

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Catawba Nuclear Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 1 1 3 1										PAGE (3) 1 OF 5	
TITLE (4) Auto-Start of Diesel Generator 1B Due to a Ligh Socket Failure																					
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 4	2 8	8 5	8 5	0 2 7	0 1	0 6	2 7	8 5				0 5 0 0 0 1									
OPERATING MODE (9) 5			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																		
POWER LEVEL (10) 0 1 0 1 0			20.402(b)			20.405(c)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)			73.71(b)									
			20.405(a)(1)(i)			50.38(c)(1)			<input type="checkbox"/> 50.73(a)(2)(v)			73.71(c)									
			20.405(a)(1)(ii)			50.38(c)(2)			<input type="checkbox"/> 50.73(a)(2)(vii)			<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)									
			20.405(a)(1)(iii)			50.73(a)(2)(i)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)			50.72(b)(2)(ii)									
			20.405(a)(1)(iv)			50.73(a)(2)(ii)			<input type="checkbox"/> 50.73(a)(2)(viii)(B)												
			20.405(a)(1)(v)			50.73(a)(2)(iii)			<input type="checkbox"/> 50.73(a)(2)(x)												
LICENSEE CONTACT FOR THIS LER (12)																					
NAME Roger W. Ouellette, Associate Engineer - Licensing										TELEPHONE NUMBER 7 1 0 4 3 1 7 3 1 - 1 7 5 3 1 0											
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs											
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR							
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)										<input checked="" type="checkbox"/> NO											

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

On April 22, 1985, at 2110:07:430 hours, Diesel Generator 1B started on a Blackout signal (undervoltage on 4.16KV essential switchgear 1ETB). A short circuit in an indicating light socket caused the actuation of one of the Generator Power Circuit Breaker 1B Fail to Trip Lockout relays. As a result, switchyard power circuit breakers 14 and 15 tripped causing a momentary undervoltage condition on the B Train section of all the 6.9KV busses (1TA, 1TB, 1TC, 1TD). Previous design allowed an undervoltage condition to be detected on the essential busses, thereby starting the associated Diesel Generator, before the 6.9KV switchgear tie breakers close to restore normal voltage. Therefore, this incident is classified as a Design Deficiency. The automatic closure of 6.9KV switchgear 1TD tie breaker restored normal voltage to 1ETB, and loadshedding did not occur.

At the time of the incident, Unit 1 was in Mode 5 (Cold Shutdown). This incident is reportable pursuant to 10 CFR 50.73, Section (a)(2)(iv), and 10 CFR 50.72, Section (b)(2)(ii).

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

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

The 6.9KV normal Auxiliary Power (EPB) System distributes power to plant auxiliary equipment. It also serves as a normal power supply to the 4.16KV Essential Auxiliary Power System. Each 6.9KV bus (1TA, 1TB, 1TC, 1TD) has two normal incoming breakers, which are associated with main stepup transformers A and B. The incoming breakers associated with each bus are provided with an undervoltage relay connected to the associated bus section. These relays operate to trip the associated breaker when switchgear voltage falls below 5.175KV for approximately 0.8 seconds. As the incoming breaker trips open, the tie breaker will close after switchgear voltage falls below 1.725KV to allow the de-energized section of the bus to be fed from the other incoming breaker.

The 4.16KV Essential Auxiliary Power System consists of two Diesel Generators and two switchgear assemblies (1ETA and 1ETB). The voltage on each switchgear was formerly monitored by three instantaneous undervoltage relays. A 2-out-of-3 undervoltage signal (3675V) on either essential bus will start the associated Diesel Generator.

The Unit 1 Main Power (EPA) System's primary function is to generate and transmit power to the Transmission System while simultaneously supplying the EPB System. The EPA System has numerous relaying schemes that serve to protect the main generator, the step-up and auxiliary transformers, and output circuits to the 230KV switchyard.

These protection schemes will promptly initiate clearing of electrical faults and conditions that may be detrimental to equipment. One such scheme is the Generator Power Circuit Breaker (GPCB) 1B fail to trip circuitry. When GPCB 1B fails to trip as required, relays 86BB1 and 86BB2 will actuate. Relay 86BB1 initiates the instantaneous trip of such equipment as switchyard Power Circuit Breakers (PCB's) 14 and 15, and B Train incoming breakers on 6.9KV busses 1TB and 1TD. Relay 86BB2 also initiates the instantaneous trip of PCB's 14 and 15, and B Train incoming breakers on 6.9KV busses 1TA and 1TC. Each relay has an indicating light (CD for 86BB1, AD for 86BB2) located on the Unit 1 protective relaying boards which will de-energize when the associated relay is actuated.

On April 22, 1985, at 2110:07:294 hours, an actuation of relay 86BB2 (GPCB 1B fail to trip lockout #2) occurred. This caused the instantaneous trip of switchyard PCB's 14 and 15 and B train incoming breakers on 6.9KV busses 1TA and 1TC. When PCB's 14 and 15 opened, the B Train section of 1TB and 1TD lost voltage momentarily. Since the B Train section of 1TD supplies 1ETB switchgear, 1ETB sensed undervoltage on all three of its phases, thus initiating a Diesel Generator 1B start signal at 2110:07:430 hours. 1TA and 1TC tie breakers closed at 2110:07:444 and 2110:07:730 hours respectively to re-energize the B train section of 1TA and 1TC.

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Since the undervoltage on 1TB and 1TD was sustained for greater than 0.8 seconds, B Train incoming feeders to 1TD and 1TB tripped at 2110:08:362 and 2110:08:405 hours respectively. Within 53 milliseconds after 1TB and 1TD incoming breakers tripped, 1TB and 1TD tie breakers closed to restore voltage to the de-energized sections of their busses. 1ETB bus voltage was restored to normal at 2110:08:503 hours. Since the loss of voltage on 1ETB was not sustained for the 0.8 second test period, Diesel Generator 1B did not load.

Because of the momentary voltage loss on the B Train sections of the 6.9KV busses, B Train load centers and motor control centers momentarily lost voltage. As a result of a momentary loss of voltage on motor control center 2EMXH, Auxiliary Building Ventilation (VA) filtered exhaust fan B tripped. The tripping of this fan caused the VA unfiltered exhaust fans and VA supply air handling units to trip. Also, momentary loss of voltage on 2EMXH caused Control Room Chilled Water (YC) Pump B to trip, thus causing the trip of YC Chiller Compressor B. As a result of a momentary loss of voltage on motor control center 1MXI, Containment Chilled Water (YV) Pump A tripped, thus causing YV Chiller Compressor A to trip. Also, after a one minute time delay, containment ventilation cooling swapped from YV to Nuclear Service Water (RN).

The systems were beginning to be returned to normal alignment at 2130:53 hours when YC chiller B was restarted. YC Chilled Water Pump B had restarted automatically approximately 30 minutes earlier. Diesel Generator 1B was then manually shutdown at 2204:30 hours. Also, the YV and RN Systems were returned to normal alignment. YV Chilled Water Pump A and YV Chiller Compressor A were subsequently restarted.

Before the power systems were returned to normal alignment, Work Request 15846 was generated to investigate the actuation of Relay 86BB2. From review of electrical elementaries and event recorder printouts, personnel determined that indicating light AD was probably shorted. The transmission crew lifted one of the leads from light socket AD and reset Relay 86BB2 successfully. When the lead was returned to its terminal, Relay 86BB2 immediately tripped. This proved that the light socket shorted. The lead was subsequently taped, and Relay 86BB2 was reset at 0017:00:156 hours on April 23, 1985.

From 0035:36 to 0046:45 hours, the VA System fans and air handling units were returned to operation. The main and auxiliary power systems were placed into normal alignment from 0119:28:766 to 0121:49:683 hours.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

CONCLUSION

The undervoltage relays on 1ETA and 2ETB are instantaneous relays. On an undervoltage signal, these relays will actuate their blackout logic and start their associated Diesel Generator. The momentary loss of voltage on 1TD was sensed before the tie breaker had closed to restore normal voltage. Therefore, this incident is classified as a Design Deficiency.

The instantaneous relays caused false starts of the Diesel Generators and unnecessary wear and tear on the Diesel. These relays were replaced with time delay relays per Nuclear Station Modification NSM 10571.

The faulty light socket (Cutler Hammer, Model #0979) was replaced per Work Request 159030PS. This work request had been written on April 21, 1985, at 0600 hours when a Nuclear Equipment Operator noticed that light AD was not lit. This indication was incorrect for plant conditions at that time.

CORRECTIVE ACTION

1. 1TD switchgear tie breaker was closed to return 1ETB bus voltage to normal.
2. Work Request 158460PS was generated to investigate the cause of Relay 86BB2 actuation.
3. The source of Relay 86BB2 actuation was identified.
4. All affected systems were returned to normal alignment.
5. Nuclear Station Modification NSM 10571 was completed which installed timing devices on the 4.16KV essential switchgear undervoltage relays.
6. Work Request 158030PS was completed which replaced light socket AD.

SAFETY ANALYSIS

Diesel Generator 1B started on a loss of voltage signal on 1ETB bus. On a sustained loss of voltage on 1ETB, the bus would have load shedded, and Diesel Generator 1B output breaker would have closed to restore normal voltage to 1ETB. The 1ETB bus would have then reloaded and powered B Train safety-related equipment. A Train essential switchgear 1ETA was unaffected by this incident.

TEXT (If more space is required, use additional NRC Form 365A's) (17)

DUKE POWER COMPANY

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HAL B. TUCKER
VICE PRESIDENT
NUCLEAR PRODUCTION

June 27, 1985

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U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413

Gentlemen:

Pursuant to 10 CFR 50.73 Section (a) (1) and (d), attached is Revision 1 to Licensee Event Report 413/85-27 concerning the auto-start of Diesel Generator 1B due to a light socket failure. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H. B. Tucker

Hal B. Tucker

RWO:slb

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator
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