

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Report No. 50-298/86-01

Docket No. 50-298

License No. DPR-46

Licensee: Nebraska Public Power District
P. O. Box 499
Columbus, Nebraska 68601

Facility Name: Cooper Nuclear Station
Brownville, Nebraska 68321

Inspection Conducted: January 6-10, 1986

Inspector: *R. E. Ireland*
for John Boardman, Reactor Inspector, Operations
Section, Reactor Safety Branch

3/14/86
Date

Accompanied
by: Luther Jones, EG&G
Howard Stromberg, EG&G

Approved: *R. E. Ireland*
R. E. Ireland, Acting Chief, Operations
Section, Reactor Safety Branch

3/14/86
Date

Inspection Summary

Inspection on January 6 - 10, 1986 (Report No. 50-298/86-01)

Areas Inspected: Licensee maintenance activities, including maintenance program implementation, maintenance program, instrumentation and control maintenance, electrical maintenance, and follow-up on previous inspection findings. The inspection involved 124 inspector-hours onsite by one NRC inspector and two consultants.

Results: Within the six areas inspected, two potential violations were identified in two areas (failure to have procedures for preventive maintenance, paragraph 2a, and failure to establish a suitable training program for electrical and mechanical maintenance personnel, paragraph 3b).

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DETAILS1. Persons Contacted

- *G. R. Horn, Nuclear Operations Division Manager
- *J. Sayer, Acting Technical Staff Manager
- *J. M. Meacham, Technical Manager
- *D. L. Reeves, Training Manager
- V. L. Wolstenholm, Quality Assurance Manager
- *D. M. Norvell, Maintenance Manager
- *E. M. Mace, Plant Engineering Supervisor
- *W. E. Crawford, Maintenance Supervisor
- D. A. Hopper, Mechanical Foreman
- S. S. Freborg, Lead Mechanical Engineer
- H. A. Jantzen, I&C Supervisor
- G. A. Schmielau, I&C Foreman
- M. E. Unruh, Maintenance Planner/Scheduler
- L. P. Clark, Electrical Supervisor
- S. J. Jobe, Electrical/I&C Engineer
- L. F. Bednar, Senior Staff Engineer

*Denotes those attending the exit interview on January 10, 1986.

2. Licensee Actions on Previous Inspection Findings

- a. (Closed) Violation (298/8411-01). Failure to have procedures for maintenance of safety-related equipment.

The specific violation was the absence of a licensee procedure to perform the manufacturer's minimum service lubrication recommendation, for the Standby Liquid Control (SLC) System pump motor bearings, or in lieu thereof, an engineering analysis and justification for not performing this lubrication.

The licensee established a lubrication periodicity for these bearings which was compatible with the then existing manufacturer's recommendation. The licensee's generic response was that their existing programs for vibration, bearing temperature, and oil analyses, in conjunction with insulation megger readings, provided adequate maintenance and detection programs for safety-related equipment.

The NRC inspector reviewed the specific maintenance actions for the SLC pump motor bearings and found that the licensee had received a revised technical manual from the manufacturer, dated 1984. This new manual was for the two specific pumps at Cooper Nuclear Station (CNS). This manual recommended 19 preventive maintenance actions, having periodicities ranging from 1 month to 5 years. A number of maintenance actions, such as verification of fastener tightness, replacement

of seals, and pump disassembly and inspection were not covered by the existing CNS maintenance concepts and procedures. Licensee personnel stated that no review and analysis had been performed on this manual, nor did existing procedures require such actions.

The NRC inspector also reviewed the licensee's vendor manual for the CNS High Pressure Coolant Injection (HPCI) turbine and pump. A revision, dated January 1980, added 23 preventive maintenance actions with periodicities ranging from 1 week to 5 years. Such actions included cleaning, lubrication, and calibration of control and governor linkages; retorquing of bolting; and inspection of the actuator drive mechanism for shaft bushing wear, gear wear, and gear backlash. These actions were not included in the current CNS maintenance program or procedures. Again, licensee personnel stated that no review of this vendor manual had been performed, nor was required by existing procedures at CNS.

In both examples reviewed by the NRC inspector, the preventive maintenance activities recommended by the equipment manufacturer had not been performed. Failure of the licensee to have procedures to: (1) perform preventive maintenance recommended by the manufacturers of safety-related equipment and systems, including the HPCI turbine pump and the SLC pump motor bearings, or in lieu thereof, (2) perform an engineering analysis with documentation of the basis for not accomplishing recommended manufacturer's maintenance is an apparent violation of CNS Technical Specification 6.3.3 which requires that procedures for preventive maintenance are to be provided. (298/8601-01).

- b. (Closed) Open Item 298-8411-03: Rewinding of Reactor Containment Building Component Cooling Water (REC) System pump motors.

The NRC inspector had reviewed PMs performed on the REC pumps and motors. All four motors had been rewound by an outside contractor who subsequently had been disapproved by the licensee's QA department. The licensee could not provide documentation of the acceptability and compliance of this work. The licensee did not approve QA or design criteria for the motor bearings, nor prohibit bearing substitution.

These four motors were scheduled for replacement as part of the licensee's Equipment Qualification (EQ) program, and have subsequently been replaced. Licensee personnel told the inspector that no other safety-related motors presently installed had been reworked by unapproved vendors.

- c. (Closed) Open Item 298-8106-03: Vendor Qualification. The two specific vendors discussed (MIDCO and Nebraska Testing Laboratories) were subsequently audited by the licensee on June 11, 1981, and April 21, 1981, respectively and found to be acceptable. Subsequent changes in the licensee procurement quality program have answered other concerns.

- d. (Closed) Violation (298/8226-01): Failure to have procedures to identify changes in vendor, or component, acceptability not related to vendor audits, or material deficiencies identified by the licensee. Licensee Procedure QAI-16, Revision 10, Section 3.4, now contains adequate controls for this concern.
- e. (Closed) Violation (298/8204-01): Failure to have administrative controls for material having shelf life. The licensee now has documented administrative controls for shelf life in Procedure 1.4, Revision 4, approved December 19, 1985, "Requisitioning," and Procedure 1.5, Revision 2, approved October 17, 1985, "Receiving."
- f. (Closed) Open Item (298/8204-03): Standby Liquid Control (SLC) system valve squibs having two manufacturing dates marked on each squib. The concern was which date was the valid basis for design life determination of this component required to initiate SLC injection. The earlier date was that of the squib manufacture (according to CONAX, the manufacturer). The latter date was that of the incorporation into an assembly by another manufacturer. The identified design life was based on this latter date, so squibs having passed the design life could not be installed based on the date-marking on the squibs.
- g. (Closed) Open Item (298/8412-05): Mechanical Maintenance Training. This item is included in unresolved item 298/8601-02.
- h. (Closed) Open Item (298/8412-05): I&C and Electrical Training. This item is included in unresolved item 298/8601-02.

3. Review of the Licensee Maintenance Program

The review of the licensee's maintenance program was expanded for this inspection to provide a broad baseline of parameters which can affect maintenance. Significant findings are identified in the following paragraphs. For this inspection, I&C was considered as part of the maintenance program; through at CNS I&C is part of the Operations organization.

a. Maintenance Procedures

- (1) CNS was not strongly proceduralized in the area of maintenance. Problems relating the lack of preventive maintenance procedures are identified in paragraph 2.e.
- (2) Other areas of maintenance management that did not appear to be proceduralized, based on licensee responses to the NRC inspector, include the following items:
 - (a) There was no documented system to provide management information for determining the status of outstanding work orders and maintenance planning.

- (b) There was no plant status monitoring system for monitoring all maintenance department activities for normal operations. Such a system was being generated for planned plant outages.
 - (c) There was no system to establish and periodically assess indicators of maintenance performance.
 - (d) There was no procedure that described the criteria for development of maintenance procedures.
- (3) The licensee used contractors, consultants, and vendors to provide technical assistance as necessary in the preparation of maintenance procedures. The INPO "writers guide" was used as an aid.
- (4) The licensee had a documented program for equipment identification and labeling (engraved, laminated) tags for both safety-related and balance of plant equipment. Color coding was used; components requiring equipment qualification (EQ) were color coded orange. Safety system divisions were color coded green or yellow.

b. Maintenance Training

NRC Inspection Report 50-298/84-12, paragraphs 6.d. and 6.e., identified inadequacies in the CNS training program for maintenance mechanics in the mechanical, electrical, and instrumentation and control disciplines. The latest CNS SALP Report 50-298/85-06, under Functional Area "C", "Maintenance", identified this weakness and recommended that the licensee establish and maintain a formal training program for maintenance (electrical and mechanical) and I&C personnel. The CNS Training Manager told the NRC inspector that no formal training program had been initiated for electrical and mechanical maintenance personnel. Also, the NRC inspector noted that the training billet for the electrical maintenance instructor was vacant.

CNS Technical Specification 6.1.4 for plant staff qualifications invokes ANSI N 18.1-1971 for minimum qualifications and training. ANSI N 18.1-1971, Section 5.3, states that a suitable training program shall be established for technicians and repairmen to properly prepare them for their assignments; and Section 5.3.4, states that technicians and repairmen shall be trained by on-the-job training, or by related technical training. The CNS training manager, in response to the NRC inspector, stated that he could not identify procedures or documentation for electrical and mechanical maintenance personnel that fulfilled the requirements of ANSI N 18.1-1971, Section 5.3. The failure to establish a suitable training program for electrical and mechanical maintenance personnel is a potential violation of CNS Technical Specification 6.1.4 which requires qualification and training to meet the requirements of ANSI N18.1-1971. (298/8601-02).

c. Facilities and Material

- (1) Maintenance supervision did not consider that maintenance activities were negatively affected by facilities, tools, instruments, equipment, or the availability of replacement parts or components, except for hoisting and rigging gear in the turbine area during outages.
- (2) Warehouse supervision considered storage space adequate at present, except possibly during peak periods associated with major outages.
- (3) The licensee's inventory control system provided the status of material availability, identified reorder points, and showed material location.
- (4) Access to storage areas was controlled. The average time to obtain material from the warehouse was identified by warehouse supervision as approximately 5 minutes.

d. Predictive Maintenance

The licensee used both vibration and oil analyses for predictive maintenance for safety-related equipment.

e. Nuclear Plant Reliability Data System (NPRDS)

Licensee personnel indicated that they made about 35 inquiries a year to NPRDS. CNS inputs to NPRDS were indicated as being 3-to-5 months behind. CNS had established a commitment to INPO to be current by March 1, 1986. Licensee personnel did not indicate program changes were being considered to assure that NPRDS would remain current and NPRDS was not considered particularly "user friendly."

f. QC Coverage of Maintenance Activities

QC coverage was by "QC checkpoints." The NRC inspector found that QC coverage for electrical preventive maintenance procedures was "essentially none," for mechanical preventive maintenance procedures, about 25%, and for I&C preventive maintenance procedures, about 15%. Most critical instrumentation was covered by surveillances procedures, which had an estimated 60% QC coverage.

g. Plant Cleanliness Control

Licensee personnel interviews disclosed that there was a program for assigning general plant house-cleaning, but that standards of cleanliness had not been specifically assigned for various plant locations. Work order forms did not include a specific check-off for cleanliness control.

h. Maintainability

Licensee personnel interviews disclosed that equipment maintainability was not considered in the original design and that no documented maintainability improvement program was presently implemented.

i. Communications

Licensee personnel interviews disclosed that communications within the maintenance organization, and with interfacing organizations was very good, with the appropriate degree of formality.

j. Root Cause Analysis Determination

Licensee personnel interviews disclosed that the licensee has no documented program for determining root causes of maintenance-related events. Postmaintenance review of completed work requests does not include a review and determination as to whether or not a problem should be entered in the corrective action system.

4. Implementation Review of Licensee Maintenance Program

The NRC Inspector selected two recent LERs and performed an in depth inspection of the maintenance program in the mechanical area. One was LER 85-017, "High Pressure Injection System Inoperability"; the other was LER 85-018, "Group 3 Isolation." Maintenance history, work item tracking forms, and Maintenance Work Requests (MWRs) were reviewed. Licensee personnel were interviewed to determine their functional responsibilities and qualifications.

a. The licensee procedures and documentation associated with LER 85-017 were reviewed. No violations or deviations were identified.

b. The licensee procedures and documentation associated with LER 85-018 as well as the MWR (WI 85-4229) for repair of the pump after removal from service were reviewed as follows:

- (1) In the MWR for the pump removal and replacement (WI-85-4229), the "Test Equipment Used" line was not filled out. Though this did not comply with CNS Procedure 7.0.1, paragraph V.D.1.0, which stated that "All test equipment and calibrated tools utilized to perform the work or testing shall be listed by their identification numbers in the Test Equipment Used Block," this appeared to be an isolated case. The test equipment was in calibration and the licensee corrected this documentation omission. The inspector has no further questions regarding this isolated event at this time.

- (1) 84-001 "Reactor Vessel Water Level Indicating Switch, NBI-LIS-101B"
- (2) 84-004 "RCIC Turbine Speed Controller"
- (3) 84-010 "Main Steam Line Leak Detection"
- (4) 84-011 "HPCI Overspeed Trip"

No violations or deviations were identified during the review.

- b. A completed maintenance package (WI 84-1841) for the repair of a relay (PCIS-REL-K14) in the Main Steam Isolation Valve (MSIV) Group 1 isolation control circuitry was reviewed. It was noted that Non-Conformance Report (NCR) 2963 had been generated. When this NCR was requested for review it could not be located. It was identified as having been put on a QA hold. The NRC inspector subsequently was provided with the NCR. It dealt with the conservative failure of GE type CR 120 A relays. All such relays installed at CNS, according to licensee personnel, were installed in fail-safe applications. Corrective action was completed except for the generation of a preventive maintenance task to replace all such relays in a periodicity of 10-12 years. Since such replacement does not have identified safety significance and was a single example, the inspector has no further questions of this item at this time.

Work activities involved in the performance of surveillance procedures were reviewed to determine if licensee personnel were following the appropriate maintenance procedures. (Functional testing of the RCIC Steam Line High Flow Instrument, and RHR Loops A and B Drywell Pressure Containment Spray Calibration.)

No violations or deviations were identified during the review.

6. Review of Electrical Maintenance, Observation of Work, Work Activities, and Associated Quality Records

The NRC inspector performed an in-depth inspection of the licensee's electrical maintenance program.

The following licensee document types were reviewed:

- a. Maintenance history.
- b. Work item tracking forms.
- c. Maintenance work requests.

- d. Qualification records.
- e. Document control procedures.
- f. Replacement part control records.

Licensee electrical maintenance personnel were interviewed to determine their areas of responsibility, functions and qualifications.

The NRC inspector reviewed procedures and other documentation associated with the following completed maintenance activities:

- a. HPCI-MOT-ALOP; HPCI Auxiliary Oil Pump Repair.
- b. EE-CB-125B (CHG); 125V Charger Output Breaker Trip Investigation.
- c. EE-CB-125B (CHG); Breaker for Tie to 250V Battery Charger Trip Investigation.
- d. No. 2 DG Exciter Panel Breaker No. 7 Fuse Troubleshooting.
- e. Replacement, Valve Operator Connection Modification.

It was noted during the inspection of the documents for these completed items, that during the valve operator connection modification work (WI-85-2340), valve RCIC-MOT-M016 was modified, inspected, and tested. However, at a later date, this valve did not function. The investigation found that the valve had been incorrectly connected. Subsequently an explanation for this item was provided. The initial test was a preliminary test with no system pressure. The motor was operating incorrectly as a series motor. The subsequent surveillance tests (6.3.1.4 and 6.3.2.6) to prove operability were the tests that showed the motor improperly wired and inoperable.

Work activities in the performance of a surveillance procedure (Station, Diesel Fire Pump, CAS, and PMIS Battery Weekly Check) were witnessed to verify that the electricians performing the job followed the appropriate licensee procedure.

No violations or deviations were identified.

7. Exit Interview

The NRC inspectors met with licensee representatives (denoted in paragraph 1) and the Senior Resident Inspector on January 10, 1986, and summarized the scope and findings of inspection activities.