Nebraska Public Power District
Nebraska's Energy Leader

NLS2001074
September 4, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

Subject: Cooper Nuclear Station, Docket 50-298, DPR-46
Design Basis Accident Radiological Assessment Calculation Methodology - Supplemental Information, Main Condenser Seismic Evaluation

References:

1. Letter (NLS2000035) to U.S. Nuclear Regulatory Commission (USNRC) from John H. Swailes (Nebraska Public Power District, (the District)) dated March 24, 2000, Design Basis Accident Radiological Assessment Calculation Methodology - Response to Request for Additional Information (Question #6).

2. Letter (NLS2000036) to USNRC from John H. Swailes (the District) dated March 29, 2000, Design Basis Accident Radiological Assessment Calculation Methodology - Supplemental Seismic Information.

3. Letter to J. H. Swailes (the District) from Lawrence J. Burkhart (USNRC) dated April 7, 2000, Cooper Nuclear Station - Issuance of Amendment on Design Basis Accident Radiological Assessment Calculational Methodology Revision (TAC No. MA7758)

4. Letter (NLS2001011) to USNRC from John H. Swailes (the District) dated February 28, 2001, Proposed License Amendment Related to the Design Basis Accident Radiological Assessment Calculational Methodology

Attached is a Nebraska Public Power District, (the District) evaluation of the seismic capability of the Cooper Nuclear Station (CNS) condenser for safe shutdown earthquake (SSE) loading. This evaluation is a preliminary submittal of the current seismic evaluation required by CNS Operating License condition 2.C.(6) in response to a Nuclear Regulatory Commission (NRC) request. The attached evaluation provides a comparison that shows the CNS condenser to be very similar to other condensers which have experienced and survived earthquakes larger than the design basis SSE postulated for the CNS site.

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By letters dated March 24, 2000 (Reference 1) and March 29, 2000 (Reference 2), the District submitted responses to a request for additional information from the NRC concerning the seismic and structural design of the main steam line piping from the main steam isolation valves (MSIVs) to the main turbine condenser, the main turbine condenser, and the turbine building. These references included the NPPD qualification information for the turbine building structure and main turbine condenser anchorage, as well as preliminary information for the piping. The attached summary of the evaluation of the "ruggedness" of the CNS condenser provides additional information related to the seismic capabilities of this portion of the potential MSIV leakage pathway.

The NRC issued Amendment No. 183 (Reference 3) to the CNS Operating License (DPR-46) which approved on a temporary basis, until CNS entered Mode 4 in preparation for refueling outage 20, the loss of coolant accident (LOCA) and control rod drop accident (CRDA) methodology revisions, and imposed license condition 2.C.(6). License condition 2.C.(6) requires CNS to submit to the NRC, no later than 8 weeks after startup for cycle 21, a request for the staff to review and approve a seismic evaluation to ensure the structural integrity of the main steam line piping from the MSIVs to the main condenser, the main condenser, and the turbine building.

In addition, the NRC has verbally requested early submittal of information related to the main condenser structural capability pursuant to license condition 2.C.(6) in order to review the resubmitted proposed license amendment related to the design basis accident radiological assessment calculational methodology (Reference 4). The District has expedited the main condenser portion of the supporting evaluations for condition 2.C.(6) in order to provide the attached information. As stated above, the attached evaluation demonstrates the CNS condenser is similar to actual condensers that have survived earthquakes which were equivalent to and larger than the postulated CNS SSE. Thus, the CNS condenser is considered to be structurally adequate to withstand the CNS SSE.

Should you have any questions concerning this matter, please contact Mr. David F. Kunsemiller at (402) 825-5236.

Sincerely,

John H. Swailes
Vice President of Nuclear Energy

/erg
Attachment

cc: Regional Administrator
USNRC - Region IV

Senior Project Manager
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector
USNRC

NPG Distribution w/o attachments

Records

ATTACHMENT 1

Evaluation of the Seismic Capability of the Condenser Anchorage for Safe Shutdown Earthquake Loading (Using Experience Method)

1 Purpose

The original design of the condenser was to seismic Class II design (0.1g base shear). This evaluation reviews the adequacy of the condenser itself using the methodology presented in the Boiling Water Reactor Owners Group (BWROG) Report NEDC-31858P-A (Reference 4.1). This methodology uses experience data to compare the Cooper Nuclear Station (CNS) condenser to the "database" condensers described in the BWROG report.

2 Condenser Comparison Evaluation

Figure 1 shows selected ground acceleration response spectra plotted against the CNS safe shutdown earthquake (SSE) ground spectrum from three documented earthquakes occurring in California. These include the 1971 San Fernando (Valley Steam Plant – United States Geological Survey (USGS) Estimate), the 1979 Imperial Valley (El Centro Steam Plant), and the 1989 Loma Prieta (Moss Landing). The Valley Steam Plant record was obtained from Reference 4.2 and the remaining records are from Reference 4.1. These earthquakes produced ground motions well in excess of the CNS SSE ground spectrum.

An evaluation of the seismic ruggedness of condensers and condenser anchorage for General Electric (GE) boiling water reactor (BWR) plants is reported in Reference 4.1. The configurations of the GE BWR condensers were compared to condensers in the earthquake experience data. Condensers in the earthquake experience data exhibited substantial seismic ruggedness even when they were not designed to resist earthquakes. Comparisons of condenser designs in GE BWR plants with those in the earthquake experience data revealed the GE plant designs are similar to those that exhibited good earthquake performance. The study concluded that a failure and significant breach of pressure boundary in the event of a design basis earthquake is highly unlikely and contrary to a large body of historical experience data. The conclusions of that study were verified by detailed comparison of the CNS condenser configuration to the earthquake experience data. In particular, detailed comparisons to the Moss Landing and Ormond Beach condensers were performed.

The seismic adequacy of the CNS condenser was verified by reference to experience data contained in Reference 4.1 with specific comparison to the Moss Landing and Ormond Beach condensers. Per Reference 4.1, these condensers are of similar configuration to CNS and experienced strong motion in excess of the CNS design basis earthquake without failure.

In addition, the adequacy of the CNS specific condenser configuration was verified by an evaluation of the CNS condenser anchorage capacity.

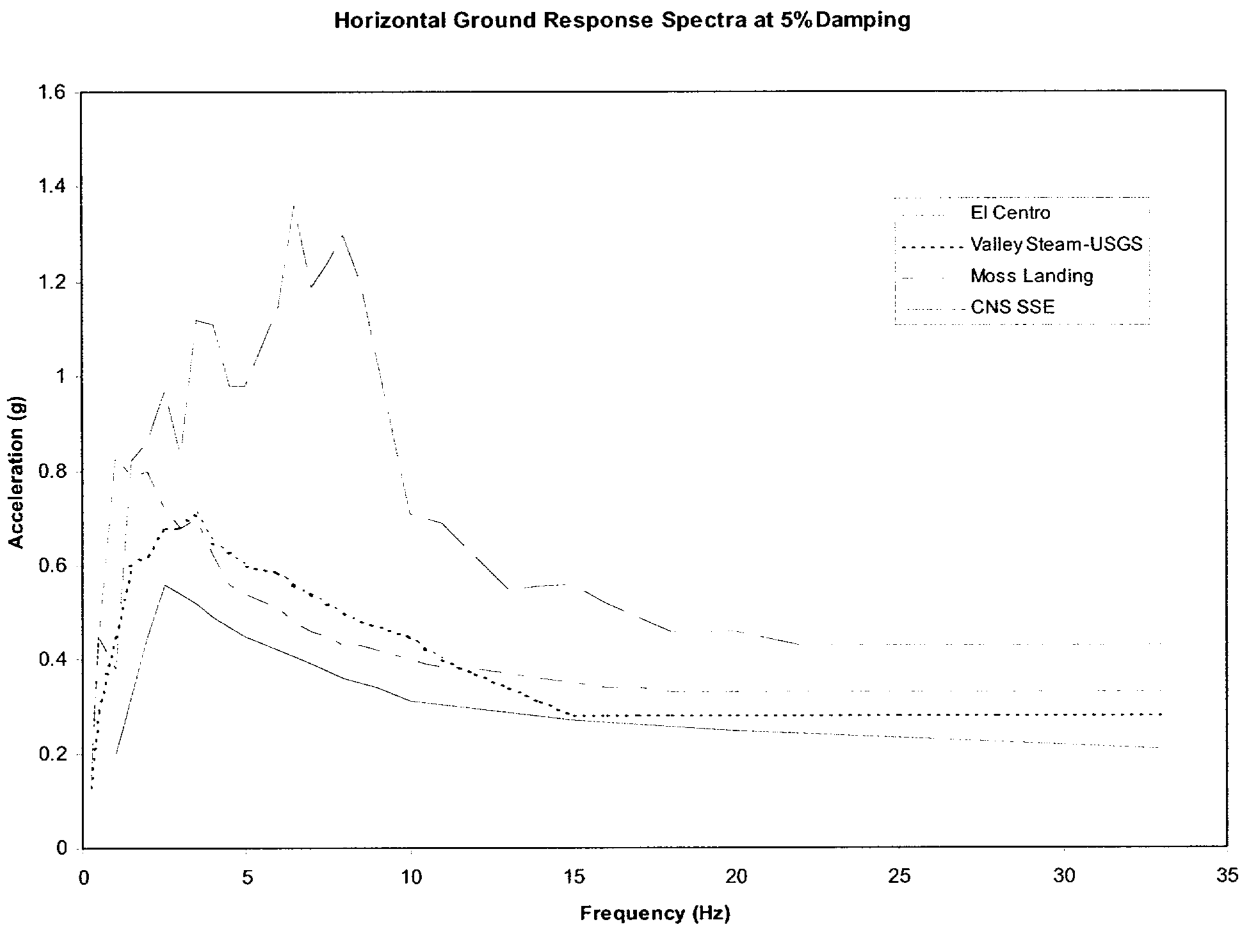

Figure 1: Selected Spectra from References 4.1 & 4.2 vs. CNS SSE Ground Spectrum

The CNS condenser is located below grade at the lowest level of the turbine building (elevation 877.5 ft.). The applied seismic demand was the SSE ground spectrum shown in Figure 1.

Table 1 lists design data for the CNS condenser and for the two experience data sites listed in Reference 4.1, Appendix D, Table 4-3 (Moss Landing 6 & 7, and Ormond Beach 1 & 2). The CNS condenser design data is similar to or bounded by data for the two experience data sites. The CNS SSE ground spectrum is enveloped by the Moss Landing spectrum per Figure 1. The Ormond Beach estimated peak ground acceleration (PGA) demand due to the February 21, 1973 Point Mugu earthquake was 0.20g, which is equivalent to the CNS PGA of 0.2g. The CNS condenser design data is also well represented by the data presented in Reference 4.1, Appendix D, Table 4-3. The comparison verifies that the results of the Reference 4.1 evaluation for structural integrity are applicable to the CNS condenser.

The comparison of condenser data and the anchorage capacity evaluations demonstrates that the conclusions presented in Reference 4.1, Appendix D can be applied to the CNS condenser. That is, a failure and significant breach of the condenser pressure boundary in the event of a design basis earthquake is highly unlikely and contrary to the experience data.

The condenser was also subject to a walkdown inspection during the most recent refueling outage (RFO-19) which found the material condition of the condenser and its anchorage to be good.

3 Condenser Evaluation Conclusion

The comparison of the important structural and operational parameters of the CNS condenser to the two database site condensers, Moss Landing 6&7 and Ormond Beach 1&2, shows that the CNS condenser is very similar to these condensers. Both of these sites experienced earthquakes equivalent to and in excess of the CNS SSE design basis earthquake. This supports the District's previous evaluation of the adequacy of the CNS condenser anchorage.

In conclusion, the CNS condenser is deemed adequate to withstand the CNS SSE design basis earthquake.

4 References

4.1 NEDC-31858P-A, General Electric, "BWROG Report for Increasing MSIV Leakage Ratio Limits and Elimination of Leakage Control Systems," August 1999, (principally Appendix D thereof).

4.2 Safety Evaluation – Duane Arnold Energy Center – Amendment No. 207 to Facility Operating License No. DPR-49, February 22, 1995.

Table 1: CNS Condenser Design Data Versus Experience Data [Ref. 4.1]

Parameter	Cooper Nuclear Station	Moss Landing 6 & 7	Ormond Beach 1 & 2
Manufacturer	Maryland Shipbuilding and Dry Dock Co.	Ingersoll Rand	Southwestern
Flow Type	Single Pass	Single Pass	Single Pass
Shell Dimensions (L x W x H)	62' x 31' x 47'	65' x 36' x 47'	52' x 27' x 20'
Tube Area per Shell	465,000 ft^2	435,000 ft^2	210,000 ft^2
Shell Material	ASTM A285C	ASTM A285C	ASTM A285C
Shell Thickness	7/8 inch	¾ inch	¾ inch
Operating Weight	3,139,000 lbs.	3,115,000 lbs.	1,767,000 lbs.
Tube Material	Type 304 S.S.	Al-brass	90-10 Cu-Ni
Tube Size	7/8 inch	1 inch	1 inch
Tube Length	60 feet	65 feet	53 feet
Tube Wall Thickness	22 Bwg	18 Bwg	20 Bwg
Number of Tubes	25,550	25,590	15,220 per shell
Tube Sheet Material	Aluminum Bronze ASTM B-169D	Munz Metal	Munz Metal
Tube Sheet Thickness	1½ inch	1½ inch	1¼ inch
No. of Tube Support Plates	13 per shell	15	14
Tube Support Plate Material	ASTM A285C	not identified	ASTM A285C
Tube Support Plate Thick.	5/8 inch	3/4 inch	5/8 inch
Tube Support Plate Spacing	39 inches	48 inches	36 to 36.5 inches
Waterbox Material	ASTM A285C	2% Ni cast iron ASTM A-48 CL 30	ASTM A285C
Waterbox Plate Thickness	½-¾ inch	N/A	5/8 to 1 inch
Expansion Joint	Rubber belt	Rubber belt	St. steel
Hot Well Capacity	68,700 gallons	20,000 gallons	34,338 gallons

Correspondence No: NLS2001074

The following table identifies those actions committed to by the District in this document. Any other actions discussed in the submittal represent intended or planned actions by the District. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the NL&S Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
NONE	