

NRC FORM 366 (5-92)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95
LICENSEE EVENT REPORT (LER)		ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNNB 7714), 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) Dresden Nuclear Power Station, Unit 3	DOCKET NUMBER (2) 05000249	PAGE (3) 1 OF 7
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TITLE (4)
Preconditioning Stationary Battery Prior To Modified Performance Test Inconsistent with Technical Specification Bases Caused by Personnel Error

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
04	19	97	97	005	00	5	16	97	None	
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)				
POWER LEVEL (10) 000	20.2201(b)	20.2203(a)(3)(i)	50.73(a)(2)(iii)	73.71(b)	
	20.2203(a)(1)	20.2203(a)(3)(ii)	50.73(a)(2)(iv)	73.71(c)	
	20.2203(a)(2)(i)	20.2203(a)(4)	50.73(a)(2)(v)	OTHER	
	20.2203(a)(2)(ii)	50.36(c)(1)	50.73(a)(2)(vii)	(Specify in Abstract below and in Text, NRC Form 366A)	
	20.2203(a)(2)(iii)	50.36(c)(2)	50.73(a)(2)(viii)(A)		
	20.2203(a)(2)(iv)	x 50.73(a)(2)(i)	50.73(a)(2)(viii)(B)		
	20.2203(a)(2)(v)	50.73(a)(2)(ii)	50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)	
NAME D. Spencer, Plant Engineering	TELEPHONE NUMBER (Include Area Code) Ext. 3292 (815) 942-2920

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 DATE (15)			
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).				<input type="checkbox"/> NO	MONTH 08	DAY 15	YEAR 97

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

On April 19, 1997, at approximately 0300, with all fuel removed from Unit 3 vessel for refueling outage (D3R14), Dresden maintenance and engineering personnel attempted a Modified Performance Test (MPT) on the Unit 3 250VDC battery to satisfy Technical Specification requirements. The test was performed after completion of maintenance which subsequently has been determined to be preconditioning. Though the preconditioning was not sufficient to invalidate the MPT, it is inconsistent with the bases of the Technical Specifications.

The preliminary cause of the event is personnel error, however, the root cause investigation is not yet completed and the finalized cause will be provided in a supplement to this LER. Corrective actions to be taken include procedure revisions and personnel discipline. This event is being reported under 10CFR50.73(a)(2)(i)(b). The safety significance of this event was minimal.

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PLANT AND SYSTEM IDENTIFICATION

General Electric - boiling water reactor - 2527 Mwt rated core thermal power.

Energy Industry Identification System (EIIIS) codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1934, IEEE Recommendation Practice for System Identification in Nuclear Power Plants and Related Facilities.

DC Power System - Class 1E [EJ]

EVENT IDENTIFICATION:

Preconditioning Stationary battery Prior To Modified Performance Test
Inconsistent with Technical Specification Bases Caused by Personnel Error

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: 04/19/97 Event Time: 0300
Reactor Mode: none Mode Name: No Mode Power Level: 0%
Reactor Coolant System Pressure: 0 psig

B. DESCRIPTION OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(i)(b), which requires the reporting of any operation or condition prohibited by Technical Specifications.

On April 19, 1997, at approximately 1000, with all fuel removed from Unit 3 vessel for refueling outage (D3R14), Dresden Maintenance and Engineering personnel (non-licensed) attempted a Modified Performance Test (MPT) on the Unit 3 250VDC battery to satisfy Technical Specification requirements. The test was performed after completion of maintenance which subsequently has been determined to be preconditioning. Though the preconditioning was not sufficient to invalidate the MPT, it is inconsistent with the bases of the Technical Specifications.

Background

In 1995, IEEE-450 "Maintenance, Testing and Replacement of Vented Lead Acid Batteries for Stationary Applications" was revised to allow the performance of an MPT. The MPT combines the battery Service test and the Performance test.

Previous to the 1995 revision, IEEE-450 identified a Service test, which demonstrates a battery's ability to meet its design bases function by simulating the load duty cycle expected during an accident. In accordance with Regulatory Guide 1.32, this test is to be performed every refuel cycle. IEEE-450 also specified that a Performance test be performed every 60 months in lieu of a Service test. The Performance test is a constant current test performed to determine a battery's capacity.

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The MPT introduced in the 1995 version of IEEE-450 combined the Service and Performance test and required a duty cycle which enveloped both tests.

In 1996, the Standardized Technical Specifications which included the MPT was approved, and the Technical Specification revision was implemented in January 1997.

Section 3/4.9.C of the Dresden Technical Specification bases states that "a MPT is a test of the battery capacity and the battery's ability to meet the loads that exceed the constant current discharge rate of the battery (high rate short duration loads) of the battery's duty cycle. This test satisfies the requirements of both a Service test and a Performance test..." The bases also states that "a battery Service test is a special test of the battery's capability "as found" to satisfy the design requirements of the D.C. electrical power system." Therefore, the MPT should be performed on a battery in the as found condition. Preconditioning is defined as any activities that would affect the results of the test. This is consistent with the recommendations of standard IEEE 450-1995.

Event Chronology

On April 26, 1996, anticipating the adaption of the Standardized Technical Specifications, the System Engineer (non-licensed) removed the 250VDC battery Service test from the D3R14 maintenance schedule because credit can be taken for a Service test when performing the MPT. Additionally, the System Engineer re-scheduled battery maintenance work following the Service test to prior to the MPT. He mistakenly believed that the MPT prerequisites were the same as the Performance test prerequisites which allows maintenance/preconditioning prior to performing the test. On August 6, 1996, the MPT procedure was issued. This procedure was reviewed by the System Engineer and it contained the prerequisite to perform the MPT with the 250VDC battery in the as-found condition. The as-found requirement of the MPT procedure was in conflict with the System Engineer's understanding that the MPT prerequisites were the same as the Performance test prerequisites, which allow maintenance prior to testing. This was a missed opportunity to identify the preconditioning issue.

During routine inspections of the 250VDC battery in late 1996, it was identified that numerous post seals were leaking and needed to be replaced. In addition, the post seals on cell number 48 could not be repaired and the cell needed to be replaced. In accordance with IEEE standard 450-1995, these corrective actions could be implemented as soon as the problems were identified. However, due to the availability requirements of the 250VDC battery, maintenance could not be performed until the next refuel outage (D3R14) when the battery would be taken Out-of-Service for testing. This work was improperly scheduled by the System Engineer to be performed prior to performing the MPT, during D3R14.

On February 4, 1997, the System Engineer, transferred out of Dresden Station Plant Engineering department and to ComEd's Commercial division. No permanent replacement for his position was/has been identified. The System Engineer assumed his new position under the condition that when the 250VDC MPT was to be performed, the System Engineer would return to Dresden, on a part time basis, to assist with test and system turnover.

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Based on guidance provided by the System Engineer, the battery was given a 222 hour equalize charge starting on April 3, 1997, in anticipation of conducting an MPT, and was completed on April 12, 1997. The System Engineer and Maintenance personnel believed that the MPT used the same prerequisites as a Performance test because the test title used the terminology "Performance", but the requirements per the IEEE-450 state to use the prerequisites of the Service test, which requires that the battery be tested in the as-found condition and that a equalization charge should not be allowed. However, the MPT procedure did have a conflict in that an equalization charge is recommended, but a prerequisite step of the MPT procedure requires that the test be performed on the battery in the as-found condition.

On April 10, 1997, during a review of the MPT procedure prior to performing the test or battery maintenance, the as-found prerequisite was identified by the Work Analyst/ DC Window Manager (WA) (non-licensed). The WA anticipated that the battery maintenance that was to be performed would violate the as-found prerequisite (note: the WA did not view the equalization charge as affecting the as-found condition of the battery because during his previous experience an equalization charge is performed for a "Performance" test and it was allowed by the MPT procedure). The WA contacted the System Engineer to resolve the issue. The System Engineer attempted to have the MPT procedure revised to remove the as-found prerequisite, but the Maintenance procedure writer (non-licensed) refused because the as-found requirement was contained in the IEEE standard and the Technical Specification's bases. The System Engineer then contacted Corporate Engineering to resolve the issue and Corporate Engineering responded with letter dated April 14, 1997. The letter stated in part, because sufficient maintenance was required on the battery and since a cell was being replaced, it was prudent to perform the test after all maintenance had been completed and an equalize charge had been received.

The Corporate Engineering view of the April 14, 1997, letter was to provide technical information concerning the MPT, not regulatory or administrative requirements of the Site. However, Station personnel viewed this letter as the authorization to proceed with the maintenance prior to performing the MPT, without properly revising the procedure or gaining regulatory relief.

Battery maintenance started on April 15, 1997, and was completed on April 19, 1997. On April 18, 1997, a Problem Identification Form (PIF) was written identifying that the maintenance and equalization charge was performed on the 250 VDC battery and that the MPT procedure's prerequisite for testing in the as-found condition could not be met. Work proceeded and an initial attempt at performing the MPT was made on April 19, 1997. The MPT was re-started on April 21, 1997, and then completed on April 22, 1997, in violation of the as-found prerequisite.

C. CAUSE OF EVENT:

The preliminary root cause of this event is personnel error (NRC cause code A). The System Engineer (non-licensed) did not fully understand the requirements for the MPT test as described in IEEE 450 and Technical Specification's bases (cognitive). The System Engineer assumed the MPT prerequisites were the same as the Performance test and did not verify this with the Technical Specification's bases, or through sufficient review of IEEE 450. Thus, when scheduling the

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battery maintenance and equalization charge, he improperly scheduled the maintenance prior to performing the MPT. Additionally, during reviews of the MPT procedure, the System Engineer did not identify the as-found prerequisite and missed an opportunity to resolve precondition issue prior to testing (cognitive). Maintenance and engineering personnel did not sufficiently question performing the procedure without meeting the as-found prerequisite. This resulted in performing the MPT procedure without properly revising the procedure or gaining regulatory relief from the as-found prerequisite (procedural).

The preliminary contributing cause of this event is Management deficiency (NRC cause code E). The work scheduling process relies on the System Engineer to properly sequence plant work during an outage. The system of checks used during the planning process failed to identify the error. Misunderstanding of codes and requirements by one individual resulted in the MPT being improperly performed.

The root cause investigation for this event is not yet complete. The final root cause will be provided in supplement to this LER.

D. SAFETY ANALYSIS:

Per the IEEE requirements, necessary maintenance can and should be performed on a battery as necessary when a detrimental condition is found. As such, the post seal repairs as well as the cleaning and retorquing of the intercell connectors performed just prior to the modified performance test could have been performed in 1996 when these problems were first identified. This maintenance would not be considered as pre-conditioning the battery or affecting the results of the modified performance test. Furthermore, a comparison of the as found to the as left intercell connection resistances indicates that the remake of the intercell connections changed the overall resistance of the battery connections by only 120-150 micro-ohms. During the first minute high rate, the change in resistance would affect the terminal voltage by about 0.15 volts out of 217.4 volts measured and a minimum acceptable voltage of 210 volts. During the long duration current of 273 amperes, the change in resistance would affect the terminal voltage by about 0.04 volts. Since the test was stopped due to potential cell reversal with a 212 volt terminal voltage, the change in resistance did not change the acceptability of the results.

Per the IEEE standard, the battery is to be tested in the as found condition which would preclude the use of an equalize charge prior to the test. However, a review of the charge given to the battery prior to the test indicates that the voltage used (2.25VPC) was within the float range for these cells (2.20 - 2.25 VPC). A generally accepted equalize voltage is 2.33 to 2.39 VPC. Lower voltages may be listed in vendors operation manuals, but all vendors specify the use the highest voltage allowed by the system, and if a lower voltage doesn't work the vendor recommends that a higher voltage be used. Therefore, although the charge voltage was increased prior to the test, the increased voltage would not significantly affect the battery's performance during the test.

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Lack of preconditioning is evidenced by comparing the last quarterly voltage readings taken on March 26, 1997, to the pretest readings taken on April 18, 1997, after the equalize charge was complete. The average cell voltage on both dates is 2.20 Vdc. Also, the range of voltages on the quarterly reading was 0.09 Vdc (2.16 to 2.25, with one outlier at 2.29) while the range of pretest voltages was 0.08 Vdc (2.15 to 2.23). After an equalize charge, the range of cell voltages is expected to be much less, on the order of 0.04 Vdc. This is shown by the cell voltages taken on 4/25/97 after completion of a true equalize charge at 2.39 volts per cell. The average cell voltage was 2.22 Vdc and the cells were more tightly grouped around that average. The range of voltages on that date is 0.04 Vdc (2.19 to 2.23) with only three cells at the low end and seven cells at the high end.

Review of Test Results

The battery passed the modified performance test at 101% with an acceptance criteria of 80%. This result is conservative because the test had to be stopped prior to the battery terminal voltage reaching 210 Vdc. The test was stopped because the new cell (# 48) was approaching cell reversal voltage of 1.00 Vdc. At the time the test was stopped, terminal voltage was 212.8 Vdc. The new cell had been received from the vendor and was to be given a freshening charge per the vendor's instructions. However, a review of work package indicates that the freshening charge was stopped prematurely. The cell did perform at approximately 97% which is acceptable. Also, a review of the post test cell data indicates that the cell is within the acceptable float voltage range with the other cells.

Conclusions

The prerequisite of performing the test in the as-found condition was not met in that an attempt to precondition the battery (equalizing charge) was made prior to the test. However, from a technical basis, as summarized below, the activities prior to the test did not bias the test results and the test is considered valid.

The voltage used to equalize the battery was insufficient to provide a true equalize charge as the voltage used was only on the high side of the float range. Cell voltages from the prior quarterly surveillance and the readings taken prior to the test indicate that the equalize voltage used did not significantly precondition the battery.

The maintenance on the post seals resulting in remaking connections did not significantly change the intercell connection resistance. Also, the replacement of cell #48 lowered the battery test results due to improper freshening charge. Therefore, based on the above, the maintenance actions performed on the battery prior to the modified performance test did not precondition the battery to obtain a better result.

Based on the above conclusions, the safety consequences of this event were minimal.

E. CORRECTIVE ACTIONS:

The MPT test documentation was reviewed to assure an acceptable test in accordance with Station procedures on Operability Evaluations. (complete)

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Procedure DES 8300-20 (MPT procedure) will be revised to reflect proper sequencing of maintenance as well as instructions concerning as-found and preconditioning issues. (2371809700501)

Station battery testing and maintenance procedures will be reviewed to verify proper instructions concerning as-found requirements and preconditioning issues. (2371809700502)

A sample review of completed Electrical Maintenance work packages will be performed to verify compliance with Station policy concerning development and revisions to the packages. (2371809700503)

The last 250VDC and 125VDC battery discharge tests will be reviewed to verify compliance with as-found requirements and preconditioning issues. (2371809700504)

A sample review of Engineering letters will be performed to verify compliance with Station policy concerning development and revisions to procedures and work packages. (2371809700505)

The Maintenance Manager provided a letter to all Maintenance Department Personnel reiterating the Station's procedure adherence requirements. (complete)

The Site Engineering Manager provided a letter to all site Engineering Personnel communicating that no Technical Evaluations (Engineering Correspondence) should be construed as authority to omit an existing procedure step or to circumvent an administrative process. (complete)

The results of the root cause investigation and any significant corrective actions will be reported in a supplement to this LER. This supplement will include a review of personnel performance, and address prior similar occurrences and the effectiveness of their corrective actions. (2371809700506)

F. PREVIOUS OCCURRENCES:

None currently identified.

G. COMPONENT FAILURE DATA:

There is no component failure identified with this event; therefore, this section is not applicable.