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May 29, 2008

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

Subject: Duke Energy Carolinas, LLC
Oconee Nuclear Station Units 1,2,&3
Docket Nos. 50-269,-270, -287
Licensee Event Report 269/2006-03, Revision 1
Problem Investigation Process Nos.: O-06-3928, O-05-6829, and O-06-02468

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 269/2006-03, Revision 1, regarding foreign material discovered in the suction piping between the Reactor Building Emergency Sump and the Low Pressure Injection System sump isolation valves. Duke's analysis concluded that this foreign material could have adversely impacted one Low Pressure Injection (LPI) Pump on Units 2 and 3 or one or more Reactor Building Spray (BS) Pumps on all three units. Revision 0 of this LER reflected the conclusions of that analysis. However, NRC notified Duke by letter of November 20, 2006 that their analysis reached a different conclusion. The NRC analysis concluded that both trains of LPI could have been affected, and a notice of violation was issued on February 13, 2007. Duke accepted the NRC's conclusion and did not contest the violation. The attached LER has been revised accordingly.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(B), operation or condition which was prohibited by Technical Specifications. It is also submitted pursuant to 10 CFR 50.73(a)(2)(v)(D), event or condition which could have prevented the fulfillment of a safety function, and 10 CFR 50.73 (a)(2)(ix)(A), event or condition which could have prevented the fulfillment of the safety functions of trains in different systems.

IE22
NRR

This event is considered to be of low to moderate significance with respect to the health and safety of the public.

Very truly yours,

Richard J. Freudenberger

for Dave Baxter, Vice President
Oconee Nuclear Station

Attachment

cc: L. A. Reyes
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INPO (via E-mail)

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(Revised 4-23-2008)

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

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

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4. TITLE

Foreign Objects Discovered in RBES Outlet Piping

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
									Oconee Unit 2	05000-0270
06	01	2006	2006	– 03	– 1	05	29	2008	Oconee Unit 3	05000-0287

9. OPERATING MODE
5

10. POWER LEVEL

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

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

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
B.G. Davenport, Regulatory Compliance Manager	(864) 885-3044

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)

Video inspection of the Reactor Building Emergency Sump (RBES) outlet pipes on all three Oconee units were performed with the units in cold shutdown. The inspections discovered the presence of foreign materials, including various hardware items such as two nuts, a washer, a nail, an O-Ring, and a piece of an adjustable wrench. These materials were evaluated as capable of damaging one or more Low Pressure Injection (LPI) Pumps in Unit 2 and 3 or one or more Reactor Building Spray (BS) Pump in each unit. Foreign material described above was removed prior to re-starting the units. The material was present for an unknown period of time.

Past operability evaluations performed by Oconee Nuclear Station initially concluded that the debris found in Unit 2 was not capable of causing inoperability of any components. However, subsequent evaluation by the NRC reached a conclusion that reasonable assurance had not been provided to show that the 2B LPI Pump would have remained operable. A licensee-identified NCV (green finding) was issued, which ONS did not contest. Inspections on Units 3 and 1 were performed after the NRC finding was issued. NRC evaluation of the Unit 3 findings concluded that LPI function could have been lost. NRC safety significance evaluation determined the change in CDF was between 1E-5 and 1E-6, and a white finding was issued by the NRC. Again, Duke did not contest this finding.

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

EVALUATION:

BACKGROUND

This event is reportable per 10CFR 50.73(a)(2)(i)(B), 10CFR 50.73 (a)(2)(v), and 10 CFR 50.73(a)(2)(ix)(A).

The Low Pressure Injection (LPI) [EIIS: BP] System functions to provide emergency core cooling by injecting the Borated Water Storage Tank (BWST) inventory into the reactor core following a large break loss of coolant accident (LBLOCA). It also provides long term core cooling by transferring pump suction to the Reactor Building Emergency Sump (RBES) and operating in the sump recirculation mode. Technical Specifications require that two trains of LPI must be operable in Modes 1 through 3. A 7-day outage time is allowed for a single train. The system contains an installed non-safety related spare pump which can be aligned to either train in the event of pump failure during emergency operation.

The Building Spray (BS) [EEIS: BE] System functions to reduce pressure in containment following a LBLOCA by injecting water from the BWST into the containment atmosphere. It also performs an iodine scrubbing function both in the injection mode and the sump recirculation mode. Two trains of Building Spray are required to be operable by Technical Specifications in Modes 1 through 4. A 7-day outage time is allowed for a single train.

EVENT DESCRIPTION

On 10-24-2005, a video inspection of the Unit 2 'A' train RBES outlet pipe was performed to look for the presence of foreign material. The unit was in cold shutdown for refueling at the time of the inspection. This was the first such inspection performed on the RBES outlet piping since the plant began operation. This initial inspection found a small common nail (about 3" long) and other minor debris of no significance.

The subsequent inspection of the Unit 2 'B' train RBES outlet pipe was performed on 10-26-05. This inspection discovered a "heavy hex" nut which was approximately 1.5" measured across the flats, about 1.75" measured across the points, and about 0.75" thick.

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Other minor debris was found which was readily determined to be insignificant (small piece of paper, small wire, and small quantity of thin chips).

Since the unit was not in a mode requiring operability of either the BS or LPI systems at the time of discovery, no equipment was declared inoperable. The nail and nut were removed from the sump outlet lines prior to restarting the unit.

Duke performed engineering evaluations of the nail and nut to determine potential past inoperability. The nail was evaluated to be capable of transport as far as the LPI coolers but not capable of causing significant damage or threat to operability. Evaluation of the nut concluded that it would transport to the sump isolation valve (2LP-20) where it would be captured in an empty cavity within the valve body and cause no operability concern.

The NRC performed an independent evaluation of the nut and concluded that for large and medium break loss-of-coolant-accidents (LOCAs) there would be sufficient flow to transport the nut into the 2B LPI pump, causing the pump to fail. A licensee-identified Non-Cited Violation (NCV) was issued with a "green" finding, as noted in an Inspection Report dated 4-28-06. Duke accepted the finding.

On 4-29-06, Unit 3 entered a scheduled refueling outage. On 4-30-06, 5-1-06, and 5-2-06, video inspections of the Unit 3 RBES outlet piping were performed. The inspections found two significant items. A metal washer (approximately 3" outside diameter (OD)) was found in the Unit 3 'A' train outlet pipe. A jaw from a Crescent wrench (ie, the moving part of an adjustable wrench), approximately 3" long, was found in the Unit 3 'B' train outlet pipe, along with an 8" length of wire and some pipe scale. The items described above were removed prior to re-starting the unit.

On 6-1-06, Engineering completed an evaluation which concluded that the materials found in the Unit 3 RBES lines could have adversely impacted the Unit 3 'A' train BS pump and either the LPI pump or BS pump in Unit 3 'B' train under certain flow conditions. In view of the findings of the NRC evaluation of Unit 2, the Unit 3 evaluation assumed that the nut and Crescent wrench jaw could transport to the LPI and BS pumps.

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Because these foreign objects were found on both Units 2 and 3, ONS performed an Operational Decision Making evaluation between 5-11-06 and 5-23-06 to determine the urgency for shutting down Unit 1 for inspection. Station management determined that continued operation was warranted but scheduled a planned shutdown specifically for the inspection.

On 6-13-06 Unit 1 was shut down for inspection of the RBES outlet piping. No significant debris was found in the Unit 1 'A' train outlet pipe. The Unit 1 'B' train outlet pipe contained a nail (approximately 2.2" long), an O-ring (approximately 1" diameter), and a nut (approximately 1" across the flats and approximately 0.6" thick). The foreign material described above was successfully removed prior to re-start of the unit.

The engineering evaluation of this material concluded that the Unit 1 'B' train BS pump could have been adversely impacted by the material under certain flow conditions.

On November 20, 2006, the NRC advised Duke that they had performed an independent evaluation of the Unit 3 debris and reached a different conclusion. The NRC evaluation concluded that both trains of LPI could have been lost by debris ingestion and that subsequent seal failures could have led to failure of the spare LPI pump (3C).

CAUSAL FACTORS

The RBES outlet piping is pressure tested for leakage at each refueling outage. Testing of this line requires the installation and subsequent removal of a flange on the normally open outlet pipes. The horizontal orientation and large size of the outlet pipe openings (with the exception of Unit 1 'A' train outlet) make them especially vulnerable to introduction of foreign material. The material identified in this report is believed to have been introduced into the RBES outlet piping during flange installation and removal activities. The apparent cause of this event is substandard FME work practices. Contributing factors include a lack of worker understanding of the importance of rigorous FME control in this work location coupled with inadequate procedural guidance for performing the flange installation and removal tasks.

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CORRECTIVE ACTIONS

Immediate:

All significant foreign material was removed from sump outlet lines between the sump and the first isolation valves on all affected units and trains.

Subsequent:

The following actions have been taken over the past two years to address FME concerns at ONS. While not subsequent to this specific event, the actions were taken to address the same apparent cause.

1) A FME procedure has been developed and implemented to cover the flange installation and removal activities.

2) Nuclear System Directive (NSD) 104 has been enhanced to clarify and emphasize Cleanliness Zone boundaries and expectations.

3) Training has been provided to Maintenance personnel on the revised NSD.

Planned:

1) A FME inspection will be performed on the RBES outlet lines during each refueling outage until ONS has sufficient history to establish the effectiveness of our FME practices.

2) ONS will evaluate the need for inspecting other piping sections which are required for accident mitigation but do not have capability for flow testing.

There are no NRC Commitment items contained in this LER.

SAFETY ANALYSIS

Engineering evaluations discussed above were performed with the conservative assumption of debris transport to the suction of the LPI and BS pumps in the affected trains. Neither detailed transport analyses nor confirmatory testing were performed to

support this assumption. The assumption of transport is believed to be very conservative.

This event involved multiple potential Safety System Functional Failures. The long term decay heat removal function of LPI trains '2B' and '3B' were challenged due to potential inoperability of the '2B' and '3B' LPI pumps. The 'A' trains would have continued to perform this function, and there is an installed spare LPI pump which could have been used to perform this function in the event of a failure of both the 'A' and 'B' pumps.

The iodine removal function of the BS system was also potentially lost for the sump recirculation mode of operation on both trains in Unit 3 due also to pump inoperability. Therefore, there was a potential loss of function for this system on Unit 3. Units 1 and 2 could have lost a single train of BS in the sump recirculation mode due to pump inoperability. The alternate train of BS would have continued to perform this function in the absence of a single failure.

The iodine removal function of the BS system is a design/licensing criterion imposed in evaluation of the Maximum Hypothetical Accident as defined in UFSAR Chapter 15. A design basis LOCA does not cause failed fuel. Consequently, the iodine removal function is not needed for a design basis event.

The loss of function of the BS System has no impact on the evaluation of Core Damage Frequency (CDF) or Large Early Release (LERF). The potential for loss of a train of the LPI System as a result of the foreign material is limited to a relatively small subset of core damage sequences due to the high flow rates needed to transport the material to the pump. This low likelihood of failure combined with the availability of a third LPI pump results in an insignificant impact on the evaluation of CDF and LERF.

By letters of November 20, 2006 and February 13, 2007, the NRC advised Duke of the results of their independent analyses. Those analyses concluded that the failures resulting from the reported FME would result in loss of LPI safety function rather than the BS iodine removal safety function. Duke accepted that conclusion. The safety significance evaluation performed by the NRC determined the change in CDF was between 1E-5 and 1E-6. A white finding was issued to Duke on February 13, 2007. Duke did not contest the

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finding. The finding was closed during the NRC 95002 inspection in August of 2007. See Inspection Report 05000287/2007009 dated October 12, 2007 (ADAMS Accession No. ML072850850).

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.

A five-year historical search of ONS' corrective action database identified the following related events which were indicative of similar deficiencies in FME control and/or awareness:

- On 10-16-02, during refueling outage 2EOC19, foreign material was discovered during inspection of the Upper Surge Tanks. The foreign material was determined to have been introduced during maintenance activities performed the previous outage.
- On 2-26-04, Unit 3 tripped due to foreign material in the EHC system. The material was determined to have been introduced during maintenance activities (filter replacement). This event was reported under LER 287/2004-01.
- On three separate occasions between March 2004 and July 2004, foreign materials were found in containment contrary to site cleanliness and FME standards. In each case, the materials were left behind by personnel performing work activities in containment.
- On 11-17-05 a nitrogen pressure regulator valve failed due to foreign material in the regulator. The regulator supplies nitrogen to the air operator on an emergency feedwater control valve. The debris (fine metal shavings) was determined to have been introduced by the cutting/grinding necessary to remove and replace the regulator.

ONS has heightened its awareness of FME issues over the past two years and made improvements in the FME Program at the site. The events discussed above are predominantly legacy issues that pre-date this renewed focus. This is an indication that the corrective actions from our past experiences are having a positive effect on the number of FME events.