

## **PMTurkeyCOLPEm Resource**

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**From:** Comar, Manny  
**Sent:** Thursday, October 30, 2014 9:06 AM  
**To:** TurkeyCOL Resource  
**Subject:** FW: FPL Letter L-2014-283 Signed 10-03-2014: NRC RAI Letter No. 019 (eRAI 5691) Voluntary Revised Response  
**Attachments:** L-2014-283 Signed 10-03-2014 - Voluntary Revised Response to NRC RAI Letter No. 019 (eRAI 5691).pdf

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**From:** Burski, Raymond [<mailto:RAYMOND.BURSKI@fpl.com>]  
**Sent:** Friday, October 03, 2014 3:46 PM  
**To:** Williamson, Alicia; Maher, William; Comar, Manny; Hoeg, Tim; Terry, Tomeka; McCree, Victor  
**Subject:** FPL Letter L-2014-283 Signed 10-03-2014: NRC RAI Letter No. 019 (eRAI 5691) Voluntary Revised Response

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  
Voluntary Revised Response to NRC Request for Additional Information Letter  
No. 019 (eRAI 5691) Standard Review Plan Section 02.05.02 Vibratory Ground Motion

Reference:

1. FPL Letter L-2011-234 to NRC dated June 24, 2011, Response to NRC Request for Additional Information Letter No. 019 (eRAI 5691) Standard Review Plan Section 02.05.02 Vibratory Ground Motion

FPL and NRC Staff have been engaged in interactions concerning the information provided in Reference 1.

As a result of these interactions Florida Power & Light Company (FPL) is providing, as an attachment to this letter, its revised response to the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) 02.05.02-1. The attachment identifies changes that will be made in a future revision of the Turkey Point Units 6 and 7 Combined License Application (if applicable).

The revised RAI response provides the current version of the response in order to facilitate the NRC Staff's review. The previous response to RAI Parts a through d and the data (OSM) to RAI 02.05.02-1 remain unchanged from the responses provided in FPL Letter L-2011-234 as discussed in the attached FPL Response.

The information provided on the enclosed optical storage medium (OSM) is to assist the NRC staff with their review, and is not convertible to PDF format. Consequently, the information provided herein deviates from the standards for electronic submission in NRC Guidance Document "Guidance for Electronic Submissions to the NRC" dated May 27, 2011.

*Note: The OSM is not included with this letter*

Ray Burski

NNP Licensing Engineer  
Turkey Point Units 6&7 COLA Project  
New Nuclear Projects  
Florida Power & Light Company  
700 Universe Blvd  
Juno Beach, FL 33408

(O) 561-694-4496

(C) 504-909-6436

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**Mail Envelope Properties** (377CB97DD54F0F4FAAC7E9FD88BCA6D0019E139303F7)

**Subject:** FW: FPL Letter L-2014-283 Signed 10-03-2014: NRC RAI Letter No. 019 (eRAI 5691) Voluntary Revised Response  
**Sent Date:** 10/30/2014 9:05:33 AM  
**Received Date:** 10/30/2014 9:05:41 AM  
**From:** Comar, Manny

**Created By:** Manny.Comar@nrc.gov

**Recipients:**  
"TurkeyCOL Resource" <TurkeyCOL.Resource@nrc.gov>  
Tracking Status: None

**Post Office:** HQCLSTR01.nrc.gov

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	3001	10/30/2014 9:05:41 AM
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**Recipients Received:**



L-2014-283  
10 CFR 52.3

October 3, 2014

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  
Voluntary Revised Response to NRC Request for Additional Information Letter  
No. 019 (eRAI 5691) Standard Review Plan Section 02.05.02 Vibratory Ground Motion

Reference:

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Proposed Turkey Point Units 6 and 7  
Docket Nos. 52-040 and 52-041  
L-2014-283 Page 2

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 October 3, 2014.

Sincerely,



William Maher  
Senior Licensing Director – New Nuclear Projects

WDM/RFB

Attachment: FPL Response to NRC RAI No. 02.05.02-1 (eRAI 5691)

Enclosure: 1 OSM Containing a Single Zip File: RAI\_02.05.02-1\_ENCLOSURE.zip

cc: (without OSM)

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-019**

**SRP Section: 02.05.02 – VIBRATORY GROUND MOTION**

Questions from Geosciences and Geotechnical Engineering Branch 1 (RGS1)

**NRC RAI Number: 02.05.02-1 (eRAI 5691)**

In order for the staff to independently evaluate the TPNPP earthquake catalog, seismic sources, hazard results and the site response calculations, in accordance with NUREG-0800, Standard Review Plan, Chapter 2.5.2, "Vibratory Ground Motion", and Regulatory Guide (RG) 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion," please provide digital files (ascii files) of the following:

- a. All seismic sources' geographic coordinates.
- b. Turkey Point earthquake catalog, including Phase I and Phase II data sets. Also include dependent events identified in Phase I and Phase II updates.
- c. Hazard curves of all individual seismic sources for each EPRI team as well as hazard curves of individual Caribbean seismic sources.
- d. The base case shear wave velocity profile and base case shear modulus reduction and damping curves used in the site amplification function calculations. In addition, provide the mean site amplification factors.

**FPL RESPONSE:**

In response to an NRC letter to FPL dated April 25, 2011, Request for Additional Information Letter No. 019 Related to SRP Section 02.05.02 - Vibratory Ground Motion for the Turkey Point Nuclear Plant Units 6 and 7 Combined License Application, FPL submitted a response to eRAI 5691 (RAI 02.05.02-1) in FPL letter, L-2011-234, to the NRC dated June 24, 2011, "Response to NRC Request for Additional Information Letter No. 019 (eRAI 5691) SRP Section 02.05.02 - Vibratory Ground Motion." Subsequent to that submittal, as discussed in FPL Letter L-2014-111, additional subsurface investigations were conducted at the Turkey Point Units 6 & 7 site during the summer of 2013. In addition, studies were performed which confirmed that the data from the additional subsurface investigations would not require any changes to the inputs for the ground motion response spectra (GMRS) and foundation input response spectra (FIRS) used in the Central and Eastern United States Seismic Source Characterization (CEUS SSC) or the site-specific soil structure interaction (SSI) analyses performed for Turkey Point Units 6 & 7. These studies have been placed in the FPL electronic reading room in a folder titled: NRC July 29, 2014 Public Meeting Support Documents, and are available for review. Therefore, the responses to Parts a through d to RAI 02.05.02-1 remain unchanged from the responses provided in FPL Letter L-2011-234 as provided below:

**Part a:**

The 26 seismic sources' geographic coordinates are presented in three ASCII files:

- File a1: **EPRI\_Source\_Geometries.txt**: EPRI sources
- File a2: **Charleston\_Source\_Geometries.txt**: Charleston sources
- File a3: **Caribbean\_Source\_Geometries.txt**: Caribbean sources

Table 1 specifies the source geometries in the three files. The geometry of a given source is specified as a series of {longitude, latitude} pairs, where latitude is +°N for all files, longitude is +°W for the EPRI sources, and longitude is +°E for Charleston and Caribbean sources.

In the file of Caribbean sources, the source type, fault type, and dip information precedes the geometry information in the header for each source.

Table 1. Geometries for PSHA seismic sources	
Source Geometry Files	Source Name in the Files (FSAR)
<b>EPRI_Source_Geometries.txt</b>	Bechtel BZ1 Bechtel Supplemental Source Dames & Moore 20 Dames & Moore Supplemental Source Law Engineering 126 Law Engineering Supplemental Source Rondout Associates 51 Rondout Associates C01 (49-05) Rondout Associates Supplemental Source Woodward-Clyde Consultants BG (BG-35) Weston Geophysical 107 Weston Geophysical Supplemental Source
<b>Charleston_Source_Geometries.txt</b>	C-A (Charleston A) C-B (Charleston B) C-BP (Charleston B') C-C (Charleston C)
<b>Caribbean_Source_Geometries.txt</b>	Cuba area Northern Hispaniola – Eastern fault Northern Hispaniola – Western fault Oriente – Eastern fault Oriente – Western fault Plantain Garden – Enriquillo fault Septentrional fault Swan Islands – Eastern fault Swan Islands – Western fault Walton – Duanvale fault

**Part b:**

In response to the NRC RAI 02.05.02-1 (eRAI 5691), part (b), two **EXCEL** files are provided:

- File b1: **FPL\_Phase1\_EqCat.xls**: all, dependent, and mainshock earthquakes for the Phase 1 seismicity catalog
- File b2: **FPL\_Phase2\_EqCat.xls**: all, dependent, and mainshock earthquakes for the Phase 2 seismicity catalog

As presented in the FSAR Section 2.5.2, the Phase 1 seismicity catalog focuses on the southern continental U.S. and the Gulf of Mexico, and the Phase 2 seismicity catalog focuses on the Caribbean region. The two digital **EXCEL** files contain the dependent or non-mainshock events, as requested. These dependent or non-mainshock events are excluded in tables or figures presented in the FSAR.

FSAR Figure 2.5.2-201 presents the original EPRI catalog of mainshock earthquakes for both Phase 1 and Phase 2 catalog developments. The plot of the Phase 1 catalog is of the mainshock earthquakes with  $R_{mb} \geq 3.0$  through mid-February 2008 in the geographic window of  $100^\circ$  to  $65^\circ$  W,  $22^\circ$  to  $35^\circ$  N. The plot of the Phase 2 catalog is of the mainshock earthquakes with  $M_W \geq 3.0$  through mid-March 2008 in the geographic window of  $100^\circ$  to  $65^\circ$  W,  $15^\circ$  to  $24^\circ$  N. In the  $2^\circ$  latitude overlap area for the Phase 1 and Phase 2 catalogs, the Phase 2 catalog is shown in FSAR Figure 2.5.2-201.

FSAR Table 2.5.2-202 lists the mainshock earthquakes of the Phase 1 catalog (697 events), and Table 2.5.2-203 lists a subset of mainshock earthquakes of the Phase 2 catalog with  $M_W \geq 6.0$  (246 events).

In response to part (b) of NRC's RAI request, the two **EXCEL** files presented as part of this response for the Phase 1 and Phase 2 seismicity catalogs are developed to include the dependent events.

<b>Phase 1 Seismicity Catalog Including Dependent Events</b>	
The <b>EXCEL</b> file <b>FPL_Phase1_EqCat.xls</b> contains three worksheets listing the total Phase 1 earthquake catalog, as well as sub-catalogs of the dependent and mainshock events	
Worksheet <b><i>AllEQs_Final</i></b>	Phase 1 catalog of 1,204 main and dependent earthquakes with $R_{mb} \geq 3.0$ or Intensity $\geq 4$
Worksheet <b><i>AllDependent_Final</i></b>	Phase 1 catalog of 507 dependent earthquakes with $R_{mb} \geq 3$ or Intensity $\geq 4$
Worksheet <b><i>FPL_Phase1_Catalog_Final</i></b>	Phase 1 catalog of 697 main earthquakes with $R_{mb} \geq 3$ or Intensity $\geq 4$



<b>Phase 2 Seismicity Catalog Including Dependent Events</b>	
The <b>EXCEL</b> file <b>FPL_Phase2_EqCat.xls</b> contains three worksheets listing the total Phase 2 earthquake catalog, as well as sub-catalogs of the dependent and mainshock events	
Worksheet <b><i>FPL-Phase2-EQCat:</i></b>	Phase 2 catalog of 30,878 main and dependent earthquakes with $M_W \geq 3.0$
Worksheet <b><i>DependentEQs</i></b>	Phase 2 catalog of 22,131 dependent earthquakes with $M_W \geq 3.0$
Worksheet <b><i>MainEQs</i></b>	Phase 2 catalog of 8,747 main earthquakes with $M_W \geq 3.0$

**Part c:**

The mean seismic hazard curves for the seven spectral ordinates [0.5Hz, 1.0Hz, 2.5Hz, 5.0Hz, 10Hz, 25Hz, 100Hz (PGA: peak ground acceleration)] for each of the 26 seismic sources [see Table 1 in Part (a) response] are presented in the **EXCEL** file:

- File c1: **MEAN\_HAZARD\_BY\_SOURCE.XLS**: seismic hazard curves of all individual seismic sources for each EPRI team, as well as hazard curves of individual Charleston model seismic sources and the Caribbean seismic sources

In this **EXCEL** file, following several rows of description of the data in the worksheet, a cell in Column A indicates the spectral ordinate for the hazard curves given in the following 26 rows – e.g., “h\_0p5hz” corresponds to the seismic hazard curves for the 0.5Hz spectral ordinate. The first row of the set of 26 rows contains the headers, while the next 25 rows contain the digital values for the 25-point seismic hazard curves. Column B is the single column of common hazard curve amplitudes for that spectral ordinate in units of ‘g’. Columns C through AB are the 26 seismic hazard curve frequencies for the 26 seismic sources in units of mean annual frequency of exceedance (MAFE). The column order of the seismic hazard curve frequencies [Columns C through AB] are given in the same order corresponding to the seismic sources listed in Table 1 of Part (a) of this RAI response.

The pattern of spectral ordinate label in the Column A cell and the following set of seismic hazard curve headers and digital values is repeated six more times to provide the seismic hazard curves for all 26 seismic sources and for all seven spectral ordinates.

Note that EPRI team source hazards are conditional on the respective team and must be weighted by 1/6 to calculate the contribution to total mean hazard for the site.

**Part d:**

The specific site response input and results requested are presented in two ASCII files:

- File d1: **FPL\_COL\_BaseCaseProfile.txt**: includes the base case profile dynamic properties, including soil layer thickness, unit weight, low-strain damping ratio, and shear wave velocity, as well as strain-dependent property curves assigned to each layer
- File d2: **FPL\_COL\_GMRS\_Amplification.txt**: includes the mean site amplification factors corresponding to the four seismic motions [high-frequency @  $10^{-4}$ , low-frequency @  $10^{-4}$ , high-frequency @  $10^{-5}$ , low-frequency @  $10^{-5}$ ] for the GMRS horizon

In addition, the input acceleration response spectra at the 9200 fps rock level are provided in the following four files:

- File d3: **FPL\_COL\_LF4.tgt**: includes the 5% damped input acceleration response spectrum at rock for the low frequency motion at 1E-4 annual probability of exceedance
- File d4: **FPL\_COL\_HF4.tgt**: includes the 5% damped input acceleration response spectrum at rock for the high frequency motion at 1E-4 annual probability of exceedance
- File d5: **FPL\_COL\_LF5.tgt**: includes the 5% damped input acceleration response spectrum at rock for the low frequency motion at 1E-5 annual probability of exceedance
- File d6: **FPL\_COL\_HF5.tgt**: includes the 5% damped input acceleration response spectrum at rock for the high frequency motion at 1E-5 annual probability of exceedance

This response is PLANT SPECIFIC.

**References:**

None

**ASSOCIATED COLA REVISIONS:**

None