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FACIL:50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 94-006-00:on 941130,Unit 4 tripped automatically.Caused by failure of flexible link connection between main generator B phase bus & associated isolated phase bus bar. All bolts on flexible link checked.W/941213 ltr.

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L-94-311
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: 94-006-00
Automatic Reactor Trip Due to Main Generator Ground

The attached Licensee Event Report, 251/94-006-00, is being provided in accordance with 10 CFR 50.73(a)(2)(iv).

If there are any questions, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Plant

jek

enclosure

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Thomas P. Johnson, Senior Resident Inspector, USNRC, Turkey Point Plant

JE22

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
TURKEY POINT UNIT 4	05000251	1 OF 3

TITLE (4)
AUTOMATIC REACTOR TRIP DUE TO MAIN GENERATOR GROUND

EVENT DATE (5)			LER NUMBER(6)			RPT DATE (7)			OTHER FACILITIES INV. (8)	
MON	DAY	YR	YR	SEQ #	R#	MON	DAY	YR	FACILITY NAMES	DOCKET # (S)
11	30	94	94	006	00	12	13	94		

OPERATING MODE (9)	1	10 CFR 50.73(a)(2)(iv)
POWER LEVEL (10)	100%	

LICENSEE CONTACT FOR THIS LER (12)

	TELEPHONE NUMBER
J. E. Knorr, Regulation and Compliance Engineer	305-246-6757

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	NPRDS?	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	NPRDS?
A									

SUPPLEMENTAL REPORT EXPECTED (14) NO ☒ YES ☐	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
(if yes, complete EXPECTED SUBMISSION DATE)				

ABSTRACT (16)

On November 30, 1994, Unit 4 tripped automatically because of the failure of a flexible link connection between the main generator B phase bus and its associated isolated phase bus bar. The flexible link came loose and grounded against the isolated phase bus duct work causing a generator lockout, turbine trip and automatic reactor trip. At the time of the trip Unit 4 was in Mode 1 operating at approximately 100% power. All systems responded as expected to the automatic reactor trip.

I. DESCRIPTION OF THE EVENT

On November 30, 1994, at 1542, Unit 4 tripped automatically because of the failure of a flexible link connection between the main generator B phase bus and its associated isolated phase bus bar. Unit 4 was in Mode 1 operating at approximately 100% power steady state operation. When the connection failed, the flexible link fell against the adjacent isolated phase bus duct thereby grounding that phase, causing a main generator ground, generator lockout, turbine trip and an automatic reactor trip. All safety systems responded as expected to the reactor trip. Reactor trip recovery actions were completed in accordance with procedure 4-EOP-E-0, Reactor Trip or Safety Injection.

The ground current was limited due to the design value for the ground circuit for the main generator. Therefore, no damage occurred to the bus work or the isolated phase bus.

The NRCOC was notified at 1648 on November 30, 1994. This event is being reported in accordance with 10 CFR 50.73(a)(iv), as an automatic actuation of the reactor protection system.

II. CAUSE OF THE EVENT

The cause of the failure of the flexible link connection was a personnel error resulting in an inadequate torque of the bolted connection. The required torque for the connection was 40 foot-pounds. These connections were disconnected, cleaned and reinstalled as part of the maintenance scheduled for this equipment during the recent refueling outage. After the trip, one flexible link was found fallen away from the bus and touching the isolated phase bus ductwork. Five bolts on the north face of the B phase of the generator bus were found loose.

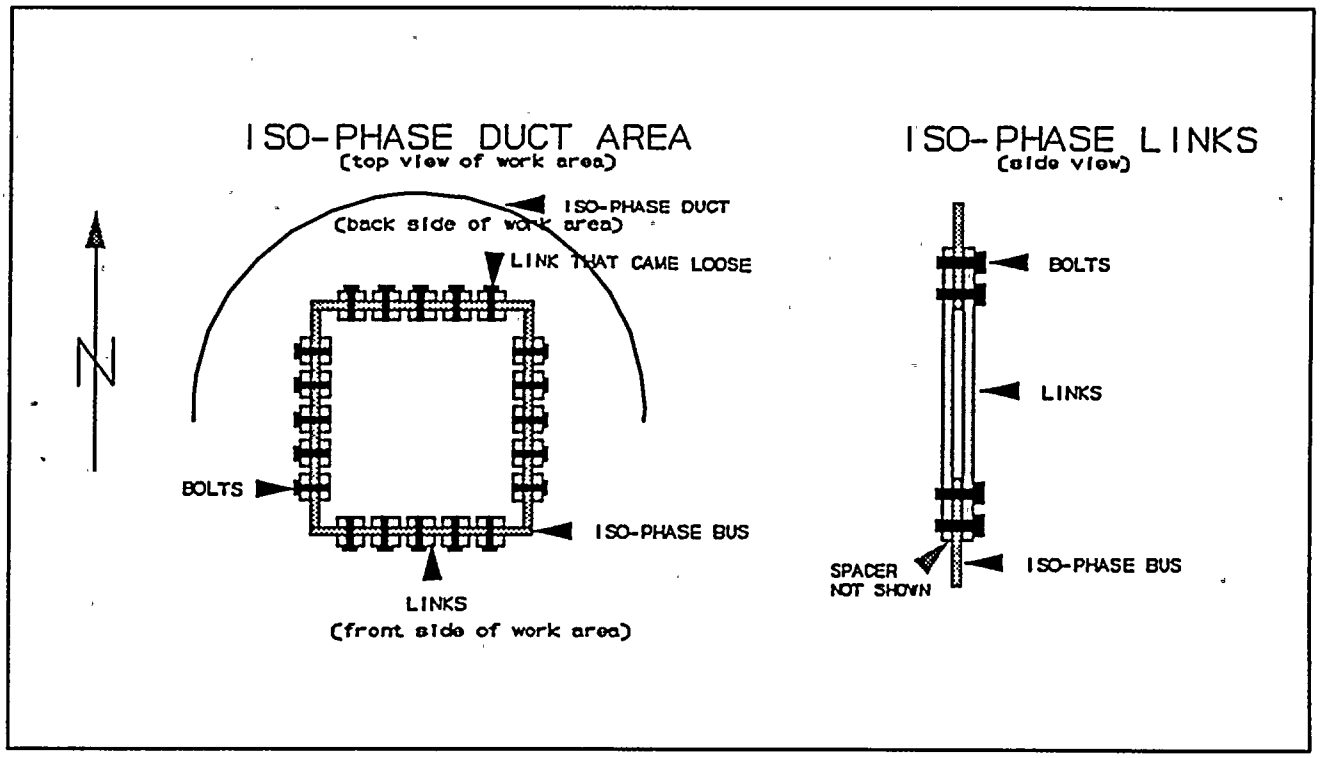
Procedure 0-PME-090.1 Power Generator Grounding For Safety and Testing Preparation, was used as work control for the flexible link removal and reinstallation. This work control was not adequate to ensure all flexible link connections were retorqued to 40 foot pounds. A contributor to the event was more than one worker completing torquing of the bolts on the B phase flexible links without verification of each link during the process. The A and C phases were each completed by one worker.

III. ANALYSIS OF THE EVENT

System Description

The main generator output voltage at Turkey Point Unit 4 is a nominal 22 kV. The grounding circuit of the main generator and isolated phase bus is designed to limit current during a ground fault. A primary main generator ground neutral relay monitors the generator ground neutral which is connected through a transformer and resistor between ground and the neutral of the wye connected generator. A secondary generator ground relay monitors voltage phase imbalance on the generator output to indicate a ground by sensing the change in the phase voltages when a ground is present on any of the phases of the generator. Both relays actuated as expected for an actual generator ground. These relays initiate a generator lockout. As discussed above, this relay operation ultimately results in an automatic reactor trip.

Each output phase of the main generator is connected to its associated isolated phase bus by a series of 20 pairs of flexible links. Each pair of links is installed back to back and requires two bolts at each end to connect it to the main generator bus at one end and the isolated phase bus on the other. Each bolt must be torqued to 40 foot-pounds. A total of 240 bolts are required to complete the installation of all flexible links between the each of three phases of the main generator buses and their associated isolated phase bus.



Safety Analysis

The UFSAR analysis for a transient of this type assumes a total loss of load without a direct or immediate reactor trip. In this event, a reactor trip occurred upon receipt of the turbine trip. The UFSAR conclusion was that this event poses no hazard to the integrity of the reactor coolant system and steam system.

No other engineered safety systems or reactor protection systems actuated or were required to actuate during or after the trip. Therefore, the health and safety of the public were not affected.

IV. CORRECTIVE ACTIONS

1. All 240 connecting bolts on the main generator flexible links were checked for proper torque.

2. The main generator was megger tested with satisfactory results.

3. The procedure used to install the main generator flexible links will be reviewed to determine necessary work process improvements. These improvements, if necessary, will be completed prior to the next outage requiring work on these links.

V. ADDITIONAL INFORMATION

EIIS Codes are shown in the format [EIIS SYSTEM: IEEE component function identifier, second component function identifier (if appropriate)].

No other LERs were issued during the past two years for a personnel error caused reactor trip.