

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 7 1 0	PAGE (3) 1 OF 0 1 5
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TITLE (4) Both Trains of the Unit 2 Component Cooling System were Inoperable Due to External Causes

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)
									N/A		0 5 0 0 0
0 9	1 7	8 8	8 8	0 1 1	0 0 1	0 1	0 1	9 8 8			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	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 20.405(a)(1)(ii)	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 20.405(a)(2)(i)	<input type="checkbox"/> 20.405(a)(2)(ii)	<input type="checkbox"/> 20.405(a)(2)(iii)	<input type="checkbox"/> 20.405(a)(2)(iv)	<input type="checkbox"/> 20.405(a)(2)(v)
	<input type="checkbox"/> 20.405(a)(2)(vi)	<input type="checkbox"/> 20.405(a)(2)(vii)	<input checked="" type="checkbox"/> 20.405(a)(2)(viii)	<input type="checkbox"/> 20.405(a)(2)(ix)	<input type="checkbox"/> 20.405(a)(2)(x)	<input type="checkbox"/> 20.405(a)(2)(xi)	<input type="checkbox"/> 20.405(a)(2)(xii)	<input type="checkbox"/> 20.405(a)(2)(xiii)	<input type="checkbox"/> 20.405(a)(2)(xiv)	<input type="checkbox"/> 20.405(a)(2)(xv)	<input type="checkbox"/> 20.405(a)(2)(xvi)
	<input type="checkbox"/> 20.405(a)(2)(xvii)	<input type="checkbox"/> 20.405(a)(2)(xviii)	<input type="checkbox"/> 20.405(a)(2)(xix)	<input type="checkbox"/> 20.405(a)(2)(xx)	<input type="checkbox"/> 20.405(a)(2)(xxi)	<input type="checkbox"/> 20.405(a)(2)(xxii)	<input type="checkbox"/> 20.405(a)(2)(xxiii)	<input type="checkbox"/> 20.405(a)(2)(xxiv)	<input type="checkbox"/> 20.405(a)(2)(xxv)	<input type="checkbox"/> 20.405(a)(2)(xxvi)	<input type="checkbox"/> 20.405(a)(2)(xxvii)

LICENSEE CONTACT FOR THIS LER (12)		TELEPHONE NUMBER	
NAME	AREA CODE	NUMBER	
Steven E. LeRoy, Licensing	7 1 0 4	3 1 7 1 3 1 6 2 1 3 1 3	

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)									
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On 09/17/88 at 0116, Component Cooling (KC) system Heat Exchanger (HX) 2A was taken out of service because the Nuclear Service Water (RN) system side of the HX was being cleaned. At 1550, while Performance personnel were performing a retest of KC HX 2A, the pressure drop across KC HX 2B exceeded the operability limit of 8.8 psid. Operations (OPS) entered Unit 2 into the Action Statement of Technical Specification (TS) 3.0.3 because both trains of the KC system were inoperable. At 1621, Performance successfully completed the retest of KC HX 2A, OPS returned it to operable status, and Unit 2 was exited from the Action Statement of TS 3.0.3. Between 1630 and 1700, Performance and OPS personnel performed a flush of KC HX 2B, which lowered the pressure drop across the HX to 8.24 psid. At 2200, KC HX 2B was taken out of service to be cleaned. On September 21, 1988 at 0420, KC HX 2B was returned to service after cleaning. This event is assigned a cause of External Cause because the in-operability of the KC HXs was caused by excessive buildup of environmental debris on the RN system side of the HX. It has not been determined what environmental factor caused the excessive buildup of environmental debris.

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## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
McGuire Nuclear Station, Unit 2	0500370	88	011	010	02	OF	05

TEXT (if more space is required, use additional NRC Form 364A's) (17)

INTRODUCTION:

On September 17, 1988 at 0116, Component Cooling (KC) system [EIIS:CC] Heat Exchanger (HX) 2A [EIIS:HX] was taken out of service because the Nuclear Service Water system [EIIS:BI] side of the HX was being cleaned. At 1550, while Performance personnel were performing a retest of KC HX 2A, the pressure drop across KC HX 2B exceeded the operability limit of 8.8 psid. Operations Control Room personnel entered Unit 2 into the Action Statement of Technical Specification (TS) 3.0.3 because both trains of the KC system were inoperable. At 1621, Performance personnel successfully completed the retest of KC HX 2A, Operations Control Room personnel returned it to operable status, and Unit 2 was exited from the Action Statement of TS 3.0.3. Between 1630 and 1700, Performance and Operations personnel performed a flush of KC HX 2B, which lowered the pressure drop across the HX to 8.24 psid. At 2200, KC HX 2B was taken out of service to be cleaned. On September 21, 1988 at 0420, KC HX 2B was returned to service after cleaning.

Unit 2 was in Mode 1, Power Operation, at 100% power at the time of this event.

This event has been assigned a cause of External Cause because the in-operability of the KC HXs was caused by excessive buildup of environmental debris on the Nuclear Service Water system side of the HX. It has not been determined what environmental factor caused the excessive buildup of environmental debris.

EVALUATION:Background

The KC system provides cooling water to the Residual Heat Removal (RD) system [EIIS:BP] HXs and pump mechanical seals following a Loss of Coolant Accident (LOCA). The ND system provides long term core cooling capability following a LOCA. The Nuclear Service Water (RN) system provides cooling water to the tube side of the KC HXs. The RN system is supplied from Lake Norman.

The KC HXs are shell and tube type HXs manufactured by Delta Southern and have a history of problems with environmental debris accumulation on the RN system side of the HX. This environmental debris consists mostly of mud and some bacteria and algae. The environmental debris clogs the tubes of the HX and degrades the heat transfer capability. A pressure drop of 8.8 psid across the RN system side of the HX has been determined by Design Engineering personnel to be the upper limit at which the HXs could be considered to perform as designed. The HXs are cleaned by opening the HX and removing the environmental debris or by increasing the amount of RN system flow to attempt to flush the environmental debris.

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		88	011	00	03	OF	05

TEXT (If more space is required, use additional NRC Form 3884's) (17)

TS 3.0.3 requires that if a Limiting Condition for Operation cannot be met (i.e. both trains of a safety related system inoperable), within 1 hour action shall be taken to place the unit in a mode in which the TS does not apply.

Description of Event

On September 17, 1988 at 0166, KC HX 2A was declared inoperable by Operations Control Room personnel for Mechanical Maintenance (MNT) personnel to clean the RN system side (tube side) of the HX. While monitoring the Performance Data Acquisition Computer, Performance personnel had determined that the pressure drop across the HX was approaching the operability limit of 8.8 psid and needed to be mechanically cleaned.

On September 18, 1988 at approximately 1400, Performance personnel were testing KC HX 2A after MNT personnel had completed the cleaning. This test included monitoring the Performance Data Acquisition Computer for flow rate and pressure drop across the RN system side of the HX. While monitoring the parameters for KC HX 2A, Performance personnel observed that KC HX 2B was consistently displaying a measured pressure drop of 8.88 psid. At 1550, Performance personnel notified Operations Control Room personnel of the in-operability of KC HX 2B and Operations Control Room personnel declared KC HX 2B inoperable and entered Unit 2 into the Action Statement of TS 3.0.3. This action was necessary because both trains of the KC system and ND system were now inoperable. At 1605, Performance personnel had completed the test of KC HX 2A and determined it to be operable. Operations Control Room personnel declared KC HX 2A operable and exited Unit 2 from the Action Statement of TS 3.0.3 at 1621.

From approximately 1630 to 1700 on September 18, 1988, Operations personnel performed a flush of KC HX 2B and lowered the pressure drop across the RN system side of the HX from 8.88 psid to 8.24 psid. This made the pressure drop across KC HX 2B to be within the operable range, but only by a small margin. At 2200, Operations Control Room personnel declared KC HX 2B inoperable for MNT personnel to clean the HX. On September 21, 1988 at 0420, Operations Control Room personnel returned KC HX 2B to operable status after MNT personnel completed the cleaning and Performance personnel tested the pressure drop across the HX and found it to be acceptable.

Conclusion

This event has been assigned a cause of External Cause because the in-operability of the KC HXs was a result of accumulation of environmental debris on the RN system side of the HXs. Lake Norman water contains mud, bacteria, and algae and this environmental debris is circulated through the RN system and accumulates in the tubes of the KC HXs. During September, October, and November of every year, the environmental debris accumulation accelerates at an unpredictable rate and causes the need for the KC HXs to be flushed and/or cleaned on a repetitive basis.

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TEXT (If more space is required, use additional NRC Form 366A (1) (17))

During other times of the year the environmental debris accumulation is not as rapid and is much more predictable. It could not be determined by Performance, Chemistry, or Design Engineering personnel exactly what environmental factor has been causing this phenomenon. It is apparently related to the higher lake temperature during this time of the year. Chemistry personnel have determined that turbidity (light scattering characteristics of the particulate matter in a sample), bacteria content, and algae in the RN system are not significantly different than at other times of the year. Other speculation by Performance personnel has not manifested any conclusive evidence for the cause of the problem. Performance personnel are continuously monitoring the pressure drop across the KC HXs as a result of the problem with the environmental debris. Performance personnel monitor during normal day shift hours and Integrated Scheduling personnel monitor at night and on the weekends. This monitoring will continue until the current cycle of debris accumulation subsides.

Design Engineering personnel have completed a design study to evaluate the RN system for ways to control the environmental debris. The study determined that the only two feasible solutions to the problem are: 1) A closed loop RN system; or, 2) A large filter. It was determined by Design Engineering personnel that neither option is cost effective at present.

A review of past McGuire Licensee Event Reports (LERs) revealed one event of entering the Action Statement of TS 3.0.3 because of External Causes. LER 369/88-24 reported an event of entering the Action Statement of TS 3.0.3 because of excessive environmental debris in the Unit 1 KC HXs. Also, LER 369/87-31 reported entering the Action Statement of TS 3.0.3 when one train of the KC system did not pass a performance test while the other train was already inoperable because of maintenance. LER 370/87-22 reported an inadequate KC HX operability determination program. After that report was issued, the Process Control and Acquisition system was installed allowing Performance personnel the capability of continuously monitoring the KC HXs. There have also been non-reportable instances involving KC HX performance. Therefore, the environmental debris accumulation problem in the KC HXs is considered recurring because every year during the months of September, October, and November the KC HXs require repetitive cleaning because of excessive environmental debris buildup.

This event is Nuclear Plant Reliability Data System (NPRDS) reportable. A search of the NPRDS revealed numerous instances of KC HX fouling. It should be noted that all plants may not report HX fouling to the NPRDS unless TS limits were exceeded.

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TEXT (if more space is required, use additional NRC Form 365A's (17))

CORRECTIVE ACTIONS:

- Immediate: KC HX 2A was returned to operable status by Operations Control Room personnel and Unit 2 was exited from the Action Statement of TS 3.0.3.
- Subsequent:
- 1) KC HX 2B was cleaned by MNT personnel and successfully retested by Performance personnel and returned to operable status by Operations Control Room personnel.
  - 2) Performance has increased the frequency for KC HX flushing based on the pressure drop across the HX to prevent the environmental debris accumulation from causing HX in-operability.
  - 3) Performance has modified the Data Acquisition Computer to average the parameters monitored for more accurate information to allow for a better prediction of operability.
  - 4) A Steering Committee Task Force has been organized within Duke to address raw water problems at Duke's nuclear stations. The Committee's agenda includes addressing the problem of Heat Exchanger fouling.

Planned: None

SAFETY ANALYSIS:

The ND system provides long term core cooling following a LOCA. The AC system supplies cooling water to the ND system. With the KC system inoperable, the long term core cooling capability of the ND system is degraded. For approximately 30 minutes on September 18, 1988, both trains of the KC system were inoperable. However, during this time, KC HX 2A was being tested for operability and was in service and the test was completed successfully. Therefore, if necessary, KC HX 2A could have performed the design function of removing heat from the KC system. Also, KC HX 2B was only 0.08 psid above the operability limit and Design Engineering personnel consider the 8.80 psid operability limit to be a conservative value. Therefore, KC HX 2B should have been able to remove heat from the KC system if necessary, although in a slightly degraded condition. During the time Unit 2 was in the Action Statement of TS 3.0.3, there were no challenges to the heat transfer capability of the Unit 2 KC HXs.

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

This event is considered to be of no significance with respect to the health and safety of the public.



DUKE POWER

October 19, 1988

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

Subject: McGuire Nuclear Station, Unit 2  
Docket No. 50-370  
Licensee Event Report 370/88-11

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 370/88-11 concerning both trains of the Component Cooling system being inoperable. This report is being submitted in accordance with 10 CFR 50.73(a) (2) (i) (B). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Hal B. Tucker

SEL/351/sel/rmf

Attachment

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Mr. P.K. Van Doorn  
NRC Resident Inspector  
McGuire Nuclear Station

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