CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9806100434 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 98-015-01:on 980312,ice weight requirements potentially not met,was identified.Caused by nonconservative assumption in software program.Ice condensers for both units will be melted out & reloaded w/fresh ice.W/980605 ltr.

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American Electric P
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AEP
AMERICAN
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POWER

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:

98-015-01

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 4
Donald C. Cook Nuclear Plant - Unit 1	50-315	

TITLE (4)
Ice Weight Requirements Potentially Not Met Due to Nonconservative Assumption In Software Program

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
03	12	98	98	-- 015 --	01	06	05	98	Cook - Unit 2	50-316
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	5
POWER LEVEL (10)	0

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)		73.71©
	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, 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 12, 1998, with Unit 1 and Unit 2 in Mode 5, plant personnel identified that the Ice Condenser Technical Specification required ice basket weights were not being adequately maintained. 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 maintain the required amount of ice in each ice basket was determined to be a condition found while the reactor was shutdown, which, if it had been found during operation, may have resulted in the plant being in an unanalyzed condition, and, in accordance with 10CFR50.72(a)(2)(i), an ENS notification was made at 1930 hours EST that day. 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 condition was determined to be work practices, in that computer code programmers failed to adequately incorporate Technical Specification requirements in the software code used to identify for refilling those ice baskets with a weight significantly below the Technical Specification requirement. 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.

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.

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 another condition related to the Ice Condenser, 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 each ice basket contained at least 1333 pounds of ice. Low weight ice baskets were inadvertently excluded from the analysis and were not identified as needing to be refilled with ice.

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.

Description of Event (cont'd)

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 ice baskets. The 20 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.

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.

Additional ice basket weights were acquired and added to the NSLICE input data sets, which represented baskets from all rows, including baskets with structural interferences from the intermediate deck structure. As more rows of baskets were added to the weighing program, baskets with low ice weights were input to the NSLICE program. After all the data sheets were entered into the computer, the NSLICE program was run to check as-found or as-left operability of the Ice Condenser. However, the NSLICE program automatically disregards input ice basket weights of less than 800 pounds. Therefore, ice baskets with a weight of less than 800 pounds were not listed in the output of the NSLICE program as needing to be refilled, and were omitted from the analysis of ice basket weight averages.

Plant personnel performing the weighing program did not use the input data sheets to determine if baskets were underweight. They instead used alternate output data that presents a graphical picture of basket weights in each bay. However, the bay data sheets show only filtered data, i.e., baskets less than 800 pounds are not displayed. In addition to the NSLICE program's failure to include these baskets in the statistical analysis, these underweight baskets were also not flagged for refilling up to the proper ice basket weight. In some cases, the Ice Condensers were returned to service with underweight baskets.

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

Cause of Event

The root cause of this condition is work practices, in that NSLICE code programmers failed to adequately incorporate Technical Specification surveillance requirements in the software code.

A contributing cause of this condition is written communication deficiencies, specifically the lack of procedural controls accurately depicting the Technical Specification 4.6.5.1.b.2 acceptance criteria and utilization of the NSLICE software program.

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 ice baskets existed which contained less than 1333 pounds of ice. 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.

Failed Component Identification

Not Applicable

Previous Similar Events

315/86-011-01