5 Interim Actions

Based on the screening evaluation outcome described in Section 4, the SSE exceeds the GMRS in the frequency range of 1 Hz to 10 Hz. Therefore, Braidwood station is not required to implement interim actions. However, due to high frequency exceedances, additional testing and confirmations are required.

5.1 Expedited Seismic Evaluation Process

Since the SSE exceeds the GMRS in the frequency range from 1 Hz to 10 Hz, the expedited seismic evaluation described in EPRI Report 3002000704 (Reference 4) will not be performed.

5.2 Interim Evaluation of Seismic Hazard

Consistent with NRC letter dated February 20, 2014, (Reference 26) the seismic hazard reevaluations presented herein are distinct from the current design and licensing bases of Braidwood station. Therefore, the results do not call into question the operability or functionality of SSCs and are not reportable pursuant to 10 CFR 50.72, "Immediate notification requirements for operating nuclear power reactors" (Reference 35), and 10 CFR 50.73, "Licensee event report system" (Reference 36).

The NRC letter also requests that licensees provide an interim evaluation or actions to demonstrate that the plant can cope with the reevaluated hazard while the expedited approach and risk evaluations are conducted. In response to that request, NEI letter dated March 12, 2014 (Reference 27), provides seismic core damage risk estimates using the updated seismic hazards for the operating nuclear plants in the Central and Eastern United States. These risk estimates continue to support the following conclusions of the NRC GI-199 Safety/Risk Assessment (Reference 28):

> Overall seismic core damage risk estimates are consistent with the Commission's Safety Goal Policy Statement because they are within the subsidiary objective of 10^{-4}/year for core damage frequency. The GI-199 Safety/Risk Assessment, based in part on information from the U. S. Nuclear Regulatory Commission's (NRC's) Individual Plant Examination of External Events (IPEEE) program, indicates that no concern exists regarding adequate protection and that the current seismic design of operating reactors provides a safety margin to withstand potential earthquakes exceeding the original design basis.

Braidwood station is included in the March 12, 2014 risk estimates (Reference 27). Using the methodology described in the NEI letter, all plants were shown to be below 10^{-4}/year; thus, the above conclusions apply.

5.3 Seismic Walkdown Insights

In response to NTTF Recommendation 2.3, the 50.54(f) letter (Reference 1) requested licensees to perform seismic walkdowns in order to, in the context of seismic response: 1) verify that the current plant configuration is consistent with the licensing basis, 2) verify the adequacy of current strategies, monitoring, and maintenance programs, and 3) identify degraded, nonconforming, or unanalyzed conditions. Seismic walkdown guidance (EPRI 1025286, Reference 31) was developed and endorsed by the NRC as a means for all plants to provide a uniform and acceptable industry response to NTTF 2.3 seismic walkdowns.

Seismic walkdowns in response to NTTF 2.3 for Braidwood station have been performed as documented in References 12 and 17. The seismic walkdowns for Braidwood station determined that no adverse anchorage conditions, no adverse seismic spatial interactions, and no other adverse seismic conditions existed for equipment examined during the walkdowns. Any potentially degraded, nonconforming, or unanalyzed conditions identified during the seismic walkdown program were assessed in accordance with the plant corrective action program, and were identified as being minor issues.

Plant vulnerabilities identified in the Braidwood station seismic Individual Plant Examination of External Events (IPEEE) (Reference 19) were assessed as part of the seismic walkdowns (References 12 and 17). Plant improvements were identified in Sections 3 and 7 of the IPEEE (Reference 19). Table G-1 in Appendix G of the seismic walkdown reports (References 12 and 17) lists the plant improvements, the IPEEE proposed resolution, the actual resolution and resolution date. The seismic walkdown reports confirm that no open items exist as a result of the seismic portion of the IPEEE program (References 19 and 30).

5.4 Beyond-Design-Basis Seismic Insights

A beyond-design-basis seismic margin assessment (SMA) was performed for the seismic portion of the Braidwood station IPEEE using the EPRI SMA methodology, EPRI NP-6041-SL (Reference 32) with the enhancements identified in NUREG-1407 (Reference 33), where applicable (Reference 19). Braidwood station is a focused scope 0.3g peak ground acceleration (PGA) plant per NUREG-1407 (Reference 33). The review level earthquake (RLE) was a median rock NUREG/CR-0098 (Reference 34) spectrum anchored to 0.3g PGA (Reference 19).

The SMA determined that all items on the success path equipment list (SPEL) were found to have a seismic capacity greater than or equal to 0.30g PGA, and the plant was assigned a seismic capacity High Confidence Low Probability of Failure (HCLPF) of 0.3g PGA. No programmatic issues were identified as a result of the SMA. No weak links were identified among buildings, distribution systems (which include piping and cable trays), or relays. Given Braidwood's design, and based on experiences with actual industrial facilities in moderate to severe earthquakes, it was concluded that Braidwood station possesses significant margin with respect to its design basis earthquake (Reference 19).

6
Conclusions

In accordance with the 50.54(f) letter (Reference 1) request for information, a seismic hazard and screening evaluation was performed for the Braidwood Nuclear Generating Station. This reevaluation followed the SPID guidance (Reference 3) in order to develop a GMRS for the site. The GMRS was developed solely for the purpose of screening for additional evaluation requirements in accordance with the SPID (Reference 3). The new GMRS represents a beyond-design-basis seismic demand and does not constitute a change in the plant design and licensing basis.

The screening evaluation comparison demonstrates that the SSE exceeds the GMRS in the frequency range of 1 Hz to 10 Hz. Therefore, a risk evaluation and a spent fuel pool evaluation will not be performed.

Based on the screening requirements in the ESEP Guidance (Reference 4), Braidwood station will not perform an expedited seismic evaluation (ESEP) because the SSE exceeds the GMRS in the 1 Hz to 10 Hz frequency range.

The GMRS exceeds the SSE in the frequency range beyond 10 Hz. Therefore, high frequency confirmations will be performed. The high frequency confirmations will be performed in accordance with the schedule provided by the industry to the NRC in the April 9, 2013 letter (Reference 6), and as endorsed by the NRC (Reference 25).

7

References

1. NRC Letter (E. J. Leeds) to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, *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,* March 2012

2. NRC Regulations Title 10, Code of Federal Regulations, Part 50, "Domestic Licensing of Production and Utilization Facilities"

3. EPRI Technical Report 1025287, *Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, dated November, 2012

4. EPRI Technical Report 3002000704, *Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, dated May 2013

5. NRC Regulations Title 10, Code of Federal Regulations, Part 100, "Reactor Site Criteria"

6. NEI Letter (A. R. Pietrangelo) to the NRC, *Proposed Path Forward for NTTF Recommendation 2.1: Seismic Reevaluations,* April 9, 2013

7. EPRI Technical Report 1021097 (NUREG-2115), *Central and Eastern United States Seismic Source Characterization for Nuclear Facilities*, dated January 2012

8. EPRI Technical Report 3002000717, *EPRI (2004, 2006) Ground-Motion Model (GMM) Review Project*, dated June 2013

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10. Braidwood Station Updated Final Safety Analysis Report (UFSAR), Revision 14

11. EPRI RSM-121313-029, LCI Report, *Braidwood Seismic Hazard and Screening Report, dated December 23, 2013*

12. NRC Correspondence RS-12-159, Enclosure 1, Braidwood Generating Station Seismic Walkdown Report Unit 1, November, 2012

13. U. S. Nuclear Regulatory Commission Reg. Guide 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," 1973

14. *Review of Existing Site Response Parameter Data for the Exelon Nuclear Fleet—Revision 1,* Simpson Gumpertz & Heger Report No. 128018-R-01, dated July 17, 2012, transmitted by letter from J. Clark to J. Hamel on July 18, 2012

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16. Exelon Generation Company letter to the NRC, *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*, RS-13-102, dated April 29, 2013

17. NRC Correspondence RS-12-159, Enclosure 2, Braidwood Generating Station Seismic Walkdown Report Unit 2, November, 2012

18. Attachment 1 to Letter from Glen T. Kaegi of Exelon to U. S. Nuclear Regulatory Commission, dated September 12, 2013 "Braidwood Station, Units 1 and 2, Descriptions of Subsurface Materials and Properties and Base Case Velocity Profiles (RS-13-205, RA-13-075, and TMI-13-104)

19. Exelon, Braidwood Nuclear Power Station Units 1 and 2, *Individual Plant Examination of External Events for Severe Accident Vulnerabilities*, June, 27, 1997

20. EPRI Report 1015108, *Program on Technology Innovation: The Effects of High-Frequency Ground Motion on Structures, Components and Equipment in Nuclear Power Plants*, June 2007

21. EPRI Report 1015109, *Program on Technology Innovation: Seismic Screening of Components Sensitive to High-Frequency Vibratory Motions*, October 2007

22. EPRI Report NP-7498, *Industry Approach to Severe Accident Policy Implementation*, November, 1991

23. EPRI Report 3002000706, *High Frequency Program, Phase 1 Seismic Test Summary*, September 2013

24. NRC Letter, Endorsement of EPRI Final Draft Report 1025287, "Seismic Evaluation Guidance," dated February 15, 2013

25. 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

26. NRC Letter (E. J. Leeds) to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, February 20, 2014

27. NEI Letter (A. R. Pietrangelo) to the NRC, *Seismic Risk Evaluations for Plants in the Central and Eastern United States,* March 12, 2014

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30. Staff Evaluation By The Office of Nuclear Reactor Regulation Related to Generic Letter 88-20, Supplement 4, Individual Plant Examination of External Events, Braidwood Nuclear Power Station, May 30, 2001

31. EPRI Technical Report 1025286, *Seismic Walkdown Guidance for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Seismic*, June 2012

32. EPRI NP-6041-SL, *A Methodology for Assessment of Nuclear Power Plant Seismic Margin (Revision 1)*, dated August 1991

33. NRC NUREG-1407, *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities*, April 1991

34. NRC NUREG/CR-0098, *Development of Criteria for Seismic Review of Selected Nuclear Power Plants*, May 1978

35. Title 10 Code of Federal Regulations Part 50 Section 72, "Immediate notification requirements for operating nuclear power reactors"

36. Title 10 Code of Federal Regulations Part 50 Section 73, "Licensee event report system"

A
Additional Tables

Table A-1a: Mean and fractile seismic hazard curves for 100 Hz (PGA) at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	7.09E-02	3.52E-02	5.12E-02	7.13E-02	9.11E-02	9.93E-02
0.001	5.15E-02	2.16E-02	3.42E-02	5.05E-02	6.93E-02	8.23E-02
0.005	1.46E-02	5.27E-03	8.12E-03	1.32E-02	2.01E-02	3.01E-02
0.01	7.19E-03	2.22E-03	3.47E-03	6.17E-03	1.02E-02	1.64E-02
0.015	4.36E-03	1.16E-03	1.82E-03	3.52E-03	6.45E-03	1.10E-02
0.03	1.52E-03	2.88E-04	4.77E-04	1.04E-03	2.29E-03	4.77E-03
0.05	6.31E-04	9.37E-05	1.64E-04	3.84E-04	9.51E-04	2.07E-03
0.075	3.07E-04	4.01E-05	7.45E-05	1.82E-04	4.70E-04	9.93E-04
0.1	1.83E-04	2.25E-05	4.31E-05	1.08E-04	2.84E-04	5.91E-04
0.15	8.70E-05	9.65E-06	1.98E-05	5.20E-05	1.36E-04	2.84E-04
0.3	2.26E-05	2.07E-06	4.56E-06	1.34E-05	3.68E-05	7.23E-05
0.5	7.39E-06	5.27E-07	1.29E-06	4.25E-06	1.23E-05	2.42E-05
0.75	2.76E-06	1.49E-07	4.01E-07	1.49E-06	4.70E-06	9.51E-06
1.	1.29E-06	5.27E-08	1.55E-07	6.45E-07	2.22E-06	4.63E-06
1.5	4.03E-07	1.01E-08	3.42E-08	1.69E-07	6.93E-07	1.53E-06
3.	4.09E-08	3.79E-10	1.46E-09	1.08E-08	6.45E-08	1.74E-07
5.	5.70E-09	1.11E-10	1.64E-10	9.93E-10	8.00E-09	2.49E-08
7.5	9.82E-10	9.11E-11	1.11E-10	1.82E-10	1.23E-09	4.37E-09
10.	2.53E-10	8.12E-11	9.11E-11	1.11E-10	3.37E-10	1.21E-09

Table A-1b: Mean and fractile seismic hazard curves for 25 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	7.51E-02	4.31E-02	5.58E-02	7.55E-02	9.37E-02	9.93E-02
0.001	5.76E-02	2.84E-02	3.95E-02	5.66E-02	7.55E-02	8.85E-02
0.005	1.95E-02	7.77E-03	1.13E-02	1.79E-02	2.68E-02	3.84E-02
0.01	1.05E-02	3.68E-03	5.42E-03	9.24E-03	1.46E-02	2.22E-02
0.015	6.82E-03	2.13E-03	3.19E-03	5.83E-03	9.93E-03	1.53E-02
0.03	2.73E-03	6.73E-04	1.04E-03	2.07E-03	4.19E-03	7.13E-03
0.05	1.21E-03	2.49E-04	4.01E-04	8.47E-04	1.87E-03	3.52E-03
0.075	6.08E-04	1.11E-04	1.87E-04	4.07E-04	9.37E-04	1.79E-03
0.1	3.69E-04	6.36E-05	1.10E-04	2.46E-04	5.75E-04	1.08E-03
0.15	1.83E-04	3.05E-05	5.50E-05	1.25E-04	2.88E-04	5.27E-04
0.3	5.45E-05	8.72E-06	1.67E-05	3.90E-05	8.72E-05	1.51E-04
0.5	2.12E-05	3.19E-06	6.36E-06	1.55E-05	3.47E-05	5.83E-05
0.75	9.39E-06	1.31E-06	2.68E-06	6.93E-06	1.57E-05	2.57E-05
1.	5.05E-06	6.45E-07	1.36E-06	3.68E-06	8.47E-06	1.42E-05
1.5	1.96E-06	2.13E-07	4.77E-07	1.38E-06	3.37E-06	5.75E-06
3.	3.08E-07	2.13E-08	5.50E-08	1.90E-07	5.35E-07	1.01E-06
5.	6.39E-08	2.68E-09	8.00E-09	3.37E-08	1.10E-07	2.35E-07
7.5	1.61E-08	4.63E-10	1.40E-09	6.93E-09	2.68E-08	6.54E-08
10.	5.62E-09	1.67E-10	4.07E-10	2.04E-09	9.24E-09	2.42E-08

Table A-1c: Mean and fractile seismic hazard curves for 10 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	8.49E-02	5.75E-02	6.64E-02	8.47E-02	9.93E-02	9.93E-02
0.001	7.07E-02	4.19E-02	5.20E-02	7.03E-02	8.98E-02	9.93E-02
0.005	2.72E-02	1.18E-02	1.64E-02	2.57E-02	3.79E-02	4.77E-02
0.01	1.47E-02	5.75E-03	8.23E-03	1.34E-02	2.10E-02	2.76E-02
0.015	9.74E-03	3.47E-03	5.12E-03	8.72E-03	1.42E-02	1.90E-02
0.03	4.37E-03	1.23E-03	1.90E-03	3.73E-03	6.73E-03	9.65E-03
0.05	2.17E-03	4.98E-04	8.12E-04	1.69E-03	3.47E-03	5.50E-03
0.075	1.16E-03	2.29E-04	3.90E-04	8.60E-04	1.84E-03	3.14E-03
0.1	7.24E-04	1.29E-04	2.25E-04	5.12E-04	1.15E-03	2.01E-03
0.15	3.58E-04	5.66E-05	1.04E-04	2.49E-04	5.66E-04	1.01E-03
0.3	1.01E-04	1.32E-05	2.60E-05	6.83E-05	1.67E-04	2.92E-04
0.5	3.74E-05	4.07E-06	8.60E-06	2.49E-05	6.45E-05	1.13E-04
0.75	1.62E-05	1.42E-06	3.19E-06	1.04E-05	2.84E-05	5.05E-05
1.	8.59E-06	6.17E-07	1.49E-06	5.27E-06	1.53E-05	2.76E-05
1.5	3.29E-06	1.62E-07	4.43E-07	1.87E-06	6.00E-06	1.11E-05
3.	5.14E-07	1.08E-08	4.01E-08	2.32E-07	9.51E-07	1.92E-06
5.	1.07E-07	1.11E-09	5.05E-09	3.73E-08	1.95E-07	4.37E-07
7.5	2.70E-08	2.07E-10	8.47E-10	7.03E-09	4.63E-08	1.18E-07
10.	9.38E-09	1.13E-10	2.60E-10	1.95E-09	1.51E-08	4.19E-08

Table A-1d: Mean and fractile seismic hazard curves for 5 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	8.95E-02	6.26E-02	7.03E-02	8.98E-02	9.93E-02	9.93E-02
0.001	7.85E-02	4.90E-02	6.00E-02	7.89E-02	9.79E-02	9.93E-02
0.005	3.33E-02	1.49E-02	2.04E-02	3.19E-02	4.63E-02	5.66E-02
0.01	1.77E-02	7.34E-03	1.04E-02	1.67E-02	2.49E-02	3.14E-02
0.015	1.15E-02	4.56E-03	6.64E-03	1.08E-02	1.64E-02	2.10E-02
0.03	4.97E-03	1.69E-03	2.57E-03	4.50E-03	7.45E-03	9.79E-03
0.05	2.38E-03	6.93E-04	1.07E-03	2.01E-03	3.68E-03	5.35E-03
0.075	1.21E-03	3.14E-04	4.90E-04	9.65E-04	1.87E-03	3.01E-03
0.1	7.21E-04	1.72E-04	2.72E-04	5.50E-04	1.10E-03	1.87E-03
0.15	3.32E-04	7.03E-05	1.16E-04	2.46E-04	5.05E-04	8.85E-04
0.3	8.19E-05	1.46E-05	2.64E-05	6.09E-05	1.32E-04	2.22E-04
0.5	2.82E-05	4.37E-06	8.47E-06	2.07E-05	4.70E-05	7.66E-05
0.75	1.16E-05	1.55E-06	3.19E-06	8.35E-06	1.95E-05	3.28E-05
1.	5.94E-06	6.93E-07	1.49E-06	4.13E-06	1.01E-05	1.74E-05
1.5	2.17E-06	1.95E-07	4.50E-07	1.40E-06	3.79E-06	6.73E-06
3.	3.12E-07	1.34E-08	3.79E-08	1.60E-07	5.50E-07	1.11E-06
5.	6.15E-08	1.23E-09	4.07E-09	2.35E-08	1.05E-07	2.46E-07
7.5	1.50E-08	2.01E-10	5.83E-10	4.19E-09	2.39E-08	6.45E-08
10.	5.10E-09	1.11E-10	1.82E-10	1.15E-09	7.55E-09	2.29E-08

Table A-1e: Mean and fractile seismic hazard curves for 2.5 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	8.30E-02	5.50E-02	6.45E-02	8.23E-02	9.93E-02	9.93E-02
0.001	6.70E-02	3.79E-02	4.77E-02	6.54E-02	8.72E-02	9.93E-02
0.005	2.16E-02	9.11E-03	1.27E-02	2.01E-02	3.09E-02	3.95E-02
0.01	1.03E-02	4.07E-03	5.83E-03	9.51E-03	1.49E-02	1.92E-02
0.015	6.39E-03	2.29E-03	3.42E-03	5.91E-03	9.37E-03	1.21E-02
0.03	2.49E-03	6.64E-04	1.05E-03	2.13E-03	3.95E-03	5.58E-03
0.05	1.04E-03	2.16E-04	3.63E-04	7.89E-04	1.69E-03	2.76E-03
0.075	4.54E-04	8.12E-05	1.40E-04	3.19E-04	7.34E-04	1.29E-03
0.1	2.37E-04	3.95E-05	6.93E-05	1.62E-04	3.79E-04	6.93E-04
0.15	9.10E-05	1.38E-05	2.53E-05	6.17E-05	1.46E-04	2.68E-04
0.3	1.79E-05	2.19E-06	4.43E-06	1.20E-05	3.01E-05	5.42E-05
0.5	5.64E-06	5.35E-07	1.20E-06	3.57E-06	9.65E-06	1.77E-05
0.75	2.23E-06	1.60E-07	3.90E-07	1.32E-06	3.84E-06	7.34E-06
1.	1.12E-06	6.26E-08	1.67E-07	6.17E-07	1.95E-06	3.90E-06
1.5	4.07E-07	1.51E-08	4.50E-08	1.95E-07	7.13E-07	1.51E-06
3.	5.79E-08	9.51E-10	3.42E-09	2.01E-08	9.65E-08	2.39E-07
5.	1.10E-08	1.60E-10	4.25E-10	2.76E-09	1.69E-08	4.77E-08
7.5	2.51E-09	1.02E-10	1.32E-10	5.05E-10	3.47E-09	1.13E-08
10.	8.07E-10	9.11E-11	1.11E-10	1.90E-10	1.07E-09	3.63E-09

Table A-1f: Mean and fractile seismic hazard curves for 1 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	5.37E-02	2.49E-02	3.47E-02	5.27E-02	7.23E-02	8.47E-02
0.001	3.43E-02	1.38E-02	2.04E-02	3.33E-02	4.77E-02	5.83E-02
0.005	7.90E-03	2.84E-03	4.37E-03	7.34E-03	1.13E-02	1.49E-02
0.01	3.81E-03	1.05E-03	1.77E-03	3.42E-03	5.83E-03	7.89E-03
0.015	2.36E-03	4.98E-04	8.85E-04	2.01E-03	3.84E-03	5.50E-03
0.03	8.19E-04	1.05E-04	2.04E-04	5.58E-04	1.44E-03	2.42E-03
0.05	2.81E-04	2.72E-05	5.50E-05	1.60E-04	4.77E-04	9.51E-04
0.075	1.00E-04	8.47E-06	1.74E-05	5.20E-05	1.60E-04	3.57E-04
0.1	4.47E-05	3.52E-06	7.34E-06	2.25E-05	7.13E-05	1.62E-04
0.15	1.37E-05	9.79E-07	2.16E-06	6.64E-06	2.22E-05	4.90E-05
0.3	2.02E-06	1.02E-07	2.53E-07	8.98E-07	3.42E-06	7.66E-06
0.5	5.81E-07	1.69E-08	4.83E-08	2.16E-07	9.37E-07	2.42E-06
0.75	2.20E-07	3.57E-09	1.18E-08	6.54E-08	3.42E-07	9.65E-07
1.	1.08E-07	1.15E-09	4.07E-09	2.64E-08	1.60E-07	4.90E-07
1.5	3.71E-08	2.57E-10	8.47E-10	6.64E-09	5.05E-08	1.72E-07
3.	4.81E-09	9.37E-11	1.18E-10	4.77E-10	4.98E-09	2.22E-08
5.	8.56E-10	8.12E-11	9.11E-11	1.27E-10	7.45E-10	3.73E-09
7.5	1.86E-10	8.12E-11	9.11E-11	1.11E-10	1.98E-10	8.00E-10
10.	5.79E-11	8.12E-11	9.11E-11	1.11E-10	1.20E-10	2.88E-10

Table A-1g: Mean and fractile seismic hazard curves for 0.5 Hz at Braidwood, 5% of critical damping (Reference 11)

AMPS(g)	MEAN	0.05	0.16	0.50	0.84	0.95
0.0005	2.46E-02	1.13E-02	1.62E-02	2.35E-02	3.28E-02	4.07E-02
0.001	1.40E-02	6.09E-03	8.85E-03	1.31E-02	1.90E-02	2.49E-02
0.005	3.43E-03	8.35E-04	1.46E-03	3.09E-03	5.42E-03	7.34E-03
0.01	1.69E-03	2.13E-04	4.43E-04	1.29E-03	3.01E-03	4.50E-03
0.015	9.92E-04	8.12E-05	1.87E-04	6.36E-04	1.84E-03	3.09E-03
0.03	2.92E-04	1.21E-05	3.09E-05	1.25E-04	5.12E-04	1.15E-03
0.05	8.82E-05	2.60E-06	6.64E-06	2.92E-05	1.38E-04	3.84E-04
0.075	2.87E-05	7.13E-07	1.79E-06	8.12E-06	4.07E-05	1.25E-04
0.1	1.21E-05	2.72E-07	6.93E-07	3.19E-06	1.72E-05	5.27E-05
0.15	3.39E-06	6.54E-08	1.82E-07	8.23E-07	5.05E-06	1.44E-05
0.3	4.43E-07	4.98E-09	1.64E-08	8.72E-08	6.09E-07	2.16E-06
0.5	1.20E-07	6.54E-10	2.35E-09	1.62E-08	1.36E-07	6.36E-07
0.75	4.36E-08	1.72E-10	4.98E-10	3.90E-09	4.13E-08	2.32E-07
1.	2.08E-08	1.11E-10	2.01E-10	1.38E-09	1.67E-08	1.10E-07
1.5	6.92E-09	9.11E-11	1.11E-10	3.19E-10	4.25E-09	3.42E-08
3.	8.36E-10	8.12E-11	9.11E-11	1.11E-10	3.63E-10	3.47E-09
5.	1.41E-10	8.12E-11	9.11E-11	1.11E-10	1.20E-10	5.42E-10
7.5	2.93E-11	8.12E-11	9.11E-11	1.11E-10	1.11E-10	1.67E-10
10.	8.80E-12	8.12E-11	9.11E-11	1.11E-10	1.11E-10	1.13E-10

Table A-2a: Amplification functions for Braidwood (Reference 11), 5% of critical damping

100 Hz (PGA)	Median AF	Sigma ln(AF)	25 Hz	Median AF	Sigma ln(AF)	10 Hz	Median AF	Sigma ln(AF)	5 Hz	Median AF	Sigma ln(AF)
1.00E-02	1.20E+00	6.92E-02	1.30E-02	9.93E-01	7.57E-02	1.90E-02	1.13E+00	1.39E-01	2.09E-02	1.48E+00	1.30E-01
4.95E-02	9.69E-01	7.70E-02	1.02E-01	6.32E-01	1.29E-01	9.99E-02	1.07E+00	1.59E-01	8.24E-02	1.46E+00	1.37E-01
9.64E-02	8.81E-01	8.01E-02	2.13E-01	5.67E-01	1.47E-01	1.85E-01	1.04E+00	1.60E-01	1.44E-01	1.45E+00	1.40E-01
1.94E-01	8.11E-01	8.35E-02	4.43E-01	5.23E-01	1.58E-01	3.56E-01	1.01E+00	1.61E-01	2.65E-01	1.43E+00	1.43E-01
2.92E-01	7.76E-01	8.53E-02	6.78E-01	5.00E-01	1.64E-01	5.23E-01	9.88E-01	1.63E-01	3.84E-01	1.41E+00	1.45E-01
3.91E-01	7.52E-01	8.65E-02	9.09E-01	5.00E-01	1.67E-01	6.90E-01	9.69E-01	1.67E-01	5.02E-01	1.39E+00	1.47E-01
4.93E-01	7.34E-01	8.77E-02	1.15E+00	5.00E-01	1.69E-01	8.61E-01	9.53E-01	1.71E-01	6.22E-01	1.38E+00	1.48E-01
7.41E-01	7.04E-01	9.07E-02	1.73E+00	5.00E-01	1.75E-01	1.27E+00	9.20E-01	1.80E-01	9.13E-01	1.35E+00	1.50E-01
1.01E+00	6.81E-01	9.30E-02	2.36E+00	5.00E-01	1.77E-01	1.72E+00	8.92E-01	1.87E-01	1.22E+00	1.32E+00	1.52E-01
1.28E+00	6.63E-01	9.56E-02	3.01E+00	5.00E-01	1.79E-01	2.17E+00	8.66E-01	1.90E-01	1.54E+00	1.29E+00	1.59E-01
1.55E+00	6.48E-01	9.91E-02	3.63E+00	5.00E-01	1.82E-01	2.61E+00	8.44E-01	1.92E-01	1.85E+00	1.26E+00	1.68E-01
2.5 Hz	Median AF	Sigma ln(AF)	1 Hz	Median AF	Sigma ln(AF)	0.5 Hz	Median AF	Sigma ln(AF)			
2.18E-02	1.25E+00	1.19E-01	1.27E-02	1.17E+00	9.31E-02	8.25E-03	1.06E+00	9.19E-02			
7.05E-02	1.26E+00	1.17E-01	3.43E-02	1.17E+00	9.12E-02	1.96E-02	1.07E+00	8.95E-02			
1.18E-01	1.26E+00	1.16E-01	5.51E-02	1.17E+00	9.07E-02	3.02E-02	1.07E+00	8.87E-02			
2.12E-01	1.27E+00	1.15E-01	9.63E-02	1.17E+00	9.07E-02	5.11E-02	1.07E+00	8.79E-02			
3.04E-01	1.28E+00	1.15E-01	1.36E-01	1.18E+00	9.13E-02	7.10E-02	1.07E+00	8.75E-02			
3.94E-01	1.28E+00	1.15E-01	1.75E-01	1.18E+00	9.23E-02	9.06E-02	1.07E+00	8.73E-02			
4.86E-01	1.29E+00	1.17E-01	2.14E-01	1.19E+00	9.39E-02	1.10E-01	1.07E+00	8.72E-02			
7.09E-01	1.30E+00	1.26E-01	3.10E-01	1.20E+00	9.79E-02	1.58E-01	1.08E+00	8.71E-02			
9.47E-01	1.30E+00	1.41E-01	4.12E-01	1.21E+00	1.02E-01	2.09E-01	1.08E+00	8.71E-02			
1.19E+00	1.30E+00	1.56E-01	5.18E-01	1.22E+00	1.07E-01	2.62E-01	1.08E+00	8.77E-02			
1.43E+00	1.29E+00	1.63E-01	6.19E-01	1.22E+00	1.18E-01	3.12E-01	1.09E+00	8.94E-02			

Tables A-2b1 and A-2b2 are tabular versions of the typical amplification factors provided in Figures 2.3.6-1 and 2.3.6-2. Values are provided for two input motion levels at approximately 10^{-4} and 10^{-5} mean annual frequency of exceedance. These tables concentrate on the frequency range of 0.5 Hz to 25 Hz, with values up to 100 Hz included, with a single value at 0.1 Hz included for completeness. These factors are unverified and are provided for information only. The figures should be considered the governing information.

Table A-2b1. Median AFs and sigmas for Model 1, Profile 1, for 2 PGA levels (Reference 29)

M1P1K1		Rock PGA=0.194		M1P1K1		PGA=0.741	
Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)	Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)
100.0	0.156	0.804	0.086	100.0	0.491	0.663	0.095
87.1	0.156	0.786	0.087	87.1	0.492	0.643	0.095
75.9	0.157	0.755	0.087	75.9	0.493	0.609	0.096
66.1	0.158	0.697	0.087	66.1	0.496	0.549	0.096
57.5	0.160	0.603	0.088	57.5	0.500	0.459	0.097
50.1	0.163	0.511	0.089	50.1	0.507	0.382	0.099
43.7	0.169	0.448	0.092	43.7	0.519	0.330	0.104
38.0	0.175	0.421	0.093	38.0	0.536	0.315	0.108
33.1	0.182	0.414	0.102	33.1	0.553	0.312	0.111
28.8	0.197	0.447	0.111	28.8	0.580	0.332	0.123
25.1	0.215	0.486	0.120	25.1	0.626	0.361	0.138
21.9	0.232	0.549	0.155	21.9	0.681	0.419	0.152
19.1	0.248	0.593	0.176	19.1	0.725	0.459	0.175
16.6	0.252	0.629	0.160	16.6	0.767	0.512	0.179
14.5	0.268	0.699	0.176	14.5	0.796	0.563	0.190
12.6	0.315	0.845	0.200	12.6	0.874	0.643	0.234
11.0	0.370	1.015	0.156	11.0	0.996	0.758	0.233
9.5	0.380	1.093	0.149	9.5	1.119	0.900	0.175
8.3	0.351	1.094	0.168	8.3	1.138	1.002	0.149
7.2	0.338	1.123	0.163	7.2	1.096	1.039	0.169
6.3	0.352	1.244	0.169	6.3	1.081	1.098	0.176
5.5	0.379	1.404	0.168	5.5	1.118	1.198	0.181
4.8	0.400	1.516	0.154	4.8	1.180	1.302	0.177
4.2	0.398	1.555	0.133	4.2	1.229	1.407	0.166
3.6	0.390	1.562	0.135	3.6	1.262	1.493	0.149
3.2	0.340	1.447	0.139	3.2	1.201	1.516	0.146
2.8	0.299	1.340	0.134	2.8	1.083	1.449	0.140
2.4	0.253	1.227	0.102	2.4	0.927	1.349	0.121
2.1	0.215	1.149	0.091	2.1	0.778	1.251	0.109
1.8	0.184	1.099	0.093	1.8	0.653	1.180	0.104
1.6	0.160	1.099	0.091	1.6	0.554	1.161	0.097

Table A-2b1: (Continued)

M1P1K1	Rock PGA=0.194			M1P1K1	PGA=0.741		
Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)	Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)
1.4	0.148	1.185	0.090	1.4	0.505	1.234	0.094
1.2	0.130	1.178	0.086	1.2	0.436	1.217	0.086
1.0	0.113	1.138	0.076	1.0	0.375	1.167	0.079
0.91	0.104	1.149	0.069	0.91	0.340	1.172	0.076
0.79	0.094	1.144	0.061	0.79	0.303	1.163	0.065
0.69	0.079	1.085	0.065	0.69	0.253	1.101	0.064
0.60	0.065	1.031	0.067	0.60	0.208	1.045	0.066
0.52	0.056	1.027	0.071	0.52	0.175	1.038	0.070
0.46	0.048	1.070	0.079	0.46	0.151	1.080	0.079
0.10	0.002	1.117	0.027	0.10	0.006	1.113	0.028

Table A-2b2. Median AFs and sigmas for Model 2, Profile 1, for 2 PGA levels (Reference 29)

M2P1K1	PGA=0.194			M2P1K1	PGA=0.741		
Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)	Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)
100.0	0.166	0.857	0.073	100.0	0.586	0.791	0.075
87.1	0.167	0.838	0.073	87.1	0.588	0.769	0.075
75.9	0.168	0.805	0.073	75.9	0.592	0.731	0.075
66.1	0.169	0.744	0.073	66.1	0.598	0.661	0.075
57.5	0.171	0.646	0.073	57.5	0.609	0.559	0.074
50.1	0.176	0.551	0.073	50.1	0.628	0.473	0.074
43.7	0.184	0.487	0.073	43.7	0.662	0.421	0.075
38.0	0.191	0.460	0.077	38.0	0.692	0.406	0.081
33.1	0.201	0.457	0.089	33.1	0.732	0.413	0.096
28.8	0.221	0.502	0.084	28.8	0.814	0.466	0.093
25.1	0.243	0.548	0.109	25.1	0.901	0.520	0.117
21.9	0.262	0.621	0.147	21.9	0.972	0.598	0.156
19.1	0.278	0.665	0.181	19.1	1.022	0.647	0.191
16.6	0.273	0.680	0.134	16.6	0.993	0.664	0.141
14.5	0.298	0.778	0.158	14.5	1.078	0.763	0.165
12.6	0.365	0.978	0.167	12.6	1.316	0.960	0.173
11.0	0.422	1.160	0.131	11.0	1.516	1.154	0.132
9.5	0.409	1.175	0.190	9.5	1.455	1.171	0.191
8.3	0.365	1.138	0.161	8.3	1.287	1.133	0.162
7.2	0.357	1.188	0.155	7.2	1.249	1.184	0.156
6.3	0.378	1.339	0.157	6.3	1.312	1.334	0.157
5.5	0.409	1.515	0.143	5.5	1.409	1.510	0.144
4.8	0.427	1.615	0.120	4.8	1.460	1.611	0.120
4.2	0.415	1.618	0.122	4.2	1.410	1.614	0.122

Table A-2b2: (Continued)

M2P1K1		PGA=0.194		M2P1K1		PGA=0.741	
Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)	Freq. (Hz)	Soil_SA	med. AF	sigma ln(AF)
3.6	0.393	1.577	0.134	3.6	1.330	1.573	0.133
3.2	0.335	1.424	0.140	3.2	1.126	1.422	0.139
2.8	0.292	1.311	0.132	2.8	0.980	1.310	0.132
2.4	0.247	1.199	0.103	2.4	0.824	1.199	0.102
2.1	0.211	1.127	0.090	2.1	0.701	1.127	0.089
1.8	0.181	1.082	0.094	1.8	0.599	1.083	0.094
1.6	0.158	1.087	0.090	1.6	0.519	1.087	0.089
1.4	0.147	1.174	0.091	1.4	0.480	1.174	0.090
1.2	0.129	1.170	0.087	1.2	0.419	1.170	0.086
1.0	0.112	1.132	0.075	1.0	0.364	1.133	0.074
0.91	0.104	1.145	0.068	0.91	0.332	1.146	0.067
0.79	0.093	1.141	0.060	0.79	0.298	1.142	0.059
0.69	0.079	1.082	0.065	0.69	0.249	1.084	0.064
0.60	0.065	1.029	0.067	0.60	0.205	1.032	0.067
0.52	0.056	1.025	0.070	0.52	0.173	1.027	0.070
0.46	0.048	1.069	0.078	0.46	0.149	1.070	0.077
0.10	0.002	1.116	0.027	0.10	0.006	1.109	0.028

Enclosure 2

SUMMARY OF REGULATORY COMMITMENTS

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC (Yes/No)
Braidwood Station, Units 1 and 2, will perform a High Frequency Confirmation evaluation in accordance with EPRI Report 1025287, Section 3.4.	As determined by NRC prioritization following submittal of all nuclear power plant Seismic Hazard Re-evaluations, but no later than December 31, 2019.	Yes	No