



January 14, 2000

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating License DPR-58
Docket No. 50-315

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report System, the following report is being submitted:

LER 315/1999-029-00, "Battery Terminal Corrosion Results in Violation of Technical Specifications."

The following commitments were identified in this submittal:

- Battery surveillance and maintenance procedures will be revised by March 15, 2000, to identify the Technical Specifications-related battery conditions that could impact 250 VDC System operability.
- An amendment request will be submitted prior to Mode 4 operation for Technical Specifications Surveillance Requirement 4.8.2.3.2.c.2 to update battery maintenance requirements to those of the industry.

If you have any questions, please contact Mr. Robert C. Godley, Director, Regulatory Affairs, at 616/465-5901, extension 2698.

Sincerely,

A handwritten signature in black ink, appearing to read 'A. Bakken III', written over a circular stamp or seal.

A. Christopher Bakken, III
Site Vice President

/srd
Attachment

c: J. E. Dyer, Region III
R. C. Godley
D. Hahn
W. J. Kropp
R. P. Powers
R. Whale
NRC Resident Inspector
Records Center, INPO

LICENSEE EVENT REPORT (LER)

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

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 (1-6 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

FACILITY NAME (1) Cook Nuclear Plant Unit 1		DOCKET NUMBER (2) 05000-315	PAGE (3) 1 of 4
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TITLE (4)
Battery Terminal Corrosion Results in Violation of Technical Specifications

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	
11	18	1998	1999	-- 029 --	00	01	14	2000	FACILITY NAME	DOCKET NUMBER	

OPERATING MODE (9)	-	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)	0	20.2201 (b)		20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	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)		50.73(a)(2)(v)				
		20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)				Specify in Abstract below or n NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)	
NAME Ms. M. B. Depuydt, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) 616/465-5901, x1589

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

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)			MONTH	DAY	YEAR
YES	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>						
(If Yes, complete EXPECTED SUBMISSION DATE).									

Abstract (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)
 On December 17, 1999, it was determined that Donald C. Cook Nuclear Plant (CNP) was not in verbatim compliance with the wording of Technical Specifications (TS) Surveillance Requirement (SR) 4.8.2.3.2.c.2 due to minor surface corrosion identified November 18, 1998, on a terminal connection of the 1-BATT-AB battery. No action was taken to declare the battery inoperable in accordance with TS or to correct the condition. Additionally, during the investigation, CNP discovered that minor surface corrosion had also been identified on a terminal of the redundant 250 VDC safety related battery on March 16, 1999, but the battery was not declared inoperable in accordance with TS. During the period from March 16, 1999, until the corrosion was removed from the 1-BATT-CD battery on May 26, 1999, both batteries were inoperable without the TS required Action being taken. On December 17, 1999, the above-described conditions were determined to be reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), as conditions prohibited by the plant's Technical Specifications.

The cause was that CNP believed that compliance with the intent of the TS wording was deemed to be acceptable. Contributing causes were that the weekly battery maintenance procedure did not identify battery corrosion as a TS operability concern, and that TS SR 4.8.2.3.2.c.2 was not current with changes in industry standards. Corrective actions were to declare the 1-BATT-AB battery inoperable, verify that the remaining battery cell terminal connections for Units 1 and 2 were free of corrosion, and increase awareness of the need for verbatim compliance with the TS wording. Future actions are to provide training on Operability Evaluations and TS compliance, revise the battery maintenance procedures, and submit an amendment request for the battery TS SR.

There is no safety significance for this event because the 1-BATT-AB battery would have been capable of performing its safety related function even with the surface corrosion on a terminal lug.

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

Conditions Prior to Event

Unit 1 was de-fueled

Description of Event

On December 17, 1999, as a result of a Nuclear Regulatory Commission inspection and the subsequent follow-up investigation, it was determined that Donald C. Cook Nuclear Plant (CNP) was not in verbatim compliance with the wording of Technical Specifications (TS) Surveillance Requirement (SR) 4.8.2.3.2.c.2. The TS SR requires verification, at least once per 18 months, that the 250 VDC safety related battery cell-to-cell and terminal connections are clean, tight, free of corrosion, and coated with anti-corrosion material. Contrary to TS SR 4.8.2.3.2.c.2, on November 18, 1998, minor surface corrosion was identified at an inaccessible location on a terminal connection of cell 30 of the 1-BATT-AB battery; however, no action was taken to declare the battery inoperable in accordance with TS 3.8.2.4, or to correct the condition, until May 15, 1999. Note that TS 3.8.2.4, "DC Distribution – Shutdown," references the surveillance requirements of TS 3.8.2.3, "DC Distribution – Operating," to verify operability of the safety related batteries while in a shutdown condition. An Operability Evaluation was performed on May 15, 1999, which concluded that the battery was operable with a non-conforming item, specifically the minor deposit of corrosion on the surface of the terminal lug that was not part of the conducting path. Following the acceptance of the Operability Evaluation by Operations, the battery was considered to be operable and the corrosion remained. The NRC questioned the operability of the 1-BATT-AB battery due to the corrosion during an inspection in December 1999, and on December 17, 1999, the 1-BATT-AB battery was declared inoperable.

During the investigation, CNP discovered that minor surface corrosion had also been identified on the redundant 250 VDC safety related battery on March 16, 1999. Corrosion was identified on the positive post of cell 109 of the 1-BATT-CD battery, but the battery was not declared inoperable in accordance with TS 3.8.2.4. The Limiting Condition for Operation for TS 3.8.2.4 requires one operable 250 VDC bus and one operable 250 VDC battery bank and associated charger when the plant is in Modes 5 and 6. During the period from March 16, 1999, until the corrosion was removed from the 1-BATT-CD battery on May 26, 1999, both batteries were inoperable, without the TS 3.8.2.4 required Action to establish primary containment integrity within eight hours being taken.

Cause of Event

The cause of the event was that CNP subscribed to a standard of TS compliance in which compliance with the intent, rather than verbatim compliance with the TS wording, was deemed to be acceptable.

A contributing cause was that the weekly battery surveillance and maintenance procedure did not identify battery corrosion as a TS operability concern.

A second contributing cause was that TS SR 4.8.2.3.2.c.2 contains requirements that have not been maintained current with changes in industry standards. Specifically, an improved method of determining the effects of corrosion on battery terminal connections is by measurement of terminal connection resistance, and is now part of the surveillance requirements in the Improved Technical Specifications, NUREG-1431, "Standard Technical Specifications."

Analysis of Event

On December 17, 1999, the above-described conditions were determined to be reportable in accordance with 10 CFR 50.73(a)(2)(i)(B), as conditions prohibited by the plant's Technical Specifications.

Each CNP unit has two separately located sets of battery trains, which include the battery banks, distribution cabinets, control panels, buses, and individual feeders connecting the various loads. Each 250 VDC battery bank is comprised of 116 individual, series-connected, lead-acid cells. The individual battery cells and interconnecting cables are required to support the safety function of the 250 VDC Distribution System under normal operating or accident conditions.

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The TS surveillance requirements for maintaining the battery terminal connections free of corrosion are in place to ensure that the interconnections for the battery cells do not degrade and impact overall battery bank output. Once initiated, battery cell connection corrosion increases with time and can lead to connector degradation and an increase in cell connection resistance. Increased resistance would result in a corresponding decrease in overall battery bank output voltage and load capacity.

The industry guidance provided by the latest revision to Institute of Electrical and Electronics Engineers (IEEE) Standard 450-1995, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications," allows that, if terminal corrosion is noted, clean the visible corrosion off of the terminal and check the resistance of the connection. CNP battery maintenance procedures incorporate the guidance provided in IEEE Standard 450-1995. Inspections for corrosion are performed weekly as part of routine battery maintenance, and any accessible corrosion buildup is removed. If corrosion is identified and removed from the battery connections during the inspection, a battery terminal connection resistance check is performed to verify resistance less than a threshold value of 150 micro-ohms.

Further industry guidance is provided by NUREG-1431, which includes surveillance requirements to measure the resistance of the battery cell terminal connections to determine if degradation is occurring. To determine if any degradation of the terminal connection on cell 30 of the 1-BATT-AB battery had occurred, resistance measurement results were reviewed for the past 30 months. The comparison showed that the terminal connection resistance for cell 30 has remained constant throughout the period. Therefore, there is reasonable assurance that the electrical connection is free of corrosion, that the 1-BATT-AB battery would have been capable of performing its safety related function even with surface corrosion on a terminal lug of cell 30, and that the intent of TS SR 4.8.2.3.2.c.2 is met. The same reasoning applies for the condition with both redundant batteries inoperable due to surface corrosion on battery cell terminal connections during the period from March 16 through May 26, 1999.

Based on the low resistance values of the battery cell terminal connections, there is no safety significance associated with the failure to comply verbatim with the TS requirement for maintaining the battery terminal connections free of corrosion.

Corrective Actions

The immediate corrective actions were to declare the 1-BATT-AB battery inoperable, and to verify that the remaining battery cell terminal connections for Units 1 and 2 were free of corrosion. The 1-BATT-AB battery is scheduled for replacement prior to plant startup from the current outage, which will resolve the corrosion concern.

CNP has increased awareness of the need for verbatim compliance with the Technical Specifications wording. The Director of Regulatory Affairs issued a memo to all Department Heads for dissemination to all departmental personnel regarding the need to comply with both the exact wording and intent of TS. The memo defined Regulatory Licensing as the point of contact for all questions regarding verbatim compliance with the TS. As a communication tool, an article was published in the plant newsletter, for all personnel to read, that reinforced the need for compliance with both the letter and intent of TS.

Corrective actions to prevent recurrence include the following:

1. Training is being provided to appropriate personnel on these issues to emphasize that an Operability Evaluation cannot override compliance with the TS, and to reinforce verbatim compliance with the TS.
2. Battery surveillance and maintenance procedures will be revised by March 15, 2000, to identify the TS-related battery conditions that could impact 250 VDC System operability.
3. An amendment request will be submitted prior to Mode 4 operation for TS SR 4.8.2.3.2.c.2 to update battery maintenance requirements to those of the industry.

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Previous Similar Events

- 315/99-004-01
- 315/99-009-01
- 315/99-024-00
- 315/99-025-00
- 315/99-030-00