



**FPL**

L-2006-240  
10CFR50.4  
10CFR2.390

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**OCT 17 2006**

Subject: Florida Power and Light Company  
Turkey Point Unit 3  
Docket Nos. 50-250  
Presentation Material Pertaining to Regulatory Conference  
On Turkey Point Preliminary White Finding Held October 10, 2006

Reference: Letter, Mr. C. A. Casto to Mr. J. A. Stall, Turkey Point Nuclear Plant – NRC  
Integrated Inspection Report 05000250/2006015; EA-06-200, Preliminary White  
Finding, dated August 24, 2006

On October 10, 2006, a meeting was held between Florida Power and Light Company (FPL) and the Nuclear Regulatory Commission (NRC) in Atlanta, Georgia regarding a Preliminary White Finding discussed in the above referenced letter.

Provided in the attached are copies of the presentation material presented at the October 10, 2006 meeting. Attachment 1 is non-proprietary. Attachment 2 is considered proprietary and contains potentially sensitive security information. FPL requests that Attachment 2 be withheld from disclosure in accordance with 10CFR2.390.

If there are any questions regarding this letter, please contact Jim Connolly at 305-246-6632.

Sincerely Yours,

Terry O. Jones  
Vice President  
Turkey Point Nuclear Plant

Attachments: 1) Turkey Point Non-Proprietary Presentation Material Regarding Preliminary  
White Finding 05000250/2006015-01  
2) Turkey Point Proprietary Presentation Material Regarding Preliminary White  
Finding 05000250/2006015-01

cc: NRC Regional Administrator  
Senior Resident Inspector, USNRC, Turkey Point

*IFD*

**ATTACHMENT 1**  
**Turkey Point Non-Proprietary Presentation Material**  
**Regarding Preliminary White Finding**  
**05000250/2006015-01**



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# ***Regulatory Conference NRC Region II***

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## **Turkey Point Nuclear Plant Unit 3**

### **Loss of Decay Heat Removal Event**



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# ***Agenda***

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- **Introductions**
- **Overview**
- **Topics of Discussion**
  - Event description
  - Corrective actions
  - Thermal-hydraulic analysis of event
  - Mitigating actions
  - SDP Analysis
- **Closing Remarks**



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# ***Overview***

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- **FPL agrees that it did not comply with requirements of 10 CFR 50.65(a)(4)**
- **FPL has learned from the loss of decay heat removal event and has taken actions to prevent recurrence**
- **FPL evaluation concludes that the change in core damage frequency is less than 1.0E-6/yr**

# ***Event Description***

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- **Initial conditions**
  - Unit 3 in Mode 5
  - Draindown in progress to support reactor head removal
- **Sequence of events**
  - While restoring power to 3C 480V load center, spurious undervoltage signal sent to 3A load sequencer
  - 3A load sequencer de-energized 3A 4kV bus, causing loss of running 3A RHR pump
  - 3A EDG re-energized 3A 4kV bus
  - 3A load sequencer does not automatically re-start the 3A RHR pump after loss of offsite power
  - Operator started 3B RHR pump and terminated the event in approximately 9 minutes



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# ***Causes***

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- **Insufficient defense in depth to prevent the event**
  - **The outage risk assessment procedure was insufficient**
  - **Experience in maneuvering plant was low with significant shutdown maintenance in progress**
  - **Vendor human error in the configuration of auxiliary switch contacts on a 480V load center breaker that went undetected**



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## ***Immediate Corrective Actions Taken***

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- **Senior management team augmented by fleet after event for additional oversight**
- **Additional reviews of remaining outage schedule performed**
- **Additional controls of protected plant and switchyard equipment implemented**
- **Outage schedule changes subject to more rigorous review and approval process**



## ***Long Term Corrective Actions***

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- **Outage risk assessment and control procedure upgraded**
  - Responsibility for procedure transferred to Operations
  - PNSC approval required for procedure changes
  - Clearly identifies required protected in-service equipment for higher risk evolutions
  - Provides logic ties for risk significant activities
- **Use of dedicated and more experienced licensed operators for outage planning and risk assessment (complete)**



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## ***Long Term Corrective Actions (cont'd)***

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- **As-left auxiliary switch contact configuration to be verified by Nuclear Receipt Inspection for 4kV & 480V breakers (complete)**
- **Plant procedures for safety-related breakers revised to check auxiliary switch contact configuration on 4kV & 480V breakers (completed for procedures needed for Fall outage breaker work)**
- **Applicable plant procedure revised to defeat the sequencer during replacement of 480V load center breakers (complete)**

## ***Long Term Corrective Actions (cont'd)***

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- **Fleet peer reviews of outage schedule (complete)**
- **Management challenge of outage schedule (prior to Fall outage)**
- **Enhanced operator and staff training on shutdown risk assessment (in-progress, complete prior to Fall outage)**
- **Outage risk management improvements (perform prior to RCS draindown)**
  - Pressurizer code safety removed
  - At least two Core Exit Thermocouples available (until just prior to detensioning reactor vessel head)
  - Containment closure ability confirmed

## ***FPL Analysis of Loss of RHR Event***

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- **Thermal-hydraulic simulation to determine effects of loss of RHR scenarios**
  - Case 1 - No operator actions
  - Case 2 - HHSI feed only
  - Case 3 - HHSI feed & PORV bleed
- **Use results to develop FPL SDP event tree**
- **Using event tree and failure probabilities, calculate change in core damage frequency**

# ***Initial Plant Conditions***

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- 63 hours 50 minutes after shutdown
  - prior to shutdown reactor was at ~50% power for 24 hours
- RCS being drained to support reactor vessel head lift
- RCS level near reactor vessel flange
- RCS temperature ~115 °F
- RCS vented via:
  - Reactor vessel head vent line with 0.219" diameter orifice
  - Pressurizer vent line 0.742" diameter
- A-RHR in service
- B-RHR in standby

## ***Initial Plant Conditions (cont'd)***

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- SG secondary side water levels average 84 % wide range
- SG atmospheric steam dumps full open
- Both RWSTs with inventory ~295,000 gal per unit available for HHSI pump use while maintaining NPSH
- Equipment required to mitigate loss of RHR in service
- 2<sup>nd</sup> qualified Unit Supervisor supervising draindown

## ***Case 1 – No Operator Action***

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- **Conclusion:**
  - With no operator action, RHR cooling will be restored simply by starting an RHR pump within approximately 9 hours after event initiation
  - No core damage with RHR pump start anytime during first 9 hrs of event

## ***Case 2 – HHSI Feed Only***

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- **Conclusion:**
  - Able to sustain steady state condition for at least 24 hours with single RWST
  - No core damage for at least 24 hours
  - Sufficient time available to implement RWST inventory management or SG secondary water makeup



## ***Case 3 – HHSI Feed & PORVs Bleed***

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- **Conclusion:**
  - No core damage for at least 16 hrs using both RWSTs
  - Sufficient time available to restore RHR or implement RWST inventory management

# ***Thermal-hydraulic Analysis Conclusions***

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- SG reflux cooling will prevent core damage without operator action for at least 9 hours
- The minimum time to start a RHR pump is at least 9 hours (time to boil is overly conservative as the criterion for RHR pump start)
- Feed & bleed prevents core damage regardless of pressurizer PORVs position
- Managing RWST inventory is proceduralized with options to:
  - Throttle HHSI flow
  - Establish RWST makeup
  - Use opposite unit RWST

## ***Key Factors for Additional NRC Consideration***

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- Base RHR restoration time on NPSH requirements (9 hr) rather than core boiling (21 min)
- Failure of PORVs to open for feed & bleed does not result in core damage
- Late restoration of RHR based on additional time provided by SG reflux cooling and feed & bleed
- Additional RWST inventory management strategies to extend availability of HHSI suction source
  - Throttling HHSI pump flow
  - Using opposite unit RWST

## *Summary of SDP Results*

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- Based on a more detailed SDP analysis FPL estimated the total CDF increase for this event to be approximately  $2.0\text{E-}7/\text{yr}$
- CDF increase below risk significance threshold of  $1.0\text{E-}6/\text{yr}$
- FPL concluded this violation to be GREEN

# ***ROP Cornerstone***

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- NRC ROP Cornerstone for this finding should be “Initiating Events”
  - ROP “Initiating Events” Cornerstone objective: limit frequency of events that upset plant stability and challenge critical safety functions
- Definitions: NRC Manual Chapter 0308 – ROP Basis Document
  - Initiating Events- “such events include reactor trips due to turbine trips, loss of feedwater, loss of off-site power . . .”
  - Mitigating Systems- “include those systems associated with safety injection, residual heat removal, and their support systems. . .”
- Event attributable to the loss of 3A 4kV bus normal electrical power to the running 3A RHR pump, not involving a failure attributable to the RHR System

# ***Conclusions***

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- FPL agrees that it did not comply with requirements of 10 CFR 50.65(a)(4)
- Review of SDP analysis shows low safety significance with delta CDF < 1.0E-6/yr
- FPL has taken timely and aggressive corrective actions to prevent recurrence

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## **Open Discussion**

## **Questions**



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## **Final Remarks**