NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Perry Nuclear Power Plant, Unit 1	0 5 0 0 0 4 4 0	1 OF 0 3

TITLE (4) Improper D.C. Bus Transfer Due To Operating Error Results In A Complete Loss Of Feedwater And A Reactor Scram On Low Reactor Water Level

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 NAMES	DOCKET NUMBER(S)
										0 5 0 0 0
0 4	2 7	8 8	8 8	— 0 1 2	— 0 0	0 5	2 7	8 8		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
1		20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	1 0 0	20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Gregory A. Dunn, Compliance Engineer, Extension 6484	2 1 6 — 2 5 9 - 3 7 3 7

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 fifteen single-space typewritten lines) (16)

On April 27, 1988, at 2209, an automatic reactor scram occurred due to a reactor water level of less than Level 3 (+177.7 inches above the top of active fuel). The low water level occurred after an improper transfer of DC power supplies resulting in a temporary loss of AC control power for the hot surge tank level control valves and a subsequent trip of all operating feedwater pumps.

The causes of the event are personnel error and procedural inadequacy. A misinterpretation of the instruction describing DC power supply transfers placed the DC electrical system in a non-recommended lineup leading to the loss of vital 120 VAC power fed from the DC Bus via an inverter. The instruction was confusing and difficult to implement.

Corrective actions to prevent recurrence include; counseling of the operators involved regarding their responsibilities towards familiarity with instructions and procedural compliance, training for all operators regarding the sequence of events, and revising the appropriate System Operating Instructions to provide greater ease of use by the operator.

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

On April 27, 1988, at 2209, a reactor scram occurred due to reactor pressure vessel [RPV] water level less than Level 3 (+177.7 inches above top of active fuel (TAF)). Prior to the event, the plant was in Operational Condition 1 (Power Operation), maintaining steady-state full power operations. Reactor thermal power was approximately 100% of rated and RPV pressure approximately 1000 psig.

On April 27 at approximately 2200, plant operators were directed to reestablish a normal lineup of the non-class 1E DC electrical power system [EI]. The Unit 2 battery [BTRY] and the reserve battery charger [BYC] (which can be used to charge either Unit 1 or Unit 2 batteries) had been lined up to supply DC loads for both units in support of equipment testing activities. The Unit 1 battery was being charged by it's normal battery charger, while the normal charger for the Unit 2 battery was shutdown. The operators were attempting to realign the Unit 1 and Unit 2 DC systems, with each to be supplied by it's respective battery and normal charger. At 2205, operators opened a tie breaker between the two units, prior to closing the main breaker on Unit 1 DC Bus D1A. This lineup resulted in the D1A loads being supplied by only the reserve charger, not connected to either plant battery. The operator at the switchgear observed indications of degraded D1A bus voltage, closed the main breaker and shutdown the reserve charger, restoring the Unit 1 DC system supply lineup to normal. Recorded data indicates that D1A bus voltage decreased to a minimum of 25VDC, and was restored to normal values (133-135 VDC) in 3 seconds. The voltage transient on D1A resulted in an unstable power supply to 120 VAC system [EE] vital busses V1A, V1B and V2C, which are normally supplied by D1A through inverter D81A [INVT].

The degradation of D1A voltage caused a trip of Reactor Recirculation System [AD] Pump A, and a resultant power decrease to 67%. Additionally, control room annunciators were momentarily lost. The momentary loss and subsequent instability of the AC power source to the vital busses caused the condensate system hot surge tank level control valves to close. Hot surge tank level decreased, causing a low level trip of all operating reactor feed booster pumps, and a subsequent trip of the turbine driven feedwater pumps. As a result of the complete loss of feedwater flow to the RPV, a reactor scram occurred at 2209 when RPV water level decreased to Level 3. At RPV Level 2 (+129.8 inches above TAF), the Reactor Core Isolation Cooling system (RCIC)[BN] automatically initiated and began injecting into the RPV. The High Pressure Core Spray System (HPCS)[BG] had been previously removed from service for planned maintenance, and was therefore not available during this event. Using the RCIC system, operators restored RPV level to normal, and exited emergency instructions at 2238. A normal Hot Shutdown feedwater system lineup was established at 2246. Minimum RPV level reached during the event was approximately 87 inches above TAF. All plant equipment functioned as designed, and all off-normal and plant emergency instructions were appropriately implemented.

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

The post scram evaluation was completed and the plant entered Operational Condition 2 (Startup) on April 30 at 1425.

The causes of this event are personnel error and procedural inadequacy. Approved operating instructions were in place to facilitate successful completion of the required DC switching operating while keeping all DC loads supplied by at least one battery and one charger at all times. Due to a misinterpretation of the instruction, the electric systems were placed in a non-recommended configuration. A review of the system operating instruction (SOI-R42) "DC Systems; Batteries, Chargers, Switchboards" has concluded that it is confusing and difficult to implement for various system configurations. In accordance with vendor provided documentation, the inverter supplying the vital busses is not recommended to be operated without a battery connected to it's power supply. Placing the system in this condition, due to the improper transfer sequence, is believed to have caused the instabilities in the vital power supplies which led to the loss of feedwater and reactor scram.

A loss of feedwater flow at 100% of rated power has been analyzed as discussed in Chapter 15 (Section 15.2.7) of the Perry Updated Safety Analysis Report (USAR). The analyzed transient results in a reactor scram at Level 3, and the initiation of HPCS and RCIC at Level 2. Although HPCS was not available during the event on April 27, all other plant conditions were within the envelope of the USAR analysis, and all plant systems responded as designed to maintain the plant in a safe condition This event, therefore, is considered to have no safety significance. No previous similar events have been identified.

Corrective actions to prevent recurrence are as follows:

1. Plant operators involved in the switching operation have been counseled by supervision regarding their responsibilities towards familiarity with instructions and procedural compliance.

2. As part of the normal training process, the sequence of events described in the LER will be discussed with all operators during operating requalification training.

3. The System Operating Instruction involved will be revised as necessary to ensure greater ease of use by the operator.

Energy Industry Identification System Codes are identified in the text as [XX].

*U.S.GPO:1986-0-624-538/455