

LICENSEE EVENT REPORT (LER)

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 (T-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)

Dresden Nuclear Power Station, Unit 2

DOCKET NUMBER (2)

05000237

PAGE (3)

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Historical Testing of 250 VDC Systems Did Not Meet Technical Specification Surveillance Requirements Due To A Design Error In Establishing The Worst Case Battery Load Profile

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
08	12	97	98	013	00	09	22	98	Dresden Unit 3	05000249
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A

OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more) (11)
1	20.2201(b) <input type="checkbox"/> 20.2203(a)(2)(v) <input checked="" type="checkbox"/> 50.73(a)(2)(i) <input type="checkbox"/> 50.73(a)(2)(viii) <input type="checkbox"/>
POWER LEVEL (10) 098	20.2203(a)(2)(i) <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 50.73(a)(2)(ii) <input type="checkbox"/> 50.73(a)(2)(x) <input type="checkbox"/>
	20.405(a)(1)(ii) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 73.71 <input type="checkbox"/>
	20.2203(a)(2)(ii) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.73(a)(2)(iv) <input type="checkbox"/> OTHER <input type="checkbox"/>
	20.2203(a)(2)(iii) <input type="checkbox"/> 50.36(c)(1) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/>
	20.2203(a)(2)(iv) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.73(a)(2)(vii) <input type="checkbox"/>

Specify in Abstract below or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME

J. Kovach, Design Engineering

TELEPHONE NUMBER (Include Area Code)

(815) 942-2920 ext 3645

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)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

X

NO

EXPECTED SUBMISSION DATE (15)

MONTH

DAY

YEAR

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

During a review performed August 25, 1998 of historical operability determination issues, it was determined that 250 Volt DC (VDC) System service tests performed prior to August 1997 did not meet technical specification (TS) surveillance requirements, which requires the issuance of a Licensee Event Report. The cause is contributed to a design error in establishing the worst case loading profile for the battery 4-hour duty cycle. The battery sizing calculation did not take into consideration a possible abnormal battery charger lineup that would have placed an additional 75 amp (A) load on the battery given a postulated design basis single active failure. The safety significance of this event was minimal. An operability evaluation determined that the 250 VDC System would have been capable to support required safety systems as designed. The immediate corrective action was to revise station procedures to prevent a battery charger lineup that would place the additional loading on the battery under the postulated single failure scenario. The battery sizing calculation was revised to reflect the additional loading. The revised calculation reflects a positive margin for both unit batteries. The Unit 2 battery service test, which included the additional battery load, was successfully completed during Unit 2, March 1997 outage (D2R15). The Unit 3 battery service test is scheduled for the Unit 3, February 1999 outage (D3R15). Long term corrective actions are in place to improve the quality of calculations performed for the Dresden station. A search of the Institute for Nuclear Power Operations (INPO) and Dresden Performance Information Form (PIF) databases was performed and one similar Licensee Event Report (LER) involving a calculation design input error was identified.

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PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2527 MWt rated core thermal power

Energy Industry Identification System (EIS) Codes are identified in the text as [XX] and are obtained from IEEE Standard 805-1984, IEEE Recommended Practice for System Identification in Nuclear Power Plants and Related Facilities.

EVENT IDENTIFICATION:

Historical Testing of 250 VDC Systems Did Not Meet Technical Specification Surveillance Requirements Due To A Design Error In Establishing The Worst Case Battery Load Profile

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 2	Event Date: 8/25/98	Event Time: 1710 CDT
Reactor Mode: 1	Mode Name: Run	Power Level: 098
Reactor Coolant System Pressure: 1000 psig		

In August of 1997, Operability Determination 97-87 was performed to evaluate the operability of the 250 VDC System [EJ] to accommodate an additional battery loading of 75A during the required 4-hour duty cycle. The operability determination concluded that analytically, sufficient margin remained in the batteries to accommodate the additional battery loading and that future battery service tests would verify the TS surveillance requirement. A procedure revision was performed to prevent a 250 VDC System configuration that would place the additional loading on the battery until service testing could verify the revised battery loading profile.

B. DESCRIPTION OF EVENT:

This LER is being submitted pursuant to 10 CFR 50.73(a)(2)(i)(B), which requires the reporting of any operation or condition prohibited by plant's Technical Specifications.

On August 25, 1998, during a review of historical operability determination 97-87, it was determined that past 250 VDC battery service tests did not meet the Surveillance Requirement of TS 4.9.A.3 (Previous TS)/ 4.9.C.4 (Current TS). The surveillance requires that the battery service test be performed to verify that battery capacity is adequate to supply and maintain operable the actual or simulated loads for the design duty cycle. The surveillance tests that were performed did not test all loads that could have been connected to the 250 VDC bus during and following an accident while postulating a design basis single active failure (i.e., loss of an emergency diesel generator). The past service tests did not include a 75A uninterruptable power supply (UPS) load that the 250 VDC bus could experience during the required duty cycle.

The initial battery sizing calculation (Revision 0, dated 10/31/91) was based on a normal battery charger lineup. Under this lineup, the normal battery chargers are fed from the Unit 2/3 emergency diesel generator (EDG) busses and the Unit 2/3 battery charger is fed from the unitized EDG busses. The following design basis assumptions, as reflected in Revision 2 (12/18/91) of the battery sizing calculation were made in determining the 250 VDC battery charger lineup and UPS operation:

- Unit 2 and 3 Battery Chargers are normally connected to their respective 250 VDC busses. These battery

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chargers are supplied from AC busses energized by the 2/3 EDG. The 2/3 EDG is the postulated single active failure that results in the loss of the battery chargers supplying the 250 VDC System.

- The Essential Service System (ESS) Uninterruptible Power Supply (UPS) is supplied from the AC bus that is energized from the unit EDG (Battery Charger 2 supplied from EDG 2 and Battery Charger 3 supplied from EDG 3). Since the UPS is supplied from ac busses energized by a different EDG, the postulated single active failure will not result in the UPS being an extended load on the 250 VDC System.

Under an abnormal lineup of the battery charger such that the 2/3 Battery Charger is connected to the 250 VDC System and the charger input and output are aligned to the same unit, a single active failure of the unit EDG supplying the battery charger would result in the ESS UPS being a continuous load on the battery during its 4-hour duty cycle. This condition has not been reflected in battery load profiles used in past battery service test.

Although currently no operability concerns exist, the inadequate surveillance testing of the batteries constitutes a historical condition that was prohibited by the plant Technical Specifications.

C. CAUSE OF EVENT:

The cause of the event is attributed to a design error in establishing the worst case load profile for the battery 4-hour duty cycle. The root cause is an inadequate calculation process that led to a failure to clearly document the justification for calculation design bases and assumptions, and as a result, the battery sizing calculation did not account for an abnormal system lineup configuration that reflected a more severe equipment load profile. (NRC Cause Code E)

In October 1991, during a Unit 3 refueling outage, the Unit 3 250 V Battery failed its service test. This was the first service test performed on this battery. The failure to restore the battery to an operable status within the LCO time limit led to the shutdown of Unit 2 because of the cross-tied configuration of the 250 VDC system. An extensive effort was put forth by the station to resolve this issue and return the unit to service in a timely manner.

A total redevelopment of the battery load profile and performance of the service test to the revised load profile was included in this effort. The revised load profile was documented in a new battery sizing calculation (revision 0) issued on October 31, 1991. The calculation included the bases and assumptions for the development of the new battery load profile. In this revision of the calculation, the UPS was included as a 4-hour load, the unit battery charger was assumed to fail, and all equipment was in its normal operating lineup. A normal lineup for the battery chargers would have the unit chargers being supplied by the 2/3 swing EDG backed bus and the UPS supplied by the unit EDG's. Under these bases, the UPS would not be a load on the battery once the unit EMD's were connected to their respective busses (i.e., greater than 10 seconds). Never the less, the UPS was included for the full duty cycle, however, a detailed explanation of the bases was not included in the calculation. The bases and assumptions of Revision 0 were reviewed by the Onsite Review Board.

Further refinement of the battery load profile, bases and assumption continued following issue of Revision 0 of the

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battery sizing calculation. In Revision 2 of the calculation (issued 12/18/91), the UPS load duration was changed from the full 4-hour duty cycle to 15 seconds. This change was made to account for the fact that, as described above, under normal system lineup and the failure of the 2/3 EDG, the UPS would be powered from the unit EDG backed busses and, therefore, would not be a continuous load on the battery. It is believed that no abnormal battery charger lineup was considered because the Technical Specifications bases at that time limited a battery charger out of service to 30 days. The Technical Specifications have since been revised under the Technical Specification Upgrade Program (TSUP) to remove this limiting condition and only require one fully operable battery charger. A detailed explanation of these bases were also not included in Revision 2 of the calculation. In addition, there is no evidence that indicates that the revised bases and assumption receive an Onsite Review as was done for Revision 0.

The following weaknesses in the calculation process existed at the time the initial battery sizing calculation was prepared:

1. A formal ComEd calculation procedure did not exist.
2. A formal ComEd procedure for establishing design input requirements did not exist.
3. There was no established requirement that AE calculations be reviewed and accepted by ComEd prior to use.

Procedures have since been developed to provide specific requirements for addressing design inputs and the use of calculations in design applications. The procedures also discuss operational requirements that are to be addressed in calculations that include system abnormal and emergency operations. Architectural/Engineer's are required to work to ComEd procedures when preparing calculations for use at the Dresden station. Source of design inputs are to be formally documented and ComEd cognizant engineers are required to review and validate design basis to be applicable and current.

The following inappropriate actions were identified in the work activities related to the battery sizing calculation:

1. Bases and assumptions with respect to system lineups and single failures selected were not adequately addressed in the calculation.
2. A revision was made to the calculation and its impact on previously established design basis was not addressed.

D. SAFETY ANALYSIS

An operability evaluation determined that positive margin still existed for both batteries with the additional UPS load and the 250 VDC system would have been capable of supporting required safety systems as designed.

There was no potential for radiation releases to the site or public. At no time were any plant systems determined to be inoperable. The health and safety of the public were not compromised as a result of this event. Therefore, the safety significance is minimal.

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E. CORRECTIVE ACTIONS:

1. At the time of the initial operability determination, immediate corrective action was taken to place a Caution Card on the Swing Battery Charger 2/3 to require entry into TS 3.9 if aligning this charger to a Unit's battery was required. (Complete)

NOTE: The action has been lifted with the completion of Action Item 2.

2. Revise Procedure 6900-01, "250 VDC Electrical System" to not allow alignment of the 2/3 250 VDC swing battery charger AC feed to be to from the same unit that the battery and load is being supplied by the charger's DC output. This ensued that the UPS would not be a load on the battery for more than 15 seconds until the service tests on both unit batteries can validate the revised load profiles of a 4-hour UPS loading. (Complete)
3. Revise the 250 VDC battery sizing calculation to include the ESS UPS as a 4-hour continuous load. (Complete)
4. Perform a battery service test for the Unit 2, 250 V battery, using the revised load profile that included the ESS UPS as a 4-hour continuous load. (Complete)
5. Perform a battery service test for the Unit 3, 250 V battery, using the revised load profile that included the ESS UPS as a 4-hour continuous load. (NTS 237-180-98013-01)
6. A procedure (NEP-12-02) was developed to address the preparation of calculations. The procedure has been revised periodically in a continuing effort to provide procedural direction to improve the quality of calculations. The procedure provides requirements for Design Inputs, including a requirement for formal documentation of the source of design inputs. (Complete)
7. In response to calculation concerns raised during the NRC ISI in the fall of 1996, procedure (NEP-12-01) was prepared to address design input requirements. The procedure establishes the method of preparation, review, and approval of Design Input Requirements for a design change or calculations. The procedure discusses operational requirements that are to be addressed in calculations that include system abnormal and emergency operation. (Complete,)
8. A program (DTI DE-014, Rev. 0, dated 09/05/96) has been established to monitor and improve the quality of calculations produced for the Dresden station. The program includes guidance for addressing and learning from comments made from offsite reviews performed by the ComEd Chief Engineers. (Complete)

F. PREVIOUS OCCURRENCES:

A search was conducted of the PIF data base for the last two years concerning LER's in the area of calculation design errors resulting from an inadequate calculation process. The following similar LER event was found:

LER 97-007, Dresden Unit 3, LPCI Recirculation Loop Line Break Detection 900 psig Reactor Pressure Permissive Setpoint Set Outside Design Basis Limit Due to Personnel Error.

This event also involved a calculation design input error. The calculation was prepared in 1993, also prior to establishment of ComEd's formal calculation process. Similar corrective actions to establish and formalize the

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calculation preparation and review process were noted in LER 97-007.

An OPEX review of LER's and industry events was also conducted and no similar events of inadequate surveillance testing resulting from incorrect design bases assumptions were found.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number
Not Applicable		