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JAFP-13-0122
September 12, 2013

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

Subject: Entergy Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident – 1.5 Year Response for CEUS Sites

James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
License No. DPR-059

- Reference:**
1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012 (ML12053A340)
 2. NRC Letter, Endorsement of EPRI Final Draft Report 1025287, "Seismic Evaluation Guidance," dated February 15, 2013 (ML12319A074)
 3. EPRI Report 1025287, Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic (ML12333A170)
 4. NEI Letter to NRC, Proposed Path Forward for NTF Recommendation 2.1: Seismic Reevaluations, dated April 9, 2013 (ML13101A345)
 5. NRC Letter, EPRI Final Draft Report XXXXXX, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Near-Term Task Force Recommendation 2.1: Seismic," as an Acceptable Alternative to the March 12, 2012, Information Request for Seismic Reevaluations, dated May 7, 2013 (ML13106A331)
 6. Entergy letter to NRC, Entergy's Response to NRC Request For Information Pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated April 29, 2013 (JAFP-13-0056)

Dear Sir or Madam:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1 of Reference 1 requested each addressee in the Central and Eastern United States (CEUS) to

submit a written response consistent with the requested seismic hazard evaluation information (items 1 through 7) by September 12, 2013. On February 15, 2013, NRC issued Reference 2, endorsing the Reference 3 industry guidance for responding to Reference 1. Section 4 of Reference 3 identifies the detailed information to be included in the seismic hazard evaluation submittals.

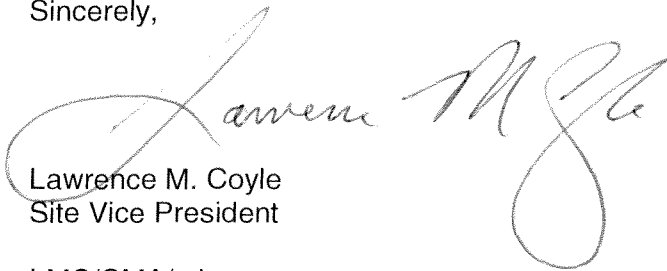
On April 9, 2013, NEI submitted Reference 4 to NRC, requesting NRC agreement to delay submittal of some of the CEUS seismic hazard evaluation information so that an update to the EPRI (2004, 2006) ground motion attenuation model could be completed and used to develop that information. NEI proposed that descriptions of subsurface materials and properties and base case velocity profiles (items 3a and 3b in Section 4 of Reference 3) be submitted to NRC by September 12, 2013, with the remaining seismic hazard and screening information submitted to NRC by March 31, 2014. In Reference 5, NRC agreed with this recommendation. Reference 6 contained Entergy's commitment to follow the approach described in Reference 4.

The attachment to this letter contains the requested descriptions of subsurface materials and properties and base case velocity profiles for JAF. The information provided in the attachment to this letter is considered an interim product of seismic hazard development efforts being performed for the industry by EPRI. The complete and final seismic hazard report(s) for JAF will be provided to the NRC in our seismic hazard submittal by March 31, 2014, in accordance with Reference 5.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact Chris M. Adner, Licensing Manager, at 315-349-6766.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 12th day of September, 2013.

Sincerely,



Lawrence M. Coyle
Site Vice President

LMC/CMA/mh

Attachment: JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

cc: NRC Regional Administrator
NRC Resident Inspector
Mr. Mohan Thadani, Senior Project Manager
Ms. Bridget Frymire, NYSPSC
Mr. Francis J. Murray Jr., President NYSERDA

JAFP-13-0122

Attachment

JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles
(5 Pages)

Table of Contents

	Page
JAF Plant Description	1
References	1
Table 1: Summary of Geotechnical Profile Data for JAF	2
Figure 1: Vs profiles for FitzPatrick Site	3
Table 2: Layer thicknesses, depths, and Vs for 3 profiles, JAF site	4-5

JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

JAF Plant Description

The basic information used to create the site geologic profile at the Fitzpatrick Nuclear Power Plant (JAF) is shown in Table 1. This profile was developed using information documented in Ref. 1. As indicated in FSAR documents, the safe-shutdown earthquake (SSE) Control Point is defined at the top of Ordovician Oswego sandstone, elevation 260', and the profile was modeled up to the surface. For dynamic properties of soft rock layers, modulus and damping curves were represented with 2 models. The first model used rock curves taken from Ref. 2, the second model assumed linear behavior. These dynamic property models were weighted equally. For dynamic properties of the basal till layer, modulus and damping curves were also represented with 2 models. The first model used soil curves taken from Ref. 2, the second model used soil curves taken from Ref. 3 and Ref. 4. These dynamic property models were weighted equally. To model the profile, rock modulus and damping curves from Ref. 2 were paired with soil modulus and damping curves from Ref. 2, and linear rock modulus and damping curves were paired with soil modulus and damping curves from Ref. 3 and Ref. 4.

The 3 base-case shear-wave velocity profiles used to model amplification at the site are shown in Figure 1. Profiles 1, 2, and 3 are weighted 0.4, 0.3, and 0.3, respectively. Thicknesses, depths, and shear-wave velocities (V_s) corresponding to each profile are shown in Table 2.

References

1. Entergy Corp. (2012). *EPRI Data Request for Site Amplification Calculations June 2012*, Informal Rept. No. LO-WTHQN-2011-01114 CA #64 Response, transmitted to EPRI July 2012; supplemented by email dated August 12, 2013.
2. EPRI (1993). *Guidelines for Determining Design Basis Ground Motions*, Elec. Power Res. Inst., Palo Alto, CA, Rept. TR-102293, Vol. 1—5.
3. Silva, W.J., N. A. Abrahamson, G.R. Toro, and C. Costantino (1996). *Description and Validation of the Stochastic Ground Motion Model*, Rept. submitted to Brookhaven Natl. Lab., Assoc. Universities Inc., Upton NY 11973, Contract No. 770573.
4. Walling, M.A., W.J., Silva and N.A. Abrahamson (2008). "Nonlinear Site Amplification Factors for Constraining the NGA Models," *Earthquake Spectra*, 24 (1) 243-255.

JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

Table 1
Summary of Geotechnical Profile Data for JAF

Depth Range (ft)	Soil/Rock Description	Density (pcf)	Shear Wave Velocity (fps)	Compressional Wave Velocity (fps)	Poisson's Ratio
0 – 12 (1)	Basal till consisting of silt, sand, gravel, cobbles and some clay (1)				
12 – 130 (1)	Ordovician Oswego sandstone (3)		7,000 – 8,000 (2)	13,000 – 15,000 (2)	0.29 – 0.32 (2)
> 130 (1)	Lorraine group – predominantly shale with some sandstone (1)		≥ 9,300 (2)		
~ 845 (2)	Trenton limestone and sandstone strata of Ordovician and Cambrian age (2)		≥ 9,300 (2)		
> 1700 (3)	Precambrian rock consisting of schists, gneiss, and granite (3)				

A geophysical survey for JAF – 1968 (Ref. J.O. 02268.5036 Rev. 0, Procedures and Criteria for Generation of In-Structure Response Spectra – James A. FitzPatrick Nuclear Power Plant)

- Compressional wave velocities range from 11,046 to 15,093 ft/sec
- Shear wave velocities range from 5,559 to 8,020 ft/sec
- Young's Modulus, shear modulus and Poisson's ratio calculated from these values. Average value of Young's modulus is 4.2×10^6 psi. Average value of shear modulus is 1.6×10^6 psi.

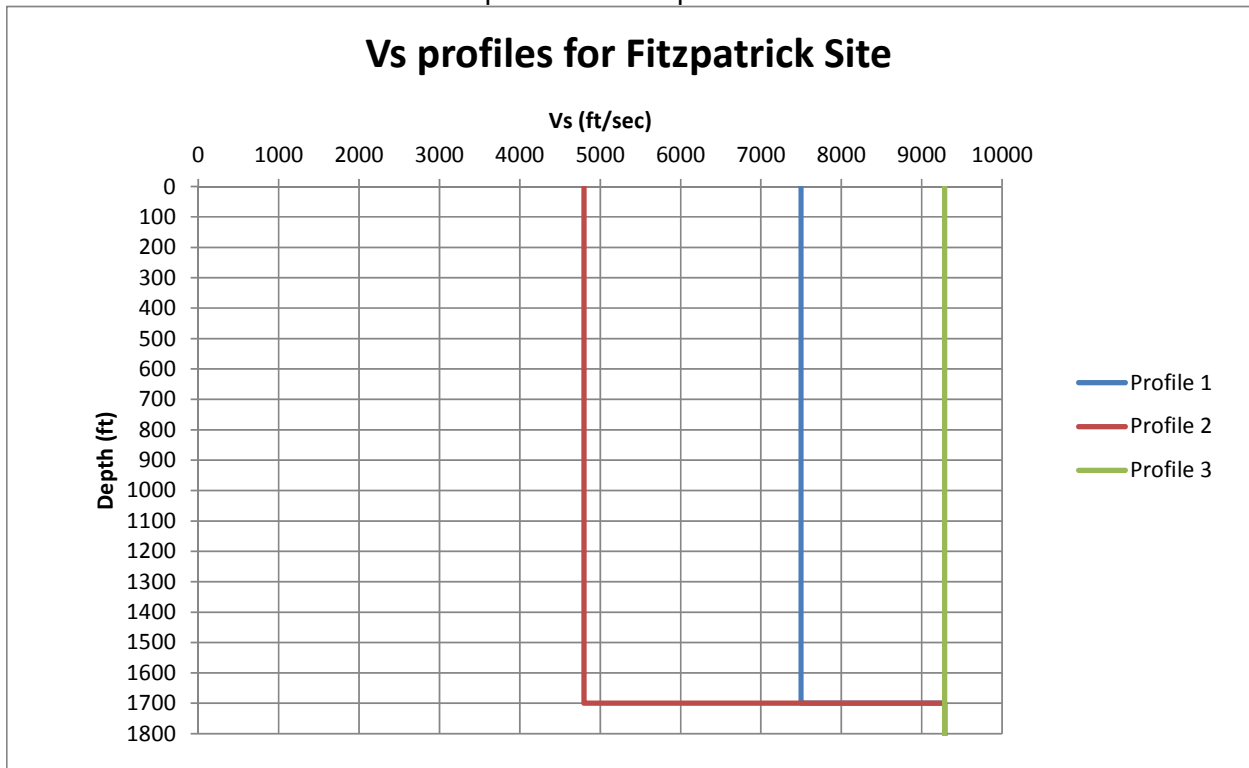
(1) Values from JAF FSAR, Section 2.5

(2) Values from EPRI Hazard Results Using the USGS 2008 Seismic Source Model, October 2011

(3) Values from JAF PSAR, Section 2.5

JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

Figure 1
Vs profiles for Fitzpatrick site



JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

Table 2
Layer thicknesses, depths, and Vs for 3 profiles, JAF site

Profile 1			Profile 2			Profile 3		
thickness(ft)	depth (ft)	Vs(ft/s)	thickness(ft)	depth (ft)	Vs(ft/s)	thickness(ft)	depth (ft)	Vs(ft/s)
	0	7500		0	4800		0	9285
6.0	6.0	7500	6.0	6.0	4800	6.0	6.0	9285
6.0	12.0	7500	6.0	12.0	4800	6.0	12.0	9285
8.0	20.0	7500	8.0	20.0	4800	8.0	20.0	9285
10.9	30.9	7500	10.9	30.9	4800	10.9	30.9	9285
18.9	49.8	7500	18.9	49.8	4800	18.9	49.8	9285
18.9	68.7	7500	18.9	68.7	4800	18.9	68.7	9285
18.9	87.6	7500	18.9	87.6	4800	18.9	87.6	9285
18.9	106.5	7500	18.9	106.5	4800	18.9	106.5	9285
13.5	120.0	7500	13.5	120.0	4800	13.5	120.0	9285
24.3	144.3	7500	24.3	144.3	4800	24.3	144.3	9285
18.9	163.2	7500	18.9	163.2	4800	18.9	163.2	9285
18.9	182.1	7500	18.9	182.1	4800	18.9	182.1	9285
18.9	201.0	7500	18.9	201.0	4800	18.9	201.0	9285
18.9	219.9	7500	18.9	219.9	4800	18.9	219.9	9285
18.9	238.8	7500	18.9	238.8	4800	18.9	238.8	9285
11.2	250.0	7500	11.2	250.0	4800	11.2	250.0	9285
26.8	276.8	7500	26.8	276.8	4800	26.8	276.8	9285
18.9	295.7	7500	18.9	295.7	4800	18.9	295.7	9285
18.9	314.6	7500	18.9	314.6	4800	18.9	314.6	9285
18.9	333.5	7500	18.9	333.5	4800	18.9	333.5	9285
18.9	352.4	7500	18.9	352.4	4800	18.9	352.4	9285
18.9	371.3	7500	18.9	371.3	4800	18.9	371.3	9285
18.9	390.2	7500	18.9	390.2	4800	18.9	390.2	9285
18.9	409.1	7500	18.9	409.1	4800	18.9	409.1	9285
18.9	428.0	7500	18.9	428.0	4800	18.9	428.0	9285
18.9	446.9	7500	18.9	446.9	4800	18.9	446.9	9285
18.9	465.8	7500	18.9	465.8	4800	18.9	465.8	9285
18.9	484.7	7500	18.9	484.7	4800	18.9	484.7	9285
15.3	500.0	7500	15.3	500.0	4800	15.3	500.0	9285
22.5	522.5	7500	22.5	522.5	4800	22.5	522.5	9285
56.7	579.2	7500	56.7	579.2	4800	56.7	579.2	9285
56.7	635.9	7500	56.7	635.9	4800	56.7	635.9	9285
56.7	692.6	7500	56.7	692.6	4800	56.7	692.6	9285
56.7	749.2	7500	56.7	749.2	4800	56.7	749.2	9285
56.7	805.9	7500	56.7	805.9	4800	56.7	805.9	9285
56.7	862.6	7500	56.7	862.6	4800	56.7	862.6	9285

JAF Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles

Table 2
Layer thicknesses, depths, and Vs for 3 profiles, JAF site

Profile 1			Profile 2			Profile 3		
thickness(ft)	depth (ft)	Vs(ft/s)	thickness(ft)	depth (ft)	Vs(ft/s)	thickness(ft)	depth (ft)	Vs(ft/s)
56.7	919.3	7500	56.7	919.3	4800	56.7	919.3	9285
56.7	976.0	7500	56.7	976.0	4800	56.7	976.0	9285
56.7	1032.7	7500	56.7	1032.7	4800	56.7	1032.7	9285
56.7	1089.4	7500	56.7	1089.4	4800	56.7	1089.4	9285
56.7	1146.1	7500	56.7	1146.1	4800	56.7	1146.1	9285
56.7	1202.8	7500	56.7	1202.8	4800	56.7	1202.8	9285
56.7	1259.5	7500	56.7	1259.5	4800	56.7	1259.5	9285
56.7	1316.2	7500	56.7	1316.2	4800	56.7	1316.2	9285
56.7	1372.9	7500	56.7	1372.9	4800	56.7	1372.9	9285
56.7	1429.6	7500	56.7	1429.6	4800	56.7	1429.6	9285
56.7	1486.3	7500	56.7	1486.3	4800	56.7	1486.3	9285
56.7	1542.9	7500	56.7	1542.9	4800	56.7	1542.9	9285
56.7	1599.6	7500	56.7	1599.6	4800	56.7	1599.6	9285
56.7	1656.3	7500	56.7	1656.3	4800	56.7	1656.3	9285
43.6	1699.9	7500	43.6	1699.9	4800	43.6	1699.9	9285
3280.8	4980.8	9285	3280.8	4980.8	9285	3280.8	4980.8	9285