OCT 10 1989

In Reply Refer To:
Docket: 50-298/89-28

Nebraska Public Power District
ATTN: George A. Trevors
Division Manager - Nuclear Support
P.O. Box 499
Columbus, Nebraska 68602-0499

Gentlemen:

Thank you for your letter of September 25, 1989, in response to our letter and the attached Notice of Violation dated August 21, 1989. As a result of our review, we find that additional information, as discussed with Messrs. J. M. Meacham, T. J. Arit, and other members of the NPPD staff (during a telephone call on October 4, 1989) is needed. Specifically, you should address how your On-the-Spot Change (OSC) process will be modified to encompass a review of design basis documentation used in a station design change. You should also address actions taken to determine if other station design changes with OSCs exist that may have been improperly implemented.

As discussed during the telephone conference, please provide the supplemental information within 30 days of the date of this letter.

Sincerely,

Original Signed By
J. L. Milhoan

James L. Milhoan, Director
Division of Reactor Projects

cc:
Nebraska Public Power District
ATTN: G. D. Watson, General Counsel
P.O. Box 499
Columbus, Nebraska 68601

Cooper Nuclear Station
ATTN: Guy R. Horn, Division
Manager of Nuclear Operations
P.O. Box 98
Brownville, Nebraska 68321

| *RIV:RI:PSS | *C:PSS | *D:DRS | D:DRP |
|---|---|---|---|
| JEoardman/cjg | TStetka | LJCallan | JLMilhoan |
| / /89 | / /89 | / /89 | 10/6/89 |

IE01
1/1

*Previously concurred

bcc to DMB (IE01)

bcc distrib. by RIV:

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Nebraska Public Power District

GENERAL OFFICE
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NLS8900358
September 25, 1989



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

Subject: NPPD Response to NRC Inspection Report 50-298/89-28
Cooper Nuclear Station
NRC Docket No. 50-298, DPR-46

Reference: Letter, G. A. Trevors to USNRC, dated September 19, 1989
Alternate Rod Insertion

Gentlemen:

This letter is written in response to your letter dated August 21, 1989, transmitting Inspection Report 50-298/89-28. Therein you indicated that certain of our activities were in violation of NRC requirements.

Following is the statement of violation and our response in accordance with 10CFR2.201.

Statement of Violation

Lack of Design Control

10 CFR part 50, Appendix B, Criterion V, states in part that "Activities affecting quality shall be prescribed by document instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Contrary to the above, the NRC inspector found that the procedures for the control of design changes were inadequate in that they allowed an on-the-spot-change (OSC) to the alternate rod insertion system which substantially changed the reset time without an evaluation.

This is a Severity Level IV violation (Supplement I)(298/8928-01)

Reason For The Violation

Station Design Change (DC) 86-034B installed the ATWS changes for the ARI and RPT systems. This DC was based on an approved Safety Evaluation Report (SER) from the NRC dated September 23, 1987. This SER approved a maximum rod insertion time of 25 seconds and an ARI reset permissive of 30-35 seconds.

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When acceptance testing for ARI was performed, it was found that the blue scram light for the last rod indicated an insertion time of 32.0 seconds after ARI initiation. General Electric (GE) had performed a CNS specific evaluation justifying full insertion times longer than 25 seconds (Attachment 1). OSC #27 to DC 86-034B incorporated this letter into the DC and utilized Option 3 of the letter which allowed 34.5 seconds for full insertion. The time delay relay which prevents ARI reset prior to the ARI system completing its function was set to allow reset 30 seconds after ARI initiation. OSC #27 did not change this set point.

However, the District believes the inspector's real concern was that the specific commitments (full insertion time and reset time) covered in the SER were not restated in the DC or the District's Safety Evaluation for the DC. These documents only referenced the SER. CNS Procedures 3.3, Station Safety Evaluations, and 3.4, Station Design Changes, do not require that commitments made to the NRC be restated. The procedures only require that authorizing documents such as a SER be referenced. If the SER was contained in the DC package, and thus readily available for review, the OSC would not have been approved and NRC review and approval would have been sought instead. The reason for the violation was the lack of a requirement to include in the DC package any NRC SER that authorized the activity being implemented by that design change.

Corrective Steps Which Have Been Taken And The Results Achieved

During and after the inspection, NPPD contacted General Electric (GE) to discuss any potential safety concerns resulting from the possibility of manual reset of the ARI system prior to all rods being inserted. As stated in the Inspection Report, the potential safety significance is relatively small. In addition, operating procedures require the operator to verify all rods are inserted prior to resetting ARI.

GE recommended re-reviewing the ARI Acceptance Test and recording the start-of-rod movement as indicated by the red "Drift" light on the full core display rather than the blue "SCRAM" light as was done originally. The "Drift" light times were recorded for any rod whose "SCRAM" light came on at fifteen (15) seconds or later after ARI initiation. The "Drift" lights indicated that the last rod started movement at approximately 24 seconds. Adding a conservative five (5) seconds for full insertion time resulted in the last rod being fully inserted at 29 seconds. Using these results, the last rod would be fully inserted prior to the time ARI could be reset. However, GE Specification 24A1911, Rev. 2, also states that the timed interval for preventing ARI system reset should be less than or equal to 10 seconds after the rod full insertion time allowable limit. GE recommended that since the full insertion time allowable limit was changed, the reset time delay should be changed also. Therefore, a letter was submitted to the NRC, on September 19, 1989 (Reference), requesting a supplement to the Safety Evaluation for extending the full insertion time allowable limit to 34.5 seconds and the reset permissive to 35-40 seconds. When approval is received from the NRC, an amendment to the DC will be

written to incorporate these new times and to change the ARI reset time delay relay set points.

Corrective Steps Which Will Be Taken To Avoid Further Violations

To avoid further violations, CNS Procedure 3.3, "Station Safety Evaluations" will be revised to include rather than just referencing the authorizing document, any NRC SER that authorized the activity being implemented by the design change.

Date When Full Compliance Will Be Achieved

The change to CNS Procedure 3.3 will be approved by November 17, 1989. The ARI reset time delay set point and the associated amendment to the DC will be completed within 90 days after the Supplemental Safety Evaluation is received from the NRC.

If you have any questions regarding this response, please contact me or R. E. Wilbur.

Sincerely,

G. A. Trevors
Division Manager
Nuclear Support

GAT/tja:jw
Attachment

cc: U.S. Nuclear Regulatory Commission
Region IV
Arlington, TX

NRC Resident Inspection
Cooper Nuclear Station

GE Nuclear Energy

11422 Miracle Hills Dr., Suite 304, Omaha, NE 68154

November 24, 1987

G-HPO-7-388

cc: Nebraska Public Power District
Columbus General Office
L. G. Kuncl
L. P. Kohles
G. S. McClure
R. E. Wilbur
S. J. Thompson
Cooper Nuclear Station
G. R. Horn
E. M. Mace
J. M. Meacham

Mr. R. D. Boyle
Project Manager
Nebraska Public Power District
P. O. Box 499
Columbus, Nebraska 68601

SUBJECT: COOPER CRD ARI PERFORMANCE

References:
1. Licensing Topical Report NEDE-31096-A, Anticipated Transients Without Scram, February 1987
2. Generic Safety Evaluation Report, BWR Scram Discharge Volume, December 1, 1980
3. DRF C11-00189, Cooper ARI SDV Fill Evaluation, Index 5

Dear Mr. Boyle:

The purpose of this letter is to provide the results of an evaluation of the Alternate Rod Insertion control rod start-of-motion and full-insertion criteria for Cooper based on plant-specific data.

In the event that the normal scram path cannot be initiated by the Reactor Protection System (RPS), the Alternate Rod Insertion (ARI) of the Control Rod Drive (CRD) System functions as an alternative path for reactor shutdown. The signal to initiate the ARI function comes from a reactor vessel dome high pressure signal, a reactor vessel low-low water level signal and manual action. Following any of these signals, ARI valves in the scram air header open and reduce the air pressure in the header. This allows the hydraulic control unit inlet and outlet scram valves to open to initiate control rod insertion. Furthermore, the air lines to the scram discharge volume (SDV) vent and drain valves will depressurize resulting in their closure.

The criteria for the control rod start-of-motion and full-insertion time for the ARI for Cooper were evaluated using plant specific data. The 15 second control rod start-of-motion and 25 second control rod full-insertion criteria given in topical report NEDE-31096-A (Ref. 1)

are the result of generic conservative assumptions used in the calculation of the scram discharge volume (SDV) fill time. These criteria may be evaluated using plant-specific data. The next limiting requirement is that full rod insertion is to be completed within 60 seconds of the ARI initiation time to maintain pressure suppression pool temperature limits (Ref. 1). Therefore for a given plant unique configuration, the 15 and 25 second values may be capable of being exceeded as long as the 60 second value is not exceeded.

For Cooper, based on the limiting available SDV volume of 251.63 gallons (north bank) and a limiting SDV pressure of 200 psig, a deviation from the 15 and 25 second criteria has been found to be acceptable. Because the SDV fill time limit also depends upon the average CRD in-leakage rate, the full-insert scram time, and the CRD start-of-motion time, the evaluation shows that the following options meet the SDV pressure limit. The District must select the option which is applicable to the Cooper Nuclear Station.

OPTION 1

Option 1 utilized the following assumptions:

a. CRD in-leakage = 5.0 GPM/CRD

b. CRD 100% scram time = 4.0 and 5.0 seconds

c. CRD start-of-motion time = 0 seconds

The CRD in-leakage of 5.0 GPM/CRD is based on the NRC Safety Evaluation Report (Ref. 2) suggested value.

The 4.0 second 100% scram time is based on the maximum 90% scram time of 2.92 seconds obtained from Cooper CRD test data. The 5.0 second 100% scram time provides an additional 1 second margin in the event that test data show a 90% scram time greater than 2.92 seconds but less than or equal to 4.0 seconds.

The CRD start-of-motion time of 0 seconds assumes that CRD motion begins at the time of ARI initiation.

The above assumptions resulted in the following calculated CRD ARI start-of-motion and full-insert time limits for OPTION 1:

| CRD Full-Insert Scram Time (Sec.) | Start-Of-Motion Time Allowable Limit (Sec.) | Full-Insertion Time Allowable Limit (Sec.) |
|---|---|---|
| 4.0 | 23.6 | 27.6 |
| 5.0 | 22.6 | 27.6 |

OPTION 2

Option 2 utilized the following assumptions:

a. CRD in-leakage = 5.0 GPM/CRD

b. CRD 100% scram time = 4.0 and 5.0 seconds

c. CRD start-of-motion time = 5 seconds

Option 2 differs from Option 1 in that the CRD start-of-motion time is 5 seconds. This implies that no CRD motion begins until 5 seconds after ARI initiation or later, and results in delaying the start-of-motion and full-insertion time allowable limits of Option 1 by the same time period. The relationship between the CRD start-of-motion time and the allowable limits is linear. The assumption was utilized because test data from other domestic plants with similar CRD ARI scram systems indicated that the first CRD motion occurs at approximately 6 or 7 seconds after ARI initiation. The Cooper ARI system is expected to perform similarly. If test data indicate that the first CRD begins motion at a different time, the start-of-motion and full-insertion time allowable limits of Option 1 can be adjusted accordingly.

The above assumptions resulted in the following calculated CRD ARI start-of-motion and full-insert time limits for OPTION 2:

| CRD Full-Insert Scram Time (Sec.) | Start-Of-Motion Time Allowable Limit (Sec.) | Full-Insertion Time Allowable Limit (Sec.) |
|---|---|---|
| 4.0 | 28.6 | 32.6 |
| 5.0 | 27.6 | 32.6 |

OPTION 3

Option 3 utilized the following assumptions:

a. CRD in-leakage = 4.0 GPM/CRD

b. CRD 100% scram time = 4.0 and 5.0 seconds

c. CRD start-of-motion time = 0 seconds

Option 3 differs from Option 1 in that a CRD in-leakage of 4.0 GPM/CRD was utilized. This lower leakage rate could be utilized if it could be verified that the average post-scram CRD leakage rate is maintained at conservatively less than or equal to 4.0 GPM/CRD, per the NRC Safety Evaluation Report (Ref. 2). The verification could be based on post-scram CRD leakage test data, or CRD withdraw stall flow test data which show that the average withdraw stall flow is less than or equal to 2.5 GPM/CRD. A combination of the post-scram CRD leakage data and CRD withdraw stall flow data could be utilized to provide a plant-specific correlation that would allow a withdraw stall flow limit that is larger than the generic 2.5 GPM/CRD. Note that data taken at Cooper in January 1987 showed an average withdraw stall flow of 1.02 GPM/CRD.

The above assumptions resulted in the following calculated CRD ARI start-of-motion and full-insert time limits for OPTION 3:

| CRD Full-Insert Scram Time (Sec.) | Start-Of-Motion Time Allowable Limit (Sec.) | Full-Insertion Time Allowable Limit (Sec.) |
|---|---|---|
| 4.0 | 30.5 | 34.5 |
| 5.0 | 29.5 | 34.5 |

OPTION 4

Option 4 utilized the following assumptions:

a. CRD in-leakage = 4.0 GPM/CRD

b. CRD 100% scram time = 4.0 and 5.0 seconds

c. CRD start-of-motion time = 5 seconds

Option 4 differs from Option 1 in that a CRD in-leakage of 4.0 GPM/CRD and a CRD start-of-motion time of 5 seconds is utilized. The justification for utilizing these assumptions are discussed under Options 3 and 2, respectively.

The above assumptions resulted in the following calculated CRD ARI start-of-motion and full-insertion time limits for OPTION 4:

| CRD Full-Insert Scram Time (Sec.) | Start-Of-Motion Time Allowable Limit (Sec.) | Full-Insertion Time Allowable Limit (Sec.) |
|---|---|---|
| 4.0 | 35.5 | 39.5 |
| 5.0 | 34.5 | 39.5 |

This evaluation performed for the District at no additional cost, should provide sufficient contingency in the event that the control rod start-of-motion and full insertion time for the Cooper ARI system fall outside the generic limits. By evaluating the existing plant maintenance records on CRD post-scram leakage rates and withdraw stall flow leakage rates, scram times and ARI start-of-motion times, the revised acceptance criteria for ARI performance can then be established.

The evaluation is contained in a Design Record File (Ref. 3).

Please feel free to contact F. E. Holland, (408) 925-4340, or me if you have any questions concerning this transmittal or the ARI/RPT project.

Sincerely,

David J. Brager
Services Project Manager
(402) 496-6919