CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9603110029 DOC.DATE: 96/02/29 NOTARIZED: NO DOCKET #
FACIL:50-269 Oconee Nuclear Station, Unit 1, Duke Power Co. 05000269
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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 96-002-00:on 960201,Containment H recombiner sys was technically inoperable due to deficient design analysis. Implemented & completed temporary mod to remove accumulation of moisture in suction & discharge piping.W/960229 ltr.

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February 29, 1996

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 269/96-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report, 269/96-02, concerning the technical inoperability of the Containment Hydrogen Recombiner System.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(v)(D). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

Joe M. Davis for
J. W. Hampton, Vice President
Oconee Nuclear Site

/fts

Attachment

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9603110029 960229
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Document Control Desk
February 29, 1996

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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)

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

TITLE (4) The Containment Hydrogen Recombiner System Was Technically Inoperable Due To A Deficient Design Analysis

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
									Oconee, Unit Two	05000 270
02	01	96	96	-- 02 --	00	02	29	96	Oconee, Unit Three	05000 287

OPERATING MODE (9)	N	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)	50.73(a)(2)(i)	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)	X 50.73(a)(2)(v) (D)	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. V. Wilkie, Safety Review Manager	(864) 885-3518

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	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 January 30, 1996, while performing an engineering review of the Containment Hydrogen Control System (CHRS), it was recognized that during accident conditions, condensation may accumulate and inhibit flow in the system flow path. On February 1, 1996, at 1330 hours, with all three units at 100% full power, Engineering completed a preliminary analysis. The analysis indicated that the potential exists for water to accumulate in the suction or discharge piping to the Hydrogen Recombiner and Hydrogen Purge Unit and block flow, thus preventing the CHRS from controlling the Reactor Building hydrogen concentration. Therefore, the CHRS was declared past and presently inoperable. The root cause of this event is determined to be Design Analysis, Unanticipated Interaction of Systems or Components. Corrective actions included a Temporary Modification (TM) which was completed on February 10, 1996 to make the system presently operable.

BACKGROUND

The Containment Hydrogen Recombiner System (CHRS) [EIIS:BB] includes a portable hydrogen recombiner, control panel, and a piping flow path designated as part of the Purge System (PR). The system is only used in the event of an accident and is not utilized during normal operation. If needed during an accident scenario, the recombiner will be moved to the affected unit and anchored to an existing foundation. Then, it will be connected by flexible piping to the PR piping. Once connected to the PR piping, the CHRS draws gases containing hydrogen from the reactor building into a heater in the recombiner. As the air temperature increases in the combiner, the hydrogen combines with oxygen to form water vapor which is then returned to the containment building.

The CHRS was added by a modification in 1985 and was incorporated into the Technical Specifications on April 30, 1987.

Technical Specification 3.16.3 requires components in the Containment Hydrogen Control System flow path to be operable. If the flow path is inoperable, it shall be restored to operable status within 7 days.

EVENT DESCRIPTION

On January 30, 1996, while performing an engineering review of the Containment Hydrogen Control System (CHRS), it was recognized that the post accident Reactor Building (RB) [EIIS:NH] environmental conditions could allow condensation to accumulate in the system flow path. As a result, a Problem Investigation Process report was generated and an engineering evaluation was initiated.

On February 1, 1996, at 1330 hours, Engineering completed a preliminary analysis. The analysis indicated that post accident RB temperature and humidity at the time the CHRS is expected to be placed in service would create a potential for water to condense and accumulate in the suction or discharge piping to the Hydrogen Recombiner and Hydrogen Purge Unit. This water accumulation may be sufficient to block flow and may prevent the CHRS from limiting the Reactor Building hydrogen concentration to less than 4 percent by volume. Upon loss of the flowpath, the CHRS would trip off, alerting the operators. However, since this problem was not anticipated, timely diagnosis may have been difficult. Based on a review of the modification that initially installed the CHRS, it is apparent that some moisture was considered due to the installation of drains and vents. However, existing vents and drains alone were not adequate to permit draining, especially in light of anticipated dose rates in the area required to be accessed. Therefore, the CHRS was declared presently and past inoperable since installation, and a seven day Limiting Condition for Operation was entered for all three Oconee Units. At 1630 hours, the NRC was notified. Preparations began immediately to determine what modifications would be required to ensure the system would perform its intended function.

Design work began on Temporary Modifications (TM) to make the system operable on each Unit. The TMs were to install a workable drainage arrangement to remove moisture from the CHRS piping low points.

On February 6, 1996, due to the possibility of not completing the TMs within seven days, a request for a change to the Technical Specifications (TS) was submitted to the NRC. This change would allow a one time extension to the Limiting Condition for Operation.

On February 7, 1996, approval from the NRC was granted to allow the additional seven days to complete the TMs.

On February 10, 1996, the TMs for all three units were completed. As a result, the CHRS was operable, but degraded on all three Units. The system is considered degraded because all the equipment utilized does not satisfy the criteria of QA Condition 1 designation, mostly in the area of material procurement and traceability. All drainage hoses to the drain tanks which have the potential to be exposed to containment design pressure have been satisfactorily tested at 59 psig. However, the drain tanks are rated for 10 psig. Therefore, the system pressure rating has been temporarily reduced from 60 psig to 10 psig while in operation. Engineering has determined that the system is capable of performing its intended function due to the following:

1. The drainage system is temporary and will be replaced or upgraded.

2. The associated materials are of high quality.

3. The new components have been seismically and environmentally evaluated.

4. The drainage system has been leakrate and functionally tested.

5. Operating procedures have been revised to include required information and steps for using the drainage system.

6. Redundant equipment is available.

7. Time and capability are available to diagnose and correct malfunctions of equipment outside containment.

CONCLUSIONS

The root cause of this event is determined to be a deficient Design Analysis, Unanticipated interaction of systems or components. During the design process of the modification to install the Containment Hydrogen Recombiner System (CHRS) in 1985, it was not recognized that the amount of condensation in the suction and discharge piping could potentially prevent the CHRS from performing its intended function. If the amount of condensation had been anticipated during the modification process, this event could have been prevented.

A review of LERs written within the last two years revealed that three events (269-94-01, 269/94-04 and 269/95-03) involved Design Analysis, Unanticipated interaction of systems or components. LER 269/94-01 involved a potential seismic interaction that could have resulted in the loss of Emergency Condenser Circulating Water. LER 269/94-04 involved a postulated event that may have rendered the Post Accident Core Cooling system inoperable. LER 269/95-03 involved a postulated single failure of a Low Pressure Injection pump during Emergency Core Cooling System operation which could have resulted in exceeding the Reactor Building pressure/temperature profile required in the Equipment Qualifications analysis. All three of the events identified above involved design deficiencies; therefore, the event is considered to be recurring. The corrective actions for the events identified above included modifications, completion of single failure analysis and Design Basis Documents. Because the design deficiencies reported in this report occurred prior to the discovery of the problems reported by those LERs, the associated corrective actions could not have prevented this event. Enhancements to the site organizational structure and design process since 1985 should prevent this type of design deficiency in the future.

A historical search of industry events involving the Hydrogen Recombiner System was performed. Several events were identified; however, none of these events involved condensation in the suction or discharge piping.

This event did not result in the release of any radioactive material, radiation overexposures or personnel injuries. There was no NPRDS reportable equipment failure associated with this event.

CORRECTIVE ACTIONS

Immediate

None

Subsequent

1. Implemented and completed a Temporary Modification to remove the accumulation of moisture in the suction and discharge piping.

2. The Operating Procedure for the Containment Hydrogen Recombiner has been revised to reflect the installation and use of the temporary arrangement.

Planned

1. A permanent modification will be implemented to remove the accumulation of moisture in the suction and discharge piping.

SAFETY ANALYSIS

The Containment Hydrogen Recombiner System (CHRS) controls hydrogen in the Reactor Building (RB) following a Design Basis Loss of Coolant Accident (LOCA). The Emergency Operating Procedure requires the Operator to monitor RB hydrogen concentrations following a LOCA. If concentrations are greater than or equal to .5%, the CHRS is placed in operation per an Operations Procedure. This procedure also requires the Operator to place the CHRS in service within 24 hours of an Engineered Safeguards [EIIS:JE] actuation if both trains of the Containment Hydrogen Monitor System are out of service. Due to the accumulation of water, the CHRS may not have been able to limit RB hydrogen concentration to 4% by volume.

Using conservative assumptions for the generation rate of hydrogen following a LOCA, it is calculated that approximately 15 days are required for hydrogen concentration in the containment to reach the lower flammability limit (4% to 6%).

Large dry containment designs like Oconee's have been shown during Individual Plant Evaluation studies to have a low probability of failure as a result of hydrogen combustion. This is especially true when hydrogen concentration is only slightly above the lower flammability limit. Hydrogen generation calculations for Oconee predict a concentration of about 5.5% by volume thirty days following a design basis accident. The containment temperature and pressure response to hydrogen ignition in this range is very mild and will not challenge containment integrity and are not expected to impact the operability of containment equipment.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
	05000	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	8 OF 8
Oconee Nuclear Station, Unit One	269	96	-- 02	-- 00	

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

In the unlikely event of a design basis accident, analysis indicates that time would have been available to drain the accumulation of water. Therefore, it is expected that the hydrogen concentration would have been limited. However, this may have resulted in higher exposures to personnel performing this task.

During the period of time that the Containment Hydrogen Recombiner System was technically inoperable, no event occurred which required the recombiner to be utilized. Therefore, the health and safety of the public were not affected by this event.