Nebraska Public Power District

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

Gentlemen:

Subject: Response to NRC Bulletin 95-02 - Unexpected Clogging of RHR Suction Strainers Cooper Nuclear Station, NRC Docket 50-298, DPR-46

Reference: NRC Bulletin 95-02, dated October 17, 1995, "Unexpected Clogging of a Residual Heat Removal (RHR) Pump Strainer While Operating in Suppression Pool Cooling Mode."

This submittal provides the Nebraska Public Power District's (District's) response to NRC Bulletin 95-02 (Reference). The District has performed the requested inspections and assessments to ensure that the Cooper Nuclear Station (CNS) Emergency Core Cooling Systems (ECCS) will not be adversely affected by debris in the suppression pool. This conclusion is based on the current condition of the CNS suppression pool and the implementation of additional measures to ensure continued suppression pool cleanliness.

NRC Bulletin 95-02 requested licensees to review the operability of their ECCS and other pumps which draw suction from the suppression pool while performing their safety function. The NRC requested that these evaluations be based on suppression pool cleanliness, suction strainer cleanliness, and the effectiveness of foreign material exclusion practices. In addition, the NRC requested licensees to review their foreign material exclusion (FME) programs and associated training and correct any weaknesses identified. The following discussion describes the specific actions taken and the results of evaluations performed in response to the bulletin.

NRC Request

1) *Verify the operability of all pumps which draw suction from the suppression pool when performing their safety functions (e.g., ECCS, containment spray, etc.), based on an evaluation of suppression pool and suction strainer cleanliness conditions. This evaluation should be based on the pool and strainer conditions during the last inspection or cleaning and an assessment of the potential for the introduction of debris or other materials that could clog the strainers since the pool was last cleaned.*

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District Response

The CNS suppression pool (torus) is currently in a clean condition. The District drained and cleaned the torus during the 1993 refueling outage to support inspection and a planned recoating of the torus. While the inspection resulted subsequently in deferral of torus recoating, these cleaning activities, as verified during recent video inspections, provided for the current good state of torus cleanliness. Further description of the inspections performed are provided below.

CNS is currently in a refueling outage. In response to issues identified resulting from the September 1995 Limerick Unit 1 event as described in NRC Bulletin 95-02, the District performed visual inspections of the ECCS and RCIC System suction strainers and torus, and sampling of the torus water during the period from October 17-25, 1995. These inspections and sampling determined that no immediate additional actions are necessary to ensure torus water cleanliness.

At CNS, each ECCS suction strainer consists of two baskets per penetration with 1/8" diameter holes, situated in a tee arrangement. The ECCS strainers are located on the following systems:

- Residual Heat Removal (RHR) System has four strainers (one per RHR loop)
- Core Spray (CS) System has two strainers (one per CS loop)
- High Pressure Coolant Injection (HPCI) System has one strainer

Although not considered an ECCS system, the Reactor Core Isolation Cooling (RCIC) System is capable of being aligned to take suction from the torus. It has one strainer (two baskets situated in a tee arrangement).

The District inspected accessible portions of the ECCS torus suction strainers, and the RCIC System strainer using a video probe to view and record the inspections. This inspection included all upper baskets for each penetration, and the upper and lower baskets for each of the CS subsystems. The lower baskets on the RHR, HPCI, and RCIC systems were not easily accessible using the video probe. While these inspections identified a few items, e.g., single pieces of string, a few small pieces of other unidentified material, the strainers were clean. Prior to startup from the current outage, the District will complete inspections of the remaining suction strainers, and will notify the NRC if the results of those inspections differ significantly from those already inspected.

The District also took grab samples of the torus water from three separate locations to determine torus water cleanliness. Three grab samples were taken from the bottom of the torus at different locations, and one sample was taken from approximately the mid-water level of the torus. These samples were filtered and examined. Upon visual examination, no fibers were identified. Upon microscopic examination, various fibers/threads were identified ranging in size from approximately 1 mm x 0.01 mm to approximately 6 mm x 0.01 mm. In addition, many very small rust particles were identified, with the measurable particles averaging

approximately 0.01 mm in diameter. Based on this sampling and examination, no fibers/threads were identified which posed any potential for impacting pump operability.

While inspecting the suction strainers, the District also visually inspected the floors in the bays where the suction strainers are located (six of sixteen bays). During these inspections, the District found a bagged flashlight in the torus, which was removed. This was found in Bay 11, which is the location of the main torus entrance. Based on this finding, the District expanded its visual inspection of the torus to include a video probe inspection of the remainder of the torus floor area.

The torus floor area inspection included the area underneath the torus catwalk to underneath the downcomer header. This was determined to be the area that had the greatest potential for items to have fallen into the torus. The only other item identified was a small rubber band that was successfully retrieved.

To ensure present and future foreign material exclusion control, the District recently implemented an upgraded foreign materials exclusion (FME) program. This program ensures that proper controls are put into place when a system is breached to guard against the introduction of any foreign material into a system during work, and to ensure post-maintenance cleanliness. FME zones are established, as appropriate, to provide FME controls commensurate with the importance of ensuring FME for the system, capability for identifying foreign material intrusion, and foreign material retrieval capability. The discipline shop supervision is responsible for defining FME zones and ensuring implementation of protective measures as necessary.

The protective measures implemented vary based on the FME program criteria, and are designed to guard against foreign material intrusion during work activities, identify if foreign material intrusion does occur, and ensure retrieval of any foreign material that is inadvertently introduced into these areas. These measures may include the use of FME devices to protect against the introduction of foreign material, use of FME monitors to log material in and out of the FME zone and to ensure FME controls are maintained, establishing strict area cleaning requirements and sequences, and securing of tools and/or personal items to prevent inadvertent loss. The FME program also ensures supervision is promptly notified if a loss of FME integrity occurs, and actions are taken to retrieve any foreign material inadvertently introduced into a system or component.

During the current outage, torus work is being performed under the highest level of FME controls. These include FME monitors, and equipment and material logging when the torus is open until protected using an FME device. To provide improved protection for the torus and drywell areas, the District is currently revising its FME program explicitly to identify the FME categorization for these areas. This will ensure a continued and consistent high level of FME protection for the torus and drywell.

Plant procedures ensure that drywell and torus closeout inspections are performed, if opened, prior to plant restart. These procedures confirm removal of equipment used to support outage activities, and specifically require inspection to verify these areas are free from any foreign material. This process provides further assurance against leaving foreign material that could potentially affect ECCS suction strainer operability in the drywell and torus. To provide further confidence of the adequacy of FME controls employed during work conducted in the torus this outage, the District will conduct a closeout video inspection of the torus in the access hatch area prior to plant startup from the current refueling outage.

The District concludes that ECCS and RCIC system capability will not be adversely impacted as a result of debris accumulation during normal operation. This conclusion is based on the current cleanliness of the torus and suction strainers as verified by visual inspections, and controls in place to prevent foreign material intrusion.

NRC Request

2) *The operability evaluation in requested action 1 above should be confirmed through appropriate test(s) and strainer inspection(s) within 120 days of the date of this bulletin.*

District Response

Based on the preliminary visual inspections of the ECCS and RCIC System suction strainers, as discussed above, the District has not identified a need to conduct any special tests of strainer operation. However, for the interim as discussed below, the District will begin trending ECCS pump suction pressures during normal pump surveillance testing when suctions are aligned to the torus to identify any significant changes which may be indicative of suction strainer clogging.

NRC Request

3) *Schedule a suppression pool cleaning. The schedule for cleaning the pool should be consistent with the operability evaluation in requested action 1 above. In addition, a program for periodic cleaning of the suppression pool should be established, including procedures for the cleaning of the pool, criteria for determining the appropriate frequency, and criteria for evaluating the adequacy of the pool cleanliness.*

District Response

The District has not yet developed a program for determining the appropriate interval for cleaning the torus. As discussed above, the torus was cleaned during the 1993 CNS refueling outage, and is currently clean. The District will evaluate this issue further, and develop a program to ensure that the torus and ECCS and RCIC System suction strainers are cleaned on a frequency commensurate with ensuring operability of the suction strainers. This program will include:

- Visual inspection of the torus suction strainers each refueling outage;
- Torus water sampling;
- Definition of appropriate criteria for determining suction strainer and torus cleaning frequency; and
- Suitable procedures for cleaning the torus and suction strainers.

The District will have this program in place by the start of its next scheduled refueling outage.

NRC Request

4) *Review FME procedures and their implementation to determine whether adequate control of materials in the drywell, suppression pool, and systems that interface with the suppression pool exists. This review should determine if comprehensive FME controls have been established to prevent materials that could potentially impact ECCS operation from being introduced into the suppression pool, and whether workers are sufficiently aware of their responsibilities regarding FME. Any identified weaknesses should be corrected. In addition, the effectiveness of the FME controls since the last time the suppression pool was cleaned and the ECCS strainers inspected, and the impact that any weaknesses noted may have on the operability of the ECCS should be assessed.*

District Response

The District has recently implemented a comprehensive upgrade to its FME program. This upgrade is detailed in the response to Item 1 above. As part of the FME program upgrade, the District trained plant personnel to ensure that workers are adequately aware of their responsibility for protecting systems against the introduction of foreign material and familiar with the controls established to implement the FME program.

However, based on further review of the FME program, the District is revising its FME procedure to identify explicitly, the FME categorization for the torus and drywell to ensure a high level of FME protection for these areas. The District further expects, based on experience obtained during the current refueling outage, that additional improvements to this program will be identified and implemented. Following the current outage, the District will review the FME program and revise it as appropriate to enhance its effectiveness.

As discussed above, although the torus was cleaned in 1993, the District did identify a few items during its inspection of the suction strainers and expanded inspection of the torus. The expansion of the inspection scope to include the torus floor ensures that no foreign material currently exists in the torus that could affect ECCS and RCIC suction strainer operation. The District will perform a closeout video inspection of the torus in and around the access hatch area to provide additional assurance against foreign material intrusion. Therefore, the current FME measures and the District's commitment to review its FME program will continue to protect against foreign material intrusion in the drywell and torus.

NRC Request

5) *Consider additional measures such as suppression pool water sampling and trending of pump suction pressure to detect clogging of ECCS suction strainers.*

District Response

As discussed above, the District will develop a program to determine the appropriate frequency for cleaning the torus and ECCS suction strainers. As part of that program development, the District will establish a periodic torus water sampling process to support determination of a required cleaning interval. As an additional interim action, the District will trend ECCS pump suction pressures during pump testing with suctions aligned to the torus. This trending will provide a means of identifying any potential suction strainer clogging concerns during operation. The District will continue to participate in industry activities associated with ECCS suction strainer clogging, and determine whether continued ECCS pump suction pressure trending is appropriate.

If you have any further questions on this subject, please contact me.

Sincerely,

G. R. Horn
Vice President - Nuclear

cc: Regional Administrator
USNRC - Region IV

Senior Resident Inspector
Cooper Nuclear Station

Senior Project Manager
USNRC -NRR Project Directorate IV-1

NPG Distribution

STATE OF NEBRASKA)
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PLATTE COUNTY)

G. R. Horn, being first duly sworn, deposes and says that he is an authorized representative of the Nebraska Public Power District, a public corporation and political subdivision of the State of Nebraska; that he is duly authorized to submit this response on behalf of Nebraska Public Power District; and that the statements contained herein are true to the best of his knowledge and belief.

G. R. Horn

Subscribed in my presence and sworn to before me this 16TH day of November, 1995.

NOTARY PUBLIC

GENERAL NOTARY-State of Nebraska
RITA L. GOFF
My Comm. Exp. Dec. 19, 1995