NRC FORM 366 (5-92) | U.S. NUCLEAR REGULATORY COMMISSION | APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
James A. FitzPatrick Nuclear Power Plant	05000333	01 OF 11

TITLE (4) Emergency Diesel Generators Potentially Inoperable Due to Fire Protection Deficiencies

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 NAME	DOCKET NUMBER
										05000
07	09	91	91	010	01	06	13	94	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)	000		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)	X	50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		(Specify in Abstract below and in Text, NRC Form 366A)
			20.405(a)(1)(iv)	X	50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Mr. Donald Simpson, Senior Licensing Engineer	(315) 349-6361

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

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

Supplementary Report: The plant had been shutdown for approximately seven weeks for maintenance. As the result of a review of the fire protection reference manual, a number of concerns were identified beginning on 6/6/91. Those determined to be reportable include: 1) Three postulated fire scenarios which could have resulted in loss of ventilation fans for spaces containing equipment required for safe shutdown. 2) Four carbon dioxide actuated fire dampers which had been intentionally closed that would have prevented ventilation of the EDG switchgear room if other supply fans were also disabled by a fire. 3) Five deficient electrical penetrations in a battery room. 4) 19 fire dampers either improperly installed or maintained which could have prevented their operation as designed. The deviations were caused by inadequate fire protection program implementation due to an insufficiently qualified staff, weak administrative controls and inadequate communication between functional work groups. Fire Protection program improvements were implemented through the JAF Results Improvement Program. These improvements included setting program goals and objectives, training, program monitoring and effectiveness evaluations. All hardware deficiencies were corrected through maintenance improvements or modifications.

B/13

Supplementary Report - Original Report date 8/15/91

EIIS Codes are in []

Description

The requirements of NRC Branch Technical Position (BTP) 9.5-1, Appendix A, and 10 CFR 50, Appendix R, resulted in over 125 submittals and over 1,000 action items. In 1987 a two-volume fire Protection Reference manual (FPRM) was prepared to cover Appendix R identified penetrations. The document was updated in 1988. In 1989 the FPRM was revised to incorporate Appendix A fire barrier penetrations. The FPRM was issued as a controlled document in 1990. It was subsequently decided to broaden the scope of the FPRM to include the fire hazard and safe shutdown analyses which were separate documents at the time, and to update the manual to reflect plant modifications which had occurred since the document was first issued. A contract was awarded to a vendor in May of 1990 to accomplish this task. The vendor identified nearly 90 items requiring further research. All but a small number were resolved with the original plant architect-engineer constructor. The initial review of the draft of the enlarged and revised FPRM was completed in May, 1991. Concurrently with this review, the plant had been in a shutdown condition for maintenance for approximately seven weeks. During the review of the FPRM or related plant walkdowns, the items discussed in this LER were identified. One group contains postulated fire scenarios which could render ventilation equipment inoperable in ways which had not been previously analyzed. The other includes mechanical discrepancies in fire barriers; ventilation damper expansion clearances and deficient penetration seals.

A. Postulated Fire Scenarios

Each of these scenarios involve postulated loss of ventilation and normal heat removal capability during a fire. It is possible that some equipment required for safe shutdown may not have functioned, if required, at the resulting elevated temperatures.

1. Loss of ventilation supply fans [VJ] for emergency diesel generators [EB] (EDGs) and EDG switchgear [NB] room (92FN-1A,B,C, and D):

   An internal memorandum dated 6/6/91 from the corporate engineering group to the plant site stated that a control room fire could damage the ventilation fan indication lamp circuity cables and result in loss of control power for these fans.

However, the memorandum stated that none of the items would prevent achieving a safe shutdown. It was stated that procedures could be revised to provide portable ventilation fans as an interim measure and that the control circuits could be fused to provide permanent solutions. Given the statement that safe shutdown capability would not be prevented, higher priority safety-related issues were pursued. The following week the memorandum was reviewed for reportability and discussed at a project engineering meeting. At that time it became apparent that portable fans would not solve the postulated problems raised by the scenarios. The issue of EDG switchgear operability with loss of ventilation was pursued through the weekend and resulted in reporting of the conditions to the NRC by use of the emergency notification system (ENS) on 6/25/91. A final analysis of the scenario and EDG switchgear operability was performed, and this resulted in a final determination on 7/9/91 that the loss of the ventilation could have prevented continued operation of the EDGs and loss of EDG switchgear.

2. Loss of ventilation fans for electric bays containing switchgear [EB, ED] and motor generators for uninterruptible power supplies and reactor protection system [EF] (67FN-12A,B,C, and D):

Continuing field inspections to support the FPRM project found a potential for failure of the electric bay ventilation fans in the event of a fire in the control room, relay room, or cable spreading room [NA]. A fire in the turbine building [NM] could have the same result.

A fire in the control room would require use of the alternate shutdown panel outside the control room. This panel controls equipment in the B side safe shutdown equipment only. A fire in the control room or relay room could result in the loss of fans B and D for the B side equipment. This could impair the ability of the plant staff to achieve shutdown of the plant.

A postulated fire in the turbine building would require the operation of the A side safe shutdown equipment because of the location of B side equipment in the turbine building. A fire in the turbine building could result in loss of fans A and C for the A side equipment. This could impair the ability of the plant to achieve shutdown. Discovery of this situation was reported using ENS on 7/12/91.

3. Loss of ventilation fans for both emergency service water (ESW) [BI] and residual heat removal service water (RHRSW) [BI] pump rooms (73FN-3A&B):

   A fire in the east cable tunnel could disable the ventilation exhaust fans for both (train A and B) ESW and RHRSW pump rooms. This fire would also disable the B side safe shutdown equipment.

   This would require the use of the remaining ESW pump A and either RHRSW pump A or C for operation of the A side safe shutdown equipment. However, this equipment could ultimately fail due to lack of ventilation fan 73FN-3A. Discovery of this situation was reported using ENS on 7/12/91.

B. Mechanical Discrepancies in Fire Barriers

   1. Emergency diesel generator (EDG) switchgear room [NG] ventilation dampers intentionally placed in closed position (92CD-1,2,3 and 4):

      During continuing field inspection to support the FPRM project, it was found that a postulated fire in the control room, relay room or cable spreading room complex, or the turbine building would disable the four cable tunnel ventilation fans (67FN-12A,B,C, and D). By themselves, the fires would result in reduced (but still adequate) ventilation to the EDG switchgear because adequate ventilation should have been provided by the EDG ventilation system (92FN-1A,B,C, and D). However, the dampers in the EDG ventilation system which are designed to closed automatically on discharge of the carbon dioxide fire extinguishing system had been intentionally closed because of difficulty in resetting them in the open position following surveillance testing. Therefore, adequate ventilation would not have been available if the cable tunnel fans were not operable. This event was reported to the NRC using the ENS on 7/21/91.

2. During the field inspection on 7/27/91, three six-inch diameter and two one-inch diameter fire barrier electrical penetrations, which are required by the NRC, Branch Technical Position 9.5-1 (BTP), Appendix A, to be sealed to achieve a three-hour fire rating, where found to have discrepancies. The three six-inch penetrations were sealed to a depth of 12 inches, except for a small diameter opening at the top of each penetration. The two, one-inch penetrations were sealed by a minimal thickness of combustible urethane foam. Although these penetrations were in the barrier between station battery room A and battery charger room A, which is required for conformance to BTP 9.5-1, Appendix A, the barrier is not required by the subsequent Appendix R safe shutdown analysis. Further, as described in the analysis section of this LER, the degraded penetration seals would have had no adverse effect on the safe shutdown of the plant.

3. Fire Dampers

On 7/9/91 and 7/24/91, 19 ventilation system fire dampers were determined to be potentially inoperable in the event of a fire due to incorrect installation of the dampers. Vendor installation instructions required the presence of a thermal expansion clearance (approximately one eighth of an inch per linear foot of damper) between the ventilation damper or sleeve and the opening in the masonry barrier in which the damper is located. The purpose of the clearance is to allow for thermal expansion of the damper, in the event of a fire, without effecting the capability of damper closure or its remaining closed. Lack of adequate expansion clearance was the result of sealing the space between the ductwork and the barrier or not providing adequate expansion clearance during original installation. Therefore, a fire could, under some circumstances, have resulted in sufficient expansion and/or deformation so that the fire dampers might not have closed.

Cause:

The root cause of these events was a lack of commitment to effective Fire Protection Program implementation (Cause Code E). These events were symptomatic of organizational and programmatic weaknesses which had gone uncorrected for some time. The weaknesses were identified through a fire protection program assessment and reported in LER-92-015-01, "Safety Significance of Appendix R Deficiencies". The site and corporate organizations responsible for program implementation communicated poorly and there was no formal accountability. At the time of the initial Appendix R site review, there were additional contributing causes which allowed events such as identified in this report to go undetected. The staff responsible for fire protection were poorly trained and therefore, not adequately qualified in the performance of their job skills. There was no formal interface, communication method or process accountability between organizations responsible for various elements of the program. Management direction, oversight and monitoring of program performance was weak and insufficient to detect and correct fire protection system physical deficiencies or errors in engineering judgment.

The four EDG ventilation system carbon dioxide fire dampers were intentionally placed in a closed position because of difficulty in resetting the dampers to the open position following surveillance testing. This was believed to be the failed safe position to retain carbon dioxide in the EDG switchgear spaces to extinguish a fire. The operational consequences on normal switchgear room ventilation in the event of failure of the cable tunnel fans (concurrent with closed dampers) were not recognized at the time that the dampers were intentionally closed.

The small openings in the three, six-inch fire barrier electrical penetration seals resulted from incorrect installation and failure to identify and correct the deficiencies following initial installation or during subsequent inspections.

The reasons for inadequate expansion clearances around the ductwork and not providing adequate internal clearance for the 19 fire dampers was improper installation due to weak installation procedures and poorly qualified personnel overseeing the installation.

Analysis:

The discrepancies in fire barrier penetrations and unanalyzed fire scenarios are reported in accordance with the provisions of 10CFR50.73(a)(2)(ii) as conditions outside the design basis of the plant as described in the UFSAR to meet the requirements of NRC Branch Technical Position (BTP) 9.5-1, Appendix A, and 10 CFR 50, Appendix R and as conditions not covered by plant operating and emergency procedures. Some discrepancies may also be reportable under 10CFR50.73(a)(2)(v) as events, which alone could have prevented the fulfillment of safety functions of systems required to shutdown the reactor or remove residual heat.

Analyses were completed assuming the inoperability of 19 fire dampers installed throughout the facility to the extent that they would not properly function as three hour rated barriers in the event of a fire due to inadequate or improper installation. Each analysis evaluated the safety significance of potential damper failure based upon combustible loading within the affected zone(s), nature of the installation deficiency, available fire detection and suppression systems on either side of the zone boundary and the fire barrier design requirements where each damper was located. Credit was also taken in the analyses for fire resistance boundary of installed ductwork where applicable. The damper analyses concluded that there would have been no adverse impact on safe plant shutdown.

Because emergency diesel generator switchgear room ventilation dampers had been intentionally placed in the closed position, an analysis was completed which assessed the operability of the emergency diesel generators in the event of a postulated fire scenario external to the EDG building that could disable half of the supply air to each switchgear room.

The two emergency diesel generator switchgear rooms have installed carbon dioxide fire suppression systems. Normal ventilation to each switchgear room is provided from two sources, the Turbine Building Ventilation System (System 67) via each respective cable tunnel and the diesel generator building ventilation system (System 92). In the event the carbon dioxide fire suppression system in either switchgear room were actuated, three CO_2 actuated dampers would close to ensure an adequate carbon dioxide concentration in the EDG switchgear room. One of these dampers is in the supply duct from the respective cable tunnel. The other two dampers, which

were intentionally failed closed, are located in the ductwork in the switchgear room. These dampers are required to close only upon actuation of the carbon dioxide suppression system. Additional dampers which are located at the fire zone boundary provide a three hour rated barrier. The safety related function of the EDG ventilation system is to maintain the EDG rooms at temperatures below 120 degrees F during operation of the emergency diesel generators.

Free convection calculations performed on the Division B EDG switchgear room, which assumed a total loss of ventilation to the room, resulted in an ambient temperature of 123 degrees F. The electrical equipment in the switchgear rooms is designed for continuous operation at an ambient temperature of 104 degrees F. An evaluation of equipment operation at 111 degrees F concluded that operability would be assured for up to 72 hours but only once in the equipment lifetime. At 123 degrees F the potential for degradation or failure of safety related electrical equipment located in the room was increased. There were mitigating factors which make the event not safety significant:

1. During normal operation, remote trouble annunciation in the Control Room would have alerted the operators to an increasing ambient temperature several hours before design temperature would have been reached. Operators could have initiated corrective actions including restoring the closed dampers or rigging temporary ventilation.

2. During normal operation, sliding fire doors between each emergency diesel room and the switchgear room are open and could have provided an alternate cooling means in the absence of a fire.

3. For a postulated fire in the Control Room, the EDG switchgear rooms would be entered because this area contains a remote shutdown station and any loss of ventilation would be immediately detected by plant operators upon arrival at that location.

In conclusion, operators could have provided temporary ventilation in order to maintain adequate EDG switchgear room temperature and assure continued emergency diesel operability.

Analysis of the discrepancies in the fire barrier electrical penetration seals between battery room A and battery charger room A revealed no significant consequences and no potential for adverse effects on safe plant operation for the following reasons:

1. Although a three-hour barrier is required by the BTP 9.5-1, Appendix A, analysis of the combustible loadings of the battery room and charger room show an equivalent fire severity of less than two hours and one hour respectively.
2. The potential ignition of the battery room casings by means of sustained arcing is not probable.
3. Potential fires in the battery spaces would occur at elevations above those of the penetration with deficient seals. A fire would have to travel down to even reach the level of the penetration. Accordingly, the penetration seals would not have been directly exposed to a fire.
4. Adequate automatic ionization detection instruments [IC] are provided at the ceiling level in the spaces and they are operable.
5. Manual hose stations [KP] and portable extinguishers are located just outside of the fire zones of concern.

Corrective Actions:

Fire watches were posted upon discovery of deficiencies in the fire barrier penetrations. The fire watches were maintained until corrective action was accomplished.

A. Postulated Fire Scenarios

1. Loss of EDG ventilation (92FN-1A,B,C and D) resulting in loss of EDGs and loss of EDG switchgear ventilation due to a postulated fire in Control Room:

   The fan indicating lamp circuitry was modified by adding a set of fuses to electrically isolate the lamp circuitry to prevent loss of control power to the fans in the event of a Control Room Fire.

2. Loss of electric bay ventilation fans (67FN-12A,B,C, and D):

The B side ventilation fan circuits have been electrically isolated from the control room. The A side ventilation fan circuits have been electrically isolated from the local panel located in the turbine building. This will prevent loss of these fans in the event of fires in the turbine building, control room, cable spreading room, or relay room.

3. Loss of ESW and RHRSW train B pump room ventilation fans:

The conduit in the east cable tunnel has been wrapped in a fire retardant material for the exhaust fan for one of the two pump rooms.

B. Mechanical Discrepancies in Fire Barriers

1. EDG room ventilation carbon dioxide activated fire dampers:

The dampers were repaired and restored to the open position. Subsequently, a plant modification was completed which replaced all six dampers with an improved design.

2. Electrical penetration seals in battery room

The fire barrier electrical penetration seals have been replaced with approved materials to restore the three-hour rated barrier.

3. Fire Dampers

Modification, repair or replacement of the fire dampers was performed to provide adequate thermal expansion clearance for operation of the 19 fire dampers. All work was completed and post work testing accomplished as of June, 1993.

A Fire Protection Improvement Plan was developed and integrated into Phase II of the FitzPatrick Results Improvement Program. This plan was designed to correct fundamental management weaknesses which lead to events such as those described in this report. Quarterly deviation and event report assessments of the Fire Protection Program performance are one means management is using to measure effectiveness of the improvement plan.

Additional Information:

Failed Components: None

Related Events:

1) LER-91-021 describes a similar event where mispositioning of ventilation dampers jeopardized the operability of safety related equipment.

2) LER-92-015-01 provided an evaluation and assessment of the safety significance of fire protection deficiencies identified through the FitzPatrick Appendix R reanalysis as applied to safe shutdown performance.