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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9104290315 DOC. DATE: 91/04/26 NOTARIZED: NO DOCKET #
 FACIL: 50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
 AUTH. NAME AUTHOR AFFILIATION
 POWELL, D.R. Florida Power & Light Co.
 PLUNKETT, T.F. Florida Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-013-00: on 901212, failure of alternate DC supply occurred. Caused by failed 4A & 4B EDG pilot exciter regulators. 4B EDG returned to vendor for repair & transistor replaced. W/910426 ltr.

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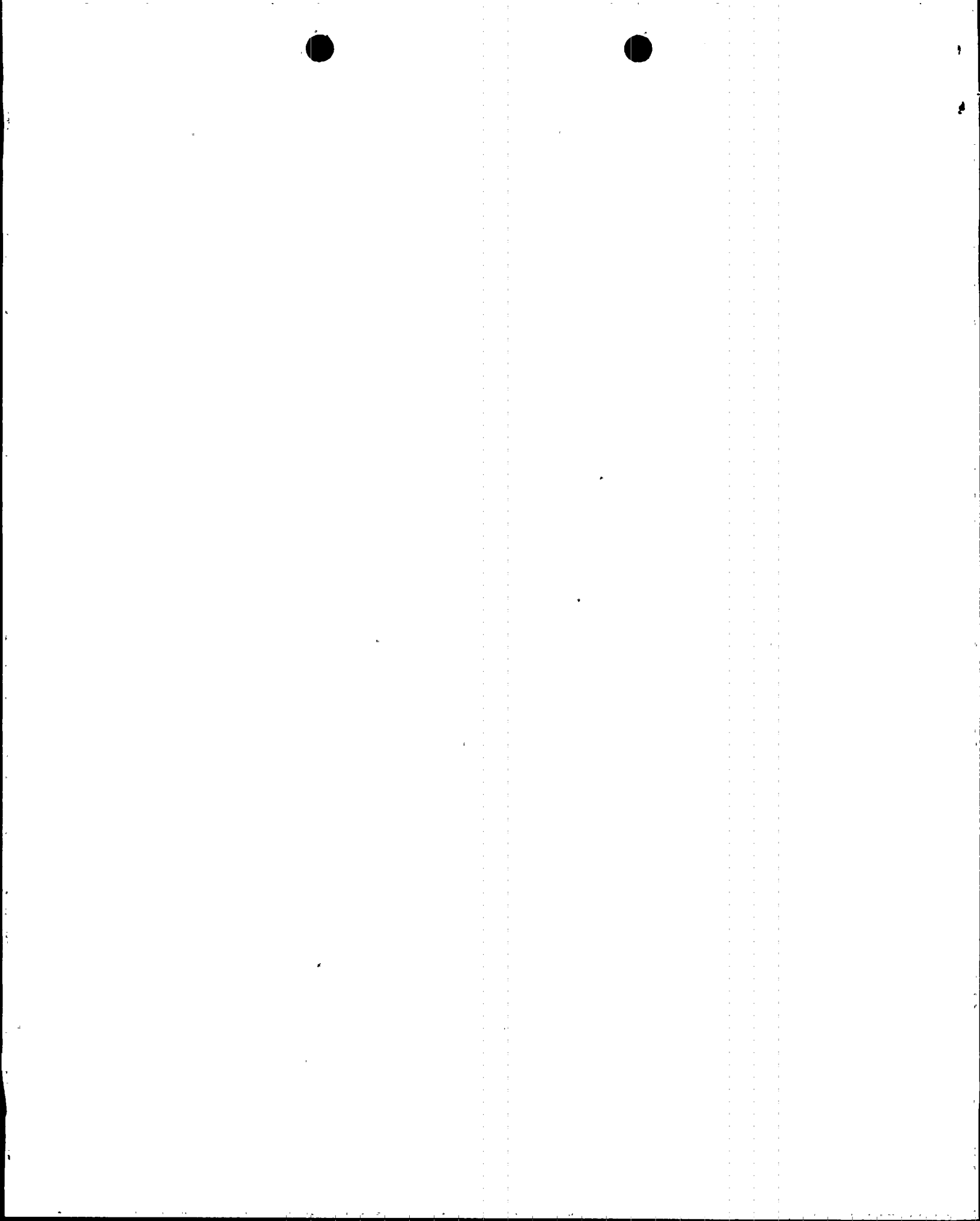
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	NRR/DET/ECMB 9H	1	1	NRR/DET/EMEB 7E	1	1
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	RGN2 FILE 01	1	1			
EXTERNAL:	EG&G BRYCE, J.H	3	3	L ST LOBBY WARD	1	1
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APR 26 1991

L-91-092
10 CFR 50.73

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

Gentlemen:

Re: Turkey Point Unit 4
Docket No. 50-251
Reportable Event: 90-013-00
Date of Event: December 12, 1990
Failures Associated With the 4A and 4B Emergency
Diesel Generators' Pilot Exciter Regulators

The attached voluntary Licensee Event Report 251-90-013-00 is being provided for information purposes only following the guidance provided by NUREG 1022, Supplement 1, Item 19.1.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Nuclear

TFP/DRP/MKA/ma

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

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PDR ADOCK 05000251
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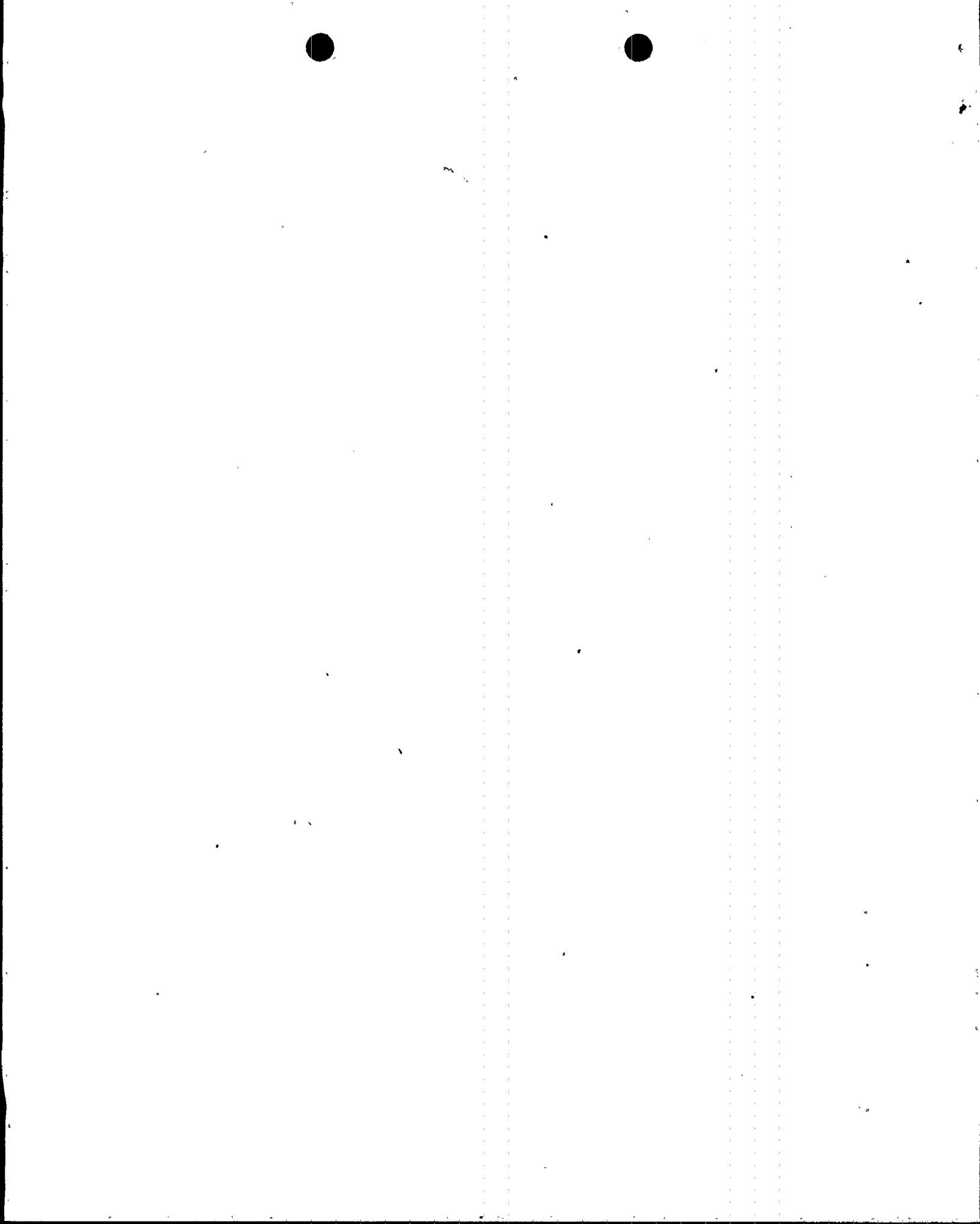
IE22

16



LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) TURKEY POINT UNIT 4										DOCKET NUMBER (2) 05000251			PAGE (3) 1 OF 4		
TITLE (4) Failures Associated With the 4A and 4B Emergency Diesel Generators' Pilot Exciter Regulators															
EVENT DATE (5)				LER NUMBER (6)			RPT DATE (7)				OTHER FACILITIES INV. (8)				
MON	DAY	YR		YR	SEQ #	R#	MON	DAY	YR		NAME				DOCKET # (5)
12	12	90		90	013	00	04	26	91						
OPERATING MODE (9)			N			<u>10 CFR</u> <u>OTHER Voluntary</u> <small>(Specify in Abstract below and in text)</small>									
POWER LEVEL (10)			000												
LICENSEE CONTACT FOR THIS LER (12)															
David R. Powell, Superintendent of Licensing												TELEPHONE NUMBER			
												305-246-6559			
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)															
CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	NPRDS					
A, B	EK	RG	X999	N											
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR	
YES	(if yes, complete EXPECTED SUBMISSION DATE)									NO					
										X					
ABSTRACT (16)															
<p>This voluntary LER is being submitted following the guidance provided by NUREG 1022, Supplement 1, Item 19.1.</p> <p>On December 12, 1990, Turkey Point Units 3 and 4 were shutdown and defueled. During pre-operational testing, the ability of the Emergency Diesel Generator (EDG) 4B to supply alternate 125 VDC control power to the EDG control panel was tested by opening the breaker that provides the normal DC power. A failure of the alternate DC supply to the control panel was experienced. The failure was attributed to the Pilot Exciter Regulator (PER). FPL believes that the PER failed because of prior meggering performed on EDG 4B cabling. Process sheets used during meggering were revised to provide instructions on how to properly megger components to prevent high currents and voltages. On January 23, 1991, with no change in status for Unit 4, the PER in EDG 4A failed after several hours of operation because of a failed transistor. To continue testing, a replacement transistor was installed. Subsequent vendor analysis along with field verification determined that diode D-12 installed across the PER's switching regulator's 28 VDC output was factory installed on EDG 4A with its polarity reversed. This caused it to act as a short circuit across the output. Diode D-12 was reversed restoring correct polarity. No additional corrective actions are deemed necessary by Florida Power & Light to correct the discovered deficiencies.</p>															



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME TURKEY POINT UNIT 4	DOCKET NUMBER 05000251	LER NUMBER 90-013-00	PAGE NO. 02 OF 04
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I DESCRIPTION OF EVENT

A. Emergency Diesel Generator 4B

On December 12, 1990, Turkey Point Units 3 and 4 were shutdown and defueled. During pre-operational testing, the ability of the Emergency Diesel Generator (EDG) 4B to supply alternate 125 VDC control power to the EDG control panel was tested by opening the breaker that provides the normal DC power. A failure of the alternate DC supply to the control panel was experienced. Troubleshooting determined that the loss of the DC supply was caused by a failure of the Pilot Exciter Regulator (PER) (EIIS:EK, Component:RG).

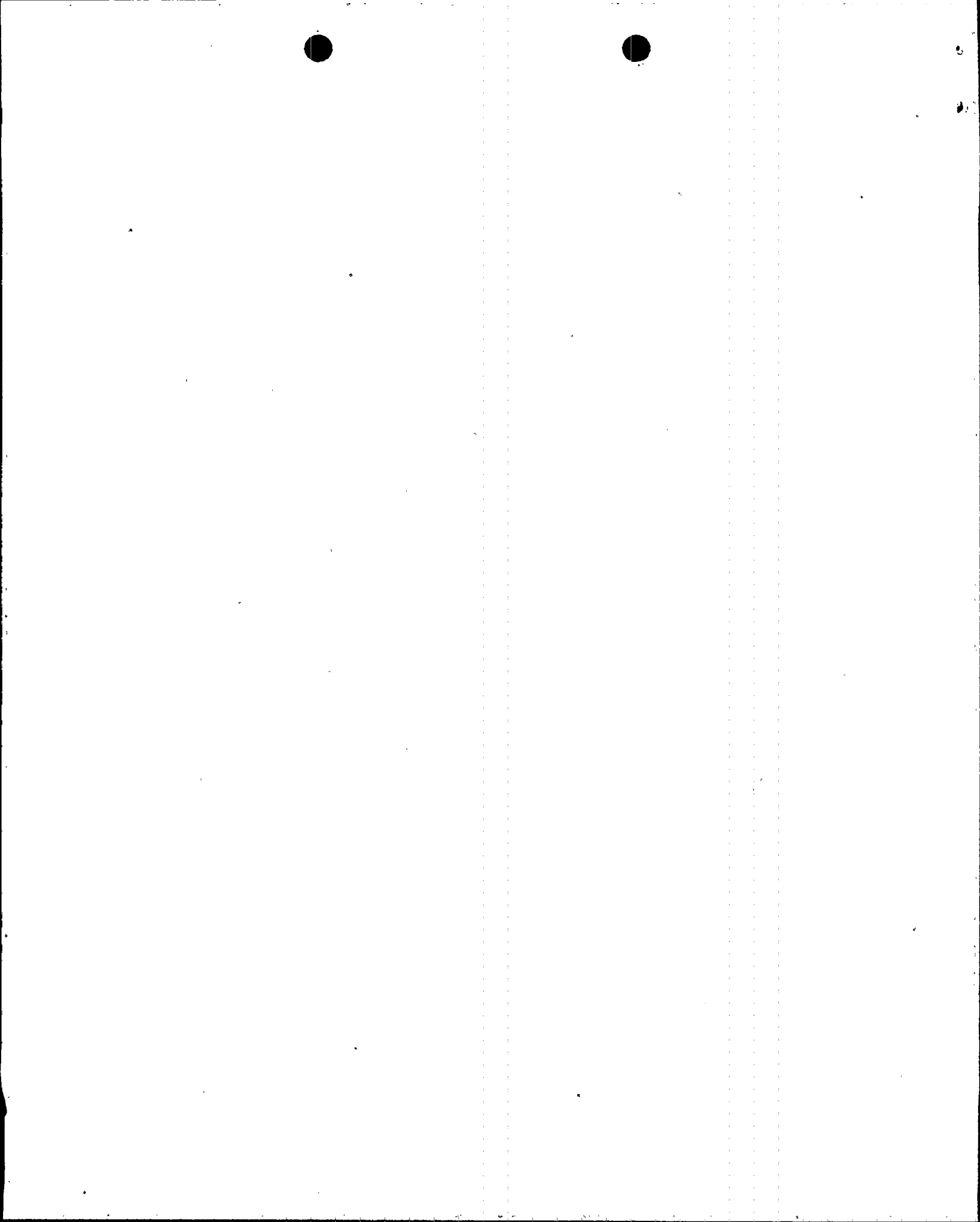
The PER performs two functions. The output of the PER is used to control the field flash relay and provide 28 VDC power to excite the pilot exciter field. The field flash relay selects either the battery field flash modules or the pilot exciter field flash module to power the 125 VDC EDG field. The PER circuit is divided into two sections. The first section is the voltage regulator section and the second section is the switching regulator section. The switching regulator provides approximately 28 VDC excitation to the pilot exciter field. With the field energized the pilot exciter supplies alternate 125 VDC power for the EDG control panel.

To facilitate troubleshooting, the PER from EDG 4A was removed and installed in place of the failed PER for EDG 4B. Testing was performed on EDG 4B to monitor the output of the PER. The 4A PER also failed to provide proper output voltage to the pilot exciter field. The failed PER from EDG 4A was removed from EDG 4B. It was replaced by a spare PER procured from the stores warehouse. This PER operated correctly as designed. After completing testing on EDG 4B, the spare PER was transferred to EDG 4A to allow testing of this unit. The 4A and 4B PERs were returned to the vendor (MKW) for failure analysis and repair.

B. Emergency Diesel Generator 4A

On January 23, 1991, the 4A EDG was undergoing pre-operational testing. After several hours of operation, the spare PER (removed from the 4B EDG after earlier testing of that unit) failed in EDG 4A. The failure was attributed to a failed Darlington high gain transistor located in the switching regulator section. To continue testing, a replacement Darlington transistor from the simulator PER (non-safety grade) was removed and installed in the spare PER. Testing revealed that the PER's Darlington transistor was being subjected to excessive current and heat. After all testing was completed, the replacement Darlington transistor was removed from the spare PER. The spare PER was shipped back to the vendor for repair.

The ability of the PERs to provide alternate DC power was tested subsequent to the identification and correction of the problems associated with EDGs 4A and 4B. The PERs performed satisfactorily.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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II CAUSE OF EVENT

A. Emergency Diesel Generator 4B

The failures of the 4A and 4B PERs were attributed to failed Darlington power transistors located in their respective switching regulator circuits. FPL believes that these failures were caused by meggering, which was performed on EDGs 4A and 4B cabling. The process sheets used during the meggering did not provide specific instructions on lifting lead wires to isolate the electrical components. This would have prevented subjecting the electrical components to high voltages during the test.

B. Emergency Diesel Generator 4A

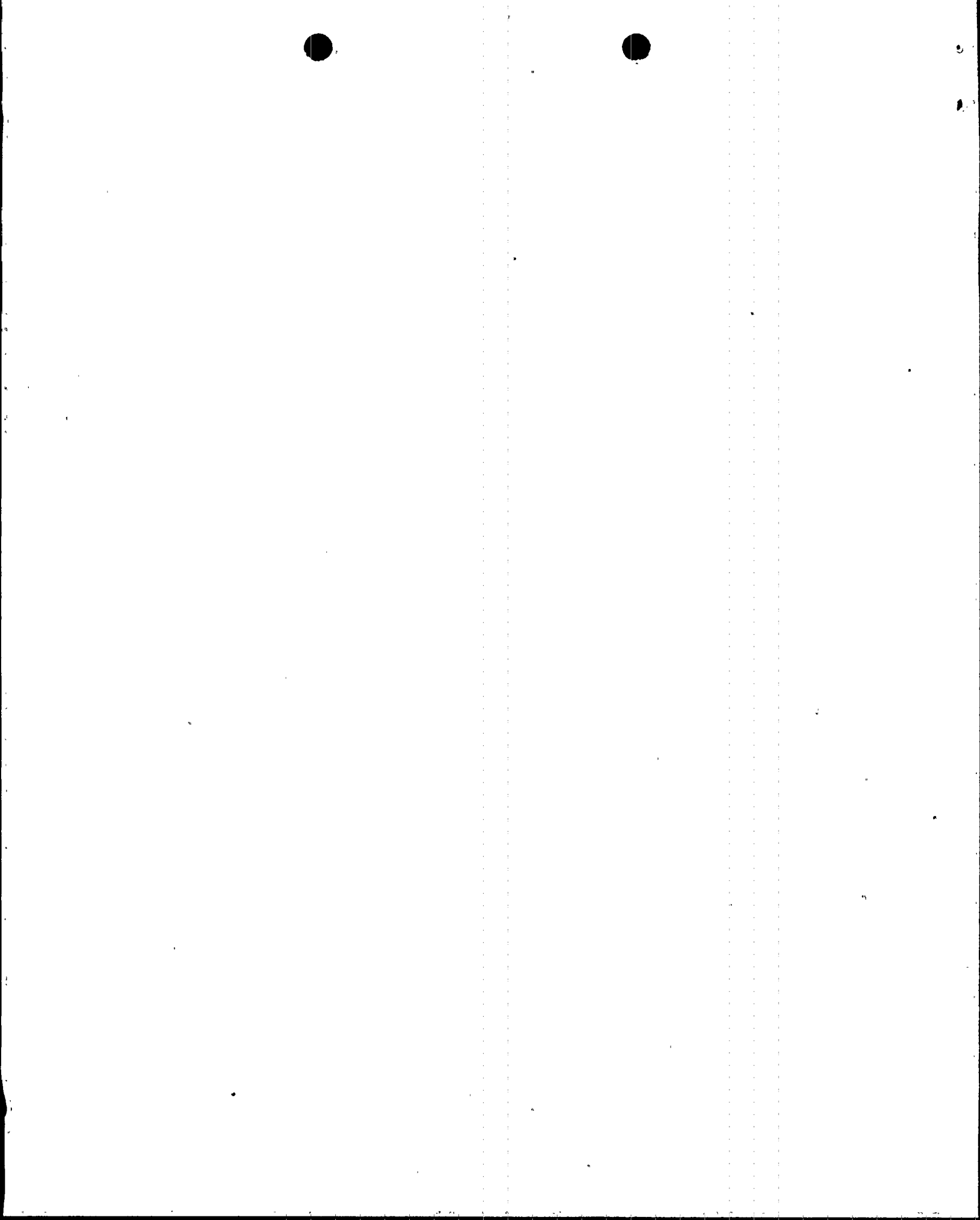
An investigation revealed that the malfunction of the spare PER (with the original transistor installed) while installed in EDG 4A was also caused by a failed Darlington transistor located in its switching regulator circuit. The transistor failed because diode D-12, which is not a component in the PER, had a reversed polarity. Diode D-12 was installed at the factory by the vendor. Factory acceptance testing by the vendor did not detect this condition. The reverse polarity caused the diode to act as a short circuit across the output of the Darlington transistor resulting in excessive current and heat. This eventually caused the transistor to fail. The diode in EDG 4A was reversed to achieve the correct circuit polarity. An inspection of diode D-12 in the EDG 4B PER determined that it was installed with the correct polarity.

III ANALYSIS OF EVENT

The Emergency Diesel Generators (EDGs) are necessary to provide on-site power to required safety related loads during a loss of power to these loads or a loss of off-site power. Both Units 3 and 4 are defueled and EDGs 4A and 4B are not required to support any required equipment during the outage.

The defect was discovered and corrected prior to turn-over of the subject EDG to the plant. Pre-operational inspections and tests were developed to locate infantile problems similar to that discussed above. The tests and inspection are performed before the equipment can be declared operational. Both units 3 and 4 are defueled and EDGs 4A and 4B are not required to support any required equipment.

At the time of this event, with both units defueled, the spent fuel pool cooling was the only load requiring backup power availability. EDGs 3A and 3B were inoperable due to the current Emergency Power Systems Enhancement Project and EDGs 4A and 4B were still undergoing pre-operational and acceptance testing. If off-site power had been lost to Turkey Point Nuclear Power Plant, at this time, the site had available at least two (non-safety) blackstart diesels, which could have been started and connected via a dedicated line to the emergency buses from the C bus in approximately 20 minutes. Thus, the health and safety of the public were not affected by this event.



LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME	DOCKET NUMBER	LER NUMBER	PAGE NO.
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IV CORRECTIVE ACTIONS

- 1) Proper meggering techniques for the EDGs were issued in the revised process sheet. The sheet require cables connected to electrical components be disconnected prior to meggering.
- 2) Vendor MKI is aware of the PER transistor failures caused by the reverse polarity D-12 diode found on EDG 4A.
- 3) The 4B EDG PER was sent to the vendor and returned to the site after undergoing repair and test. The Darlington transistor was replaced.
- 4) The 4A EDG PER was returned to the vendor for repair. The failed Darlington transistor was replaced and the PER tested prior to return to the site.
- 5) After removal of the simulator's transistor, the spare PER was returned to the vendor for repair. Following replacement and testing of the new Darlington transistor by the vendor, the PER was returned to the site.
- 6) The reversed diode D-12 on EDG 4A, was removed. The diode was installed with the correct polarity.

V ADDITIONAL INFORMATION

No similar LERs of this nature have been identified.

