CATEGORY 1

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ACCESSION NBR:9806100440 DOC.DATE: 98/06/05 NOTARIZED: NO DOCKET #
FACIL:50-315 Donald C. Cook Nuclear Power Plant, Unit 1, Indiana M 05000315
AUTH.NAME AUTHOR AFFILIATION
SCHOEPF,P. American Electric Power Co., Inc.
SAMPSON,J.R. American Electric Power Co., Inc.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 98-007-01:on 980211,ice condense4r weights us to determine TS compliance not representative,was determined. Caused by mgt methods.Ice condensers for both units will be melted out & reloaded w/fresh ice.W/980605 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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CATEGORY 1 DOCUMENT

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American Electric P
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
616 465 5901

AEP
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June 5, 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:

98-007-01

Sincerely,

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
NRC Resident Inspector

1/1

IE22

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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)

FACILITY NAME (1)	DOCKET NUMBER (2)	Page 1 of 6
Donald C. Cook Nuclear Plant - Unit 1	50-315	

TITLE (4)
Ice Condenser Weights Used to Determine Technical Specification Compliance Not Representative

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
02	11	98	98	-- 007 --	01	06	05	98	Cook - Unit 2	50-316
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5
POWER LEVEL (10)	00

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(3)(i)	50.73(a)(2)(iii)	73.71(b)
	20.2203(a)(1)		20.2203(a)(3)(ii)	50.73(a)(2)(iv)	73.71c
	20.2203(a)(2)(i)		20.2203(a)(4)	50.73(a)(2)(v)	OTHER
	20.2203(a)(2)(ii)		50.36(c)(1)	50.73(a)(2)(vii)	(Specify in Abstract below and in Text, NRC Form 366A)
	20.2203(a)(2)(iii)		50.36(c)(2)	50.73(a)(2)(viii)(A)	
	20.2203(a)(2)(iv)		50.73(a)(2)(i)	50.73(a)(2)(viii)(B)	
	20.2203(a)(2)(v)	X	50.73(a)(2)(ii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Paul Schoepf, Mechanical Systems Manager	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 February 11, 1988, with Unit 1 and Unit 2 in Mode 5, it was determined that the Ice Condenser ice basket weights used to determine compliance with Technical Specifications may not constitute a representative sample. The Ice Condenser absorbs thermal energy released during a coolant leak inside Containment to limit the peak pressure, and consists of 1944 ice baskets each filled with a required minimum of 1333 pounds of borated ice. The inability to select a representative sample of ice baskets for weighing may result in a maldistribution of ice that could have impacted the ability of the Ice Condenser to perform its function. The condition was determined reportable under 10CFR50.72 (b) (2) (i), and an ENS notification was made at 1618 hours on February 11, 1988. This LER is submitted in accordance with 10CFR50.73(a)(2)(i) as a condition prohibited by Technical Specifications, and 10CFR50.73(a)(2)(ii) for an unanalyzed condition.

The cause of this event is classified as management methods, which resulted in ineffective management of the Ice Condenser system, written communications resulting in inadequate surveillance procedures, and the use of inadequate software programs. To correct any potential maldistribution of ice, the Ice Condensers for both units will be melted out and reloaded with fresh ice. The basis of the Ice Condenser surveillance program will be reconstituted. The software used to support the Ice Condenser surveillance program will either be revised or replaced. Responsibilities for the Ice Condenser system surveillance program will be reassigned concurrently to Engineering and Maintenance.

The safety significance of this condition was assessed. The assessment concluded that the ice mass contained in the Ice Condenser as a whole was in excess of the amount used in the long term containment analysis, and that the containment pressure would have remained below the design pressure value of 12 psig. Therefore, this condition was of minimal safety significance.

Conditions Prior to Occurrence
Unit 1 was in Mode 5, Cold Shutdown
Unit 2 was in Mode 5, Cold Shutdown

Description of Event
The Ice Condenser is a safety-related system whose primary function 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, for the purpose of limiting the initial peak pressure in the Containment. 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 a partial melt-down of the 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 reactor coolant system volume 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 is dependent 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 Technical Specification (T/S) ice bed weight surveillance provides assurance that the required ice inventory will be resident in an adequate distribution in the Ice Condenser. The surveillance is accomplished through a statistical analysis of a representative sample of individual ice basket weights in lieu of a 100 percent ice basket weight surveillance.

During the investigation of this condition, plant personnel determined that the requirements of T/S surveillance 4.6.5.1.b.2 were not being met. The surveillance requirement states, in part, that the operability of the Ice Condenser shall be verified at least once per 18 months by:

> Weighing a representative sample of at least 144 ice baskets and verifying each basket contains at least 1333 pounds of ice. The representative sample shall include 6 baskets from each of the 24 Ice Condenser bays and shall be constituted of one basket each from Radial Rows 1, 2, 4, 6, 8, and 9 (or from the same row of an adjacent bay if a basket from a designated row cannot be obtained for weighing) within each bay. If any basket if found to contain less than 1333 pounds of ice, a representative sample of 20 additional baskets from the same bay shall be weighed. The minimum average weight of the ice from the 20 additional baskets and the discrepant basket shall not be less than 1333 pounds per basket at a 95 percent level of confidence.

Contrary to T/S requirements, the surveillance performed to verify operability of the Ice Condenser did not ensure that a representative sample of ice baskets were selected. Compliance with the T/S requirements had previously been demonstrated by a statistical analysis of sample ice basket weights which were considered representative, even though some baskets are unweighable as acknowledged by both the Technical Specifications and the Updated Final Safety Analysis Report (UFSAR). Visual surveys of ice baskets indicate that some baskets in both units, predominantly in radial rows 9, but also radial row 8 and azimuthal row 5, show greater than expected ice loss due to sublimation.

Description of Event (cont'd)

The investigation revealed that implementation of the ice bed weight surveillance is accomplished by **12 EHP 4030.STP.211, "Ice Condenser Surveillance". The guidance provided in this procedure deals mainly with the physical work methods to be used for ice basket weighing and maintenance activities. The procedure does not provide guidance on the selection of baskets to be weighed or on the statistical analysis of the data. During performance of this surveillance, random selection of the initial 144 ice baskets to be weighed and the subsequent statistical analysis is accomplished by two separate computer programs. Neither software program is referenced in the surveillance procedure.

ICEPICK, a computer software random number generator, is utilized to pick the initial 144 ice basket sample. The minimum 144 ice basket sample is required to be expanded for 20 additional ice baskets for each ice basket determined to be below the T/S average weight. The expanded sample is performed in the same bay as the discrepant basket and is considered to be representative of the discrepant ice baskets. The 20 additional baskets, however, are selected by the lead test engineer, as ICEPICK has no capability to perform the sample expansion of 20 additional ice baskets.

Statistical analysis of the individual ice basket weight data is performed using the NSLICE software program. Input for NSLICE is from data gathered from the weighing of ice baskets in accordance with **12 EHP 4030.STP.211. The data represents weights collected during the as-found weighing, the after mass addition weighing, and the as left weighing. No procedural guidance is provided for the input of data, or the use of the output tables from the NSLICE program. The output tables depict individual ice basket ice mass, average ice mass for individual radial rows, each bay within the ice bed, each row-group average, and for the total ice bed mass at the 95% confidence factor.

NSLICE was developed by AEP early in the plant's life, but has never been updated to keep pace with changing requirements. The as-found weighing program and the expanded weighing program have evolved as advances in weighing methods have occurred, and the original ice weight surveillance practices and the bases of the statistical analysis depicted in the NSLICE program were closely aligned. As a result of changes in T/S requirements and related changes to ice basket mass maintenance and surveillance practices, the statistical analyses did not remain aligned with the requirements and practices.

The current T/S surveillance requirements for the ice basket weights evolved from a requirement to weigh a sample of 60 baskets to a requirement to weigh 96 representative baskets due to weighing results which indicated non-uniform sublimation rates in the Ice Condenser. The 96 sample weights were to be collected from radial rows 2, 4, 6 and 8 in each of the 24 bays. During the early weighing program, attempts at weighing the baskets in radial rows 1 and 9, the wall baskets, proved unsuccessful. Later, improvements in weighing methods resulted in the acquisition of wall basket ice weights. Evaluation of this additional data revealed that the adjacent radial row ice basket weights were not representative of the wall ice basket weights due to sublimation. This resulted in radial rows 1 and 9 sample ice weights being added to the T/S surveillance. This change resulted in the ice basket weighing program requirements embodied in the current requirements of T/S 4.6.5.1.b.2.

The T/S surveillance provides for the selection of alternate ice baskets if the initially selected basket is determined to be unweighable. An alternate representative ice basket can be selected from the same radial row within the same bay or within an adjacent bay. The use of alternate ice baskets was added to T/S 4.6.5.1.b.2 with Amendment 18, and has been frequently exercised.

Description of Event (cont'd)

The current typical Ice Condenser weighing program would start by attempting to weigh the 144 ice baskets selected by ICEPICK. Initially selected individual ice baskets deemed to be unweighable during the weighing process would have alternates selected from the same radial row in the same bay or an adjacent bay. The condition of the ice baskets often resulted in numerous attempts being made to obtain the weight of individual ice baskets. In the radial rows adjacent to the crane wall, principally radial rows 9 and 8, the majority of the ice baskets were considered to be unweighable in the recent past, due to being frozen and/or damaged. The unweighable status of these ice baskets combined with the use of alternate baskets frequently resulted in the weight from the same ice baskets being utilized in the statistical analysis of successive weighing programs.

The as-found weighing program was considered to be successfully completed once the minimum 144 ice baskets plus the required expansion had been completed with the row, bay, row group and total Ice Condenser averages above the specified minimum. No consideration was given to collecting or utilizing representative samples of ice basket weights. If the average of any one row and/or group were below the specified minimum, additional samples would be collected in an attempt to increase the average weight of the ice baskets. Weighing activities would subsequently be expanded to include attempting to weigh all ice baskets with the exception of those baskets with physical interferences from the intermediate deck. The as-found weighing program and the expanded weighing program would be performed concurrently with all individual ice basket weights being input into the same NSLICE data set.

STP.211 provides a maximum allowable gross weight for an individual ice basket. The maximum allowable weight of the basket plus the contained ice was derived from the structural analysis of the Ice Condenser system. STP.211 did not provide a minimum allowable ice mass for an individual ice basket. All acceptance criteria contained in STP.211 associated with minimum ice mass was based upon the statistically derived averages of all weighed ice baskets.

The number of baskets being emptied and refilled has steadily decreased since the late 1980 early 1990 time period. The emptying and refilling of individual ice baskets beyond those baskets individually demonstrated to be below the T/S minimum average ice mass was gradually eliminated from the scope of work performed during an Ice Condenser maintenance outage. The acceptance criteria was considered to be the averages of the various groupings as stated in Technical Specifications. The use of the various averages as the sole ice mass acceptance criteria included sample expansion until the average was determined to be above minimum Technical Specification acceptance criteria with no additional individual weights being collected. These additional, unweighed ice baskets had not been demonstrated to be outside the T/S acceptance criteria, and therefore were considered to be expanded scope. Work items classified as expanded outage scope were typically not performed due to budget and schedule constraints. The 'expanded scope' deletions effectively eliminated all unweighed ice baskets from ice mass maintenance activities. During the most recent outages, this philosophy had progressed to the point of not performing ice mass addition activities to individual baskets which had been demonstrated to be below the Technical Specification weight limit. The decision to exclude filling low weight baskets was partially justified based upon using the criteria of various averages being above the T/S weight limit.

Cause of Event

The cause of this event is classified as management methods, resulting in ineffective management of the Ice Condenser system. The responsibilities related to the Ice Condenser system design basis, surveillance, and maintenance were fragmented.

A contributing cause was written communications, which resulted in poorly documented, inadequately accessible, and, therefore, poorly understood surveillance bases. Fragmentation of the responsibilities for the Ice Condenser system compounded the consequences of poor written communications.

Another contributing cause was the use of inadequate software programs, NSLICE and ICEPICK.

Analysis of Event

The condition was determined to represent an unanalyzed condition, and in accordance with 10CFR50.72(b)(2)(i) an ENS notification was made. Additionally, the condition resulted in not meeting the requirements of Technical Specification 4.6.5.1.b.2 in that a representative sample of ice basket weights was not obtained. This LER is therefore submitted in accordance with 10CFR50.73(a)(2)(i) for any operation or condition prohibited by the plant's Technical Specifications, and 10CFR50.73(a)(2)(ii) for an unanalyzed condition.

The safety significance of this condition was assessed by Westinghouse. The assessment concluded that the ice mass contained in the Ice Condenser as a whole was in excess of the amount used in the long term containment analysis, and that containment pressure would have remained below the design basis value. Therefore, any potential maldistribution of ice, which may not have been discovered due to the failure to identify and fill low weight ice baskets from NSLICE program output, was determined to be of minimal safety significance.

Corrective Actions

To correct any potential maldistribution of ice, the Ice Condensers for both units will be melted out and reloaded with fresh ice. The melt out of Unit 1 is complete, and the production of fresh ice is in progress. The melt out of Unit 2 will commence in the near future.

The basis of the Ice Condenser surveillance program will be reconstituted and incorporated into the Design Basis Documents. Utilizing the reconstituted surveillance basis, all Ice Condenser surveillance procedures will either be revised or completely rewritten. As part of the reconstitution process, the surveillance methodology as well as the selection and acceptance criteria for individual ice basket and various basket groupings will be reviewed for compliance with both the T/S and the analytical basis of the Ice Condenser system.

The software used to support the Ice Condenser surveillance program will either be revised or replaced. The selection process for all ice baskets to be weighed will be established and incorporated into procedures, as well as the acceptance criteria for individual baskets and basket groupings.

A comprehensive assessment of the plant surveillance program is being performed as part of the Restart Plan. This assessment will be completed prior to restart of either unit. Specific actions that arise from this assessment will be communicated to the NRC during the restart process.

Corrective Actions (cont'd)

To address the ineffective management methods for the Ice Condenser system, the surveillance requirements for the Ice Condenser will be shared by both the Engineering and Maintenance organizations. The Maintenance organization will be principally responsible for implementation of surveillance and maintenance requirements, including supervision of the labor force. The shift of the direct supervisory oversight of the surveillance labor force to the maintenance organization will permit the engineering staff to focus on adequate translation and maintenance of the design bases requirements of the Ice Condenser system. As a portion of the regeneration of the surveillance procedures, the surveillance methodology as well as the selection and acceptance criteria for individual ice baskets will be reviewed for compliance with both the T/S and the analytical bases of the Ice Condenser system.

Failed Component Identification

Not applicable.

Previous Similar Events

316/86-011-01