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

Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station (CNS), Units 1 and 2
Docket Number(s) 50-413 and 50-414
Renewed License Nos. NPF-35 and NPF-52

Subject: Catawba Nuclear Station (CNS) Seismic Mitigating Strategies Assessment (MSA) Report for the Reevaluated Seismic Hazard Information – NEI 12-06, Appendix H, Revision 2, H.4.4 Path 4: GMRS < 2xSSE

References:

1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2015, ADAMS Accession Number ML16005A625
2. JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, January 2016, ADAMS Accession Number ML15357A163

The purpose of this letter is to provide the results of the assessment for Catawba Nuclear Station (CNS) to demonstrate that the FLEX strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 can be implemented considering the impacts of the reevaluated seismic hazard. The assessment was performed in accordance with the guidance provided in Appendix H Section H.4.4 of NEI 12-06 Revision 2 [Reference 1] which was endorsed by the NRC [Reference 2].

Based upon the MSA in the Attachment, the mitigating strategies for CNS, as described in References 14 & 15 of the Attachment, are acceptable considering the impacts of the reevaluated seismic hazard.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

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NRR

Please address any comments or questions regarding this matter to Cecil A. Fletcher II, Catawba Nuclear Regulatory Affairs Manager, at (803) 701-3622.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 29, 2017.

Sincerely,

Tom Simril

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Vice President, Catawba Nuclear Station

Attachment	Mitigating Strategies Assessment for CNS NEI 12-06 Appendix H – Seismic "Path 4"
Enclosure 1	High Frequency Review Consistent with Path 2

xc (with enclosures):

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ATTACHMENT

Duke Energy Carolinas, LLC (Duke Energy)

Catawba Nuclear Station (CNS), Units 1 and 2

Docket Number(s) 50-413 and 50-414

Renewed License Nos. NPF-35 and NPF-52

Mitigating Strategies Assessment for CNS

NEI 12-06 Appendix H – Seismic "Path 4"

1. BACKGROUND

Catawba Nuclear Station (CNS) has completed a mitigating strategies assessment (MSA) for the impacts of the reevaluated seismic hazard to determine if the mitigating (FLEX) strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 remain acceptable at the reevaluated seismic hazard levels. The MSA was performed in accordance with the guidance provided in Appendix H of NEI 12-06 Revision 2 [Reference 1] which was endorsed by the NRC [Reference 2].

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the reevaluated seismic hazard information at CNS, developed using the Probabilistic Seismic Hazard Analysis (PSHA). The MSSHI includes a performance-based Ground Motion Response Spectrum (GMRS), Uniform Hazard Response Spectra (UHRS) at various annual probabilities of exceedance, and a family of seismic hazard curves at various frequencies and fractiles developed at the CNS control point elevation. CNS submitted the reevaluated seismic hazard information including the UHRS, GMRS and the hazard curves to the NRC on March 31, 2014 ([Reference 3], transmitted by [Reference 17]). The NRC staff concluded that the GMRS that was submitted adequately characterizes the reevaluated seismic hazard for the CNS site [Reference 4]. Section 6.1.1 of [Reference 2] identifies the method described in Section H.4.4 of [Reference 1] as applicable to CNS.

2. ASSESSMENT TO MSSHI

Consistent with Section H.4.4 (Path 4) of Reference 1, the CNS GMRS has spectral accelerations greater than the Safe Shutdown Earthquake (SSE) but no more than 2 times the SSE anywhere in the 1 to 10 Hz frequency range. As described in the Final Integrated Plan (FIP) [References 14, 15], the plant equipment relied on for FLEX strategies have previously been evaluated as seismically robust to the SSE levels. The basic elements within the MSA of Path 4 SSCs are described in Reference 1. Implementation of each of these basic Path 4 elements for the CNS site is summarized below.

2.1 Scope of MSA Plant Equipment

The scope of SSCs considered for the Path 4 MSA was determined following the guidance used for the expedited seismic evaluation process (ESEP) defined in EPRI 3002000704 [Reference 9]. FLEX SSCs excluded from consideration in the ESEP were added to the MSA equipment scope. In addition, SSC failure modes not addressed in the ESEP that could potentially affect the FLEX strategies were added and evaluated. The selection of the scope of SSCs for the Path 4 MSA is presented in Stevenson & Associates Report 16C4417-RPT-001 [Reference 21].

SSCs associated with the FLEX strategy that are inherently rugged or sufficiently rugged are discussed in Section 2.3 below and identified in Section H.4.4 (Path 4) of Reference 1. These SSCs were not explicitly added to the scope of MSA plant equipment.

2.2 Step 1 – ESEP Review

Equipment used in support of the FLEX strategies has been evaluated to demonstrate seismic adequacy following the guidance in Section 5 of NEI 12-06. As stated in Appendix H of NEI 12-06, previous seismic evaluations should be credited to the extent that they apply for the assessment of the MSSHI. This includes the expedited seismic evaluation process (ESEP) evaluations [Reference 10] for the FLEX strategies which were performed in accordance with EPRI 3002000704 [Reference 9]. The ESEP evaluations remain applicable for this MSA since these evaluations directly addressed the most critical 1 Hz to 10 Hz part of the new seismic hazard using seismic responses from the scaling of the design basis analyses. In addition, separate evaluations are performed to address high frequency exceedances under the high frequency (HF) sensitive equipment assessment process, as required, and are documented in Section 4 of this attachment.

2.3 Step 2 – Inherently/Sufficiently Rugged Equipment

The qualitative assessment of certain SSCs not included in the ESEP was accomplished using (1) a qualitative screening of "inherently rugged" SSCs and (2) evaluation of SSCs to determine if they are "sufficiently rugged." Reference 1 documents the process and the justification for this ruggedness assessment. SSCs that are either inherently rugged or sufficiently rugged are described in Reference 1 and no further evaluations for these rugged SSCs are required under the MSA. The qualitative assessment is presented in detail in Reference 25.

2.4 Step 3 – Evaluations Using Section H.5 of Reference 1

Step three for Path 4 plants includes the evaluations of:

1. FLEX Equipment Storage Building and Non-Seismic Category 1 Structures that could impact FLEX implementation
2. Operator Pathways
3. Tie down of FLEX portable equipment
4. Seismic Interactions not included in the ESEP that could affect FLEX strategies
5. Haul Paths

The results of the reviews of each of these five areas are described in the sections below.

2.4.1 FLEX Equipment Storage Building

The FLEX Storage Facility is described in the FIP [Reference 14] as follows:

> "The FLEX Storage Facility at CNS is a single, large building located in the northwest area of the plant in a portion of the material lay-down storage area. This area is well above the flood level. The building is designed to resist seismic, wind forces, and tornado missiles of a magnitude that bounds all design basis hazards. The FLEX Storage Facility was seismically designed in accordance with the considerations presented in ASCE 7-10, and also meets the CNS SSE criteria.
>
> The FLEX Storage Facility is a dome structure that has an outside diameter of 144 ft. It has two equipment doors on opposite sides of the building and two personnel access doors. The building is located outside of the protected area approximately 500 feet west of the Shipping and Receiving Warehouse."

The FLEX Storage Facility was designed to the SSE, which has a Peak Ground Acceleration (PGA) of 0.15g horizontal and 0.10g vertical. Stevenson & Associates Calculation 16C4417-CAL-001 [Reference 24] reviewed and evaluated the FLEX storage facility to the Foundation Input Response Spectrum (FIRS) estimated from the GMRS, and applicable in the proximity of the FLEX storage facility. Per the review of the FLEX building, major structural components, including the flex building dome shell, small entryway, and the large entryway, as well as the overall structural stability of the flex building dome structure, including the sliding and overturning of the dome, and bearing capacity, were considered credible failure modes and considered for evaluation. Per Reference 24, a $HCLPF_{1\%}$ ($C_{1\%}$) capacity was calculated for each of the failure modes based on the Conservative Deterministic Failure Margin (CDFM) method of EPRI NP-6041-SL [Reference 12], and using the FIRS estimated from the GMRS as input to the FLEX storage facility. Subsequently, a $HCLPF_{10\%}$ ($C_{10\%}$) capacity was developed to comply with NEI 12-06 Appendix H requirements of Section H.5 [Reference 1]. Although sliding of the structure was not found to meet the NEI 12-06 Appendix H requirements, additional evaluation was performed and it was concluded that the computed sliding will not have a negative impact on the door's ability to function. The ring foundation and dome shell are rigid enough that they will withstand the forces produced by the new seismic movements. As such, potential sliding will not impact implementation of the FLEX strategies.

Non-Seismic Category 1 Structures

The Turbine Building (TB) was identified as the only non-seismic category 1 structure that could potentially impact the operator paths at the GMRS level. Per the Stevenson

& Associates Calculation 16C4417-CAL-002 [Reference 20], the $C_{10\%}$ seismic capacity level of the Turbine Building was determined to exceed the GMRS. Hence, the Turbine building was screened out for MSA Path 4 and does not adversely affect the implementation of the FLEX strategy.

Also, block walls were identified in near proximity to the portable FLEX panel boards. Block walls representing all block walls throughout the plant were evaluated in subsequent Stevenson & Associates Report 16C4417-RPT-002 [Reference 25] to verify that they do not collapse due to a seismic event. Also with debris removal capabilities and the fact that only hoses and cables are to be maneuvered over the debris, Non-seismic category 1 structures are concluded to be adequate.

2.4.2 Operator Pathways

Pre-determined operator pathways have been previously identified and documented in the FLEX Support Guidelines (FSGs) documented per Reference 19 Table 4-1. The primary operator pathways were reviewed and walked-down and documented in Reference 18. CNS has reviewed the operator pathways and verified that the operator pathways are not impacted by the MSSHI. Considerations for this review included:

- Multiple available pathways or multiple FLEX components
- Pathways in seismic Category 1 structures with previous reviews for seismic ruggedness
- Debris removal capabilities for moderate to smaller seismic interactions
- Available time for operator actions
- Operator pathways were reviewed during a walkdown to assess seismic interactions associated with a GMRS level seismic event

Components and structures with the potential for seismic interaction with the operator pathways were identified during the walk-down. The identified components and structures were evaluated in References 20 and 25 and were concluded to have adequate capacities corresponding to the GMRS level.

2.4.3 Tie Down of FLEX Portable Equipment

FLEX portable equipment at CNS includes the following (as listed in the FIP [Reference 14]:

- Diesel-powered low, medium and high pressure pumps
- Diesel generators

- Hose trailers
- A fuel transfer trailer
- A CAT 924 loader
- A pickup truck
- Portable spot coolers
- Electric sump pumps
- Portable transformers
- Portable panelboards
- Ventilation fans
- Lighting

Stored equipment was evaluated (for stability and restraint as required/necessary) and protected from seismic interactions to the SSE level as part of the FLEX design process to ensure that unsecured and/or non-seismic components do not damage the FLEX equipment. In addition, large FLEX equipment such as pumps and power supplies were secured as necessary to protect them during a SSE seismic event.

Per Stevenson & Associates Calculation 16C4417-CAL-002 [Reference 20], the FLEX Storage Building equipment storage racks are seismically robust to withstand the FIRS estimated from the GMRS and applicable in the proximity of the FLEX storage facility . Brittle anchorage failure, which would result in overturning of the rack and potential impact with the FLEX equipment, is considered the critical failure mechanism.

As observed in the walkdown [Reference 18], the large wheeled vehicles and trailers were not tied down, but rather implemented wheel blocks. Stevenson & Associates Calculation 16C4417-CAL-002 [Reference 20] evaluates the equipment located in the FLEX Storage Building to the FIRS estimated from the GMRS and applicable in the proximity of the FLEX storage facility, for sliding and overturning resulting from a seismic event in accordance with Appendix A of ASCE 43-05 [Reference 22]. It verified that the equipment could not cause significant damage and has no adverse interactions that could impair the ability of the equipment to perform its mitigating strategy function during or following the GMRS level seismic event using the methods described in NEI 12-06 [Reference 1].

2.4.4 Additional Seismic Interactions

Seismic interactions that could potentially affect the FLEX strategies and were not previously reviewed as part of the ESEP program (e.g., flooding from non-seismically robust tanks, interactions to distributed systems associated with the ESEP equipment list, etc.) were reviewed for CNS. No Piping attached to buried tanks within the FLEX strategy exists.

This assessment was conducted by a walkdown of non-ESEP MSA items which identified that credible seismic interactions are not present [Reference 18].

Stevenson & Associates Calculation 16C4417-CAL-002 [Reference 20] lists relevant structures, systems and components that didn't screen out and identified that credible seismic interactions are not present.

CNS has reviewed the additional seismic interactions and verified that the Mitigation Strategies are not adversely impacted by the GMRS.

2.4.5 Haul Path

Haul paths are as described in the FIP [Reference 14]. The following is quoted directly from the FIP:

- "From the Vehicle Barrier Access Port (VBAP) proceeding East along the southern bank of the Standby Nuclear Service Water Pond (SNSWP) to the FLEX pump ramp access to the SNSWP.
- From the SNSWP ramp through Gate #47 next to the Independent Spent Fuel Storage Installation (ISFSI) Area into the Protected Area and then South to the East side of the Auxiliary and Reactor Buildings. Pump discharge hoses may be deployed along this path for deployment strategies requiring a pump taking suction from the SNSWP and discharging through hoses to the suction of a second pump located outside the Auxiliary Building (e.g., for SG feedwater to support core cooling).
- From the VBAP to the Vehicle Access Port (VAP) into the Protected Area proceeding East along the North side of Unit 2 connecting to the roadway along the east side of the Auxiliary Building.
- From the VBAP proceeding directly south along the interior road circling the site on the south side of Unit 1 to the east side of the Auxiliary Building. Enter rear Gate #17 on the northeast side of plant into the Protected Area to the path along the east side of the Auxiliary Building and/or other established routes.
- From the roadway on the East side of the Auxiliary Building inside the Protected Area, there are two paths that run west to FLEX equipment positions as follows:
    - West to the north side of Unit 2 Diesel Generator Building
    - West to the south side of Unit 1 Diesel Generator Building"

Stevenson & Associates Calculation 16C4417-CAL-002 [Reference 20] performed an evaluation of the beyond design basis seismic event's impact on the deployment paths required for implementation of the FLEX strategies, considering as input the FIRS estimated from the GMRS, and found that the $C_{10\%}$ seismic capacity level corresponding to soil liquefaction exceeded the GMRS and therefore screened out; soil liquefaction is therefore not a concern.

CNS has reviewed the haul paths and verified that the haul paths are not adversely impacted by the MSSHI. The haul paths were walked-down as described in Reference 18, and the walk-down concentrated on assuring that sufficient space is available to maneuver around any potential debris from Non-seismic category 1 structures in order to maintain the determined haul paths. The walkdowns concluded that excess space is available and even if debris exists, the haul paths are maintained and no seismic interactions are considered credible.

CNS addresses debris and potential fallen transmission lines on the haul paths as described in the FIP [Reference 14]:

> "Transmission lines can impede deployment of FLEX equipment along the pre-determined haul paths. In this case, CNS will ground the power lines and move them out of the deployment path. For other debris potentially impeding FLEX deployment, CNS has a CAT 924 Loader that can be used for debris clearing on the deployment path."

3. SPENT FUEL POOL COOLING REVIEW

Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool cooling for CNS was performed based on the initial conditions established in NEI 12-06 [Reference 1] for spent fuel cooling coping in the event of an ELAP/LUHS. The evaluation also used the results of pool heat up analyses from the ELAP evaluation as input.

The FLEX strategy for spent fuel pool (SFP) cooling utilizes SFP level monitoring and make-up capability as described in the CNS Final Integrated Plan (FIP) [Reference 14]. Primary strategy SFP make-up capability is provided using the portable FLEX low pressure pump taking suction through a portable flexible hose and discharging through one of two permanently installed connection tie-ins to the Nuclear Service Water (RN) system.

Secondary strategy SFP make-up capability is provided using the portable FLEX low pressure pump taking suction through a portable flexible hose and discharging through one of two permanently installed connection tie-ins to the Nuclear Service Water (RN) system. Water from RN flows through a jumper hose to connect to the Spent Fuel Pool Cooling (KF) system skimmer loop. The source of make-up water is the Standby Nuclear Service Water Pond (SNSWP).

The permanently installed plant equipment relied on for the implementation of the SFP Cooling FLEX strategy has been designed and installed, or evaluated to remain functional, in accordance with the plant design basis to the SSE loading conditions. The spent fuel pool integrity evaluations demonstrated inherent margins of the spent fuel pool structure and interfacings plant equipment above the SSE to a peak spectral acceleration of 0.8g [Reference 16]. The portable FLEX equipment storage and deployment pathways were respectively evaluated to the FLEX storage facility FIRS estimated from the GMRS, and the envelope of all FIRS estimated from the GMRS for various structures on the CNS site. The permanently installed plant equipment needed to accomplish SFP cooling have been evaluated to the GMRS. Per the Stevenson & Associates Report 16C4417-RPT-002 [Reference 25], the permanently installed plant equipment needed to accomplish SFP level monitoring has been evaluated and found to be seismically rugged for seismic levels up to 2xSSE. It was therefore concluded that the equipment relied on for the implementation of the SFP Cooling FLEX strategy has adequate capacity to withstand the GMRS.

4. HIGH FREQUENCY REVIEW

The high frequency review is included as Enclosure 1 to this attachment.

The selection process for high frequency evaluation is described in detail in Stevenson & Associates Report 16C4437-RPT-001 [Reference 23]. The analysis described in this report functionally screened out all devices in these categories, and thus there were no devices selected for further evaluation.

5. CONCLUSION

Therefore, the FLEX strategies for CNS as described in the FIP [Reference 14] are acceptable as specified and no further seismic evaluations are necessary.

6. REFERENCES

1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2015, ADAMS Accession Number ML16005A625.
2. JLD-ISG-2012-01, Revision 1, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, January 2016, ADAMS Accession Number ML15357A163.
3. Enercon, Report No. DUKCORP042-PR-001, Seismic Hazard and Screening Report in Response to the 50.54(F) Information Request Regarding Fukishima Near-Term Task Force Recommendation 2.1: Seismic for Catawba Nuclear Station Duke Energy Carolinas, March 13, 2014, ADAMS Accession Number ML14099A182.
4. NRC Letter, "Catawba Nuclear Station, Units 1 and 2 - Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima DAI-ICHI Accident (TAC Nos. MF3965 and MF 3966)", dated April 27, 2015, ADAMS Accession Number ML15096A513.
5. Not Used.
6. Not Used.
7. EPRI 3002004396, Final Report, July 2015, High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation, ADAMS Accession Number ML15223A102.
8. NRC Letter, Endorsement of Electric Power Research Institute Final Draft Report 3002004396, "High Frequency Program: Application Guidance for Functional Confirmation and Fragility", dated September 17, 2015, ADAMS Accession Number ML15218A569.
9. EPRI, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 3002000704, Palo Alto, CA, April, 2013.
10. Duke Energy Letter CNS-15-0096 from Catawba Nuclear Station, Errata Letter for 10 CFR 50.54(f) Submittal of Expedited Seismic Evaluation Process (ESEP) Report, Revision 2, dated November 05, 2015, ADAMS Accession Number ML15317A013.
11. EPRI, "Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 1025287, Palo Alto, CA, November, 2012.
12. EPRI, "EPRI NP-6041-SL Revision 1: A Methodology for Assessment of Nuclear Plant Seismic Margin, Revision 1", Palo Alto, CA, August, 1991.

13. NRC Letter, "Catawba Nuclear Station, Units 1 and 2 – Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (CAC Nos. MF5233 and MF5234)", dated March 17, 2016, ADAMS Accession Number ML16072A037. (Review of Plant ESEP Submittal).

14. Duke Energy Letter CNS-16-005 from Catawba Nuclear Station, Final Notification of Full Compliance with Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events" and with Order EA-12-051, "Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation" for Catawba Nuclear Station, dated February 15, 2016, ADAMS Accession Number ML16049A041.

15. NRC Letter, Catawba Nuclear Station, Units 1 and 2 - Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC Nos. MF1162, MF1163, MF1060, and MF1061), dated October 20, 2016, ADAMS Accession Number ML16277A404.

16. Duke Energy Letter to NRC from Kelvin Henderson, July 20, 2016: "Spent Fuel Pool Evaluation Supplemental Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", July 20, 2016, ADAMS Accession Number ML16204A060.

17. Duke Energy Letter to NRC from Kelvin Henderson, March 31, 2014: Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014, ADAMS Accession Number ML14093A052.

18. Stevenson and Associates, Report 16C4417-RPT-003, Revision 0, "Walkdown results for MSA – NEI 12-06 Appendix H Path 4".

19. CNS-1465.00-00-0022, Revision 2, Design Basis Specification FLEX Program for NRC Order EA-12-049.

20. Stevenson and Associates, Calculation 16C4417-CAL-002, Revision 0, "NEI 12-06 Appendix H Path 4 Seismic Evaluations".

21. Stevenson and Associates, Report 16C4417-RPT-001, Revision 0, "Selection of scope of plant mechanical equipment for MSA – NEI 12-06 Appendix H Path 4".

22. ASCE 43-05, "Seismic Design Criteria for Structures, Systems and Components in Nuclear Facilities", 2005.

23. Stevenson and Associates, Report 16C4437-RPT-001, Revision 0, "Selection of Relays and Switches for High Frequency Seismic Evaluation at Catawba Nuclear Station".

24. Stevenson and Associates, Calculation 16C4417-CAL-001, Revision 0, "Seismic Capacity Calculation for FLEX Building", 2017.

25. Stevenson and Associates, Report 16C4417-RPT-002, Revision 0, "Screening of Selected Plant Equipment for MSA - NEI 12-06 Appendix H Path 4".

ENCLOSURE 1

HIGH FREQUENCY REVIEW CONSISTENT WITH PATH 2

ENCLOSURE 1 – HIGH FREQUENCY REVIEW CONSISTENT WITH PATH 2

For Path 4 plants, NEI 12-06 Section H.4.4 [Reference 1] requires licensees with GMRS exceedances of the SSE above 10 Hz to perform a high frequency evaluation of relays in accordance with the methodology described in NEI 12-06 Section H.4.2. This section describes the selection process for high frequency evaluation as focusing on moving-contact electrical control devices subject to intermittent states (predominantly relays and contactors) in the control systems of components in four categories:

(1) *"Relays and contactors whose chatter could cause malfunction of a reactor SCRAM.*
(2) *Relays and contactors in seal-in or lockout circuits whose chatter could cause a reactor coolant system (RCS) leakage pathway that was not considered in the FLEX strategies. Examples include the automatic depressurization system (ADS) actuation relays in boiling-water reactors (BWRs) and relays that could actuate pressurizer power-operated relief valves (PORVs).*
(3) *Relays and contactors that may lead to circuit seal-ins or lockouts that could impede the Phase 1 FLEX capabilities, including buses fed by station batteries through inverters.*
(4) *Relays and contactors that may lead to circuit seal-ins or lockouts that could impede FLEX capabilities for mitigation of seismic events in permanently installed Phase 2 SSCs that have the capability to begin operation without operator manual actions.*

The selection process for each of these categories is described in detail in Stevenson & Associates Report 16C4437-RPT-001 [Reference 23]. The analysis described in this report functionally screened out all devices in these categories, and thus no devices were selected for further evaluation.