



ND-2012-0030  
May 16, 2012

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

Subject: **PSEG Early Site Permit Application**  
**Docket No. 52-043**  
**Response to Request for Additional Information, RAI No. 43, Vibratory**  
**Ground Motion**

- References:
- 1) PSEG Power, LLC letter to USNRC, Application for Early Site Permit for the PSEG Site, dated May 25, 2010
  - 2) RAI No. 43, SRP Section: 02.05.02 – Vibratory Ground Motion, dated December 12, 2011 (eRAI 6162)
  - 3) PSEG Power, LLC Letter No. ND-2012-0002 to USNRC, Response to Request for Additional Information, RAI No. 43, Vibratory Ground Motion, dated January 10, 2012
  - 4) PSEG Power, LLC Letter No. ND-2012-0006 to USNRC, Response to Request for Additional Information, RAI No. 43, Vibratory Ground Motion, dated January 25, 2012
  - 5) PSEG Power, LLC Letter No. ND-2012-0009 to USNRC, Response to Request for Additional Information, RAI No. 43, Vibratory Ground Motion, dated February 9, 2012
  - 6) PSEG Power, LLC Letter No. ND-2012-0018 to USNRC, Response to Request for Additional Information, RAI No. 43, Vibratory Ground Motion, dated March 15, 2012
  - 7) PSEG Power, LLC Letter No. ND-2012-0026 to USNRC, Withdrawal of Response to Request for Additional Information, RAI No. 43, Vibratory Ground Motion, dated April 3, 2012

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The purpose of this letter is to respond to the request for additional information (RAI) identified in Reference 2 above. This RAI addresses Vibratory Ground Motion, as described in Subsection 2.5.2 of the Site Safety Analysis Report (SSAR), as submitted in Part 2 of the PSEG Site Early Site Permit Application, Revision 0.

Enclosure 1 provides our response for RAI No. 43, Question No. 02.05.02-9. Our response to Question 02.05.02-9 does not require a revision to the SSAR. Enclosure 2 includes a CD-ROM containing the calculations requested in Question No. 02.05.02-9. The response to RAI No. 43, Question No. 02.05.02-9 was originally provided in Reference 4, but withdrawn in Reference 7. The response to RAI No. 43, Question 02.05.02-9 provided here is identical to the response provided in Reference 4, except that there is no request for it to be withheld from public disclosure.

The response to RAI No. 43, Question Nos. 02.05.02-3, 02.05.02-6, 02.05.02-7 and 02.05.02-8 was provided in Reference 3. The response to RAI No. 43, Question No. 02.05.02-2 was provided in Reference 5. The response to RAI No. 43, Question Nos. 02.05.02-1 and 02.05.02-4 was provided in Reference 6.

The response to RAI No. 43, Question No. 02.05.02-5 will be provided by July 20, 2012.

No new regulatory commitments are established in this submittal.

If any additional information is needed, please contact David Robillard, PSEG Nuclear Development Licensing Engineer, at (856) 339-7914.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 16th day of May, 2012.

Sincerely,



James Mallon  
Early Site Permit Manager  
Nuclear Development  
PSEG Power, LLC

- Enclosure 1: Response to NRC Request for Additional Information, RAI No. 43, Question No. 02.05.02-9, SRP Section: 2.5.2 – Vibratory Ground Motion
- Enclosure 2: CD-ROM containing calculations requested in Question No. 02.05.02-9

cc: USNRC Project Manager, Division of New Reactor Licensing, PSEG Site  
(w/enclosures)  
USNRC Environmental Project Manager, Division of Site and Environmental  
Reviews (w/enclosures)  
USNRC Region I, Regional Administrator (w/enclosures)

**PSEG Letter ND-2012-0030, dated May 16, 2012**

**ENCLOSURE 1**

**RESPONSE to RAI No. 43**

**QUESTION No. 02.05.02-9**

## **Response to RAI No. 43, Question 02.05.02-9:**

In Reference 2, the NRC staff asked PSEG for information regarding the Vibratory Ground Motion, as described in Subsection 2.5.2 of the Site Safety Analysis Report. The specific request for Question 02.05.02-9 was:

*The staff had an opportunity to briefly review several calculation packages developed to support the PSEG PSHA calculations during its site audit conducted on September 29-30, 2011. In accordance with NUREG-0800, Standard Review Plan, Section 2.5.2, "Vibratory Ground Motion," and Regulatory Guide (RG) 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion,"*

- a. *to enable the staff to fully evaluate the technical details of the calculations presented therein, please provide copies of the following calculation packages or provide extensive summaries of the calculation packages, which includes descriptions of objectives, inputs, assumptions, procedures, calculations, analyses, figures, tables, and/or results where necessary.*
  - #2251-ESP-REI-2047-ACR-034 "Calculation of Site Response for the PSEG site".
  - #2251-ESP-REI-2047-ACR-040 "Calculation of Smooth Vertical GMRS for the PSEG site".
  - #2251-ESP-REI-2047-ACR-044 "Replication of 1989 EPRI-SOG Hazard for Individual Law Engineering Sources".
  - #2251-ESP-REI-2047-ACR-014 "PSEG Site Hazard Contribution by Source".
  - #2251-ESP-REI-2047-ACR-046 "Sensitivity of Site Amplification Factors for the PSEG Site ESP to Revisions in Degradation Curves".
- b. *Calculation Package # 2047-ACR-005 states that large seismic sources were modified to include only portions of them up to 500km distance from the PSEG site for computational efficiency. Please justify why this simplification is adequate. Has there been any sensitivity study showing the impacts of such simplifications on the total hazard curves?*

## **PSEG Response to NRC RAI:**

- a. Enclosure 2 includes a CD-ROM containing the above requested calculations.
- b. The modification of large seismic sources to include only portions within 500 km of the PSEG site is justified by SSAR Figures 2.5.2-25 through 2.5.2-30. These figures show the deaggregation of hazard by magnitude and distance. For the 10E-4 deaggregation of 1 Hz and 2.5 Hz seismic hazard (SSAR Figure 2.5.2-25), which of the six figures referenced above, shows the hazard most affected by distant contributors to seismic ground motions, contributions beyond 400 km are indistinguishable from zero. The exception in SSAR Figure 2.5.2-25 is for earthquakes occurring in the Charleston and Charlevoix seismic zones, which can

produce large earthquakes and lie about 800 to 1000 km (500 to 600 mi) from the PSEG Site. SSAR Figures 2.5-25 through 2.5-30 indicate that inclusion in the seismic hazard calculations of sources of small and moderate earthquakes at distances beyond 500 km would have an insignificant effect on seismic hazard.

Further justification for limiting calculations to 500 km for sources of small and moderate earthquakes comes from the EPRI-SOG study, which recommends that "...active sources (e.g., the central Virginia seismic zone) lying within 200 km of the site must be considered..." and "Sources at Charleston, South Carolina, New Madrid, Missouri, and La Malbaie, Quebec, must be considered if they lie within 500 km of the site." (SSAR Reference 2.5.2-36, page 9-9). The region of high seismicity near La Malbaie, Quebec is commonly referred to as the Charlevoix seismic zone. In the case of the PSEG Site, seismic sources were included to a distance of 500 km, and the Charleston and Charlevoix seismic zones were included at distances of 800 to 1000 km, all of which exceed the recommendations of the EPRI-SOG study.

**Associated PSEG Site ESP Application Revisions:**

None.

**PSEG Letter ND-2012-0030, dated May 16, 2012**

**ENCLOSURE 2**

**CD-ROM containing calculations requested in Question No. 02.05.02-9**

