

LICENSEE EVENT REPORT (LER)

Facility Name (1) Byron, Unit 1 Docket Number (2) 015000454 Page (3) 1 of 09

Title (4) Reactor Trip on High Negative Flux Rate

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)
07	13	85	85	0618	00	08	12	85		015000454

OPERATING MODE (9) 1

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

POWER LEVEL (10) <u>0111</u>	20.402(b) <u>---</u>	20.405(c) <u>X</u>	50.73(a)(2)(iv) <u>---</u>	73.71(b) <u>---</u>
	20.405(a)(1)(i) <u>---</u>	50.36(c)(1) <u>---</u>	50.73(a)(2)(v) <u>---</u>	73.71(c) <u>---</u>
	20.405(a)(1)(ii) <u>---</u>	50.36(c)(2) <u>---</u>	50.73(a)(2)(vii) <u>---</u>	Other (Specify in Abstract below and in Text)
	20.405(a)(1)(iii) <u>---</u>	50.73(a)(2)(i) <u>---</u>	50.73(a)(2)(viii)(A) <u>---</u>	
	20.405(a)(1)(iv) <u>---</u>	50.73(a)(2)(ii) <u>---</u>	50.73(a)(2)(viii)(B) <u>---</u>	
	20.405(a)(1)(v) <u>---</u>	50.73(a)(2)(iii) <u>---</u>	50.73(a)(2)(x) <u>---</u>	

LICENSEE CONTACT FOR THIS LER (12)

Name Rick Campbell Ext 2379 TELEPHONE NUMBER 8115234-5441

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		
C	A	A	V	A	R	M	W	1	2	0	N
C	I	I	A	M	P	X	9	9	9	N	
C	I	B	R	J	X	B	2	3	0	N	

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15) X YES NO

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

On July 13, 1985, a lightning strike at Byron Station resulted in a reactor trip and damage to plant instrumentation. It is believed that lightning struck in the vicinity of the Unit One containment and induced a voltage transient on the station ground, which caused two Rod Drive power supplies to fail. To prevent similar equipment damage due to lightning strikes, Byron has modified the Unit One containment lightning protection system.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			Page (3)	
		Year	Sequential Number	Revision Number		
Byron, Unit 1	0 5 0 0 0 4 5 4	8 5	- 0 6 8	- 0 0	0 2	OF 0 9

TEXT

With the reactor in mode 1 at 11% power on July 13, 1975 at 0439 CDT, a lightning strike in the vicinity of Byron Station resulted in a reactor trip and damage to plant instrumentation. A listing of affected plant equipment is provided in Table I.

It is believed that lightning induced a voltage transient on the station ground, causing Rod Drive power supplies 1BD PS-1 and 1BD PS-2 to fail. These power supplies feed control and alarm circuitry associated with control rod banks B and D and shutdown bank B. Thus, failure of the power supplies resulted in insertion of these rod banks, and a negative flux rate trip.

Investigation into the instrument failure indicates that most likely a lightning strike to the reactor containment building occurred. The lightning was conducted to ground through the containment building steel. As the lightning strike passed by containment penetrations, voltage was induced into cables passing through the penetrations. The induced voltage potential was enough to damage plant instrumentation. As a result, portions of Train B safeguards instrumentation were unavailable.

The reactor tripped due to a negative flux rate in a normal and controlled manner. Although, portions of Train B safeguards instrumentation were damaged, Train A safeguards were unaffected. This was confirmed by performing safeguards operability surveillances. Therefore public and/or plant safety were not compromised at any time.

Byron station has not experienced a lightning-induced reactor trip previously.

All damaged equipment has been repaired and tested. Testing consisted of functional checks, channel checks, operability tests and performance of appropriate surveillances. In addition to testing damaged equipment, all devices which could have been affected were tested. This included any equipment with cables passing through a containment penetration associated with damaged equipment. Also, seven affected containment penetrations were leak tested to ensure containment integrity. Prior to Unit One criticality, various operability surveillances were performed on plant equipment. The purpose of performing these surveillances was to sample plant equipment and identify other failures not detected earlier. No failures were detected. Refer to Table II for a listing of the surveillances performed.

To prevent equipment damage due to similar lightning strikes, the containment lightning protection system was modified. This modification was installed prior to start-up after the lightning strike. The primary objective of the modification was to minimize the effect of lightning strikes on plant equipment. This objective was satisfied by isolating the containment lightning protection grid from structural steel and routing new conductors from the grid to the station ground mat. This approach will ensure that lightning strikes are carried to ground external to the containment structure.

TABLE 1
EQUIPMENT AFFECTED BY LIGHTNING STRIKE

A. PROTECTION CHANNEL II INSTRUMENTS

- *1. Steam Pressure Transmitter 1FT-545
- *2. Steam Generator 1A Level Transmitter 1LT-519
- *3. Steam Flow Transmitter 1FT-513
- *4. Steam Flow Transmitter 1FT-523
- *5. Steam Flow Transmitter 1FT-533
- *6. Steam Flow Transmitter 1FT-543
- *7. Pressurizer Pressure Transmitter 1PT-456
- *8. Steam Generator Wide Range Level Transmitter 1LT-502
- *9. Tave 422 NRA Card 1TY-0421B
- *10. Wide Range Cold Leg Temp NRA Card 1TY-413B
- *11. Wide Range Cold Leg Temp NRA Card 1TY-423B
- *12. Wide Range Cold Leg Temp NRA Card 1TY-433B
- *13. Wide Range Cold Leg Temp NRA Card 1TY-443B

B. TRAIN B EQUIPMENT

- 1. Train B SSPS Universal Logic Cards
 - *A404 Turbing Throttle Valve Rx Trip Logic (2/2)
- *2. Train B SSPS "OPERATE" Lamp
- *3. Train B SSPS Power Supply #2

TABLE 1 (Continued)

- 4. 1PA06J Power Supply (26 VDC)
- *5. 1PA19J Power Supply #1 fuse
- *6. 1PA32J
- C. METRO TOWER
 - *1. Temperature at 30' (Loop II)
 - *2. Wind Direction at 34' (Loop I)
 - *3. Wind Speed at 34' (Loop I)
 - *4. Wind Speed at 250' (Loop I)
- D. ROD DRIVE
 - *1. Rod Drive Power Supply 2AC PS-2
 - *2. Rod Drive Power Supply 2BD PS-3
 - *3. Rod Drive Power Supply 1BD PS-1, PS-2
- E. LOOSE PARTS MONITORING
 - *1. 1VE-LM001 Loose Parts Monitor Channel 1
 - *2. 1VE-LM002 Loose Parts Monitor Channel 2
 - *3. 1VE-LM003 Loose Parts Monitor Channel 3

TABLE 1 (Continued)

F.

1. EQUIPMENT AFFECTED: Multiplexor 2 Autoterm 4, 5, 6, 7
Gatehouse Turnstyle Cardreaders
ROOT CAUSE: Watch Tour Cardreader and Associated Autoterm

Due to a problem initiated by a cardreader, autoterm number 6 within multiplexor number 2 blew a modem board. The loss of this one autoterm caused a subsequent loss of communication with all autoterms within this single multiplexor. The cardreader which initiated all failures required complete replacement. A modem board within the autoterm also required replacement.

2. EQUIPMENT AFFECTED: Multiplexor 6 Autoterm 3 Door 0552 Door 0351
ROOT CAUSE: Damage to Door 0551

After the lightning strike it was determined that damage to door 0551 caused autoterm 3 within multiplexor 6 to fail. Initial problem detection was diagnosed as being related to the card reader at door 551. The cardreader at door 551 was replaced initially. Further diagnostics later revealed that the modem board within autoterm 3, multiplexor 6 required replacement. It was also determined at this time that the door for the autoterm needed replacement also. The reasoning behind replacing the door is not known at this time.

3. EQUIPMENT AFFECTED: Surveillance Cameras #4, 11, 12, 14, 15, 20
ROOT CAUSE: Surge to Cameras

After the lightning strike a total of six surveillance cameras failed to provide indication in the security centers. It was determined that five of the six cameras suffered from a failed primary video unit. The auxiliary input to each camera was used which restored camera isolation. The remaining camera failed due to a shorted isolation amplifier. The amplifier was replaced and the camera operation was restored.

4. EQUIPMENT AFFECTED: Multiplexor 2 5015 Autoterm 2
ROOT CAUSE: Transformer Failure

Following the lightning strike overhead door 15 in the receiving building failed due to a blown 12 volt transformer. The 12 volt transformer was replaced and door operation was restored.

5. EQUIPMENT AFFECTED: Security Lighting K13, K5, L10
ROOT CAUSE: Unknown

The failure of security lighting, as reported, has not been investigated fully at this time.

TABLE 1 (Continued)

G.

SECURITY EQUIPMENT
FAILURE (ITEM FROM
PREVIOUS LIST)

NWR #

COMPLETED

TEST REQUIRED (ALL
PERFORMED BY SECURITY)

1

B99802
Release #58
B99514
Release #286

X

Functional Check of all
devices in Channel 5;
multiplexor 2 autoterm's
4, 5, 6, 7

2

B99802
Release #60
B99514
Release #288, 283

X

Functional Check of all
related to multiplexor 6
autoterm 6 (Doors D551,
D552, D351)

3

B99610
Release #98, 99,
100, 97, 96

X

Verify that picture from
camera is restored

4

B99611
Release #291

X

Function Check

5.

-NO INFORMATION AVAILABLE-

TABLE II
MISCELLANEOUS OPERABILITY CHECKS AND SURVEILLANCES

BOS AP-1	Unit 1 System Aux Power Transformers Weekly Surv.
BOS AP-2	34KV Line to River Screen House Quarterly Surv.
BOS AP-3	Unit 2 System Aux Power Transformers Weekly Surv.
BOS SY-1	345KV Switchyard Weekly Surv.
LBOS 3.1.1-10	Rx Trip Brkr Shunt and Undervoltage Trip Independence Test Train A Staggered Test Basis Bimonthly
LBOS 3.1.1-11	Rx Trip Brkr Shunt and Undervoltage Trip Independence Test Train B Staggered Test Basis Bimonthly
LBOS 3.1.1-20	Train A Solid State Protection System Bimonthly Surv.
LBOS 3.1.1-21	Train B Solid State Protection System Bimonthly Surv.
LBOS 3.1.1-15	Analog Channel Oper. Test of Source Range Channel N32
LBOS 3.1.1-14	Analog Channel Oper. Test of Source Range Channels N35 and N36
LBOS 3.1.1-1	Analog Channel Oper. Test of Power Range Channels N41, N42, N43 and N44
LBOS 3.2.1-802	ESFAS Inst. Slave Relay Surv (Train A Auto SI-K604)
LBOS 3.2.1-812	ESFAS Inst. Slave Relay Surv (Train B Auto SI-K604)
LBOS 3.2.1-842	ESFAS Inst. Slave Relay Surv (Train A Phase A Isol-K607)
LBOS 3.2.1-843	ESFAS Inst. Slave Relay Surv (Train A Phase A Isol-K612)
LBOS 3.2.1-870	ESFAS Inst. Slave Relay Surv (Train B Phase B Isol-K618,K626)
LBOS 3.2.1-880	ESFAS Inst. Slave Relay Surv (Train A Cont Vent Isol-K615,K622)
LBOS 3.2.1-890	ESFAS Inst. Slave Relay Surv (Train B Cont Vent Isol-K615,K622)
LBOS 3.2.1-940	ESFAS Inst. Slave Relay Surv (Train A AFW Pump Start-K632,K639)
LBOS 3.2.1-941	ESFAS Inst. Slave Relay Surv (Train A AFW Pump Start-K633)
LBOS 3.2.1-820	ESFAS Inst. Slave Relay Surv (Train A Cont Spray-K643)
LBOS 3.2.1-851	ESFAS Inst. Slave Relay Surv (Train B Phase A Isol-K643)
LBOS 3.2.1-981	ESFAS Inst. Slave Relay Surv (Train A P-14 S/G H1-2-K621)
LBOS 3.2.1-991	ESFAS Inst. Slave Relay Surv (Train B P-14 S/G H1-2-K621)
LBOS 3.2.1-950	ESFAS Inst. Slave Relay Surv (Train B AFW Pump Start-K632,K639)
LBOS 3.2.1-990	ESFAS Inst. Slave Relay Surv (Train B P-14 S/G H1-2-K637)
LBOS 3.3.10-2	Rad Gas Effluent Mon Instrumentation Surv.
LBOS 3.3.10-3	Rad Gas Effluent Mon Instrumentation Surv.
LBOS 6.1.7.1-1	Containment Vent. Isol. Valves Monthly Surv.

LBOS 8.1.1.2.a-1 1A Diesel Gen. Oper. Monthly Surv.
 LBOS 8.1.1.2.a-2 1B Diesel Gen. Oper. Monthly Surv.
 LBOS 8.1.2-1 Offsite AC Power Availability Weekly Surv.
 LBOS 8.1.3.b-1 2A Diesel Gen Oper Monthly Surv.
 LBOS 8.3.1-1 ESF Onsite Power Dist During Operation Weekly Surv
 BCS 11.2.1-1 Common Noble Rad Gas Effluents
 Check of Containment Penetration Integrity-Electrical
 Penetrations - E29 through E42
 Check of Fire Hazards Panel
 Check of Post Accident Monitoring Equipment
 Check of Remote Shutdown Panel Instrumentation
 Check of Fire Protection Panel
 Check of Proper DEHC Operation during Startup
 LBVS 3.3.1-2 Containment High Range Radiation Monitors
 LBVS 3.3.1-3 RCS Leakage Radiation Monitor
 LBVS 3.3.1-4 Main Control Room Air Intake Radiation Monitors



Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

August 12, 1985

LTR: BYRON 85-1120

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

Dear Sir:

The enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv) which requires a 30 day written report.

This report is number 85-068-00; Docket No. 50-454.

Very truly yours,

R. E. Querio
Station Superintendent
Byron Nuclear Power Station

REQ/gt

Enclosure: Licensee Event Report No. 85-068-00

cc: J. G. Keppler, NRC Region III Administrator
J. Hinds, NRC Resident Inspector
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