

Indian Point 3  
Nuclear Power Plant  
P.O. Box 215  
Buchanan, New York 10511  
914-736-8000



April 1, 1996  
IPN-96-041

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  
Licensee Event Report # 96-006-00  
**Two Emergency Diesel Generators Were Declared Inoperable in  
Hot Shutdown Due to a Leaking Lube Oil Header Check Valve; A  
Condition Outside the Design Basis of the Plant**

Dear Sir:

The attached Licensee Event Report (LER) 96-006-00 is hereby submitted as required by 10CFR50.73. This event is of the type defined in 10 CFR 50.73 (a)(2)(ii)(B) and is also reportable under 10 CFR 50.73 (a)(2)(i)(B).

Also, attached are the commitments made by the Authority in this LER.

Very truly yours,

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

Attachment

cc: See next page

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9604080162 960401  
PDR ADOCK 05000286  
S PDR

JE22/1

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

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

LIST OF COMMITMENTS

Number	Commitment	Due
IPN-96-041-01	NYPA will evaluate an independent engineering consultant failure analysis on the check valve for EDG 32 and EDG 33.	April 30, 1996.
IPN-96-041-02	If specific causes for the valve failure are identified, a supplemental LER will be provided to the NRC.	June 30, 1996.

**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) Indian Point Unit 3		DOCKET NUMBER (2) 05000286	PAGE (3) 1 OF 7
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TITLE (4) Two Emergency Diesel Generators Were Declared Inoperable in Hot Shutdown Due to Leaking Lube Oil Header Check Valves; a Condition Outside the Design Basis of the Plant

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
03	01	96	96	-- 006 --	00	04	01	96		05000
										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)	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)	<input checked="" type="checkbox"/> 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)	<input checked="" type="checkbox"/> 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 Anthony Vitale, Maintenance Supervisor	TELEPHONE NUMBER (Include Area Code) (914) 736-8632
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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).	<input checked="" type="checkbox"/> NO				

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

On March 1, 1996, with the plant in the hot shutdown condition, Emergency Diesel Generator (EDG) 32 was discovered to have a leaking lube oil header check valve rendering EDG 32 inoperable. EDG 33 was in a 72 hour Limiting condition for Operation (LCO) as a result of being inoperable from a leaking lube oil check valve discovered the previous day. Operations determined that the Technical Specification LCO was not met and reported a one hour non-emergency notification that the condition was outside plant design basis. Operations also determined that two EDGs inoperable was a condition prohibited by Technical Specifications. The diesel engine oil lubrication system contains a check valve in lines off the main oil header to the engine head. As a result of the leaking lube oil header check valve, oil from the prelube pump was discharged into the engine head valve area. Lube oil leakage into the engine cylinders during standby conditions could result in hydraulic lock upon engine start. The cause of the check valve leakage was a failure to fully seat. Preliminary investigations did not indicate any defect or problem with the valve. Corrective actions include performance of a failure analysis on the valves by an independent engineering consultant, revision of plant procedure(s) for the EDGs, and issuance of a shift order. The valves were replaced, testing performed and the EDGs returned to operable status.

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TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)		PAGE (3)
Indian Point Unit 3	05000286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER
		96	-- 006 --	00
				2 OF 7

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

**DESCRIPTION OF EVENT**

On March 1, 1996, at approximately 0345 hours, with the plant in the hot shutdown condition [reactor power at 100 cps, Reactor Coolant System (RCS) temperature at approximately 548 degrees F, RCS pressure at approximately 1950 psig, and pressurizer level at approximately 30 percent], a Shift Manager (SM) on routine rounds discovered the west side of the Emergency Diesel Generator (EDG) {EK} 32 lube oil {LA} header downstream of the system's check valve {V} to the engine head, much hotter than the east side and approximately the same temperature as the piping on the inlet side of the valves. Since the purpose of the check valve is to prevent lube oil flow to the distribution lines to the engine head, the high line temperature indicated the header check valve was leaking by its seat. Operations assessed their findings with Maintenance and Engineering and concluded the valve was leaking and conservatively declared EDG 32 inoperable. Because EDG 33 was also inoperable for the same problem, Operations determined that the LCO for Technical Specification 3.7 was not met. At approximately 0418 hours, a one hour non-emergency event notification (log No. 30049) reported the plant outside design basis.

EDG 33 was out of service because on February 29, 1996, Maintenance discovered (during routine walkdowns) that the lube oil distribution lines downstream of the west header check valve were hot. Maintenance concluded that the check valve was leaking by its seat and notified operations. Operations entered a 72 hour LCO for Technical Specification 3.7, placed the engine control switch in off, initiated a Deviation Event Report (DER) and repair of the valve. In addition, functional testing and hand checking was initiated for EDG 31, EDG 32, and hand checking performed on the 10 CFR 50 Appendix R diesel. Testing for EDG 31 and EDG 32 was completed at approximately 1839 and 2033 hours respectively on February 29, 1996, and EDG 31 and EDG 32 were demonstrated operable. During Operator routine rounds the next day (March 1, 1996), the oil lines for EDG 32 were checked and it was believed to have a leaking lube oil header check valve. When EDG 32 was discovered with the same problem on March 1, 1996, the defective check valve for the lube oil header on EDG 33 had been replaced, the Protective Tagging Order (PTO) cleared and EDG 33 warmed up and ready for functional testing. On March 1, 1996, at approximately 0523 hours, EDG 33 testing was complete. At approximately 0650 hours, EDG 33 was declared operable and the LCO exited. The period of time that two EDGs were declared to be in an inoperable condition was approximately 3 hours. An Engineering and Maintenance assessment of the initiation of leakage of the check valve for EDG 32, after it had been tested and declared operable, concluded that the leakage occurred because the valve failed to seat after testing. The diesel engine was considered inoperable because of the damage potential from accumulated lube oil in the engine cylinders. As a result of a leaking check valve, lube oil was being distributed to the engine head which could then seep into the engine combustion chamber.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR 96	SEQUENTIAL NUMBER -- 006 --	REVISION NUMBER 00	3 OF 7

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

Accumulation of lube oil in the engine combustion chamber could cause damage upon engine start because of hydraulic lockup. The engines for the EDGs are ALCO (A152) Model 16-251-E.

The work request that replaced the valves required removal of the engine head valve covers and removal and cleaning of excess oil. Maintenance observed no excessive oil in the engine upper head valve area for either EDG 32 or EDG 33. The work request also required the engine to be barred over (i.e., rotate crankshaft) with cylinder indicator cocks open. Maintenance observed no leakage of oil or significant findings for EDG 32 but some oil discharge for EDG 33. As a result of the corrective maintenance, Maintenance determined that no significant amount of oil had accumulated in EDG 32 or EDG 33 engine cylinders and the EDG's were actually operable. The check valve that was discovered leaking for EDG 32 is a replacement type, a one-piece carbon steel spring check design with a hard seat, manufactured by Parker-Hannifin (P020), Model Number 24024625 / VCL16P15 Series 20, supplied by Fairbanks Morse (FM) (F010)/ALCO. The check valve for EDG 33 was an original type, a two-piece carbon steel spring check design with a hard seat, Parker-Hannifin Model Number 24024625 / VCL16P15 Series 10, supplied by ALCO.

Maintenance inspected the check valves that leaked and found no indication of dirt or debris or damage to the valve poppet/seat. Review by Maintenance of the assessment results of oil sample analysis required by the monthly functional test indicated no problems with the oil. A review of the maintenance history of these valves did not uncover any problems.

**CAUSE OF EVENT**

The cause of the EDG 32 and EDG 33 lube oil header check valve leakage was the failure of valves to seat. Preliminary investigations discovered no problems with the valves. The specific failure mechanism of the valves is under investigation.

**CORRECTIVE ACTIONS**

The following corrective actions have been or will be performed to address the causes of this event:

- The check valves for the lube oil header on EDG 32 and EDG 33 were replaced, the engine head valve covers removed and cleaned, the engine barred, and the EDG's satisfactorily tested and returned to service. Testing included checking the temperature of the upstream and downstream portions of the lube oil piping. EDG 33 was declared operable on March 1, 1996, at approximately 0650 hours. EDG 32 was declared operable on March 2, 1996, at approximately 0502 hours.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR 96	SEQUENTIAL NUMBER -- 006 --	REVISION NUMBER 00	4 OF 7

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- In order to raise shift personnel awareness an Operations Shift Order was issued from March 11 through March 18, 1996, to inform the operators of the condition where EDG lube oil check valves leak and request a check of the EDG lube oil check valves by "handing" the lube oil lines on the cylinder head side of the check valve and if hot to consider the valve as leaking.
- Term Procedure Changes (TPC) were initiated for Procedure SOP-EL-1, "Diesel Generator Operation," and SOP-EL-13, "Appendix R Diesel Generator Operation," to add a requirement to verify the lube oil check valves have seated by verifying a differential temperature exists across the check valve, and if the check valve is determined not to be seated to notify the Shift Manager immediately. Revision of the procedures will follow in accordance with site administrative procedures.
- The failed check valves for EDG 32 and EDG 33 were sent to an independent engineering consultant for performance of a failure analysis. NYPA's evaluation of the analysis is scheduled for completion on April 30, 1996.
- If specific causes for the valve failure are identified, a supplemental LER will be provided to the NRC. A supplement to the LER, if required, will be provided by June 30, 1996.

**ANALYSIS OF EVENT**

This event is reportable under 10 CFR 50.73 (a) (2) (ii) (B). The licensee shall report conditions that were outside the design basis of the plant. With two EDGs inoperable, the LCO for Technical Specification 3.7 was not met. The plant design requires two EDGs to mitigate the consequences of a design basis event by starting and supplying the power requirements of one minimum required set of safeguards equipment. The event is also 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.

EDG 32 and EDG 33 were conservatively declared to be inoperable after discovering what was believed to be a leaking lube oil header check valve. Neither Operations nor Engineering knew at that time if oil had actually seeped into the engine cylinders with an amount that could be a potential hazard to the engine. Because of the reporting time requirements for this condition, rather than waiting for additional information to perform an operability determination, the affected EDG was declared inoperable. The plant was also in a condition prohibited by Technical Specification 3.7.A, which requires three EDGs operable above cold shutdown.

**LICENSEE EVENT REPORT (LER)**  
TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR 96	SEQUENTIAL NUMBER -- 006 --	REVISION NUMBER 00	5 OF 7

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As a result of further assessment of the condition, Licensing discovered that because the remaining EDG 31 room exhaust fans (314/415) are supplied power from EDG 33 and EDG 32 respectively, which were declared inoperable, EDG 31 did not have its required support equipment (room ventilation) with power available from EDGs that were declared operable. In addition, as a result of corrective maintenance, Maintenance determined that no significant amount of oil had accumulated in the EDG 32 or EDG 33 engine cylinders, and that EDG 33 had been repaired and warmed up for testing prior to EDG 32 being declared inoperable. Therefore, Maintenance believes EDG 33 could have been available to supply power to a room ventilation fan for EDG 31. LER 95-015-01 identified a corrective action to perform an engineering evaluation to determine the possibility/feasibility of modifying the exhaust fan's power supplies such that each EDG supplies emergency power to the exhaust fans that are supporting its operation. The engineering evaluation was completed by the commitment date of January 15, 1996, concluding that modifying each EDG room exhaust fan's power supplies was feasible.

Similar events have been reported in previous Licensee Event Reports (LERs). A review of LERs over the last three years identified the following: LERs 96-002, 95-015, 95-007, 93-053, 93-042.

**SAFETY SIGNIFICANCE**

This event did not have a significant effect on the health and safety of the public. Technical Specification 3.7.A requires three EDGs to be operable above cold shutdown. This requirement was not met at the time EDG 32 was declared inoperable at approximately 0345 hours and EDG 33 was in an LCO and declared inoperable for the same problem. The plant is designed for a loss of offsite power (LOOP) or 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. Any two EDGs, as a backup to the normal AC power supply are capable of supplying the power requirements of one minimum required set of safeguards equipment. EDG 33 was satisfactorily tested and declared operable at 0650 hours on March 1, 1996, and EDG 32 repaired and declared operable at 0502 hours on March 2, 1996. The period of time that two EDGs were declared to be in an inoperable condition was approximately 3 hours.

There was no actual safety significance because there was no loss of offsite power requiring the operation of the EDGs nor a design basis accident. Normal offsite power is available from one 345 kV feeder and one 138 kV feeder from the Buchanan substation. In addition, offsite power is available from two 13.8 kV underground feeders from the Buchanan substation, two 26 MW gas turbine generators at Buchanan connected to the 13.8 kV underground feeders, and a 21 MW gas turbine generator at the site. Operations verified a 138 kV and 13.8 kV offsite power supply was available. Also, an alternate source of onsite power for safe shutdown loads is available from the 10 CFR 50, Appendix R diesel generator and is required to be operable above cold shutdown.

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TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR 96	SEQUENTIAL NUMBER -- 006 --	REVISION NUMBER 00	6 OF 7

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Although EDG 32 was declared inoperable as a result of suspected oil accumulation in the engine cylinders, subsequent testing proved that no oil had seeped into the engine. In addition, although testing of EDG 33 showed some oil had seeped into the engine cylinders, Maintenance judged the amount was not significant and that EDG 33 could have also functioned as required. Also, the Protective Tagging Order (PTO) for EDG 33 was cleared prior to identification and declaring EDG 32 inoperable. The EDG engine control switch was in the off position for the operators to perform functional testing and the engine had warmed up prior to EDG 32 being declared inoperable. Therefore, Maintenance believes EDG 33 was available after clearance of the PTO and could have supplied power including the ventilation system for EDG 31.

The potential safety significance for design basis conditions is discussed as follows.

The monthly functional test (3PT-M79) requires that the manual start and load be performed in accordance with system operating procedure (SOP-EL-1). The SOP for the diesel generators state that, if lube oil or jacket water is suspected of leaking into the cylinders or the diesel generator is being returned to service following PM or corrective maintenance, per the recommendations of NRC Information Notice 91-62, the engine is to be checked for cylinder liner leakage. The check includes bumping the engine with its cylinder indicator cocks open. Also, the valves are disassembled and inspected or replaced annually under the diesel generator annual inspection (procedure GNR-002-ELC).

Licensing evaluated the reported condition and discovered that the remaining EDG 31 room exhaust fans (314/415) are supplied power from EDG 33 and EDG 32 respectively, which were declared inoperable. Therefore, EDG 31 did not have its required support equipment (room ventilation) powered from an EDG demonstrated operable. The Standard Technical Specifications (STS) 3.8.1 (NUREG-1431), allow a four (4) hour completion time from discovery of the condition concurrent with inoperability of the redundant required features. The period of time EDG 32 and EDG 33 were declared inoperable was three (3) hours, which is within the STS allowed time. However, EDG 33 was repaired and available for operation. Operator action could have been initiated to start the EDG. In addition, corrective maintenance did not discover any lube oil in EDG 32, and EDG 33 was judged by Maintenance to have no significant oil accumulation. Therefore, it is believed both EDG 32 and EDG 33 could have started without any damage and supplied power including power to the ventilation system for EDG 31. The EDG 31 room ventilation system contains temperature alarms to alert operators to high temperatures. It is believed EDG 31 could have provided decay heat removal by RHR Pump 31, AFW Pump 31, ESW Pump 35 and safety injection by Safety Injection Pump 32.

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
Indian Point Unit 3	05000286	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
		96	-- 006 --	00	

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The EDG's are functionally tested monthly to include a piping inspection. If it is suspected that lube oil is leaking the engine is checked for cylinder leakage in accordance with the EDG System Operating Procedure. The engine is required to be checked for oil in the cylinders prior to returning them to service from quarterly Preventive Maintenance (PM). If a check valve were to leak, the seepage of oil into the cylinder would be expected to be identified during the monthly testing inspection and the cause of the leakage assessed. The quarterly PM would clear the engine of any oil and further assessment performed. Functional testing in the past was acceptable and no engine hydraulic lock damage identified. Therefore, a quarter of a year is considered to be the longest period of time during which the check valve would be inoperable. This duration was considered by Licensing with the frequency of a LOOP (6.8E-2 per year) and a large break LOCA (4.77E-4 per year), as identified in the Indian Point 3 Individual Plant Examination. The combined frequency of a LOOP and a LOCA would be 3.24E-5 per year and with the addition of the failure of the valve per year, Licensing concluded that there was no significant effect on public health and safety.