Nebraska Public Power District
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NLS2017070
August 24, 2017

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

Subject: Nebraska Public Power District's Seismic Mitigating Strategies Assessment Report for the Reevaluated Seismic Hazard Information
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:
1. NEI 12-06, Revision 2, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2015
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 22, 2016

Dear Sir or Madam:

The purpose of this letter is to provide the results of the assessment for Cooper Nuclear Station (CNS) to demonstrate that the FLEX strategies developed, implemented, and maintained in accordance with Nuclear Regulatory Commission (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 Reference 1, which was endorsed by the NRC in Reference 2.

Based upon the mitigating strategies assessment in the enclosure, the mitigating strategies for CNS considering the impacts of the reevaluated seismic hazard are acceptable as described in CNS' FLEX Final Integrated Plan.

There are no new regulatory commitments and no revisions to existing regulatory commitments contained in this letter.

Should you have any questions or if additional information is required, please contact Jim Shaw, Licensing Manager, at (402) 825-2788.

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A010
NRR

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

Executed On 8/24/2017
(Date)

Sincerely,

John Dent, Jr.
Vice President - Nuclear and
Chief Nuclear Officer

/bk

Enclosure: Cooper Nuclear Station - Seismic Mitigating Strategies Assessment

cc: Regional Administrator, w/ enclosure
USNRC - Region IV

Director, w/ enclosure
USNRC - Office of Nuclear Reactor Regulation

Cooper Project Manager, w/ enclosure
USNRC - NRR Plant Licensing Branch IV

Senior Resident Inspector, w/ enclosure
USNRC - CNS

CNS Records, w/ enclosure

NPG Distribution, w/o enclosure

NLS2017070
Enclosure

ENCLOSURE

Cooper Nuclear Station - Seismic Mitigating Strategies Assessment

ATTACHMENT 9.1 ENGINEERING REPORT COVER SHEET & INSTRUCTIONS
Sheet 1 of 2

Engineering Report No. 2017-008 Rev 0
Page 1 of 5

Engineering Report Cover Sheet

Engineering Report Title:
Review of S&A Report 16C4384-RPT-007,
50.54(f) NTTF 2.1, Mitigating Strategies Assessment (MSA) Response Template

Engineering Report Type: (3)

New ☒ Revision ☐ Cancelled ☐ Superseded ☐
Superseded by: _____

(6)
ECR No. N/A **EC No.** 17-008

(4) **Report Origin:** ☐ CNS ☒ Vendor
Vendor Document No.: 16C4384-RPT-007

(5) **Quality-Related:** ☐ Yes ☒ No

Prepared by: Stevenson and Associates Date: ~
Responsible Engineer (Print Name/Sign)

Design Verified: N/A Date: ~
Design Verifier (if required) (Print Name/Sign)

Reviewed by: Peter Breglio Derek Helmick Date: 7-18-17
Reviewer (Print Name/Sign)

Approved by: RACHIDDIA Rachid Dia Date: 7-18-2017
Supervisor / Manager (Print Name/Sign)

Table of Contents

1 SCOPE AND OBJECTIVE

This report provides a review of vendor (Stevenson & Associates) prepared report 16C4384-RPT-007, referred to as the "Report" within this Engineering Report (ER). The Report's purpose is to provide summary information describing the Mitigating Strategies Assessment (MSA) performed in accordance with NEI 12-06 Appendix H – Seismic "Path 4" and results in support of formal response to the NRC's Near-Term Task Force (NTTF), 50.54(f) letter request associated with, Enclosure 1, Item (4) referred to as the "Letter" within this ER.

Enclosure 1 to the 50.54(f) letter requests that addressees perform a reevaluation of the seismic hazards at their sites using present-day NRC requirements and guidance to develop a ground motion response spectrum (GMRS). In addition, the required response section of Enclosure 1, Item (4) requests that each addressee provide a comparison of the GMRS and SSE to confirm, if necessary, that Systems Structures and Components (SSCs) which may be affected by high-frequency evaluation ground motion will maintain their functions important to safety.

In addition, the purpose of the MSA is to demonstrate that the FLEX strategies as developed, implemented and maintained in accordance with NRC Order EA-12-049 can be implemented considering the impacts of the reevaluated seismic hazard.

2 DESIGN INPUTS

Section 6.0 of the Report provides a reference list of design inputs used in performing the evaluation. The inputs have been reviewed and have been found to be acceptable.

3 ASSUMPTIONS

None

4 DETAILED DISCUSSION

The guidance provided in NEI 12-06, Appendix H, Revision 2, was used for the evaluations summarized in the Report. Section H.4.4 Path 4: (GMRS < 2xSSE) of the document provided general steps to follow for the MSA. The document was created in strict adherence with the current NEI / industry developed template specific to Section H.4.4 Path 4.

Accordingly, the following major topics are addressed within the Report:

a. Assessment to Mitigating Strategies Seismic Hazard Information (MSSHI)
b. Spent Fuel Pool Cooling Review
c. High Frequency Review
d. Conclusions

Assessment to MSSHI

The Cooper Nuclear Station (CNS) GMRS has spectral accelerations greater than the safe shutdown earthquake (SSE) but no more than 2 times the Safe Shutdown Earthquake (SSE) anywhere in the 1 to 10 Hz frequency range. As described in the Final Implementation Plan (FIP), 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 NEI 12-06. Implementation of each of these basic Path 4 elements (steps) for the CNS site is summarized below.

Step 1 – Scope of MSA Plant Equipment

The selection of the scope of SSCs for the Path 4 MSA is presented in Stevenson & Associates Report 16C4384-RPT-004

Step 2 – Expedited Seismic Evaluation Process (ESEP) Review

The 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. 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 the Report.

Step 3 – 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".

Step 4 – Evaluations Using Section H.5 of NEI 12-06

Step 4 for a Path 4 plant (CNS) includes the following evaluations:

1. FLEX equipment storage buildings 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 ESEP that could affect FLEX strategies
5. Haul Paths

Spent Fuel Pool (SFP) Cooling Review

The evaluation of spent fuel pool cooling for CNS was performed based on the initial conditions established in NEI 12-06 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. Since the FLEX strategy for SFP cooling includes an option to run a flexible hose directly from the discharge of the portable pump to the pool, then no additional evaluation of the permanently installed FLEX makeup connection and the SFP emergency make-up piping is required.

High Frequency Review

The selection process for high frequency evaluation is described in detail in Stevenson & Associates Report 16C4384-RPT-001. The high frequency evaluation for the selected devices was performed in Stevenson & Associates Calculation 16C4384-CAL-001.

5 OPERATING EXPERIENCE

CNS or industry Operating Experience does not apply to the criteria set forth by the scope of this 50.54(f) letter response summary document.

6 SUMMARY OF RESULTS

In response to the NRC's Near-Term Task Force (NTTF), 50.54(f) letter request associated with, Enclosure 1, Item (4), CNS has performed a Mitigating Strategies Assessment (MSA) performed in accordance with NEI 12-06 Appendix H – Seismic "Path 4".

The assessment identified no outstanding issues per the applicable criteria set forth in NEI 12-06, Appendix H.

7 CONCLUSIONS AND RECOMMENDATIONS

The FLEX strategies for Cooper Nuclear Station as described in the FLEX Integrated Plan (FIP) are determined as acceptable with no further seismic evaluations required.

8 REFERENCES

Section 6.0 of the evaluation provides a list of references that have been reviewed for suitability to support this report. The review agrees that references are suitable and correct.

9 ATTACHMENTS

1. Stevenson and Associates Document No: 16C4384-RPT-007, "50.54(f) NTTF 2.1 Mitigating Strategies Assessment (MSA) Response Template"

ATTACHMENT 1

Stevenson and Associates
Document No: 16C4384-RPT-007, Rev.0

Stevenson & Associates
Engineering Solutions for Nuclear Energy

Document No: 16C4384-RPT-007
Revision 0
July 17, 2017

Cooper 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

Prepared for:

Nebraska Public Power District
Cooper Nuclear Station
Brownville, Nebraska

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REVISION RECORD

Initial Issue (Rev. 0) — Date

Prepared by: Konstantinos Oikonomou, Ph.D., P.E. — 7/17/2017

Reviewed by: Charles Papadelis — 7/17/2017

Approved by: Apostolos Karavoussianis — 7/17/2017

Revision History

Rev. No.	Prepared by/ Date	Reviewed by/ Date	Approved by/ Date	Description of Revision

ATTACHMENT

Nebraska Public Power District

Cooper Nuclear Station (CNS)

Docket No. 50-298

Renewed License No. DPR-46

Mitigating Strategies Assessment for CNS

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

1. BACKGROUND

Cooper 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 20, 2014 and February 11, 2015 [References 3, 21]. 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 Safe Shutdown Earthquake (SSE) anywhere in the 1 to 10 Hz frequency range. As described in the Final Integration Plan (FIP) [Reference 14], 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 ER 2017-007, Stevenson & Associates Report 16C4384-RPT-004 [Reference 25].

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 of selected SSCs is presented in ER 2017-007, Stevenson & Associates Report 16C4384-RPT-006 [Reference 16].

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 buildings 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 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 Buildings

As part of NEI 12-06, CNS has constructed two facilities to house FLEX equipment that will be used to implement the FLEX strategies. The FLEX storage facilities are two identical and separate structures which comprise seven (7) interconnected modified intermodal type containers aligned in the North-South direction, with maximum achievable site separation in accordance with NEI 12-06. Both buildings are identical in design; they are constructed of standard light gauge metal and utilize a reinforced concrete slab to support and retain all structures from postulated environmental

conditions. Per the CNS FIP, the FLEX buildings have been designed to conform to the ASCE 7-10 wind and seismic ruggedness requirements, per the requirements of NEI 12-06.

The FLEX storage facilities were walked down to examine the tying down of FLEX equipment and to identify potential interactions. The walkdown of the FLEX storage facilities is discussed in ER 2017-007, Stevenson & Associates Report 16C4384-RPT-008 [Reference 18]. The FLEX storage facilities were evaluated in NEDC-17-003, Stevenson and Associates Calculation 16C4384-CAL-002 [Reference 17] for the updated seismic hazard and were concluded to have adequate capacities corresponding to the GMRS level.

Non-Seismic Category 1 Structures

The operator paths were walked down to identify non-seismic Category 1 structures that would be expected to impact the operator paths at the GMRS level as well as debris removal capabilities in case of smaller seismic interactions. Per the walkdown report [Reference 18] the operator pathways in non-seismic Category 1 structures were concluded to be adequate at the GMRS level, on the basis that sufficient debris removal capabilities are available, and that only hoses are to be maneuvered over the debris in the potentially impacted areas.

The haul path walkdowns concentrated on assuring that sufficient space is available to maneuver around any potential debris from non-seismic Category 1 structures. The staging areas were also walked down for potential seismic interactions with non-seismic Category 1 nearby buildings. Per the walkdown report [Reference 18] it was concluded that excess space is available, that the haul paths are maintained even if debris exists, and that no seismic interactions are considered credible.

2.4.2 Operator Pathways

Operator pathways have been identified and documented in the FSGs [Reference 20]. The walkdown team walked down the operator pathways and verified that the operator pathways are not impacted by any potential seismic interaction hazards. The walkdown of the operator pathways is discussed in the walkdown report [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
- FLEX hookups are in seismic Category 1 structures with previous reviews for seismic ruggedness
- FLEX strategies consist of staging most equipment outside the buildings and running hoses and cables to the hookup locations.
- 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

Structures with the potential for seismic interaction with the operator pathways were identified during the walk-down. The identified structures were evaluated in ER 2017-007, Stevenson & Associates Report 16C4384-RPT-006 [Reference 16] and were concluded to have adequate capacities corresponding to the GMRS level.

The block walls at CNS were walked down to assess the potential for interaction with the operator pathways. It was concluded that, with debris removal capabilities and the fact that only hoses and cables are to be maneuvered over the debris, no seismic interactions are considered credible [Reference 18].

2.4.3 Tie Down of FLEX Portable Equipment

The FLEX portable equipment is stored inside the two FLEX storage facilities located on the CNS site. The FLEX equipment types and storage are described in FSGs [Reference 20].

The FLEX portable equipment stored inside the FLEX building was walked-down to ensure stability and restraint as required/necessary and protection from potential seismic interactions. It was concluded that, except for the front loader tractor which was not tied down, large FLEX equipment such as pumps and power supplies were secured as necessary to protect them during a seismic event. Per the review of the straps, anchors and hoist rings used, it was judged that the tie-down components possess considerable capacity to sufficiently restrain the FLEX portable equipment for the GMRS level earthquake. The walkdown also considered unsecured and/or non-seismic components stored around the FLEX equipment and concluded that no damage to the FLEX equipment is credible due to the presence of these components. The walkdown of the FLEX portable equipment is discussed in the walkdown report [Reference 18].

CNS has reviewed the storage requirements (including any tie-down or restraint devices) in effect for FLEX portable equipment and verified that the equipment has no adverse interactions or significant damage 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 Section H.5 of NEI 12-06.

Regarding the front loader tractor, following the walkdown, tie down straps were installed on the tractor to avoid any potential seismic interactions between the tractor and the surrounding items.

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.

The Reactor Building Reactor Equipment Cooling Heat Exchangers REC-HX-A and REC-HX-B were selected in ER 2017-007, Stevenson & Associates Report 16C4384-RPT-004

[Reference 25] as part of the scope of plant equipment for the MSA, and were identified as a potential seismic interaction hazard. They were evaluated for anchorage failure in NEDC-17-003, Stevenson & Associates Calculation 16C4384-CAL-002 [Reference 17] to assess the potential for seismic interaction and loss of inventory. More specifically, a detailed anchorage evaluation was first performed using the in-structure response spectra (ISRS) obtained by scaling the design basis SSE ISRS by a factor of 1.39 (equal to the GMRS-to-SSE ratio in the frequency range of 1-10 Hz), and it was found that the heat exchangers do not possess sufficient anchorage capacity to withstand an earthquake of that level. A subsequent detailed anchorage evaluation was performed using the ISRS corresponding to the IPEEE HCLPF Spectrum (IHS), which fully envelopes the GMRS in the frequency range of 1-10 Hz. Accordingly, IHS ISRS scaled down by a factor of 0.8 (equal to the GMRS-to-IHS ratio in the frequency range of 1-10 Hz) were used to conservatively represent the GMRS level in-structure demand. Such an approach is sufficient to demonstrate adequate structural ruggedness of the heat exchangers to the GMRS level. The anchorage evaluation with the scaled down IHS ISRS demonstrated that the heat exchangers have adequate $C_{10\%}$ capacities corresponding to the GMRS level earthquake and therefore pose no seismic interaction or loss of inventory concerns.

The Reactor Building FC Recirculation Fans FC-R-1E, FC-R-1F, FC-R-1H and FC-R-1J were also identified as a potential seismic interaction hazard. The fans were evaluated for anchorage failure in NEDC-17-003, Stevenson & Associates Calculation 16C4384-CAL-002 [Reference 17] using the scaled down IHS ISRS, which conservatively represent the GMRS level in-structure demand, as discussed above for the heat exchangers. The anchorage evaluation with the scaled down IHS ISRS demonstrated that the fans have adequate $C_{10\%}$ capacities corresponding to the GMRS level earthquake and therefore pose no seismic interaction concerns.

Per the walkdown report [Reference 18] a standard electrical pole was observed near to the FLEX storage facility #1. It was concluded that the pole does not have the mass to affect the structure via a fall impact; however, it may block access to the two end containers, in which case a tractor stored at the other end will be used to remove the potential debris. Therefore, it was concluded that additional credible seismic interaction concerns are not present.

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

2.4.5 Haul Path

Pre-determined FLEX equipment deployment routes have been previously identified and documented in the FSGs [Reference 20]. Typically, the haul paths attempt to avoid areas with trees, power lines, narrow passages etc., when practical. However, high winds can cause debris from distant sources to interfere with planned haul paths. During the FLEX building walkdown it was verified that debris removal equipment is stored inside the FLEX storage buildings and the Turbine building. Therefore, at least one piece of equipment remains functional and deployable to clear obstructions from the pathway between the FLEX storage buildings and its deployment location(s).

The haul path walkdowns 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, that the haul paths are maintained even if debris exists, and that no seismic interactions are considered credible [Reference 18].

The haul paths were evaluated for potential soil liquefaction and were concluded to have adequate capacities corresponding to the GMRS level [Reference 17].

CNS has reviewed the haul paths and verified that the haul paths are not adversely impacted by the MSSHI.

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 heatup 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 CNS Final Integrated Plan (FIP) [Reference 14]. The primary strategy for SFP make-up capability is provided using the portable FLEX pump taking suction from the hardened well though a bladder and portable flexible hoses, and tied into a Fuel Pool Cooling (FPC) System chemical decontamination connection to supply makeup through the FPC System to the SFP through the normal fill location. The secondary strategy for SFP make-up capability employs the same configuration as described above, but the FLEX Pump discharges directly to the Spent Fuel Pool through flexible hoses. The source of make-up water is the North Well Pump. Since the FLEX strategy for SFP cooling includes an option to run a flexible hose directly from the discharge of the portable pump to the pool, then no additional evaluation of the permanently installed FLEX makeup connection and the SFP emergency make-up piping is required.

To adequately monitor SFP levels, two new level indication systems were installed, a primary and a backup [Reference 16]. Each system includes a level probe installed in the SFP, signal processor, and battery backup/uninterruptible power source. In addition to the above SFP levels, Reference 16 states that the SFP level and temperature can be locally monitored at the Spent Fuel Pool. Since locally monitoring at the SFP is the only method noted for determining pool temperature, emergency response personnel will already be required to be in the proximity of the Spent Fuel Pool. Visually monitoring the pool level will therefore not place unnecessary strain on the personnel availability and is considered adequate to meet the CNS FLEX Strategies.

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 ER 2017-005, Stevenson & Associates Report 16C4384-RPT-001 [Reference 19]. The high frequency evaluation

for the selected devices was performed in NEDC 17-02, Stevenson & Associates Calculation 16C4384-CAL-001 [Reference 22].

It is noted that calculation 16C4384-CAL-001 evaluated the selected devices per the methodology of EPRI NTTF 2.1 High Frequency Program. The seismic screening of electrical contact devices for the NEI 12-06 Appendix H High Frequency Program uses the methods of the EPRI NTTF 2.1 High Frequency Program [Reference 1], however the acceptance criteria applies a C10% factor to account for a 90% probability of success [Reference 1]. This means the 100% probability of success acceptance criteria for the EPRI NTTF 2.1 High Frequency Program is more conservative, and any device evaluated and seismically screened from that program would also seismically screen from the NEI 12-06 Appendix H High Frequency Program.

Per the ER 2017-006, Stevenson & Associates Report 16C4384-RPT-005 [Reference 23], where applicable, operator actions that are included in existing station procedures [Reference 24] are used to resolve functional failures of contact devices that impact the operation of essential plant components.

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. Nebraska Public Power District Letter NLS2014027 to NRC, Nebraska Public Power District's Seismic Hazard and Screening Report (CEUS Sites) - 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, dated March 20, 2014, ADAMS Accession Number ML14094A040.
4. NRC Letter, Cooper Nuclear Station - 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 No. MF3734), dated September 8, 2015, ADAMS Accession Number ML15240A030.
5. ER 2017-006 Revision 0, Stevenson & Associates 16C4384-RPT-005 Revision 0, 50.54(f) NTTF 2.1 Seismic High Frequency Confirmation.
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. ER 2015-007 Revision 0, Stevenson & Associates 13C4125-RPT-004 Revision 2, Expedited Seismic Evaluation Process (ESEP) Report in Response to the 50.54(f) Information Request Regarding Fukushima Near-Term Task Force Recommendation 2.1: Seismic for the Cooper Nuclear Station.
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, Cooper Nuclear Station - Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (TAC No. MF5235), dated September 23, 2015, ADAMS Accession Number ML15238A626.
14. Nebraska Public Power District Letter NLS2016070 from Cooper Nuclear Station, Completion of Required Action by NRC Order EA-12-049 - Mitigation Strategies for Beyond-Design-Basis External Events Cooper Nuclear Station, Docket No. 50-298, DPR-46, dated January 04, 2017, ADAMS Accession Number ML17017A166.
15. Not Used.
16. ER 2017-007 Revision 0, Stevenson & Associates 16C4384-RPT-006, Revision 0, Screening of Selected Plant Equipment for MSA - NEI 12-06 Appendix H Path 4.
17. NEDC-17-003 Revision 0, Stevenson & Associates 16C4384-CAL-002, Revision 0, NEI 12-06 Appendix H Path 4 Seismic Evaluations.
18. ER 2017-007 Revision 0, Stevenson & Associates 16C4384-RPT-008, Revision 0, Walkdown Results for NEI 12-06 Appendix H Path 4 Seismic Evaluation.
19. ER 2017-005 Revision 0, Stevenson & Associates 16C4384-RPT-001, Revision 2, Selection of Relays and Switches for High Frequency Seismic Evaluation.
20. Flex Support Guideline 5.10FLEX Flex Support Guidelines (FSGs).
21. Nebraska Public Power District Letter NLS2015017 to NRC, Revision to Nebraska Public Power District's Response to Nuclear Regulatory Commission Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated February 11, 2015, ADAMS Accession Number ML15050A165.
22. NEDC 17-02 Revision 0, Stevenson & Associates 16C4384-CAL-001, Revision 0, High Frequency Functional Confirmation and Fragility Evaluation of Relays.
23. ER 2017-006 Revision 0, Stevenson & Associates 16C4384-RPT-005, Revision 0, 50.54(f) NTTF 2.1 Seismic High Frequency Confirmation.

24. Cooper Nuclear Station Emergency Procedure 5.8.1, Revision 27, RPV Pressure Control Systems.

25. ER 2017-007 Revision 0, Stevenson & Associates 16C4384-RPT-004, Revision 0, Selection of Scope of Plant Equipment for MSA - NEI 12-06 Appendix H Path 4.

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 high frequency evaluation is described in detail in ER 2017-005, Stevenson & Associates Report 16C4384-RPT-001 [Reference 19]. The high frequency evaluation for the selected devices was performed in NEDC 17-02, Stevenson & Associates Calculation 16C4384-CAL-001 [Reference 22].

It is noted that calculation 16C4384-CAL-001 evaluated the selected devices per the methodology of EPRI NTTF 2.1 High Frequency Program. The seismic screening of electrical contact devices for the NEI 12-06 Appendix H High Frequency Program uses the methods of the EPRI NTTF 2.1 High Frequency Program [Reference 1], however the acceptance criteria applies a C10% factor to account for a 90% probability of success [Reference 1]. This means the 100% probability of success acceptance criteria for the EPRI NTTF 2.1 High Frequency Program is more conservative, and any device evaluated and seismically screened from that program would also seismically screen from the NEI 12-06 Appendix H High Frequency Program.

Per the ER 2017-006, Stevenson & Associates Report 16C4384-RPT-005 [Reference 23], where applicable, operator actions that are included in existing station procedures [Reference 24] are used to resolve functional failures of contact devices that impact the operation of essential plant components.