

Commonwealth Edison Company
Byron Generating Station
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Byron, IL 61010-9794
Tel 815-234-5441



December 6, 1996

LTR: BYRON 96-0308
FILE: 3.03.0800 (1.10.0101)

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)(ii).

This report is number 95-005S2; Docket No. 50-454.

Sincerely,

A handwritten signature in dark ink, appearing to read "K. L. Koffon", is written over the typed name.

K. L. Koffon
Station Manager
Byron Nuclear Power Station

KLK/WD/js

Enclosure: Licensee Event Report No. 95-005S2

cc: H. J. Miller, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
ComEd Distribution List

Handwritten initials, possibly "JL" or "JLW", are written in the right margin of the letter.

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PDR ADOCK 05000454
S PDR

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NRC FORM 366 (4.95)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98			ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION.		
LICENSEE EVENT REPORT (LER)											
(See reverse for required number of											
BYRON NUCLEAR POWER STATION						05000454			1 OF 14		
FIRE PROTECTION REPORT DISCREPANCIES DUE TO INADEQUATE EVALUATIONS DURING PREPARATION OF ORIGINAL ANALYSIS											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME		DOCKET NUMBER
10	10	95	95	005	02	12	6	96	Byron Unit 2		05000455
OPERATING MODE (9)		1							FACILITY NAME		DOCKET NUMBER
POWER LEVEL (10)		97%									05000
			20.2201(b)			20.2203(a)(2)(v)			50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)		X	50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)		
NAME						TELEPHONE NUMBER (Include Area Code)					
Don Robinson, SEC, Ext. 2843						815-234-5441					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
B				N							
YES (If yes, complete EXPECTED SUBMISSION DATE).					NO	EXPECTED SUBMISSION DATE (15)					

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

In October of 1995, a review of the Safe Shutdown Analysis (SSA) in the Fire Protection Report (FPR) identified discrepancies in the analysis which are not in compliance with 10CFR 50, Appendix R, and were reportable per 10CFR 50.73(a)(1) and 50.73(a)(2)(ii) (B). The LER issued in October 1995 identified a long term corrective action to assess the FPR SSA to confirm the integrity of the analysis and to identify any other unknown discrepancies which may exist.

As a result of that ongoing assessment, it was identified in June 1996 that both redundant trains of Control Room Ventilation could be lost due to a single fire occurring in fire zones 2.1-0, 3.2B-1, 11.4-0, 11.4C-0, 11.5-0, and 11.6-0. This loss of redundant trains was not analyzed in the Fire Protection Report and does not comply with Sect. III.G of the 10CFR50 Appendix R and was reportable per 10CFR50.73(a)(1) and 50.73(a)(2)(ii)(B).

Furthermore, as a result of this continuing assessment, it was identified on 11/07/96 that the existing Safe Shutdown Analysis (SSA) of the Fire Protection Report (FPR) does not evaluate the potential for redundant 4 Kv ESF buses and redundant diesel generators to lose their capability to isolate fault currents and protect themselves from damage due to a fire in Byron fire zones 3.2A-1&2. This unanalyzed condition is not in compliance with 10CFR50, Appendix R and is reportable per 10CFR50.73(a)(1) and 50.73(a)(2)(ii)(A).

The cause of the event was that the existing FPR SSA does not consider all consequences of the loss of DC control power, i.e., the potential to leave the bus without protection from electrical faults.

Compensatory actions in the form of fire watches, administrative control of transient combustibles and hot work, and temporary provisions to mitigate the consequences of the above events will be in place until permanent corrections are installed to restore compliance.

(4-95)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	2 OF 14
		95 --	005 --	02	
TEXT (If more space is required, use additional copies of NRC Form 366A) (17)					

A. PLANT CONDITIONS PRIOR TO EVENTS:

NOTIFICATION #1:

Event Date/Time 10-10-95 /1000

Unit 1 MODE 1 - Power Operations RX Power 99.2% RCS NOT/NOP

Unit 2 MODE 1 - Power Operations RX Power 99.8% RCS NOT/NOP

NOTIFICATION #5:

Event Date/Time 11-07-96 / 1050

Unit 1 MODE 1 - Power Operations RX Power 97% RCS NOT/NOP

Unit 2 MODE 1 - Power Operations RX Power 100% RCS NOT/NOP

B. DESCRIPTION OF EVENTS:

DISCOVERY:

At 1000 hours on 10/09/95, Byron Site Engineering received a telephone call from Braidwood Site Engineering identifying that Fire Zone 11.5-0 and 11.6-0 Fire Protection Report (FPR) Safe Shutdown Analysis were deficient in that they failed to recognize that both trains of Miscellaneous Electric Equipment Room (MEER) Supply Fans could be lost due to a fire in either of these zones. Byron Site Engineering began an evaluation to determine if a similar condition existed at Byron.

NOTIFICATION #1:

At 1000 hours on 10/10/95, Byron Site Engineering concluded that a deficiency similar to Braidwood's deficiency existed for Byron Fire Zone 11.6-0 FPR Safe Shutdown Analysis. A Byron Problem Identification Form (PIF) was written at that time to document the following discrepancy. Byron FPR, Unit 1, Section 2.4.2.51 (Fire Zone 11.6-0 Safe Shutdown Analysis) states that Division 12 fans will be available after a fire in this zone. FPR Section A5.8.22 states that the Division 12 MEER supply fan will be operational after a fire in zone 11.6-0. Neither of the above statements can be justified because the Division 12 MEER Supply Fan (1VE01C) could be lost due to a fire in zone 11.6-0. Similarly, the Unit 2 Division 22 MEER Supply Fan (2VE01C) could be lost due to a fire in zone 11.6-0.

The FPR Safe Shutdown Analysis for Fire Zone 11.6-0 failed to recognize the loss of electric power to the Division 12 and 22 MEER Supply Fans. Although the power cables for these fans are not routed through Fire Zone 11.6-0, they are powered from Motor Control Centers (MCCs) which are affected by a fire in zone 11.6-0. The MCCs supplying power to the Division 12 and 22 MEER Supply Fans are powered from two 480 volt breakers that also power MCCs located in zone 11.6-0. The MCCs located in fire zone 11.6-0 can be damaged by a fire in this zone. A fire induced fault on these MCCs will cause the 480 volt breakers to open which will also de-energize the MEER Supply Fans. See Figure 1 in Attachment A for a diagram of the above configuration.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	3 OF 14
		95	-- 005	-- 02	

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

B. DESCRIPTION OF EVENTS: (cont.)

At 1425 on 10/12/95, it was determined that the existing configuration was not in compliance with 10CFR 50, Appendix R, for Fire Zone 11.6-0 and that this condition was reportable per 10CFR 50.72(b)(1)(ii)(B). An ENS phone notification was made to the NRC at 1510 on 10/12/95 (Event #29449) for a condition outside the design basis for the plant.

NOTIFICATION #2:

A review of all other Byron configurations of multiple MCCs powered from a common 480 volt breaker was conducted. At 1510 on 10/13/95, all configurations were judged to be acceptable for 10CFR 50, Appendix R considerations, except for a deficiency in the FPR Safe Shutdown Analysis for Fire Zone 11.4-0. The original Safe Shutdown Analysis failed to recognize the possible loss of both Diesel Oil Transfer Pumps for the 1A Emergency Diesel Generator and the loss of the Division 11 ESF Switchgear Room Supply Fan in this zone.

Unit 1 FPR Sections 2.4.2.43 and A5.8.17 state that Division 11 equipment is relied upon for a fire in Fire Zone 11.4-0. The power cable for Diesel Oil Transfer Pump (1DO01PA, Division 11) is routed in this zone and can be damaged by a fire. Redundant pump (1DO01PC, Division 11), its power cable, and MCC power source are located outside of zone 11.4-0. The MCC power source receives power from a common 480 volt bus breaker which also powers an MCC located in Fire Zone 11.4-0. The MCC located in zone 11.4-0 can be damaged by a fire in this zone. Therefore, a fire-induced failure on this MCC will cause the common supply breaker to open and de-energize the MCC supplying power to pump 1DO01PC. With both Diesel Oil Transfer pumps not available, the 1A Emergency Diesel Generator is not available. Additionally, the Division 11 ESF Switchgear Room Supply Fan (1VX04C) is powered by the MCC for pump 1DO01PC. Similarly, fan 1VX04C may not be available for a fire in zone 11.4-0. See Figure 2 in Attachment A for a diagram of the above configuration.

At 1530 on 10/13/95, it was determined that the existing configuration was not in compliance with 10CFR 50, Appendix R in Fire Zone 11.4-0 and is reportable per 10CFR 50.72(b)(1)(ii)(B). An update to the ENS phone notification (Event #29449) was made to the NRC at 1604 hours on 10/13/95.

NOTIFICATION #3:

In response to the events, a review of previous occurrences for this type of deficiency identified several PIFs, written in 1993-1995, against the FPR Safe Shutdown Analysis. The identified PIFs were written as a result of reviews to resolve Thermo-Lag (Generic Letter 92-08) issues. The PIFs were also briefly described in a Byron letter (dated 1/13/94) to the NRC addressing Generic Letter 92-08 issues. At the time the PIFs were screened for reportability, it was determined they were not reportable. However at 1455 hours on 10/26/95, Byron Station concluded seven of these PIFs have consequences similar to the events reported on 10/12/95 and 10/13/95 and are, therefore, reportable. A ENS Phone notification (second update to Event #29449) was made to the NRC at 1534 hours on 10/26/95. The seven PIFs are discussed individually below.

- 1). Power cable 1SX001 for the 1A Essential Service Water pump is not protected with a 3-hour fire barrier in Fire Zone 11.3-0, as specified in the FPR Section 2.4.2.37, Safe Shutdown Analysis.
- 2). Control cables 1AF338 and 1AF346 for the 1B Auxiliary Feedwater pump are not protected with a 3-hour fire barrier in Fire Zone 11.6-0, as required to support the analysis for that zone.

(4-95)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	4 OF 14
		95 --	005 --	02	
TEXT (If more space is required, use additional copies of NRC Form 366A) (17)					

B. DESCRIPTION OF EVENTS: (cont.)

- 3). Four Division 11 conduits located in the Division 12 Cable Tunnel (Fire Zone 3.1-1), containing 1A Emergency Diesel Generator Control cables, are not protected with a 1-hour fire barrier, as required to support the analysis for that zone.
- 4). Control cables 2DG222 and 2DG223 for the 2A Emergency Diesel Generator are not protected with a 1-hour fire barrier in Fire Zone 3.1-2, as required to support the analysis for that zone.
- 5). Power cable 1CV011 for the 1B Centrifugal Charging pump is not protected with a 1-hour fire barrier in Fire Zone 11.3-1, as required to support the analysis for that zone.
- 6). Control cable 1RH030 for Motor Operated Valve 1RH8701A is not protected with a 3-hour fire barrier in Fire Zone 11.5-0, as specified in the FPR Section 2.4.3.2.1.3 Safe Shutdown Analysis.
- 7). Control cables 1DG157 and 1DG175 for the 1A Emergency Diesel Generator are not protected with a 1-hour fire barrier in Fire Zone 3.2A-1, as required to support the analysis for that zone.

Compensatory actions in the form of hourly fire watches have been in place in the affected fire zones since late 1992 due to Thermo-Lag fire barrier deficiencies. Hourly fire watches existed in these zones prior to 1992 for other reasons. The hourly fire watches will remain in place until the fire barrier discrepancies are permanently resolved.

Long term corrective actions to Notifications 1-3 included an assessment of the Byron FPR Safe Shutdown Analysis to confirm the technical integrity of the analysis and to search for and identify any other unknown discrepancies which may exist. As a result of this ongoing assessment, the following discrepancy in the analysis was identified on 6/04/96.

NOTIFICATION #4:

At 1545 on 6/04/96, Byron Site Engineering concluded the existing Byron Fire Protection Report (FPR) Safe Shutdown Analysis (SSA) conclusions regarding the availability of the Control Room Ventilation (VC) System after a fire in fire zones 2.1-0, 3.2B-1, 11.4-0, 11.4C-0, 11.5-0, and 11.6-0 were incorrect. Detailed reviews performed at Byron Station identified that redundant safe shutdown cables from both trains of VC are currently located within the fire zones identified above and are not protected in accordance with the requirements of Section III.G of 10CFR50 Appendix R. This error is attributed to the fact that not all the critical VC system components, including their associated cables, were identified as required for safe shutdown and consequently their cable routings were not evaluated in the SSA.

Recent detailed reviews have identified several VC system dampers which are required to operate but were previously not identified as required for safe shutdown. Specifically, these VC isolation dampers fail closed and would block the system flow path. These additional VC system equipment and cables are now evaluated along with the previously identified VC system equipment and cables. This review considered the locations of any support equipment and cables necessary for VC operation, i.e., ac and dc power supplies. The results identified the six fire zones containing safe shutdown cables from redundant VC system trains that are not protected from a fire in the zone.

(4-95)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	5 OF 14
		95	-- 005	-- 02	

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

B. DESCRIPTION OF EVENTS: (cont.)

The VC system is designed to provide controlled temperature and relative humidity in the Main Control Room (MCR), Auxiliary Electrical Equipment Room (AEER), VC Equipment Rooms, Cable Spreading rooms, Security Control Room, and various other Control Room Complex Rooms. The system provides a habitable environment for the MCR operators and provides cooling to the main control boards and related safe shutdown equipment in the AEER.

The capability to safely shut down following a fire in the zone, considering that both redundant VC trains may be lost, was assessed in all six fire zones. For fire zone 11.4-0 (general area of Auxiliary Building, elevation 383), a fire could disable both trains of VC and disrupt power to the Unit 2 Fire Hazards Panel. If the temperature in the AEER became too high due to the loss of VC, instrumentation required to safely shutdown Unit 2 could be lost at the MCR panels and the Remote Shutdown panels (RSP) on elevation 383 of the Auxiliary Building. The Fire Hazards panel located in the electrical penetration area on elevation 426 provides alternate safe shutdown instrumentation in the event instrumentation at the MCR and RSP panels are not available. However, a fire in this zone 11.4-0 could fail the source of electrical power to the Unit 2 Fire Hazard panel. Compensatory actions and long term solutions are being implemented for this zone 11.4-0, as discussed later in this LER.

For the remaining five fire zones (2.1-0, 3.2B-1, 11.4C-0, 11.5-0, 11.6-0) instrumentation required to safely shut down the units would be available at the Fire Hazards Panels. Existing SSA conclusions concerning fires in the MCR and AEER are believed to bound the consequences of the loss of VC in these six fire zones. Fire Protection Report (FPR) Unit 1 Sections 2.4.2.4 and 2.4.2.21 and Unit 2 Sections 2.4.2.2 and 2.4.2.20 currently evaluate the capability to achieve and maintain safe shutdown following a fire in the MCR and the AEER. The fire in the MCR is assumed to disable control and instrumentation functions and force evacuation of the MCR. The fire in the AEER is assumed to disable redundant control and instrumentation functions. These existing evaluations for fire bound the consequences of the loss of ventilation to the MCR and the AEER. These evaluations assume that instrumentation provided at the Fire Hazard panels are available. In some cases, compensatory actions described later in this LER are being implemented to enhance the bounding analyses for the MCR and AEER.

It was determined the existing VC System configuration was not in compliance with the requirements of Section III.G of 10CFR50 Appendix R and this condition was reportable per 10CFR 50.72(b)(1)(ii). An ENS phone notification was made to the NRC at 1608 on 6/04/96 (update to event #29449) for a condition outside the design basis of the plant. This notification included a conclusion that Byron fire zone 3.2A-1 also contained redundant unprotected VC cables such that redundant trains of VC would be disabled by a fire. These conclusions for zone 3.2A-1 are incorrect, one train of VC is protected from fire in this zone. Zone 3.2A-1 complies with Appendix R requirements and will not be addressed further in this LER.

NOTIFICATION #5:

At 1050 on 11/07/96, during the ongoing Byron Fire Protection Report Improvement Review, it was concluded that the existing Safe Shutdown Analysis (SSA) of the Fire Protection Report (FPR) does not evaluate the potential for a single fire to disable both redundant 4 Kv ESF buses and both diesel generators in Byron fire zones 3.2A-1&2. This error is attributed to the fact the existing SSA did not consider that a fire in these zones could cause both redundant ESF buses to lose their capability to isolate fault currents and protect themselves from damage. This unanalyzed condition is not in compliance with 10CFR50, Appendix R.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	6 OF 14
		95 --	005 --	02	

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

B. DESCRIPTION OF EVENTS: (cont.)

In fire zone 3.2A-2 (Unit 2 Non-segregated Bus Duct Area, elevation 439' Aux Building), Division 21 safe shutdown equipment is relied upon for safe shutdown since Division 22 cables are routed through this zone. In this zone, Bus 241 (Div 21) normal and reserve DC control power supply cables are routed in rigid steel conduits. A fire in this zone could damage these cables and interrupt all control power to Bus 241. This situation is addressed in the current FPR SSA, but the SSA does not address that loss of DC control power prevents Bus 241 breakers from opening to isolate cable faults. The 4 Kv power cable from Bus 241 cubicle #5 to the SX Tower Unit Substation 231Z, is also routed in rigid steel conduit through zone 3.2A-2. The DC control power cable and unit substation power cable are separated from each other by approximately 5 feet. Therefore, a single fire could cause the loss of control power to Bus 241 and, subsequently, cause a fault on the cable from Bus 241 cubicle #5. If the sequence of cable failures should occur such that the control/power cable fails before the substation 231Z power cable fails, the fault current would not be interrupted because their respective breakers would not have control power and damage could occur to the ESF bus and the 2A D/G. By analysis, safe shutdown cannot be assured if either the 2A D/G or Bus 241 is unavailable. Automatic detection and CO2 suppression are present in this zone 3.2A-2.

This concern also applies to Unit 1 fire zone 3.2A-1 (Unit 1 Non-segregated Bus Duct Area, elevation 439' Aux Building). In this zone, Division 11 is relied upon for safe shutdown. Bus 141 (Div 11) normal and reserve DC control power cables are located in this zone. A 4 Kv power cable to SX Tower Unit Substation 131Z is also located in the zone. However, in this zone, the DC control power cables and the 4 Kv power cable are separated by more than 30 feet with limited intervening combustibles. Fire detection and suppression are present in the zone. The intervening combustibles are cable trays orientated such that there is no continuous path of combustibles between conduits. Although it is not credible that a single fire can affect both sets of cables, a deviation from the Appendix R separation requirement of "no intervening combustibles" is not documented in the FPR. Therefore, the lack of a documented deviation from Appendix R, is a condition outside of the Licensing basis.

These occurrences are reportable per 10CFR 50.73(a)(1) and 50.73 (a)(2)(ii)(B).

(4-95)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	7 OF 14
		95 --	005 --	02	
TEXT (If more space is required, use additional copies of NRC Form 366A) (17)					

C. CAUSE OF EVENT:

NOTIFICATIONS #1 AND #2:

The cause of the events reported on 10/12/95 and 10/13/95 was a failure of the team of analysts preparing the original Byron Safe Shutdown Analysis to recognize the interconnection between MCCs powered from a single 480 volt Bus breaker. Consequently, the Safe Shutdown Analysis for Fire Zones 11.4-0 and 11.6-0 did not consider the potential loss of some MCCs located outside of the fire zone. The team of analysts considered the equipment and cables located in the fire zone that could be directly affected by a fire. An assumption was implicitly made and the analyses was performed as if the power and control for each component formed an independent circuit and that a failure of cables for one component would not have any impact on any other safe shutdown components. This assumption is based on breaker coordination studies that demonstrate that fire induced faults on a cable will not cause an upstream supply breaker to open before the specific load fuse or breaker for the circuit in question opens. This assumption would not apply if two MCCs are fed from a single bus breaker.

NOTIFICATION #3:

The cause of the seven instances of missing Thermo-Lag fire barriers reported on 10/26/95 can be grouped into 3 types of errors.

- 1). Lack of specification of requirement in the FPR Safe Shutdown Analysis (4 occurrences)

In one instance, the safe shutdown cable routing was not correctly specified in the FPR. In the remaining instances, the FPR analysis did not recognize the Safe Shutdown significance of impacted cables. Consequently the cables were not evaluated correctly, nor were protection requirements specified. Because there was no requirement in the FPR, the corresponding design document did not specify a fire barrier and therefore was not installed in the field.

- 2). Failure of the Design Process to include FPR requirement in appropriate design documentation (2 occurrences)

In two occurrences, the design drawings for trays did not specify that fire barriers were required. Transferring the initial FPR requirements into the appropriate design drawings was not performed correctly. All of these instances occurred on Unit 1. The design process failures are believed to be isolated instances during completion of construction on Unit 1.

- 3). Fire barrier specified on design document was not installed in the plant (1 occurrence).

In this instance, the FPR evaluation and design drawings specified the requirement, however the appropriate fire barrier was not installed in the field. This instance occurred on Unit 1. The installation process failure is believed to be an isolated instance during completion of construction on Unit 1.

(4-95)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	8 OF 14
		95 --	005 --	02	

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

C. CAUSE OF EVENT (cont.)

The cause of why the above seven instances were not reported to the NRC at the time they were initially screened, reflects a matter of judgment at the time of screening. All events are some combination of Thermo-Lag fire barrier not installed as specified in the FPR or a failure to specify a fire barrier in the FPR. The first PIFs written were strongly associated with Thermo-Lag resolution activities in progress at the time. They were assigned to a "trending PIF" for identification of root cause believed to be common among all identified events. As further deficiencies were documented, some of which are less strongly tied to Thermo-Lag, they were similarly assigned to the trending PIF. This process resulted in later PIFs not being screened for potential reportability to the extent they would have had they not been assigned to the trending PIF. Closeout of the trending PIF specified root cause and corrective actions for the collective population of PIFs. No further assessments for reportability were performed.

NOTIFICATION #4:

The cause of the event reported on 6/04/96 was that recent detailed reviews at Byron Station identified several VC system dampers which are required to operate for safe shutdown but which were not identified as required in the original FPR safe shutdown analysis. These VC system components were not evaluated in the original SSA. The exact reason for not identifying these VC dampers and their associated cables as safe shutdown is unknown. Upon loss of power, the VC isolation dampers fail closed and would block the system flow path.

NOTIFICATION #5:

The cause of the event reported on 11/07/96 was the existing FPR SSA does not recognize that a fire in zones 3.2A-1 or 2 could potentially leave both redundant ESF 4 KV buses with no circuit protection to isolate electrical equipment faults that may result from the fire. The existing SSA documents the potential loss of DC control power to the redundant ESF buses, and evaluates actions which must be taken to close necessary circuit breakers manually using station procedures. However, the SSA does not consider all the consequences of the loss of DC control power, i.e., the potential to leave the bus without protection from electrical faults. The reason for not evaluating this consequence and its impact upon safe shutdown is unknown. The missing evaluation was never included in the FPR analyses.

D. SAFETY ANALYSIS:

The instances described in this LER are situations where protection was not provided to assure one train of Safe Shutdown equipment is available to safely shutdown the reactor for a postulated fire as required in 10CFR 50 Appendix R. Automatic fire detection systems are installed throughout all affected areas. Hourly fire watches were also present in the affected fire zones back to the initiation of the Fire Watch Program in 1988. The use of ignition sources and transient combustibles in the affected areas is also strictly controlled by station administrative procedures.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	9 OF 14
		95 --	005 --	01	

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

C. SAFETY ANALYSIS (cont.)

Based on the low combustible loadings and type and configuration of combustibles (i.e. IEEE 383 qualified cable insulation) in these fire zones, a slow developing, low heat release rate fire would be expected. With the presence of the automatic detection systems, hourly fire watches and station administrative controls, it is highly unlikely a fire could result with the intensity to damage all cables included in Appendix R Safe Shutdown Analysis. Had conditions conducive to a fire existed or an actual fire occurred in any fire zone, the automatic detection system or compensatory hourly fire watch would have detected the conditions prior to the fire developing or detected the fire in its incipient stage. Because of this prompt identification, it is highly likely that the on-site fire brigade would have extinguished the fire before the fire affected both safe shutdown trains. There are also active fire suppression systems installed in some of the affected zones. These systems could have further limited the likelihood of a fire affecting both trains of safe shutdown equipment in those particular zones.

A detailed Fire Hazard Analysis was performed by ComEd Fire Protection Engineers for the event of Notification #5. The analysis (docketed in letter BYRON-96-5188 to the NRC on 11/20/96) concludes that the circuit configuration, fire protection features, and the compensatory actions established for the fire zones provide reasonable assurance that safe shutdown will not be affected in the event of fire, pending permanent resolution of this concern.

There is no impact on the health and safety of the public as a result of these events.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	10 OF 14
		95 --	005 --	02	

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

E. CORRECTIVE ACTIONS:

Short Term Corrective Actions:

1. Daily Orders were immediately written to identify and define to Operations the deficiencies reported on 10/12/95, 6/04/96, and 11/07/96.
2. Hourly fire watches are in effect in all fire zones impacted and will remain so until permanent corrective actions are taken.
3. Darmatt KM1 fire barrier was installed on some of the conduits and trays containing 1A Diesel Generator cables in the spring of 1995. This installation resolves some of the discrepancies identified in 1993. [Applies to notification #3]
4. Criteria for reporting deficiencies in the FPR were established in an October 23, 1995, teleconference between Byron and Braidwood Station Regulatory Assurance and Site Engineering Departments. The criteria will be applied to any future events to establish whether it is reportable. [Applies to notification #3]
5. Temporary procedures and a temporary alteration have been implemented to allow restoration of one train of the control room ventilation system in a once through purge mode using 100% outside air. These procedures involve opening two dampers in the supply air flowpath, and manually operating a supply fan at the switchgear bus breaker, and opening control room envelope doors to establish a relief flowpath to the turbine building operating deck. It is estimated that these actions can be implemented within 30 minutes of receiving a fire alarm and loss of control room ventilation. These actions will restore adequate airflow through the control room envelope using outside air. [Applies to notification #4, fire zones 11.4-O, 11.4C-O]
6. Training will be provided for all scheduled shifts when assuming their shift responsibilities. All training of scheduled shifts will occur within one week of the installation of measures discussed in item 5 above. (NTS #454-180-95-0005S1-02) [Applies to notification #4, fire zones 11.4-O, 11.4C-O].
7. There is currently a set of equipment for local safe shutdown actions in the remote shutdown control room. This equipment may not be accessible for a fire in zone 11.4C-O. Therefore, two additional sets of equipment for local safe shutdown actions have been provided in the Shift Engineer's office. [Applies to notification #4, fire zone 11.4C-O].
8. Fire zone 3.2B-1 has been designated a transient combustible and hot work exclusion area. In the event that either transient combustibles must be present or hot work must be performed, a continuous fire watch in the zone will be established. [Applies to notification #4, fire zone 3.2B-1]. The common area surrounding the cables of concern in fire zone 11.4-O has been designated a transient combustible exclusion area with no hot work allowed. If transient combustibles are brought into the area or hot work performed, a fire watch in the zone will be established. The administrative controls will remain in effect until permanent resolution of the condition is achieved. [Applies to notification #4, fire zone 11.4-O].

NRC FORM 366A (4-95)		U.S. NUCLEAR REGULATORY COMMISSION							
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION									
BYRON NUCLEAR POWER STATION	05000454	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center; font-size: small;">YEAR</td> <td style="width: 33%; text-align: center; font-size: small;">SEQUENTIAL</td> <td style="width: 33%; text-align: center; font-size: small;">REVISION</td> </tr> <tr> <td style="text-align: center;">95 --</td> <td style="text-align: center;">005 --</td> <td style="text-align: center;">02</td> </tr> </table>	YEAR	SEQUENTIAL	REVISION	95 --	005 --	02	11 OF 14
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E. CORRECTIVE ACTIONS (cont.)

9. Caution cards are in place at the appropriate locations to assure local/remote switches are kept in positions assumed in the safe shutdown evaluations. The administrative control will remain in effect until permanent resolution of the condition is achieved. [Applies to notification #4, fire zone 3.2B-1] This will assure the Unit 1 Fire Hazard panel is available for a fire in zone 3.2B-1.

10. Fire zones 3.2A-1 and 2 have been designated transient combustible and hot work exclusion areas. In the event that either transient combustibles must be present or hot work must be performed, a continuous fire watch in the zones will be established. The administrative controls will remain in effect until permanent resolution of the condition is achieved. [Applies to Notification #5]

11. Temporary Operating procedures are in place in the Main Control Room to provide an immediate response upon the receipt of an alarm on the MCR fire detection panels for a fire in zones 3.2A-1 or 2. The procedures identify the actions to be taken to ensure the relied upon ESF 4 Kv buses will be available for the safe shutdown of the unit. A description of these actions is contained in a docketed letter BYRON-96-5188 to the NRC dated 11/20/96. The temporary procedures will remain in effect until permanent resolution of the condition is achieved. [Applies to Notification #5]

Long Term Corrective Actions:

1. Plant modifications have been initiated to permanently correct each deficiency described in this LER. The Unit 1 modifications were installed May, 1996, and the Unit 2 modifications are scheduled to be installed by December, 1996. (NTS # 454180950005-01,02) [Applies to all notifications].

2. An action plan to assess the FPR Safe Shutdown Analysis (Section 2.4 of the FPR) has been developed. The plan reviewed all previously identified problems, determined root cause, and recommended corrective actions in order to confirm the technical integrity of the FPR analysis. Comprehensive reviews of the Byron FPR Safe Shutdown Analysis are ongoing to search for and identify any other unknown discrepancies which may exist. (NTS # 454180950005-03)

3. A permanent design change to provide an alternate power source to the Unit 1 Fire Hazard Panel from a Division 11 power source will be completed and installed no later than Refuel Outage B1R08. [Applies to notification #4, fire zone 3.2B-1](NTS #454-180-95-0005S1-05)

4. A permanent design change to provide an alternate power source to the Unit 2 Fire Hazard Panel from a Division 21 power source will be completed and installed no later than Refuel Outage B2R07. [Applies to notification #4, fire zone 11.4-0](NTS #454-180-95-0005S1-06)

5. A permanent design change to remove one train of VC from the Unit 1 Remote Shutdown Panel and fire hazard zone 11.4c-0 will be completed and installed no later than Refuel Outage B1R08. [Applies to notification #4, fire zone 11.4C-0](NTS #454-180-95-0005S1-07)

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION	05000454	YEAR	SEQUENTIAL	REVISION	12 OF 14
		95 --	005 --	02	

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

E. CORRECTIVE ACTIONS (cont.)

6. A permanent design change to protect conduits and 4 Kv power cables to the Essential Service Water (SX) Tower Unit Substations (131Z and 231Z) with a 1 hour rated fire barrier will be completed and installed in fire zones 3.2A-1 and 2 by no later than May 31, 1997. This permanent change will remove the vulnerability to the ESF electrical buses described in Notification #5. (NTS #454-180-95-0005S2-01)

F. RECURRING EVENTS SEARCH AND ANALYSES:

As discussed in DESCRIPTION OF EVENT, previous occurrences at Byron Station were researched and are reported as a part of this LER.

A search of INPO (SOERs, SERs) and NRC (Generic Letters, Bulletins, Notices) documents resulted in no recommendations applicable to the events in this LER.

G. COMPONENT FAILURE DATA:

None.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION

05000454

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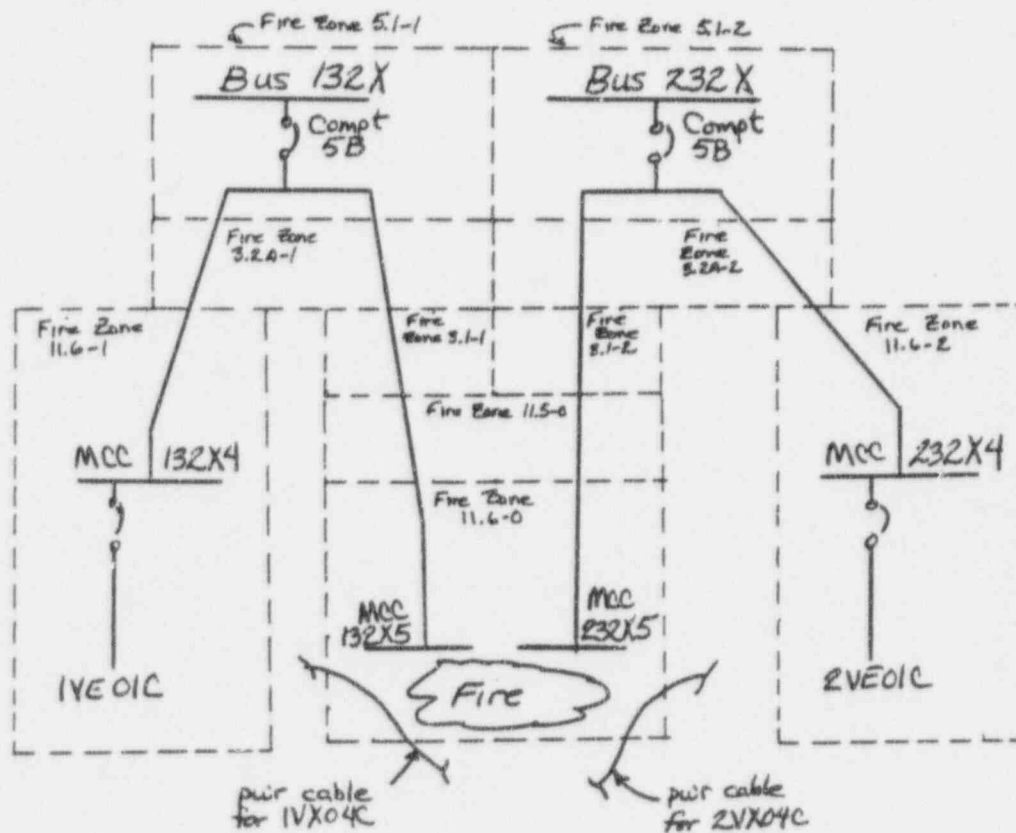
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13 OF 14

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Attachment A

Figure 1: Configuration of Fire Zone 11.6-0



Problem: Appendix R Fire in Zone 11.6-0 (Elev. 426', AB) may cause failure of:

- 1). Power cable for 1VX04C (U-1 Div 11 MEER Supply Fan)
- 2). Power cable for 2VX04C (U-2 Div 21 MEER Supply Fan)
- 3). Fault MCC 132X5 which causes Bus 132 Compt 5B breaker to open when sensing fault current.

Therefore MCC 132X4 de-energized resulting in:

- (a) Loss of 1VE01C (U-1 Div 12 MEER Supply Fan)
- 4). Fault MCC 232X5 which causes Bus 232 Compt 5B Breaker to open when sensing fault current.

Therefore MCC 232X4 de-energized resulting in:

- (a) Loss of 2VE01C (U-2 Div 22 MEER Supply Fan)

Which means for a fire in Zone 11.6-0;

Both redundant MEER Supply Fans are lost on both units.

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LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

BYRON NUCLEAR POWER STATION

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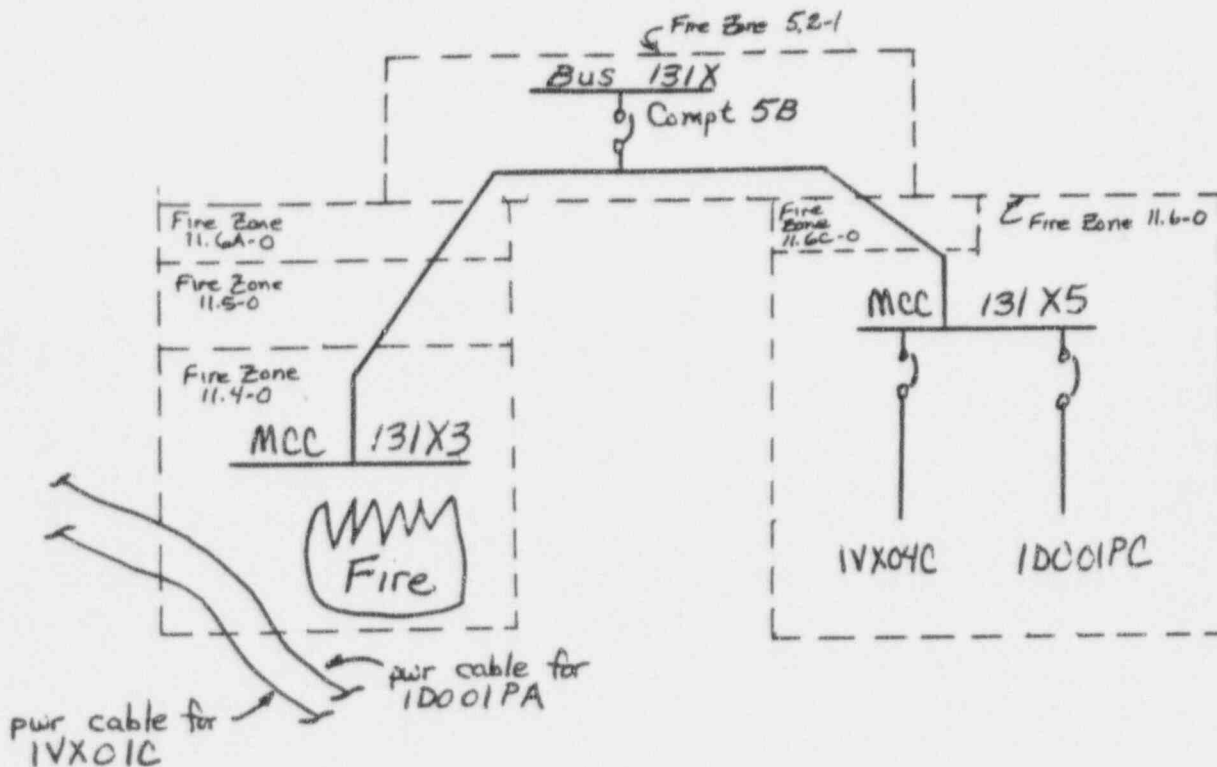
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14 OF 14

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Attachment A

Figure 2: Configuration of Fire Zone 11.4-0



Problem: Appendix R Fire in Zone 11.4-0 (Elev. 383', AB) may cause failure of:

- 1). Pwr cable for 1VX01C (Div 12 ESF Swgr Supply Fan)
- 2). Pwr cable for 1DO01PA (A Diesel Oil pp for 1A D/G)
- 3). Fault MCC 131X3 which causes Bus 131 Compt 5B breaker to open when sensing fault current.

Therefore MCC 131X5 de-energized resulting in:

- (a) Loss of 1VX04C (Div 11 ESF Swgr Supply Fan)
- (b) Loss of 1DO01PC (A Diesel Oil pump for 1A D/G)

Which means for a fire in Zone 11.4-0, which the FPR Safe Shutdown Analysis states that Division 11 will be protected from fire:

- 1). Both DO pumps for the 1A D/G are lost
- 2). Div 11 ESF Swgr Room Supply Fan 1VX04C is lost