CATEGORY 1

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FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
AUTH.NAME AUTHOR AFFILIATION
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SAMPSON,J.R. Indiana Michigan Power Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-017-01:on 980327,debris was found in sample ice from ice condenser sys.Caused by poor work practices.Ice condenser has been completely thawed & inspection,repair & refurbishment activities have begun.W/980701 ltr.

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American Electric Power
Cook Nuclear Plant
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Bridgman, MI 49106
616 465 5901

AEP
AMERICAN ELECTRIC POWER

July 1, 1998

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating Licenses DPR-58
Docket No. 50-315

Document Control Manager:

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

98-017-01

Sincerely,

John R. Sampson

J. R. Sampson
Site Vice President

/mbd

Attachment

c: C. J. Paperiello (Acting), Region III
J. R. Sampson
P. A. Barrett
S. J. Brewer
R. Whale
D. Hahn
Records Center, INPO
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070100

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IE22

NRC Form 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Cook Nuclear Plant Unit 1	50-315	1 of 5

TITLE (4)

Debris Recovered from Ice Condenser Represents Unanalyzed Condition

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 NAME	DOCKET NUMBER
											Cook - Unit 2	50-316
03	27	98	98	--	017	--	01	07	01	98	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
		20.2201 (b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
POWER LEVEL (10)	0	20.2203(a)(1)	20.2203(a)(3)(i)	X 50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Paul Schoepf, Safety Related Mechanical Engineering Superintendent	616/465-5901, x2408

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 15 single-spaced typewritten lines) (16)

On March 27, 1998, debris was found in a sample of ice from the Ice Condenser System. The Unit 1 Ice Condenser was then completely thawed and three 55-gallon drums of debris were collected. The debris could have blocked flow through Ice Condenser floor drains and Containment Recirculation Sump screens, which represents an unanalyzed condition. An ENS notification was made on March 27, 1998, in accordance with 10CFR50.72(b)(2)(i) for an unanalyzed condition, and this LER is submitted in accordance with 10CFR50.73(a)(2)(ii)(A) for an unanalyzed condition.

The root cause of debris in the Ice Condenser was determined to be poor work practices, with contributing causes of written communications and supervisory methods. To insure all debris is removed, both units' Ice Condensers will be carefully inspected following the complete thaw of ice. The Ice Condenser worker training program will be overhauled and video inspections of ice baskets will be performed, Ice Condenser Foreign Material Exclusion and task standards will be revised, and oversight responsibility of Ice Condenser work will be transferred from Engineering to the Maintenance Department to access a larger staff skilled in production supervision.

The quantity of debris is negligible compared to the mass of ice in the Ice Condenser, and is not a threat to Ice Condenser performance. However, taken in aggregate, the additional debris from the Ice Condenser would have exacerbated the fibrous material condition described in LER 50-315/97-024, further degrading the ability of the Containment Recirculation Sump to perform its function.

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TEXT *(If more space is required, use additional copies of NRC Form (366A)* (17)

CONDITIONS PRIOR TO EVENT
Unit 1 was in Mode 5, Cold Shutdown
Unit 2 was in Mode 5, Cold Shutdown

DESCRIPTION OF EVENT
The primary function of the safety-related Ice Condenser system is the absorption of thermal energy released abruptly in the event of a Loss of Coolant Accident (LOCA) or Main Steam Line break (MSLB) inside Containment, to limit the initial peak Containment pressure. The system consists of a completely enclosed annular compartment located around approximately 300 degrees of the perimeter of the Containment. The main part of the Ice Condenser is a mass of sodium tetraborate ice stored inside the compartment. The sodium tetraborate solution produced by the melting ice absorbs and retains iodine released during the accident and serves as a heat transfer medium and neutron poison for reactivity control following the postulated design basis incident (LOCA). The total ice mass provides sufficient heat removal capability to condense the steam released during a LOCA or a MSLB event. The Ice Condenser plays no role in the normal operation of the plant.

Accomplishment of the function of the Ice Condenser system depends upon the quantity and distribution of the ice mass within the Ice Condenser. The ice mass is contained within an array of 1944 ice baskets. Eighty-one ice baskets, arranged in a 9 by 9 grid, are located in each of the 24 bays of the Ice Condenser. The ice baskets are 48 feet tall with an approximate diameter of 12 inches. The vertical portion of the basket is substantially open to accommodate heat transfer. The borated water from the melted ice passes through the Ice Condenser floor drains and into the Containment Recirculation Sump.

The Containment Recirculation Sump is located in the basement of the lower Containment, and collects water from the Reactor Coolant System, the Containment Spray System, and the Ice Condenser for the Emergency Core Cooling System (ECCS) pumps during the recirculation phase following a LOCA. The Recirculation Sump screen prevents debris from flowing into the ECCS pump suctions during recirculation. The vertical screen and an outer trash rack are designed to prevent missiles and other debris from entering the ECCS pump suction piping.

Inspection of a filter in the system used to melt ice obtained from a sample of 110 Unit 1 and five Unit 2 ice baskets revealed the presence of debris. The nature and volume of debris found from both units was such that the potential existed to block flow through the Ice Condenser floor drains and Containment Recirculation Sump screens. Flow blockage of the Containment sump screens would reduce the amount of borated water available for long term reactor core and Containment cooling, and represents an unanalyzed condition.

The decision was made to completely thaw both units' Ice Condensers to address a variety of issues, including the existence of debris in the ice bed. The thaw of the Unit 1 Ice Condenser was completed in late May, 1998, and thaw of the Unit 2 Ice Condenser is scheduled to begin in July, 1998.

The type of debris found in the Unit 1 Ice Condenser includes a variety of materials, such as:

- tape (including complete rolls)
- a coat
- plastic banding
- ice basket coupling screws and screw heads
- ice basket cruciforms
- rope
- gloves
- plastic wrap
- cloth
- nuts & bolts
- wire
- rags

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TEXT *(If more space is required, use additional copies of NRC Form (366A)* **(17)**

DESCRIPTION OF EVENT (cont'd)

flashlights and batteries
wood
small hand tools (such as wrenches)
plastic tubes from tube lights
paper
larger tools (such as pneumatic vibrators, weigh rigs, and metal bars used to maintain the ice bed).

While some minor amounts of debris are still being removed from the Unit 1 Ice Condenser, an estimate of the volume of material was three 55-gallon drums, based on visual surveys of removed material and walk downs of the Ice Condenser. It was further estimated that five cubic feet of material removed from the Unit 1 Ice Condenser was considered transportable to the Containment Recirculation Sump (items such as paper, tape, cloth, rope, etc). However, it should be noted that most of the material considered transportable to the Containment Recirculation Sump remained in the ice baskets following the Unit 1 Ice Condenser thaw.

The Unit 2 Ice Condenser thaw has not started, but the types and quantities of debris are expected to be similar due to similar maintenance practices for the two Ice Condensers.

CAUSE OF EVENT

The cause of the debris in the Ice Condenser was poor work practices. Foreign material entered the ice bed as a result of poor work practices during plant construction, initial ice load, or during subsequent surveillance and maintenance activities, which did not preclude entry of material into the ice bed.

A contributing cause was poor written communications. Strict standards and procedures did not exist to control foreign material during initial ice load or during subsequent maintenance activities on the ice bed.

Another contributing cause was poor supervisory methods resulting in ineffective contractor control. Contract personnel have historically performed most work inside the Ice Condenser under the supervision of personnel in the Engineering department. Training for contract ice crew personnel stressed the importance of Ice Condenser cleanliness, and there is evidence that workers understood this, however supervisory oversight was not effective in converting this knowledge into adequate worker performance.

ANALYSIS OF EVENT

On March 27, 1998, an ENS notification (EN 33975) was made in accordance with 10CFR50.72(b)(2)(i), for a condition found while the reactor was shutdown, which if it had been found while the reactor was operating, could have resulted in the plant being in an unanalyzed condition. This LER is therefore submitted in accordance with 10CFR50.73(a)(2)(ii)(A), for an unanalyzed condition.

The safety significance of debris in the ice bed was considered in a 1984 Westinghouse report, which outlined the primary threats caused by debris. The significance can be summarized as, "any accumulation of debris is unacceptable if it prevents the ice condenser system from operating at its minimum required capacity. This can happen if debris reduces the ice inventory below the minimum required, if it prevents the proper flow of steam through the ice bed, or if it unacceptably reduces the heat transfer from steam to the ice,...debris must not have an unacceptable impact on the operation of the emergency core cooling system and/or the Containment spray system."

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TEXT *(If more space is required, use additional copies of NRC Form (366A)* **(17)**

ANALYSIS OF EVENT (cont'd)
Following the melt of the Unit 1 ice, it was confirmed that the quantity of debris in the ice was noteworthy, comprising an estimated volume of three 55-gallon drums, with an estimated 5 cubic feet of the debris being potentially transportable from the ice baskets to the Containment Recirculation Sump.

Although this quantity of material is noteworthy given plant foreign material standards, this quantity of material is negligible compared to the quantity of ice resident in the ice beds. Given the small volume and weight of the debris compared to the volume and weight of the ice, the existence of this material is not considered a significant threat to Ice Condenser thermal performance.

The quantity of material is significant, however, from the perspective of potential threats to Containment Recirculation Sump blockage. Post-melt surveys of the Unit 1 Ice Condenser indicated that most debris was resident in the ice bed, and fell to the bottom of the basket during melting. For debris in the ice bed to threaten the Recirculation Sump:

1. The blowdown forces due to an accident would have to force the debris to travel up through the ice baskets, through the upper deck grating, and over to and down the refueling cavity drains; or,

2. The debris would have to travel out of the sides or bottoms of the ice baskets (through the 1" mesh), through the floor drain grating (1.75 inch openings), and through 12 inch flapper valve drains to the lower Containment.

Although both paths are somewhat tortuous, and there are no models to study debris transport for this type of material, if the noted quantities of debris are present, some would likely transport to the Recirculation Sump, reducing the flow area through the Recirculation Sump screens.

A previous Licensee Event Report (LER) (LER 50-315/97-024-04), addressed degradation of the Containment Recirculation Sump due to fibrous material found in Containment, which could potentially have caused excessive blockage of the sump screen. The issue of Containment Recirculation Sump screen blockage discussed in LER 97-024-04 is relevant to this LER because, taken in aggregate, the additional debris from the Ice Condenser would have exacerbated the condition described in LER 97-024, further degrading the ability of the Recirculation Sump to perform its function.

CORRECTIVE ACTION
The Unit 1 Ice Condenser has been completely thawed, and inspection, repair, and refurbishment activities have begun. The Unit 2 Ice Condenser thaw is scheduled and will also be followed by a number of inspection, repair and refurbishment activities. The thaw of each Ice Condenser includes removal of debris from the ice baskets and flow passages. A detailed inspection will be performed of each Ice Condenser bay for cleanliness prior to refilling ice baskets in that bay. Production of ice and reload of ice into each Ice Condenser will be strictly controlled to ensure that foreign material is not introduced into the ice beds during refill.

To improve work practices, the training program for personnel performing work in the Ice Condenser is being overhauled. Training will provide focused information to raise the sensitivity of workers to foreign material, and to inform workers of new strict controls for foreign material in the Ice Condensers. A video inspection will be performed of baskets emptied for maintenance, prior to basket refill with ice, which will afford an opportunity to identify any foreign material remaining in baskets after emptying. Additionally, a final inspection of emptied baskets will be performed by QC personnel just prior to refill, which will provide a final check of ice basket cleanliness.

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TEXT *(If more space is required, use additional copies of NRC Form (366A)* **(17)**

CORRECTIVE ACTION (cont'd)
To improve written communications related to the Ice Condensers, standards for control of foreign material within the Ice Condensers are being revised to invoke strict controls to preclude the entry of foreign material into the ice bed.

To address poor supervisory methods, responsibility for oversight of Ice Condenser production workers is being realigned from the Engineering department to the Maintenance department. The Maintenance department has more production supervisors with the skills necessary to provide thorough supervisory oversight to workers compared to the Engineering department. Therefore, this realignment of responsibilities is expected to result in improved worker performance in foreign material control.

FAILED COMPONENT IDENTIFICATION
Not Applicable

PREVIOUS SIMILAR EVENTS
LER 50-315/97-024-04

[illegible]