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New York Power Authority

Robert J. Barrett
Plant Manager

December 24, 1996
IPN-96-132

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

SUBJECT: Indian Point 3 Nuclear Power Plant
Docket No. 50-286
License No. DPR-64
License Event Report # 95-015-02
Maintenance on Emergency Diesel Generator Room Exhaust Fan Exceeded The Allowed Outage Time; A Condition Prohibited by Technical Specifications

Dear Sir:

The attached Licensee Event Report (LER) 95-015-02 is hereby submitted as required by 10 CFR 50.73. This event is the type defined in 10 CFR 50.73 (a)(2)(i)(B). The purpose of this revision is to provide additional information on the impact of the condition as a result of further assessments.

Also attached are the commitments made by the Authority in this letter.

Very truly yours,

Robert J. Barrett
Plant Manager
Indian Point 3 Nuclear Power Plant

IE22

Attachment

cc: See next page

cc: Mr. Hubert J. Miller
Regional Administrator
Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406-1415

INPO Record Center
700 Galleria Parkway
Atlanta, Georgia 30339-5957

U.S. Nuclear Regulatory Commission
Resident Inspectors' Office
Indian Point 3 Nuclear Power Plant

List of Commitments

Number	Commitment	Due
IPN-96-132-01	Modify the exhaust fan's power supplies such that each EDG supplies emergency power to the exhaust fans that are supporting its operation. This will alleviate the difficulty in maintaining configuration control when removing the fans or EDG from service. The power feeds for EDG Exhaust fans will be modified such that each set of fans will be fed from the power supply fed by the associated EDG.	December 31, 1997
IPN-96-132-02	The appropriate administrative controls will be revised to ensure that EDG 32 and EDG 33 remain operable during cold shutdown to meet Technical Specification 3.7.F until the modification to the power supplies removes the operability concerns.	February 20, 1997
IPN-96-132-03	The safety significance of having 3 EDGs inoperable during cold shutdown will be assessed and LER 96-015-02 revised as required.	February 15, 1997

NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 5/31/95

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.

LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Indian Point Unit 3	05000286	1 OF 11

TITLE (4) Maintenance on Emergency Diesel Generator Room Exhaust Fan Exceeded The Allowed Outage Time; A Condition Prohibited by Technical Specifications

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
07	27	95	95	-- 015 --	02	12	24	96		05000
									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)	100		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)		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)		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)
Andrew Mihalik, System Engineer	(914)736-8362

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).	NO				

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

On July 27, 1995, at approximately 1904 hours, with reactor power at 100%, as a result of questions raised by the Independent Safety Engineering Group (ISEG) as documented in Deviation Event Report (DER) 95-1658, Systems Engineering concluded that Emergency Diesel Generator (EDG) 33 was in a Limiting Condition for Operation (LCO) as a result of maintenance on its room exhaust fan 318 and exceeded the allowed out-of-service time of 72 hours for an inoperable EDG. The EDG was available and its redundant room exhaust fan was operable, but the condition would not meet single failure criteria under postulated accident conditions. A period was identified during cold shutdown where a single failure could cause the loss of all three EDGs. Subsequently, additional periods during cold shutdown were identified. The cause of the event was a misinterpretation of the design criteria as applied to plant operations with respect to the use of the word "redundant" to describe the exhaust fans in each EDG room. Contributing causes include an inadequate design review of the system and its requirements, and difficulty in maintaining configuration control as a result of the nontraditional system design utilizing one EDG to support operability of another EDG. Corrective actions include revision of procedures, and evaluation and modification of the power supply assignments.

DESCRIPTION OF EVENT

On July 17, 1995, at approximately 1517 hours with reactor power at 100%, the Independent Safety Engineering Group (ISEG) identified a potential operability concern during a routine review of the Limiting Conditions for Operation (LCO) log. ISEG noted periods of maintenance on the emergency diesel generator (EDG)(EK)(VJ) rooms' exhaust fans (FAN) that appeared excessive. The Operations Department had entered in the LCO log a potential LCO because an EDG exhaust fan had been removed from service. A potential LCO is entered for inoperable equipment that is required to be operable but the number of inoperable components required by the LCO has not yet reached the threshold for implementing the action requirements. However, after ISEG reviewed EDG and support equipment design drawings and electrical load assignments along with Technical Specification requirements, they concluded possible EDG inoperability could occur due to maintenance on the EDG rooms' exhaust fan(s). A Deviation Event Report (DER), 95-1658, was initiated to record the concern and initiate further review.

System engineering performed a review of the maintenance history for the EDGs and their rooms' exhaust fans as documented in the LCO entry log index and tracking sheets from October 1993 to July 1995, and determined that an EDG exhaust fan was out of service for a period of time that exceeded the Technical Specification allowed outage time for an EDG. The Technical Specifications and the FSAR do not specifically identify the need for exhaust fans or EDG room ventilation to support EDG operability; therefore, an LCO with a specified allowed outage time was not entered when a room exhaust fan was taken out of service. The Design Basis Document identifies that the fans are 100% redundant and one fan is required to support EDG operation; therefore, the exhaust fans were tracked as a potential LCO in the LCO log. No allowed outage time or formal LCO criteria exists for an exhaust fan being out of service. Therefore, the plant must still remain capable of sustaining an accident concurrent with a single failure while an exhaust fan is out of service. However, the configuration of the power supplies for the exhaust fans does not accommodate single failure under situations of exhaust fan inoperability.

The EDG Building Heating and Ventilation System (VJ) is used during standby EDG operation and is relied upon to support EDG and Station Battery 33 (EJ)(BTRY) operations during Design Basis Accidents (DBA). The EDG Building Heating and Ventilation System provides ventilation air to remove heat generated from equipment and components located in each room of the EDG building. The removal of heat maintains indoor air temperatures at or below the maximum temperature necessary for proper operation of the equipment and components.

The EDG Building Heating and Ventilation System design provides redundant room exhaust fans using two 100% capacity ventilation exhaust fans and one intake louver (LV) bank for each EDG room. The original station design provided emergency power for essential equipment from two 480 volt AC Motor Control Centers (MCCs) (ED). At that time, the only sources of emergency power available were MCCs 36A and 36B. The current station design also includes MCC 36C. Because only two emergency power MCCs were available originally to supply power to three EDG rooms, providing only one 100% fan in each room would not satisfy single failure criteria. Therefore, the original design included two redundant 100% fans in each EDG cell with one powered from MCC 36A and the other powered from MCC 36B. This design would satisfy the single failure criteria if it is assumed that the plant would always have either MCC 36A or MCC 36B operable. Each EDG cell would have power to at least one exhaust fan as required. See the following matrix of current power assignments.

Matrix of Electric Power Assignments for EDGs and Room Exhaust Fans

EDG No.	Room Exhaust Fan No.	Power Source
31	314	MCC 36A(EDG 33)
	315	MCC 36B(EDG 32)
32	316	MCC 36A(EDG 33)
	317	MCC 36B(EDG 32)
33	318	MCC 36A(EDG 33)
	319	MCC 36B(EDG 32)

Systems Engineering discovered that between July 10, 1995, at 1805 hours to July 17, 1995, at 1200 hours, EDG 33 room exhaust fan 318 was out of service for maintenance for a total period of time of approximately 162 hours. The condition was also discovered to have occurred several times when the plant was in cold shutdown during a 28 month improvement outage which started in February 1993. The condition was determined to be reportable as a violation of Technical Specification 3.7.B.1 because the allowed out-of-service time of 72 hours for one EDG was exceeded. On July 27, 1995, at approximately 1904 hours DER 95-1746 was initiated to document this determination. The Operations Department was notified and a Shift Order was issued to identify the need to enter a 72 hour EDG LCO for the applicable EDG if fans 314 (31 EDG), 315 (31 EDG), 317 (32 EDG) or 318 (33 EDG) were declared inoperable. If fan 316 or fan 319 were out of service, the plant would still be capable of sustaining a single failure since the redundant fans are powered by the EDG that they are supporting. Therefore, fan 316 and fan 319 were not included in the Shift Order. Subsequent to the LER revision, during a Maintenance Rule assessment, a System Engineer discovered that past LERs did not adequately report the impact of EDG inoperability.

CAUSE OF EVENT

The cause of the event was the misinterpretation of design inputs as applied to plant operations, i.e., engineering codes and standards, regulatory requirements, licensing commitments, design basis, design criteria, etc. The design basis document clearly identifies each exhaust fan as being a 100% capacity unit and, as a result, the fans in each cell are redundant. While each fan is individually capable of providing 100% of required flow, their associated power supplies are not redundant under all postulated operating conditions or scenarios. The misinterpretation led to the assumption that this redundancy allowed one fan to be out of service indefinitely provided that the "redundant" fan was in service to support EDG operability. The flaw in this assumption lies in the fact that the emergency power supply for the redundant fan may be a redundant EDG. The redundant EDG would be subject to a postulated single failure during a DBA. If that redundant EDG fails to start, then the EDG relying on only one fan would also be unable to perform its design basis function due to a lack of room ventilation. This condition would be outside of the plant's Technical Specifications. The single failure requirement may be modified on entering an LCO condition with a defined allowed outage time, in this case 72 hours per the plant's Technical Specifications, anytime an exhaust fan was out of service. Exhaust fan 318 was tracked via the LCO tracking log index; however, the LCO duration of 72 hours was not identified, and consequently, was exceeded.

Contributing causes to the event include:

- The difficulty in maintaining configuration control for this design because the support component for one EDG relies on the operability of another EDG. The design basis traditionally treats the EDGs as totally redundant and independent components, but for the ventilation, they are not completely independent.

- An inadequate understanding of the system design exists in examining only the fan's capacity for redundancy and not the redundancy/independence of the power supplies for the fans. In the Design Basis Document, NYPA misapplied the redundancy term when defining the allowable limits for system operation.

CORRECTIVE ACTION

The following corrective actions have been or will be performed to address the deficiencies identified during the investigation of this event and to prevent recurrence:

- SOP-RPC-8, "Removal of Safety Related Equipment From Service," was revised to include appropriate guidance regarding the removal of EDG exhaust fans from service with respect to other equipment required to remain in service, allowed outage times, and action levels if the conditions are not met. This will ensure that there are no misinterpretations of the design criteria and how it applies to the conditions required for EDG operability and conformance with the plant's Technical Specifications. Revision 13 of SOP-RPC-8 was approved August 23, 1995.

- Modify the exhaust fan's power supplies such that each EDG supplies emergency power to the exhaust fans that are supporting its operation. This will alleviate the difficulty in maintaining configuration control when removing the fans or EDG from service. The power feeds for EDG Exhaust fans will be modified such that each set of fans will be fed from the power supply fed by the associated EDG. This modification is currently planned for completion in 1997.

- Revise DBD-315, "Emergency Diesel Generator Building Heating and Ventilation System," to clarify the redundancy/independence of the power supplies for the fans. A change notice to revise DBD-315 will be complete December 31, 1995.

- A review and evaluation will be performed of safety related power distribution equipment to determine if there is other equipment that could be affected by the loss of a supportive Heating, Ventilation, and Air Conditioning (HVAC) system component, specifically including the effects of redundancy and independence. The review and evaluation will be completed by March 31, 1997.

- The appropriate administrative controls will be revised to ensure that EDG 32 and EDG 33 remain operable during cold shutdown to meet Technical Specification 3.7.F until the modification to the power supplies removes the operability concerns. The appropriate administrative controls will be revised by February 20, 1997.

- The safety significance of having 3 EDGs inoperable during cold shutdown will be assessed and this LER revised as required. The supplement if required will be issued by February 15, 1997.

ANALYSIS OF EVENT

This event is reportable under 10 CFR 50.73 (a)(2)(i)(B). The licensee shall report any operation or condition prohibited by the plant's Technical Specifications. A condition was discovered where the minimum number of EDGs were not operable. This is because room exhaust fan 318 for EDG 33 was removed from service for maintenance for a time longer than permitted by Technical Specification 3.7.B.1 (72 hours). Specification 1.5 defines "operable" and considers the availability of necessary support systems for operability. EDG 33 was available for operation if exhaust fan 319 was operable. If exhaust fan 319 was made inoperable due to a postulated single failure (EDG 32), then only one EDG would be operable during the design basis event. Initially, EDG 33 would be functional but after a period of time it would overheat. EDG 31 would then be vulnerable to overheating also because without EDGs 32 and 33, EDG 31 has no ventilation fans. Two EDGs are required to mitigate the consequences of a design basis event by supplying power to the minimum loads needed to bring the plant to and maintain it in the cold shutdown condition. Technical Specification 3.7.A requires that the reactor shall not be brought above the cold shutdown condition unless three (3) EDGs are operable.

The plant was in violation of Technical Specifications 3.7.B.1 which allows the requirements of Technical Specification 3.7.A to be modified to allow one diesel to be inoperable for up to 72 hours. Indian Point 3 (IP3) was in a condition prohibited by this requirement when EDG 33 room exhaust fan 318 was out of service for maintenance from July 10, 1995, at 1805 hours to July 17, 1995, at 1200 hours, a total of approximately 162 hours. This condition also occurred during the time period between June 19, 1995, at 1730 hours to June 26, 1995, at 0850 hours, a total of approximately 159 hours, when EDG 31 room exhaust fan 314 was out of service. The plant was in the hot standby condition during this latter time period.

Additionally, Technical Specification 3.7.F.4 requires that under all conditions, including cold shutdown, a minimum of two diesel generators be operable. IP3 was in a condition prohibited by this requirement on several occasions during the time period between October 1993 and March 1995 when the plant was in the cold shutdown condition. (Prior to October 1993, the occurrence of this condition could not be determined because inadequate records exist.) This condition occurred when an EDG was relying on one operable fan to support its operability and the EDG that supplied emergency power for the redundant fan was removed from service for maintenance. During these conditions, the plant would be unable to support a single failure and maintain the minimum required EDGs. For example, during the time between February 27, 1995, and March 27, 1995, fan 314 was out of service and fan 315 was supporting 31 EDG.

A condition also existed whereby all three (3) EDGs could have been rendered inoperable. If a Loss of Offsite Power (LOOP) occurred during a time EDG 32 or EDG 33 was out of service, a postulated single failure of the EDG remaining in service (either EDG 32 or EDG 33) could result in the consequential failure of EDG 31 since there would be no power supply to the EDG 31 room exhaust fans. Therefore, during that time, a condition existed whereby all (3) EDGs could have been potentially rendered inoperable.

LER 95-015-00 identified this condition for the period between February 27, 1995 at 1345 hours to March 5, 1995, at 1105 hours, approximately 142 hours when 32 EDG was taken out of service for maintenance. A review identified three other LERs where the condition existed.

LER 93-019-01 identifies EDG 33 as out of service from May 10 until August 24, 1993. LER 93-042-00 identifies EDG 32 as out of service from September 2 until October 8, 1993. LER 95-007-00 identifies EDG 33 as inoperable from 0517 hours on March 27 until 1755 hours on March 31, 1995, during which time EDG 32 was also inoperable (from 1425 hours until 1713 hours on March 27, 1995).

A review identified other unreported periods when EDG 32 or 33 was out of service. In 1993, 32 EDG was out of service nine (9) times for approximately 288 hours and 33 EDG was out of service four (4) times for approximately 635 hours. In 1994, 32 EDG was out of service twelve (12) times for approximately 1253 hours and 33 EDG was out of service twelve (12) times for approximately 983 hours. In the first quarter of 1995, 32 EDG was out of service seven (7) times for approximately 192 hours and 33 EDG was out of service five (5) times for approximately 228 hours.

Similar events have been reported in previous Licensee Event Reports (LERs). Events related to EDG ventilation systems that impacted EDG operability have been reported in LERs 95-004, 94-010, 92-017, 92-016, and 92-010. Events affecting operability of the EDGs excluding the ventilation system were reported in LERs 95-007, 93-053, 93-027, 93-024, 93-020, and 93-019. Events regarding ventilation systems that impacted the operability of Engineered Safety Features (ESF) systems excluding the EDGs, were reported in LERs 95-003, 94-009, 94-006, and 93-048. Events reported when procedures or activities did not properly consider Technical specification requirements that impacted EDG operability were reported in LERs 93-042, and 92-016.

SAFETY SIGNIFICANCE

This event had no significant effect on the health and safety of the public.

The plant was designed to safely shut down following a loss of offsite power (LOOP) or a safe shutdown earthquake (SSE) and to mitigate the consequences of a loss of coolant accident (LOCA) considering a LOOP. A single failure is considered in evaluating the ability to meet this design. The condition in which one of the EDG rooms' exhaust fans were out of service during power operation for a period of time that exceeded the Technical Specification allowed outage time (72 hours) for an inoperable EDG was determined to exist during July 10, 1995, at 1805 hours to July 17, 1995, at 1200 hours, and during June 19, 1995, at 1730 hours to June 26, 1995, at 0850 hours. The condition where the plant would be unable to support a single failure also existed at cold shutdown for the 28 month improvement outage, which started in February 1993, during the following times:

February 9, 1994, at 0520 hours to February 12, 1994, at 1405 hours
March 4, 1994, at 0530 hours to March 5, 1994, at 0600 hours
January 3, 1995, at 0500 hours to January 6, 1995, at 0920 hours*
January 23, 1995, at 0455 hours to January 24, 1995, at 1025 hours*
February 6, 1995, at 1244 hours to February 6, 1995, at 1025 hours*
February, 27, 1995, at 1345 hours to March 5, 1995, at 1105 hours

*per the LCO tracking sheet 94-235, fan 317 was logged as inoperable but as of January 1, 1995, it was considered functional, i.e., the fan was not protectively tagged out.

There was no actual safety significance because there was no loss of ventilation nor was there a design basis accident with a loss of offsite power.

The potential safety significance was assessed for design basis conditions and is discussed as follows. Procedures and equipment exist to safely shutdown the plant following a LOOP. There were two sources of backup power available for plant shutdown. The 10CFR50, Appendix R diesel generator and two gas turbine generators are the backup sources. There are control room procedures to allow the gas turbines to be connected to the 13.8 KV bus. The 13.8 KV bus would feed the 6.9 KV bus and the 480 volt AC buses. At different times either or both of these alternate power sources could have been out of service for maintenance or other reasons.

Postulating a LOCA with a LOOP while exceeding the Technical Specification allowed outage time for the room exhaust fan for 33 EDG and assuming a single failure of EDG 32 occurs will result in less than the required minimum number of emergency power sources (i.e., less than two EDGs) due to the failure of EDG 32 and the loss of ventilation and subsequent overheating of EDG 33.

The plant's electrical power arrangement is such that for this reportable condition only the following scenario results in a potential for inadequate onsite emergency power:

- either one of the EDG 31 room exhaust fans (314 or 315) or fan 317 (EDG 32), or fan 318 (EDG 33) are out of service for a period of time that exceeds the Technical Specification allowed outage time for a EDG,
- a LOCA occurs with a LOOP, and
- a single failure results in loss of either EDG 32 or EDG 33.

Any two emergency diesel generators, as a backup to the normal standby AC power supply, are capable of sequentially starting and supplying the power requirements of one minimum required set of engineered safeguards equipment. The EDGs are started on an initiation of safety injection or an undervoltage condition on its own bus. Adequate power could be made available through the use of backup power sources.

During the time period in which the plant was in the cold shutdown condition, a safety injection signal would be bypassed. Additionally, the design basis calculations for the ventilation system assume an outside ambient temperature of 95 degrees F and the EDGs operating at 110% load (1950 KW). Diesel loading with associated heat generation during an accident at cold shutdown is significantly less than the design basis loading. Therefore, room heatup rates would have been less than design giving the operators more time to respond. Additionally, the instances at cold shutdown where the Technical Specification 3.7.F.4 requirement could not be met were between January and March, and the ambient temperatures were significantly lower than the assumed design basis temperature. This would have greatly reduced the possibility of the EDG overheating as a result of a total loss of ventilation. This was demonstrated during the loss of offsite power which occurred on February 27, 1995 (LER 95-004-00). EDG 31 was operating at approximately 800 KW - 1000 KW and its fan 314 did not start automatically as expected. Fan 315 did not have a power supply because EDG 32 was out of service for maintenance. It was approximately 30-40 minutes into the event when it was noted that the temperature in EDG 31 cell was approaching the alarm setpoint (115 degrees F). Operators were able to manually start the fan precluding the actuation of the alarm and maintaining ambient conditions well within the allowable limits. Although the design basis calculations and analyses indicate that the rate of rise for the EDG rooms ambient temperature during worst case conditions is extremely fast, this event indicates that it is greatly mitigated during relaxed conditions.

Technical Specification 3.7.F.4 requires a minimum of two operable EDGs while the plant is in the cold shutdown condition. A postulated loss of offsite power coincident with the loss of an EDG would have been mitigated with the available EDG or with an available backup power source (10CFR50 Appendix R diesel generator or gas turbines).

A probabilistic risk based assessment was performed to evaluate the impact of an extended outage of EDG 33 exhaust fan 318. The unavailability of EDG 33 without exhaust fan 318 is 8.92 x 10E-02, a 1.7% increase from the base value of 8.77 x 10E-02. The impact of this increase on core damage frequency was found to be negligible. The sensitivity analysis performed for this scenario based on the probabilistic risk assessments of the IP3 Individual Plant Examination concluded that there is no measurable increase in core damage frequency; therefore, there is no significant impact on safety.