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September 14, 2006

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

Subject: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC  
(Duke)  
Catawba Nuclear Station, Unit 1  
Docket No. 50-413  
Licensee Event Report 413/06-002

Attached is Licensee Event Report 413/06-002 entitled "Safe Shutdown Potentially Challenged by an External Flooding Event and Inadequate Design and Configuration Control."

There are no regulatory commitments contained in this letter.

This event is considered to be of no significance with respect to the health and safety of the public. If there are any questions on this report, please contact A. Jones-Young at (803) 831-3051.

Sincerely,

D.M. Jamil

Attachment

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xc (with attachment):

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**1. FACILITY NAME** Catawba Nuclear Station, Unit 1 **2. DOCKET NUMBER** 05000 413 **3. PAGE** 1 OF 8

**4. TITLE**  
 Safe Shutdown Potentially Challenged by an External Flooding Event and Inadequate Design and Configuration Control

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
05	22	2006	2006	- 002 -	00	09	14	2006	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	3	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)	
10. POWER LEVEL	N	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)	X	50.73(a)(2)(v)(A)		73.71(a)(5)	OTHER Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)			
		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: A. Jones-Young, Regulatory Compliance TELEPHONE NUMBER (Include Area Code): 803-831-3051

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

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

On 05/22/06, while Unit 1 was shutdown in Mode 3, the Unit 2 Cooling Towers (CT) experienced excessive overflow due to clogged upper level CT screens. This condition created a source of water that followed a flow path through unsealed electrical conduit penetrations to the 1A Diesel Generator (DG) Room. The water intrusion condition was discovered and stopped prior to any DG damage. DG 1A was the only DG affected by this condition. However, the presence of this flow path highlighted potential vulnerabilities in barriers to the Probable Maximum Precipitation (PMP) event that could challenge safe shutdown capabilities.

The identified flood protection deficiencies were attributed to inadequate design and configuration control of features to protect against flooding. The flood protection deficiencies were corrected by the installation of new flood protection seal barriers.

This report does involve a safety system functional failure as it relates to a postulated PMP. There was minimal safety significance to this event.

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

BACKGROUND

This event is being reported under the following criteria:

10 CFR 50.73(a)(2)(i)(B), Technical Specification prohibited operation or condition, and

10 CFR 50.73 (a)(2)(v)(A), Any event or condition that could have prohibited the fulfillment of a safety function of systems or structures.

Catawba Nuclear Station Unit 1 is a Westinghouse four-loop Pressurized Water Reactor (PWR) [EIIS: RCT]. Unit 1 was shutdown in Mode 3 (Hot Standby) prior to this event.

10 CFR 50 Appendix A, General Design Criterion 2, "Design Bases for Protection against Natural Phenomena," requires that structures, systems, and components (SSCs) important to safety be designed to withstand the effects of natural phenomena such as floods, tsunamis, and seiches without loss of capability to perform their safety functions. Catawba Nuclear Station is designed to safely handle the run-off from a Probable Maximum Precipitation (PMP) event such that the flood waters do not adversely affect any SSCs important to safety. Additionally, Catawba is provided with a surface water drainage system that is designed and constructed to protect all safety-related facilities from flooding during a local PMP.

The Diesel Generator (DG) [EIIS: EK] System operates to supply emergency power for the continued operation of specific important plant equipment. Unit 1 has two emergency DGs 1A and 1B. Each DG is used as the standby emergency power source for each 4160-volt emergency bus. DGs 1A and 1B are dedicated to essential busses 1ETA and 1ETB [EIIS: EB], respectively. The DGs will start automatically on a safety injection signal or on a bus loss of voltage or degraded voltage signal. Loads will automatically connect to the bus as required by the respective load sequencer [EIIS: EK].

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.8.1 governs AC Sources - Operating for Modes 1, 2, 3, and 4. LCO 3.8.1 requires in part that two DGs be operable. Condition B for this

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LCO specifies that with one DG inoperable, the DG must be restored to operable status within 72 hours, in addition to the other Required Actions that must be performed. Condition G specifies that with the Required Action and associated Completion Time of Condition B not met, the unit must be in Mode 3 within 6 hours and in Mode 5 within 36 hours.

No structures, systems, or components were out of service that had any effect on the event.

**EVENT DESCRIPTION**

(Certain event times are approximate.)

Date/Time	Event Description
05/20/06/1403	Condenser Circulating Water (RC) [EIIS: KF] System Pumps lost power during the Dual Unit Loop Event (LER 413-06-001).
05/21/06/2020	2A RC pump placed in service with 2A and 2B Cooling Towers in BYPASS (to basin).
05/21/06/----	2A and 2B Cooling Towers placed in service with RC flow aligned to the upper level.
05/22/06/----	Unit 2 Cooling Tower upper level screens clogged causing water to spill over the outer wall of the Cooling Towers.
05/22/06/----	Unit 1 remained shutdown in Mode 3. No activities were in progress that had any effect on the event.
05/22/06/0649	Water started flowing into 1A DG Room through open Nuclear Service Water System (RN) [EIIS: BI] conduit sleeves coming from conduit man hole (CMH)-3 into the south wall of 1A DG Room. One WN (DG Room Sump Pump System) sump pump auto-started.

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05/22/06/0653      Water level in the 1A WN sump annunciated on high level (There are two WN sump pumps in each DG room. The start of the second pump gives a high level alarm in the Control Room.).

05/22/06/-----      Operations personnel dispatched Maintenance personnel to the 1A DG Room to investigate the functionality of the WN sump pumps.

05/22/06/0815      During routine environmental surveillances, chemistry personnel discovered that Unit 2 Cooling Towers A and B were spilling over the top excessively causing water to reach the ground. Chemistry personnel notified their management and Operations management.

05/22/06/-----      Operations made the required RC System alignments to mitigate spillover from the upper Cooling Tower screens.

05/22/06/-----      Site personnel investigated and found the source of the water entering 1A DG Room.

05/22/06/0855      Operations made a conservative decision to declare DG 1A inoperable due to the water intrusion. DGs 1B, 2A and 2B were not affected by this condition.

05/22/06/0900      Operations personnel completed RC system alignments to terminate spillover. At this time, water stopped flowing into the 1A DG Room through the open RN system conduit sleeve.

05/22/06/-----      An extent of condition (EOC) was initiated for electrical conduit penetrations entering the Unit 1 and 2 DG Rooms and the Auxiliary Building.

05/23/06/-----      The missing/degraded flood protection design features highlighted potential vulnerabilities in barriers to the PMP. Engineering was asked to assist with the reportability determination.

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05/23/06/2106                      Operations declared DG 1A operable based upon sealing the penetrations affecting 1A DG.

07/17/06/-----                      Engineering completed an evaluation which supported a determination that the as-found condition of DG 1A conduit seals was reportable. Management concurred with this decision and initiated the appropriate reportability processes.

**CAUSAL FACTORS**

The intrusion of water into the 1A DG Room has been attributed to a Possible Design, Manufacturing, Construction/Installation Deficiency and inadequate configuration control of conduit/trench barriers to protect against flooding.

The PMP results in maximum flooding of the Station Yard. Based upon a review of the data and conditions surrounding the potential for water intrusion, the 1A DG would not be able to handle the expected water intrusion from such an event for a period of time where operator actions could be considered creditable to preclude declaring the DG inoperable. Based upon an inflow of 400 gpm to the room, only approximately 15 minutes would be available to respond to the water intrusion when alarms were evident. Given the nature of the PMP, there would not be a readily straightforward method to remove water from the room. This would further complicate the mitigation effort.

Subsequent inspections relative to the cause and extent of condition of the problem identified that the other three diesel generator rooms (1B, 2A and 2B) were not subject to the same problem. Several potential barriers that were identified on the drawings were either missing or degraded. On DG 1B, inspections revealed that there was one conduit on the DG side that was degraded but intact and conduits from the CMH going to DG 1B Room were open. These open conduits were subsequently sealed. There was no path, even during a PMP, that would cause DG 1B to become inoperable. On DGs 2A and 2B, there were no open conduits found on the DG side nor on the CMH going to the DGs.

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A review of modifications, work orders, and procedure changes performed since the last refueling outage did not reveal any changes being made to the affected flood protection barriers. The time frame for the existence of these flood protection deficiencies is indeterminate. There were no processes/procedures in place to periodically inspect these flood protection barriers.

Additionally, during the past 3 years, 1B DG was inoperable at various times for various reasons. With 1A DG determined to be inoperable due to this issue, both DGs would have been inoperable during those times, which is a condition prohibited by T.S. Also, because both DGs potentially could have been unavailable if a PMP event would have occurred during those times, this event is considered a safety system functional failure.

**CORRECTIVE ACTIONS**

Immediate:

1. Site personnel investigated and found the source of the water that was entering 1A DG Room.
2. Operations personnel made the required RC system alignments to terminate spillover from the upper Cooling Tower screens prior to causing damage to DG 1A.

Subsequent:

1. Work Orders were completed to inspect the conduit sleeves leading to the Unit 1 and Unit 2 DG Rooms and seal as needed.
2. An extent of condition (EOC) was performed for electrical conduit penetrations entering the Auxiliary Building.



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Planned:

1. Implement a preventative maintenance program to ensure that the identified flood protection barriers are inspected periodically. This will be driven by frequencies consistent with the characteristics of the materials of construction of the penetration seals used.

There are no NRC commitments contained in this LER.

**SAFETY ANALYSIS**

During a postulated design basis flooding event (PMP) the omission or degradation of flood protection barriers would have challenged the safe shutdown capability of 1A DG. DGs 1B, 2A, and 2B flood barriers were sufficiently intact and would not have been challenged by a PMP. Additionally, during the time that flood barriers for 1A DG were inadequate, DG 1B was taken out of service for various reasons. During the last three years, DG 1B was unavailable for approximately 187.74 hours. Therefore, at those times, had a PMP occurred, both DGs may have been unavailable to perform their safety function. No actual PMP event occurred during the time that the flood barriers were inadequate. Offsite power was available and would not have been affected by the condition identified in this LER. A risk assessment of this event determined that the Conditional Core Damage Probability (CCDP) associated with this event is  $< 1E-6$  on Unit 1. The Conditional Large Early Release Probability (CLERP) associated with this event is  $< 1E-7$  on Unit 1. Therefore, this event is of low risk significance.

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

**ADDITIONAL INFORMATION**

Within the last three years, there were no LERs involving an external flooding event that could have potentially challenged safe shutdown capabilities and that was attributed to a Possible Design,

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Manufacturing, Construction/Installation Deficiency. Therefore, this event was determined to be non-recurring in nature.

Energy Industry Identification System (EIIS) codes are identified in the text as [EIIS: XX]. This event is not considered reportable to the Equipment Performance and Information Exchange (EPIX) program.

This event is considered to be a Safety System Functional Failure.

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