Duke Energy

W. R. McCollum, Jr.
Vice President

Duke Energy
Oconee Nuclear Station
7800 Rochester Highway
Seneca, SC 29672
(864) 885-3107 OFFICE
(864) 885-3564 FAX

May 6, 2002

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 269/2002-01, Revision 0
Problem Investigation Process No.: O-02-1066

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 269/2002-01, Revision 0, concerning the inability of the Pressurizer heaters powered from the Oconee Standby Shutdown Facility (SSF) to compensate for Pressurizer heat transfer losses.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B) as "operation prohibited by Technical Specifications." 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
Atlanta, GA 30303

Mr. L. N. Olshan
Project Manager
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. M. C. Shannon
NRC Senior Resident Inspector
Oconee Nuclear Station

INPO (via E-mail)

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Oconee Nuclear Station, Unit 1	050- 0269	1 OF 9

4. TITLE

Pressurizer Heat Loss Exceeds Standby Shutdown Facility Powered Heater Capacity

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									Unit 2	0500270
03	07	02	02	– 01	– 00	05	06	2002	Unit 3	0500287

9. OPERATING MODE	1
10. POWER LEVEL	100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
L.E. Nicholson, Regulatory Compliance Manager	(864) 885-3292

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On 03/07/2002 Site Engineering concluded that ambient heat losses from the Pressurizer (PZR) on all three Oconee units exceeded the capacity of PZR heaters powered from the Standby Shutdown Facility (SSF). Therefore, the ability to maintain a steam bubble in the PZR for system pressure control during SSF events (Fire, Flood, and Security) might be lost and the existing procedural guidance would not fully address some expected conditions. Normal system operation or other emergency scenarios were not affected because additional PZR heaters are available in those conditions.

PZR heaters support operability of the SSF Auxiliary Service Water System (SSF ASW). Per Technical Specification 3.10.1, the SSF ASW was declared inoperable for all three Oconee units. Abnormal Procedures were subsequently revised to provide adequate guidance and all on-coming Operators received simulator training on the new guidance prior to accepting shift duties. Additional corrective actions are planned.

The apparent cause was a fundamental lack of appreciation for the potential impact of PZR insulation deficiencies. This event is considered to have no significance with respect to the health and safety of the public.

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	2 OF 9

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

EVALUATION:

BACKGROUND

This event is reportable per 10CFR 50.73(a) (2) (i) (B) as "operation prohibited by Technical Specifications (TS)."

The Reactor Coolant System (RCS) [EIIS:AB] Pressurizer (PZR) [EIIS:PZR] establishes and maintains RCS pressure within prescribed limits using electric heaters and a water spray nozzle. The PZR heaters replace heat lost during normal steady state operation, and restore system pressure following transients. The PZR spray line cools the PZR to reduce RCS pressure.

Technical Specification (TS) 3.4.9 requires that 126 kw of heater capacity powered from an emergency power supply be operable. Several banks of heaters are capable of independently meeting this requirement.

The Standby Shutdown Facility (SSF) [EIIS:NB] functions as a backup to existing safety systems for additional "defense in-depth" protection under extreme emergency conditions. The SSF was not included in the original plant design when the first Oconee Unit began operation in 1973. Following initial licensing of Oconee, NRC concern increased for issues beyond the traditional accidents analyzed in Chapter 15 of the Oconee Updated Final Safety Analysis Report (UFSAR). In the late 1970's, Duke Energy designed the SSF as an alternate means to achieve and maintain all three Oconee units in Mode 3 following postulated fire, sabotage, or flooding events. The Oconee SSF was made operational in 1986. The SSF was subsequently credited as a source of alternate AC power and decay heat removal during station blackout and tornado events.

The SSF includes a diesel generator [EIIS:AD], associated electrical switchgear including the SSF Essential AC Power System, an auxiliary service water (ASW) pump [EIIS:BA], ASW piping from the condenser circulating water piping through the ASW pump to the steam generators, reactor coolant makeup pumps, reactor coolant makeup piping from the spent fuel pools through the makeup pump to the reactor coolant pumps seals, SSF HVAC equipment, and SSF instrumentation and controls.

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	3 OF 9

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

Technical Specification (TS) 3.10.1 requires the SSF and its subsystems to be operable in modes 1, 2, and 3. One of the functional requirements is to maintain reactor coolant pressure control following an event. Manually controlled PZR heaters (126 kW of PZR heater capacity) are capable of being powered from the SSF to meet this functional requirement. Per the Bases of the TS, these PZR heaters are considered a support system for the SSF ASW, so an adequate number of these PZR heaters must be OPERABLE for the SSF ASW system to be considered OPERABLE.

At time of discovery, all three Oconee Units were operating at 100% power with no safety systems or components out of service that would have contributed to this event.

EVENT DESCRIPTION

An Engineering effort was initiated to develop a test to determine the ambient heat losses from the PZR on each Oconee unit. A list of necessary data was developed to determine the source for each input parameter. It was expected that the need for installation of test instrumentation would preclude any actual testing until such instrumentation could be installed during upcoming outages. However, as the project progressed, Engineering found that all necessary data could be obtained with the exception of one flow parameter, which could be approximated by calculation.

Upon analysis of the initial results, the PZR heat losses were estimated to be:

Unit	Total Demand (kw)	Ambient Losses (kw)
1	201	143
2	207	149
3	236	178

The differences between the total demand and the ambient losses are attributed to the heat transferred to PZR spray and spray bypass flows. Variations between units appear to be due to differences in the condition of PZR insulation. The total demand and ambient loss numbers exceeded the value of 70 kw previously used as the expected heat loss from the PZRs and exceeded the 126 kw capacity required by TS 3.4.9 to be powered from plant emergency power and the nominal 126 kw PZR heater capacity powered from the SSF.

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	4 OF 9

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

Although the UFSAR states that letdown and makeup can be balanced for RCS pressure control without heaters, and single phase RCS natural circulation flow can still be maintained, this identified condition constitutes a loss of functional capability of the PZR heaters powered from the SSF to maintain pressure control using a steam bubble.

After review and verification of the data and methods, Operations was notified and, at 14:00 on 3/7/2002, Operations declared the SSF ASW to be inoperable and entered TS 3.10.1 Condition A on all three Oconee units. This condition requires the SSF ASW system to be restored within 7 days.

An 8 hour ENS notification was made at 2003 on 3/7/2002 under 10 CFR 50.72(b)(2)(v) as a "condition which at time of discovery could have prevented fulfillment" of a safety function. Duke Energy subsequently concluded that this condition would NOT have prevented fulfillment of the safety function. (See the Safety Assessment section below.)

For non-SSF events, the available PZR heater capacity powered from an emergency power supply exceeds the TS 3.4.9 requirement and the worst case total demand indicated by the testing. Therefore, the intent of TS 3.4.9 is met, even though the specific requirement is non-conservative for certain scenarios.

Procedural guidance was generated and validated to permit operation with the RCS water solid following an SSF event. In order to determine if the higher than expected ambient losses from the PZR would interrupt single phase RCS natural circulation, simulations of an SSF event were run using the RETRAN computer program. Based on the RETRAN analysis results, a post-trip subcooled natural circulation condition can be maintained from the SSF using the new guidance.

Operations shift personnel received training on the changes being made to the applicable SSF operating procedures. This training included use of an SSF simulator which allowed hands on experience throttling ASW flow and throttling SSF RC letdown to maintain RCS pressure within the desired control band.

On 3/12/2002, the Plant Operations Review Committee reviewed and approved the new procedural guidance as a compensatory measure to

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	5 OF 9

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

restore operability. The fact that the ambient PZR heat loss continued to exceed the capacity of the heaters powered from the SSF was considered a loss of functional capability and was declared to be an Operable but Degraded/Nonconforming condition.

On 3/13/2002 at 0150 OPS exited TS 3.10.1 Condition A on all three Oconee units following implementation of these procedure changes and training of oncoming shift personnel. Subsequent shifts were required to receive the training prior to assuming their shift duties.

Subsequently, an NRC Special Inspection Team performed a review of SSF operability with the new procedural guidance in place. This team reviewed the applicable Abnormal Operating Procedure, Operator training (including simulator performance), and the RETRAN analysis used to support the new guidance. There were no significant findings.

Selected Licensee Commitment (SLC) 16.5.8a "PZR Heaters" was implemented on 3/27/2002 to address PZR heater capacity to compensate for ambient heat losses. This SLC provides more restrictive requirements for PZR heater capacity pending revision of TS 3.4.9 to correct the current non-conservative requirement.

CAUSAL FACTORS

Due to the historical nature of this event, Duke Energy did not determine a root cause. Instead a Duke Energy team performed an assessment of various aspects of the event, including investigation of the historical information available on the issue of PZR heat loss versus heat capacity, and identification of factors that contributed to the event.

The assessment team determined that:

1. The original SSF design basis for PZR heaters to support natural circulation cooling was inadequate.

2. The potential impact of PZR heat loss on natural circulation, and therefore system operability, was not well recognized or generally understood by site personnel.

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	6 OF 9

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

3. There were several missed opportunities to identify PZR insulation deficiencies.

Although there were problems in the past now recognized as missed opportunities to identify the issue, the current discovery occurred as a result of a voluntary initiative to develop a PZR ambient heat loss test, which was recommended by a recent, previous Oconee assessment. Problem evaluations and corrective actions for those previous problems were influenced by an underlying assumption that the original design and calculations were adequate and a lack of appreciation of the impact of PZR insulation on SSF operability. The assessment team concluded that the discovery and reaction to this issue is reflective of an organization that is challenging previously accepted ideas and taking the necessary steps to achieve lasting resolution.

CORRECTIVE ACTIONS

Immediate:

1. Operations declared the SSF ASW inoperable and entered appropriate Action Statements.

Subsequent:

1. The Abnormal Procedure used for SSF operation during postulated events was revised to provide adequate guidance for maintaining stable Mode 3 conditions with the RCS system water solid. Implementation included hands on simulator training for all shift operators prior to assuming their shift duties.

2. A Selected Licensee Commitment (SLC) was created as an interim measure to provide more restrictive requirements related to PZR heater capacity pending revision of TS 3.4.9 to correct the current non-conservative requirement. This SLC includes surveillances to verify the required capacity is maintained.

Planned:

1. Implement appropriate option(s) to restore the ability to control system pressure while maintaining a steam bubble in the PZR. This may include actions to:

A. Assess the current status of the PZR heater insulation on all three Oconee units. Perform visual and thermal imaging examinations of the current insulation (completed on Unit 1 during shut down for a scheduled refueling outage). After these inspections, appropriate short term actions should be taken to address noted defects.

B. Perform an improved PZR heat loss calculation which addresses identified deficiencies in the current approved calculation. This calculation may also include a sensitivity analysis calculation for PZR ambient losses. One of the cases should consider expected losses from an un-insulated PZR in order to provide a baseline for potential insulation efficiency gains due to improving the overall condition of insulation in the field.

C. Write an enhanced Periodic Test Procedure to better determine and monitor actual ambient losses from the PZR.

D. Evaluate options to repair and/or upgrade insulation and/or modifications to provide additional heater capacity powered from the SSF.

2. Submit revisions to TS 3.4.9, TS 3.10.1 Bases, and the UFSAR as needed to correct current non-conservative heater requirements.

3. Revise appropriate SSF Design Basis Documents to address the role of PZR heaters in SSF operability.

Planned corrective actions 1 and 2 are considered NRC Commitment items. There are no other NRC Commitment items contained in this LER.

SAFETY ANALYSIS

As this report addresses the ability to respond to postulated scenarios which have not actually occurred, there was no actual impact on the health and safety of the public.

For any event or transient scenario involving decay heat removal via the steam generators, an adequate number of PZR heaters must be functional to compensate for ambient losses in order to maintain a

PZR steam bubble for RCS pressure control and ensure adequate natural circulation cooling. Therefore TS 3.4.9 and the Bases of TS 3.10.1 require a number of PZR heaters to be operable.

For non-SSF events, the available PZR heater capacity powered from an emergency power supply (even allowing for single failure) exceeds both the TS 3.4.9 requirement and the worst case total demand indicated by the heat loss testing. For some SSF events, such as a turbine building flood, control room access and plant power remain available, so that adequate PZR heater capacity would exist. Thus, this issue is only a concern for a sub-set of SSF event scenarios.

Per the Bases of TS 3.10.1, the SSF ASW system is used to maintain single phase RCS natural circulation flow. The PZR heaters powered from the SSF are considered a support system for the SSF ASW.

The limited historical data indicates that the PZR heat losses have exceeded the expected value of 70 kw since initial operation of the SSF in 1986. Also the current loss data on all three units significantly exceeds the 126 kw requirement. Thus, in the past, given an SSF event challenging the PZR heaters, the system would not have responded as expected to maintain RCS pressure control and natural circulation. The SSF abnormal procedures did not provide guidance to assure that a subcooled condition was maintained with heater capacity less than heat loss. There was a potential for RCS natural circulation flow to be lost.

However, the plant can still be safely shut down, even for those SSF events which do specifically result in loss of plant systems affecting PZR heater power or control so that SSF powered PZR heaters would be challenged. The event assessment team concluded that the previous procedures using the SSF ASW were sufficient to achieve boiler-condenser mode cooling (a saturated, not subcooled condition) successfully without complications. Boiler-condenser mode cooling was reviewed and approved by the NRC Staff as part of the B&W Owners Group Abnormal Transient Operator Guideline program and is incorporated in the Technical Bases Document (Rev 9) and the Oconee Emergency Operating Procedure.

The current Probability Risk Assessment (PRA) plant model does not include the PZR heaters. Therefore inoperable PZR heaters have no calculated impact on risk. As stated above, the boiler-condenser

FACILITY NAME (1)	DOCKET (2) NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Oconee Nuclear Station, Unit 1	0500269	2002	- 01 -	00	9 OF 9

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

mode provides adequate secondary side heat removal, therefore inability to maintain natural circulation has no impact on actual risk. Thus, from a safety and risk perspective, the lack of adequate heater capacity is not a core damage issue.

The safety function to remove decay heat would not be lost, therefore Duke Energy has concluded that this event did not include a Safety System Functional Failure and is not reportable under 10CFR 50.73(a)(2)(v).

ADDITIONAL INFORMATION

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

This event is not considered reportable under the Equipment Performance and Information Exchange (EPIX) program.

There have been no previous occurrences of this event at Oconee.