



L-2015-198  
10 CFR 52.3

July 17, 2015

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

Re: Florida Power & Light Company  
Proposed Turkey Point Units 6 and 7  
Docket Nos. 52-040 and 52-041  
Supplement to Revised Response to NRC Request for Additional Information Letter No. 061 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

References:

1. NRC Letter to FPL dated May 17, 2012, Request for Additional Information Letter No. 61 Related to SRP Section 03.07.01 Seismic Design Parameters for the Turkey Point Units 6 and 7 Combined License Application
2. FPL Letter L-2015-085 to NRC dated April 2, 2015, Voluntary Revised Response to NRC Request for Additional Information Letter No. 061 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters

Florida Power & Light Company (FPL) provides, as an attachment to this letter, its supplement to the revised response to the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) 03.07.01-15 provided in Reference 1. The response to RAI 03.07.01-15 provided in Reference 2 has been updated to include additional information requested by the NRC staff during an audit of Section 3.7 on June 22 – 25, 2015.

If you have any questions, or need additional information, please contact me at 561-691-7490.

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

Executed on July 17, 2015.

Sincerely,

A handwritten signature in blue ink, appearing to read 'William Maher', is written over a horizontal line.

William Maher  
Senior Licensing Director – New Nuclear Projects

WDM/RFB

Florida Power & Light Company  
700 Universe Boulevard, Juno Beach, FL 33408

DO97  
NRO

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Attachment : FPL Revised Response to NRC RAI No. 03.07.01-15 (eRAI 6432)

cc:

PTN 6 & 7 Project Manager, AP1000 Projects Branch 1, USNRC DNRL/NRO  
Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, Turkey Point Plant 3 & 4



**NRC RAI Letter No. PTN-RAI-LTR-061**

**SRP Section: 03.07.01 – Seismic Design Parameters**

Questions from Structural Engineering Branch 1

**NRC RAI Number: 03.07.01-15 (eRAI 6432)**

In Revision 3 of the applicant's FSAR, (aka. TPG-1000-S2R-802, "Turkey Point Site-Specific Seismic Evaluation Report") Figures 2.1-3 through 8 show the response spectra at the foundation level. These spectra have  $z_{pa}$  values that are less than the 0.1g at the foundation depth that is required by Appendix S to 10 CFR Part 50. (Note that this issue was previously identified in a question on Figure 2.5.2-252 regarding the input motion at Elevation -35). The response spectra shown in those figures form the basis of the input motions that are used to compute the in-structure response spectra (ISRS) from the SSI analyses. Meeting the Appendix S requirements would appear to require adjusting the input motions upward which would result in margins, as compared to the DCD ISRS at the six key locations, to reduce significantly from those indicated in the tables mentioned above. Additionally, it is noted in the AP1000 DCD that the CSDRS is at finished grade. Since the input motion at the foundation level is less than the minimum required by Appendix S, the surface spectra shown in Appendix 3JJ, which neglect any adjustment required to satisfy Appendix S, appear to be understated. Thus, the applicant is requested to provide a discussion as to how the results provided in Appendix 3JJ and Figures 2.1-3 through 8 meet the Appendix S to 10 CFR Part 50 requirements for minimum seismic input at the foundation level.

**FPL RESPONSE:**

**INTRODUCTION**

This response is a supplement and revision to information previously submitted to the NRC in FPL Letter L-2015-085, "Voluntary Revised Response to NRC Request for Additional Information Letter No. 061 (eRAI 6432) Related to SRP Section 03.07.01 – Seismic Design Parameters," dated April 2, 2015. Subsequent to that submittal, necessary additional clarifications to the revised response to RAI 03.07.01-15 were identified during the NRC's audit of FSAR Sections 3.7 and 3.8 of the Turkey Point Units 6 & 7 Combined License Application on June 22 – 25, 2015. This submittal contains the necessary clarifications, indicated by revision bars, to the revised response to RAI 03.07.01-15 and corresponding Associated COLA Revisions. In addition, as part of this review, it was identified that revisions are needed to the new FSAR Tables 3JJ-211 and 3JJ-212 provided in Reference 1 to reflect corrected values for the concrete fill and adjacent layer elevations and thicknesses. The corrected values were used in the supporting analysis, therefore there is no affect on the sensitivity analysis in the revised response provided in Reference 1.



## **Revisions to FPL Letter L-2015-085**

### **Part C: Sensitivity Assessment of Updated Site Characterization on Site Response and Strain Compatible Properties**

Under Part C of the response, the second paragraph of Attachment 2, Page 42 of 172, in FPL Letter L-2015-085 is revised as follows:

In the sensitivity assessments, the profiles based on the initial and updated site properties were considered. For each profile the site response was computed as the average of the lower-bound (LB), best-estimate (BE), and upper-bound (UB) S-wave velocity profiles. These results were compared with the initial site response analyses which used 60 simulated profiles to rigorously capture the uncertainty in the site properties. The response spectra were developed by adjusting the initial response spectra by a ratio of the newly computed response spectra, which were computed with just three profiles (i.e., LB, BE, and UB). The ratio was smoothed and limited to be greater than unity. Only best-estimate strain-compatible properties were developed due to the limited number of profiles considered in the sensitivity analyses. **The “estimated BE” is computed as the logarithmic mean of the three profiles (LB, BE and UB).**

### **Part D: Sensitivity Evaluation of Updated Site Characterization on SSI Analyses**

#### **Part D.1 – Sensitivity Evaluation of Updated Site Characterization on NI SSI Analysis**

Under Part D.1 of the response, the second paragraph of Attachment 2, Page 45 of 172, in FPL Letter L-2015-085 is revised as follows:

Updated three-dimensional (3D) SASSI SSI sensitivity analyses of the Nuclear Island were performed utilizing the updated site characterization data and included both the initial and updated strain compatible BE soil/rock, grouted rock and lean concrete fill properties. The initial and updated BE NI and FAR layer thickness, unit weight, shear wave velocity (Vs), compression wave velocity (Vp) and damping values, from the ground surface to the simulated half-space at a depth of about 600 feet are presented in Tables D.1-1 to D.1-6. Figures D.1-1 through D.1-6 graphically present the TPNP Vs, Vp and damping profiles over the approximately 600-foot depth. **The “estimated BE” in these figures is computed as the logarithmic mean of the three profiles (LB, BE and UB).**

This response is PLANT SPECIFIC.

#### **References:**

1. FPL Letter L-2015-085 to NRC dated April 2, 2015, Voluntary Revised Response to NRC Request for Additional Information Letter No. 061 (eRAI 6432) Related to SRP Section 03.07.01 - Seismic Design Parameters



#### ASSOCIATED COLA REVISIONS:

The Associated COLA Revisions provided in Attachment 2 to FPL Letter 2015-085 will be included in a future COLA revision with the following additional changes shown by bold red and strikethrough fonts.

In the third paragraph of Attachment 2, Page 109 of 172, the COLA Revisions identified for FSAR Subsection 2.5.2.5.1 will be changed as follows:

In order to capture the uncertainty in this estimate, a coefficient of variation of 1.5 applied to the shear modulus was used to provide upper and lower bounds. These values are based on an assumed unit weight of 130 pounds per cubic foot (pcf) and a **normalized** Standard Penetration Test (SPT) resistance (**normalized with respect to overburden pressure**) of  $N_1 = 30$  **blows per foot** for the fill. ~~Unit weights for the upper 636 feet (194 meters) soil and rock, i.e., including fill, are in the range of 120 pcf to 130 pcf.~~

In the second paragraph of Attachment 2, Page 118 of 172, the new FSAR Subsection 3JJ.7 will be updated as follows:

In the RG 1.60 analyses, strain-compatible profiles were developed using full-column iterative site response to achieve a RG 1.60 spectrum at the foundation elevation. **The approach used here is iterative and consists of running the site response analysis using P-SHAKE, with modified rock motions (input at bedrock) convolved through each of the 3 profiles (LB, BE and UB) and computing the response at the foundation elevation horizon. The analysis is repeated, modifying the input rock motion each time, until the 5% damped mean ARS at the foundation horizon closely matches the SSE.** As an example of this process, the first and tenth iterative of the FAR profile with "updated" site profiles are shown in Figures 3JJ-273 and 3JJ-274, respectively. ~~Although there is still some discrepancy in the fit at frequencies above 20 Hz, because the RG 1.60 spectral shape is not a seismologically plausible ground motion (rather, it is a design spectrum). However, the difference is not expected to influence the results.~~ **As shown in Figure 3JJ-274, the computed spectra closely match the RG 1.60 spectrum, particularly at low- to mid-range frequencies which are important for strain-compatible soil properties. This** The iterative process is applied to both the "initial" and "updated" NI and FAR site columns. The best-estimate SSI profiles were computed using the logarithmic mean of the LB, BE, and UB S-wave velocity profiles.

In the fourth paragraph of Attachment 2, Page 118 of 172, the new FSAR Subsection 3JJ.7 will be revised as follows:

The associated strain compatible S-wave, P-wave and damping profiles for the RG 1.60 and site-specific input motions are shown in Figures 3JJ-275 through 3JJ-286. **The "estimated BE" in these figures is computed as the logarithmic mean of the three profiles (LB, BE and UB).**



In Attachment 2, Page 121 of 172, the new FSAR Table 3JJ-211 will be revised as follows:

**Table 3JJ-211**  
**Site Profiles for the "Initial" Models**

Far Field (FAR)			Nuclear Island (NI)		
Layer	Elevation Top [ft]	Thickness [ft]	Layer	Elevation Top [ft]	Thickness [ft]
Fill	25.5	30.5	Fill	25.5	41.5*
Miami Limestone	-5.0	26.0	Concrete	-16.0*	<del>19.0</del> <del>25.0</del> *
Key Largo Limestone	-31.0	90.0	Key Largo Limestone	<del>-35.0</del> <del>41.0</del> *	<del>86.0</del> <del>80.0</del> *
Tamiami/Hawthorn	-121.0	330.0	Tamiami/Hawthorn	-121.0	330.0
Hawthorn Lower	-451.0	160.0	Hawthorn Lower	-451.0	160.0
Sonic-log data (linear)	-611.0	11364.0	Sonic-log data (linear)	-611.0	11364.0
Half-space	-11975.0	--	Half-space	-11975.0	--

\* Indicates different values between the FAR and NI profiles.

In Attachment 2, Page 122 of 172, the new FSAR Table 3JJ-212 will be revised as follows:

**Table 3JJ-212**  
**Site Profiles for the Sensitivity Model**

Far Field (FAR)			Nuclear Island (NI)		
Layer	Elevation Top [ft]	Thickness [ft]	Layer	Elevation Top [ft]	Thickness [ft]
Fill	25.5	30.2*	Fill	25.5	41.5*
Miami Limestone	-4.7*	22.2*	Concrete	-16.0*	<b>19.0</b> <b>25.0</b> *
Key Largo Limestone	-26.9*	22.5*	Key Largo Limestone	<b>-35.0</b> <b>41.0</b> *	<b>14.4</b> <b>8.4</b> *
Fort Thompson Limestone	-49.4	66.0	Fort Thompson Limestone	-49.4	66.0
Upper Tamiami Formation	-115.4	52.2	Upper Tamiami Formation	-115.4	52.2
Lower Tamiami Formation	-167.6	50.2	Lower Tamiami Formation	-167.6	50.2
Peace River Formation	-217.8	237.0	Peace River Formation	-217.8	237.0
Arcadia	-454.8	156.2	Arcadia	-454.8	156.2
Sonic-log data (linear)	-611.0	11364.0	Sonic-log data (linear)	-611.0	11364.0
Half-space	-11975.0	--	Half-space	-11975.0	--

\* Indicates different values between the FAR and NI profiles.



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**ASSOCIATED ENCLOSURES:**

None