

MAR 26 1987

Docket No. 50-346

Toledo Edison Company
ATTN: Mr. Donald Shelton
Vice President
Nuclear
Edison Plaza
300 Madison Avenue
Toledo, OH 43652

SUBJECT: ADDITIONAL PROTECTION FOR LIGHTNING STRIKES AT NUCLEAR POWER
GENERATING STATIONS

Gentlemen:

During a telephone conversation between Mr. John Keagler and Mr. R. S. Love of my staff on March 11, 1987, Mr. Keagler requested additional information on protection from lightning strikes. In addition to IE Information Notice No. 85-86, "Lightning Strikes at Nuclear Power Generating Stations," the following documents on lightning strikes are available in the NRC Public Document Room (PDR) or from the Superintendent of Documents (S/D).

1. Licensee Event Reports (PDR)
2. Engineering Evaluation Report, Lightning Events at Nuclear Power Plants by the Office for Analysis and Evaluation of Operational Data, dated April 1986 (PDR).
3. NUREG-1032, Evaluation of Station Blackout Accidents at Nuclear Power Plants (S/D).

To assist you in your review for applicability at your facility, we are enclosing LER 50-454/86-068, the Engineering Evaluation Report referenced above and a sketch of a containment building dome lightning rod and ground cable arrangement. The general arrangement depicted on this sketch has been used at several facilities to provide additional lightning protection.

If we can be of any further assistance in this matter, please contact my office at (312) 5500.

8703310501 870326
PDR ADOCK 05000346
P PDR

Thomas M. Burdick, for
Charles W. Hehl, Chief
Operations Branch

Enclosure: As stated

See Attached Distribution

LER only

RIII

RL
Love/lc
3/26/87

LER only

RIII

AB for
Phillips

RIII

B for
Hehl

TEO1 11

cc w/enclosure:

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Utilities Commission



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
INPO Record Center
CECO Distribution List

#3/017

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LICENSEE EVENT REPORT (LER)

Facility Name (1) Byron, Unit 1 Docket Number (2) 0 5 0 0 0 4 5 4 Page (3) 1 of 0 4

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	016 18	0 0 0	0 8	13	85		0 5 0 0 0 1 1 0 5 0 0 0 1 1

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>0</u>	<u>1</u>	<u>1</u>	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73
				<input type="checkbox"/> 20.405(a)(1)(1)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)
				<input type="checkbox"/> 20.405(a)(1)(11)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> Other (Specify in Abstract below and in Text)
				<input type="checkbox"/> 20.405(a)(1)(111)	<input type="checkbox"/> 50.73(a)(2)(1)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	
				<input type="checkbox"/> 20.405(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(11)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
				<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(111)	<input type="checkbox"/> 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name Pick Campbell Ext 2275 TELEPHONE NUMBER 8 1 5 2 3 4 - 1 5 4 4 1

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURE TYPE	REPORTABLE TO NRRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURE TYPE	REPORTABLE TO NRRDS
C	A A	V A R M W	2 0	N	C	A A	R J X	L 0 4 5	N
C	I I	A M P X	9 9 9	N	C	I B	P J X	B 2 3 0	N

SUPPLEMENTAL REPORT EXPECTED (14)

Yes (If yes, complete EXPECTED SUBMISSION DATE) X | NO Expected Submission Date (15)

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.

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	D 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 1B0 PS-1 and 1B0 PS-2 to fail. These power supplies feed control and alarm circuitry associated with control rods 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 1PT-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-504
- *9. Tave 422 NRA Card 1TY-0421E
- *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 SURVEILLANCE

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-K61B.K62b)
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.

- 1BOS 8.1.1.2.a-1 1A Diesel Gen. Oper. Monthly Surv.
- 1BOS 8.1.1.2.a-2 1B Diesel Gen. Oper. Monthly Surv.
- 1BOS 8.1.2-1 Offsite AC Power Availability Weekly Surv.
- 1BOS 8.1.3.b-1 2A Diesel Gen Oper Monthly Surv.
- 1BOS 8.3.1-1 ESP 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
- 1BVS 3.3.1-2 Containment High Range Radiation Monitors
- 1BVS 3.3.1-3 RCS Leakage Radiation Monitor
- 1BVS 3.3.1-4 Main Control Room Air Intake Radiation Monitors

ENGINEERING EVALUATION REPORT

Lightning Events at Nuclear Power Plants

by the

Office for Analysis and Evaluation of Operational Data

April 1986

Prepared by: M. Chiramal

Note: This report supports ongoing AEOD and NRC activities, and does not represent the position or requirements of the responsible NRC program offices.

XA
B605060074 860422
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~~OSP 7/1/86~~

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SUMMARY

During the summer of 1985, several nuclear plants in the United States were affected by lightning strikes. To alert licensees of the problems that were experienced by nuclear units, the Office of Inspection and Enforcement issued Information Notice 85-86, "Lightning Strikes at Nuclear Power Generating Stations" on November 5, 1985. To assess the impact that lightning strikes have had on operating nuclear plants, and to determine the safety implications of the effects of lightning, AEOD conducted a search of the licensee event report (LER) data base and a review of the events thus obtained.

The search identified 62 events involving lightning for the period 1981 to 1985. The 62 events occurred at 30 plant sites and involved 32 reactor units. In comparing the the number of lightning events, the geographic location of the affected units and the annual lightning strike density at the location, a direct correlation between the annual lightning strike density and the number of events is noted.

The data show that the systems affected are: (1) the offsite power system, (2) the safety-related instrumentation and control systems, (3) the meteorological and weather systems, (4) the radiation, gas and effluent flow monitoring systems, and (5) the air intake tunnel halon system.

This report documents the review of the events with regard to how lightning strikes affected these systems. The report includes the findings of the review and concludes that although lightning strikes have adversely affected the operation of some nuclear plants, in most cases, there has been no significant degradation of safety and minimal equipment damage. In particular cases where damage has been extensive or where failures caused by lightning strikes have been repetitive, the licensees have taken corrective actions to reduce the consequences of future strikes. Since the Office of Inspection and Enforcement has recently issued an information notice on lightning strikes at nuclear plants to alert licensees of some of the problems experienced, the report suggests that no further actions be taken at this time.

1.0 INTRODUCTION

General Design Criterion 2 (10 CFR 50, Appendix A) requires that structures, systems and components important to safety be designed to withstand the effects of natural phenomena. Although GDC 2 does not specifically cite lightning as an example of a natural phenomenon, nuclear plants, in general, are designed to be protected from lightning strikes prevalent at the sites where the plants are located. During the summer of 1985, several nuclear plants in the United States were affected by lightning. In many cases the lightning caused the affected plant to trip; and in some cases, only an isolated system, like the meteorological system, was affected. To alert licensees of operating plants of the potential problems due to lightning, the Office of Inspection and Enforcement issued Information Notice 85-86, "Lightning Strikes at Nuclear Power Generating Stations" on November 5, 1985.

As a result of these events and to assess the adequacy of the protection provided, a search for and review of lightning events at nuclear plants was initiated to determine the effects that lightning strikes have had on safety-related systems at operating nuclear plants. Searches of the data bases of operational events from 1981 to the end of 1985 were performed.

Sixty-two events involving lightning were identified. These 62 events are contained in the 61 licensee event reports (LERs) listed in Appendix A of this report. The appendix also includes in... abstracts of the events involved. It should be noted that only those lightning-induced events that affected systems important to safety, and/or are required by regulations to be reported, are included. That is, all incidents of lightning strikes at, or near, a nuclear plant are not included because they are not reportable.

2.0 DISCUSSION

2.1 Geographic Distribution of Lightning Events

The 62 events occurred at 30 plant sites and involved 32 reactor units. The units affected and the number of events involved are summarized as follows:

<u>Plant Name</u>	<u>Number of Events/Plant</u>
Big Rock Point, Brunswick 1, Byron 1, Catawba 1, Connecticut Yankee, Cooper, Davis-Besse, D.C. Cook 1, Duane Arnold, Fitzpatrick, Hatch 1, McGuire 2, Shoreham, Summer 1, Turkey Point 3, Vermont Yankee, Waterford 3	1
Arkansas Nuclear One 2, Farley 2, Grand Gulf 1, Maine Yankee, Peach Bottom 3, Pilgrim, Susquehanna 1, Susquehanna 2, St. Lucie 2, Wolf Creek	2
Yankee Rowe	3
Browns Ferry 1, Crystal River 3	5
McGuire 1, TMI 2	6

The above data, displayed on a map of the United States with all the operating nuclear plants located on it, is shown in Figure 1. As seen on the map, all the reactor units which suffered lightning-involved events are located in the mid-western and eastern regions of the U.S. The majority (55 events) involved units east of the Mississippi River. Since the total number of lightning strikes at the plant site are not reportable or reported, an indirect measure of susceptibility of plants to lightning strikes was developed based on the lightning strike density for the region in which the plant is located. Figure 2 (obtained from Reference 1) is a contour map of mean lightning strike density for the contiguous U.S. When Figure 1 is compared to Figure 2, a direct correlation between lightning strike (i.e., ground flash) density and the number of lightning-caused events at nuclear units is seen. That is, the plants with the higher number of lightning events are located in geographic regions of high lightning strike density. For example, certain sections of Florida and Alabama have a mean annual ground flash density of 10 to 12 flashes/square-km, and plants such as Crystal River 3, St. Lucie 2, Farley 2 and Browns Ferry 1, which have suffered multiple lightning events, are located in those sections. There are exceptions to this correlation, such as some of the nuclear plants located in the New England region (Yankee Rowe, Pilgrim and Vermont Yankee). These plants have experienced multiple lightning-induced events, but are located in regions with a mean annual lightning flash density of only 2 to 3 flashes/square-km. This situation could be due to the design and installation of lightning protection equipment at the plants located in regions of low lightning strike density. (See Reference 2 for details of a study that assessed the effectiveness of lightning protection at nuclear power plants.)

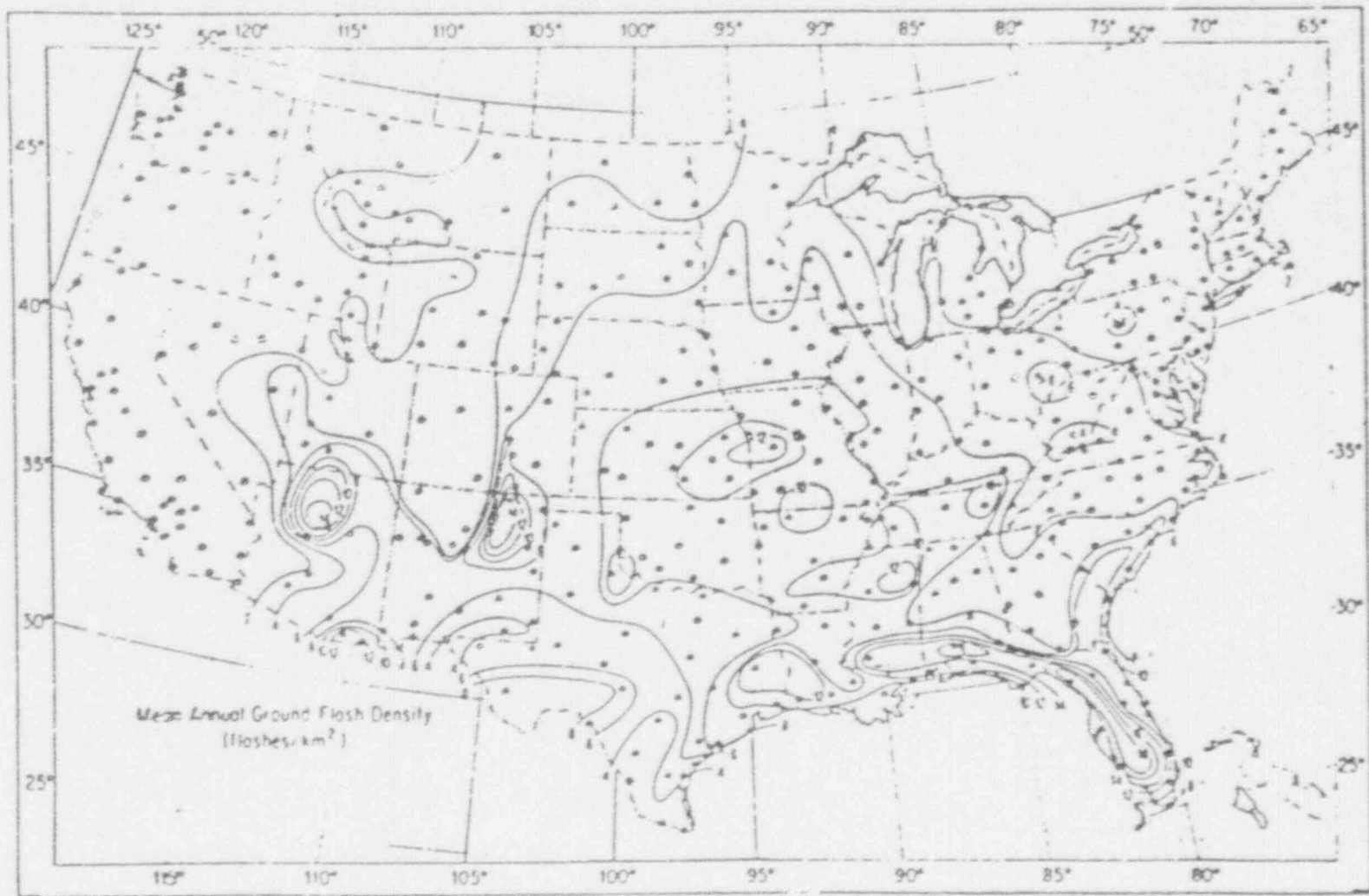


Figure 2 . Contour map of mean annual lightning strike density.

2.2 Seasonal Distribution of Lightning Events

The 62 events were tabulated by the month and the year of occurrence. The results are presented in the following table.

Table 1--Events by Year and Month

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Totals
1981	1	-	-	-	2	2	1	-	1	-	-	-	7
1982	1	2	-	-	-	7	2	1	-	-	2	-	15
1983	-	-	-	1	1	3	3	3	3	1	-	-	15
1984	-	-	2	-	2	2	3	-	1	-	-	-	10
1985	-	1	-	-	3	1	4	2	1	2	-	1	15
Totals	2	3	2	1	8	15	13	6	6	3	2	1	62

One conclusion evident in Table 1 is that lightning-induced events are clustered during the summer months when thunderstorms prevail. Table 1 also shows that the total number of lightning events experienced annually by the nations' nuclear plants are more or less constant.

2.3 Systems Affected by Lightning

The 62 events were reviewed to determine the systems that were primarily affected by the lightning strike. The systems affected fall into five broad categories, as follows :

- o Offsite Power system
- o Safety-related Instrumentation and Control systems
- o Weather and Meteorological systems
- o Radiation, Gas and Effluent Flow Monitoring systems
- o Air Intake Tunnel Halon system

A discussion of each of these systems, the nuclear units involved and how they were affected by the lightning strike follows.

2.3.1 Offsite Power System

Of the 62 events, 29 were categorized as lightning-induced events affecting the offsite power system. The following is the list of plants that fall into this category, with the number of events involved.

<u>Plant Name</u>	<u>Number of Events/Plant</u>
Connecticut Yankee, Pilgrim, Cook 1, Crystal River 3, Fitzpatrick, Summer 1, Grand Gulf 1, McGuire 2, Davis Besse, Catawba 1, Wolf Creek, Waterford, Shoreham	1
Maine Yankee, Susquehanna 1, Susquehanna 2, Peach Bottom 3	2
Yankee Rowe	3
McGuire 1	5

Total	29

Of these 29 events, seven led to a reactor trip due to lightning affecting the offsite power system. Yankee Rowe, Susquehanna 1 and Peach Bottom 3 each experienced two reactor trips, and Susquehanna 2, one reactor trip. (For more information on these events refer to Appendix A for LERs 50-029/82-019 & 83-022, 50-387/84-028 & 029, 50-278/85-018 and 50-388/85-025). The effects on the offsite power system (e.g., partial loss, breakers tripping and reclosing, voltage surges) often caused problems in the onsite power systems leading to loss of some operating equipment (e.g., generator trip, reactor coolant pump trip, loss of transformers). The loss of operating equipment, in turn, would cause a reactor trip. The plants that experienced reactor trips (due to the effects of lightning on the offsite power system) are all located in Pennsylvania or Massachusetts. Since these states are in regions of medium to low lightning flash density, the data would suggest that the level of lightning protection provided at these plants (or for the offsite power system supplying these plants) may be inadequate. The plant and equipment involved, however, did not sustain serious damage and, except for the reactor trip system actuation, no safety-related system was affected.

Four events at McGuire 1 (84-010 & 017, and 85-017, & 020), one at McGuire 2 (85-005) and one at Catawba 1 (85-034) had the same result - inadvertent start of the emergency diesel generators. This was caused by the lightning inducing voltage transients in the offsite power system which in turn actuated the instantaneous undervoltage relays of the safety-related buses associated with the diesel generators. The licensee for Catawba 1 has made design modifications to the undervoltage circuitry to correct the problem, and the licensees for the McGuire units have initiated similar plans.

Voltage surges or spikes in the implant electrical distribution systems, induced by lightning strikes on offsite transmission lines, were the cause of all the events at Summer 1, Wolf Creek and Shoreham and one of the events at McGuire 1 (LER 50-395/83-074; 50-482/85-055 & 071; 50-322/85-040; and 50-369/82-046).

Except for the event at Waterford 3 (85-054), all of the events involved a partial loss of offsite power (e.g., loss of a transmission line, trip of sections of the switchyard, transformer trip). In some cases the event occurred while the unit was at power and the partial loss did not affect plant operation. In other cases the event occurred while the plant was shutdown, and the partial loss had no significant effect on the unit.

At Waterford 3, while the unit was shutdown, a lightning strike caused the loss of all offsite power for one half-hour duration. The lightning caused the complete loss of the grid. (Two fossil units connected to the ring grid also tripped.) The emergency diesel generators started and energized the vital buses as designed.

In all 29 events, except for an occasional lightning arrester or insulator failure, very little equipment damage occurred. No safety-related systems or equipment were damaged.

2.3.2 Safety-Related Instrumentation and Control Systems

Nine of the 62 events involved lightning-induced problems on implant safety-related instrumentation system and equipment. Examples of such problems are: blown fuses of inverters and control rod power supplies, inadvertent actuation of multiple channels of the main steam line radiation monitors and pressurizer pressure, and damaged electronic components. The following is a list of the nine events and the units involved:

<u>Plant Name</u>	<u>Number of Events/Plant</u>
Big Rock Point, Brunswick 1, Grand Gulf 1, Byron 1, Turkey Point 3	1
Farley 2, ANO 2	2

Total	9

Six of these nine events resulted in a reactor trip. The trip at Turkey Point 3 (85-019) involved the spurious actuation of multiple reactor protection system channels of pressurizer pressure. Brunswick 1 tripped because the main steam line radiation monitors actuated (84-025). ANO 2 tripped from 100 percent power due to voltage spikes on Core Protection Calculator channels 2 and 4 (85-016). The two events at Farley 2 (84-004 and 85-010), and the one at Byron 1 (85-068), involved reactor trips due to power range neutron flux high negative rate, which were caused by control rods dropping into the core. Lightning apparently caused surges in the distribution system and tripped multiple power supplies

in the control rod drive system. These events raise some concern regarding the adequacy of the protection provided at these plants for mitigating the effects of lightning. In all cases where multiple channels of safety-related instruments were affected, the failures were to the "fail-safe" state and the plant was able to be safely shut down. Of these events the one that occurred at Byron 1 was the most significant.

The lightning event at Byron 1 also involved failures of several channels of safety-related instruments and equipment. Byron 1 was operating at about 11 percent power on July 13, 1985 when a severe thunderstorm occurred in the vicinity of the plant. A lightning bolt apparently struck the Unit 1 containment building and induced voltage surges in instrumentation and control cables in one of the four containment penetration areas. The voltage surges failed four power supplies in the control rod drive system which resulted in several control rods dropping into the reactor core. A power range negative flux rate reactor trip occurred immediately. In addition to the reactor trip, damage to plant instrumentation and equipment also occurred. Instrumentation and equipment affected included: protection system channel 11 instruments, train B solid state protection system components, meteorological tower instruments, rod drive power supplies and loose part monitoring instruments. Some security equipment was also damaged. (See 85-068 for details of the event)

As seen on Figures 1 and 2, Byron is located in a region of medium lightning activity (6 flashes/square-km.). As such, is not expected to be subjected to many lightning strikes. However, because of the damage sustained during this strike, the licensee modified the lightning protection system of the containment structure to minimize the effect of any future strikes. To ensure that lightning strike currents are carried directly to ground, the containment lightning protection grid has been isolated from structural steel and new conductors have been routed from the grid to the station ground mat. These corrective actions should improve the protection provided to the safety-related instrumentation systems and equipment at Byron 1.

2.3.3 Meteorological, Weather and Environmental Systems

Twelve of the 62 lightning events caused failures in systems isolated from the nuclear plant, such as meteorological, weather or environmental towers and stations. Lightning strikes in the vicinity of these systems have failed instruments in the system by causing electronic component damage and blown fuses. The plants involved and the number of events experienced are as follows:

<u>Plant Name</u>	<u>Number of Events/Plant</u>
Browns Ferry 1	5
Crystal River 3	4
Vermont Yankee, Cooper, TMI 2	1
	—
Total	12

Browns Ferry 1 and Crystal River 3 are located in areas of high mean annual lightning strike density. Yet all of the events that occurred at Browns Ferry 1 (the meteorological station is common to all three Browns Ferry units) and four of the five experienced by Crystal River 3, affected systems physically isolated from the stations themselves. This suggests that the lightning protection provided at these plants has been effective. It should also be noted that the five events at Browns Ferry occurred in 1981 and 1982, and the four events at Crystal River 3 occurred in 1981, 1982 and 1983. In the last 2 years, there have been no events reported at these sites. Apparently the corrective actions taken at these units have been effective in reducing lightning-induced damage to these systems.

2.3.4 Radiation, Gas and Effluent Flow Monitors

Seven of the lightning-induced events involved problems with radiation, effluent flow or stack gas/offgas monitors. The majority of the problems were due to voltage surges induced by the lightning strikes. In all cases, the failures were associated with instruments confined to a particular location and involved no serious consequence. The number of events and the plants involved are as follows:

<u>Plant Name</u>	<u>Number of Events/Plant</u>
Pilgrim, Hatch 1, Arnold, McGuire 1, Wolf Creek	1
St. Lucie 2	2

Total	7

St. Lucie 2 is located in a zone of high lightning strike density but has experienced only two events (both occurred on October 24, 1983, and were apparently caused by the same lightning strike). This suggests that the lightning protection provided at St. Lucie has been adequate.

2.3.5 Air Intake Tunnel Halon System

Five events involved a spurious actuation or inoperability of the air intake tunnel halon system (and auxiliary and fuel handling building supply and exhaust fans) due to lightning flashes actuating certain ultraviolet detectors located in the air intake structure. All of these events occurred at TMI 2 in 1982 and 1983. Since then no additional events have been reported, suggesting that the corrective actions taken have been appropriate.

3.0 FINDINGS AND CONCLUSIONS

Based on a review of the sixty-two lightning-induced events that occurred at operating U.S. nuclear plants during the period from 1981 to 1985, the following findings and conclusions are presented:

1. The plants that experienced the lightning events are located in the mid-western and eastern regions of the United States. The majority (55 of the events) involved units located east of the Mississippi River.

2. There appears to be a direct correlation between the lightning strike density in a region and the number of lightning events experienced by a nuclear unit in that region. Exceptions to this correlation (e.g., the number of events experienced by certain plants located in the New England region) are probably due to inadequacies in the design and/or installation of the lightning protection systems.

3. The data suggests that the total number of lightning-induced events experienced each year by the operating nuclear plants in the U.S. is approximately the same and is likely to remain so, without additional improvements in protection.

4. Systems affected by lightning strikes have been: (1) the offsite power systems; (2) onsite safety-related instrumentation and control systems; (3) radiation monitoring systems; (4) weather and meteorological systems; and (5) air intake halon system (at TMI 2).

5. Of the 62 events studied, 29 were categorized as lightning-induced events affecting the offsite power system. Seven of the 29 events led to a reactor trip. The plants that experienced reactor trips (i.e., Susquehanna 1 & 2, Peach Bottom 3 and Yankee Rowe), are located in regions of low to medium lightning strike density, suggesting that the level of lightning protection provided at these plants (or for the offsite power system) may be inadequate.

6. Four events at McGuire 1 and one at Catawba 1 were due to the sensitivity of inplant undervoltage relays on the offsite power system. The design modifications to the undervoltage circuitry at both the McGuire and Catawba plants are intended to correct the problem.

7. In the 29 events affecting the offsite power system, no significant equipment damage was sustained. The effects of the lightning strike have included partial to full loss of offsite transmission lines, damage to lightning arrestors, trip of switchyard breakers, and voltage surges in offsite and onsite electrical systems. No safety-related systems or equipments were damaged.

8. Nine of the 62 events resulted in problems to inplant safety-related instrumentation and control systems. Problems such as spurious actuations of protection channels, blown fuses of power supplies and damage to electronic components were caused by voltage spikes and surges induced by the lightning strike. Six of the nine events led to a reactor trip. In events where multiple channels of safety-related instrumentation or control systems were affected, the failures have been to a safe state (i.e., the channels failed in such a manner that the protection or safety function was accomplished). Of these events, the one at Byron 1 involved both instrumentation system and equipment failures. The licensee at the Byron plant modified the plant lightning protection system to minimize the effects of any future strikes.

9. Eleven lightning events involved failures in systems which are located in isolated locations such as the meteorological, weather or environmental stations. Five of the events occurred at the Browns Ferry site and four at the Crystal River plant. Since 1983 no further events have been reported by these plants. This suggests that the corrective actions taken at these sites have been adequate.

10. Seven events at six plants involved problems with radiation, effluent flow or gas monitors. The problems were primarily caused by voltage surges induced by lightning strikes in the vicinity of the plants.

11. Five events which occurred at TMI 2 involved ultraviolet detectors used in the air intake halon system. Since 1983 no events have been reported, hence the problem has apparently been corrected.

Based on the above findings it has been concluded that lightning strikes have affected the operation of a significant number U.S. nuclear plants. However, in almost all cases, the safety of the plant was not significantly degraded and the equipment damage caused by the event was not serious. That is, in general, the safety-related systems and components in operating nuclear plants are adequately protected from the effects of lightning. In particular cases where damage was extensive or where repeated problems occurred, the licensee took adequate corrective actions. Finally, the Office of Inspection and Enforcement has recently issued Information Notice 85-86, "Lightning Strikes at Nuclear Power Generating Stations," to alert licensees of some of the more significant problems experienced by nuclear plants.

Accordingly, no further action regarding lightning events is recommended at the present time beyond continued routine review of LERs and other operational data reports submitted for such events.

REFERENCES

1. D.R. MacGorman, M.W. Maier, W.D. Rust, National Oceanic and Atmospheric Administration, " Lightning Strike Density for the Contiguous United States from Thunderstorm Duration Records ", NUREG/CR-3759.
2. ENTCOR Corporation, " Lightning Problems and Protection at Nuclear Power Plants ", NSAC-41, December 1981.

APPENDIX A

EVENTS INVOLVING LIGHTNING

Docket No. 50-278; LER NO. 85-018

Plant Name: Peach Bottom Atomic Power Station- Unit 3.

Date of Event: July 11, 1984

ABSTRACT

On July 11, 1984, at 1920 with Unit 3 at 95 percent power and Unit 2 shutdown for a refueling and pipe replacement outage, a fault occurred in the cross-tie between the north and south substations during a lightning storm. Substation breakers #45, #55, #225 and #245 opened to clear the fault. Coincidentally, the Unit 3 startup bus breaker SU-35 opened and deprived the plant of one of two offsite power sources. The affected 4160 volt emergency safeguard buses fast-transferred to the Unit 2 startup bus. Following the fast transfer, a scram on high neutron flux and reactor low level Group II and III isolations occurred. The high neutron flux was caused by spurious closure of the "80D" main steam isolation valve due to a failed dc solenoid valve. The reactor feedwater pumps automatically recovered level to +45 inches and tripped on high level. The Unit 3 13.2 kV auxiliary bus #4 was manually transferred to the Unit 2 startup bus A and the RCIC system was started to control reactor water level. The operator manually closed the SU-35 breaker to restore offsite power to the Unit 3 startup bus.

A task force was assembled in August 1984 to address corrective actions for this event.

Docket No. 50-298

Plant Name; Cooper Nuclear Station

Date of Event: July 19, 1985

At approximately 0453, July 19, 1985, with the reactor in cold shutdown and refueling in progress, a meteorological system trouble alarm was received by the control room. The apparent cause of the alarm was failure of the meteorological system due to a lightning strike on the meteorological data tower, northwest of the station. Repair actions were promptly initiated on the system and were completed at approximately 1045 when the system was restored to service.

Docket No. 50-382 LER No. 85-054

Plant Name: Waterford 3

Date of Event: December 12, 1985.

ABSTRACT

At 1926 on December 12, 1985, while the reactor was in Mode 5 (cold shutdown), all offsite power was lost. As a result both emergency diesel generators started in the emergency mode and restored power to essential loads. The initiating event, which led to the loss of offsite power, was a lightning fault resulting in several breaker operations, additional faults and misoperation of some relaying. Various relay setpoints have been changed to prevent some of the events recurring.

Docket No. 50-482 LER No. 85-071

Plant Name: Wolf Creek

Date of Event: October 9, 1985.

ABSTRACT

On October 9, 1985 at approximately 1015 CDT a control room ventilation isolation signal(CRIVS) was initiated due to a radiation monitor in the control building HVAC system sensing a momentary low voltage condition. All required ESF equipment responded properly. During this event the plant was in Mode 3, hot standby.

FORM 1 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 029 1982 019 0 8208J90122 175541 06/29/82

DOCKET:029 YANKEE ROWE TYPE:PWR
 REGION: 1 NSSS:WE
 ARCHITECTURAL ENGINEER: SWXX
 FACILITY OPERATOR: YANKEE ATOMIC ELECTRIC CO.
 SYMBOL: YAE

REFERENCE LERS:
 1 029/80-021

ABSTRACT
 VOLTAGE SURGES ON THE 115 KV LINES DURING A THUNDER STORM RESULTED IN LOSS OF THE Z-126 LINE AND A LOSS OF FLOW SCRAM. THE LOSS OF ONE OF THE TWO OPPOSITE LINES REDUCED THE NUMBER OF INDEPENDENT CIRCUITS BELOW TECH SPEC 3.6.1.1.A LIMITS. A SIMILAR OCCURRENCE WAS REPORTED AS LER 80-21. THE LINE WAS RESTORED 11 MINUTES AFTER THE TRIP. THE PLANT WAS PLACED IN MODE 3. THE CAUSE WAS A LIGHTNING STRIKE ON THE 115 KV LINE DURING THE STORM. THE OCB IS A TYPE GM-3B, 115 KV, 1,500,000 KVA, UNIT MANUFACTURED BY THE WESTINGHOUSE ELECTRIC CORP. THE LINE WAS RESTORED TO SERVICE.

FORM 2 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 029 1983 019 0 8307010024 183932 05/23/83

DOCKET:029 YANKEE ROWE TYPE:PWR
 REGION: 1 NSSS:WE
 ARCHITECTURAL ENGINEER: SWXX
 FACILITY OPERATOR: YANKEE ATOMIC ELECTRIC CO.
 SYMBOL: YAE

ABSTRACT
 DURING NORMAL OPERATION IN MODE 1, A LIGHTNING STRIKE CAUSED THE Z-126, 115 KV TRANSMISSION LINE O.C.B. AT HARRIMAN HYDRO STATION SWITCHYARD TO OPEN AND LOCK OUT, RESULTING IN LOSS OF CONTINUITY OF THAT CIRCUIT (TECH SPEC 3.6.1.1). THE LINE REMAINED ENERGIZED. STATION POWER REDUCTION WAS INITIATED. THIS IS THE FIRST REPORTABLE OCCURRENCE OF THIS NATURE. THE ROOT CAUSE OF THE EVENT WAS A LIGHTNING STRIKE ON THE 115 KV TRANSMISSION LINE SYSTEM RESULTING IN THE OPENING AND LOCKING OUT OF THE Z-126 LINE O.C.B. LINE CONTINUITY WAS RESTORED IN ONE HOUR. THE PLANT WAS RETURNED TO 100% POWER. NO CORRECTIVE ACTION IS DEEMED NECESSARY.

FORM 3 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 029 1983 022 0 8307220295 184362 06/14/83

DOCKET:029 YANKEE ROWE TYPE:PWR
 REGION: 1 NSSS:WE
 ARCHITECTURAL ENGINEER: SWXX

FACILITY OPERATOR: YANKEE ATOMIC ELECTRIC CO-
SYMBOL YAG

WATCH-LIST CODES FOR THIS LER ARE:

- 990 COMPLEX EVENT
- 975 POSSIBLE SIGNIFICANT EVENT

REFERENCE LERS:

- 1 029/83-019
- 2 029/82-019
- 3 029/80-021

ABSTRACT

DURING NORMAL OPERATION IN MODE 1 A LIGHTNING INDUCED ELECTRICAL DISTURBANCE ON THE Z-126 115 KV TRANSMISSION LINE RESULTED IN A PLANT TRIP AND THE TEMPORARY DEENERGIZATION OF SOME PLANT EQUIPMENT REQUIRED BY TECH SPEC. THE PLANT WENT INTO THE ACTION STATEMENTS FOR THE FOLLOWING TECH SPECS: 3.4.4; 3.5.1; 3.6.1.1; 3.6.2.1; 3.6.2.3; TABLE 3.3-4. THIS EVENT WAS CAUSED BY A LIGHTNING STRIKE ON THE TRANSMISSION LINE IN CLOSE PROXIMITY TO THE SWITCHYARD. DEFNERGIZED BUSES AND INOPERABLE EQUIPMENT WERE PROMPTLY RETURNED TO SERVICE BY OPERATIONS AND MAINTENANCE PERSONNEL. THE PLANT WAS RETURNED TO POWER OPERATION.

FORM 4 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
155 1983 013 0 8310270245 186257 07/21/83

DOCKET:155 BIG ROCK POINT TYPE:SWR
REGION: 3 NSSS:DE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: CONSUMERS POWER CO.
SYMBOL: CPC

COMMENTS

STEPS 5 THRU 7: COMP. ZZZ = UNKNOWN EQUIPMENT, YC EFFECT IX = ELECTRICAL DAMAGED.

REFERENCE LERS:

- 1 155/78-040
- 2 155/79-015

ABSTRACT

FOLLOWING A LIGHTNING STRIKE AT THE PLANT SITE, OPERATORS OBSERVED A BLOWN FUSE ON THE STATIC INVERTER EQUIPMENT FOR ONE OF TWO CONTAINMENT VACUUM RELIEF LOOPS. THUS THE VENTILATION SUPPLY LOOP WAS INOPERABLE AND THE FUSE WAS IMMEDIATELY REPLACED. THE REDUNDANT LOOP WAS NOT AFFECTED AND REMAINED OPERABLE. PRIOR FUSE BLOWING REPORTED IN LER 78-40 AND LER 79-15 BUT NOT RELATED TO LIGHTNING. FOLLOWING THE LIGHTNING STRIKE, INVESTIGATION REVEALED DAMAGE TO PLANT TELEPHONE SYSTEMS, SECURITY SYSTEM EQUIPMENT, DOMESTIC WATER CONTROLS, AS WELL AS THE BLOWN FUSE DESCRIBED ABOVE. SAFETY RELATED SYSTEMS IN THE PLANT HAVE NOT BEEN PRONE TO PRIOR LIGHTNING DAMAGE. REPORTABILITY BASED ON TECH SPEC 6.9.2.B(2).

FORM 5 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
213 1983 014 0 8308250101 185176 07/30/83

DOCKET:213 CONNECTICUT YANKEE TYPE:PWR

REGION: 1

NSSS:WE

ARCHITECTURAL ENGINEER: MXXX

FACILITY OPERATOR: CONN. YANKEE ATOMIC POWER CO.

SYMBOL: COY

ABSTRACT

WHILE IN MODE ONE, ONE OF THE TWO INCOMING STATION SERVICE SUPPLIES WAS DISABLED BY A THUNDERSTORM. THE DISABLED SOURCE WAS THE 1206 LINE (115 KV). ADMINISTRATIVE TECH SPECS STATE THAT TWO INCOMING POWER SOURCES BE AVAILABLE FOR POWER OPERATION. WITH ONE SOURCE DISABLED, IT MUST BE RESTORED WITHIN 72 HOURS, OR PLANT SHUTDOWN IS REQUIRED. FOLLOWING THE LOSS OF THE 1206 LINE, AUTO TRANSFER OF HOUSE LOADS WAS MADE TO THE REMAINING 115 KV LINE. THE AFFECTED LINE HAD BEEN DISABLED AT AN OFFSITE SWITCHYARD. THE AFFECTED LINE WAS RESTORED TO SERVICE ON 7/31/83. THE PLANT REMAINED AT 100% POWER THROUGHOUT THIS TIME PERIOD.

FORM	6	LER SCSS DATA				03-03-86	
DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE	
250	1985	019	0	8508280031	195294	07/21/85	

DOCKET:250 TURKEY POINT 3 TYPE:PWR
 REGION: 2 NSSS:WE
 ARCHITECTURAL ENGINEER: BECH
 FACILITY OPERATOR: FLORIDA POWER & LIGHT CO.
 SYMBOL: FPL

COMMENTS

STEP 1: CONF NEI - PRESSURIZER PRESSURE PROTECTION COMPARATORS.

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv); ESF actuations.

ABSTRACT

POWER LEVEL - 100%. ON JULY 21, 1985 AT 11:41 P.M., UNIT 3 EXPERIENCED A REACTOR TRIP FROM 100% POWER DUE TO A SPURIOUS LOW PRESSURIZER PRESSURE SIGNAL GENERATED IN THE REACTOR PROTECTION SYSTEM (RPS). THE REACTOR TRIP LOGIC IN THE RPS INITIATED A SUBSEQUENT TURBINE TRIP. THE REACTOR TRIP RESULTED IN STEAM GENERATOR LEVELS DECREASING BELOW THE LOW-LOW SETPOINTS, 15% OF THE NARROW RANGE SPAN, DUE TO STEAM GENERATOR SHRINK. THIS INITIATED AN AUTOMATIC START OF AUXILIARY FEEDWATER PUMPS. PLANT PROCEDURES WERE USED TO STABILIZE THE UNIT IN A HOT STANDBY CONDITION. A HEAVY ELECTRICAL AND RAIN STORM WAS IN PROGRESS AT THE TIME OF THE EVEN.. THE FINDINGS FROM A POST-TRIP REVIEW INDICATED THAT THE MOST PROBABLE CAUSE WAS A LIGHTNING STRIKE, WHICH AFFECTED PRESSURIZER PRESSURE PROTECTION COMPARATORS GETTING A SPURIOUS PRESSURIZER LOW PRESSURE REACTOR TRIP. THE FOLLOWING CORRECTIVE MEASURES WERE TAKEN: (1) TO ENSURE THAT THE PRESSURIZER PRESSURE AND LEVEL PROTECTION CHANNELS WERE NOT DAMAGED BY THE LIGHTNING STRIKE, A PERIODIC OPERABILITY TEST WAS PERFORMED USING OPERATING PROCEDURE 14004.4. THESE PROTECTION CHANNELS PERFORMED SATISFACTORILY. (2) A REVIEW WAS CONDUCTED OF THE PRINTOUTS OF THE UNIT 3 480 VAC LOAD CENTER VOLTAGE ANALYZERS AND THE UNDERVOLTAGE CIRCUITS SEQUENCE OF EVENTS RECORDER. NO ABNORMAL INDICATIONS WERE EVIDENT ON THESE PRINTOUTS.

FORM	7	LER SCSS DATA				03-03-86	
DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE	

DOCKET:259 BROWNS FERRY 1 TYPE:BWR
REGION: 2 NSSS:GE
ARCHITECTURAL ENGINEER: TVAX
FACILITY OPERATOR: TENNESSEE VALLEY AUTHORITY
SYMBOL: TVA

COMMENTS
STEP 2: COMPONENT XR - WIND DIRECTION RECORDER.

REFERENCE LERS:
1 259/82-015 2 259/82-058

ABSTRACT
WIND DIRECTION CHANNEL XR-90-102-2 (ELEVATION 33 FEET) FAILED. THE WIND DIRECTION CHANNEL IS COMMON TO UNITS 1, 2, AND 3. THERE WERE NO PREVIOUS SIMILAR EVENTS. IN LINE FUSE IN THE ESTERLINE ANGUS RECORDER BLEW DURING AN ELECTRICAL STORM. THE FUSE WAS REPLACED AND THE SYSTEM WAS RETURNED TO SERVICE WITHIN 24 HOURS.

FORM 8 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
259	1982	001	0	8202160256	172042	01/03/82

DOCKET:259 BROWNS FERRY 1 TYPE:BWR
REGION: 2 NSSS:GE
ARCHITECTURAL ENGINEER: TVAX
FACILITY OPERATOR: TENNESSEE VALLEY AUTHORITY
SYMBOL: TVA

ABSTRACT
METEOROLOGICAL INSTRUMENTATION 0-TDR-90-103 AIR TEMPERATURE DELTA T AT ELEVATION 620-737 MSL AND 0-XR-90-102-1 (30 FOOT AIR SPEED) AT ELEVATION 620 MSL FAILED. (TECH. SPEC. TABLE 3.2.1.) THIS INSTRUMENTATION IS COMMON TO UNITS 1, 2, AND 3. LIGHTNING DAMAGE TO TRANSISTORS 03 AND 04 CAUSED THE 0-TDR-90-103 OUTAGE. 2 BLOWN FUSES IN PANEL 9-34 AND 2 BLOWN FUSES AT THE METEOROLOGICAL STATION RENDERED 0-XR-90-102-1 INOPERABLE. FUSES AT THE ACROMAG 312D WERE REPLACED AND THE UNIT RETURNED TO SERVICE WITHIN 24 HOURS.

FORM 9 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
259	1982	015	0	8203180250	172499	02/09/82

DOCKET:259 BROWNS FERRY 1 TYPE:BWR
REGION: 2 NSSS:GE
ARCHITECTURAL ENGINEER: TVAX
FACILITY OPERATOR: TENNESSEE VALLEY AUTHORITY
SYMBOL: TVA

COMMENTS
STEP 2: COMPONENT XR - WIND SPEED AND DIRECTION RECORDER, MODEL NO. 312D.

REFERENCE LERS:
1 259/82-001 2 259/80-002 3 259/82-058 4 259/81-026

APPENDIX

DELTA AIR TEMPERATURE RECORDER 620-737 MSL (TDR-90-103) WAS OBSERVED TO READ DOWNSCALE ON JUNE 30 AND JULY 4, 1982. THIS INSTRUMENTATION IS COMMON TO UNITS 1, 2, AND 3. TECH SPEC TABLE 3.2.1 REQUIRES A MINIMUM OPERABLE OF ONE DELTA AIR TEMPERATURE RECORDER BETWEEN ELEVATION 620-737 MSL. LIGHTNING STRUCK IN THE VICINITY OF THE ENVIRONMENTAL DATA STATION CAUSING FAILURE OF THE DELTA AIR TEMPERATURE RECORDER 620-737 MSL. BLOWN FUSES WERE REPLACED. THE 620-737 MSL AIR TEMPERATURE RECORDER WAS OUT OF SERVICE FOR 16 HOURS ON JUNE 30 AND 16-1/2 HOURS ON JULY 4, 1982. THIS IS CONSIDERED A RANDOM EVENT AND NO FURTHER RECURRENCE CONTROL IS PLANNED.

FORM 10 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
259 1982 043 0 8208030178 175469 06/30/82

DOCKET:259 BROWNS FERRY 1 TYPE:BWR
REGION: 2 NSSS:GE
ARCHITECTURAL ENGINEER: TVAX
FACILITY OPERATOR: TENNESSEE VALLEY AUTHORITY
SYMBOL: TVA

ABSTRACT
DELTA AIR TEMPERATURE RECORDER 620-737 MSL (TDR-90-103) WAS OBSERVED TO READ DOWNSCALE ON JUNE 30 AND JULY 4, 1982. THIS INSTRUMENTATION IS COMMON TO UNITS 1, 2, AND 3. TECH SPEC TABLE 3.2.1 REQUIRES A MINIMUM OPERABLE OF ONE DELTA AIR TEMPERATURE RECORDER BETWEEN ELEVATION 620-737 MSL. LIGHTNING STRUCK IN THE VICINITY OF THE ENVIRONMENTAL DATA STATION CAUSING FAILURE OF THE DELTA AIR TEMPERATURE RECORDER 620-737 MSL. BLOWN FUSES WERE REPLACED. THE 620-737 MSL AIR TEMPERATURE RECORDER WAS OUT OF SERVICE FOR 16 HOURS ON JUNE 30 AND 16-1/2 HOURS ON JULY 4, 1982. THIS IS CONSIDERED A RANDOM EVENT AND NO FURTHER RECURRENCE CONTROL IS PLANNED.

FORM 11 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
259 1982 053 0 8209160115 176903 08/10/82

DOCKET:259 BROWNS FERRY 1 TYPE:BWR
REGION: 2 NSSS:GE
ARCHITECTURAL ENGINEER: TVAX
FACILITY OPERATOR: TENNESSEE VALLEY AUTHORITY
SYMBOL: TVA

COMMENTS
STEP 2: COMPONENT XR - WIND DIRECTION RECORDER, MODEL NO. L-11015.

ABSTRACT
ELEV. 620 MSL WIND DIRECTION RECORDER (1-XR-90-102-2) WAS OBSERVED TO READ DOWNSCALE. THIS INSTRUMENTATION IS COMMON TO UNITS 1, 2, AND 3. TECH SPEC TABLE 3.2.1 REQUIRES THAT CHANNEL TO BE OPERABLE. LIGHTNING STRUCK IN THE VICINITY OF THE ENVIRONMENTAL DATA STATION CAUSING FAILURE OF THE ESTERLINE ANGUS RECORDER (MODEL L-11015). BLOWN FUSES WERE REPLACED IN THE WIND DIRECTION CHANNEL AND IT WAS RETURNED TO SERVICE. THE RECORDER WAS OUT OF SERVICE FOR APPROXIMATELY SEVEN HOURS.

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
271 1984 014 0 8408300478 191143 07/23/84

DOCKET:271 VERMONT YANKEE TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: EBAS
FACILITY OPERATOR: VERMONT YANKEE NUCLEAR POWER CORP.
SYMBOL: VYC

REPORTABILITY CODES FOR THIS LER ARE:
10 10 CFR 50.73(a)(2)(i): Shutdowns or technical
specification violations.

REFERENCE LERS:
1 271/80-028

ABSTRACT
POWER LEVEL - 000%. DURING WEEKLY ENV AIR SAMPLE COLLECTIONS ON
7/22/84, IT WAS DISCOVERED THAT A CONTINUOUS SAMPLE WAS NOT BEING
DRAWN AT SAMPLE STATION AT 1.2. TECH SPECS TABLE 3.9.1 REQUIRES THAT
CONTINUOUS AIR SAMPLING BE PERFORMED. LOW PLANT RELEASE LEVELS WERE
MONITORED DURING THIS PERIOD AND PAST EXPERIENCE HAS INDICATED THAT
THESE LEVELS ARE DETECTABLE BY ENV AIR SAMPLING. THE MAIN FUSE FOR
THE SAMPLING STATION HAD BLOWN OUT APPROX 8 HRS INTO SAMPLING CYCLE.
A SEVERE ELECTRICAL STORM WAS REPORTED IN THE AREA AT THIS TIME. A
NEW FUSE WAS INSTALLED IN THE SAMPLE STATION AND A SUBSEQUENT
FUNCTIONAL CHECK OF THE STATION WAS PERFORMED. NO FURTHER DAMAGE WAS
NOTED. A PREVIOUS SIMILAR OCCURRENCE WAS REPORTED AS LER 80-28/3L.
UNABLE TO LOCATE RECORD FOR LER: 278/85-018

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
293 1981 018 1 8106240038 166558 05/12/81

DOCKET:293 PILGRIM 1 TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: BOSTON EDISON CO.
SYMBOL: BEC

ABSTRACT
FOLLOWING A LIGHTNING HIT IN THE AREA OF MAIN STACK, THE STACK GAS
RADIATION MONITOR 1705-18A ALARMED ON PANEL C903 IN THE CONTROL ROOM.
BOTH THE PRE AMPLIFIER AND PULSE HEIGHT DISCRIMINATOR CIRCUITS HAD
FAILED APPARENTLY DUE TO A VOLTAGE SURGE GENERATED BY THE LIGHTNING
STRIKE. THESE SUB COMPONENTS WERE REPLACED IN-KIND, THE SYSTEM
RECALIBRATED AND RETURNED TO SERVICE.

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
293 1983 045 0 8309120477 185386 08/02/83

DOCKET:293 PILGRIM 1 TYPE:BWR
REGION: 1 NSSS:GE

ABSTRACT

A LIGHTNING STRIKE RENDERED ALL METEOROLOGICAL INSTRUMENTATION INOPERABLE. THIS WAS THE FIRST LIGHTNING INDUCED LOSS OF ALL METEOROLOGICAL INSTRUMENTATION. ALL AFFECTED INSTRUMENTATION WAS REPAIRED OR REPLACED AND THE FUNCTIONAL TEST WAS SATISFACTORY. AN ENGINEERING INVESTIGATION WILL BE CONDUCTED TO EVALUATE THE INSTALLED LIGHTNING ELIMINATOR SYSTEM.

FORM 19 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
302	1982	048	0	8208200229	175867	07/15/82

DOCKET:302 CRYSTAL RIVER 3 TYPE:FWR
REGION: 2 NSSS:BW
ARCHITECTURAL ENGINEER: GLBT
FACILITY OPERATOR: FLORIDA POWER CORPORATION
SYMBOL: FPC

COMMENTS

MANY PREVIOUS EVENTS WERE NOT IDENTIFIED BY LER NO.

ABSTRACT

DURING A THUNDERSTORM, IT WAS DISCOVERED THAT THE WINDSPEED AND TEMPERATURE CHANNELS FOR BOTH 33 AND 175 FT. METEOROLOGICAL TOWER ELEVATIONS WERE NOT FUNCTIONING PROPERLY. THIS IS CONTRARY TO TECH SPECS 3.3.3.4. THESE ARE THE SECOND AND SIXTH OCCURRENCES FOR THE 33 AND 175 FT. WIND CHANNELS, RESPECTIVELY. IT IS ALSO THE FOURTH AND FIFTH OCCURRENCE FOR THE 33 AND 175 FT. TEMPERATURE CHANNEL, RESPECTIVELY. THIS IS THE 22ND REPORT UNDER THIS SPECIFICATION. THESE INSTRUMENTS WERE AFFECTED BY A LIGHTNING STRIKE. DAMAGED EQUIPMENT WAS REMOVED, REPAIRED, AND CALIBRATED. THE INSTRUMENTS WERE RETURNED TO SERVICE. AN EVALUATION IS IN PROGRESS TO DETERMINE METHODS TO PREVENT RECURRENCE OF THIS TYPE OF EVENT.

FORM 19 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
302	1983	032	0	8309130200	185437	08/05/83

DOCKET:302 CRYSTAL RIVER 3 TYPE:FWR
REGION: 2 NSSS:BW
ARCHITECTURAL ENGINEER: GLBT
FACILITY OPERATOR: FLORIDA POWER CORPORATION
SYMBOL: FPC

COMMENTS

STEP 3: COMPONENT ZTT = ALL METEOROLOGICAL INSTRUMENTATION

ABSTRACT

AT 1800 ON AUGUST 5, 1983, DURING SEVERE WEATHER CONDITIONS, THE METEOROLOGICAL MONITORING INSTRUMENTATION WAS FOUND TO BE INOPERABLE (TECH SPEC 3.3.3.4). THE INSTRUMENTATION WAS RETURNED TO OPERABILITY BY 1120 ON AUG 11, 1983. THIS WAS THE THIRD TIME THAT LIGHTNING HAS STRUCK THE METEOROLOGICAL TOWER AND THE TWENTY-NINTH REPORT UNDER SPECIFICATION 3.3.3.4. THE METEOROLOGICAL INSTRUMENTATION FAILURE WAS CAUSED BY A LIGHTNING STRIKE. COMPONENTS WERE REPLACED AND RECALIBRATED, AS NECESSARY.

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
302 1983 045 1 8312130142 187846 10/16/83

DOCKET:302 CRYSTAL RIVER 3 TYPE:PWR
REGION: 2 NSSS:BW
ARCHITECTURAL ENGINEER: GLBT
FACILITY OPERATOR: FLORIDA POWER CORPORATION
SYMBOL: FPC

COMMENTS
STEP 1: COMP XE - WIND DIRECTION INDICATOR 30TH REPORT - SEVERAL OCCURRENCES IN 23 DAYS

REFERENCE LERS:
1 302/82-005 2 302/82-069 3 302/82-031 4 302/83-005

ABSTRACT
ON OCTOBER 16, 1983, DURING ROUTINE PLANT OPERATION, IT WAS DISCOVERED THAT THE 175' WIND DIRECTION INSTRUMENTATION WAS INOPERABLE. ON OCTOBER 26, 1983, THE 33' WIND DIRECTION INSTRUMENTATION WAS DISCOVERED INOPERABLE. ON NOVEMBER 2, 1983, THE 33' WIND DIRECTION INSTRUMENTATION WAS DISCOVERED INOPERABLE. ON NOVEMBER 4, 1983, THE 175' WIND DIRECTION INSTRUMENTATION WAS OUT OF TOLERANCE. ON NOVEMBER 8, 1983, THE 175' WIND SPEED INSTRUMENTATION WAS INOPERABLE. BACKUP DATA WAS AVAILABLE THROUGH A PRE-ESTABLISHED CHANNEL FROM THE NATIONAL WEATHER SERVICE. THE APPARENT CAUSES FOR THE INSTRUMENTATION FAILURES ARE SEVERE WEATHER DAMAGE AND COMPONENT FAILURE. ALL INSTRUMENTATION WAS REPAIRED AND RETURNED TO SERVICE BY NOVEMBER 9, 1983. THIS REVISION DOCUMENTS ADDITIONAL FAILURES DURING THE SAME TIME PERIOD.

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
309 1983 014 0 8306030341 183245 04/25/83

DOCKET:309 MAINE YANKEE TYPE:PWR
REGION: 1 NSSS:CE
ARCHITECTURAL ENGINEER: SWXX
FACILITY OPERATOR: MAINE YANKEE ATOMIC POWER CO.
SYMBOL: MYA

ABSTRACT
WHILE AT STEADY-STATE FULL POWER OPERATION ON APRIL 25, 1983, SECTION 207 OF THE 115KV RESERVE STATION SERVICE LINE BECAME UNAVAILABLE WHEN ONE PHASE WAS DAMAGED BY LIGHTNING. THE ALTERNATE SECTION 69 115KV INCOMING SERVICE LINE HAS BEEN OUT OF SERVICE FOR UPGRADING SINCE APRIL 19, 1983. THE LOSS OF THE REMAINING 115KV INCOMING LINE FORCED OPERATION IN A DEGRADED MODE PERMITTED BY TECH SPEC 3.12.B. SECTION 207 WAS RESTORED TO SERVICE WITHIN FOUR HOURS. BOTH EMERGENCY DIESEL POWER SUPPLIES WERE CONTINUOUSLY OPERABLE WHILE THE LINE WAS OUT OF SERVICE. SECTION 207 WOULD BE TAKEN OUT OF SERVICE FOR A PERIOD OF LESS THAN ONE HOUR TO INSTALL NEW LIGHTNING ARRESTORS, AND THIS ACTION WAS EXPECTED TO BE COMPLETED PRIOR TO THE TIME SECTION 69 WAS RESTORED TO SERVICE.

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
309 1983 025 0 8308110104 185192 07/02/83

DOCKET:309 MAINE YANKEE TYPE:PWR
REGION: 1 NSSS:CE
ARCHITECTURAL ENGINEER: SWXX
FACILITY OPERATOR: MAINE YANKEE ATOMIC POWER CO.
SYMBOL: MYA

ABSTRACT

DURING NORMAL STEADY STATE FULL POWER OPERATIONS, SECTION 69 OF THE 115 KV RESERVE STATION SERVICE LINE BECAME INOPERABLE WHEN BREAKERS AT THE SURWIEC SUBSTATION OPENED. THE ALTERNATE 115 KV INCOMING LINE, SECTION 207, WAS OUT OF SERVICE FOR GENERAL UPGRADE. THE LOSS OF THE REMAINING 115 KV INCOMING LINE FORCED OPERATION IN A DEGRADED MODE PERMITTED BY TECH SPECS 3.12.B. EMERGENCY DIESEL POWER SUPPLIES REMAINED OPERABLE WHILE THE 115 KV LINES WERE OUT OF SERVICE. SECTION 69 WAS RESTORED AND RETURNED TO SERVICE WITHIN 4 MINUTES. LIGHTNING STORM ACTIVITY THROUGHOUT THE POWER DISTRIBUTION AREA RESULTED IN THE TEMPORARY LOSS OF SEVERAL OTHER SERVICE LINES DURING THE PERIOD WHEN THE SECTION 69 BREAKERS WERE OPEN. SINCE THE POWER SYSTEM DISPATCHER WAS ABLE TO RECLOSE THE BREAKERS AND RETURN SERVICE WITHOUT DIFFICULTY. THE LOSS OF SECTION 69 WAS PROBABLY DUE TO A LIGHTNING STRIKE. THE LIGHTNING MOST LIKELY ACTIVATED GROUND FAULT ISOLATION PROTECTION FOR THE LINE, OPENING THE SUPPLY BREAKERS AT SURWIEC.

FORM 23 LER SOSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
315 1981 049 0 8111090703 170051 09/30/81

DOCKET:315 COOK 1 TYPE:PWR
REGION: 3 NSSS:WE
ARCHITECTURAL ENGINEER: AEP'S
FACILITY OPERATOR: INDIANA & MICHIGAN ELECTRIC CO.
SYMBOL: IME

REFERENCE LERS:
1 315/79-026

ABSTRACT

THE 69/4KV ALTERNATE RESERVE SOURCE WAS DECLARED INOPERABLE AFTER 'EP VOLTAGE FAILURE' ALARMS WERE RECEIVED IN THE CONTROL ROOMS. THIS FAILURE AFFECTED BOTH UNIT ONE AND UNIT TWO. A SIMILAR EVENT THAT OCCURRED PREVIOUSLY WAS REPORTED VIA L.E.R. 315/79-026. THE ALARM INDICATION RESULTED WHEN A JUMPER ON ONE PHASE OF THE 69KV FAILED. THIS FAILURE PROBABLY OCCURRED DUE TO A LIGHTNING STRIKE AS A SEVERE THUNDERSTORM WAS MOVING THROUGH THE AREA. THE PLANTSIDE BREAKERS WERE OPENED AND REMAINING POWER SUPPLIES DEMONSTRATED TO BE OPERABLE. THE JUMPER WAS REPLACED AND BREAKER CLOSED WITHIN 10 HOURS AND 6 MINUTES.

FORM 24 LER SOSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
320 1982 018 0 8207090160 174127 06/01/82

DOCKET:320 THREE MILE ISLAND 2 TYPE:PWR

REGION: 1

NSSS: BW

ARCHITECTURAL ENGINEER: JNRO

FACILITY OPERATOR: METROPOLITAN EDISON CO.

SYMBOL: MEC

COMMENTS

STEP 1: COMPONENT XE - ULTRAVIOLET LIGHT DETECTOR. STEP 2: ISYS HS - AIR INTAKE TUNNEL. STEP 5: T-COL X - LONG TERM COLD SHUTDOWN.

ABSTRACT

THE AIR INTAKE TUNNEL (AIT) HALON SYSTEM ACTUATED. THIS TRIGGERED THE ACTUATION OF THE AIR DELUGE SYSTEM AND TRIPPED THE AUXILIARY AND FUEL HANDLING BUILDINGS (AB & FHB) SUPPLY AND EXHAUST FANS. THIS EVENT IS CONSIDERED REPORTABLE PER TECH SPEC 6.9.1.9(B) DUE TO ENTRY INTO AND COMPLIANCE WITH THE ACTION STATEMENTS OF TECH SPEC 3.9.12 AND 3.7.10.3 AS A RESULT OF LOW VENTILATION FLOWRATE AND INOPERABILITY (DUE TO DISCHARGE) OF THE HALON SYSTEM. RESPECTIVELY, THE INITIATING CAUSE OF THE EVENT IS ATTRIBUTED TO LIGHTNING SETTING OFF AN ULTRAVIOLET LIGHT DETECTOR IN THE AIR INTAKE TUNNEL. SYSTEM INTERLOCKS OPERATED AS DESIGNED IN PERFORMING THE SUBSEQUENT SYSTEM ACTUATIONS/TRIPS. THE HALON & DELUGE SYSTEMS WERE SECURED AND THE VENTILATION SYSTEMS RESTORED BY 1745 HOURS. THE HALON SYSTEM WAS RECHARGED AND RETURNED TO SERVICE AT 1750 HOURS ON JUNE 12, 1982.

FORM 25 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
320	1982	019	0	8207090191	174126	06/01/82

DOCKET: 320 THREE MILE ISLAND 2 TYPE: PWR
 REGION: 1 NSSS: BW
 ARCHITECTURAL ENGINEER: BNRO
 FACILITY OPERATOR: METROPOLITAN EDISON CO.
 SYMBOL: MEC

COMMENTS

STEP 1: COMPONENT MSC - AMPLIFIER CHIP.

REFERENCE LERS:

1 320/81-035 2 320/81-036 3 320/81-038

ABSTRACT

THE WIND SPEED, WIND DIRECTION, AND AIR TEMPERATURE INDICATION IN THE UNIT 2 CONTROL ROOM WAS LOST. THIS EVENT IS CONSIDERED REPORTABLE PER SECTION 6.9.1.9(B) DUE TO ENTRY INTO AND COMPLIANCE WITH THE ACTION STATEMENT OF TECH SPEC 3.3.3.4. THIS LER IS SIMILAR TO LER'S 81-35, 81-36, AND 81-38. THIS EVENT WAS APPARENTLY CAUSED BY LIGHTNING STRIKING THE METEOROLOGICAL TOWER RESULTING IN TWO BLOWN AMPLIFIER CHIPS IN THE BUFFER AMPLIFIER AND A BLOWN FUSE IN THE 12 VOLT POWER SUPPLY. THE COMPONENTS WERE REPLACED AND THE METEOROLOGICAL INSTRUMENTS RETURNED TO SERVICE AT 1945 HOURS ON JUNE 1, 1982.

FORM 26 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
320	1982	023	1	8311210400	187467	06/29/82

DOCKET: 320 THREE MILE ISLAND 2 TYPE: PWR
 REGION: 1 NSSS: BW

ARCHITECTURAL ENGINEER: BNRD
FACILITY OPERATOR: METROPOLITAN EDISON CO.
SYMBOL: MEC

COMMENTS

STEPS 1,2,&3 ISYS SW - AIR INTAKE TUNNEL.

REFERENCE LERS:

1 320/82-018

ABSTRACT

THE AIR INTAKE TUNNEL (AIT) HALON SYSTEM ACTUATED. THIS CAUSED THE ACTUATION OF THE AIT DELUGE SYSTEM AND TRIPPED THE AUXILIARY AND FUEL HANDLING BUILDINGS SUPPLY AND EXHAUST FANS. THIS EVENT IS CONSIDERED REPORTABLE PER TECH SPEC 6.9.1.9(B) DUE TO ENTRY INTO AND COMPLIANCE WITH THE ACTION STATEMENTS OF TECH SPEC 3.9.12 AND 3.7.10.3 AS A RESULT OF LOW VENTILATION FLOWRATE AND INOPERABILITY (DUE TO DISCHARGE) OF THE HALON SYSTEM, RESPECTIVELY. SIMILAR EVENT: LER 82-018. THE INITIATING CAUSE OF THE EVENT IS ATTRIBUTED TO LIGHTNING ACTUATING THE ULTRAVIOLET LIGHT DETECTORS IN THE AIR INTAKE TUNNEL. THE SYSTEM OPERATED AS DESIGNED PERFORMING THE SUBSEQUENT SYSTEM ACTUATING/TRIPS. THE HALON AND DELUGE SYSTEMS WERE SECURED AND THE VENTILATION SYSTEMS RESOTRED AT 1710 HOUR ON JUNE 29, 1982. THE HALON SYSTEM WAS RECHARGED AND RETURNED TO SERVICE AT 1827 HOURS ON JULY 9, 1982.

FORM 27 LER SCSS DATA 08-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
320 1983 025 1 8410230116 195412 06/21/83

DOCKET:320 THREE MILE ISLAND 2 TYPE:PWR
REGION: 1 NSSS:BW
ARCHITECTURAL ENGINEER: BNRD
FACILITY OPERATOR: METROPOLITAN EDISON CO.
SYMBOL: MEC

COMMENTS

UV DETECTORS SUCEPTABLE TO BE TRIGGERED BY LIGHTNING FLASHES. STEPS 1-24:
ISYS SW - AIR INTAKE TUNNEL; STEP 25: T-COLUMN X - LONG TERM COLD SHUTDOWN.

REFERENCE LERS:

1 320/82-018 2 320/82-023 3 320/83-014 4 320/83-031
5 320/83-043

ABSTRACT

ON 6-21-83, THE FOLLWING WAS DETERMINED TO BE REPORTABLE PURSUANT TO SECTION 6.9.1.9(B) OF THE TECH SPECS. BETWEEN 5-26-83, AND 7-20-83, THE AIR INTAKE TUNNEL (AIT) HALON SYSTEM WAS PARTIALLY DISARMED ON 11 OCCASIONS. THE DISARMING WAS INTENTIONAL TO PROTECT THE SYSTEM FROM LIGHTNING INDUCED SPURIOUS HALON DISCHARGED. AFTER PASSAGE OF THE THUNDERSTORM, THE AIT HALON SYSTEM WAS RESTORED TO A FULL FUNCTIONAL STATUS. THESE EVENTS CONCERN TECH SPEC 3.7.10.3. ON 3 OCCASIONS (REFERENCE LER'S 82-18, 82-23, AND 83-14) THE AIT HALON SYSTEM WAS SET OFF BY LIGHTNING FLASHES. THE HALON SYSTEM UTILIZES ULTRAVIOLET LIGHT AND RATE OF PRESSURE RISE DETECTORS TO TRIGGER THE HALON DISCHARGE. THE UV DETECTORS OF 2 ZONES ARE ORIENTED SUCH THAT THEY MAY BE TRIPPED BY FLASHES OUTSIDE THE AIR INTAKE STRUCTURE. AS AN INTERIM PROTECTIVE ACTION, THE SUSCEPTIBLE AIT HALON SYSTEM ZONE(S) WERE DISARMED DURING THUNDERSTORMS TO PREVENT SPURIOUS DISCHARGES. PERMANENT CORRECTIVE ACTION: AIT STRUCTURE LOUVERS HAVE BEEN

INSTALLED. LOUVERS SHOULD PREVENT OCCURRENCES OF THE ABOVE EVENTS.

FORM 28 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
320 1983 031 1 8410230123 195413 07/21/83

DOCKET:320 THREE MILE ISLAND 2 TYPE:PWR
REGION: 1 NSSS:BW
ARCHITECTURAL ENGINEER: BNRO
FACILITY OPERATOR: METROPOLITAN EDISON CO.
SYMBOL: MEC

COMMENTS

UV DETECTORS SUCEPTABLE TO BE TRIGGERED BY LIGHTNING FLASHES. STEPS 1-10:
ISYS SW - AIR INTAKE TUNNEL; STEP 11: T-COLUMN X - LONG TERM COLD SHUTDOWN.

REFERENCE LERS:

1 320/82-018 2 320/82-023 3 320/83-014 4 320/83-025
5 320/83-043

ABSTRACT

ON 6-21-83, THE FOLLOWING WAS DETERMINED TO BE REPORTABLE PURSUANT TO SECTION 6.9.1.9(B) OF THE TECH SPECS. BETWEEN 7-21 AND 8-5-83, THE AIR INTAKE TUNNEL (AIT) HALON SYSTEM WAS PARTIALLY DISARMED ON 4 OCCASIONS. THE DISARMING WAS INTENTIONAL TO PROTECT THE SYSTEM FROM LIGHTNING INDUCED SPURIOUS HALON DISCHARGES. AFTER PASSAGE OF THE THUNDERSTORM, THE SYSTEM WAS RESTORED TO A FULL FUNCTIONAL STATUS. THESE EVENTS CONCERN TECH SPEC 3.7.10.3. (REFERENCE LER 83-25). ON 3 OCCASIONS, (REFERENCE LERS 82-18, 82-23 AND 83-14) THE AIT HALON SYSTEM WAS SET OFF BY LIGHTNING FLASHES. THE HALON SYSTEM UTILIZES ULTRAVIOLET LIGHT AND RATE OF PRESSURE RISE DETECTORS TO TRIGGER THE HALON DISCHARGE. THE UV DETECTORS OF 2 ZONES ARE ORIENTED SUCH THAT THEY MAY BE TRIPPED BY FLASHES OUTSIDE THE AIR INTAKE STRUCTURE. AS AN INTERIM PROTECTIVE ACTION, THE SUSCEPTIBLE AIT HALON SYSTEM ZONE(S) WERE DISARMED DURING THUNDERSTORMS TO PREVENT SPURIOUS DISCHARGES. PERMANENT CORRECTIVE INCLUDED INSTALLING AIT STRUCTURE LOUVERS. LOUVERS SHOULD PREVENT RECURRENCE OF THE EVENT.

FORM 29 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
320 1983 043 1 8410230150 195416 08/27/83

DOCKET:320 THREE MILE ISLAND 2 TYPE:PWR
REGION: 1 NSSS:BW
ARCHITECTURAL ENGINEER: BNRO
FACILITY OPERATOR: METROPOLITAN EDISON CO.
SYMBOL: MEC

COMMENTS

UV DETECTORS SUCEPTABLE TO BE TRIGGERED BY LIGHTNING FLASHES. STEPS 1-6:
ISYS SW - AIR INTAKE TUNNEL; STEP 9: T-COLUMN X - LONG TERM COLD SHUTDOWN.

REFERENCE LERS:

1 320/82-018 2 320/82-023 3 320/83-014 4 320/83-025
5 320/83-031

ABSTRACT

ON 8-21-83, THE FOLLOWING WAS DETERMINED TO BE RETRIABLE PURSUANT TO SECTION 6.9.1.9(B) OF THE TECH SPECS. BETWEEN 8-17 AND 9-12-83, THE AIR INTAKE TUNNEL (AIT) HALON SYSTEM WAS PARTIALLY DISARMED ON 3 OCCASIONS. THE DISARMING WAS INTENTION TO PROTECT THE SYSTEM FROM LIGHTNING INDUCED SPURIOUS HALON DISCHARGES. AFTER PASSAGE OF THE STORM, THE SYSTEM WAS RESTORED TO A FULL FUNCTIONAL STATUS. THESE EVENTS CONCERN TECH SPEC 3.7.10.3. REFERENCE LER'S 83-25 AND 83-31. ON 3 OCCASIONS (LER'S 82-18, 82-23, AND 83-014), THE AIR HALON SYSTEM WAS SET OFF BY LIGHTNING FLASHES. AS AN INTERIM PROTECTIVE ACTION, THE SUSCEPTIBLE AIT HALON SYSTEM ZONE(S) WERE DISARMED DURING STORMS TO PREVENT SPURIOUS DISCHARGES. THE HALON SYSTEM UTILIZES ULTRAVIOLET LIGHT AND RATE OF PRESSURE RISE DETECTORS TO TRIGGER THE HALON DISCHARGE. THE ULTRAVIOLET DETECTORS OF 2 ZONES ARE ORIENTED SUCH THAT THEY MAY BE TRIPPED BY FLASHES OUTSIDE OF THE AIR INTAKE STRUCTURE. PERMANENT CORRECTIVE ACTION INCLUDED INSTALLATION OF AIT STRUCTURE LOUVERS. DISARMING THE AIR HALON SYSTEM HAS BEEN DISCONTINUED.

FORM 30 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 321 1981 074 0 8108130172 189464 07/20/81

DOCKET:321 HATCH 1 TYPE:EMR
 REGION: 2 NSSS:GE
 ARCHITECTURAL ENGINEER: BESS
 FACILITY OPERATOR: GEORGIA POWER CO.
 SYMBOL: GPC

COMMENTS

STEP 1: COMPONENT MSC - TRANSISTOR.

REFERENCE LER:
 1 321/79-084

ABSTRACT

THE MAIN STACK OFF-GAS FLOW RECORDER WAS FOUND INOPERATIVE. E.T.S. REQUIRES CONTINUOUS MONITORING OF STACK GAS FLOW. THIS IS A REPETITIVE EVENT: LER 50-321/1979-034. THE CAUSE HAS BEEN ATTRIBUTED TO COMPONENT FAILURE. THE FAILURE WAS DUE TO SEVERAL TRANSISTOR FAILURES IN EACH FLOW MEASURING UNIT. THE COMPONENTS WERE REPLACED. THE FLOW UNITS RECALIBRATED AND RETURNED TO SERVICE.

FORM 31 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 322 1985 040 0 8510190154 196465 09/09/85

DOCKET:322 SHOREHAM TYPE:EMR
 REGION: 1 NSSS:GE
 ARCHITECTURAL ENGINEER: SMXX
 FACILITY OPERATOR: LONG ISLAND LIGHTING CO.
 SYMBOL: LIL

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 001%. ON 9-9-85 AT 1050. AN REACTOR PLDG STANDBY

VENTILATION SYSTEM (RBNVS)/CONTROL ROOM AIR CONDITIONING (CRAC) INITIATION OCCURRED DUE TO AN UNDERVOLTAGE CONDITION. THE PLANT WAS IN OPERATIONAL CONDITION 2. THE UNDERVOLTAGE CONDITION WAS DUE TO A LIGHTNING STORM WHICH CAUSED THE 138 KV OFFSITE POWER TO DECREASE BY 8KV. ALL ELECTRICAL BUSES BEING FED FROM THE 138 KV POWER WERE REDUCED PROPORTIONALLY. THIS UNDERVOLTAGE TRIP IS A NORMAL DESIGN CONDITION FOR EQUIPMENT BEING UTILIZED FOR NORMAL PLANT OPERATIONS. BY INITIATING RBSVS/CRAC, THE REACTOR BLDG NORMAL VENTILATION SYSTEM (RBNVS) TRIPPED BY DESIGN. ONCE THE CAUSE WAS DETERMINED, THE RBNVS WAS RETURNED TO NORMAL AND THE RBSVS/CRAC WAS SECURED. THERE WAS NO SAFETY SIGNIFICANCE TO THE EVENT.

FORM 32 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 325 1984 025 0 8410180587 191814 09/10/84

DOCKET:325 BRUNSWICK 1 TYPE:BWR
 REGION: 2 NSSS:GE
 ARCHITECTURAL ENGINEER: UECX
 FACILITY OPERATOR: CAROLINA POWER & LIGHT CO.
 SYMBOL: CPL

COMMENTS

STEPS 1 AND 2: EFFECT IX= ELECTRICAL DISTURBANCE; STEP 01 COMPONENT XI= ACOUSTICAL MONITOR.

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 099%. ON 9-10-84, AT 0909, A UNIT 1 AUTOMATIC REACTOR SCRAM AND A PRIMARY CONTAINMENT GROUP 1 ISOLATION OCCURRED DUE TO AN INSTRUMENT UPSCALE ACTUATION OF UNIT 1 REACTOR MAIN STEAM LINE RADIATION HIGH MONITORS 1-D12-RM-K603C AND D. AT THE TIME, UNIT 1 WAS AT 99% POWER. AT 0915, ON 9-10-84, THE UNIT 2 RPS AUTOMATICALLY INITIATED DUE TO A NEUTRON FLUX HIGH SIGNAL TO THE REACTOR AVERAGE POWER RANGE MONITORING SYSTEM. AT THE TIME, UNIT 2 WAS IN A REFUEL/MAINTENANCE OUTAGE. THE EVENTS RESULTED FROM LIGHTNING STRIKING THE UNITS' COMMON TURBINE BLDG STRUCTURE HEATER BAY SEMI-CRANE AND COMMON ELECTRICAL SWITCHYARD AREA, WHICH INDUCED ELECTRICAL IMPULSES INTO EACH UNIT'S SUBJECT INSTRUMENTATION. AFTER THE UNIT 2 EVENT, THE RPS TRIP SIGNAL WAS RESET. DURING THE UNIT 1 SCRAM RECOVERY, REACTOR LEVEL BRIEFLY DECREASED TO LOW LEVEL 0.1. THE UNIT HIGH PRESSURE COOLANT INJECTION AND REACTOR CORE ISOLATION COOLING SYSTEMS AUTOMATICALLY STARTED BUT DID NOT INJECT. REACTOR SAFETY RELIEF VALVE (SRV) FO13G AUTOMATICALLY LIFTED AT THE HIGHEST REACTOR PRESSURE OF 1105 PSIG, AND SRVS FO13A AND E WERE MANUALLY OPENED TO CONTROL REACTOR PRESSURE. NO SONIC INDICATION OF SRV POSITIONS WAS AVAILABLE, ALTHOUGH THE SRV TAILPIPE TEMPERATURE INDICATORS WERE FUNCTIONING PROPERLY. FOLLOWING PASSAGE OF HURRICANE DIANA, SUBSEQUENT REACTOR CRITICALITY ON UNIT 1 WAS ESTABLISHED ON 9-15-84.

FORM 33 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 331 1984 020 0 8407250586 190732 06/17/84

DOCKET: 331 ARNOLD TYPE: BWR
REGION: 3 NSSS: GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: IOWA ELECTRIC LIGHT & POWER CO.
SYMBOL: IEL

COMMENTS

STEPS 1, 5, 9, AND 13: MODEL GA-2T0

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:

1 331/84-026 2 331/84-003 3 331/84-004 4 331/84-011
5 331/77-050 6 331/83-037

ABSTRACT

POWER LEVEL - 057%. THE 'A' STANDBY FILTER UNIT (SFU) WAS STARTED AUTOMATICALLY 4 TIMES ON 3 SEPARATE DAYS BY SPURIOUS INITIATION SIGNALS FROM THE CONTROL BLDG AIR INTAKE 'A' RADIATION MONITOR. IN EACH CASE, THE RADIATION IN THE AREA WAS CONFIRMED TO BE AT NORMAL BACKGROUND LEVELS. THE SIGNALS WERE IDENTIFIED AS FALSE AND THE SFU WAS RESET. AFTER INVESTIGATION, IT IS BELIEVED THAT A CAUSE OF THE 'A' INITIATION MAY BE HIGH MOISTURE OR THUNDERSTORMS. REPLACEMENT OF THESE MONITORS AND RELOCATION TO A LESS EXPOSED AREA HAVE BEEN INITIATED. RADIATION WAS AT NORMAL BACKGROUND LEVELS AND THE SFU'S FUNCTIONED AS DESIGNED.

FORM 34 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
333 1982 033 0 8208230063 175871 07/06/82

DOCKET: 333 FITZPATRICK TYPE: BWR
REGION: 1 NSSS: GE
ARCHITECTURAL ENGINEER: SWXX
FACILITY OPERATOR: POWER AUTHORITY OF THE STATE OF NY
SYMBOL: PNY

ABSTRACT

RESERVE POWER BREAKER 10022 WAS OPEN FOR APPROXIMATELY 4 MINUTES THUS CAUSING #3 LIGHT HOUSE HILL LINE TO BE NOT AVAILABLE. NO SIGNIFICANT HAZARD EXISTED BECAUSE THE OTHER 115KV LINE WAS STILL AVAILABLE AND IS CROSS TIED SUCH THAT IN THE EVENT OF A UNIT TRIP WITH RESULTING LOSS OF HOUSE SERVICE POWER, ALL LOADS WOULD HAVE REMAINED ENERGIZED VIA THE AVAILABLE 115KV LINE. SEE: TECH SPEC REFERENCE: PARAGRAPH 3.9.A.1.A. LIGHTNING STRUCK ONE OF THE TWO 115KV RESERVE POWER LINES CAUSING SUPPLY BREAKER TO OPEN. THE OPERATOR PLACED THE BREAKER CONTROL SWITCH IN "AUTO AFTER STOP" POSITION NEGATING THE AUTO RECLOSE FEATURE OF THE BREAKER WHILE HE CALLED POWER CONTROL CENTER AND ENSURED THE LINE WAS CLEAR FOR RECLOSING BREAKER.

FORM 35 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
346 1981 008 0 8103030834 164312 01/27/81

DOCKET: 346 DAVIS-BESSE I TYPE: PWR
REGION: 3 NSSS: BW

ARCHITECTURAL ENGINEER: BESS
FACILITY OPERATOR: TOLEDO EDISON CO.
SYMBOL: TEC

COMMENTS

WEATHER WAS WET AND SNOWY

ABSTRACT

ON JANUARY 27 SWITCHYARD BUS K TRIPPED AND LOCKED OUT, DE-ENERGIZING STARTUP TRANSFORMER 02 AND CAUSING THE STATION 13.8 KV BUS BEING POWERED BY STARTUP TRANSFORMER 02 TO FAST TRANSFER TO STARTUP TRANSFORMER 01. ON FEBRUARY 1, J BUS TRIPPED AND LOCKED OUT, DE-ENERGIZING STARTUP TRANSFORMER 01 AND CAUSING THE STATION 12.8 KV BUS A TO FAST TRANSFER TO STARTUP TRANSFORMER 02. THE K BUS TRIP OCCURRED DUE TO ACTION FROM A DIRECTIONAL GROUND CURRENT RELAY AND THAT THE C PHASE LIGHTNING ARRESTER ON STARTUP TRANSFORMER 02 APPEARED CHARGED. THIS COULD HAVE BEEN CAUSED BY AN INTERNAL FAILURE, A BOLT OF LIGHTNING OR ELECTRICAL SURGE. TESTING DETERMINED FOR THE J BUS THAT THE "B" PHASE LIGHTNING ARRESTER HAD FAULTED. IN BOTH INSTANCES THE WEATHER WAS SNOWY AND WET.

FORM 36 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
364 1984 004 0 8404240385 189262 03/27/84

DOCKET:364 FARLEY 2 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: BESS
FACILITY OPERATOR: ALABAMA POWER CO.
SYMBOL: APC

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 100%. AT 1247 ON 3-27-84, THE REACTOR TRIPPED FROM 100% POWER DUE TO A POWER RANGE NEUTRON HIGH FLUX NEGATIVE RATE. THIS WAS CAUSED BY ALL CONTROL RODS DROPPING INTO THE CORE DUE TO A VOLTAGE SURGE, CAUSED BY SEVERE LIGHTNING, WHICH TRIPPED THE PRIMARY AND BACKUP 25 VDC POWER SUPPLIES TO ALL FOUR ROD CONTROL POWER CABINETS. THE REACTOR TRIP BREAKERS OPENED DUE TO THE HIGH NEGATIVE RATE.

FORM 37 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
364 1985 010 0 8508210046 195240 07/15/85

DOCKET:364 FARLEY 2 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: BESS
FACILITY OPERATOR: ALABAMA POWER CO.
SYMBOL: APC

COMMENTS

STEP 1: COMP MEI - FAST DEAD BUS TRANSFER DEVICE.

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

* POWER LEVEL - 099%. AT 1949 ON 7-15-85, DURING STEADY STATE OPERATION AT 99 PERCENT POWER AND WITH SEVERE THUNDERSTORMS IN THE AREA, A REACTOR TRIP OCCURRED DUE TO A HIGH NEGATIVE FLUX RATE AS DETECTED BY THE POWER RANGE NUCLEAR DETECTORS. LIGHTNING APPARENTLY CAUSED A VOLTAGE SURGE WHICH TRIPPED BOTH THE NORMAL AND REDUNDANT POWER SUPPLIES IN ROD CONTROL SYSTEM POWER CABINETS 2AC AND 2BD. THE CONTROL RODS POWERED BY THESE CABINETS DROPPED INTO THE CORE CAUSING THE HIGH NEGATIVE FLUX RATE. SHORTLY AFTER THE TRIP, BOTH GENERATOR OUTPUT BREAKERS OPENED PREMATURELY RESULTING IN DE-ENERGIZING ALL THREE REACTOR COOLANT PUMPS BEFORE THE FAST DEAD BUS TRANSFER FEATURE COULD TRANSFER THEIR POWER SUPPLY FROM THE AUXILIARY TO THE STARTUP TRANSFORMERS. THE RESULTING LOSS OF FORCED COOLANT CIRCULATION CONSTITUTED A "NOTIFICATION OF UNUSUAL EVENT" CONDITION. NATURAL CIRCULATION COOLING WAS VERIFIED. APPROXIMATELY 25 MINUTES AFTER THE REACTOR TRIP, REACTOR COOLANT PUMP 2B WAS STARTED AND THE NOTIFICATION OF UNUSUAL EVENT CONDITION WAS TERMINATED. TESTING VERIFIED THE PROPER OPERATION OF THE OUTPUT BREAKERS AND THE FAST DEAD BUS TRANSFER. FOLLOWING TESTING AND THE COMPLETION OF REQUIRED REPAIRS THE UNIT RETURNED TO POWER OPERATION ON 7-17-85.

FORM 38 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
368 1982 040 0 8301140420 181585 11/22/82

DOCKET:368 ARKANSAS NUCLEAR 2 TYPE:PWR
REGION: 4 NSSS:CE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: ARKANSAS POWER AND LIGHT CO.
SYMBOL: APL

REFERENCE LERS:

- | | | | |
|--------------|---------------|---------------|---------------|
| 1 368/82-009 | 2 368/81-010 | 3 368/80-058 | 4 368/80-053 |
| 5 368/82-027 | 6 368/82-005 | 7 368/80-080 | 8 368/79-073 |
| 9 368/79-013 | 10 368/79-004 | 11 368/78-025 | 12 368/78-020 |

ABSTRACT

ON 11/22/82 WHILE IN MODE 2, CONTROL ELEMENT ASSEMBLY CALCULATOR (CEAC) #2 FAILED. CEA POSITION READINGS WERE TAKEN EVERY 4 HOURS, AND THE CORE PROTECTION CALCULATORS (CPC) WERE PLACED IN CEAC #2 INOP AS REQUIRED BY ACTION 5 OF TECH SPEC TABLE 3.3-1. CEAC #1 WAS OPERABLE. CPC 'C' ALSO FAILED AT THIS TIME BUT THE OTHER 3 CHANNELS REMAINED OPERABLE. ONLY 3 CPC CHANNELS ARE REQUIRED TO BE OPERABLE PER TECH SPEC 3.3.1.1. THIS OCCURRENCE IS REPORTABLE PER TECH SPEC 6.9.A.9.B. SIMILAR OCCURRENCES WERE REPORTED IN LER'S 82-009, 81-010, 80-058, AND 80-053. OTHER OCCURRENCES IDENTIFYING CEAC FAILURES WERE REPORTED IN LER'S 82-027, 82-005, 80-080, 79-073, 79-013, 79-004, 78-025, AND 78-020. NO SPECIFIC CAUSE COULD BE DETERMINED. THE CAUSE POSSIBLY COULD BE RELATED TO A LIGHTNING STORM IN PROGRESS AT THE TIME OF THE OCCURRENCE. CEAC #2 AND CPC 'C' RECEIVE POWER FROM THE SAME SOURCE. SOFTWARE AND HARDWARE DIAGNOSTICS REVEALED NO INDICATION OF THE CAUSE OF THE FAILURE. CEAC #2 AND CPC 'C' WERE RE-INITIALIZED AND THE PERIODIC SURVEILLANCES WERE PERFORMED TO VERIFY PROPER OPERATION. AFTER PROVING OPERABILITY, CEAC #2 AND CPC 'C' WERE RETURNED TO SERVICE.

FORM 39 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
368	1985	016	0	8509200061	190018	08/05/85

DOCKET: 368 ARKANSAS NUCLEAR 2 TYPE: PWR
 REGION: 4 NSSS: CE
 ARCHITECTURAL ENGINEER: BECH
 FACILITY OPERATOR: ARKANSAS POWER AND LIGHT CO.
 SYMBOL: APL

REPORTABILITY CODES FOR THIS LER ARE:
 13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LER: 1 368/85-017 2 368/85-015

ABSTRACT

POWER LEVEL = 100%. ON 8-5-85 AT 0856 HRS. A REACTOR TRIP OCCURRED. CORE PROTECTION CALCULATOR CHANNELS 2 AND 4 GENERATED LOW DNBR TRIPS AS A RESULT OF ERRONEOUS RCS PARAMETER INPUTS CAUSED BY AN ELECTRICAL TRANSIENT INDUCED BY A LIGHTNING STRIKE. POST TRIP RESPONSE WAS NORMAL. EFW ACTUATED ON LOW SG LEVEL. EFW CONTROL VALVE 2CV-1039 FAILED OPEN DUE TO A SHORTED CLOSING COIL IN THE VALVE OPERATOR. THE CAUSE WAS FOUND TO BE A WIRING ERROR. THE COIL WAS REPLACED, AND A WIRING ERROR WAS CORRECTED. TESTING PROVED SATISFACTORY OPERATION AND 2CV-1039 WAS RETURNED TO SERVICE.

FORM 40 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
369	1982	046	0	8207090217	174138	06/01/82

DOCKET: 369 MCGUIRE 1 TYPE: PWR
 REGION: 2 NSSS: WB
 ARCHITECTURAL ENGINEER: DUYE
 FACILITY OPERATOR: DUKE POWER CO.
 SYMBOL: DPC

COMMENTS

STEP 1: EFFECT IX - INTERFERENCE.

ABSTRACT

THE CONVENTIONAL WASTE (WC) SYSTEM DISCHARGE FLOW INSTRUMENTATION'S FLOW RECORDER WAS FOUND TO BE RECORDING LESS THAN THE CALCULATED FLOW. THE FLOW INSTRUMENTATION WAS DECLARED INOPERABLE PER TECH SPEC 3.3.3.8 WHICH IS REPORTABLE PURSUANT TO TECH SPEC 6.9.1.13(B). THIS RESULTED FROM DEVIATION OF THE INSTRUMENT'S INTERNAL ELECTRONIC ZERO POSITION (IEZP) (INSTRUMENT SPECIALTIES COMPANY MODEL 1870 FLOW METER, WITH A CMOS CENTRAL PROCESSING UNIT). A SEVERE ELECTRICAL STORM THE PREVIOUS EVENING IS THOUGHT TO HAVE CAUSED POWER SUPPLY INTERFERENCE WHICH RESULTED IN EITHER THE CPU LOSING THE IEZP OR THE ZERO POSITION DRIFTING. THE IEZP WAS RESET AND THE INSTRUMENTATION DECLARED OPERABLE.

FORM 41 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
369	1982	076	0	8212140176	179709	11/04/82

DOCKET:369 MCGUIRE 1 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

ABSTRACT

THE POWER SUPPLY TO THE C MAIN FIRE PUMP WAS LOST FOR APPROXIMATELY 2 HOURS AND 25 MINUTES. SINCE THE A MAIN FIRE PUMP WAS ALREADY OUT OF SERVICE, 2 OF THE 3 MAIN FIRE PUMPS WERE INOPERABLE WHICH VIOLATES TECH SPEC 3.7.10.1 AND IS REPORTABLE PURSUANT TO TECH SPEC 6.9.1.13(B). THE JOCKEY PUMPS MAINTAINED NORMAL PRESSURE IN THE FIRE PROTECTION SYSTEM AND ONE MAIN FIRE PUMP WAS ALWAYS AVAILABLE HAD THE SYSTEM BEEN CHALLENGED. THE C MAIN FIRE PUMP IS SUPPLIED WITH POWER FROM A SOURCE THAT IS TOTALLY INDEPENDENT OF MCGUIRE. THE POWER LOSS RESULTED FROM A BROKEN INSULATOR (APPARENTLY DAMAGED BY LIGHTNING) ON THE 44 KV LOWE TRANSMISSION LINE (ALTERNATE POWER SUPPLY TO COWANS FORD FROM RIVERBEND). THE TRANSMISSION LINE INSULATOR WAS REPLACED, POWER RESTORED, AND THE PUMP DECLARED OPERABLE.

FORM 42 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
369 1984 010 0 8405070494 189636 03/28/84

DOCKET:369 MCGUIRE 1 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

COMMENTS

STEP 3: EFFECT CODE IX - VOLTAGE FLUCTUATIONS

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:

1 369/84-006

ABSTRACT

POWER LEVEL - 000%. DIESEL GENERATOR (D/G) 1B EXPERIENCED AN INVALID AUTOMATIC START ON MARCH 28, 1984 AT 1725. THE D/G STARTED ON A UNIT 1 BLACKOUT SIGNAL GENERATED BY A MOMENTARY POWER TRANSMISSIONS SYSTEM DISTURBANCE DUE TO A SEVERE STORM. (D/G 1A WAS INOPERABLE DUE TO MAINTENANCE.) UNIT 1 WAS IN A REFUELING OUTAGE WITH ALL FUEL REMOVED FROM THE REACTOR AT THE TIME OF THIS OCCURRENCE. THIS INCIDENT IS ATTRIBUTED TO AN UNUSUAL SERVICE CONDITION DUE TO THE POWER DISTRIBUTION SYSTEM DISTURBANCE CAUSED BY THE SEVERE WEATHER. THIS EVENT IS SIMILAR TO PREVIOUS LER 369/84-06. THE BLACKOUT SIGNAL CLEARED IN LESS THAN 1 SECOND, THEREFORE THE D/G WAS NOT LOADED. THE D/G WAS SHUT DOWN AFTER OPERATING FOR APPROXIMATELY SIX MINUTES. THE D/G PERFORMED AS DESIGNED DURING THIS INCIDENT.

FORM 43 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
369 1984 017 0 8407030321 190511 05/23/84

DOCKET:369 MCGUIRE 1 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

COMMENTS

STEP 1: EFFECT CODE 1X - VOLTAGE FLUCTUATIONS

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:

1 369/84-010 2 369/84-006

ABSTRACT

POWER LEVEL - 050%. DIESEL GENERATORS (D/G'S) 1A AND 1B EXPERIENCED AN INVALID AUTOMATIC START ON MAY 23, 1984 AT 1655. THE DG'S STARTED ON A UNIT 1 BLACKOUT SIGNAL GENERATED BY A MOMENTARY POWER DISTRIBUTION SYSTEM DISTURBANCE CAUSED BY AN ELECTRICAL STORM IN THE SERVICE AREA. UNIT 1 WAS IN MODE 1 AT 50% POWER AT THE TIME OF THE OCCURRENCE. THIS INCIDENT IS ATTRIBUTED TO AN UNUSUAL SERVICE CONDITION, DUE TO THE POWER DISTRIBUTION SYSTEM DISTURBANCE CAUSED BY THE ELECTRICAL STORM. THIS EVENT IS SIMILAR TO PREVIOUS LER'S 369/84-10 AND 369/84-06. THE BLACKOUT SIGNAL CLEARED IN LESS THAN 1 SECOND; THE D/G'S DID NOT LOAD. THE D/G'S WERE SHUT DOWN AFTER OPERATING FOR APPROXIMATELY 22 MINUTES. THE D/G'S PERFORMED AS DESIGNED DURING THIS INCIDENT. DUKE POWER IS PURSUING INSTALLING A TIME DELAY ON THE UV RELAY TO AID IN PREVENTION OF SPURIOUS STARTS.

FORM 44 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
369 1983 017 0 8506240051 194635 05/15/85

DOCKET:369 MCGUIRE 1 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

COMMENTS

STEP 2: EFFECT 1X - VOLTAGE FLUCTUATIONS.

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 000%. ON 5-15-85, DG 1A EXPERIENCED AN INVALID AUTOMATIC START DUE TO A UNIT BLACKOUT SIGNAL GENERATED BY A MOMENTARY POWER TRANSMISSIONS SYSTEM ELECTRICAL DISTURBANCE DURING A SEVERE STORM. (DG 1B WAS INOPERABLE AT THE TIME DUE TO MAINTENANCE REPAIRS). THE UNIT WAS IN MODE 6 WITH ALL FUEL REMOVED FROM THE REACTOR CORE AT THE TIME OF THE OCCURRENCE. THIS INCIDENT IS ATTRIBUTED TO AN UNUSUAL SERVICE CONDITION, DUE TO THE POWER DISTRIBUTION SYSTEM DISTURBANCE CAUSED BY THE SEVERE WEATHER, AND A DESIGN DEFICIENCY BECAUSE THE START CIRCUITRY OF THE DG'S CAUSE THEM TO START ON AN INSTANTANEOUS UNDERVOLTAGE CONDITION.

FORM 45 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
369 1985 020 0 8507180641 195215 06/07/85

DOCKET:369 MCGUIRE 1 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

REPORTABILITY CODES FOR THIS LER ARE:
13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:
1 369/85-017

ABSTRACT

POWER LEVEL - 000%. DG 1B EXPERIENCED 2 INVALID AUTOMATIC STARTS ON 6-7-85 AT 1644 AND AGAIN AT 1908. IN EACH CASE, DG 1B STARTED ON A UNIT 1 BLACKOUT SIGNAL GENERATED BY A MOMENTARY POWER TRANSMISSIONS SYSTEM DISTURBANCE DURING A SEVERE STORM. (DG 1A WAS OPERABLE, BUT DID NOT START BECAUSE THE 4KV ESSENTIAL SWITCHGEAR, IETA, WAS ALIGNED TO THE 500 KV SWITCHYARD VIA UNIT 2 AND DID NOT EXPERIENCE THE VOLTAGE DIP.) THE UNIT WAS IN MODE 5 (COLD SHUTDOWN) AT THE TIME OF THIS OCCURRENCE. THIS INCIDENT IS ATTRIBUTED TO AN UNUSUAL SERVICE CONDITION, DUE TO THE POWER DISTRIBUTION SYSTEM DISTURBANCES CAUSED BY THE SEVERE WEATHER. A DESIGN DEFICIENCY WAS IDENTIFIED SINCE THE START CIRCUITRY OF THE DG'S CAUSE THEM TO START ON AN INSTANTANEOUS UNDERVOLTAGE CONDITION. THE DG STARTED AS DESIGNED AND WOULD HAVE LOADED IF IT WAS NECESSARY. PLANT SAFETY WAS NOT AFFECTED. THE START SYSTEM WILL BE MODIFIED TO PREVENT DG STARTS ON SPURIOUS VOLTAGE DROPS.

FORM 46 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
370 1985 005 0 8503250315 193683 02/28/85

DOCKET:370 MCGUIRE 2 TYPE:PWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DPC

REPORTABILITY CODES FOR THIS LER ARE:
13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 00%. DG 2B EXPERIENCED AN INVALID AUTOMATIC START WHEN AN ELECTRICAL STORM APPARENTLY CAUSED A VOLTAGE DIP ON THE TRAIN 'B' ESSENTIAL SWITCHGEAR. UNIT 2 WAS SHUTDOWN FOR REFUELING AT THE TIME. CORRECTIVE ACTIONS WILL CONSIST OF INSTALLATION OF A MODIFICATION TO THE UNDERVOLTAGE RELAYS TO PROVIDE A TIME DELAY TO AID IN SCREENING OUT SPURIOUS START SIGNALS.

UNABLE TO LOCATE RECORD FOR LER: 382/85-054

FORM 48 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE

DOCKET:387 SUSQUEHANNA 1 TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: PENNSYLVANIA POWER & LIGHT CO.
SYMBOL: PPL

REPORTABILITY CODES FOR THIS LER ARE:
13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 100%. AS A RESULT OF A LIGHTNING STRIKE ON A 230KV TRANSMISSION LINE, THE UNIT 1 STARTUP TRANSFORMER T-10 ISOLATED, ONE OF TWO SOURCES OF OFFSITE POWER. THE LOSS OF THE T-10 TRANSFORMER CAUSED A TRIP TO THE UNIT 1 AND UNIT 2 'A' REACTOR PROTECTION SYSTEM (RPS). REACTOR BLDG ZONE I, II AND III HVAC SYSTEMS TRIPPED AND STANDBY GAS TREATMENT SYSTEM INITIATED DUE TO THE LOSS OF RPS. THE EFFECT ON FEEDWATER AND REACTOR RECIRCULATION CONTROLS CAUSED A REACTOR VESSEL LEVEL INCREASE WHICH RESULTED IN A REACTOR SCRAM. PLANT SYSTEMS RESPONDED AS DESIGNED AND RESULTED IN THE SAFE SHUTDOWN OF THE NUCLEAR POWER PLANT. THIS EVENT IS REPORTABLE PER 10CFR50.73(A)(2)(IV) SINCE AN UNPLANNED ENGINEERED SAFETY FEATURES (ESF) ACTUATION OCCURRED AND THE RPS TRIPPED.

FORM 49 LER SCSS DATA 03-03-86

DOCKET	YEAR	LER NUMBER	REVISION	DCS NUMBER	NSIC	EVENT DATE
387	1984	029	0	8408090421	191267	07/03/84

DOCKET:387 SUSQUEHANNA 1 TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: PENNSYLVANIA POWER & LIGHT CO.
SYMBOL: PPL

COMMENTS

STEP 7: IX = VOLTAGE TRANSIENT; STEP 9: ISYS HS = COMMON REFUELING FLOOR.
STEP 12: EFFECT HX = CONSTANT SPEED AND FLOW.

REPORTABILITY CODES FOR THIS LER ARE:
13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 100%. AS A RESULT OF A LIGHTNING STRIKE ON A 230KV TRANSMISSION LINE, THE UNIT 1 START-UP TRANSFORMER T-10 ISOLATED 1 OF 2 SOURCES OF OFFSITE POWER. THE LOSS OF THE T-10 TRANSFORMER CAUSED A TRIP TO THE UNIT 1 AND 2 'A' RPS. REACTOR BLDG ZONE I, II, AND III HVAC SYSTEMS TRIPPED AND STANDBY GAS TREATMENT SYSTEM INITIATED DUE TO THE LOSS OF RPS. THE EFFECT ON FEEDWATER AND REACTOR RECIRCULATION CONTROLS CAUSED A REACTOR VESSEL LEVEL INCREASE. MANUAL FEEDWATER CONTROL WAS TAKEN TO DECREASE REACTOR VESSEL LEVEL. THE 'A' REACTOR FEEDWATER TURBINE TRIPPED 3 SECS AFTER BEING RESET. THE 'C' REACTOR FEEDWATER TURBINE FLOW DECREASED DUE TO THE STEAM SUPPLY ISOLATING. THE 'B' REACTOR FEEDWATER PUMP DID NOT PROVIDE SUFFICIENT FLOW TO MAINTAIN REACTOR VESSEL LEVEL. THE REACTOR SCRAMMED ON LOW LEVEL. REACTOR VESSEL LEVEL DECREASED AND INITIATED THE HPCI AND RCIC SYSTEMS, AND CLOSED THE MSIV'S. REACTOR VESSEL LEVEL INCREASED TO THE TRIP POINT FOR HPCI, RCIC, AND REACTOR FEEDWATER TURBINES. ALL SAFETY SYSTEMS WHICH WERE REQUIRED OPERATED SATISFACTORY. THIS EVENT

IS REPORTABLE PER 10CFR 50.73(A)(2)(IV) SINCE AN UNPLANNED ENGINEERED SAFETY FEATURE (ESF) ACTUATION OCCURRED AND THE RFS TRIPPED.

FORM 50 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
388 1985 C20 0 8507110122 195383 05/31/85

DOCKET:388 SUSQUEHANNA 2 TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: PENNSYLVANIA POWER & LIGHT CO.
SYMBOL: PPL

COMMENTS

WATCH 975: LOSS OF OFFSITE POWER.

WATCH-LIST CODES FOR THIS LER ARE:
975 POSSIBLE SIGNIFICANT EVENT

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:

1 388/85-017 2 388/85-011

ABSTRACT

POWER LEVEL - 000%. ON 5-31-85, A LIGHTNING STRIKE TO OR NEAR THE TIE LINE BETWEEN THE 500KV AND 230KV SWITCHYARDS CAUSED A VOLTAGE TRANSIENT WITHIN UNIT 2. ALL TRIPS WERE PER DESIGN AND CAUSED BY A LOSS OF MOTIVE POWER OR LOSS OF CONTROL POWER. THE AUTOMATIC START OF THE CONTROL ROOM EMERGENCY OUTSIDE AIR SUPPLY SYSTEM WAS PER SYSTEM DESIGN. THE TRIP OF THE SGT8 AFTER ITS AUTO-RESTART WAS NOT PER DESIGN. A MALFUNCTIONING SGT8 DAMPER ACTUATOR WAS REPLACED AND PROPER OPERATION WAS VERIFIED. A REVIEW OF THE POSSIBILITY OF ADDITIONAL LIGHTNING PROTECTION FOR OFFSITE POWER SOURCES HAS BEEN REQUESTED.

FORM 51 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
388 1985 025 0 8511120242 196749 10/05/85

DOCKET:388 SUSQUEHANNA 2 TYPE:BWR
REGION: 1 NSSS:GE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: PENNSYLVANIA POWER & LIGHT CO.
SYMBOL: PPL

COMMENTS

STEP 3: CAUSE IX-GROUND FAULT CLEARED; STEP 6: TYPE AR.

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 100%. ON 10-5-85 AT 0837 A PHASE TO GROUND FAULT OCCURRED ON THE SUSQUEHANNA-ALBURTIS-WESCOVILLE 500KV TRANSMISSION LINES DUE TO A LIGHTNING STRIKE. THIS CAUSED THE GENERATOR 2/WESCOVILLE TIE CIRCUIT BREAKER (2T) TO OPEN. THE 2T BREAKER

RECLOSED 2 SECS LATER IT TRIPPED IMMEDIATELY WHEN A FAILURE OF THE 2T BREAKER WAS SENSED BY THE BREAKER FAILURE LOGIC. THE BREAKER FAILURE LOGIC IN TURN TRIPPED THE SUNBURY 2 NORTH CIRCUIT BREAKER (4T) ISOLATING THE UNIT 2 GENERATOR. THIS CAUSED A TURBINE TRIP AND REACTOR SCRAM ON TURBINE CONTROL VALVE FAST CLOSURE. THE PLANT RESPONDED AS DESIGNED. TWO SAFETY RELIEF VALVES ACTUATED TO LIMIT REACTOR PRESSURE TO 1085 PSIG AND RESEATED SATISFACTORILY. THE HIGHEST REACTOR WATER LEVEL DURING THE SCRAM WAS +41 INCHES AND THE LOWEST WATER LEVEL WAS +2 INCHES. THE SENSED BREAKER FAILURE CONDITION WAS CAUSED BY NORMALLY OPEN CONTACTS ON A RELAY IN THE BREAKER FAILURE LOGIC BEING STUCK CLOSED. THE RELAY FAILURE WAS UNRELATED TO THE LIGHTNING STRIKE. THE 2T BREAKER WAS ISOLATED, AND UNIT 2 WAS RESTARTED AND SYNCHRONIZED TO THE GRID AT APPROX 1050 ON 10-6-85. THE FAILED RELAY HAS SINCE BEEN REPAIRED AND THE 2T BREAKER RETURNED TO SERVICE.

FORM 52 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 389 1983 059 0 1020272 187024 09/25/83

DOCKET:389 ST. LUCIE 2 TYPE:PWR
 REGION: 2 NSSS:CE
 ARCHITECTURAL ENGINEER: EBAS
 FACILITY OPERATOR: FLORIDA POWER & LIGHT COMPANY
 SYMBOL: FPL

ABSTRACT

WHILE OPERATING AT 94% POWER, CHANNEL CHECK SURVEILLANCES REQUIRED BY TECH SPECS 3/4.3.3.1 AND 3/4.3.3.9 FOR MAIN STEAM RELIEF VALVE RADIATION MONITORS AND S/G BLOWDOWN EFFLUENT MONITORS WERE NOT PERFORMED. A LIGHTNING STRIKE HAD RENDERED CONTROL ROOM MONITORING INSTRUMENTATION INOPERABLE, HOWEVER PORTABLE INSTRUMENTATION WAS AVAILABLE FOR LOCAL MONITORING. SURVEILLANCE WAS RESUMED IMMEDIATELY UPON DISCOVERY. THE CAUSE OF THIS EVENT WAS A LOSS OF CONTROL ROOM INDICATION FOR THE SUBJECT CHANNELS AND THE OPERATOR ON SHIFT BEING UNAWARE THAT LOCAL READOUT HAD BEEN PROVIDED BY THE I&C DEPARTMENT. OPERATIONS DEPARTMENT PERSONNEL ARE NOW AWARE THAT LOCAL READOUT IS AVAILABLE, AND THE I&C DEPT. HAS ORDERED ADDITIONAL READOUTS THAT CAN BE INSTALLED.

FORM 53 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 389 1983 063 0 8311010384 187210 09/24/83

DOCKET:389 ST. LUCIE 2 TYPE:PWR
 REGION: 2 NSSS:CE
 ARCHITECTURAL ENGINEER: EBAS
 FACILITY OPERATOR: FLORIDA POWER & LIGHT COMPANY
 SYMBOL: FPL

ABSTRACT

WHILE OPERATING AT 94% POWER, A LIGHTNING STRIKE RESULTED IN THE CONTAINMENT GASEOUS MONITOR FAILING. CONTAINMENT GASEOUS MONITOR IS 1 OF 3 SYSTEMS REQUIRED TO DETECT RCS LEAKAGE PER TECH SPEC 3/4.4.6. THE GASEOUS MONITOR WAS RESTORED TO SERVICE WITHIN THE TIME LIMITS SPECIFIED. THIS WAS THE FIRST OCCURRENCE OF THIS TYPE. THE CONTAINMENT GASEOUS MONITOR FAILED DUE TO A VOLTAGE SPIKE IN SOLID

STATE CIRCUITRY (CAUSED BY THE LIGHTNING STRIKE) WHICH SCRAMBLED THE LOGIC CIRCUITS AND DATA BASE. THE SYSTEM WAS RESTORED BY RESETTING THE LOGIC.

FORM 54 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
395 1983 074 0 8308080001 185102 06/03/83

DOCKET:395 SUMMER 1 TYPE:FWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: GLBT
FACILITY OPERATOR: SOUTH CAROLINA ELECTRIC & GAS CO.
SYMBOL: SCC

ABSTRACT

WITH THE PLANT IN MODE 1, THE "A" EMERGENCY DIESEL GENERATOR WAS CONNECTED TO VITAL BUS 1DA AND LOADED TO 4250KW DURING ITS OPERABILITY SURVEILLANCE TEST. THE NORMAL 115KV POWER SUPPLY TO THE VITAL BUS WAS LOST AND THE DIESEL GENERATOR OUTPUT BREAKER TRIPPED OPEN. THE DIESEL WAS SHUT DOWN AND LOCKED OUT BY A PHASE DIFFERENTIAL RELAY, THEREBY LOSING ALL A.C. POWER INPUT TO THE VITAL BUS. NO ADVERSE CONSEQUENCES RESULTED AS THE REDUNDANT VITAL BUS REMAINED OPERABLE FOR PLANT SAFEGUARDS. THE EVENT WAS CAUSED BY AN ELECTRICAL SURGE FROM A LIGHTNING STORM. THE SURGE TRIPPED: (1) THE NORMAL POWER FEED BREAKER FOR VITAL BUS 1DA OPEN ON OVERCURRENT, (2) THE DIESEL GENERATOR OUTPUT BREAKER OPEN ON OVERCURRENT AND PHASE DIFFERENTIAL. THE LICENSEE WILL EVALUATE ADDITIONAL SURGE SUPPRESSION CIRCUITRY TO PROTECT THE DIESEL GENERATOR CIRCUITRY.

FORM 55 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
413 1985 034 0 8506250256 195253 05/15/85

DOCKET:413 CATAWBA 1 TYPE:FWR
REGION: 2 NSSS:WE
ARCHITECTURAL ENGINEER: DUKE
FACILITY OPERATOR: DUKE POWER CO.
SYMBOL: DFC

COMMENTS

STEP 1 AND 2: EFFECT 1X - ELECTRICAL FAULT; OTHER REPORTABILITY - 10CFR50.72(B)(2)(II).

REPORTABILITY CODES FOR THIS LER ARE:

- 13 10 CFR 50.73(a)(2)(iv): ESF actuations.
- 21 OTHER: Voluntary report, special report, Part 21 report, etc.

ABSTRACT

POWER LEVEL - 000%. DIESEL GENERATOR'S (D/G) 1A AND 1B EXPERIENCED AN INVALID AUTOMATIC START ON MAY 15, 1985, AT 2348 HOURS. THE D/G'S STARTED FOLLOWING THE DETECTION OF AN UNDERVOLTAGE CONDITION ON THE ESSENTIAL SWITCHGEAR. THIS CONDITION WAS DUE TO A MOMENTARY TRANSMISSION SYSTEM DISTURBANCE WHICH OCCURRED WHEN A BREAKER FAILED AT THE HARRISBURG TIE STATION DURING A LIGHTNING STORM. UNIT 1 WAS IN MODE 5 (COLD SHUTDOWN) AT THE TIME OF THE INCIDENT. THIS INCIDENT IS CLASSIFIED AS AN UNUSUAL SERVICE CONDITION, DUE TO THE DISTRIBUTION

SYSTEM DISTURBANCE.

FORM 56 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 416 1982 003 0 8207200226 175365 06/16/82

DOCKET:416 GRAND GULF 1 TYPE:BWR
 REGION: 2 N SIZE
 ARCHITECTURAL ENGINEER: BECH
 FACILITY OPERATOR: MISSISSIPPI POWER & LIGHT CO.
 SYMBOL: MPL

COMMENTS
 STEP 24 MODEL NO. FBA-3.

REFERENCE LERS:
 1 416/82-143

ABSTRACT
 DURING TESTING, THE OUTPUT AMPLIFIERS FOR THE FREE FIELD FBA (FORCED BALANCED ACCELEROMETER) WERE FOUND INOPERABLE WHICH CONSTITUTES A LIMITING CONDITION FOR OPERATION (TECH SPEC 2.3.7.2). THE INCIDENT IS BEING REPORTED IN ACCORDANCE WITH TECH SPEC 6.9.1.13.B. FAILURE OF THE FREE FIELD FBA RESULTED IN LOSS OF SEISMIC MONITORING IN AN AREA OUTSIDE THE POWER BLOCK. THE PROBABLE CAUSE FOR FAILURE OF THE AMPLIFIERS FOR THE KINEMATICS FBA-3 IS ATTRIBUTED TO NATURAL CAUSES (I.E., LIGHTNING DAMAGE). OUTPUT AMPLIFIERS HAVE BEEN REPLACED AND THE SURVEILLANCE TEST COMPLETED.

FORM 57 LER SCSS DATA 03-03-86

 DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
 416 1984 027 0 8406070256 190269 05/03/84

DOCKET:416 GRAND GULF 1 TYPE:BWR
 REGION: 2 NSSS:GE
 ARCHITECTURAL ENGINEER: BECH
 FACILITY OPERATOR: MISSISSIPPI POWER & LIGHT CO.
 SYMBOL: MPL

REPORTABILITY CODES FOR THIS LER ARE:
 13 10 CFR 50.73(a)(2)(iv): ESF actuations.

REFERENCE LERS:
 1 416/84-024

ABSTRACT
 POWER LEVEL - 000%. DURING ADVERSE WEATHER ON MAY 3, 1984, A LIGHTNING STRIKE CAUSED A LOSS OF POWER FROM THE 115KV OFFSITE POWER SUPPLY. THIS RESULTED IN DEENERGIZATION OF THE DIVISION 1 AND DIVISION 3 ESF BUSES. BOTH DIVISIONS' DIESEL GENERATORS STARTED AND ENERGIZED THEIR RESPECTIVE BUSES. THERE WAS ALSO A DIVISION 1 AUXILIARY BUILDING ISOLATION. THE BUSES WERE PARALLELED TO THE 500KV OFFSITE POWER SUPPLY TO RESTORE NORMAL POWER.

FORM 58 LER SCSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
454 1985 068 0 8508190453 196135 07/13/85

DOCKET:454 BYRON 1 TYPE:PWR
REGION: 3 NSSS:WE
ARCHITECTURAL ENGINEER: SLXX
FACILITY OPERATOR: COMMONWEALTH EDISON CO.
SYMBOL: CHE

COMMENTS

STEP 1: PSYS EP - STATION GROUND; STEP 17: COMP XI - STATUS LAMP; STEP 20:
COMP YI - WIND SPEED AND DIRECTION INDICATOR; STEP 26: COMP MEI -
SURVEILLANCE CAMERAS; STEPS 23, 24: ISYS SW - GATE HOUSE; STEPS 25, 26, 28,
29: SYS SW - UNKNOWN AREAS; STEP 7: EFF TX - CONDUCTED TO GROUND. WATCH
975 - LIGHTNING DAMAGES SAFEGUARDS INSTRUMENTATION.

WATCH-LIST CODES FOR THIS LER ARE:

975 POSSIBLE SIGNIFICANT EVENT

REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 011%. 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. 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
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. 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.

FORM 59 LER SOSS DATA 03-03-86

DOCKET YEAR LER NUMBER REVISION DCS NUMBER NSIC EVENT DATE
482 1985 055 0 8509110090 195439 03/06/85

DOCKET:482 WOLF CREEK 1 TYPE:PWR
REGION: 4 NSSS:WE
ARCHITECTURAL ENGINEER: BECH
FACILITY OPERATOR: KANSAS GAS & ELECTRIC CO.
SYMBOL: KGE

COMMENTS

STEP 2: EFFECT IX - VOLTAGE FLUCTUATION.

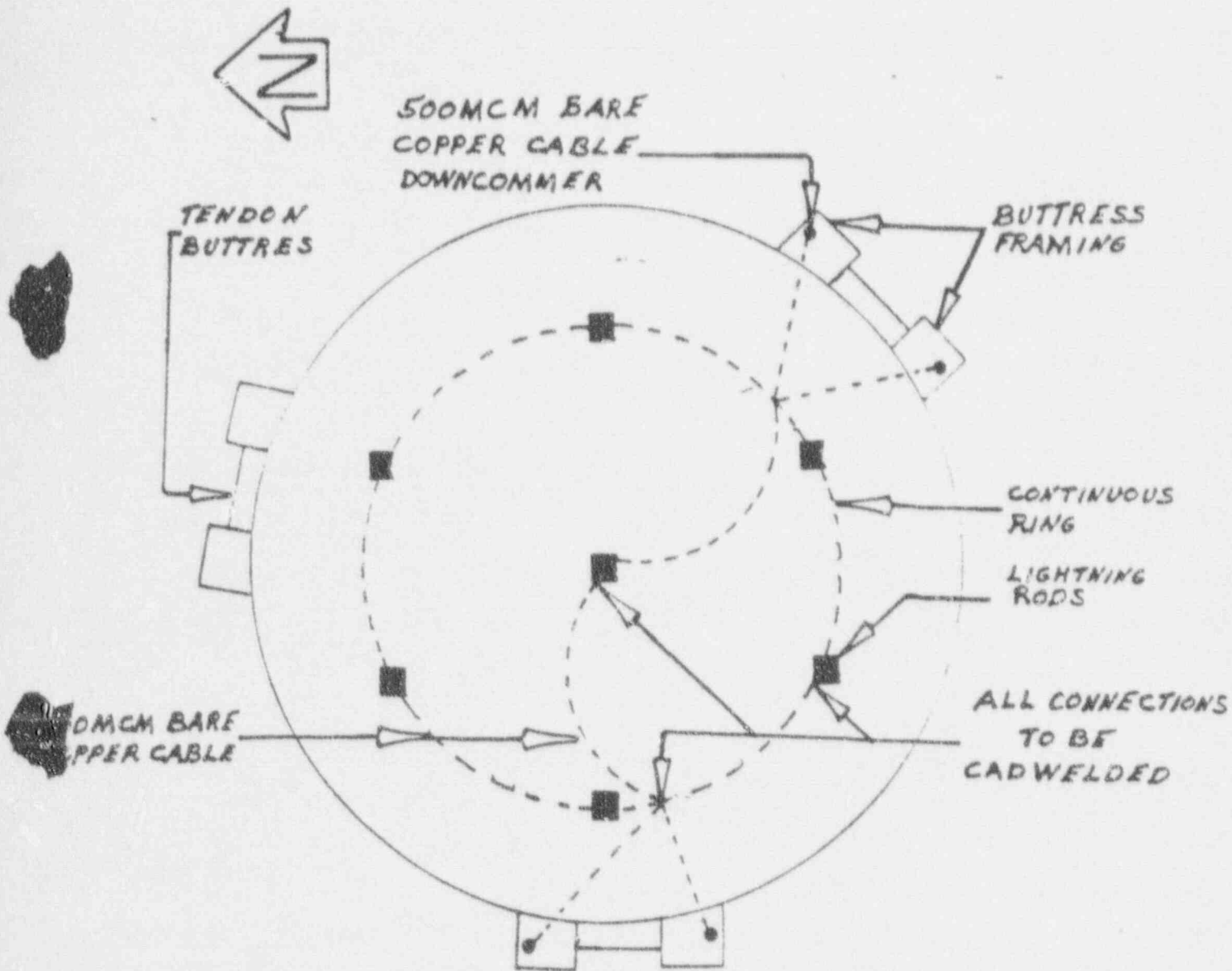
REPORTABILITY CODES FOR THIS LER ARE:

13 10 CFR 50.73(a)(2)(iv): ESF actuations.

ABSTRACT

POWER LEVEL - 092%. ON 8-6-85, AT 2141 CDT A CONTROL ROOM VENTILATION ISOLATION WAS INITIATED DUE TO A RADIATION MONITOR MOMENTARILY SIGNALING HIGH RADIATION LEVELS IN THE OUTSIDE AIR MAKEUP TO THE CONTROL BLDG VENTILATION SYSTEM. ALL REQUIRED ESF'S EQUIPMENT FUNCTIONED PROPERLY. DURING THIS EVENT THE PLANT WAS IN MODE 1, POWER OPERATION, AT 92% REACTOR POWER. THE ISOLATION SIGNAL OCCURRED DUE TO A NEARBY LIGHTNING STRIKE CAUSING A VOLTAGE FLUCTUATION TO THE RADIATION MONITOR POWER SUPPLY, WHICH IN TURN CAUSED THE MONITOR TO ALARM. AFTER THE VOLTAGE FLUCTUATION PASSED, THE MONITOR IMMEDIATELY RETURNED TO NORMAL READINGS AND CLEARED THE ALARM. THE REASON THAT THIS MONITOR ALARMED WHILE OTHER RADIATION MONITORS POWERED FROM THE SAME SOURCE DID NOT ALARM IS STILL BEING INVESTIGATED. NO RADIATION WAS PRESENT AS CONFIRMED BY A REDUNDANT CONTROL BLDG VENTILATION RADIATION MONITOR.

CONTAINMENT BL'DG DOME
LIGHTNING ROD AND GROUND
CABLE ARRANGEMENT



NOTE: INSTALL BONDING JUMPER FROM EACH DOWNCOMMER TO EACH LADDER SECTION AND TO BUTTRESS FRAMING AT 10' INTERVALS.

INSTALL BONDING JUMPER FROM EACH DOWNCOMMER TO EXISTING GROUND MAT AND/OR TO 10' GROUND RODS.