CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9907270053 DOC.DATE: 99/07/20 NOTARIZED: NO DOCKET #
FACIL:50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
AUTH.NAME AUTHOR AFFILIATION
LAFLEUR,D.R. Florida Power & Light Co.
HOVEY,R.J. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 99-001-00:on 990623,manual RT from 100% power following multiple control rod drops was noted.Caused by manual action taken by Reactor Control Operator.Inspected & repaired Stationary Gripper Regulating cards.With 990720 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 6
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

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CATEGORY 1 DOCUMENT

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FPL

JUL 20 1999

L-99-158
10 CFR § 50.73

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

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 1999-001-00
Date of Event: June 23, 1999
Manual Reactor Trip from 100% Power
Following Multiple Control Rod Drops

The attached Licensee Event Report 1999-001 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

If there are any questions, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Nuclear Plant

RJH/SF/DRL
Attachment

cc: Regional Administrator, USNRC, Region II
Senior Resident Inspector, USNRC, Turkey Point Nuclear Plant

IE22

NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

Manual Reactor Trip from 100% Power Following Multiple Control Rod Drops

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
06	23	1999	1999	- 001 -	00	07	20	1999	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
David R. Lafleur	(305) 246 - 7150

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	AA	JC	W123	YES		-	-	-	-	-
X	IG	JI	G077	YES		-	-	-	-	-

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

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

On June 23, 1999, FPL's Turkey Point Unit 3 was operating in Mode 1 at 100% power. At approximately 11:38 AM, Shutdown Bank B, Group 1 rods (4 control rods) dropped to the bottom of the core. The Reactor Control Operator (RCO) manually tripped the reactor approximately 8 seconds after receipt of rod drop indications. The remaining rods inserted as expected when the reactor trip breakers were opened.

The immediate cause of the reactor trip was manual action taken by the RCO in response to indications of more than two control rods dropped in the core.

The underlying cause of the trip was failure of a Stationary Gripper Regulating circuit card in the Rod Control System. The card failure was due to fracture of an uninsulated solder terminal post. The terminal post fracture was located flush with the top of the circuit board below a resistor lead solder joint. Failure of the card caused the group 1 rods in Shutdown Bank B to be released by their Stationary Gripper Coils, allowing the rods to drop into the core.

Corrective actions included inspections and repairs of Stationary Gripper Regulating cards, and post maintenance testing.

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

Description of the Event

On June 23, 1999, FPL's Turkey Point Unit 3 was operating in Mode 1 at 100% power. At approximately 11:38 AM Shutdown Bank B, Group 1 rods (4 control rods) [AA:rod] dropped to the bottom of the core. The RCO manually tripped the reactor approximately 8 seconds after receipt of rod drop indications. The remaining rods inserted as expected when the reactor trip breakers were opened.

All equipment required for mitigation of the event functioned properly with the exception of Intermediate Power Range Nuclear Instrument N-36 [IG:ji] which was observed to be reading low after the reactor tripped.

At approximately 12:00 noon, all Main Steam Isolation Valves (MSIVs) [SB:isv] were closed to control T average.

The NRC Operations Center was notified at 12:25 on June 23, 1999 in accordance with 10 CFR 50.72 (b) (2) (ii), Reactor Protection System Actuation.

The Rod Cluster Control Assemblies (RCCAs or rods) are used to add negative reactivity to the reactor core. During reactor startup, RCCAs are withdrawn from the reactor core. To shut down the reactor, RCCAs are inserted into the core. There are forty-five RCCAs.

RCCA movement is effected through the use of a Control Rod Drive Mechanism (CRDM) [AA:jc]. Each RCCA has an associated CRDM, located on the reactor head. The CRDM is used to position the rod within the core. The CRDM uses magnetic forces to lift and hold the rod. To move the RCCA up or down, one step at a time, the Rod Control System sequentially energizes and de-energizes three coils in the CRDM. The three coils are the Stationary Gripper, the Moveable Gripper, and the Lift coil. To hold the RCCA in place, the system maintains a low level current through the Stationary Gripper coil.

The Rod Control System is a solid state electronic control system consisting of four power cabinets, one logic cabinet, and the DC Hold Cabinet. The logic cabinet generates current regulating signals that are used by the power cabinets, based upon the speed, direction, and selected bank control input signals. The power cabinets generate and deliver power to the CRDM coils, based upon the signals received from the logic cabinet. Power to the system is delivered via the Reactor Trip Breakers from two motor-generator sets.

The forty-five CRDMs are divided among the four power cabinets. Each cabinet supports three groups of approximately four CRDMs. Only one group may be moved at a particular time while the other groups are held stationary. The dropped rods belong to Shutdown Bank B, Group 1, which is powered by the 1BD Power Cabinet.

Three Silicon Controlled Rectifiers (SCRs) generate the stationary current for each rod group in a power cabinet. These SCRs rectify three-phase AC power and supply each CRDM stationary gripper coil with 4.4 amps to hold or 8 amps to engage (when stepping). The firing card gates the SCRs, which is in turn controlled by the Phase Control card.

The Phase Control card receives an error signal from the Stationary Gripper Regulation circuit card (Stationary Regulation card) and senses the phase relationship of the three phase AC input power. The Stationary Regulation card senses the stationary coil currents and compares these signals to a reference signal developed by the regulated 24 Vdc power supply.

Cause of the Event

The immediate cause of the reactor trip was manual action taken by the RCO in response to indications of more than two control rods dropped in the core. By procedure, indication of more than two control rod bottom lights on, more than two rod position indicators indicating zero, or dropped rods all in the same bank group require an immediate manual trip of the reactor.

The underlying cause of the trip was failure of a Stationary Regulation card in the Rod Control System. The card failure was due to fracture of an uninsulated solder terminal post. The post fracture was located flush with the top of the circuit board, below a resistor lead solder joint. Failure of the card caused the Group 1 rods in Shutdown Bank B to be released by their Stationary Gripper Coils, allowing the rods to drop into the core.

For a rod to fall, the Stationary Gripper mechanism must release its grip on the RCCA. To do this, the magnetic forces generated by the gripper coil must fall below the gripper opening spring force. The magnetic force generated by the coil is directly proportional to the current in the coil. The rods in Shutdown Bank B, Group 1 dropped into the core because sufficient stationary current was not maintained to each gripper coil. Stationary current was not maintained due to a non-existent regulating current from the Stationary Gripper Regulating System. Non-existent regulating current was a result of failure of the Stationary Regulation card.

Analysis of the Event

Shutdown Bank B, Group 1 rods are controlled from power cabinet 1BD. Subsequent inspection of this power cabinet found error "DS1" on card K-1. This error indicated that the signal to stationary and moving coils was zero.

Approximately three hours before the trip, maintenance had been performed on the door to the CRDM logic cabinet room. Records and interviews with on duty personnel indicate that the door had been propped open for a period of approximately forty minutes. This may have caused a slight fluctuation in room temperature. However, the room air conditioning system was operating properly and no room high temperature alarms were received by control room personnel.

FPL found a fracture of an uninsulated solder terminal post on Resistor #52 (R52) on the Stationary Regulation card for Shutdown Bank B, Group 1. The fracture was located flush with the top of the circuit board, below the R52 lead solder joint. R52 is a "selectable" resistor, whose value was determined during original plant configuration. It is mounted and soldered to the component side of the card. The resistor leads are wrapped around and soldered to terminal posts. The posts pass through the card to the foil side where they are soldered to the foil. There are two other "selectable" resistors on each regulation card, mounted in similar fashion. Fracture of this post caused a break in the circuit connecting the resistor to the circuit board foil.

FPL conducted an inspection of all regulation cards (Stationary, Movable and Lift circuits). One other regulation card located in cabinet 2AC exhibited post fracture. The failed post terminals were removed and each R52 resistor lead was soldered directly to its circuit board foil in accordance with standard printed circuit board fabrication techniques. Two additional cards located in cabinets 1BD and 2BD were

found to have poorly soldered joints indicating insufficient wetting in the soldering process. The joints were cleaned and resoldered in accordance with standard printed circuit board fabrication techniques. Phase control circuit cards do not have uninsulated solder posts and did not require inspection.

Analysis of Safety Significance

RCCA drop is an Updated Final Safety Analysis Report (UFSAR) analyzed accident. The dropped rod event is a Condition II event that is assumed to be initiated by a single electrical or mechanical failure which causes any number and combination of rods from the same group of a given bank to drop to the bottom of the core. The resulting negative reactivity insertion causes nuclear power to rapidly decrease. An increase in the hot channel factor may occur due to the skewed power distribution representative of a dropped rod configuration. In this case, the drop of Shutdown Bank B, Group 1 rods was symmetrical since all dropped rods were in the same group. The analysis for the Unit 3 core design verifies that the plant will return to a stabilized condition at less than or equal to its initial power. Results of the analysis show that a dropped RCCA event does not adversely affect the core, since the Departure from Nucleate Boiling Ratio (DNBR) remains above the limit value for a range of dropped RCCA worths.

Because the assumptions and results of the analysis in the UFSAR bound the conditions of the actual event, this event did not compromise the health or safety of plant personnel or the general public.

Corrective Actions

1. Regulation cards S/N 77 from power cabinet 1BD, slot I-1, S/N 162 from power cabinet 2AC, slot C-1, S/N 26 from power cabinet 2BD, slot F-2, and S/N 68 from cabinet 1BD, slot C-2 were repaired and returned to service.
2. All other Unit 3 Stationary, Moveable and Lift Regulation cards were inspected for loose R52s and found to be satisfactory.
3. The Rod Control System was successfully post maintenance tested.
4. FPL will perform a formal root cause analysis to determine the cause for the fracture of solder terminal posts on regulation circuit cards.
5. FPL will determine the need to remount "selectable" resistors in the Rod Control System regulation control circuitry.
6. Further corrective actions derived from actions 4 and 5 above will be included in FPL's corrective action program.
7. FPL adjusted the compensating voltage on Intermediate Power Range Nuclear Instrument N-36. N-36 was post maintenance tested and declared back in service.

Additional Information

A manual reactor trip was initiated on Unit 3 in 1996 based on multiple dropped rods due to failure of a different regulating card (S/N 73, slot F-1) in the 2AC power cabinet. This event was described in LER 250/96-010. The failed card was attributed

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

to high ambient temperatures in the rod control cabinets. Corrective actions included lowering the ambient temperature in the card cage areas of the power cabinets.

A manual reactor trip was initiated on Unit 3 in 1997 when 12 control rods dropped into the core due to failure of a redundant pair of rod control power supplies. This event was described in LER 250/97-06. Corrective actions included replacing 12 power supplies in the rod control logic and power cabinets.

Neither of these previous trips involved bad solder joints or fractured solder terminals.

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