FPL

APR 0 2 2008

10 CFR § 50.73
L-2008-019

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 2007-002-01
Date of Event: June 6, 2007
LER 2007-002-01, Completion of Shutdown Required by Technical Specifications due to Inoperable Rod Position Indication for Two Control Rods in the Same Control Bank

The attached License Event Report (LER) 05000250/2007-002-01 is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(A). This LER is a supplement and supersedes the LER previously submitted to NRC by FPL letter L-2007-123 on August 6, 2007.

If there are any questions, please call Ms. Olga Hanek at (305) 246-6607.

Very truly yours,

William Jefferson, Jr.
Vice President
Turkey Point Nuclear Plant

SM

Attachment

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

IE22

NRR

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose 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)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Turkey Point Unit 3	05000250	1 OF 5

4. TITLE Completion of Shutdown Required by Technical Specifications due to Inoperable Rod Position Indication for Two Control Rods in the Same Control Bank

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
06	06	2007	2007	- 002 -	01	04	02	2008	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☒ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Stavroula Mihalakea– Licensing Engineer	305-246-6454

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	IG	AA		Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On June 6, 2007, Turkey Point Unit 3 was operating at 100% power. At 0650, Operators observed that Rod Position Indication (RPI) [IG] for control rod F-4 in Control Bank C [AA] began to oscillate above and below 218 steps. The RPI for rod M-6 in the same Control Bank C had been inoperable since September 1, 2006. At 0745, unable to comply with Technical Specification (TS) 3.1.3.2 Action a., i.e., maximum of one analog rod position indication per bank inoperable, TS 3.0.3 was entered to place the Unit 3 in Hot Standby. At 0746, a plant shutdown was initiated. The cause of the failed RPIs is the incorrect application of the coil stack connector [IG:CON] insert material (neoprene) for the required environment. The root cause for this event is that the Integrated Head Assembly Vendor Quality Assurance Program implementation failed to ensure the proper connectors were used in the fabrication of the RPI pigtail assemblies supplied to FPL during the reactor vessel head replacement in 2004. Additionally, FPL's nuclear material management technical reviewer failed to review design basis documentation and to ensure proper engineering documentation was prepared for the new stock code part. The Unit 3 RPI coil connectors were removed, the RPI pigtail assembly wires were spliced to the RPI intermediate vessel head cables and upon completion of repairs Unit 3 was returned to service. Unit 4 was proactively shutdown to replace the same type of connectors with qualified cable splices, similar to the Unit 3 repairs.

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

DESCRIPTION OF THE EVENT

On June 6, 2007, Turkey Point Unit 3 was operating at 100% power with no safety systems out of service. At 0650, Operators observed that Rod Position Indication (RPI) for control rod F-4 in Control Bank C began to oscillate above and below 218 steps. At that time, Operations entered the off normal operating procedure for rod misalignment, declared control rod F-4 inoperable, and entered Technical Specification (TS) 3.1.3.1 Action d.1 to restore the inoperable rod to operable status. Operations confirmed that no control rod misalignment existed, and exited the 1 hour TS action.

Subsequently, at 0745 Operations entered the off normal operating procedure for rod position indication malfunction, declared the RPI for rod F-4 in Control Bank C inoperable and reviewed TS 3.1.3.2 for compliance. TS 3.1.3.2 allows continued operation with a maximum of one inoperable rod position indication per Control Bank provided the rod position is verified indirectly by the moveable incore detectors (i.e., flux map) every eight hours or power must be reduced to 75%. If more than one RPI is inoperable in the same Control Bank, entry into TS 3.0.3 is required to initiate a unit shutdown.

Prior to this event, there had been three RPI failures since September of 2006. Flux mapping was being performed for two control rods G-5 in Control Bank A and E-5 in Shutdown Bank B due to these two RPI failures that had recently occurred on May 1, 2007 for rod G-5 and on June 2, 2007 for rod E-5. The third RPI for rod M-6 in control Bank C had occurred September 1, 2006. Flux mapping was not being performed for rod M-6, since a Technical Specification change was approved by the Nuclear Regulatory Commission (NRC), to allow an alternate method for monitoring the rod's position, i.e., by verifying gripper coil parameters of the control rod drive mechanism to determine it has not changed state.

At approximately 0745, with inoperable RPIs for rods F-4 and M-6 in the same control bank C, unable to comply with TS 3.1.3.2 Action a., i.e., maximum of one analog rod position indication per bank inoperable, Operations entered 1 hour action in accordance with TS 3.0.3 to place Unit 3 in Hot Standby. At approximately 0746, Operations initiated the Unit 3 shutdown. At 1152, reactor power was reduced below 25% and a manual reactor trip was performed in accordance with operating procedures. As such, at 1152, Operations exited TS 3.0.3. There were no abnormal indications observed during the duration of the Unit 3 shutdown. The RPI failures had no effect on the operation of any plant safety systems. There were no adverse effects on nuclear safety nor was the health and safety of the public compromised during this event.

This event was reported to the NRC on June 6, 2007 at 0932 pursuant to 10CFR50.72(b)(2)(i) due to initiation of a plant shutdown required by the plant Technical Specifications; and submitted event notification # 43408. FPL condition report 2007-17324 was originated. This event is reportable pursuant to the requirements of 10CFR50.73(a)(2) (i)(A) due to a completion of a plant shutdown required by Technical Specifications. This LER is a supplement and supersedes the LER previously submitted to NRC by FPL letter L-2007-123 on August 6, 2007.

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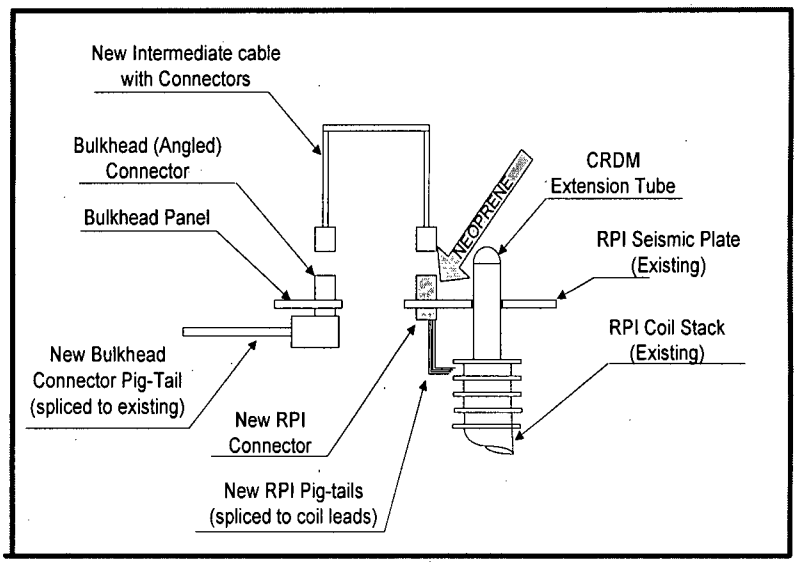
BACKGROUND INFORMATION

The Turkey Point Unit 3 Reactor Vessel Closure Head (RVCH) was replaced during the Fall 2004 refueling outage. As part of the replacement effort, additional improvements were made to increase overall reactor vessel related system reliability, and enhance refueling/defueling operations. The RVCH was replaced with a new Integrated Head Assembly (IHA). This included all new IHA cable and connector assemblies for the Rod Position Indication, Control Rod Drive Mechanism, Core Exit Thermocouples, and Reactor Vessel Level Instrumentation System.

The RPI cable replacement included the following (Refer to Figure 1): a) replacement of cables surrounding the reactor cavity with new cable spliced into the existing cable, b) new bulkhead connector and panel on the refueling floor on the west end of the reactor cavity, c) new intermediate cables with connectors from the bulkhead connector panel to the RPI Seismic Plate Coil stack connectors. The existing Rod Position Indicator (RPI) coils were reused. The RPI coil stack seismic plate connectors were also replaced.

Figure 1: RPI Coil Stack Cable Connectors



The rod position detector is a linear variable transformer consisting of primary and secondary coils alternately stacked on stainless steel support tube. The Rod Control Cluster Assembly (RCCA) drive rod serves as the "core" of the transformer. The vertical position of the drive rod changes the primary to secondary coupling and produces a unique A.C. analog secondary voltage. The output voltage is an analog signal directly proportional to the position of the control rod.

EVENT ANALYSIS

There have been four Turkey Point Unit 3 RPI failures since September 1, 2006 resulting in inoperable RPIs for rods M-6 in control Bank C, G-5 in Control Bank A, E-5 in Shutdown Bank B, and F-4 in Control Bank C. The number and chronology of failures was considered highly abnormal and potentially indicative of common cause failure. The symptoms of failure were similar amongst the four RPI detectors consisting of sudden erratic rod position indication without intentional rod movement.

After testing the RPI cables and connectors it was determined that the cause of the erratic RPI indication was the insulation breakdown of the connector insert on the reactor head. Based on part numbers, vendor documentation, insert material color, and laboratory testing of the failed dielectric from the M-6 RPI coil stack connector, it was determined that the RPI coil stack seismic plate connectors utilized neoprene rubber inserts, instead of silicone rubber. The connector insert, which should provide insulation between connector pins and connector body, was found to be conductive across its exposed face. All the failures identified were at the RPI coil stack seismic plate connection with the seismic plate-mounted male connectors being the failure initiator/propagator. For these failed connectors, all tests showed evidence of a migration of neoprene material to the mating cable connectors with silicone rubber inserts.

The RPI coil stack seismic plate connectors with neoprene inserts are a subcomponent of the RPI coil stack pigtail assembly. These assemblies were fabricated and installed during the Fall 2004 outage for the replacement of the reactor vessel head. The RPI cables and connectors installed in the vicinity of the reactor vessel must be able to maintain their physical and electrical insulation properties over many years under high temperature environmental conditions. The degradation of the neoprene rubber insert from the pigtail assembly connector contaminated and permeated the silicon rubber insert of the intermediate cable mating connector. The contamination of the intermediate cable connector resulted in a breakdown of its silicon rubber insert and caused it to become conductive. This conductivity resulted in shorting of conductor dielectric thus causing the erratic RPI detector oscillations.

CAUSE OF THE EVENT

There are two root causes for this event. One root cause is that the IHA Vendor Quality Assurance Program implementation failed to ensure the proper connectors specified by the IHA vendor and FPL purchase order were used in the fabrication of the RPI pigtail assemblies supplied to FPL. The other is that the FPL nuclear material management technical reviewer failed to review design basis documentation and take action to ensure proper engineering documentation was prepared for the new stock code part per FPL quality instructions.

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ANALYSIS OF SAFETY SIGNIFICANCE

Unit 3 was shutdown in accordance to plant procedures due to multiple RPI failures. The multiple RPI failures had no adverse impact on the ability of the operators to shutdown the reactor. There were no instances of rod misalignment.

ADDITIONAL INFORMATION: EXTENT OF CONDITION

Based on the insulation resistance checks of all 45 RPI circuits, only the four RPIs identified previously were found with unacceptable resistance readings. The remaining 41 RPIs were capable of performing their function at the time of the Unit 3 shutdown. Only the RPI seismic plate stack coil pigtail assembly connectors had the neoprene inserts. The Unit 4 installed RPI seismic plate stack coil pigtail assembly connectors had neoprene inserts. Other head cable connector inserts were silicone rubber, which is the proper material for the application. The condition report for this event is 2007-17324.

CORRECTIVE ACTIONS

Turkey Point Unit 3 was shutdown and the RPI seismic plate coil stack connectors were removed. Because of parts unavailability and the long lead time to procure new connectors, the RPI coil stack pigtail assembly wires have been spliced to the RPI intermediate head cables as a corrective action which eliminates the failure mode by eliminating the unqualified portion of the RPI system.

Turkey Point Unit 4 was proactively shutdown on July 22, 2007 to remove these connectors and splice the RPI coil stack pigtail assembly wires to the RPI intermediate head cables.

FPL personnel have investigated the IHA vendor's quality program. FPL Quality Assurance findings were incorporated into the IHA vendor's corrective action program for process resolution.

FPL nuclear material management technical reviewers were trained and qualified to FPL's Quality instructions.

SIMILAR EVENTS: There is no record of past occurrences of this type of event at Turkey Point.