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L-2011-030
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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to NRC Request for Additional Information (RAI) Regarding Extended Power Uprate (EPU) License Amendment Request (LAR) No. 205 and Human Performance Issues – Round 1

References:

(1) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2010-113), "License Amendment Request No. 205: Extended Power Uprate (EPU)," (TAC Nos. ME4907 and ME4908), Accession No. ML103560169, October 21, 2010.

(2) Email from J. Paige (NRC) to T. Abbatiello (FPL), "Turkey Point EPU - Health Physics and Human Performance (IHPB) Request for Additional Information - Round 1," January 25, 2011

By letter L-2010-113 dated October 21, 2010 [Reference 1], Florida Power and Light (FPL) requested to amend Facility Operating Licenses DPR-31 and DPR-41 and revise the Turkey Point Units 3 and 4 Technical Specifications (TS). The proposed amendment will increase each unit's licensed core power level from 2300 megawatts thermal (MWt) to 2644 MWt and revise the Renewed Facility Operating Licenses and TS to support operation at this increased core thermal power level. This represents an approximate increase of 15% and is therefore considered an extended power uprate (EPU).

By email from the U.S. Nuclear Regulatory Commission (NRC) Project Manager (PM) dated January 25, 2011 [Reference 2], additional information regarding Human Factors issues was requested by the NRC staff in the Health Physics and Human Performance Branch (IHPB) to support their review of the EPU LAR. The RAI consisted of eight (8) questions regarding operator training, response capabilities, equipment and procedural interfaces. These eight RAI questions and the applicable FPL responses are documented in Attachment 1 to this letter.

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the State Designee of Florida.

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2010-113 [Reference 1].

This submittal contains no new commitments and no revisions to existing commitments.

Should you have any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager, at (305) 246-7327.

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NRR

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 3rd, 2011.

Very truly yours,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

Attachments

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Resident Inspector, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

Turkey Point Units 3 and 4

RESPONSE TO NRC RAI REGARDING EPU LAR NO. 205
AND IHPB HUMAN PERFORMANCE ISSUES – ROUND 1

ATTACHMENT 1

Response to Request for Additional Information

The following information is provided by Florida Power & Light (FPL) in response to the U. S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support License Amendment Request (LAR) 205, Extended Power Uprate (EPU), for Turkey Point Nuclear Plant (PTN) Units 3 and 4 that was submitted to the NRC by FPL via letter (L-2010-113) dated October 21, 2010 [Reference 1].

In an email dated January 25, 2011 [Reference 2], the NRC staff requested additional information regarding FPL's request to implement the Extended Power Uprate. The RAI consisted of eight questions from the Health Physics and Human Performance Branch (IHPB) regarding operator training, response capabilities, equipment and procedural interfaces. These eight RAI questions and the applicable FPL responses are documented below.

IHPB-1.1 As described in LAR, Section 2.11.1.1, "Regulatory Evaluation", the units are equipped with a common control room. Are operators trained and licensed to operate either unit? If so, how has this been considered in the EPU implementation plan, e.g. how will potential human errors be prevented or minimized during the time period when the units are significantly different?

All Turkey Point Operators are trained and licensed to operate either unit.

The EPU project implementation plan includes a comprehensive training component. As part of Turkey Point's training program, the Systematic Approach to Training (SAT) process is used to determine training needs, design and develop training, followed by implementation and evaluation to ensure continuous improvement. This systematic approach will be applied to EPU changes.

Units 3 and 4 are currently scheduled to operate at EPU following the spring 2012 and fall 2012 outages, respectively. During the period between implementation of the uprate at each unit, operators will maintain proficiency through continuing training on both units based on actual configurations. Human errors will be prevented through rigorous training in classroom, plant, simulator, and laboratory settings prior to implementation of modifications at each unit. The training will include evaluation tools such as written exams, simulator evaluations, and task performance tools.

The simulator is updated as EPU modifications are installed. Operators will then be provided training on the modification before the uprate. All EPU-required simulator modeling changes are scheduled for installation and testing before each unit's uprate implementation outage. This will allow operator simulator training on the unit in the EPU configuration before heatup and startup to the uprated power level.

Given the current implementation schedule, newly licensed operators anticipated in late 2011 will receive a dual unit license applicable to the plants as they are configured in December 2011. Prior to allowing them to operate uprated Unit 3, they must undergo preplanned "delta" training on the differences between Unit 3 and Unit 4. After integration of the newly licensed operators into their respective crews, additional crew training will be conducted on the simulator configured with the EPU modifications prior to heatup and startup of the unit. This same process

will be applied to the newly licensed operators anticipated in late 2012.

In summary, operators will receive training on EPU modifications before the modification is implemented and will receive training, including simulator training, on each unit before heatup and startup in the EPU configuration.

IHPB-1.2 **In Section 2.11.1.2.2 "Description of Analysis and Evaluations", Topic 1.0, "Changes in Emergency and Abnormal Operating Procedures", the licensee stated, "In addition to the more significant items listed below, minor changes (typically setpoints) have been identified for several Emergency, Abnormal and other Operating procedures." The licensee should add these "minor" changes to the list that it provided, or describe the criteria by which they were defined as "minor" and excluded.**

The "minor" changes to the Emergency, Abnormal and other Operating procedures are either editorial or setpoint changes to the procedures. They have been evaluated for time critical operator actions and it has been determined that they have no impact on the time available to perform critical operator actions, critical steps or operator actions in the Emergency, Abnormal and other Operating procedures. Examples of minor Emergency Operating procedure (EOP) setpoint changes are provided below:

EOP Setpoint Short Description	Existing Setpoint Value	EPU Updated Setpoint Value
PRZR pressure permissive to block SI	1990 psig	1987 psig
PRZR pressure 50 psi below permissive to block SI	1940 psig	1937 psig
Shutoff pressure of HHSI pumps not to exceed 2000 psig (Adverse Containment)	1925 psig	1950 psig
Saturation pressure for temperature T1 plus 10 psig (Normal Containment)	175 psig	150 psig

EPU changes that impact time critical operator actions are addressed in IHPB-1.3 below.

IHPB-1.3 **In the same section, 2.11.1.2.2, Topic 1.0, "Changes in Emergency and Abnormal Operating Procedures", the licensee listed four changes to the strategy for cold leg and hot leg recirculation. How do each of the four changes affect the operator actions stated in the associated procedures? Format the response in causal terms such as, "the use of two HHSI pumps adds /changes / deletes the following actions in the current action sequence in the EOPs... As a result, use of two pumps reduces/increases recovery time and, thus, reduces / increases the time available for operators to accomplish the function."**

The EOP changes referred to are identified in the table below.

Input Description	Existing Value	EPU Value
HHSI flow interruption time during switchover from injection to cold leg recirculation	2 minutes	2 minutes
Latest time to switchover HHSI to hot leg recirculation	12 hours	6.5 hours*
HHSI flow interruption time during switchover to hot leg recirculation	10 minutes	3 minutes

*Earliest time to switchover HHSI to hot leg recirculation for EPU is 5.5 hours.

The transfer from injection to cold leg recirculation is performed in accordance with EOP-ES-1.3, Transfer to Cold Leg Recirculation. Procedure EOP-ES-1.3 will be changed to start two HHSI pumps instead of only one.

Starting the second pump, while using appropriate self-checking tools, is estimated to add about 10 seconds to the time required and switchover to cold leg recirculation can still be performed in less than the two minutes. Any actions required to align an unaffected unit's HHSI pump are already addressed in the existing procedure E-0, Reactor Trip or Safety Injection, Attachment 1 which are implemented prior to entering procedure ES-1.3. The sequencing of the unaffected unit's HHSI pump alignment attachment in procedure E-0 may change but the operator actions and their completion times will not change. The EOP changes will be verified and validated in accordance with an established sequence in the plant procedure for Emergency and Off-Normal Operating Procedures Verification and Validation

The switchover from cold leg recirculation to hot leg recirculation is performed in accordance with EOP-ES-1.4, Transfer to Hot Leg Recirculation. Procedure ES-1.4 steps will be changed to start two HHSI pumps within three minutes.

The new procedure step will change the time limit that HHSI flow can be interrupted during switchover to hot leg recirculation from 10 to 3 minutes. The current action to start one HHSI pump will be changed to start two HHSI pumps. Simulator validation of the current EOP requiring one HHSI pump to be started has shown that the evolution can be completed in less than 2 minutes. Starting the second pump, while using appropriate self-checking tools, will only add about 10 seconds to the time required to switch over to hot leg recirculation.

As stated in LR 2.11.1.2.2, because simultaneous hot and cold leg recirculation will not be conducted under EPU, Attachment 1, Concurrent Cold Leg and Hot Leg Recirculation, will be removed from the Emergency Operating Procedure (EOP) ES-1.4, Transfer to Hot Leg Recirculation and replaced with a new alignment performing the same function. This new alignment will provide the required flow to prevent boron precipitation and remove decay heat. Any EOP revisions will be

developed, verified and validated in accordance with the established plant procedures for changes to EOPs described in the response to IHPB-1.5 below. This will include demonstrations on the station's simulator and in simulated plant walk-through exercises that prescribed operator actions are performed within acceptable times.

Changes to response times for operator actions credited in the revised margin to overfill analysis for Steam Generator Tube Rupture are discussed in the response to Reactor Systems (SRXB) RAI Round 1.

In addition, as stated in LR section 2.11.1, the reevaluation of the Fire Protection program identified Time Critical Operator Actions, which are further discussed in LR Section 2.5.1.4 and as part of response to Fire Protection Branch (AFPB) RAI Round 1.

IHPB-1.4 **In Topic 2.0 of Section 2.11.1.2.2, "Changes to Operator Actions Sensitive to Power Uprate", the licensee did not answer the question completely. The licensee identified some actions with response times that were affected, but didn't discuss whether times were reduced or increased, lengths of time involved, and why the changes were acceptable. Therefore, responses to the following are needed:**

a. Identify and describe operator actions that will involve additional response time or will have reduced time available. The response should address any operator workarounds that might affect existing response times.

Operator actions that involve changes to response times as a result of EPU include the following:

Description	Current Setpoint Value	EPU Setpoint Value	Comments
Time for transfer from hot leg recirculation back to cold leg recirculation	12 hours	17 hours	The time is increased for EPU and is considered a long-term action, and will have no impact on the operator's ability to perform.
Time to prepare for transfer to hot leg recirculation	10 hours	5.5 hours	The time is reduced for EPU. However, it is still considered a long-term action and will have no impact on the operator's ability to perform.
Time injection into the core can be stopped during transfer to hot leg	10 minutes	3 minutes	The time is reduced for EPU. Simulator validation of the

Description	Current Setpoint Value	EPU Setpoint Value	Comments
recirculation			current EOP requiring one HHSI pump to be started has shown that the evolution can be completed in less than 2 minutes. Starting the second pump, while using appropriate self-checking tools, will only add about 10 seconds to the time required to switch over to hot leg recirculation.
The time for initial switchover from cold leg to hot leg recirculation	12 hours	5.5 – 6.5 hours	The times and frequencies to transfer from cold and hot leg recirculation have changed. These times have been reduced for EPU and are considered a long-term action associated with the analysis. The time interval to transfer from cold leg recirculation to hot leg recirculation is reduced to a 1-hour window. The 1-hour will provide adequate time to perform switchover.
The frequency for alternating HHSI pump injection between cold leg and hot leg recirculation	24 hours	16 hours	The time is reduced for EPU. However, it is still considered a long-term action and will have no impact on the operator's ability to perform.

There are no operator workarounds that will affect the response times described above.

b. Identify any operator actions that are being automated or being changed from automatic to manual as a result of the power uprate.

There are no time-critical operator actions related to emergency or abnormal operating procedures that are being automated or being changed from automatic to manual as a result of the uprate. EOP changes to address single failures will be developed, verified and validated in accordance with the established plant procedures for changes to EOPs described in the response to IHPB-1.5 below.

c. Provide justification for the acceptability of any changes identified in 4.a. or 4.b. above.

As described in detail in the response to IHPB-1.5 below, changes in time-critical operator actions will be verified and validated through a process in which both technical and human engineering adequacy are addressed. Validation of these procedures can include several methods to ensure the procedures can be implemented. This formal process will demonstrate that the procedure action steps can be performed within or at the designated intervals by the operating crew and that the procedure adequately aids in the coordination of actions among crew personnel where necessary. Operators will be provided with simulator training on the EPU modifications and EOP changes before the uprate is implemented.

IHPB-1.5 In Section 2.11.1 of the LAR, "Human Factors", much credit is taken for "approved plant procedures and processes such as the modification process". Please summarize the procedures and processes that are used to develop or change human factors interfaces. Include specific references that address verification and validation of operator actions and interfaces.

As discussed in the response to RAI IHPB-1.8 below, if a modification has the potential to impact human system interfaces, plant operators are typically involved in the design process so that human factor engineering (HFE) requirements can be addressed and incorporated early. In addition, plant modifications, including EPU modifications, undergo an initial screening for HFE considerations aligned to the guidelines provided in NUREG-0700, "Human-System Interface Design Review Guidelines." The screening checklist used for this purpose determines if the modification:

- Will change the layout of the control room, control board, operator console, or remote shutdown panel;
- Will install new equipment in the control room, control board, operator console, or remote shutdown panel;
- Add new equipment that requires operator local control for off-normal or emergency operating procedures;
- Affect the access of existing equipment required for operator action;
- Affect alarms, equipment failures or off-normal conditions that could affect operator response;
- Affect the method in which an operator interfaces with a control or data system;

- Affect the environment of the control room, control board, operator console, remote shutdown panel, or any location where operator action is required for off-normal conditions;
- Involve changes to existing operator computer displays; and/or
- Involve color coding, labeling, scaling, or displays that are different than the existing standard conventions.

If the answer to any of these screening questions is 'Yes,' then an HFE evaluation is performed. The HFE evaluation must address the applicable NUREG-0700 sections or HFE practices used in the design. Key stakeholders, usually including the Operations Department, review and approve the HFE evaluation. The HFE Evaluation is included in the engineering change document.

Changes in operator action requirements as discussed in LR Section 2.11.1 will be verified and validated through the station's formalized pre-planned sequence of verification and validation of changes to emergency operating procedures (EOPs) and off-normal operating procedures (ONOPs) using the plant procedure for Emergency and Off-Normal Operating Procedures Verification and Validation. The procedure requires an operating crew and an observer/reviewer team to verify the correctness of the written procedure, ensure that generic and plant-specific technical aspects have been properly incorporated, and validate that the specified actions can be followed to accomplish the objective of the procedure. Additional subject matter experts may be assigned to the team based on the scope of the validations being performed. This includes ensuring that prescribed operator actions can be performed within acceptable times as described in the procedures. Changes to EOPs and ONOPs are validated using one of the following methods:

- Simulator validation – performed on the simulator using scenarios for the procedures to be validated.
- Walk-through method – involves a step-by-step enactment of the steps required in the procedure with no changes to plant configuration or operational conditions.
- Table-top method – involves a step-by-step review of the procedure using appropriate reference materials to determine plant or equipment response to the procedure actions.
- Reference Method – involves the comparison of a procedure with the accepted validation of the opposite unit procedure, an identical or near identical system operation, a procedure for similar equipment or old style procedure upon which the procedure being validated has been based.

The procedure requires that the simulator method be used for major EOP and ONOP changes unless the conditions can not be duplicated or the change is to a Functional Restoration EOP. In accordance with this process, the EOP changes

discussed in the response to IHPB-1.3 above will be validated through the simulator method.

Modifications requiring simulator changes are being scheduled such that the modification can be tested on the simulator and the operators trained to them prior to implementation in the plant. This will include EPU-generated changes to control room controls and displays. All simulator modeling changes are scheduled for installation and testing before each unit's uprate implementation outage. This will allow operator simulator training on the unit in the uprated configuration before heatup and startup.

The Plant Nuclear Safety Committee review and approval is required for all changes to EOPs and ONOPs.

The integration of the HFE screening and evaluation into the modification process, the formalized verification and validation of EOPs and ONOPs, and the SAT-based training process applied to modifications, operator actions and interfaces, including time-critical operator actions, will ensure that the effects of the proposed EPU on operator performance and the available time for operator actions are addressed and not adversely affected by the proposed EPU.

IHPB-1.6 In Topic 3. "Changes to Control Room Controls, Displays and Alarms", several lists are provided, but in two cases, it appears that the associated list was inadvertently omitted.

a. The licensee stated, "Alarm response procedures (Units 3 and 4) will require revision as a result of setpoint changes:" Where is the list of procedures?

b. The licensee stated, "Plant computer setpoints will be changed for the following parameters:" Where is the list of parameters?

The statements referred to in Topic 3 were not meant to imply that lists of alarm response procedures or plant computer setpoints were changing as a result of EPU. As described in the response to IHPB-1.5 above, the station has formal programs and processes for identifying changes to procedures including alarm response procedures and plant computer setpoint changes resulting from station modifications. These changes will undergo HFE evaluations and be validated in accordance with the plant's verifications and validation process. Furthermore, operators will receive pre-implementation classroom and simulator training on the uprate configuration including for changes to alarm response procedures and plant computer setpoint changes.

IHPB-1.7 Will EPU require any operator interface changes from analog to digital? If so, list those digital changes that change, add, or delete displays used by operators, discuss any differences between the analog display and the digital display, and justify equivalency or describe the advantages of digital display to the operator(s).

Operator interface changes from analog to digital will be formally identified through the Human Factors Engineering checklist. The identification of such

changes will then trigger an HFE Evaluation as described in the response to IHPB-1.5 above. Operations department personnel will be involved early in this process. They will participate in the evaluation and provide formal review and approval. The HFE Evaluation will ensure that any deviations from applicable NUREG-0700 and HFE practices are justified. This will include providing assurance that any such changes are beneficial to the operators. These changes will be verified and validated and incorporated into the applicable procedures. The operators will then receive classroom and simulator-based training on them before implementation.

IHPB-1.8 Will detailed operator training be completed, including making required modifications to the plant simulator and incorporating EPU-required changes into the lead plant procedures and operator training program, prior to implementation of the EPU at the lead unit?

Yes. As described in the responses to IHPB-1.1 and IHPB-1.5 above, modifications to the plant simulator, the incorporation of changes to operating procedures and the training program resulting from the EPU, and operator training on these procedures will be completed prior to implementation of the EPU at the lead unit.

References

1. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2010-113), "License Amendment Request No. 205: Extended Power Uprate (EPU)," (TAC Nos. ME4907 and ME4908), October 21, 2010.
2. Email from J. Paige (NRC) to T. Abbatiello (FPL), "Turkey Point EPU - Health Physics and Human Performance (IHPB) Request for Additional Information - Round 1," January 25, 2011