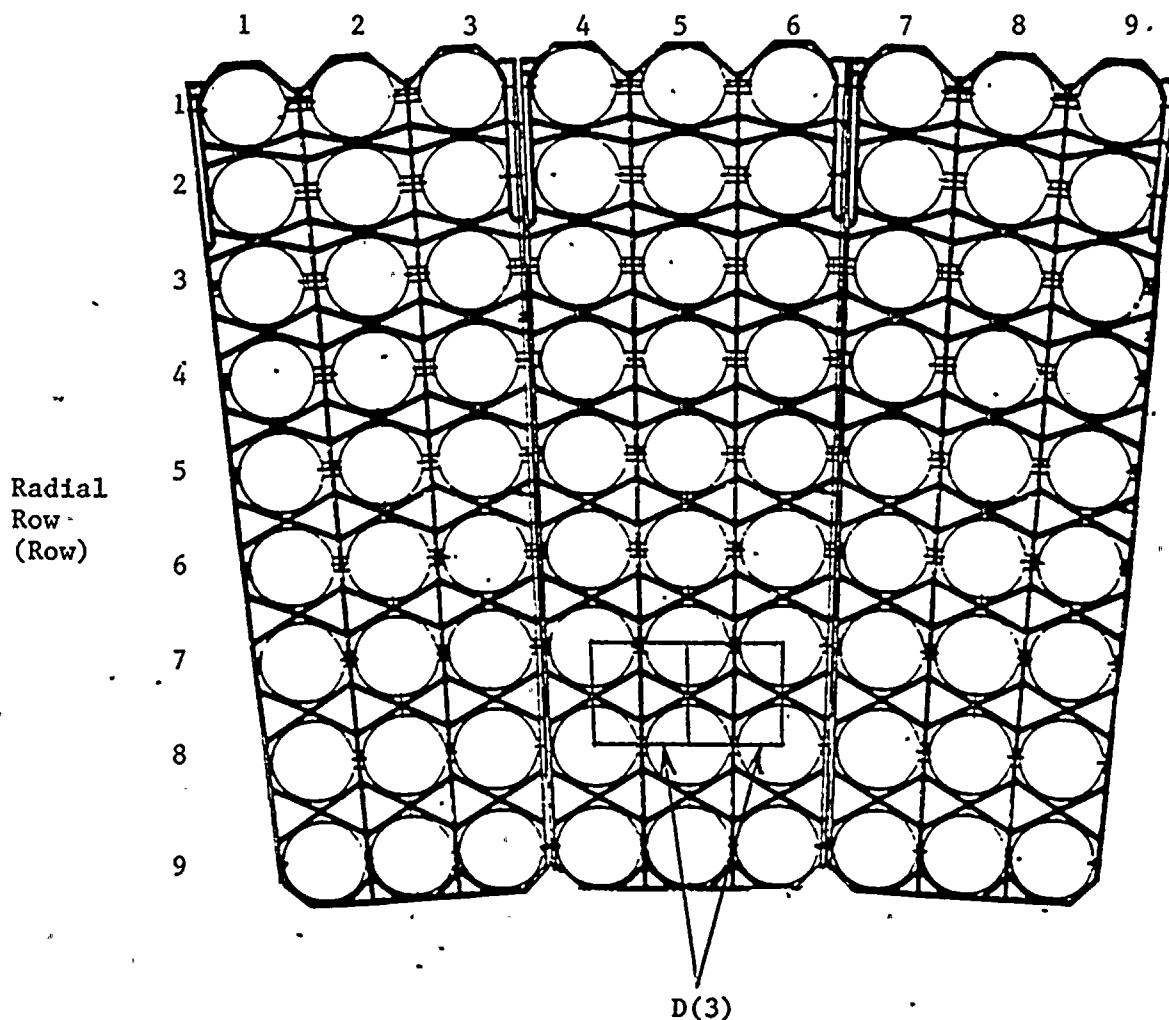


## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  D. C. Cook Nuclear Plant - Unit 1	DOCKET NUMBER (2)  0 5 0 0 0 3 1 5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 8	0 0 7	0 0	1 1	OF	1 5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

## ATTACHMENT 7

Bay 6 (of 24 total)  
Azimuthal Row (Basket)

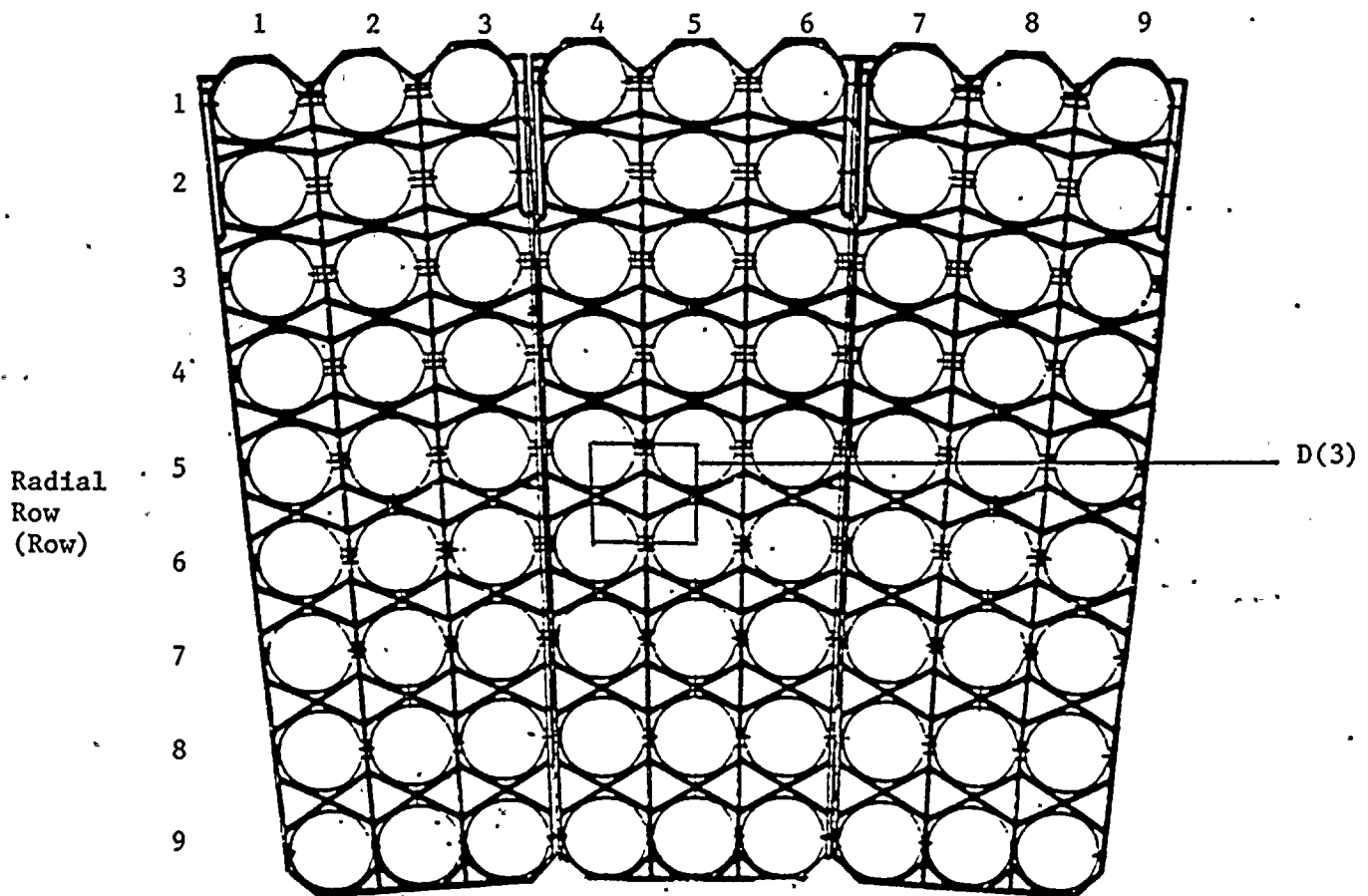
Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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## ATTACHMENT 8

Bay 8 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

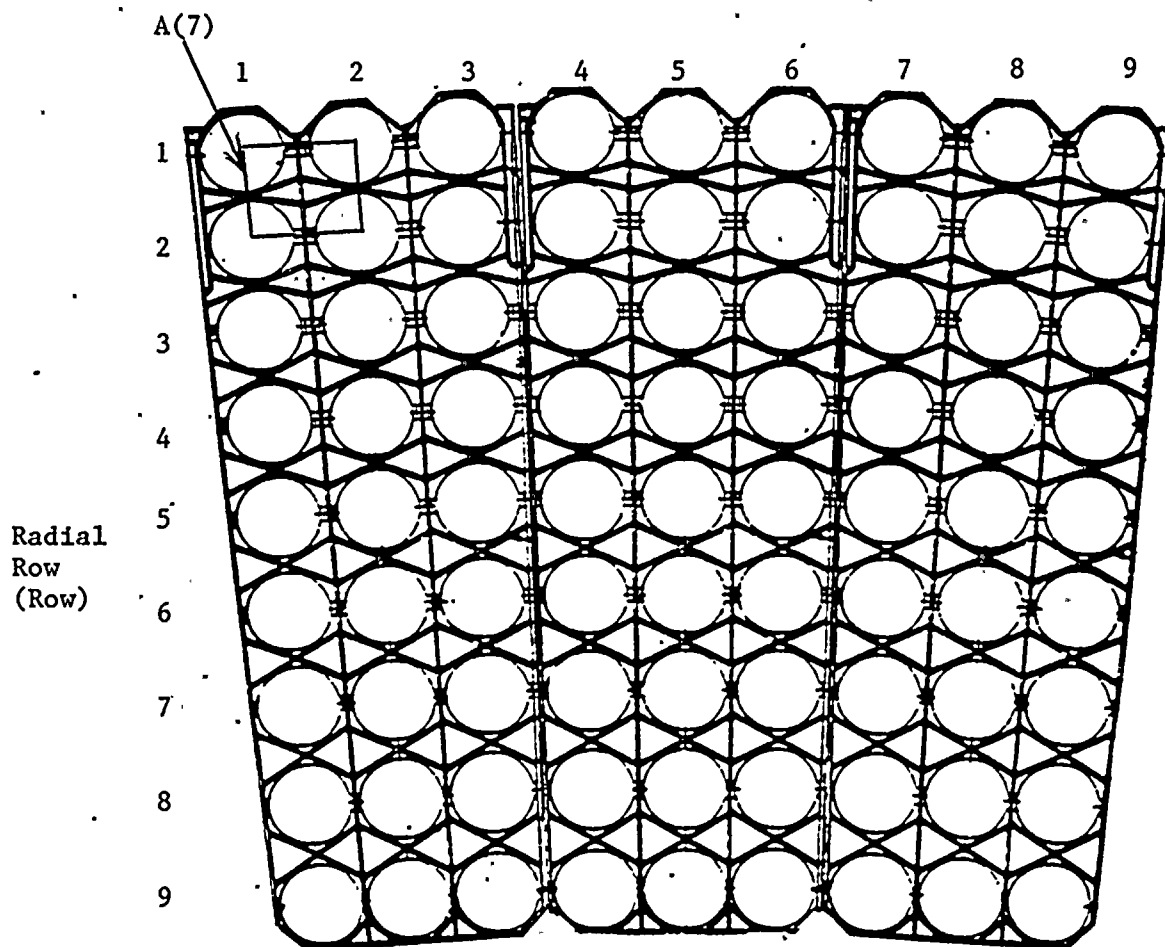
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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8   8	—   0   0   7	—   0   0	1   3	OF	1   5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

## ATTACHMENT 9

Bay 12 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

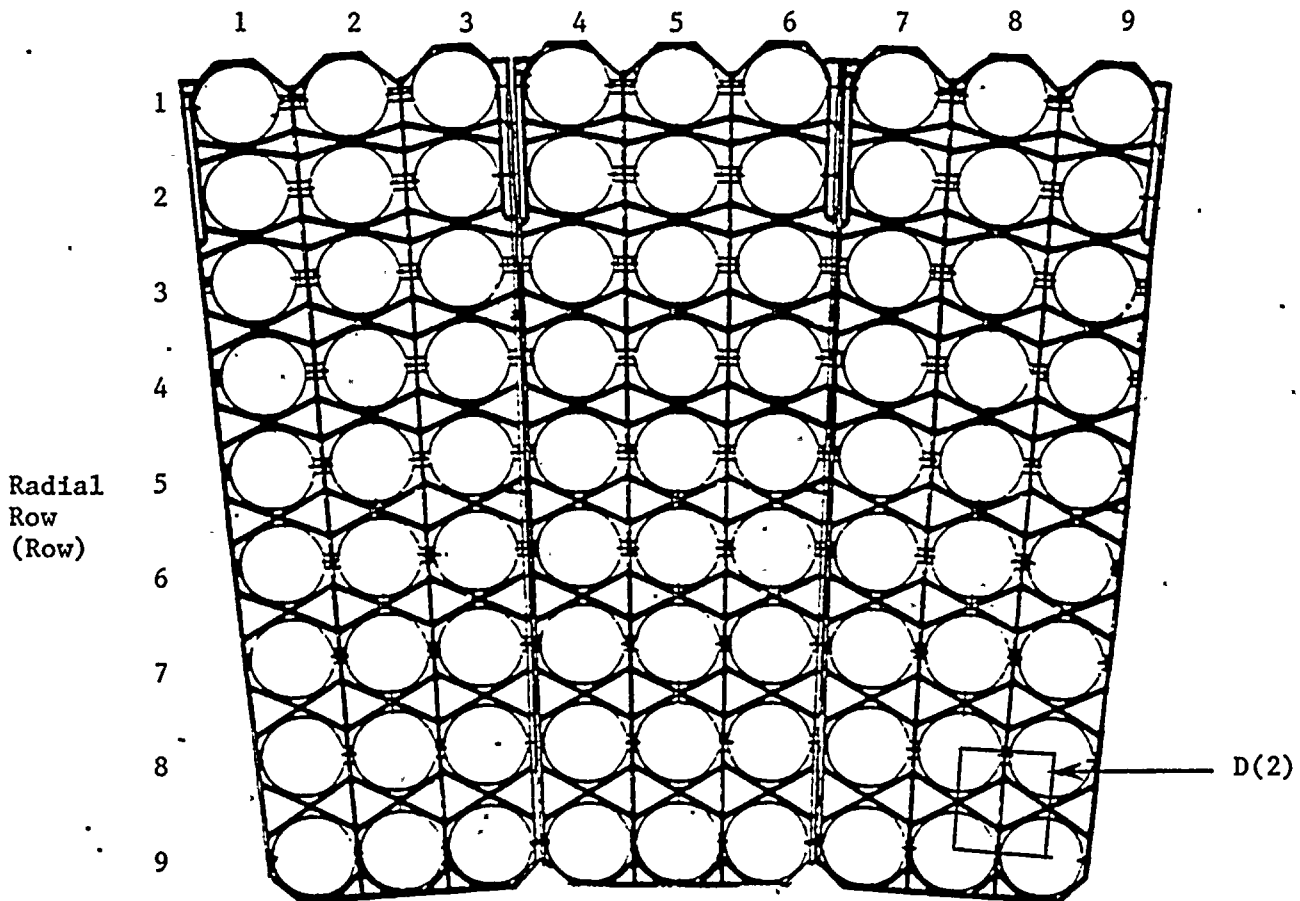
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EXPIRES: 8/31/88

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

## ATTACHMENT 10

Bay 14 (of 24 total)  
Azimuthal Row (Basket)

Note: The lattice frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).





Indiana Michigan  
Power Company  
Cook Nuclear Plant  
P.O. Box 458  
Bridgman, MI 49106  
616 465 5901



September 30, 1988

United States Nuclear Regulatory Commission  
Document Control Desk  
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Operating License DPR-58  
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73  
entitled Licensee Event Reporting System, the following  
report is being submitted:

88-007-00

Sincerely,

  
W. G. Smith, Jr.  
Plant Manager

WGS:clw

Attachment

cc: D. H. Williams, Jr.  
A. B. Davis, Region III  
M. P. Alexich  
P. A. Barrett  
J. E. Borggren  
R. F. Kroeger  
NRC Resident Inspector  
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