



FLORIDA POWER & LIGHT COMPANY

APR 1 0 1986

L-86-157

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

Gentlemen:

Re: Reportable Event 86-06  
St. Lucie Unit 2  
Date of Event: March 12 1986  
Both Diesel Generators Out of Service Due to Mechanical Failures

The attached Licensee Event Report is being submitted pursuant to the requirements to 10 CFR to provide notification of the subject event.

Very truly yours,

*C. O. Woody*  
C. O. Woody  
Group Vice President  
Nuclear Energy

COW/PLP:de

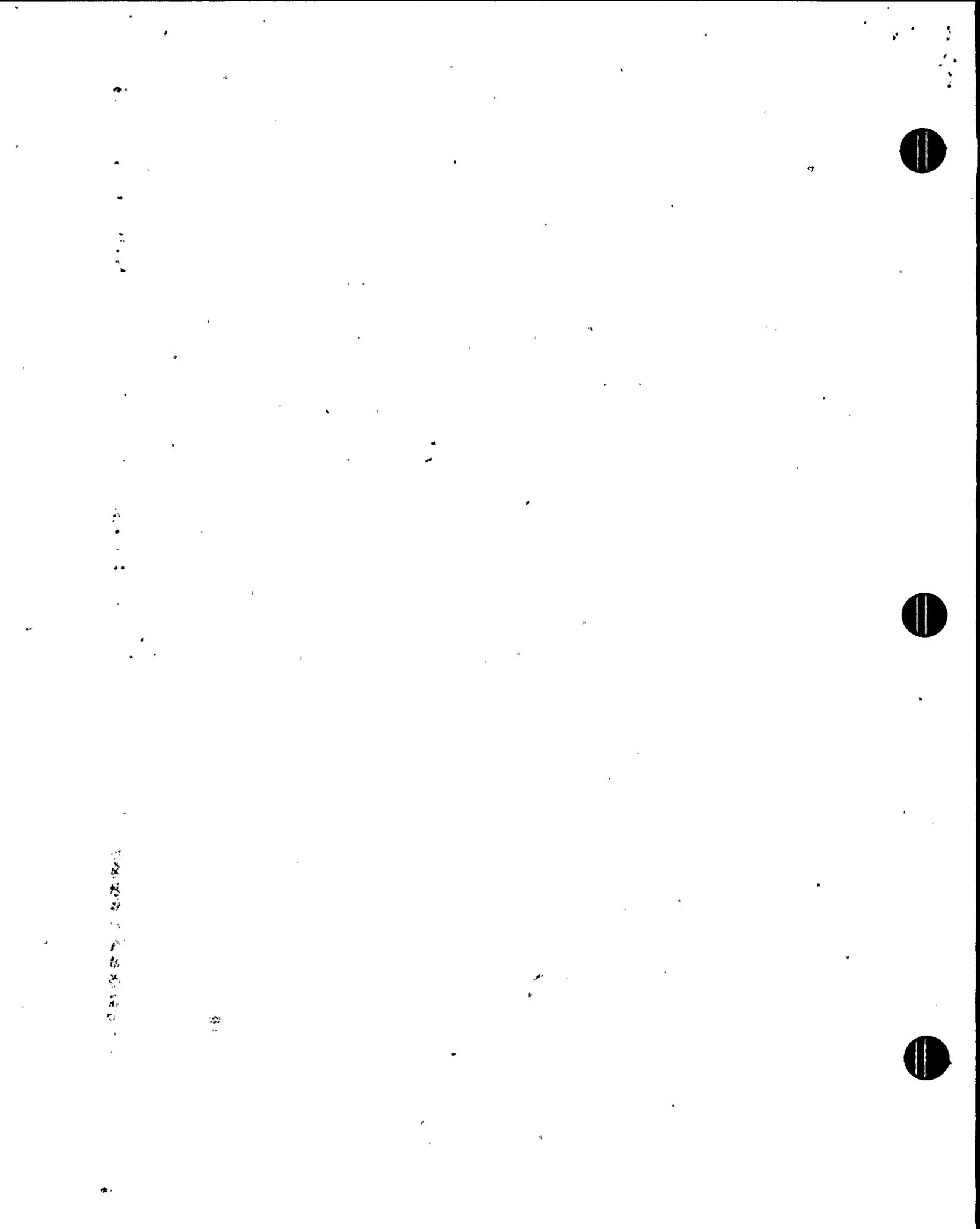
Attachment

cc: Dr. J. Nelson Grace, Region II, USNRC  
Harold F. Reis, Esquire  
PNS-LI-86-114

8604150428 5pp.

L6:1

L-86-157		No. of Copies 44		04/14/86	
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) St. Lucie, Unit 2	DOCKET NUMBER (2) 0   5   0   0   0   3   8   9	PAGE (3) 1 OF 04
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TITLE (4)  
Both Diesel Generators Out of Service Due to Mechanical Failures.

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)							
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES							
0	3	1	2	8	6	8	6	0	4	1	0	8	6	N/A		
									DOCKET NUMBER(S)							
									0   5   0   0   0							

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)									
POWER LEVEL (10) 1   0   0	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(e)	<input type="checkbox"/> 60.73(a)(2)(i)-(v)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.406(a)(1)(i)-(d)	<input type="checkbox"/> 60.38(a)(1)	<input checked="" type="checkbox"/> 60.73(a)(2)(i)-(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.406(a)(1)(i)-(h)	<input type="checkbox"/> 60.38(a)(2)	<input type="checkbox"/> 60.73(a)(2)(i)-(v)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.406(a)(1)(i)-(m)	<input type="checkbox"/> 60.73(a)(2)(i)-(i)	<input type="checkbox"/> 60.73(a)(2)(i)-(v)(A)							
	<input type="checkbox"/> 20.406(a)(1)(i)-(p)	<input type="checkbox"/> 60.73(a)(2)(i)-(n)	<input type="checkbox"/> 60.73(a)(2)(i)-(v)(B)							
<input type="checkbox"/> 20.406(a)(1)(i)-(v)	<input type="checkbox"/> 60.73(a)(2)(i)-(w)	<input type="checkbox"/> 60.73(a)(2)(i)-(v)								

LICENSEE CONTACT FOR THIS LER (12)

NAME Dave Williams, Shift Technical Advisor	TELEPHONE NUMBER AREA CODE: 310 5   461 51 -1315 1510
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

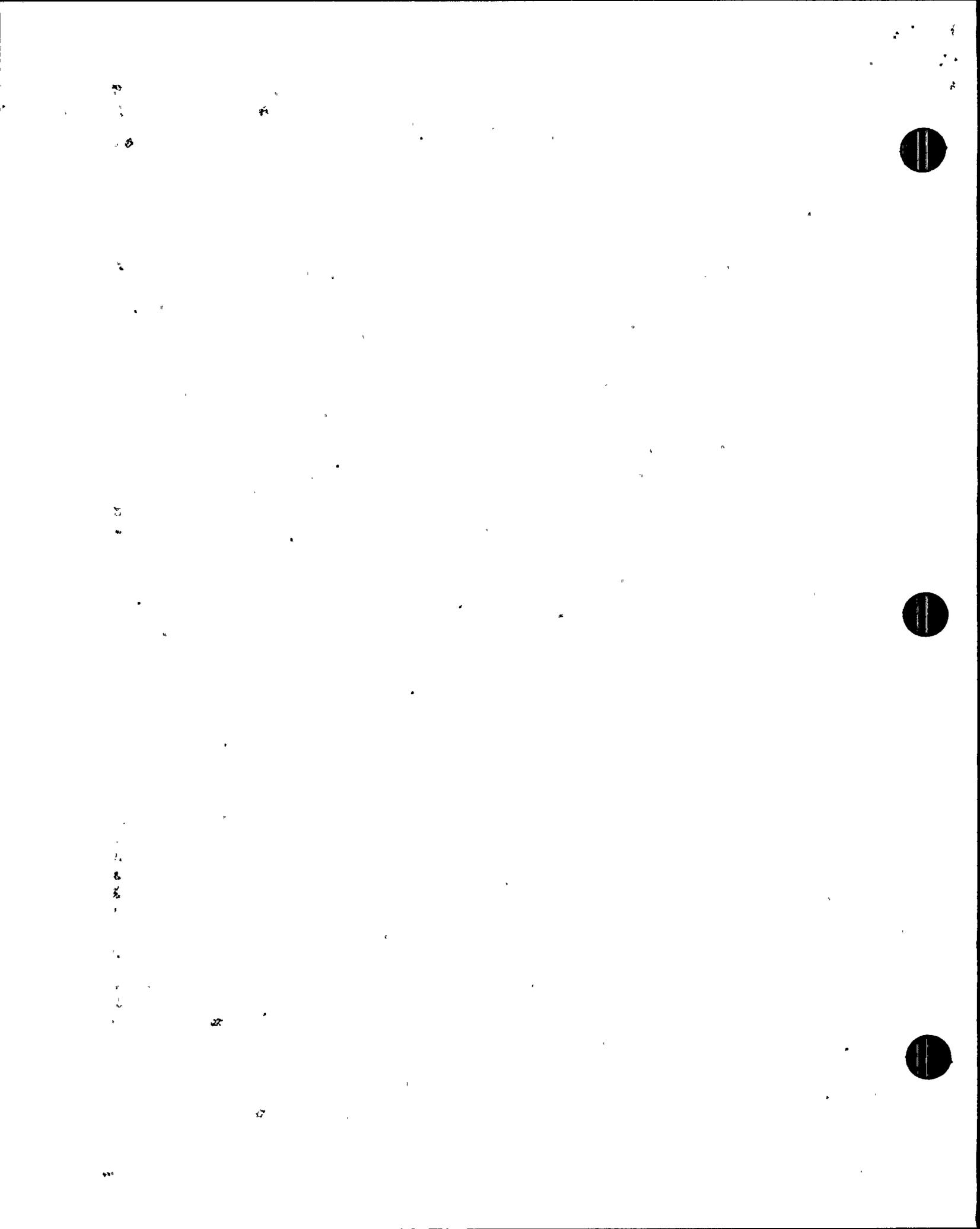
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC
X	EK	6151	W121910	Y					
X	EK	FA1N	X191919	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15) MONTH:   DAY:   YEAR:
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

On March 10, 1986, while Unit 2 was at full power, the 2B Emergency Diesel Generator (D/G) was taken out of service to repair an idler pulley wheel on the belt-driven engine cooling fan. On March 12, while performing a required operability surveillance on the redundant 2A D/G, one of the two engines in the diesel generator set failed to start. Repairs on the 2B D/G were completed and the unit was returned to operable status within the time limit allowed by the applicable Technical Specification. The damage to the idler pulley is believed to be related to a belt flapping problem which has been observed on the 12-cylinder engines in the D/G set. The failure of the 2A D/G was caused by a loose locknut in a friction clutch assembly which operates the mechanical governor used for engine startup. The event was mitigated by the fact that offsite power was available throughout the event, and the fact that the time both diesels were inoperable did not exceed the two (2) hour limit allowed by Technical Specifications. Corrective actions were to repair both diesels and inspect the remaining idler pulley wheels on the diesels for similar failures. The friction clutches on the remaining engine governors will be inspected during the Unit 2 refueling outage which is scheduled for April 1986. The failure of each diesel generator set was unrelated.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
St. Lucie, Unit 2	0   5   0   0   0   3   8   9	8   6	-   0   0   6	-   0   0	0   2	OF 0   4

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

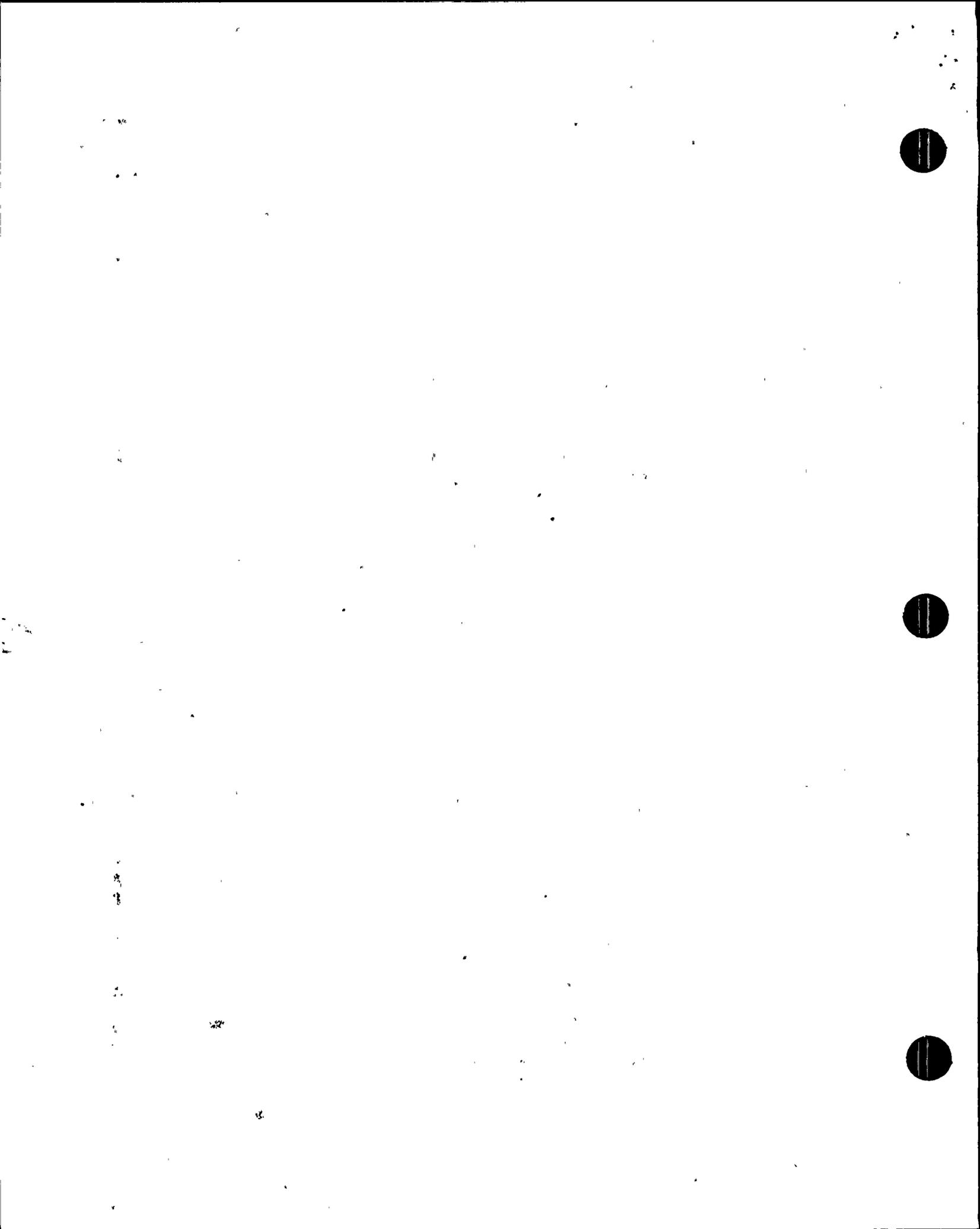
EVENT DESCRIPTION

On March 10, 1986, an engineer inspecting the cooling water system (EIIS:LB) for the 2B Emergency Diesel Generator (D/G) (EIIS:EK) noticed failed bolts on a idler pulley wheel for one of the belt-driven engine cooling fans for the 12-cylinder engine. Of the four bolts holding the pulley onto a mounting bracket, one was sheared and the others were loosened. Unit 2 was operating at full power at the time of discovery. At 1410 hours, the 2B D/G was removed from service for repair and the unit entered a 72 hour ACTION statement in accordance with Technical Specifications. The redundant 2A D/G was demonstrated operable within one (1) hour and once per eight (8) hours thereafter. Difficulties in accessing the idler pulley delayed repair of the diesel until the morning of March 12.

At 0637 hours on March 12, the 2B D/G was started locally for post-maintenance testing. Following this testing, the diesel was stopped and allowed to cool to ambient conditions as required by the operability surveillance. It was also necessary to add oil to the engine sump at this time. At 1214 hours, the 2A D/G was started for an operability check. An alarm was received which indicated that one of the engines in the 2A D/G set had failed to start. The D/G sets installed in Unit 2 are General Motors-EMD 645-E4 units. Each set consists of a 16-cylinder and 12-cylinder engine mounted in tandem driving a single generator. The engine fail-to-start alarm is actuated by high differential temperature between the turbocharger exhausts of the engines in the D/G set. Local observations indicated that the 12-cylinder engine (designated 2A2) was receiving insufficient fuel flow and the 16-cylinder engine was carrying the entire electrical load. At 1222 hours, the 2A D/G was stopped. In accordance with ACTION (e) of Technical Specification 3.8.1.1, the operability of offsite power sources was verified and immediate actions were undertaken to refill the 2B D/G engine oil sump and return this unit to service. At 1238 hours, the 2B D/G was started for its operability surveillance which was successfully completed at 1343 hours. Troubleshooting of the 2A D/G revealed a problem in the mechanical section of the Woodward engine governor which is used for startup. The problem was corrected and the 2A D/G was returned to service at 0438 hours on March 13. Unit 2 remained at full power throughout the event.

CAUSE OF THE EVENT

The root cause of the loose idler pulley bolts on the 2B D/G is believed to be related to excessive flapping of the fan belts which has been observed previously on the 12-cylinder engines. The idler pulleys on the remaining engines were inspected and no similar failures were found. The Maintenance Department is planning to test a modification to the 12-cylinder engines during the next refueling outage which will enhance the ability of the fan belt system to absorb the energy of these belts. If the test is successful, the modification will be made permanent.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)	
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St. Lucie, Unit 2	0 5 0 0 0 3 8 9	8 6	0 0 6	0 0	0 3	OF 0 4

TEXT (if more space is required, use additional NRC Form 306A's) (17)

The root cause of the 2A2 diesel failing to start was a loose component in the mechanical section of the Woodward EGP-B13P engine governor. This governor consists of an electrical section which operates at or near rated engine speed, and a mechanical section which is mainly used during engine startup and shutdown. During startup, a small motor is used to run up the mechanical governor to allow the engine to reach rated speed where the electric governor assumes control of engine speed. This motor operates on the linkage of the mechanical governor by means of a friction clutch. A loose locknut in the friction clutch allowed excessive slippage and prevented the mechanical governor from demanding sufficient fuel flow to pick up load on the engine.

**EVENT ANALYSIS**

The event is reportable under 10 CFR 50.73 (a)(2)(v) as neither diesel generator set was operable between the time the 2A D/G failed and the 2B D/G was returned to service. This condition is allowed for a period not to exceed two (2) hours by Technical Specification 3.8.1.1, provided both offsite power sources are available. Both offsite power sources were operable throughout this event and the time both diesels were out of service was less than two (2) hours.

Although the failed idler pulley was noticed by incidental observation, the failure would have been detected in later surveillances. Failure of the pulley to maintain tension on the cooling fan drive belt would have reduced the ability of the cooling water system to remove engine heat and a diesel trip on high cooling water temperature would have occurred during testing. This automatic diesel trip is bypassed on emergency starts and would not have prevented operation under emergency conditions. It should be noted that there are a total of four cooling fans on each D/G set, two for each engine. The failed idler pulley affected only one of the fans for the 12-cylinder engine, the other fans remained operable. Engine cooling requirements for prolonged operation under emergency conditions would be dependent on the actual electrical load on the D/G set and the ability to manually shift load to the other engine in the set.

Failure of the locknut in the governor friction clutch on the 2A2 diesel was detected during surveillance testing. As was noted previously, this failure only affects the ability of the diesel to reach rated speed, and has no effect once the electric governor assumes control. Conversations with the governor vendor have indicated that this is the first known failure of this type. The friction clutches are supplied as assembled units and are not required to be disassembled and inspected as part of the vendor's recommended preventative maintenance program.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	

TEXT (if more space is required, use additional NRC Form 366A) (17)

CORRECTIVE ACTIONS

The failed idler pulley bolts were replaced on the 2B D/G, Similar pulleys on the remaining engines were checked and found to be satisfactory. The loose locknut on the friction clutch for the 2A2 diesel governor was tightened and the engine retested. Similar components on the remaining engine governors will be inspected during the Unit 2 refuelling outage scheduled to begin in April.

ADDITIONAL INFORMATION

The failure of each diesel generator set was unrelated. The 2A D/G Governor is a Woodward Model EGP-B13P. The 2B D/G fan idler pulley is part of an ES-165 Vertical Cooler assembly designed by the O&M Manufacturing Company.

See LER 389-83-1 for a previous event where both diesel generators were out of service.