CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9706030019 DOC.DATE: 97/05/22 NOTARIZED: NO DOCKET #
FACIL:50-251 Turkey Point Plant, Unit 4, Florida Power and Light C 05000251
AUTH.NAME AUTHOR AFFILIATION
MOWREY,C.L. Florida Power & Light Co.
HOVEY,R.J. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-002-00:on 970423,automatic reactor tripped.Caused by actuation of turbine overspeed protection circuit. Administrative procedures governing inadequate work controls will be revised to capture lessons learned.W/970522 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 7
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 PD	1	1	CROTEAU,R	1	1
INTERNAL:	~~AEOD/SPD/RAB~~	2	2	AEOD/SPD/RRAB	1	1
	FILE CENTER	1	1	NRR/DE/ECGB	1	1
	NRR/DE/EELB	1	1	NRR/DE/EMEB	1	1
	NRR/DRCH/HHFB	1	1	NRR/DRCH/HICB	1	1
	NRR/DRCH/HOLB	1	1	NRR/DRCH/HQMB	1	1
	NRR/DRPM/PECB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	RES/DET/EIB	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	L ST LOBBY WARD	1	1	LITCO BRYCE,J H	1	1
	NOAC POORE,W.	1	1	NOAC QUEENER,DS	1	1
	NRC PDR	1	1	NUDOCS FULL TXT	1	1

CATEGORY 1 DOCUMENT

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL DESK (DCD) ON EXTENSION 415-2083

FULL TEXT CONVERSION REQUIRED
TOTAL NUMBER OF COPIES REQUIRED: LTTR 24 ENCL 24

FPL

MAY 22 1997

L-97-128
10 CFR 50.73

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

Re: Turkey Point Unit 4
Docket No. 50-251
Reportable Event: 97-002-00
Automatic Reactor Trip Due to Loss of External Load

The attached Licensee Event Report 251/97-002-00 is being provided in accordance with 10 CFR 50.73(a)(2)(iv).

If there are any questions, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

CLM

attachment

cc: Luis A. Reyes, Regional Administrator, Region II, USNRC
Thomas P. Johnson, Senior Resident Inspector, Turkey Point Plant, USNRC

IE22

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
TURKEY POINT UNIT 4	05000251	1 OF 6

TITLE Automatic Reactor Trip Due to Loss of External Load

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)
4	23	97	97	002	00	5	22	97		

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

LICENSEE CONTACT FOR THIS LER (12)

	TELEPHONE NUMBER
C. L. Mowrey, Compliance Specialist	305-246-6204

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

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

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

ABSTRACT (16)

On April 23, 1997, Unit 4 tripped from 100% power. An I&C Specialist, working inside the back of the Main Control Board, apparently bumped a relay, causing a false Turbine Overspeed Protection signal. The signal caused turbine control valves to close (loss of load), and the reactor tripped on Over Temperature Delta-T.

The root cause of the event was inadequate physical protection. The contact arm on this relay is not enclosed, and can be actuated with very slight force. Contributors were inadequate work controls and a loss of lighting inside the panel during the work. The work document did not indicate that the work had the potential to trip the unit.

This relay and others like it will be evaluated to determine if they can be enclosed or relocated, to prevent inadvertent actuation. Until the evaluation is complete, Nuclear Plant Supervisor (NPS) permission is required to work inside this panel, and the NPS will brief the workers on the location and sensitivity of the relays. Administrative procedures governing the inadequate work controls will be revised to capture the lessons learned.

I. DESCRIPTION OF THE EVENT

On April 23, 1997, Florida Power & Light Company's Turkey Point Unit 4 was operating in Mode 1 at 100% power. The following maintenance activities were in progress:

1. Periodic surveillance testing on T-average and Delta-T Protection Channels [JC], requiring the condenser steam dump valves [JI:cv] to be in manual.
2. Rescaling of Condensate Storage Tank (CST) level indicators [KA:li] on the control console. Train A had been completed; the train B indicator was being changed.
3. Restoration of a Temporary System Alteration on Lighting Panel LP-50 [FF:pl], which rendered all turbine valve position indication [JJ:zi], and the digital generator load indicator [TB:ji], out of service.

At approximately 10:53 a.m., the first of three Turbine Overspeed Protection Circuit (OPC) signals was detected by the plant Digital Data Processing System (DDPS) [IQ] computer. The OPC circuit is normally actuated upon a turbine trip, or by an imbalance between steam pressure (>50%) and turbine load (<20%). The circuit prevents turbine overspeed by dumping turbine control oil pressure [TG], thereby causing the turbine control valves to close. The system takes about two seconds to completely drain the oil pressure, but it takes only a 20% decrease in oil pressure to effectively close the turbine control valves.

About ten seconds after the initial OPC alarm an automatic reactor trip occurred due to Over Temperature Delta-T (OTdT). Due to the lost turbine valve position indication from the LP-50 work, operators could not verify the turbine valves closed after the trip. Therefore they manually closed the Main Steam Isolation Valves (MSIVs) [SB:iv] in accordance with the Response Not Obtained step of the Emergency Operating Procedure.

Review of the DDPS sequence of events showed that the event was initiated at 10:53:57.13, when the OPC alarm was received by DDPS. During the next 3.33 seconds this alarm cleared, and then actuated and cleared two more times, with a total time in alarm of 1.95 seconds; the last actuation lasted 1.5 seconds. About 7.8 seconds after the last actuation the reactor tripped.

Closing the turbine control valves had the immediate effect of dropping T_{ref}, which is developed from the turbine first stage pressure signal. T_{ref} is used as a setpoint input to the Hi Steam Flow comparators, which alarmed repeatedly during this time.

The secondary effect of closing the turbine control valves was a diminished heat sink for the Reactor Coolant System (RCS) [AB], exacerbated by the unavailability of the condenser steam dump valves. As steam flow was cut off, cold leg RCS temperature increased rapidly, which in turn caused an increase in T_{avg}. T_{avg} is a parameter input to the OTdT setpoint. The difference between actual T_{avg} and nominal T_{avg} (T_{avg} at rated thermal power) is applied to a lead/lag element that has a large dynamic gain for a rapidly changing signal. The overall effect of the increasing T_{avg} was a large penalty on the OTdT setpoint, driving the setpoint down to meet actual Delta-T, causing a reactor trip.

The loss of external load and manual MSIV closure resulted in actuation of both pressurizer Power Operated Relief Valves (PORVs) [AB:rv], and each of the 1085 psig Main Steam safety valves [SB:rv] (one on each of the three steam generators). All valves reseated properly upon pressure reduction. The PORVs, lifting at 2335 psig, prevented the pressurizer safety valves [AB:rv] from lifting. All control rods [AA] fully inserted on the reactor trip. The high RCS temperature resulting from the loss of external load kept pressurizer level above the programmed no-load value; a second charging pump was started manually to aid in maintaining pressurizer level. The high RCS temperature also prevented an automatic feedwater isolation signal. Manual operator action was taken successfully, to maintain steam generator levels between 10% and 80% narrow range level. Therefore automatic Auxiliary Feedwater actuation did not occur, and was not needed.

The NRC Operations Center was notified in accordance with 10 CFR §50.72(b)(2)(ii).

II. CAUSE OF THE EVENT

The cause of the reactor trip was actuation of the Turbine Overspeed Protection Circuit (OPC). The OPC circuit apparently was actuated when the R/OPC relay was bumped.

The root cause of the event was inadequate physical protection for the relay.

The R/OPC relay is a Westinghouse Model SG relay, located inside Main Control Board panel 4C02 [JL:cbd]. It is mounted on the rear panel which forms a stanchion between two access doors at the rear of the board. When gaining access to one of the panel's front mounted devices, such as the CST level indicator, one comes in close proximity to this relay without being aware of it. The relay is constructed so that its contact arm is not enclosed. The force needed to actuate this arm was tested and found to be very slight.

A contributor was inadequate work controls. Turkey Point uses a "Red Sheet" to identify work which could pose a risk to continued plant operation (called "load threatening work," or "sensitive work"). The Red Sheet completed for the work on the CST level indicators did not indicate that the work had the potential to trip the unit, i.e., close proximity to the R/OPC relay.

Another contributor was the outage on Lighting Panel LP-50. LP-50 was de-energized just prior to completion of the work on the CST level indicators. With LP-50 out of service, the normal lighting inside control board 4C02 was lost, and the CST level indicator work was being finished by flashlight.

III. ANALYSIS OF THE EVENT

The Turkey Point Units 3 and 4 Updated Final Safety Analysis Report (UFSAR) discusses the expected plant response to a complete loss of generator load. The UFSAR assumes a complete loss of load without a subsequent reactor trip, and shows the adequacy of the pressure relieving devices and that no core damage results. The UFSAR conclusion was that this event poses no hazard to the integrity of the reactor coolant system and steam system. In the event reported herein the reactor trip occurred as designed. Therefore, the UFSAR analysis bounds the trip which occurred in this case. As a result of this analysis, plant procedures are developed to provide operator guidance in responding to these transient conditions and to assure that the plant is stabilized in a safe condition. The unit was stabilized in Mode 3 in accordance with these approved plant procedures. All safety related equipment operated per design. Therefore the health and safety of the public were not adversely affected.

IV. CORRECTIVE ACTIONS

1) A training brief will be issued to all plant departments detailing the lessons learned from this incident. Each Maintenance discipline will receive additional training on the correct level of review detail for Red Sheets.

2) Engineering will investigate the possibility of installing a relay cover or relocating the R/OPC relay for both Unit 3 and Unit 4.

3) Operations has hung a caution tag on the 3C02 and 4C02 access doors, requiring permission from the Nuclear Plant Supervisor to enter. Prior to granting access, the Nuclear Plant Supervisor will provide a briefing regarding the location and sensitivity of the relays. These tags will remain until Corrective Action #2 is complete.

4) Procedure 0-ADM-701, Control of Plant Work Activities, will be revised to require a job walkdown prior to work inside control room consoles or vertical panels (if the unit is at power), and the Red Sheet will be revised to identify such work as sensitive work. These changes will improve the recognition of sensitive jobs, and also help prevent the scheduling of other work which might impact such sensitive jobs, e.g., lighting outages.

5) Engineering will inspect the Unit 3 and Unit 4 control consoles and vertical panels to identify those relays that are not enclosed, and may be inadvertently actuated; to determine the consequences of such actuation; and to determine any needed countermeasures.

V. ADDITIONAL INFORMATION

Similar events: LER 250/91-002 reported a reactor trip signal generated (with the unit defueled) as a result of allowing work in both trains of reactor protection simultaneously. A contributor to that event was that one train of protection was activated when a technician bumped an unprotected breaker inside a cabinet. Corrective actions for that event were directed at safety-related protection equipment, and did not include non-safety relays. LERs 251/94-004 and 250/96-006 reported events caused in part by relays mounted on breaker cubicle doors, which

were jarred. In both cases, the jarring resulted from mechanical agitation by nearby components, not from bumping by personnel.

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