Nebraska Public Power District

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NLS940023
July 28, 1994

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

Subject: Update to Control Room Emergency Filter System Commitments
Cooper Nuclear Station
Docket No. 50-298, DPR-46

References: 1. Letter from G. R. Horn (NPPD) to NRC dated July 20, 1994, "Control Room Emergency Filter System Commitments."

2. Meeting Between Nebraska Public Power District and the Nuclear Regulatory Commission on July 7, 1994 concerning the Control Room Emergency Filter System.

3. "Control Room Operator Dose Due to Inleakage to Control Room", Nuclear Engineering Design Calculation, NEDC 94-071.

Gentlemen:

The purpose of this letter is to provide the NRC with an update regarding commitments made by Nebraska Public Power District (District) in its July 20, 1994 letter concerning the Control Room Emergency Filter System (Reference 1) and also discussed during a July 7, 1994 meeting between the District and the NRC (Reference 2). As requested in a July 28, 1994 NRC/District teleconference, this letter clarifies the District's current plans and discusses additional actions planned. Therefore, this letter supersedes the July 20, 1994 letter in its entirety.

I. Prior to startup, the District will establish the following administrative, operability, and surveillance requirements for the Control Room Emergency Filter System:

1. The Control Room Envelope pressurization operability limit will be ≥ +0.03" wg with respect to the adjacent buildings and atmosphere. If this pressurization requirement cannot be met, the District will declare the system inoperable and enter the appropriate Limiting Condition for Operation (LCO).

2. The Control Room Envelope pressurization administrative operating limit will be ≥ +0.04" wg with respect to the adjacent buildings and atmosphere. If this pressurization requirement cannot be met, the District will initiate an accelerated testing frequency to ensure that the operability limit of ≥ +0.03" wg is met. During the period of accelerated testing, the District will initiate efforts to restore the pressure to ≥ +0.04" wg.

3. The normal testing frequency will be once per month (31 days).

4. The accelerated testing frequency will be once every two weeks (14 days).

5. Accelerated testing may be suspended and the normal frequency resumed after two consecutive biweekly tests with results ≥ +0.04" wg.

6. The surveillance interval may be extended by a maximum of 25% to allow for adverse wind conditions.

II. Following startup, the District will perform the following additional actions:

1. A modification will be made to the Control Room Emergency Filter System to increase the ventilation flow and the pressurization margin. This modification will increase the flowrate from the current technical specification value of 341 ± 10% cfm to approximately 1000 cfm. By letter dated July 27, 1994, Proposed Change No. 135 to the CNS Technical Specifications was submitted for NRC approval to support this modification.

2. Following NRC approval of Proposed Change No. 135 and implementation of the corresponding design change, operability and administrative limits for Control Room pressurization will be increased by 0.01" wg to ≥ +0.04" wg and ≥ +0.05" wg respectively.

3. The surveillance frequencies for the operability and administrative limits will remain as described in Items I.3, I.4, and I 6 above.

4. Accelerated testing may be suspended and the normal frequency resumed after two consecutive biweekly tests with results ≥ +0.05" wg.

III. The basis for the +0.03" wg operability limit is as follows:

No Loss of Offsite Power occurs which results in the ventilation systems in adjoining areas maintaining a negative pressure with respect to atmosphere. This provides the least positive pressure margin for the Control Room with respect to atmosphere.

Based upon Nuclear Engineering Design Calculation, NEDC 94-071, the District has determined that the following constitutes the worst case conditions relative to operator dose:

1. The design basis Loss of Coolant Accident (LOCA), which provides the highest source term.

2. A 30 minute fumigation period upon accident initiation followed by Stability Class A meteorological conditions, which provide the highest source term concentration.

Given these conditions, the District has determined that a ≥ +0.03" wg operability limit is acceptable for the following reasons:

1. Under the stated conditions, filtered outside air would be brought into the Control Room through the Emergency Filter System. Sources of unfiltered outside air consist of doors, cable and pipe penetrations, building wall openings, and two Control Building HVAC ducts which pass through the envelope. Positive pressurization of the Control Room Envelope using filtered outside air ensures that leakage would be out of the envelope through door seals, penetrations, and building wall openings.

   The Control Building HVAC ducts supply air to and exhaust air from the Emergency Switchgear Rooms. The supply duct is at a higher pressure than the Control Room Envelope with the ventilation system in service. This duct is designed and inscalled to seismic class I criteria and, therefore, postulating a catastrophic failure is not required. The ducts were extensively sealed when originally installed and recent testing has determined them to be leak tight.

2. The Control Room is surrounded on three sides by other buildings. Wake effects from the adjacent buildings for most wind directions tend to reduce the atmospheric pressure surrounding the Control Building thereby increasing the Control Room's positive pressure margin. The one exception is a northerly wind when the north wall and roof of the Control Room could experience a positive pressure from direct impingement. It is conservatively estimated that a wind speed of 8 mph would result in maximum wind pressures on the exposed wall or roof of 0.024" wg (using a 0.8 pressure coefficient per ASHRAE). However, during this case, the Control Room is upwind of any expected plume release point thus limiting the consequences of any inleakage.

   The instrumentation currently utilized for measuring Control Room positive pressurization is an inclined manometer graduated in 0.01" wg increments (i.e. ~ 0.005" wg accuracy). Combining the 0.005" wg accuracy with the 0.024" wg wind effect, assuming up to an 8 mph wind, shows that a reading of 0.03" wg or greater ensures positive pressure at wind speeds up to 8 mph.

The CNS testing program was reviewed against the potential for wind wake effects, wind speed, and direction which could adversely affect testing. The results of the review, and confirmed by testing, determined that the wind wake effect would be insignificant for wind speeds less than 4 mph. Testing will be performed with wind speeds of 0-4 mph to prevent masking of potentially degraded conditions.

Per the "Handbook of Chemical Analysis Procedures," FEMA, the worst case meteorological conditions (Stability Class A) would occur at wind speeds of $\leq$ 6.7 mph. The source term concentration in the vicinity of the Control Room is inversely proportional to wind speed due to the dispersal effects of the higher winds. At wind speeds $>$ 6.7 mph, the operator thyroid dose becomes insignificant regardless of the positive pressure in the Control Room.

Based upon the negligible dose effects at wind speeds $>$ 6.7 mph and that 0.03" wg provides positive pressure up to wind speeds of 8 mph, maintaining a positive pressure in the Control Room Envelope is not required at wind speeds $\geq$ 8 mph.

3. Nuclear Engineering Department Calculation, NEDC 94-071, was performed to determine the worst case doses for design basis conditions. If the actions described above are taken to ensure that the Control Room Envelope remains at a positive pressure during the worst case bounding condition, the limits of 10 CFR 50, Appendix A, GDC 19 are met with significant margin. However, even assuming the minimum Technical Specification allowable filter flow rate of 305 cfm and unfiltered inleakage of as much as 2000 cfm, the GDC 19 limits are still met (see Attachment A).

The District believes that the test pressure acceptance criteria and test frequencies described above will ensure that Control Room habitability will be maintained under all postulated accident conditions.

IV. The District will continue to study system performance following the flowrate increase modification in order to determine what further actions may be required in order to maximize the margin to safety of the Control Room Envelope. Any modifications required as a result of this study will be installed during the 1995 refueling outage.

Once the Control Room Envelope issue has been brought to final resolution, a change to the Control Room Emergency Filter System technical specification will be proposed to establish an operability value, appropriate limiting conditions for operability, and surveillance requirements for Control Room positive pressurization.

In addition, beginning on or about August 2, 1994, the District will perform a tracer gas study of the Control Room Envelope. NCS Corporation, in conjunction with Lagus Technologies, will be used as professional consultants to perform this study. The study will consist of attempting to measure the unfiltered inleakage into the Control Room

Envelope and measuring the leakage rate of the positive pressure duct that penetrates the envelope. The Control Room Envelope will be injected with a volume of tracer gas and the rate of concentration decay over time will be measured to determine dilution due to inleakage. The positive pressure duct will have a tracer injected into the airflow stream (ensuring proper mixing) and the Control Room Envelope will be monitored for tracer gas inleakage. Based upon the results of these tests, a determination will be made as to the need for a barrier challenge test which would consist of the injection of a tracer gas into the higher pressure Control Room Envelope and monitoring the adjoining areas for tracer outleakage.

If you have any questions, or need any additional information, please contact me.

Sincerely,

G. R. Horn
Vice President - Nuclear

Attachment

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cc: Regional Administrator
USNRC - Region IV
Arlington, Texas

NRC Resident Inspector
Cooper Nuclear Station

NPG Distribution

ATTACHMENT A

Control Room Operator Radiological Accident Dose

The radiological dose to the Control Room operators following a design basis accident has been calculated per the methodology outlined in Reference 1. Overall worst case operator dose has been determined to occur due to a design basis LOCA. This dose is shown as Case A in the table below. A sensitivity analysis has shown that using the maximum filtered flow rate as specified by Technical Specifications 3.12.A.2.c (341 cfm +10%) is the worst case for the dose analysis. The unfiltered flow rate is 10 cfm based upon the assumption that the Control Room Envelope is positively pressurized and the only unfiltered inleakage is due to the opening and closing of doors. Some of the conservative assumptions utilized in the dose calculations are as follows:

1) Charcoal adsorber filter efficiencies of 95% and 90% are utilized for the Standby Gas Treatment and Control Room Emergency Filter Systems respectively.

2) No mixing in Secondary Containment and instantaneous mixing in Primary Containment and the Control Room are assumed.

3) Instantaneous release of fission products occurs with no time delay and with maximum allowable MSIV leakage added to containment leakage.

4) Worst case fumigation conditions occur for the first 30 minutes, followed by Stability Class A meteorological conditions. Site specific wind conditions are utilized to determine plume effects (X/Q).

5) Source terms available for immediate release from containment include 100% of the noble gases and 25% of the halogens, in accordance with the Updated Safety Analysis Report and Regulatory Guide 1.3.

Cases B and C show the results of a sensitivity analysis for unfiltered flow rates. The unfiltered flow rate used for Case C (2000 cfm) is conservatively determined from Reference 2 assuming no positive pressurization. For Cases B and C, the filtered flow is 305 cfm since, at the higher unfiltered flow rate, the minimum filtered flow rate (341 cfm -10%) is more conservative. For all cases, the Control Room operator doses are within 10CFR50, Appendix A, GDC 19 limits of 5 Rem whole body (and 30 Rem thyroid) per Reference 2.

Case	Filtered Flow Rate (cfm)	Unfiltered Flow Rate (cfm)	Thyroid Dose (Rem)	Whole Body Dose (Rem)
A	375	10	11.39	1.74
B	305	1000	27.08	1.77
C	305	2000	29.75	1.78

References:

1) "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Criterion 19", K. G. Murphy and Dr. K. M. Campe, 13th AEC Air Cleaning Conference, 1974.

2) US NRC Standard Review Plan, Section 6.4, "Control Room Habitability System", Rev. 2-July 1981.