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SUBJECT: LER 88-002-00:on 880326,ice buildup in ice condenser flow passages due to sublimation.

W/8 ltr.

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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
D. C. Cook Nuclear Plant - Unit 1	0 5 0 0 0 3 1 5	1 OF 1 0

TITLE (4)
Ice Buildup 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 3	2 6	8 8	8 8	0 0 2	0 0	0 4	2 5	8 8		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	3	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)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
T. K. Postlewait - Technical Engineering Superintendent	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 NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On March 26, 1988, with Unit 1 in Mode 3 (Hot Standby), 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 twelve flow passages in four of the twenty-four ice condenser bays. The flow passages were declared inoperable at 1530 hours.

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 and an internal investigation of the event. The flow passages were declared operable on March 27, 1988, at 0600 hours. 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.

IE22

NRC Form 366
(9-83)

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 2	— 0 0	0 2 OF 1 0

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

Conditions Prior to Occurrence

Unit 1 in Mode 3 (Hot Standby)

Description of Event

The as-found visual inspection ice condenser (EIIS/COND) flow passages conducted on March 26, 1988, indicating frost and ice accumulation greater than 3/8 inch in two flow passages in Bay 5, four flow passages in Bay 17, two flow passages in Bay 19 and four flow passages in Bay 24. Subsequently, the inspection was expanded to include at least twenty additional flow passages in each of these bays. This inspection revealed no additional frost or ice buildup in any of the additional flow passages inspected. A total of 12 flow passages were affected. There are a total of 3072 flow passages in the Ice Condenser. Attachments 1 through 6 graphically describe the geometry of the flow passages and the location of the ice/frost accumulation. The flow passages were declared inoperable at 1530 hours on March 26, 1988.

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 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. The flow passages were declared operable at 0600 hours on March 27, 1988.

During the surveillance interval prior to the March 26, 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. However, it has been concluded that the inoperability of the AHU's did not significantly contribute to the frost and ice formation experienced. Two blocked flow passages resulted from an AHU that overflowed when its drain line became clogged with ice.

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

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

Cause of Event

Other than the AHU previously mentioned as having overflowed 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 5, 17, 19 and 24 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.

Corrective Actions

The corrective action was to manually clean the flow passages to remove the accessible frost and ice buildup. The AHU with the clogged drain line was turned off and the drain line has been cleaned. Operations performs tours of the ice condenser at least three times per week. The tour includes a check for proper operation of the air handling units and initiation of required corrective actions for malfunctioning units. To address future indications of AHU overflow, administrative controls will be developed and put in place by October 1, 1988, to evaluate any effect(s) of AHU overflow on flow passages and to implement appropriate corrective actions.

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.

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

Failed Component Identification

No component failures were identified during this event.

Previous Similar Events

LER 50-316/85-013
LER 50-316/86-002
LER 50-315/86-013
LER 50-316/87-002
LER 50-315/87-013
LER 50-316/87-010

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D. C. Cook Nuclear Plant - Unit 1	0 5 0 0 0 3 1 5	8 8	— 0 0 2	— 0 0	0 5 OF 1 0

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 it's 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 thru 6).

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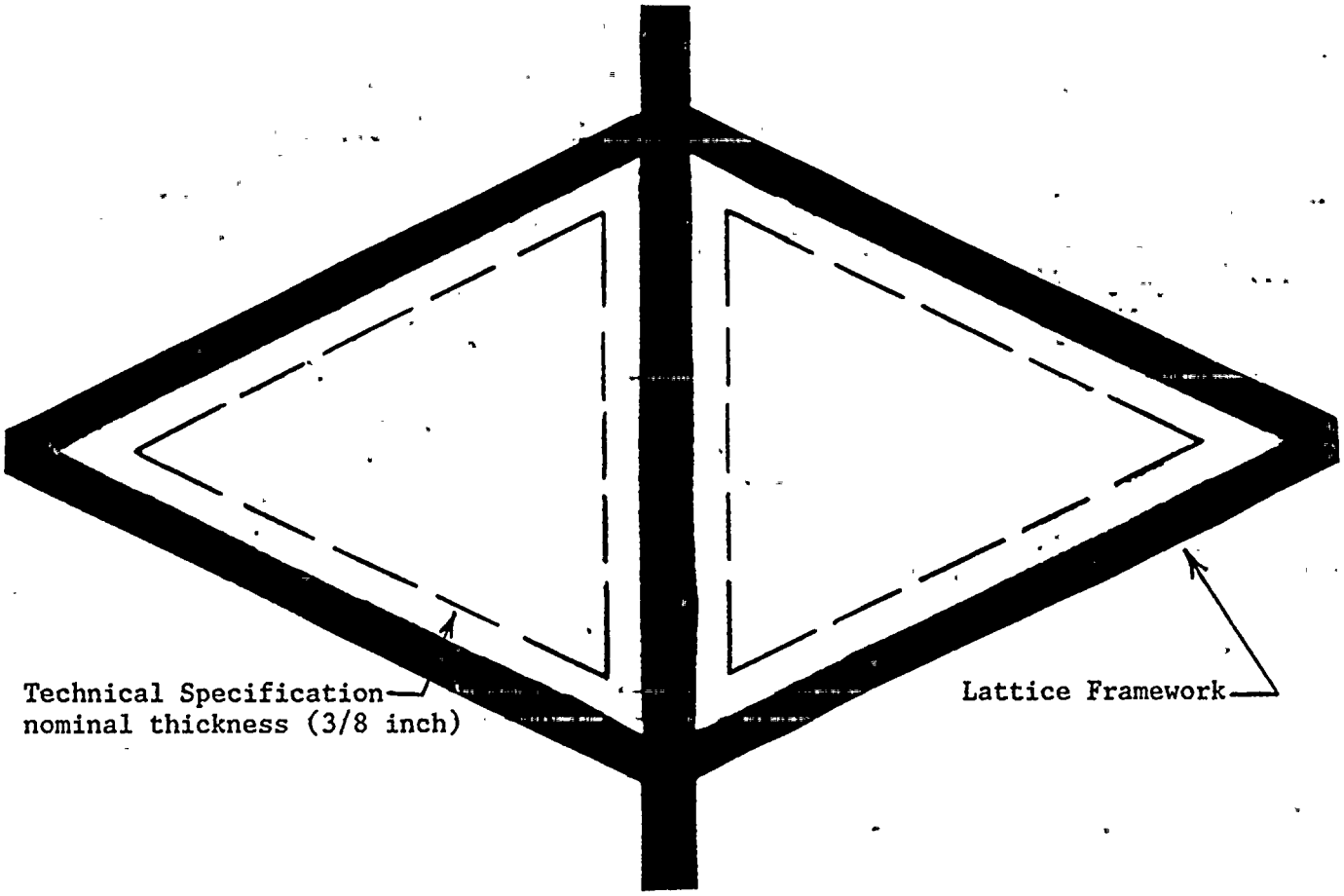
TEXT (If more space is required, use additional NRC Form 366A's) (17)

ATTACHMENT 2

Representative Diagram of Ice/Frost Buildup in Two Flow Passages



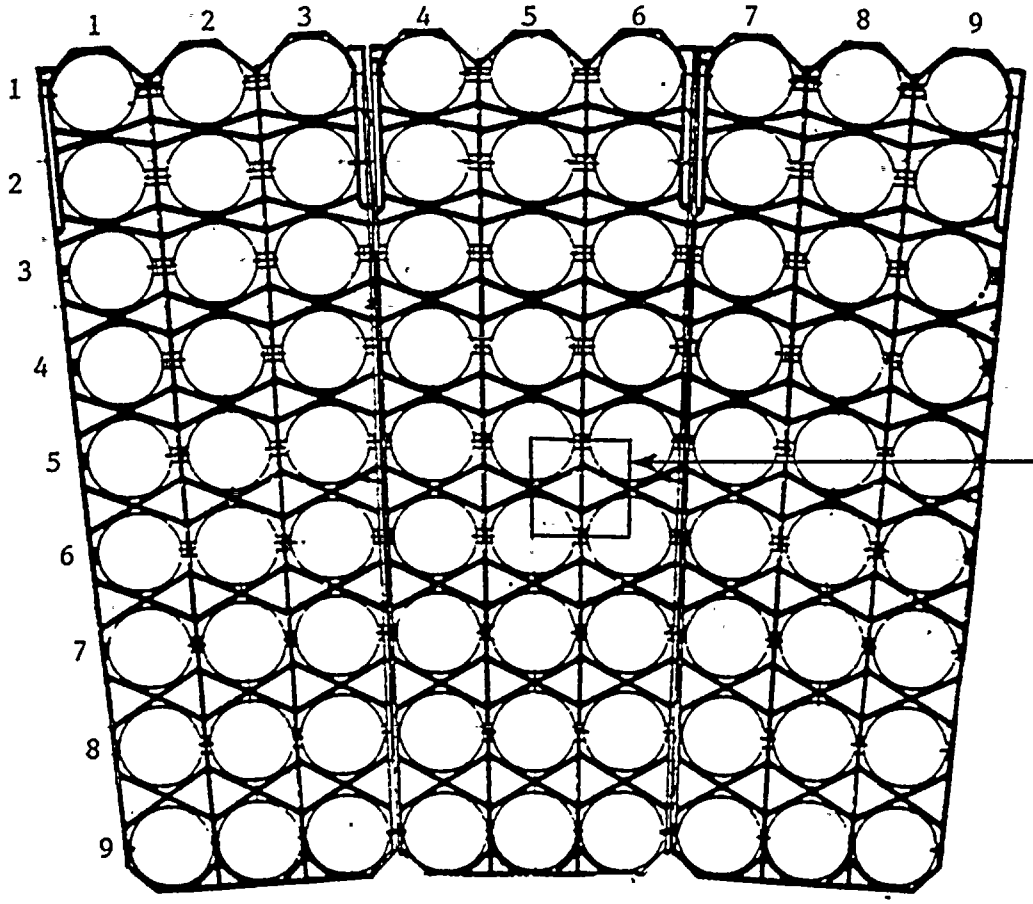
Scale:

1/2 inch equals 1 inch

ATTACHMENT 3

Bay 5 (of 24 total)

Azimuthal Row (Basket)



NOTE: The Lattice Frameworks affected are indicated in parenthesis after the category description number (see Attachment 1).

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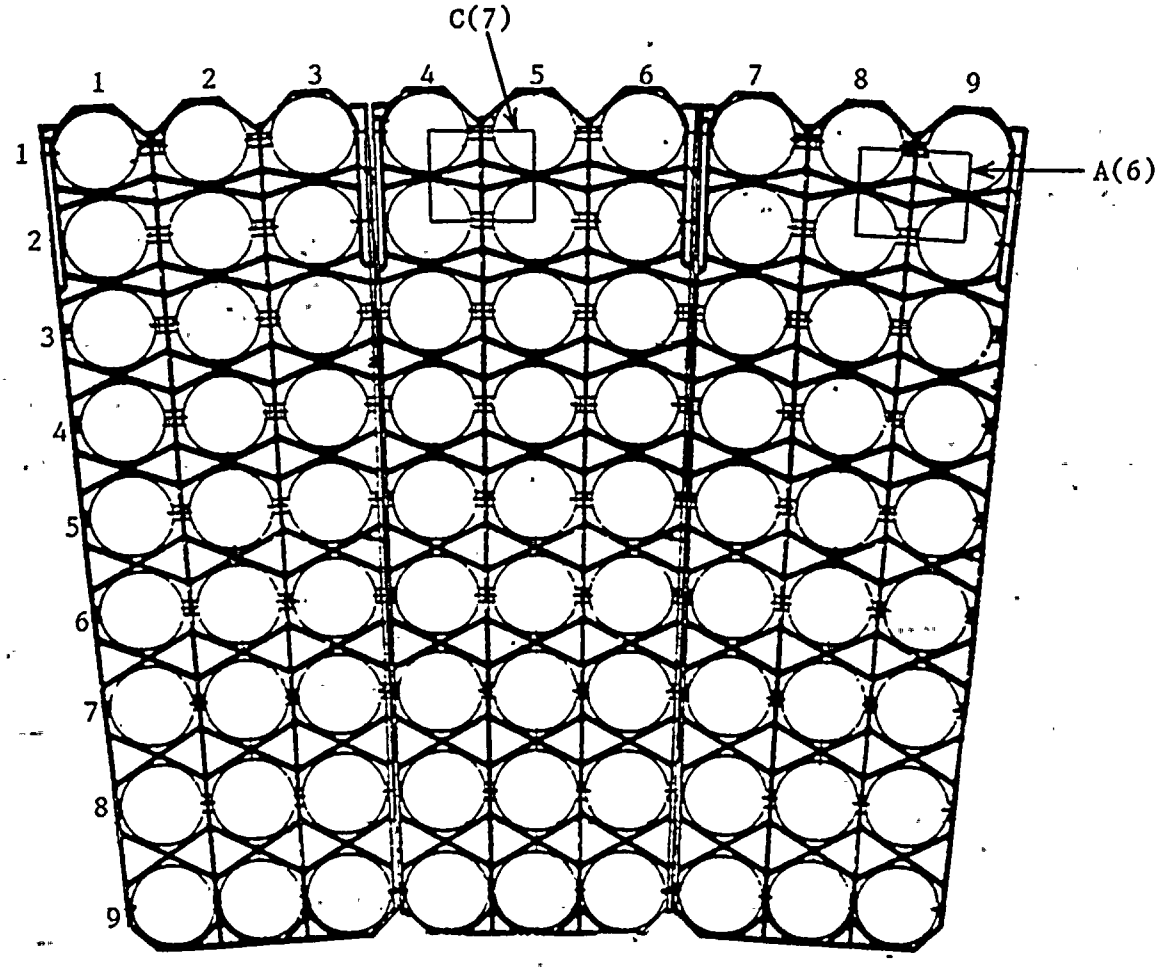
TEXT (If more space is required, use additional NRC Form 366A's) (17)

ATTACHMENT 4

Bay 17 (of 24 total)

Azimuthal Row (Basket)



NOTE: The Lattice Framework affected are indicated in parenthesis after the category description number (see Attachment 1).

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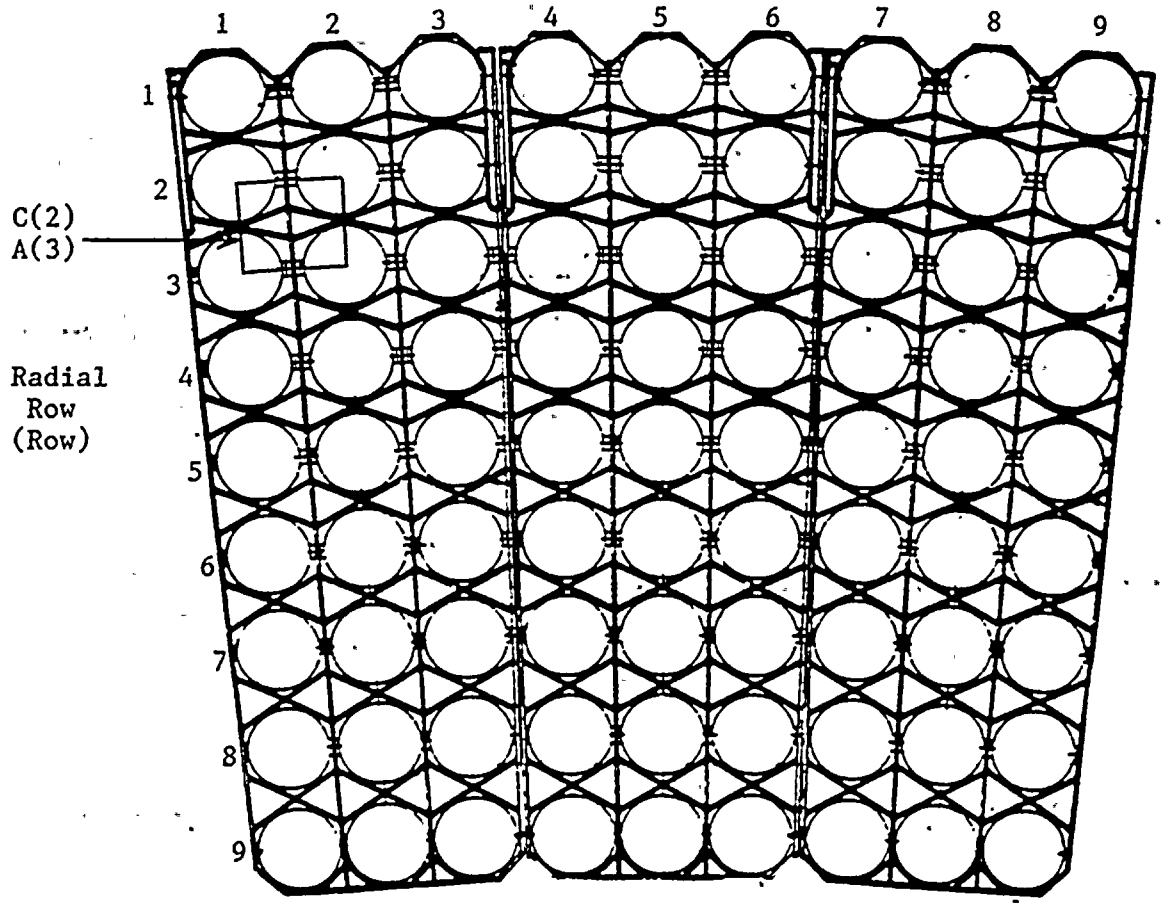
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
D. C. Cook Nuclear Plant - Unit 1	0 5 0 0 0 3 1 5	8 8	— 0 0 2	— 0 0	0 9 OF 1 0

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

ATTACHMENT 5

Bay 19 (of 24 total)

Azimuthal Row (Basket)

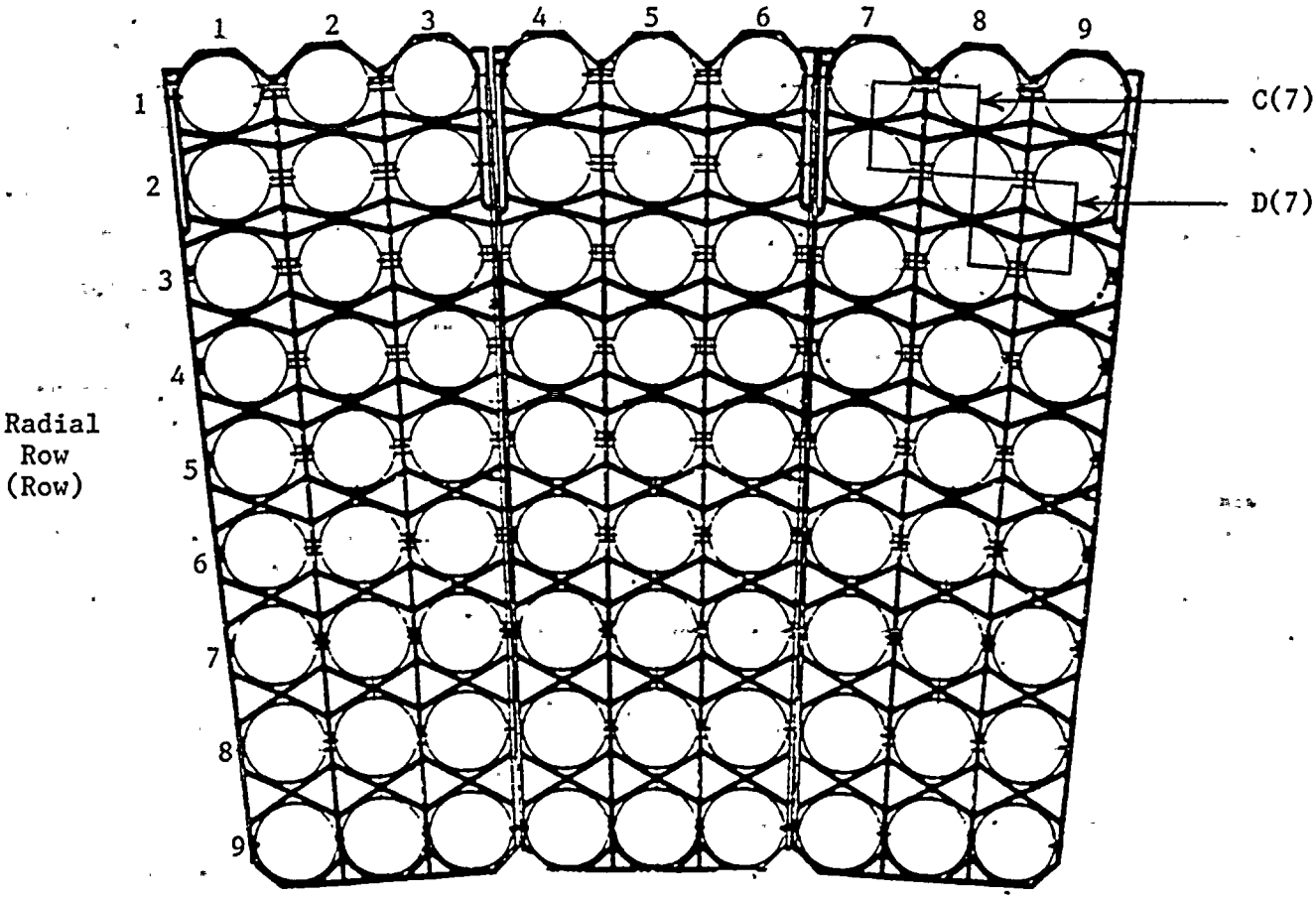


NOTE: The Lattice Framework affected are indicated in parenthesis after the category description number (see Attachment 1).

ATTACHMENT 6

Bay 24 (of 24 total)

Azimuthal Row (Basket)



NOTE: The Lattice Framework 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

INDIANA MICHIGAN POWER

April 25, 1988

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

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:

88-002-00

Sincerely,

W. G. Smith, Jr.
Plant Manager

WGS:clw

Attachment

cc: D. H. Williams, Jr.
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