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)

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Cook Nuclear Plant Unit 1	50-315	1 of 5

TITLE (4)

Defective and Missing Ice Condenser Basket Welds Represents Unanalyzed Condition, and 10 CFR Part 21 Report

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
06	06	98	98	--	032	-- 00	07	30	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)	00	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)	X 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. Frank Pisarsky, Mechanical Component Engineering Manager	616-465-5901, x2607

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 June 23, 1998, with Unit 1 in Cold Shutdown, it was determined that the aggregate effect of missing and defective welds on the bottom cross bar and bottom grid structure of multiple ice condenser ice baskets constituted an unanalyzed condition. Preliminary analysis had previously indicated that the presence of defective welds on the bottom cross bar might be acceptable, as long as the ice basket bottom maintained its original geometry. During the inspection of the Unit 1 ice baskets, however, it became apparent that in addition to defective welds, welds were also missing. This was determined to constitute an unanalyzed condition and an ENS notification was made at 1019 hours EDT under 10CFR50.72(b)(2)(i). This LER is submitted in accordance with the requirement of 10CFR50.73(a)(2)(ii) for an unanalyzed condition discovered while shutdown, as well as to fulfill the requirements of 10CFR21.21(c)(3)(ii) for defective components.

This condition was determined to result from a lack of manufacturing quality oversight by the original equipment manufacturer (OEM) and the OEM's vendors, poor welding techniques and improper ice basket handling during weighing activities. The bottom rim of each ice condenser ice basket is being removed for inspection and repair of the welds as necessary.

This condition was evaluated, and it was determined that the potential safety significance of this condition was bounded by the analysis performed by Westinghouse for LER 315/98-006-02, which dealt with the potential for up to 60 baskets to be unpinned in Modes 3 and 4. In accordance with that analysis, the safety significance of the identified damage to the ice baskets is minimal.

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

CONDITION PRIOR TO EVENT

Unit 1 was in Mode 5, Cold Shutdown
Unit 2 was in Mode 5, Cold Shutdown

DESCRIPTION OF EVENT

On June 6, 1998 while performing in situ visual inspections of the Unit 1 ice condenser ice basket bottom cross hold-down bar welds, Quality Control (QC) personnel noted cracks on the bar fillet welds. Subsequent to finding these cracks, QC Personnel inspected a total of 1237 ice basket bottoms in Unit 1 and found 12 bottoms with cracked welds. The design drawing of the vendor that supplied the ice baskets, Westinghouse Electric Company, requires a total of 4 hold-down bar welds per basket. Out of a total of 4948 hold-down bar welds inspected, QC Personnel noted that 5 hold-down bar welds were missing.

In addition to the hold-down bar welds, QC Personnel performed a serviceability inspection of the end grid bar assembly on the ice basket bottoms. An initial inspection of 70 end grid bar assemblies revealed that at least 4 welds were missing on each of the seventy end grid assemblies. The vendor drawing requires a total of 24 welds on each end grid assembly. Numerous end grid assemblies also had individual grid bars within the assembly that were damaged, however, that damage is not included in this LER as ice basket damage was reported in LER 98-008-01. After evaluating the aggregate effect of the defective and missing welds found in the grid assembly and the cross bar on previous engineering analyses, it was determined that the potential for an unanalyzed condition existed.

CAUSE OF EVENT

The cause of the missing welds was the lack of manufacturing quality oversight by the original equipment manufacturer (OEM), Westinghouse Electric Company, and the OEM's vendors. Contributing causes to the event was poor compliance by the OEM's vendors with design drawings, and poor manufacturing practices by the OEM's vendors.

The defective welds were caused by incomplete fusion caused by improper welding techniques. A combination of poor electrode angle, improper welding parameters and inadequate weld joint cleaning resulted in incomplete fusion defects in some of the hold-down bar welds.

The broken welds are attributable to improper handling of the ice baskets during weighing activities. The baskets had been dropped causing impact loading, forced up from below with hydraulic rams, and pulled vertically up from the top of the ice basket. These activities, presumably carried out in an effort to free stuck baskets, were uncontrolled and not in compliance with current work practices.

ANALYSIS OF EVENT

In accordance with 10 CFR 21.21(c)(3)(ii) and 10CFR50.73(a)(2)(ii), the following information is submitted to fulfill both Part 21 reporting requirements and Licensee Event Report requirements.

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 covering an arc of

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ANALYSIS OF EVENT (cont'd)
approximately 300 degrees of the perimeter of the containment. The annular compartment consists of 24 bays containing 81 cylindrical ice baskets per bay, positioned in a vertical array of columns. Each ice basket is approximately 12 inches in diameter and 48 feet long, filled vertically with borated ice. The function of the ice condenser is dependent upon the quality and distribution of the ice mass within the 1,944 baskets of the Ice Condenser.

The major constituent of the ice condenser is the mass of sodium tetraborate ice stored within the baskets inside the compartment. The sodium tetraborate solution produced by the melting ice absorbs and retains iodine released during a postulated design basis accident (LOCA) and serves as a heat transfer medium and neutron poison for reactivity control following the accident. 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.

To perform their design basis function, the ice baskets are required to withstand design loads and are restrained to ensure they do not eject upward out of the ice bed during design basis accident blowdown forces. Upward movement of the baskets has the potential to open bypass flow routes, impact and damage other ice condenser equipment, or cause ejection out of the ice condenser, becoming a missile inside containment. The basket restraint is achieved by a U-bolt arrangement connected to the cross bar and grid configuration on the bottom of the ice basket. The vertical portion of the baskets is substantially open to accommodate heat transfer to the borated ice. The baskets are designed not to collapse, which could cause adjacent or additional ice basket columns to collapse, resulting in excessive flow passageway blockage, bypass flow routes, or undefined heat transfer geometry.

On June 23, 1998 an ENS notification was made at 1019 hours EDT to report defective and missing welds found during an inspection on the Unit 1 ice condenser basket bottom cross bar and bottom basket grids. The bottom cross bar and grid configuration is safety significant in that this arrangement contributes to the prevention of the basket being ejected by blowdown forces during design basis accidents. Preliminary analyses had indicated that the presence of defective welds on the bottom cross bar might be acceptable, however, the aggregate affect of missing and defective welds on both the bottom cross bar and bottom grid structure was determined to constitute an unanalyzed condition. This condition is therefore reportable under 10 CFR 50.73(a)(2)(ii).

Cracking in the ice basket bottom hold-down bar welds was first discovered in 1992. The testing and analysis performed by the Design Engineering group in 1992 concluded that the ice basket bottom assembly would perform its intended safety function with cracked welds if the ice basket bottom maintained its original geometry. The analysis showed that the ice basket bottom rim lip and the frictional forces from the cracked weld would prevent the ice basket from becoming a missile when subjected to design loads.

In 1998, the NRC questioned the acceptance of the testing and analysis performed in 1992, because design bases lateral loads had not been considered. The 1992 ice basket bottom calculation was re-performed to include horizontal and lateral seismic loading on the ice basket bottom rim. In validation of a calculation assumption, the grid assembly welds were inspected and found to be either missing or cracked. Based on the conclusions from revised analyses performed on the ice basket bottom rim, and the discovery of the missing and cracked welds in the grid assembly, it was determined that during a design basis accident (DBA) and design basis earthquake (DBE), the uplift forces on the baskets might be sufficient to cause ice baskets ejection. Previous submittals which reported ice basket concerns were reviewed. It was determined that the analysis performed by Westinghouse for LER 315/98-006-02 is the bounding analysis for ice basket damage and deficiencies. LER 315/98-006-02 reported a potential condition wherein up to 60 ice baskets could have been unpinned from the lower support beam at the same time in Modes 3 and 4. The analysis performed for this condition ultimately bounded the potential for ice basket ejection due to basket damage, insufficient number of screws at the coupling connections, and damaged or defective bottom assembly welds. The analysis concludes that the safety significance of these conditions is minimal.

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ANALYSIS OF EVENT (cont'd)
The condition has also been determined to be reportable under 10 CFR Part 21 since the defective and missing welds can be attributed to be defects in the manufacturing process of the ice baskets. It is expected that similar conditions will be found in the Unit 2 Ice Condenser baskets.

10 CFR 21.21(c)(3)(ii) requires a written report within 30 days following receipt of the information by the responsible corporate officer on the identification of a defect or failure to comply. The written report is required to include the following information per 10 CFR 21.21(c)(4):

(i) Name and address of the individual informing the Commission:

John Sampson
Site Vice President, Nuclear Generation Group
American Electric Power Company
500 Circle Drive
Buchanan, MI 49107-1395

(ii) Identification of the facility, activity, or component supplied which fails to comply or contains a defect:

Donald C. Cook Nuclear Plant, Unit 1
American Electric Power Company
Unit 1 Ice Condenser Basket

(iii) Identification of the firm constructing the facility or supplying the basic component which contains the defect:

Westinghouse Electric Company
Westinghouse Energy Center
4350 Northern Pike
Monroeville, PA 15146

(iv) Nature of the defect and the safety hazard which is created or could be created by such defect:

The hold-down bar welds are welded during the manufacturing process of the ice basket bottoms. These welds are structural welds that are part of the ice basket uplift anchorage assembly. The uplift anchorage assembly prevents the ice basket from becoming a missile when subjected to the uplift forces associated with gases passing through the ice condenser during a DBA. The purpose of the hold-down bar welds is to transfer the uplift forces induced on the ice basket bottom to the hold-down bar that is attached to the structural support steel via U-bolts and a pin. The purpose of the end grid assembly is to provide stability and prevent the ice basket bottom rim from becoming oval when subjected to lateral forces associated with a DBA.

The defective and missing welds found on the basket bottom cross bar and basket bottom grid assembly were analyzed and it was determined that the defective welds could potentially create a safety hazard by causing the basket to lift out of the ice bed, becoming a missile inside containment. Bypass flow of the ice condenser or an undefined heat transfer geometry could potentially occur, constituting an unanalyzed condition, which could potentially limit the ice condenser's ability to mitigate peak containment pressure from a LOCA or MSLB.

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ANALYSIS OF EVENT (cont'd)

(v) The date on which the information of such defect was obtained:

June 23, 1998

(vi) In the case of a basic component which contains a defect, the number and location of all such components in use at the facility subject to the regulations in this part:

The Donald C. Cook Nuclear Plant Unit 1 has 1944 Ice Condenser ice baskets.

(vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been taken or will be taken to complete the action:

This information is provided under the "Corrective Action" section of this LER.

(viii) Any advice related to the defect that has been, is being or will be given to purchasers or licensees:

None

CORRECTIVE ACTIONS

The bottom rim of each of the 1,944 ice condenser ice baskets is being removed for inspection and repair the welds as necessary.

The Quality Assurance Supplier Performance Section and the Materials Department receipt inspection personnel have been briefed regarding this condition. Future receipt inspections will specifically verify that the required welds exist.

Baskets that are repaired will be welded using the American Electric Power welding procedures. An OEM vendor, under the guidance and quality assurance program of the OEM, will fabricate all new ice baskets and ice basket components.

The procedure that governs ice basket weighing is being transferred from Engineering to Maintenance to ensure that weighing activities, typically carried out by contract personnel, have adequate supervision. The surveillance procedures which govern ice condenser activities are being reviewed and revised. The review will consider the adequacy of the guidance for performing surveillances, and the required qualification and quality techniques for personnel performing the surveillances, among other things. This will be completed prior to either unit's ice condenser being declared operable. For additional information pertaining to the review of the ice condenser surveillance program, please see LER 315/98-004-02.

FAILED COMPONENT IDENTIFICATION

None

PREVIOUS SIMILAR EVENTS

LER 315/98-008-01
LER 315/98-004-02