Commonwealth Edison
Dresden Nuclear Power Station
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June 21, 1994

GFSLTR 94-0205

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

Licensee Event Report 94-013, Docket 50-237 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10CFR50.73(a)(2)(iv).

Sincerely,

Gary F. Spedl
Station Manager
Dresden Station

GFS/TCW:cfq

Enclosure

cc: J. Martin, Regional Administrator, Region III
NRC Resident Inspector's Office
File/NRC
File/Numerical

JE77

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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 (MNBB 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Dresden Nuclear Power Station, Unit 2	05000237	1 OF 8

TITLE (4)
Auto Initiation of Diesel Generator 2/3 During Modification Due to Design 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
									None	
05	23	94	94	-- 013 --	00	06	22	94	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	089

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	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)	X	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)		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	TELEPHONE NUMBER (Include Area Code)
Thomas C. Wolz, Site Engineering Ext. 2567	(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)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

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

During preparations for an operations surveillance, an inadvertent automatic start of the Unit 2/3 Diesel Generator was received when the newly installed Bus 33-1 to Bus 23-1 bus tie breaker was closed. Investigation of the event identified that the recently installed modification contained a design discrepancy that was undetected by the design checking process or installation and testing personnel. The discrepancy resulted in the control circuits for the Bus 33-1 breaker of the Bus 33-1 to Bus 23-1 Tie, the Bus 33-1 Main Feed breaker, and the Unit 3 automatic start of the Unit 2/3 Diesel Generator being superimposed. This wiring error did not prevent any system from providing its safety function. The immediate corrective actions included diagnosis of the wiring discrepancy, development of a work package to correct the discrepancy, and an additional design and field wiring review prior to successful completion of the operations surveillance. Additional corrective actions include a lessons learned notification to the design organization at this and other company sites reinforcing the expectations and requirements of the design program.

EVENT IDENTIFICATION:

Auto Initiation of Diesel Generator 2/3 During Modification Due to Design Error

A. PLANT CONDITIONS PRIOR TO EVENT:

Unit: 2 (3) Event Date: 05/23/94 Event Time: 0637

Reactor Mode: N (N) Mode Name: Run (Refuel) Power Level: 89% (0)

Reactor Coolant System Pressure: 1003.5 psig (0 psig)

B. DESCRIPTION OF EVENT:

On May 23, 1994 with Unit 2 in Run mode at 89% power and Unit 3 in Refuel mode, Operations department personnel were making preparations to perform logic testing on the Unit 3 auxiliary electrical system [EB] per Dresden Operating Surveillance (DOS) 6600-03. Per the procedure, the control room operator attempted to close the Bus 33-1 to Bus 23-1 tie breaker to establish initial conditions for the test. When the control switch for this breaker was taken to the close position, an automatic initiation of the Unit 2/3 Diesel Generator [EK], an annunciator for a Unit 3 125 volt DC system [EJ] negative ground, and an annunciator for a Unit 2 125 volt DC system positive ground were received in addition to the closing of the breaker. The operator immediately re-opened this breaker and verified proper operation of the diesel generator. After allowing the diesel generator to run briefly, it was secured in accordance with station procedure.

The Bus 33-1 to Bus 23-1 tie breaker had been recently installed in accordance with Modification M12-0-91-018B and tested in accordance with Special Procedure 93-10-88 to verify operability of tie breaker control logic prior to returning the Unit 2/3 Diesel Generator to service on April 23, 1994. The Bus 33-1 to Bus 23-1 tie remained out of service pending the completion of modification testing for an unrelated portion of the tie breaker control circuit per DOS 6600-03. Site Engineering and Construction (SEC) and Operational Analysis Department (OAD) personnel were notified and assisted Operations personnel in the diagnosis of the problem. Through use of the drawings for the modification and field measurement at various places in the control logic, the cause of the initiation was identified to be a cross wiring of the Bus 33-1 to Bus 23-1 tie breaker closing circuit with the Unit 3 automatic start circuit for the Unit 2/3 Diesel Generator due to a discrepancy in the wiring drawings. A change to the wiring prints was initiated and a work package was prepared and approved to correct the discrepancy. A further investigation of this modification was initiated in order to verify that no other discrepancies of this nature existed with this modification or other recently installed modifications prior to continuing with DOS 6600-03 or performing testing for the corrective work for this discrepancy. After determining that there were no other discrepancies of this nature, testing was allowed to proceed and was successfully completed on the morning of May 26, 1994.

C. CAUSE OF EVENT:

This Licensee Event Report is submitted in accordance with 10CFR50.73(a)(2)(iv) which requires the report of any unexpected initiation of an Emergency Safety Feature (ESF) system.

The cause of the event was a wiring error during the installation of the Bus 33-1 and Bus 23-1 Tie modification due to a design error in the installation drawings (see Attachment A). The control circuitry for the Bus 33-1 breaker for the Bus 33-1 and Bus 23-1 Tie, the Bus 33-1 Main Feed breaker, and the Unit 3 automatic start of the Unit 2/3 Diesel Generator were superimposed, resulting in the automatic start signal to the generator when the Bus 33-1 to Bus 23-1 tie breaker was closed.

Other contributing factors were identified which led to the discrepancy and its failure to be detected throughout the process of design, installation, and testing of the modification. First, the organization performing the design of this modification did not identify the discrepancy during the initial design or through their internal checking process. Termination / determination checklists or "wiring lists" were prepared from a combination of the wiring diagrams and the cubicle wiring lists provided by the switchgear vendor. These lists were prepared as recommended by design procedure for complex modifications due to a lack of true existing wiring diagrams for the internal wiring of the switchgear cubicle. The arrangement of the external wiring diagram which depicted the "ZW" and "ZX" terminal blocks with a faint separation between blocks contributed to the initial error of listing the incorrect destination points on the wiring diagrams at the other end of the affected wires and on the wiring lists (see Attachment B). The design package, including the drawings, were subsequently issued to the station for comments.

During the comment process and field walkdowns, this discrepancy was not identified by station personnel or by field engineers for the design organization. In performing wiring walkdowns in the field, it is not apparent that the wiring diagram and the wiring lists were used concurrently. The design package was issued to the station for field implementation.

The third opportunity to identify this discrepancy existed during the development of the work instructions. The package preparer listed the wiring terminations and verifications in the work package as shown on the wire list. The wiring diagram, although noted in the work package, was not referenced and used in conjunction with the wiring list because the wire lists were more comprehensive. The work package was reviewed and approved.

The fourth opportunity occurred during installation. The installation personnel and the quality control inspector noted that three lugs were landed at one terminal point at the location the work package instructed them to land the new wires. This condition is not normally within work practices; however, it is permissible if specifically identified on drawings. The QC inspector looked at the wiring diagram and identified that the three existing wires were in fact identified on the drawing at the same side of the terminal block, not identifying that the new wires were not shown at this point as the wiring lists would indicate.

Finally, this discrepancy was not identified by testing personnel because the Bus 33-1 Feed breaker control circuit and the 2/3 Diesel Generator auto start circuit from Unit

3 were out of service and therefore isolated from the Bus 33-1 to Bus 23-1 tie breaker at the time testing was performed. The Bus 33-1 to Bus 23-1 tie breaker performed as specified by the schematic diagram under this set of conditions. Since the Bus 33-1 Feed breaker control circuit and the 2/3 Diesel Generator auto start circuit from Unit 3 were not supposed to be affected by this modification, there was no reason to require those circuits to be energized when performing the testing for this modification.

D. SAFETY ANALYSIS:

The Bus 33-1 and Bus 23-1 crosstie was being installed under the Station Blackout commitment per 10CFR50.63 to improve the independence of offsite power. Overall testing of the new system was not complete at the time of the event and it was not considered operable. The Unit 2/3 Diesel Generator is designed to automatically start and load to Division I of the unit from which the intiation was received upon an undervoltage signal on either the turbine building or reactor building bus, an ECCS initiation signal, or a main and reserve feed breaker open concurrently to the turbine building bus from the switchyard. Bus 33-1 is the Unit 3 4kV Division I reactor building bus providing power to all essential Division I reactor building equipment. Its normal source of power is via the Bus 33-1 Main Feed breaker from Bus 33. The 2/3 Diesel Generator is the reserve power feed to Division I on both units. The new Bus 33-1 to Bus 23-1 tie provides an additional reserve power feed to the Division I buses via offsite power from the opposite unit.

A review of the circuit with the wiring discrepancy installed identified that several different inadvertent actuations could have occurred dependent on the initial conditions. The close circuit for the Bus 33-1 crosstie breaker, the Unit 3 automatic start circuit for the Unit 2/3 Diesel Generator, and the Bus 33-1 Main Feed Breaker close circuit were inadvertently tied together. The actuation of any one of these components could have resulted in the actuation of all three components under specific conditions. When the Bus 33-1 crosstie breaker was closed, Unit 3 125 volt DC system positive voltage was applied to a portion of the Unit 2/3 Diesel Generator auto start circuit with Unit 2 125 volt system negative potential for the duration that the control switch was in the close position. The potential difference in this case was large enough to result in the momentary actuation of the automatic start relay, but not large enough to generate enough current to open the protective fuses for the circuit.

The 125 volt DC systems remained available to provide control power and its safety functions to equipment on both units. Ground alarms were received on each unit when the breaker control switch was placed in the close position. These ground paths were immediately isolated by the placement of the Bus 33-1 crosstie breaker in the Pull-to-Lock position. Although the Unit 2/3 Diesel Generator automatic start circuit for Unit 3 was affected by this wiring discrepancy, the ability of the circuit to provide an automatic start to either unit was not disabled. The Unit 2 and Unit 3 Diesel Generators were also available at the time to provide auxiliary power to Division II equipment on Units 2 and 3 respectively. Since the systems involved in this event remained available to provide their safety functions, and the redundant equipment was also available at the time, the safety significance of this event is minimal.

E. CORRECTIVE ACTIONS:

Immediate corrective actions included diagnosis of the wiring discrepancy, development of an approved work package to correct the discrepancy, and development of an approved testing package to verify the correction of the discrepancy.

Prior to performing DOS 6600-03, a review was implemented to determine the susceptibility of other electrical modification design work to a comparable error. The review focused on modifications performed during the time period since the previous performance of DOS 6600-03 to verify the surveillance test would proceed without the occurrence of other events. After performing the review and determining that no other adverse conditions were created by the installation of modifications, the operations department was informed to proceed with the performance of the test. DOS 6600-03 was successfully completed on May 26, 1994.

A review of the effects of the event on the 125 volt DC systems was completed to verify that the operation of the equipment in this configuration did not degrade the system. Since the fuse protection on both the automatic start relay circuit and the Bus 33-1 to Bus 23-1 tie breaker control circuit remained intact, the review concluded that the systems components (i.e. fuses, control and synchro switches, the autostart relay coil) did not suffer any apparent degradation due to this event. The control circuit fuses for the automatic start relays that experienced the current flow due to the error were replaced as a conservative measure to ensure that they had not partially opened due to the event.

The design organization preparing the design of the modification had initiated and implemented corrective actions to improve their design checking processes prior to the event but subsequent to the issue of the design to the station.

The equivalent Bus Cross-tie Modification at Quad Cities Station, Units 1 and 2 were reviewed by the design site engineering electrical group. No errors were discovered.

A Corporate Lessons Learned Initial Notification will be distributed to the corporation through the Lessons Learned program. Corporate engineering also will provide a communication vehicle to ComEd engineering personnel and Architect Engineering organizations describing specifics of the event and reenforcing walkdown expectations. (Outstanding Corrective Action #1)

The walkdown procedure (PEG-003) for the design organization will be revised to reinforce the requirements of the existing procedure and to provide additional guidance and expectations for the method used in performing walkdowns. Examples of these enhancements include:

- Documenting walkdown exceptions to include documentation of inaccessible walkdown areas in the design documents with a plan to walkdown prior to or at the start of construction.

- Adding statement that when wire lists have been prepared and are available, they are to be used in conjunction with the design drawings

when conducting walkdown involving wiring inspection and/or verification. (Outstanding Corrective Action #2)

F. PREVIOUS OCCURRENCES:

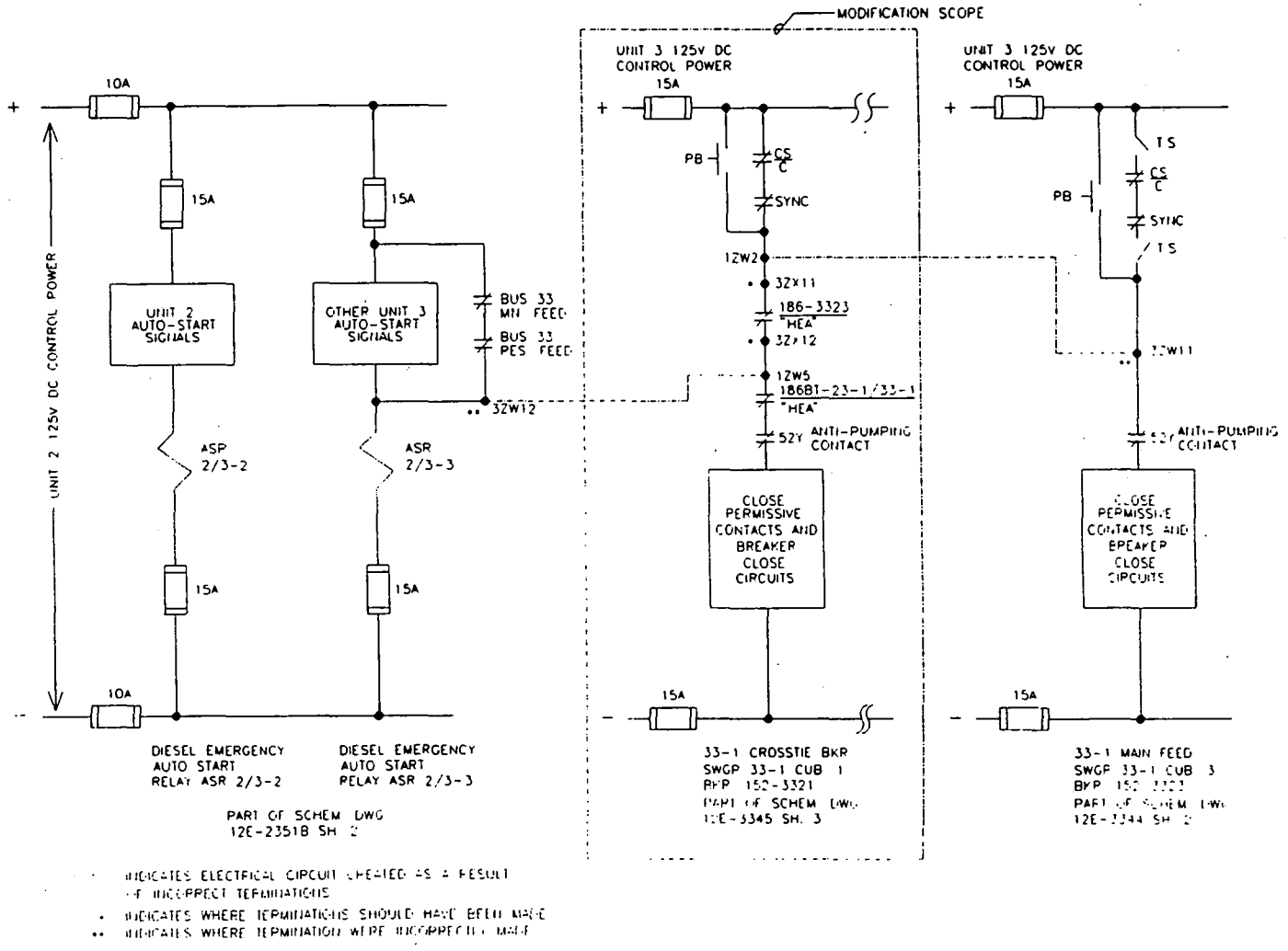
LER/Docket Numbers	Title
88-023/05000265	Failure of MCC 28/29-5 Main Feed Swap-Over Due to an Unlanded Lead Caused by an Installation Error. This wiring error was found during outage testing and was attributed to an initial construction mistake. Corrective actions included development an action plan for reviewing untested components for possible failures.

G. COMPONENT FAILURE DATA:

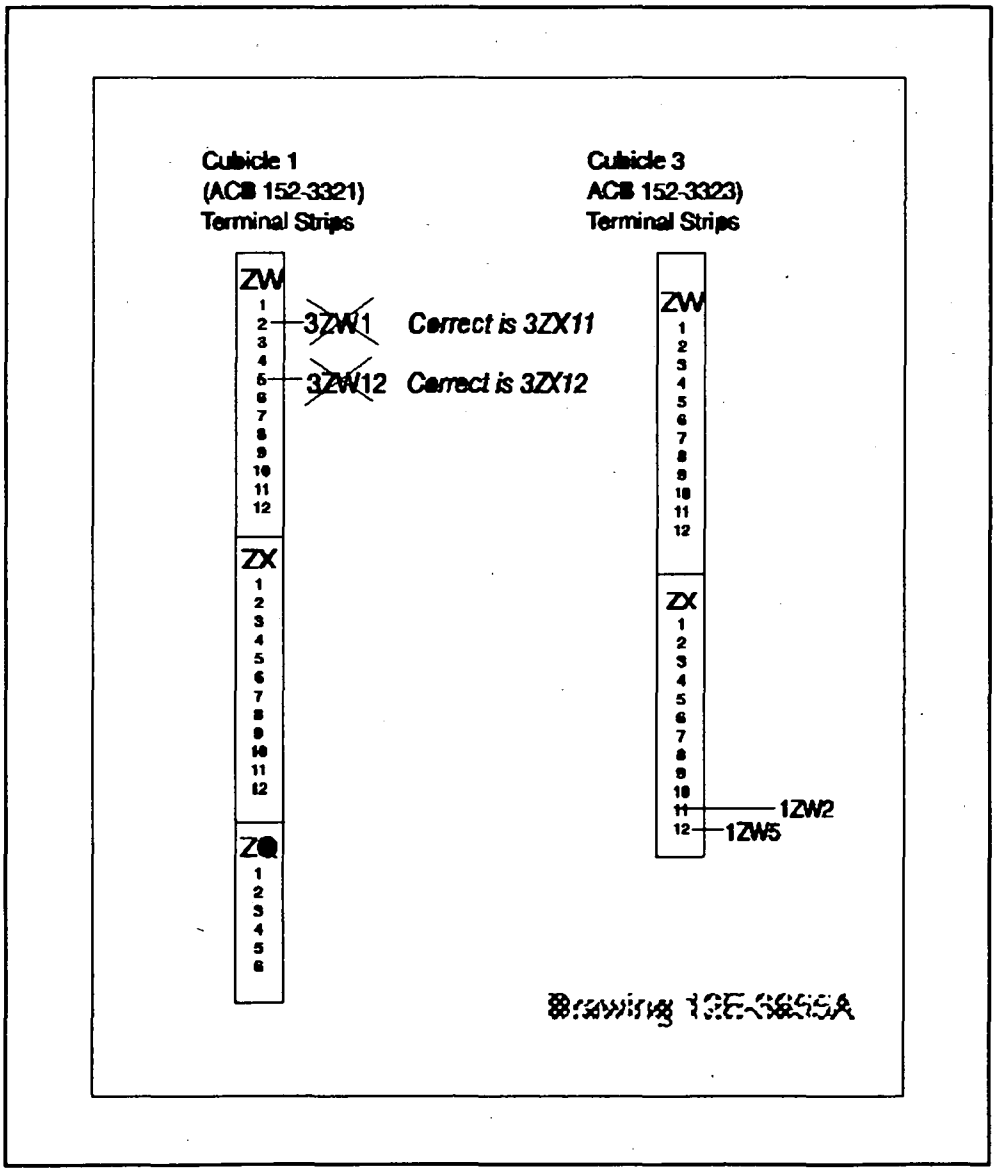
There were no observed component failures contributing to this event.

Attachment A

SIMPLIFIED SCHEMATIC SHOWING SNEAK CIRCUIT CREATED BY WIRING ERROR



Attachment B



Identification of the Design Error Included in Electrical Drawing 12E-3655A