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DUKE POWER

May 30, 1990

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Unit 1 & 2
Docket No. 50-369
Licensee Event Report 369/89-07

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/89-07 concerning improper screws that were installed in the bottom of ice condenser baskets. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Tony L. McConnell

T.L. McConnell

DVE/ADJ/cbl/

Attachment

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MC-815-04
(20)

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)
McGuire Nuclear Station, Unit 1	0 5 0 0 0 3 6 9	1 OF 0 6

TITLE (4) Improper Screws Were Installed In The Bottom Of Ice Condenser Baskets Because Of Improper Material Selection

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 4	1 7	9 0	9 0	- 0 0 7	- 0 0	0 5	3 0	9 0	McGuire, Unit 2	0 5 0 0 0 3 7 0
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	1 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)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	X 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
	AREA CODE
Alan Sipe, Chairman, McGuire Safety Review Group	7 0 4 — 8 7 5 - 4 1 8 3

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 October 18, 1988, during routine inspection, a Unit 1 Ice Condenser Basket was found with the bottom screws missing. At that time, a Problem Investigation Report (PIR) was initiated to resolve the problem. Subsequently, work requests were written to inspect and repair all Ice Condenser Baskets in Units 1 and 2. Number 10-16, type 410 stainless steel screws were used for these repairs. Screws were replaced in the bottom or intermediate section of ten baskets in Unit 1 and one basket in Unit 2. On March 30, 1990, during an evaluation being performed by Design Engineering personnel, it was discovered that the original equipment supplier (Westinghouse) had specified specially treated number 10-32, AISI 1022 carbon steel screws for use in the bottom and intermediate sections of the baskets. A review of the shear and bending forces during seismic and design basis events showed that the number 10-16, type 410 stainless steel screws were unacceptable as used. A PIR was initiated to resolve the problem. All stainless steel screws were replaced in the bottom and intermediate sections of the ten Unit 1 baskets and temporary reinforcing cables were added to support the one Unit 2 basket until the screws can be replaced. This event is assigned a cause of Installation Deficiency because of improper material selection. Units 1 and 2 have been in all modes of operation during the time the inappropriate screws were installed.

EVALUATION:

Background

The primary function of the Ice Condenser [EIIS:BC] (NF) system is the absorption of thermal energy released abruptly in the event of a Loss-Of-Coolant Accident (LOCA) for the purpose of limiting the initial peak pressure in Containment. A secondary function of the NF system is the further absorption of energy after the initial incident causing the Containment pressure to be reduced to and held at a lower level for a period of time.

The Ice Condenser is subdivided into 24 bays which contain 1944 ice baskets [EIIS:BSKT] that are 12 inches in diameter and 48 feet long. Each bay consists of 9 columns and 9 rows of ice baskets. The ice columns are composed of four basket sections approximately 12 feet long each, filled with borated flake ice.

The baskets are formed from a 14 gage (.075) perforated sheet metal. The perforations are 1.0 inch x 1.0 inch holes spaced on a 1.25 inch center. The radius at the junction of the perforation is 0.0625 inch. The ice basket material is made from ASTM-569 which is a commercial quality, low carbon steel. The basket component parts are corrosion protected by a hot dip galvanized process. The perforated basket assembly has an open area of approximately 64 percent to provide the necessary surface area for heat transfer between the steam/air mixture and the ice to limit the Containment pressure within design limits. Interconnection couplings and stiffening rings are located at the bottom and at 6 foot levels of each basket section respectively. The bottom coupling and stiffening ring are cylindrical in shape and approximately 3 inches high with a rolled internal lip. The lip provides stiffening to the basket. These couplings are attached to the ice basket by locking steel metal screws and basket detents.

The basket sections are assembled into the lattice frames to form a continuous column of ice 48 feet high. The bottom wire mesh is designed to allow water to flow out of the basket and has attachments for mechanical connection to the lower support structure to prevent uplift of the ice baskets during a LOCA. The lattice frames provide only lateral ice basket support at intervals corresponding to the stiffened ice basket sections. The vertical loads of the ice and ice basket are transmitted by the basket to the lower support structure. The attachment between the ice basket and the lower support structure is disengaged to permit weighing of the baskets. Provision is made for lifting and weighing the whole length of selected columns for surveillance purposes.

Technical Specification (TS) 3/4.6.5.1 specifies that the ice bed shall be operable with:

a. The stored ice having a boron concentration of at least 1800 ppm boron as sodium tetraborate and pH of 9.0 to 9.5,

b. Flow channels through the Ice Condenser,

c. A maximum ice bed temperature of less than or equal to 27°F,

d. A total ice weight of at least 2,466,420 pounds at a 95 percent level of confidence, and

e. 1944 ice baskets.

These conditions are applicable in Mode 1 (Power Operation), Mode 2 (Startup), Mode 3 (Hot Standby), and Mode 4 (Hot Shutdown). The TS action statement states that with the ice bed inoperable, restore the ice bed to operable status within 48 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

Description of Event

During previous Ice Condenser maintenance, the ice baskets were disassembled at the base to remove foreign material. Because of this practice, it was discovered that some baskets had not been reassembled properly and that attachment pins and screws were missing from the bottom and intermediate couplings. As a result of this discovery, PIR 1-M88-0255 was initiated on October 18, 1988 to address the problem. The proposed resolution of the problem was to install pins and screws in the bottom and intermediate couplings of the baskets which had been found deficient and to perform an inspection of all ice baskets for missing pins or screws.

Consequently, work requests 501372 and 501948 were generated to inspect all ice baskets to ensure that the bottoms were properly attached and that all necessary screws were installed. During the performance of the repair, McGuire Engineering Support personnel made a decision to replace all missing screws with number 10-16, type 410 stainless steel screws. A previous McGuire Variation Notice had authorized use of the stainless steel screws in one part of the ice baskets. Since all of the metal screws used in assembly of the ice baskets were originally the same, McGuire Engineering Support personnel involved believed that the stainless steel screws approved by the variation notice were also appropriate for use in any part of the ice basket assembly. Screws were subsequently replaced in the bottom or intermediate sections of ten baskets in Unit 1 and one basket in Unit 2.

On February 19, 1990, during ice unloading operations on Unit 1, Basket 7-8 in Bay 3 was dropped and damaged while attempting to lower it back to the normal position. Because of this damaged basket, Design Engineering personnel began performing an engineering evaluation of Ice Condenser operability. During the course of this evaluation the Design Engineering personnel involved also received queries from McGuire personnel concerning commercial grade screws for Ice Condenser use.

Because of the questions about commercial grade and the evaluation of Ice Condenser basket structure, Design Engineering personnel discovered the error in the type of screw used in the previous repairs.

A review of the shear and bending forces applied to the basket couplings during seismic and design basis events showed that the number 10-16, type 410 stainless steel screws were unacceptable for use in the bottom or intermediate couplings.

On April 17, 1990, PIR 1-M90-0107 was initiated to resolve the problem. As a result, all stainless steel screws were replaced in the bottom or intermediate couplings of the baskets in Unit 1 Ice Condenser. Stainless steel reinforcing cables were added to prevent movement of the basket in question in the Unit 2 Ice Condenser until the screws can be replaced.

Conclusion

This event is assigned a cause of Installation Deficiency because of improper material selection. Self tapping stainless steel screws (number 10-16, type 410 stainless steel) were used for the ice basket couplings in McGuire Unit 1 and Unit 2 Ice Condensers. The decision to use the stainless steel screws was based on the fact that a previous McGuire Variation Notice had been initiated to allow the use of number 10-16, type 410 stainless steel screws to hold stiffener rings in baskets replacing damaged rings. No other reference was noted on the Manufacturers Drawing as to the material required for screws for the ice baskets and; therefore, the wrong material was chosen when replacing the missing coupling screws. A review of the Design Report for Ice Condenser baskets showed that the original equipment supplier (Westinghouse) had specified carbon steel screws (number 10-32, AISI 1022 carbon steel) for the Ice Condenser basket couplings.

The basket assembly drawing (MCM 1201.17-0596 sh. 001) does not show a material specification for these screws. During Design Engineering's most recent review of the damaged basket, a Westinghouse stress analysis was discovered which indicated that the tensile strength of the 10-32, AISI 1022 carbon steel screws was 140 KSI. The type 410 stainless steel screws used as replacement fasteners have a tensile strength of 75 KSI.

Based on the additional information provided by the Westinghouse stress analysis, a review of the shear and bending forces applied to the basket couplings during seismic and design basis events was performed. The review showed that the 410 stainless steel screws were unacceptable. The Ice Condenser was therefore inoperable while the 410 stainless steel screws were installed.

Work requests 97639 and 503532 were initiated to implement corrective actions. The screws were changed in the bottom or intermediate couplings to the original carbon steel screws for the baskets in Unit 1. Stainless steel support cables were added to support the basket in Unit 2 until the screws can be replaced. These actions corrected the problem by preventing the possibility of the ice baskets moving out of the Ice Condenser matrix. Subsequently, Unit 1 and Unit 2 Ice Condensers have been declared operable.

A review of the Operating Experience Program database for the past twenty-four months prior to this event revealed no events involving TS violations because of Installation Deficiencies caused by improper material selection. Therefore, this event is not considered to be recurring.

This event is not Nuclear Plant Reliability Data System (NPRDS) reportable.

There were no personnel injuries, radiation overexposures, or uncontrolled releases of radioactive material as a result of this event.

CORRECTIVE ACTIONS:

Immediate: None

Subsequent:

1) Work Request 97639 was initiated to replace all improper screws in the of intermediate and bottom couplings of the ice baskets in Unit 1 Ice Condenser.

2) Work Request 503532 was initiated to repair basket 7-6 in bay 10 of Unit 2 Ice Condenser.

3) Mechanical Maintenance personnel replaced all stainless steel screws in the intermediate and bottom couplings of ice baskets in the Unit 1 Ice Condenser with the proper type screws.

4) Mechanical Maintenance personnel installed temporary stainless steel support cables around basket 7-6 in bay 10 of Unit 2 Ice Condenser.

Planned:

1) Mechanical Maintenance personnel will install proper type screws in the bottom coupling of basket 7-6 in bay 10 of Unit 2 Ice Condenser and the temporary support cables will be removed during the next refueling outage.

2) Design Engineering personnel will initiate an editorial change to drawing MCM 1201.17-0596 sh. 001 to specify the special material required for the screws used in the Ice Condenser basket couplings.

SAFETY ANALYSIS:

The safety evaluation of the McGuire Ice Condensers is based on having a required number of ice baskets operable with a sufficient quantity of ice. The presence of the stainless steel screws in the bottom or intermediate coupling of the ice baskets did not result in any degradation of Ice Condenser conditions during normal operation. The effect of the inappropriate screws was that during a postulated LOCA plus Seismic Event a loaded ice basket could possibly have moved out of the Ice Condenser matrix. The movement could change the flow of fluid through the Ice Condenser, permit increased bypass of fluid around the Ice Condenser, or prevent the ice in the subject basket or adjacent baskets from contributing to the condensing and cooling of the fluid released during a LOCA. Additionally, movement of a loaded ice basket out of the Ice Condenser structure would represent a missile with possible unanalyzed safety questions. However, while the condition is not analyzed, potential damage to other safety related structures should be minimal.

At no time during the period when the inappropriate screws were installed was the Ice Condenser system challenged. No seismic events occurred and no movement of the

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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)

subject baskets occurred. Also, during this time period, the Containment Spray [EIIS:BE] (NS) system, the Safety Injection [EIIS:BQ] (NI) system, and other safeguard systems were available to mitigate possible problems during a LOCA to control containment pressure.

This event did not affect the health and safety of the public.