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

Subject: Oconee Nuclear Station
Docket Nos. 50-269,-270, -287
Licensee Event Report 50-269/2000-02, Revision 00
Problem Investigation Process No.: 0-000-0933

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 269/2000-02, concerning operation with two trains of the Chilled Water System out of service. In this condition, the plant's Technical Specifications require entry into Technical Specification 3.0.3.

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,

W. R. McCollum, Jr.

Attachment

IE22

cc: Mr. Luis A. Reyes
Administrator, Region II
U.S. Nuclear Regulatory Commission
61 Forsyth Street, S. W., Suite 23T85
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Mr. D. E. LaBarge
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Mr. M. C. Shannon
NRC Senior Resident Inspector
Oconee Nuclear Station

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-1998)

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit 1	05000 - 269	1 OF 8

TITLE (4)
TS 3.0.3 Entry due to Control Room Cooling Chiller Refrigerant Leaks

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	09	00	2000	02	- 00	04	06	00	Unit 2	05000 - 270
									FACILITY NAME: Unit 3	DOCKET NUMBER: 05000 - 287

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
POWER LEVEL (10)	100%	20.2201(b)	20.2203(a)(2)(v)	X	50.73(a)(2)(i)(B)		50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)		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)		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)
L.E. Nicholson, Regulatory Compliance Manager	(864) 885-3292

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	KM	CHU	Y018	YES						

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 9, 2000, all three Oconee Units were operating at 100% power. At 0935 Operations swapped from the "B" Control Room Air Conditioning Chiller to the "A" Chiller for routine monitoring of "A" Chiller. At 1000, the "A" Control Room Air Conditioning Chiller tripped. The "A" Chiller was restarted but tripped again. At 1027 the "B" chiller was restarted, but it tripped at 1035. Operations declared entry into Technical Specification 3.0.3 for all three units. At 1116 the NRC was notified per 10 CFR 50.72. At 1130 Operations began to decrease power.

Refrigerant leaks were found at tubing fittings on both chillers. Refrigerant was added to both chillers. The "B" and "A" Chillers were declared operable at 1246 and 1536, respectively.

Degraded copper tubing flares at filter/dryer connections on the chillers caused refrigerant leaks. The root cause was insufficient detail in the maintenance procedures to evaluate the flares. A lack of effective monitoring for refrigerant loss contributed to the event. The tubing has been replaced and enhancements are planned for leakage monitoring.

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

EVALUATION:

BACKGROUND

This event is reportable per 10CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specifications." This event placed Units 1, 2, and 3 in Technical Specification (TS) 3.7.16, Condition E, which requires entry into LCO 3.0.3.

Oconee Units 1 and 2 share a common Control Room, while Unit 3 has a separate Control Room.

The Oconee Control Room Area Cooling System (CRACS) [EIIS:VI] is composed of two sub-systems: The Control Room Ventilation System (CRVS) and the Chilled Water (WC) [EIIS:KM] system. The CRVS includes Air Handling Units (AHUs) [EIIS:AHU] (i.e. fans, cooling coils, and dampers), ductwork, etc. to maintain a suitable environment for equipment and operating personnel in the Control Rooms and the associated Cable Rooms, Electrical Equipment Rooms, and areas called the Control Room Zone. During normal operation CRACS must maintain the Control Room Zone temperatures within the limits assumed as initial conditions within the post-accident analyses. Provided that the temperatures within these areas are within the assumed limits at the start of an event, the CRACS cooling function is not required during the first 18 hours of an event.

WC supports the CRACS for both Control Rooms. The major components of the WC System are chillers [EIIS:CHU], pumps, valves, piping, and controls. The main piping header is shared between units and is common to both trains. The two chillers and water circulation pumps are divided into two trains located in the Turbine Building basement. The WC piping divides into two trains at each pair of AHUs.

The "A" and "B" chillers are YORK model YS DC DB S3 CNA0 rotary screw chillers. They were installed by minor modification ONOE-4326 in March 1992 as replacements for previous models.

On March 27, 1999, Oconee implemented Improved Technical Specifications (ITS). One change from the previous Customized Technical Specifications was that ITS 3.7.16 incorporated a

limiting condition for operation for CRACS. If one train of either the CRVS (air side) or the WC (water side) of the system is inoperable, a 30 day action statement applies. However, if both trains of either CRVS or WC are inoperable on the same Control Room, ITS 3.0.3 applies. ITS also includes a surveillance requirement to verify the Control Room temperature is less than or equal to 80F once every 12 hours. If the Control Room temperature exceeds 80F, a 7-day action statement applies.

Prior to this event, all three units were operating at 100% power. Chilled Water had been secured to AHU-22, one of two CRVS AHU's serving the Unit 1 Equipment Room, to replace a control valve. AHU-22 had been declared out of service, which placed Unit 1 in TS 3.7.16 Condition "A". No other safety systems or components were out of service that would have contributed to this event.

EVENT DESCRIPTION

At 0935 on March 9, 2000, Operations swapped from the "B" Chiller to the "A" Chiller in order to do routine monitoring of "A" Chiller.

At 1000 Operators in the Control Room received an alarm indicating Chiller Panel trouble. A Non-Licensed Operator was sent to investigate and found that the "A" Chiller had tripped due to low evaporator pressure. The Maintenance HVAC crew was notified.

At 1020, the "A" Chiller was restarted, but tripped approximately one minute later. At 1021, Operations entered TS 3.7.16, Condition "B" due to one train of WC being out of service.

The "B" Chiller was started at 1027. At 1035 the "B" Chiller tripped. The "B" Chiller was restarted at 1039 but tripped again at 1055. Operations declared entry into TS 3.0.3 at 1035 for all three Oconee Units.

At 1116 the NRC was notified per 10 CFR 50.72.

At 1130 Operations began to decrease power on all three units in accordance with TS 3.0.3.

The "B" Chiller was restarted at 1129 in service mode. System Engineering was contacted to assist the HVAC crew. Both Chillers were found to be low on refrigerant and had small refrigerant leaks at tubing fittings associated with evaporator oil return filter dryers. The fittings on the "B" Chiller were tightened and refrigerant was added. The "B" Chiller continued to operate and was declared operable at 1246. TS 3.0.3 was exited.

At 1334, Operations began returning to 100% power.

At 1430 the "A" Chiller was started in service mode. The "A" Chiller tubing flares at the evaporator oil return filter dryers were cut off and new flares made. The fittings were tightened and refrigerant added. It was declared operable at 1536.

The chiller oil filter dryers are connected to the system by copper tubing with flared fittings. A root cause investigation team examined the condition of all the flared fitting connections and discovered that there was a significant variation in the conditions of the flared fittings (i.e. length of flared section, angle of flare, etc.). Some fittings had damage, such as nicks or gouges, on the flared mating surface.

The investigation also found that the oil filter dryers are replaced during annual Preventive Maintenance (PM) activities. The most recent PM on the "A" chiller was a quarterly PM performed on December 15, 1999. The most recent PM on the "B" chiller was a combined annual/quarterly PM on January 26, 2000. During these PMs proper refrigerant charge was verified and there was no indication of any refrigerant leaks on either chiller. At the time of the event, the "A" and "B" chillers had each operated approximately 1000 hours since these latest PMs.

CAUSAL FACTORS

There was insufficient detail in the maintenance procedure to assure that excessive tubing flare wear/deterioration would be detected and evaluated by visual inspection during annual chiller preventative maintenance. The maintenance activities require the fitting connections to be disconnected and reconnected for filter replacement. Maintenance technicians have been relying on leak

detection inspections after fitting reconnection to verify the fitting connection can provide a "leak free" joint.

Contributing to this cause was the fact that the established chiller operating and maintenance program did not effectively control the refrigerant charge. The following are specific examples of weaknesses in this program:

a) Chiller operating parameters are not adequately monitored, and/or evaluated at a frequency to detect and correct low refrigerant conditions in a timely manner. Refrigerant charge (level) is not directly measurable, but can be estimated based on system performance during operation. As a result of a previous similar event, a recommendation was made to revise Operations daily rounds sheets to monitor operating parameters that would indicate proper refrigerant charge. This recommendation was not adequately communicated to Operations, and, therefore was not implemented. Quarterly monitoring per the PM procedure was not adequate to prevent this event.

b) Data on the amount of refrigerant added to the Chillers has not been used for evaluation and/or trending of leaks.

c) Maintenance methods and techniques to detect small refrigerant leaks on the chillers are not defined by procedure. The methods and techniques used varied among technicians.

On August 13, 1999, a similar event occurred. The "B" Chilled Water pump tripped, resulting in a trip of the "B" Chiller. When the "A" Chiller was started, it tripped due to incorrect oil to refrigerant ratio. TS 3.0.3 entry was declared, then withdrawn after the "B" Chiller was successfully operated with the "A" Chilled Water pump. The root cause investigation from that event proposed corrective actions to 1) enhance the PM procedure to better verify correct oil levels and adequate refrigerant charge, 2) revise Operations rounds sheets to monitor operating parameters that would indicate refrigerant leakage, and 3) install a third Chiller as an additional back-up. These PM enhancements did not consider the need to enhance refrigerant addition monitoring or leak detection methods. Therefore, the enhancements to the PM procedure alone were not adequate to prevent this event. The proposed enhancement to the Operations rounds sheets was not properly communicated to Operations and was not implemented. The

modification to install a third chiller is still in the early phases of scope and cost estimation, and has not received final approval by management.

CORRECTIVE ACTIONS

Immediate:

1. Tubing fittings were tightened, refrigerant was added, and the "B" chiller was restarted and declared operable, allowing Operations to exit TS 3.0.3 and TS 3.7.16, Condition E.

2. For the "A" chiller, the tubing was reflared, fittings were tightened, refrigerant was added, and the chiller was restarted and declared operable, allowing Operations to exit TS 3.7.16, Condition "B".

Subsequent:

1. All copper tubing associated with the evaporator oil return filter dryers on both chillers was replaced.

2. Management expectations for leak detection and fitting inspection were communicated to the HVAC maintenance team.

3. A detailed leak survey was performed on both chillers.

4. Operations Shift personnel implemented increased monitoring of chiller performance.

Planned:

1. Appropriate Chiller Maintenance procedures will be revised to add specific inspection steps for tubing and fittings.

2. Available refrigerant leak detection methods will be evaluated. The most appropriate method will be incorporated into the chiller Maintenance Procedures.

3. Programmatic enhancements will be made to improve monitoring and trending of chiller performance.

None of these corrective actions are considered NRC Commitment items. There are no other NRC Commitment items contained in this LER.

SAFETY ANALYSIS

An additional function related to CRACS is the function of the Control Room Ventilation System Booster Fans to provide filtered air to pressurize the control room for control of radioactive and chemical contaminants. This event had no impact on the booster fans, Control Room pressurization, or post-accident Control Room doses.

As stated in the Background section of this report, the CRACS sub-systems CRVS and WC function during normal operation to maintain the Control Room, Cable Room, and Equipment Room temperatures within the limits assumed within the post-accident analyses as initial conditions.

The control, cable, and equipment room temperatures did not exceed TS limits or assumed limits on initial conditions during this event. A control room area temperature recorded by computer indicated an increase from 68.0 degrees F at the start of the event to a maximum of 69.4 degrees F (a 1.4 degree increase).

The most limiting scenario for CRACS with respect to temperature control is the LOCA-LOOP (LOCA with loss of off-site power) scenario because the CRACS AHU fans, the WC chillers, and WC pumps are assumed to trip off. System restoration requires manual operator action.

The temperature at which limiting components are assumed to become inoperable is 120F in the cable and equipment rooms and 100F in the control room. The calculated time to reach these limits following a LOCA-LOOP, assuming no cooling, is greater than 18 hours.

The Loss of Power Abnormal Procedure is referenced by the Emergency Operating Procedure and contains steps to restore power to the CRACS AHUs and the WC system and to restart the CRACS system within

18 hours after the initial event. Actual restart would be expected to occur much sooner.

If the problems encountered during this event were to occur associated with a design basis event, such as a LOCA-LOOP, site personnel would be required to diagnose the problem and restore the system to proper operation prior to reaching the operating limits of any essential components.

In an accident scenario, the Emergency Response Organization would be in place soon after the initial event and possibly prior to restart of the CRACS system. The Technical Support Center and Operational Support Center are located within the Control Room areas and would be able to direct and co-ordinate troubleshooting and repair activities such as those required to restore the "A" and "B" Chillers in this event. During this event, the actual time from the initial chiller trip until the "B" chiller was restored was less than three hours. Therefore, given the staffing available in an accident scenario, the diagnosis and correction of this type of problem can reasonably be expected to occur within the 18 hours supported by heat up calculations. Restoring the system within that time would prevent the operating limits of any components from being exceeded.

Therefore, engineering judgement indicates that this event did not prevent the fulfillment of any safety function and did not result in a Safety System Functional Failure.

The health and safety of the public was not affected by this event.

ADDITIONAL INFORMATION

There were no releases of radioactive materials, radiation exposures or personnel injuries associated with this event.

This event is considered reportable under the Equipment Performance and Information Exchange (EPIX) program.