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10 CFR 50.4 10 CFR 52.79

April 22, 2013

UN#13-043

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

1)

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016 Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI 386, Vibratory Ground Motion

References:

- Surinder Arora (NRC) to Paul Infanger (UniStar Nuclear Energy), "CCNPP3 Final RAI 386 RGS1 7016," dated February 20, 2013
- UniStar Nuclear Energy Letter UN#13-024, from Mark T. Finley to Document Control Desk, U.S. NRC, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI 386, Vibratory Ground Motion, dated March 18, 2013

The purpose of this letter is to respond to the request for additional information (RAI) identified in the NRC e-mail correspondence to UniStar Nuclear Energy, dated February 20, 2013 (Reference). This RAI addresses Vibratory Ground Motion, as discussed in Section 2.5 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 Combined License Application (COLA), Revision 9.

Reference 2 indicated that response to RAI 386 Question 02.05.02-26 would be provided to the NRC by May 10, 2013.

The enclosure provides our response to RAI 386 Question 02.05.02-26. Revision to the COLA FSAR is not required as a result of this response.

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This RAI response does not include any new regulatory commitments. This letter does not contain any proprietary information.

As this RAI response does not impact any earlier RAI responses or require a revision to the COLA FSAR, a Table of Changes is not included.

If there are any questions regarding this transmittal, please contact me at (410) 369-1907 or Mr. Wayne A. Massie at (410) 369-1910.

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

Executed on April 22, Finley

Enclosure: Response to NRC Request for Additional Information RAI No. 386, Question 02.05.02-26, Vibratory Ground Motion, Calvert Cliffs Nuclear Power Plant, Unit 3

cc: Surinder Arora, NRC Project Manager, U.S. EPR Projects Branch Laura Quinn-Willingham, NRC Environmental Project Manager, U.S. EPR COL Application Amy Snyder, NRC Project Manager, U.S. EPR DC Application, (w/o enclosure) Patricia Holahan, Acting Deputy Regional Administrator, NRC Region II, (w/o enclosure) Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2, David Lew, Deputy Regional Administrator, NRC Region I (w/o enclosure)

Enclosure

Responses to NRC Request for Additional Information RAI No. 386, Question 02.05.02-26, Vibratory Ground Motion, Calvert Cliffs Nuclear Power Plant, Unit 3 Enclosure UN#13-043 Page 2 of 47

RAI No. 386

Question 02.05.02-26

In the supplementary response to RAI 322 Question 02.05.02-23, submitted on December 20, 2012 (ML12361A440), UniStar discussed the results of a sensitivity study conducted to analyze the impact of the 2011 Mineral Virginia Earthquake on the published earthquake recurrence rates and the subsequent seismic hazard estimates at the CCNPP Unit 3 site. UniStar concluded that the Mineral Virginia earthquake's impact on the seismic hazard calculations were minimal.

In accordance with 10 CFR 100.23, please provide further details of the sensitivity study. Specifically, please describe the calculated rates for each specific case studied, their impacts on the individual hazard curves and the collective total hazard impact from all sources in all cases studied. Also discuss the potential changes to the mean earthquake recurrence rates, and any other detailed information used in reaching the final determination that the Mineral Virginia earthquake does not impact the total seismic hazard at the site.

Response

A sensitivity study was carried out to investigate the impact of the 2011 Mineral, Virginia Earthquake on calculated recurrence rates and the related hazard for distributed seismicity source zones from the EPRI/DOE/NRC (2012)¹ Central and Eastern United States (CEUS) seismic source characterization (SSC) model. For the sensitivity calculation, the 2011 Mineral, Virginia Earthquake was added to the EPRI/DOE/NRC (2012)¹ catalog; other earthquakes that occurred since the end of 2008 (the most recent year for which the CEUS SSC catalog includes data) are not considered. For catalog completeness, the evaluation in EPRI/DOE/NRC (2012)¹ was used without revision. The results of the analysis, as described in the following paragraphs, indicate that hazard at the CCNPP Unit 3 Site is insensitive to the inclusion of the Mineral, Virginia Earthquake in the assessment of recurrence rates.

Rates are determined using the software program ABSMOOTH14, obtained from the CEUS SSC internet site: www.ceus-ssc.org. Minor changes were made to the program to enable its implementation within the Paul C. Rizzo Associates, Inc. (RIZZO) operating environment. The resulting program (CEUS_SMOOTHING) is controlled in accordance with RIZZO Quality Assurance (QA) procedures for software, which implement requirements of Subpart 2.7, "Quality Assurance Requirements of Computer Software for Nuclear Facility Application," of NQA-1-1994 and NQA-1-2008, including the NQA-1a-2009 Addenda.

The results submitted on December 20, 2012² (ML12361A440) were determined using the input control parameters for ABSMOOTH14 from the EPRI/DOE/NRC (2012) SSC. For those control parameter inputs, re-calculated recurrence rates using the EPRI/DOE/NRC (2012) earthquake catalog generally agreed well with the published values. For the Extended Continental Crust Atlantic Margin (ECC-AM) seismotectonic source zone, rates converged, but the mean value differed somewhat for different runs. Thus, in the December 20, 2012 submittal, the sensitivity

¹ Technical Report: Central and Eastern United States Seismic Source Characterization for Nuclear Facilities, Electric Power Research Institute, U.S. Department of Energy, and the U.S. Nuclear Regulatory Commission, 2012

² UniStar Nuclear Energy Letter UN#12-162, from Mark T. Finley to Document Control Desk, U.S. NRC, Response to Request for Additional Information for the Calvert Cliffs Nuclear Power Plant, Unit 3, RAI 322 and RAI 345, Vibratory Ground Motion, dated December 20, 2012

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analysis results were compared to the re-calculated hazard for the ECC-AM source zone using the original catalog, without the Mineral Virginia Earthquake and three different initial conditions for the Markov chain.

Since the December 20, 2012 submittal², it has been determined that a better convergence for the ECC-AM source zone can be achieved by modifying the input parameters that control the Markov chain process for ABSMOOTH14/CEUS_SMOOTHING, instead of those input parameters provided within the EPRI/DOE/NRC (2012)¹ report. The control parameters for the Study Region source zone are now also used for the ECC-AM source zone. With this revision, alternative runs for the ECCAM source zone converge to a similar result close to the published mean rate. Thus, results from the sensitivity analysis are now reported relative to the mean rates published in EPRI/DOE/NRC (2012)¹ rather than to the re-calculated rates. This provides a direct comparison to the results used in the Final Safety Analysis Report (FSAR) update. The published mean rates and the re-calculated base-case mean rates are now similar for all source zones considered.

For the sensitivity study, the following calculations are carried out for source zones that host the site of the Mineral, Virginia Earthquake (i.e., study region, Mesozoic, and Younger Extended Mmax zone [narrow and wide interpretations, MESE-N and MESE-W], and ECC-AM seismotectonic zone):

- 1. ABSMOOTH14/CEUS_SMOOTHING is used to determine rates based on a version of the EPRI/DOE/NRC (2012)¹ catalog to which the Mineral, Virginia Earthquake was added. Sensitivity rates are calculated for each of the three magnitude weighting cases (i.e., A, B, and E) included in the EPRI/DOE/NRC (2012)¹ logic tree for recurrence rates.
- 2. Using the rates reflecting the impact of the Mineral, Virginia Earthquake, the seismic hazard at the CCNPP Unit 3 Site is determined for each source zone. At this step, weights from the EPRI/DOE/NRC (2012)¹ logic tree for alternative conceptual approaches for seismic source zonation are not applied.
- 3. Using the source zone hazard results reflecting the impact of the Mineral, Virginia Earthquake, the total hazard at the CCNPP Unit 3 Site is determined using the weights from the EPRI/DOE/NRC (2012)¹ logic tree.

For each step in the analysis, the sensitivity results including the Mineral, Virginia Earthquake are compared to the original results published in EPRI/DOE/NRC (2012)¹:

- Mean rates are compared in terms of **M** > 5 events per deg² per year
- Hazard derived for each source zone is compared in terms of mean annual probability of exceedance
- UHRS with 10⁻⁴, 10⁻⁵, and 10⁻⁶ mean annual probability of exceedance derived from the hazard curves for each source zone are compared in terms of spectral acceleration
- Total hazard is compared in terms of mean annual probability of exceedance
- UHRS with 10⁻⁴, 10⁻⁵, and 10⁻⁶ mean annual probability of exceedance derived from the total hazard are compared in terms of spectral acceleration

The comparisons show that the source zone rates and the ground motion hazard at the CCNPP Unit 3 Site are insensitive to including the Mineral, Virginia Earthquake in the analyses.

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Recurrence Rates:

The original and sensitivity rates are displayed on *Figures 1 through 12*. For each source zone, the original rates and the sensitivity rates are displayed side-by-side. Also for each source zone, the figure shows the absolute difference in rate between the original and sensitivity cases. The comparison is shown for each magnitude weighting case (i.e., A, B, and E) used in EPRI/DOE/NRC (2012)¹.

Rates shown are for moment magnitude (**M**) greater than 5 per degree-squared per year. All rates less than 10^{-6} are included in the lowest rate bin and displayed with the same dark blue color. Similarly, all rates greater than 10^{-2} are included in the highest bin and displayed with the same dark brown color. Figures presenting the rate information are summarized in *Table 1*.

Comparison of the original and sensitivity rates show that the impact of the Mineral, Virginia Earthquake is small. This conclusion is reached by examining the overall spatial pattern of the level of the rates for the two cases and also because of the small differences obtained. Absolute differences between the sensitivity and original results in the vicinity of the Mineral, Virginia Earthquake range from less than 1×10^{-6} to 1×10^{-3} M > 5 events per deg² per year—generally less than 10 percent difference.

Another perspective for considering the observed differences in recurrence rate related to the Mineral, Virginia Earthquake, is to examine differences in the original rates between the various configurations of the Midcontinent-Craton (MidC) source zone. The four configurations of this source zone result from uncertainty in whether the Paleozoic Extended Crust source zone is "narrow" or "wide" and in whether the Rough Creek Graben is part of the Reelfoot Rift or the MidC source zone. Because recurrence parameters are calculated independently for the four configurations of the MidC source zone using the identical earthquake catalog, differences in calculated rates far from the boundaries, that vary among the configurations, provide a context for evaluation of the rates reflecting the addition of the Mineral, Virginia Earthquake to the catalog. Note that because the four configurations of the MidC have different geographic extents, the penalty functions used in determining the recurrence rates are not identical. Comparisons of the mean rates far from the eastern boundary of the MidC source zone (e.g., South Dakota) show differences typically on the order of 1×10^{-5} to 1×10^{-4} M > 5 events per deg² per year-from less than 10 percent up to 50 percent difference relative to the rates for the MidC-A configuration. Results for magnitude weighting Scheme E, which is the highest weighted magnitude weighting scheme, are shown on *Figure 13*. Percent differences in mean rate among the different configurations of the MidC source zone can be several times larger than differences between the original and sensitivity mean rates near the epicenter of the Mineral Virginia Earthquake.

Hazard Results for Each Source Zone:

For the Mineral, Virginia Earthquake sensitivity study, seismic hazard is calculated for each source zone using the sensitivity rates. Weights for the "Conceptual Approach" and "Separation of Mesozoic Extended and Non-extended" logic tree nodes are not applied at this step (i.e., each source zone weight is taken as 1.0). Comparisons are made in terms of uniform hazard response spectra (UHRS) with 10⁻⁴, 10⁻⁵, and 10⁻⁶ mean annual probability of exceedance (MAPE) (*Tables 2 through 5*). Sensitivity results lead to spectral accelerations that are within 5 percent of those using the original rates published in EPRI/DOE/NRC (2012)¹.

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Results for the four individual source zones are also compared in terms of hazard curves (*Tables 5 through 16, Figures 14 through 17*) for 100 Hz, 10 Hz, and 1 Hz SA. The impact of the Mineral, Virginia Earthquake on the unweighted source zone hazard ranges from less than 1 percent up to about 10 percent, depending on source zone and, for a given source zone, spectral acceleration level and response oscillator frequency.

Total Hazard Results:

The sensitivity of the total seismic hazard at the CCNPP Unit 3 Site is examined by incorporating the sensitivity hazard results for source zones hosting the Mineral, Virginia Earthquake, along with hazard from other source zones considered in the original Probabilistic Seismic Hazard Analysis (PSHA) using the appropriate logic tree weights from EPRI/DOE/NRC (2012)¹.

In terms of the UHRS with 10^{-4} , 10^{-5} , and 10^{-6} mean annual probabilities of exceedance, the sensitivity results exhibit up to about 3 percent greater spectral acceleration values than the original results (*Table 18, Figure 18*).

For total hazard curves, comparisons are provided for 100 Hz, 10 Hz, and 1 Hz SA over a spectral acceleration range from 0.01 to 5 g (*Tables 19 through 21, Figure 19*). The sensitivity results show mean annual exceedance frequencies up to between 6 and 7 percent greater than the original results.

Summary and Conclusion:

A sensitivity study is carried out to examine the impact of the Mineral, Virginia Earthquake on the estimate of seismic hazard at the CCNPP Unit 3 Site. The sensitivity study consists of calculating recurrence rates using a version of the EPRI/DOE/NRC (2012)¹ earthquake catalog to which the Mineral, Virginia Event is added. No other changes were made to the catalog. The assessment of catalog completeness was used as published. Using the sensitivity rates reflecting the Mineral, Virginia Earthquake, the impact on hazard from individual source zones and on the total hazard at the Site is determined. The results described here expand upon and confirm those described in the supplementary response to RAI 322 Question 02.05.02-23 in the December 20, 2012 submittal².

Comparison of the sensitivity rates to the original published rates show small differences in the vicinity of the earthquake epicenter where the impact would be expected to be most prominent. Percent differences in mean rate are of the same order or less as observed for the alternative configurations of the MidC source zone, far from the boundaries that differ between the configurations. Rates for the alternative configurations of the MidC source zone were all computed using the published EPRI/DOE/NRC (2012)¹ earthquake catalog.

For each source zone considered individually with a weight of 1.0, hazard calculations using the sensitivity rates lead to differences in estimated mean annual probabilities of exceedance ranging from near zero up to about 10 percent. In terms of the UHRS at the Site, derived from the hazard for each source zone, spectral acceleration shows an increase of up to 5 percent.

When results for the individual source zones are combined, taking into account the logic tree weights from EPRI/DOE/NRC for alternative seismic source characterization approaches, the sensitivity results give mean annual probabilities of exceedance for the acceleration levels

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considered that are up to 7 percent greater than the original results. The impact on UHRS with 10^{-4} , 10^{-5} , and 10^{-6} mean annual probabilities of exceedance is less than 3 percent.

It is concluded that hazard estimation for the CCNPP Unit 3 Site is insensitive to the inclusion of the Mineral, Virginia Earthquake in calculation of recurrence rates. The impact on UHRS used to determine site response and the Ground Motion Response Spectrum (GMRS) is less than 3 percent, which is less than the precision of the original seismic hazard calculations. This result is not unexpected because the Mineral, Virginia Earthquake is consistent with the data and information used to characterize seismic sources in EPRI/DOE/NRC (2012)¹.

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TABLE 1FIGURES SUMMARIZING RATE RESULTS

SOURCE ZONE	Rates	MAGNITUDE WEIGHTING CASE	FIGURE
Study	Original Sensitivity and Difference between Original and	A	1
Region	Sensitivity	В	2
Region		E	3
	Original Sonsitivity and Difference between Original and	Α	4
MESE-N	Someitivity	В	5
	Sensitivity	E	6
	Original Someitivity and Differences between Original and	A	7
MESE-W	Somolitivity	В	8
	Sensitivity	E	9
ECC-AM	Original Someitivity and Difference between Original and	A	10
	Someitivity	В	11
	SCIISIUVILY	Е	12
MidC	Difference between MidC-A and MidC-B, MidC-C, and MidC-D	E	13

1

COMPARISON OF ORIGINAL AND SENSITIVITY ROCK UNIFORM HAZARD RESPONSE SPECTRA FOR THE CCNPP UNIT 3 SITE FOR HAZARD FROM THE STUDY REGION SOURCE ZONE

DESDONSE	SPECTRAL ACCE	ELERATION (g)	PERCENT DIFFERENCE
FREQUENCY (Hz)	Original	SENSITIVITY	(Original versus Sensitivity)
	1E-4 mean annual pro	bability of exceedance	
0.5	2.02E-02	2.09E-02	3.21
1	3.84E-02	3.95E-02	2.63
2.5	9.28E-02	9.46E-02	1.99
5	1.60E-01	1.63E-01	2.00
10	2.28E-01	2.32E-01	1.80
25	3.33E-01	3.40E-01	2.23
100	1.16E-01	1.19E-01	2.06
	1E-5 mean annual pro	bability of exceedance	
0.5	6.81E-02	6.95E-02	2.03
1	1.24E-01	1.26E-01	1.37
2.5	3.03E-01	3.06E-01	0.92
5	5.52E-01	5.55E-01	0.62
10	8.34E-01	8.37E-01	0.40
25	1.23E+00	1.24E+00	0.16
100	4.51E-01	4.51E-01	0.00
	1E-6 mean annual pro	bability of exceedance	
0.5	2.03E-01	2.05E-01	1.33
1	3.67E-01	3.70E-01	0.65
2.5	8.91E-01	8.92E-01	0.12
5	1.62E+00	1.61E+00	-0.12
10	2.49E+00	2.48E+00	-0.44
25	3.91E+00	3.89E+00	-0.59
100	1.39E+00	1.38E+00	-0.65

Note:

COMPARISON OF ORIGINAL AND SENSITIVITY ROCK UNIFORM HAZARD RESPONSE SPECTRA FOR THE CCNPP UNIT 3 SITE FOR HAZARD FROM THE MESE-N SOURCE ZONE

	SPECTRAL ACC	Percent	
RESPONSE FREQUENCY (Hz)		Sensitivity	DIFFERENCE (Original Versus
	ORIGINAL	JENSITIVITT	SENSITIVITY)
	1E-4 mean annual pro	bability of exceedance	
0.5	1.68E-02	1.71E-02	1.31
1	3.39E-02	3.42E-02	0.97
2.5	8.52E-02	8.60E-02	0.94
5	1.49E-01	1.50E-01	0.87
10	2.12E-01	2.14E-01	0.56
25	3.11E-01	3.14E-01	1.06
100	1.09E-01	1.09E-01	0.46
	1E-5 mean annual pro	bability of exceedance	
0.5	6.12E-02	6.18E-02	0.90
1	1.15E-01	1.15E-01	0.35
2.5	2.83E-01	2.84E-01	0.32
5	5.15E-01	5.18E-01	0.45
10	7.78E-01	7.81E-01	0.31
25	1.15E+00	1.15E+00	0.35
100	4.17E-01	4.20E-01	0.50
	1E-6 mean annual pro	bability of exceedance	
0.5	1.89E-01	1.89E-01	-0.05
1	3.45E-01	3.44E-01	-0.09
2.5	8.38E-01	8.37E-01	-0.01
5	1.52E+00	1.52E+00	0.13
10	2.34E+00	2.35E+00	0.30
25	3.65E+00	3.67E+00	0.33
100	1.30E+00	1.31E+00	0.46

Note:

COMPARISON OF ORIGINAL AND SENSITIVITY ROCK UNIFORM HAZARD RESPONSE SPECTRA FOR THE CCNPP UNIT 3 SITE FOR HAZARD FROM THE MESE-W SOURCE ZONE

	SPECTRAL ACC	CELERATION (g)	PERCENT
Response Frequency (Hz)	Original	Sensitivity	DIFFERENCE (Original Versus Sensitivity)
	1E-4 mean annual pro	bability of exceedance	
0.5	2.01E-02	2.02E-02	0.55
1	3.85E-02	3.85E-02	0.16
2.5	9.33E-02	9.28E-02	-0.49
5	1.61E-01	1.60E-01	-0.81
10	2.29E-01	2.27E-01	-1.18
25	3.35E-01	3.32E-01	-1.01
100	1.17E-01	1.16E-01	-1.02
	1E-5 mean annual pro	bability of exceedance	
0.5	6.87E-02	6.87E-02	0.04
1	1.25E-01	1.24E-01	-0.40
2.5	3.04E-01	3.02E-01	-0.95
5	5.54E-01	5.47E-01	-1.26
10	8.37E-01	8.25E-01	-1.45
25	1.23E+00	1.22E+00	-1.54
100	4.51E-01	4.43E-01	-1.69
	1E-6 mean annual pro	bability of exceedance	······································
0.5	2.05E-01	2.05E-01	-0.44
1	3.71E-01	3.69E-01	-0.67
2.5	8.96E-01	8.87E-01	-0.96
5	1.62E+00	1.60E+00	-1.05
10	2.49E+00	2.46E+00	-1.04
25	3.90E+00	3.85E+00	-1.26
100	1.39E+00	1.37E+00	-1.16

Note:

COMPARISON OF ORIGINAL AND SENSITIVITY ROCK UNIFORM HAZARD RESPONSE SPECTRA FOR THE CCNPP UNIT 3 SITE FOR HAZARD FROM THE ECC-AM SOURCE ZONE

	SPECTRAL ACC	PERCENT	
Response Frequency (Hz)	Original	Sensitivity	Difference (Original Versus Sensitivity)
	1E-4 mean annual pro	bability of exceedance	
0.5	1.59E-02	1.63E-02	2.77
1	3.24E-02	3.33E-02	3.00
2.5	8.23E-02	8.52E-02	3.51
5	1.45E-01	1.50E-01	3.59
10	2.07E-01	2.15E-01	3.77
25	3.02E-01	3.14E-01	4.11
100	1.06E-01	1.10E-01	4.06
	1E-5 mean annual pro	bability of exceedance	·
0.5	5.88E-02	6.07E-02	3.27
1	1.11E-01	1.15E-01	3.51
2.5	2.80E-01	2.92E-01	4.21
5	5.18E-01	5.41E-01	4.40
10	7.88E-01	8.25E-01	4.60
25	1.17E+00	1.22E+00	4.55
100	4.27E-01	4.48E-01	4.96
	1E-6 mean annual pro	bability of exceedance	· · · · · · · · · · · · · · · · · · ·
0.5	1.83E-01	1.91E-01	4.04
1	3.39E-01	3.53E-01	4.22
2.5	8.44E-01	8.78E-01	4.02
5	1.55E+00	1.61E+00	4.00
10	2.42E+00	2.51E+00	3.80
25	3.85E+00	4.00E+00	3.95
100	1.37E+00	1.42E+00	3.72

Note:

TABLE 6 ORIGINAL AND SENSITIVITY RESULTS FOR 100 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE STUDY REGION SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	3.73E-03	3.96E-03	6.17
0.02	1.65E-03	1.74E-03	5.45
0.03	9.27E-04	9.77E-04	5.39
0.04	5.95E-04	6.25E-04	5.04
0.05	4.14E-04	4.34E-04	4.83
0.06	3.06E-04	3.20E-04	4.58
0.07	2.36E-04	2.46E-04	4.24
0.08	1.88E-04	1.96E-04	4.26
0.09	1.54E-04	1.60E-04	3.90
0.10	1.29E-04	1.34E-04	3.88
0.20	4.04E-05	4.12E-05	1.98
0.25	2.78E-05	2.82E-05	1.44
0.30	2.04E-05	2.06E-05	0.98
0.40	1.24E-05	1.24E-05	0.00
0.50	8.29E-06	8.29E-06	0.00
0.60	5.91E-06	5.90E-06	-0.17
0.70	4.41E-06	4.39E-06	-0.45
0.80	3.39E-06	3.37E-06	-0.59
0.90	2.68E-06	2.65E-06	-1.12
1.00	2.15E-06	2.13E-06	-0.93
2.00	4.27E-07	4.19E-07	-1.87
3.00	1.35E-07	1.33E-07	-1.48
5.00	2.36E-08	2.31E-08	-2.12

Note:

ORIGINAL AND SENSITIVITY RESULTS FOR 10 HZ SA HAZARD AT THE CONNP UNIT 3 SITE FROM THE STUDY REGION SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	6.98E-03	7.42E-03	6.30
0.02	3.69E-03	3.91E-03	5.96
0.03	2.34E-03	2.48E-03	5.98
0.04	1.62E-03	1.72E-03	6.17
0.05	1.19E-03	1.26E-03	5.88
0.06	9.13E-04	9.62E-04	5.37
0.07	7.21E-04	7.59E-04	5.27
0.08	5.84E-04	6.14E-04	5.14
0.09	4.83E-04	5.07E-04	4.97
0.10	4.06E-04	4.26E-04	4.93
0.20	1.25E-04	1.29E-04	3.20
0.25	8.49E-05	8.76E-05	3.18
0.30	6.19E-05	6.36E-05	2.75
0.40	3.76E-05	3.84E-05	2.13
0.50	2.54E-05	2.58E-05	1.57
0.60	1.83E-05	1.86E-05	1.64
0.70	1.39E-05	1.40E-05	0.72
0.80	1.08E-05	1.09E-05	0.93
0.90	8.68E-06	8.72E-06	0.46
1.00	7.10E-06	7.12E-06	0.28
2.00	1.69E-06	1.67E-06	-1.18
3.00	6.43E-07	6.37E-07	-0.93
5.00	1.60E-07	1.59E-07	-0.62

Note:

ORIGINAL AND SENSITIVITY RESULTS FOR 1 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE STUDY REGION SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	9.44E-04	9.97E-04	5.61
0.02	3.16E-04	3.33E-04	5.38
0.03	1.57E-04	1.65E-04	5.10
0.04	9.30E-05	9.75E-05	4.84
0.05	6.12E-05	6.40E-05	4.58
0.06	4.31E-05	4.49E-05	4.18
0.07	3.18E-05	3.32E-05	4.40
0.08	2.44E-05	2.54E-05	4.10
0.09	1.93E-05	2.00E-05	3.63
0.10	1.56E-05	1.61E-05	3.21
0.20	3.70E-06	3.78E-06	2.16
0.25	2.30E-06	2.35E-06	2.17
0.30	1.56E-06	1.58E-06	1.28
0.40	8.30E-07	8.42E-07	1.45
0.50	5.03E-07	5.10E-07	1.39
0.60	3.31E-07	3.35E-07	1.21
0.70	2.30E-07	2.32E-07	0.87
0.80	1.66E-07	1.68E-07	1.20
0.90	1.24E-07	1.25E-07	0.81
1.00	9.49E-08	9.58E-08	0.95
2.00	1.36E-08	1.37E-08	0.74
3.00	3.63E-09	3.67E-09	1.10
5.00	5.48E-10	5.55E-10	1.28

Note:

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TABLE 9 ORIGINAL AND SENSITIVITY RESULTS FOR 100 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-N SOURCE ZONE

Acceleration	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (Sensitivity Versus
(g)	ORIGINAL	SENSITIVITY	Original)
0.01	2.99E-03	3.09E-03	3.34
0.02	1.40E-03	1.44E-03	2.86
0.03	8.04E-04	8.27E-04	2.86
0.04	5.21E-04	5.34E-04	2.50
0.05	3.65E-04	3.73E-04	2.19
0.06	2.71E-04	2.76E-04	1.85
0.07	2.09E-04	2.13E-04	1.91
0.08	1.67E-04	1.70E-04	ال.80 ي
0.09	1.37E-04	1.39E-04	1.46
0.10	1.15E-04	1.16E-04	0.87
0.20	3.58E-05	3.61E-05	0.84
0.25	2.45E-05	2.47E-05	0.82
0.30	1.79E-05	1.81E-05	1.12
0.40	1.08E-05	1.09E-05	0.93
0.50	7.22E-06	7.28E-06	0.83
0.60	5.13E-06	5.18E-06	0.97
0.70	3.82E-06	3.85E-06	0.79
0.80	2.93E-06	2.96E-06	1.02
0.90	2.30E-06	2.33E-06	1.30
1.00	1.85E-06	1.87E-06	1.08
2.00	3.64E-07	3.68E-07	1.10
3.00	1.15E-07	1.16E-07	0.87
5.00	2.02E-08	2.03E-08	0.50

Note:

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TABLE 10

ORIGINAL AND SENSITIVITY RESULTS FOR 10 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-N SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	5.12E-03	5.30E-03	3.52
0.02	2.96E-03	3.06E-03	3.38
0.03	1.95E-03	2.01E-03	3.08
0.04	1.38E-03	1.42E-03	2.90
0.05	1.02E-03	1.06E-03	3.92
0.06	7.90E-04	8.13E-04	2.91
0.07	6.28E-04	6.45E-04	2.71
0.08	5.11E-04	5.24E-04	2.54
0.09	4.24E-04	4.34E-04	2.36
0.10	3.57E-04	3.66E-04	2.52
0.20	1.11E-04	1.12E-04	0.90
0.25	7.54E-05	7.63E-05	1.19
0.30	5.50E-05	5.55E-05	0.91
0.40	3.33E-05	3.35E-05	0.60
0.50	2.24E-05	2.26E-05	0.89
0.60	1.62E-05	1.63E-05	0.62
0.70	1.22E-05	1.23E-05	0.82
0.80	9.50E-06	9.55E-06	0.53
0.90	7.59E-06	7.64E-06	0.66
1.00	6.20E-06	6.23E-06	0.48
2.00	1.45E-06	1.46E-06	0.69
3.00	5.53E-07	5.56E-07	0.54
5.00	1.38E-07	1.38E-07	0.00

Note:

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TABLE 11

ORIGINAL AND SENSITIVITY RESULTS FOR 1 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-N SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (SENSITIVITY VERSUS
(g)	Original	SENSITIVITY	ORIGINAL)
0.01	6.84E-04	7.01E-04	2.49
0.02	2.41E-04	2.47E-04	2.49
0.03	1.24E-04	1.26E-04	1.61
0.04	7.48E-05	7.62E-05	1.87
0.05	4.99E-05	5.07E-05	1.60
0.06	3.55E-05	3.61E-05	1.69
0.07	2.65E-05	2.69E-05	1.51
0.08	2.05E-05	2.07E-05	0.98
0.09	1.63E-05	1.64E-05	0.61
0.10	1.32E-05	1.33E-05	0.76
0.20	3.20E-06	3.21E-06	0.31
0.25	2.00E-06	2.00E-06	0.00
0.30	1.35E-06	1.35E-06	0.00
0.40	7.24E-07	7.21E-07	-0.41
0.50	4.40E-07	4.37E-07	-0.68
0.60	2.89E-07	2.87E-07	-0.69
0.70	2.01E-07	2.00E-07	-0.50
0.80	1.46E-07	1.44E-07	-1.37
0.90	1.09E-07	1.08E-07	-0.92
1.00	8.33E-08	8.25E-08	-0.96
2.00	1.20E-08	1.19E-08	-0.83
3.00	3.24E-09	3.19E-09	-1.54
5.00	4.92E-10	4.85E-10	-1.42

Note:

TABLE 12 ORIGINAL AND SENSITIVITY RESULTS FOR 100 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-W SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (SENSITIVITY VERSUS
(g)	Original	SENSITIVITY	Original)
0.01	3.72E-03	4.02E-03	8.06
0.02	1.66E-03	1.79E-03	7.83
0.03	9.38E-04	1.01E-03	7.68
0.04	6.02E-04	6.44E-04	6.98
0.05	4.20E-04	4.47E-04	6.43
0.06	3.10E-04	3.29E-04	6.13
0.07	2.39E-04	2.53E-04	5.86
0.08	1.91E-04	2.02E-04	5.76
0.09	1.56E-04	1.65E-04	5.77
0.10	1.31E-04	1.37E-04	4.58
0.20	4.08E-05	4.20E-05	2.94
0.25	2.80E-05	2.86E-05	2.14
0.30	2.05E-05	2.09E-05	1.95
0.40	1.24E-05	1.26E-05	1.61
0.50	8.28E-06	8.37E-06	1.09
0.60	5.90E-06	5.95E-06	0.85
0.70	4.40E-06	4.42E-06	0.45
0.80	3.38E-06	3.40E-06	0.59
0.90	2.66E-06	2.67E-06	0.38
1.00	2.14E-06	2.15E-06	0.47
2.00	4.24E-07	4.24E-07	0.00
3.00	1.35E-07	1.35E-07	0.00
5.00	2.36E-08	2.36E-08	0.00

Note:

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TABLE 13

ORIGINAL AND SENSITIVITY RESULTS FOR 10 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-W SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (SENSITIVITY VERSUS
(g)	Original	SENSITIVITY	Original)
0.01	6.84E-03	7.37E-03	7.75
0.02	3.68E-03	3.97E-03	7.88
0.03	2.35E-03	2.54E-03	8.09
0.04	1.64E-03	1.76E-03	7.32
0.05	1.20E-03	1.30E-03	8.33
0.06	9.22E-04	9.91E-04	7.48
0.07	7.29E-04	7.82E-04	7.27
0.08	5.91E-04	6.33E-04	7.11
0.09	4.89E-04	5.23E-04	6.95
0.10	4.11E-04	4.39E-04	6.81
0.20	1.27E-04	1.33E-04	4.72
0.25	8.60E-05	8.98E-05	4.42
0.30	6.27E-05	6.52E-05	3.99
0.40	3.79E-05	3.92E-05	3.43
0.50	2.56E-05	2.63E-05	2.73
0.60	1.84E-05	1.89E-05	2.72
0.70	1.39E-05	1.42E-05	2.16
0.80	1.09E-05	1.11E-05	1.83
0.90	8.71E-06	8.85E-06	1.61
1.00	7.11E-06	7.21E-06	1.41
2.00	1.68E-06	1.70E-06	1.19
3.00	6.43E-07	6.49E-07	0.93
5.00	1.61E-07	1.63E-07	1.24

Note:

ORIGINAL AND SENSITIVITY RESULTS FOR 1 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE MESE-W SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	9.14E-04	9.86E-04	7.88
0.02	3.11E-04	3.36E-04	8.04
0.03	1.56E-04	1.68E-04	7.69
0.04	9.32E-05	1.00E-04	7.30
0.05	6.16E-05	6.60E-05	7.14
0.06	4.35E-05	4.66E-05	7.13
0.07	3.22E-05	3.44E-05	6.83
0.08	2.48E-05	2.64E-05	6.45
0.09	1.96E-05	2.08E-05	6.12
0.10	1.58E-05	1.68E-05	6.33
0.20	3.77E-06	3.97E-06	5.31
0.25	2.35E-06	2.46E-06	4.68
0.30	1.59E-06	1.66E-06	4.40
0.40	8.49E-07	8.86E-07	4.36
0.50	5.16E-07	5.38E-07	4.26
0.60	3.39E-07	3.54E-07	4.42
0.70	2.36E-07	2.46E-07	4.24
0.80	1.71E-07	1.78E-07	4.09
0.90	1.28E-07	1.33E-07	3.91
1.00	9.77E-08	1.02E-07	4.40
2.00	1.40E-08	1.47E-08	5.00
3.00	3.76E-09	3.95E-09	5.05
5.00	5.65E-10	5.96E-10	5.49

Note:

TABLE 15ORIGINAL AND SENSITIVITY RESULTS FOR 100 HZ SA HAZARD AT THE
CCNPP UNIT 3 SITE FROM THE ECC-AM SOURCE ZONE

Acceleration	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	2.87E-03	2.99E-03	4.18
0.02	1.33E-03	1.39E-03	4.51
0.03	7.60E-04	7.97E-04	4.87
0.04	4.92E-04	5.17E-04	5.08
0.05	3.45E-04	3.64E-04	5.51
0.06	2.56E-04	2.71E-04	5.86
0.07	1.99E-04	2.10E-04	5.53
0.08	1.59E-04	1.69E-04	6.29
0.09	1.31E-04	1.39E-04	6.11
0.10	1.10E-04	1.17E-04	6.36
0.20	3.53E-05	3.81E-05	7.93
0.25	2.46E-05	2.65E-05	7.72
0.30	1.82E-05	1.97E-05	8.24
0.40	1.12E-05	1.22E-05	8.93
0.50	7.62E-06	8.28E-06	8.66
0.60	5.50E-06	5.98E-06	8.73
0.70	4.14E-06	4.50E-06	8.70
0.80	3.21E-06	3.49E-06	8.72
0.90	2.55E-06	2.78E-06	9.02
1.00	2.06E-06	2.24E-06	8.74
2.00	4.21E-07	4.58E-07	8.79
3.00	1.34E-07	1.46E-07	8.96
5.00	2.35E-08	2.56E-08	8.94

Note:

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TABLE 16

ORIGINAL AND SENSITIVITY RESULTS FOR 10 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE ECC-AM SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	4.97E-03	5.14E-03	3.42
0.02	2.84E-03	2.96E-03	4.23
0.03	1.86E-03	1.94E-03	4.30
0.04	1.31E-03	1.37E-03	4.58
0.05	9.68E-04	1.01E-03	4.34
0.06	7.46E-04	7.82E-04	4.83
0.07	5.92E-04	6.22E-04	5.07
0.08	4.81E-04	5.07E-04	5.41
0.09	3.99E-04	4.21E-04	5.51
0.10	3.37E-04	3.55E-04	5.34
0.20	1.06E-04	1.13E-04	6.60
0.25	7.26E-05	7.76E-05	6.89
0.30	5.33E-05	5.72E-05	7.32
0.40	3.27E-05	3.52E-05	7.65
0.50	2.23E-05	2.41E-05	8.07
0.60	1.63E-05	1.76E-05	7.98
0.70	1.24E-05	1.34E-05	8.06
0.80	9.74E-06	1.06E-05	8.83
0.90	7.85E-06	8.53E-06	8.66
1.00	6.45E-06	7.01E-06	8.68
2.00	1.57E-06	1.71E-06	8.92
3.00	6.04E-07	6.59E-07	9.11
5.00	4.97E-03	1.64E-07	9.33

Note:

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TABLE 17

ORIGINAL AND SENSITIVITY RESULTS FOR 1 HZ SA HAZARD AT THE CCNPP UNIT 3 SITE FROM THE ECC-AM SOURCE ZONE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	Original	SENSITIVITY	Original)
0.01	6.32E-04	6.55E-04	3.64
0.02	2.22E-04	2.33E-04	4.95
0.03	1.14E-04	1.20E-04	5.26
0.04	6.92E-05	7.30E-05	5.49
0.05	4.63E-05	4.90E-05	5.83
0.06	3.31E-05	3.51E-05	6.04
0.07	2.47E-05	2.63E-05	6.48
0.08	1.91E-05	2.04E-05	6.81
0.09	1.52E-05	1.63E-05	7.24
0.10	1.24E-05	1.33E-05	7.26
0.20	3.05E-06	3.30E-06	8.20
0.25	1.91E-06	2.08E-06	8.90
0.30	1.30E-06	1.42E-06	9.23
0.40	6.98E-07	7.64E-07	9.46
0.50	4.25E-07	4.67E-07	9.88
0.60	2.80E-07	3.08E-07	10.00
0.70	1.95E-07	2.15E-07	10.26
0.80	1.42E-07	1.56E-07	9.86
0.90	1.06E-07	1.17E-07	10.38
1.00	8.10E-08	8.94E-08	10.37
2.00	1.17E-08	1.29E-08	10.26
3.00	3.13E-09	3.46E-09	10.54
5.00	4.73E-10	5.22E-10	10.36

Note:

TABLE 18COMPARISON OF ORIGINAL AND SENSITIVITY ROCK UNIFORM HAZARDRESPONSE SPECTRA FOR THE CCNPP UNIT 3 SITE

DESPONSE	SPECTRAL ACC	PERCENT DIFFERENCE		
FREQUENCY (HZ)	Original	SENSITIVITY	(Sensitivity Versus Original)	
	1E-4 mean annual p	robability of exceedance		
0.5	4.19E-02	4.22E-02	0.69	
1	5.40E-02	5.45E-02	0.94	
2.5	9.85E-02	1.00E-01	1.87	
5	1.57E-01	1.61E-01	2.43	
10	2.18E-01	2.23E-01	2.67	
25	3.17E-01	3.26E-01	2.87	
100	1.11E-01	1.14E-01	2.89	
	1E-5 mean annual p	robability of exceedance		
0.5	1.19E-01	1.19E-01	0.59	
1	1.43E-01	1.45E-01	1.47	
2.5	2.94E-01	3.01E-01	2.45	
5	5.28E-01	5.42E-01	2.67	
10	7.97E-01	8.21E-01	2.93	
25	1.18E+00	1.21E+00	2.71	
100	4.31E-01	4.44E-01	3.02	
1E-6 mean annual probability of exceedance				
0.5	2.69E-01	2.71E-01	0.89	
1	3.63E-01	3.70E-01	2.15	
2.5	8.54E-01	8.75E-01	2.47	
5	1.56E+00	1.60E+00	2.50	
10	2.42E+00	2.48E+00	2.31	
25	3.83E+00	3.91E+00	2.33	
100	1.36E+00	1.39E+00	2.28	

Note:

TABLE 19 ORIGINAL AND SENSITIVITY TOTAL HAZARD RESULTS FOR 100 HZ SA FOR THE CCNPP UNIT 3 SITE

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		Percent Difference (Sensitivity Versus
(g)	ORIGINAL	SENSITIVITY	Original)
0.01	4.11E-03	4.26E-03	3.57
0.02	1.71E-03	1.78E-03	3.95
0.03	9.34E-04	9.72E-04	4.07
0.04	5.85E-04	6.10E-04	4.23
0.05	4.00E-04	4.18E-04	4.44
0.06	2.91E-04	3.05E-04	4.67
0.07	2.23E-04	2.32E-04	4.11
0.08	1.76E-04	1.84E-04	4.60
0.09	1.43E-04	1.50E-04	4.67
0.10	1.19E-04	1.25E-04	4.79
0.20	3.68E-05	3.87E-05	5.13
0.25	2.54E-05	2.66E-05	4.88
0.30	1.87E-05	1.96E-05	5.06
0.40	1.14E-05	1.20E-05	5.40
0.50	7.69E-06	8.10E-06	5.32
0.60	5.52E-06	5.81E-06	5.33
0.70	4.14E-06	4.35E-06	5.19
0.80	3.19E-06	3.37E-06	5.49
0.90	2.53E-06	2.67E-06	5.45
1.00	2.04E-06	2.15E-06	5.26
2.00	4.11E-07	4.33E-07	5.32
3.00	1.31E-07	1.38E-07	5.06
5.00	2.29E-08	2.41E-08	5.18

Note:

MEAN ANNUAL PROBABILITY OF PERCENT DIFFERENCE ACCELERATION EXCEEDANCE (SENSITIVITY VERSUS **(g) ORIGINAL**) ORIGINAL SENSITIVITY 8.19E-03 0.01 8.42E-03 2.83 0.02 4.07E-03 4.21E-03 3.40 0.03 2.50E-03 2.59E-03 3.47 0.04 1.69E-03 1.76E-03 4.03 0.05 1.22E-03 1.27E-03 3.94 0.06 9.22E-04 9.59E-04 3.99 0.07 7.20E-04 7.49E-04 4.09 0.08 5.77E-04 4.30 6.02E-04 0.09 4.30 4.73E-04 4.93E-04 0.10 3.95E-04 4.12E-04 4.20 0.20 4.69 1.16E-04 1.21E-04 0.25 7.81E-05 8.19E-05 4.90 0.30 5.67E-05 4.98 5.95E-05 0.40 3.43E-05 3.60E-05 4.93 0.50 2.31E-05 2.44E-05 5.44 0.60 1.68E-05 1.77E-05 5.06 0.70 1.27E-05 5.22 1.34E-05 0.80 9.94E-06 1.05E-05 5.56 0.90 7.99E-06 8.42E-06 5.35 1.00 6.55E-06 6.90E-06 5.27 2.00 1.57E-06 1.66E-06 5.44 3.00 6.02E-07 6.35E-07 5.53 5.00 1.58E-07 1.50E-07 5.44

TABLE 20ORIGINAL AND SENSITIVITY TOTAL HAZARD RESULTS FOR 10 HZ SA FOR THE
CCNPP UNIT 3 SITE

Note:

ACCELERATION	MEAN ANNUAL PROBABILITY OF Exceedance		PERCENT DIFFERENCE (SENSITIVITY VERSUS
(g)	Original	SENSITIVITY	Original)
0.01	1.99E-03	2.02E-03	1.41
0.02	6.72E-04	6.83E-04	1.68
0.03	3.25E-04	3.31E-04	1.78
0.04	1.86E-04	1.90E-04	2.05
0.05	1.18E-04	1.20E-04	1.88
0.06	7.96E-05	8.14E-05	2.25
0.07	5.64E-05	5.78E-05	2.40
0.08	4.15E-05	4.25E-05	2.45
0.09	3.14E-05	3.23E-05	2.79
0.10	2.44E-05	2.51E-05	2.96
0.20	4.32E-06	4.50E-06	4.14
0.25	2.47E-06	2.59E-06	4.74
0.30	1.58E-06	1.66E-06	4.90
0.40	7.89E-07	8.32E-07	5.42
0.50	4.64E-07	4.91E-07	5.77
0.60	3.00E-07	3.18E-07	5.98
0.70	2.07E-07	2.20E-07	6.05
0.80	1.49E-07	1.58E-07	6.16
0.90	1.11E-07	1.18E-07	6.37
1.00	8.49E-08	9.01E-08	6.13
2.00	1.22E-08	1.29E-08	5.96
3.00	3.26E-09	3.47E-09	6.31
5.00	4.93E-10	5.24E-10	6.24

TABLE 21ORIGINAL AND SENSITIVITY TOTAL HAZARD RESULTS FOR 1 HZ SA FOR THE
CCNPP UNIT 3 SITE

Note:

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FIGURE 1

COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF $M_W\,5$ AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE STUDY REGION M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME A

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FIGURE 2

COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE STUDY REGION M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME B

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FIGURE 3 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE STUDY REGION M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME E Enclosure UN#13-043 Page 31 of 47



FIGURE 4

COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE MESE-N M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME A

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FIGURE 5 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE MESE-N M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME B

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FIGURE 6 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE MESE-N M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME E

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FIGURE 7

COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF $M_W\,5$ AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE MESE-W M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME A

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FIGURE 8

COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF $M_W\,5$ and greater earthquakes per degree-squared per year for the mese-W M_{MAX} source zone for magnitude weighting scheme B

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FIGURE 9 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE MESE-W M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME E Enclosure UN#13-043 Page 37 of 47



FIGURE 10 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE ECC-AM M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME A

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FIGURE 11 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE ECC-AM M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME B Enclosure UN#13-043 Page 39 of 47



FIGURE 12 COMPARISON OF ORIGINAL AND SENSITIVITY MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR FOR THE ECC- AM M_{MAX} SOURCE ZONE FOR MAGNITUDE WEIGHTING SCHEME E Enclosure UN#13-043 Page 40 of 47



FIGURE 13

COMPARISON OF THE DIFFERENCE IN MEAN RATES OF M_W 5 AND GREATER EARTHQUAKES PER DEGREE-SQUARED PER YEAR BETWEEN THE MIDC-A SOURCE ZONE AND THE MIDC-B, MIDC-C, AND MIDC-D SOURCE ZONES FOR MAGNITUDE WEIGHTING SCHEME E Enclosure UN#13-043 Page 41 of 47



FIGURE 14 COMPARISON OF ORIGINAL AND SENSITIVITY HAZARD RESULTS FOR 100 HZ, 10 HZ, AND 1 HZ SA AT THE CCNPP UNIT 3 SITE: STUDY REGION SOURCE ZONE Enclosure UN#13-043 Page 42 of 47



FIGURE 15 COMPARISON OF ORIGINAL AND SENSITIVITY HAZARD RESULTS FOR 100 HZ, 10 HZ, AND 1 HZ SA AT THE CCNPP UNIT 3 SITE: MESE-N SOURCE ZONE

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FIGURE 16 COMPARISON OF ORIGINAL AND SENSITIVITY HAZARD RESULTS FOR 100 HZ, 10 HZ, AND 1 HZ SA AT THE CCNPP UNIT 3 SITE: MESE-W SOURCE ZONE

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FIGURE 17 COMPARISON OF ORIGINAL AND SENSITIVITY HAZARD RESULTS FOR 100 HZ,

10 HZ, AND 1 HZ SA AT THE CCNPP UNIT 3 SITE: ECC-AM SOURCE ZONE

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FIGURE 18 COMPARISON OF ORIGINAL AND SENSITIVITY UNIFORM HAZARD RESPONSE SPECTRA FOR TOTAL HAZARD AT THE CCNPP UNIT 3 SITE

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FIGURE 19 COMPARISON OF ORIGINAL AND SENSITIVITY HAZARD RESULTS FOR 100 HZ, 10 HZ, AND 1 HZ SA: TOTAL HAZARD FOR THE CCNPP UNIT 3 SITE

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COLA Impact

Revision to the COLA FSAR is not required as a result of this response.