Nebraska Public Power District
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NLS2017072
August 24, 2017

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Nebraska Public Power District's Seismic High Frequency Confirmation - 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 Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:

1. NRC letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012

2. NRC letter, "Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated October 27, 2015

3. NEI letter, "Request for NRC Endorsement of High Frequency Program: Application Guidance for Functional Confirmation and Fragility Evaluation (EPRI 3002004396)," dated July 30, 2015

4. EPRI 3002004396, "High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation," dated July 2015

5. 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

6. EPRI 1025287, "Seismic Evaluation Guidance - Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic," February 2013

A010
NRR

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Dear Sir or Madam:

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1 (Recommendation 2.1: Seismic), Requested Information Item 4, of Reference 1, requested addressees to provide information related to the functionality of high-frequency sensitive structures, systems, and components under certain circumstances. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic hazard evaluation screening determination results and the associated schedules for submittal of the remaining seismic hazard evaluation activities. This letter identified that Nebraska Public Power District is to submit a limited scope, high frequency evaluation for Cooper Nuclear Station (CNS) by August 31, 2017.

By Reference 3, Nuclear Energy Institute submitted an Electric Power Research Institute (EPRI) report entitled, High Frequency Program Application Guidance for Functional Confirmation and Fragility Evaluation (EPRI 3002004396) (Reference 4) for NRC review and endorsement. EPRI 3002004396 provides methods and criteria for evaluating the high frequency sensitive equipment to the reevaluated ground motion response spectrum (GMRS) hazard levels. This report supplements the guidance in the Seismic Evaluation Guidance - Screening, Prioritization and Implementation Details (Reference 6), for plants where the GMRS exceeds the safe shutdown earthquake spectrum in the frequency range greater than 10 Hz. NRC endorsement of Reference 4 was provided in Reference 5.

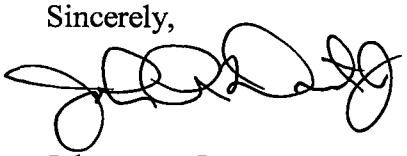
The enclosure to this letter provides the requested information in response to Reference 1 for CNS, based on the guidance in Reference 4.

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.

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 High Frequency Confirmation

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

ENCLOSURE

Cooper Nuclear Station - Seismic High Frequency Confirmation

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

Engineering Report No. 2017-006 Rev 0
Page 1 of 5

Engineering Report Cover Sheet

Engineering Report Title:
Review of S&A Report 16C4384-RPT-005,
50.54(f) NTTF 2.1 Seismic High Frequency Confirmation

Engineering Report Type: (3)

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

(6)
ECR No. N/A **EC No.** 17-003

(4) **Report Origin:** ☐ CNS ☒ Vendor
Vendor Document No.: 16C4384-RPT-005

(5) **Quality-Related:** ☐ Yes ☒ No

Prepared by: Stevenson and Associates Date: 5/8/17
Responsible Engineer (Print Name/Sign)

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

Reviewed by: Peter Braglio 5/9/17 Derek Helmick 5/9/17 Date: —
Reviewer (Print Name/Sign)

Approved by: RALHID DIA Rachid Dia Date: 5/11/17
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-005, referred to as the "Report" within this ER. The Report's purpose is to provide summary information describing the High Frequency Confirmation evaluations 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 SSCs which may be affected by high-frequency evaluation ground motion will maintain their functions important to safety.

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

EPRI guidance document 3002004396 was used for Cooper Nuclear Station engineering evaluations described in the Report. Section 4.1 of the guidance document provided general steps to follow for the high frequency confirmation component evaluation. Accordingly, the following topics are addressed within the Report:

a. Cooper Nuclear Station's SSE and GMRS Information
b. Selection of components and a list of specific components for high-frequency confirmation
c. Estimation of seismic demand for subject components
d. Estimation of seismic capacity for subject components
e. Summary of subject components' high-frequency evaluations
f. Summary of Results

SSE and GMRS Information

Copper Nuclear Station submitted reevaluated seismic hazard information including GMRS and seismic hazard information to the NRC on March 31, 2014 and amended this information on February 11, 2015. In a letter dated September 8, 2015, the NRC staff concluded that the submitted GMRS adequately characterizes the reevaluated seismic hazard for the Cooper Nuclear Station site. The NRC final screening determination letter concluded that the Cooper Nuclear Station GMRS to SSE comparison resulted in a need to perform a High Frequency Confirmation in accordance with the screening criteria in the SPID (Screening, Prioritization and Implementation Details) EPRI guidance document 1025287.

Selection of Components

The fundamental objective of the high frequency confirmation review is to determine whether the occurrence of a seismic event could cause credited equipment to fail to perform as necessary. This objective was achieved by confirming that key plant safety functions critical to immediate plant safety are preserved (reactor trip, reactor vessel inventory and pressure control, and core cooling) and that the plant operators have the necessary power available to achieve and maintain this state immediately following the seismic event (AC/DC power support systems).

Within the applicable functions, the components that required a high frequency confirmation were contact control devices subject to intermittent states in seal-in or lockout (SILO) circuits. Accordingly, the objective of the review as stated in the Report was to determine if seismic induced high frequency relay chatter would prevent the completion of the subject key plant safety functions.

Estimation of Seismic Demand

The basis for calculating high-frequency seismic demand on the subject components in the horizontal direction is the Cooper Nuclear Station horizontal ground motion response spectrum (GMRS), which was generated as part of the Cooper Nuclear Station Seismic Hazard and Screening Report submitted to the NRC on March 31, 2014, amended on February 11, 2015 and accepted by the NRC on September 8, 2015.

The horizontal GMRS and site soil conditions were used to calculate the vertical GMRS (VGMRS), which was the basis for calculating high-frequency seismic demand on the subject components in the vertical direction.

Estimation of Seismic Capacity

Seismic capacities are defined as the highest seismic test level reached by the contact device without chatter or other malfunction. The capacity was determined by the following:

(1) If a contact device was tested as part of the EPRI High Frequency Testing program, then the component seismic capacity from this program is used.

(2) If a contact device was not tested as part of (1), then one or more of the following means to determine the component capacity were used:

(a) Device-specific seismic test reports (either from the station or from the SQURTS testing program).

(b) Generic Equipment Ruggedness Spectra (GERS).

(c) Assembly (e.g. electrical cabinet) tests where the component functional performance was monitored.

The high-frequency capacity of each device was evaluated with the component mounting point demand from Section 3 using the criteria in Section 4.5 of EPRI Report 3002004396. The high-frequency evaluations as described above were performed in NEDC 17-002 (Stevenson & Associates Calculation 16C4384-CAL-001, High Frequency Functional Confirmation and Fragility Evaluation of Relays).

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

Cooper Nuclear Station has performed a High Frequency Confirmation evaluation in response to the NRC's 50.54(f) letter using the methods in EPRI report 3002004396. The evaluation identified a total of 136 components that required evaluation. As summarized in Table B-1, Appendix B of the "Report", 89 of the devices have adequate seismic capacity, two (2) have existing plant procedures to cope with the effect of contact chatter, and 45 components required resolution following the criteria in Section 4.6 of EPRI report 3002004396.

7 CONCLUSIONS AND RECOMMENDATIONS

As a result of this evaluation, and the effort to continue to improve plant safety, Cooper Nuclear Station intends to address equipment sensitive to high frequency ground motion for the reevaluated seismic hazard information through mitigation strategies in lieu of a separate resolution of the 45 components identified under the Letter which do not impact the credited path for mitigation strategies.

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-005, " 50.54(f) NTTF 2.1 Seismic High Frequency Confirmation"

ATTACHMENT 1

Stevenson and Associates
Document No: 16C4384-RPT-005, " 50.54(f) NTTF 2.1