

APPENDIX B

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

NRC Inspection Report No. 50-285/92-10

Operating License No. DPR-40

Licensee: Omaha Public Power District (OPPD)
444 South 16th Street Mall
Omaha, Nebraska 68102-2247

Facility Name: Fort Calhoun Station (FCS)

Inspection At: FCS, Fort Calhoun, Washington County, Nebraska

Inspection Conducted: April 27 through May 1, 1992

Inspector: P. A. Goldberg, Reactor Inspector, Plant Systems Section, Division
of Reactor Safety

Approved: T. F. Westerman 5/19/92
T. F. Westerman, Chief, Plant Systems Section
Division of Reactor Safety Date

Inspection Summary

Inspection Conducted April 27 through May 1, 1992 (Report 50-285/92-10)

Areas Inspected: Routine, announced inspection of the licensee's actions on previously identified items.

Results: Within the items inspected, a violation was identified while reviewing Violation 285/9001-04, containment sump level calibration, a Technical Specification surveillance requirement was found deleted due to the failure to maintain adequate procedures (paragraph 2.6).

During the inspection, the following items were closed: Violations 285/9001-04, 285/9001-05, and 285/9122-01, Open Item 285/8938-01, Open Item 285/9122-02, and Licensee Event Report 285/90-03.

DETAILS

1. PERSONS CONTACTED

OPPD

- *R. Andrews, Division Manager, Nuclear Services
- *B. Blome, Supervisor, Corporate Quality Assurance
- **G. Cook, Supervisor, Station Licensing
- D. Gage, Senior Instructional Technologist
- *S. Gambhir, Division Manager, Production Engineering
- **W. Gates, Division Manager, Nuclear Operations
- *R. Jaworski, Manager, Station Engineering
- *W. Jones, Senior Vice President
- J. Knight, Station Support Group Lead Engineer
- R. Lewis, Principal Engineer, DCN-Mechanical
- *T. McIvor, Manager, Nuclear Projects
- B. Mierzejewski, System Engineer
- G. Miller, Special Services Engineer
- M. Newland, Instrument and Controls Technician
- **T. Patterson, Manager, Fort Calhoun Station
- *R. Phelps, Manager, Design Engineering
- S. Resch, Special Services Engineer
- *M. Roberts, Supervisor Security Support Services
- *R. Short, Manager, Nuclear Licensing
- T. Therkildsen, Project Engineer
- *M. Tesar, Acting Training Manager

NRC

- *P. Goldberg, Reactor Inspector, Region IV
- *R. Mullikin, Senior Resident Inspector
- *T. Westerman, Chief, Plant Systems Section, Region IV

*Denotes persons present at the May 1, 1992, exit interview.

**Denotes persons contacted for followup exit on May 6, 1992.

The inspector also contacted other licensee personnel during the course of the inspection.

2. FOLLOWUP TO PREVIOUS INSPECTION FINDINGS (92700, 92701, and 92702)

2.1 (Closed) Licensee Event Report (LER) (285/90-03): Containment Piping Systems Outside Design Basis (92700)

The inspector reviewed LER 90-03, Revision 1, dated April 16, 1990, concerning Seismic I safety-related piping and supports inside containment, which had been reanalyzed as a result of deficiencies found during the 1985 Safety System Outage Modification Inspection (SSOMI). The analyses found some piping

and/or supports to be outside of the design basis for stresses as specified in the Updated Safety Analysis Report (USAR). Auxiliary feedwater (AFW) piping and the steam generator blowdown (SGB) piping were reanalyzed and the piping stresses were found to exceed the allowable stress limits specified in the ASME Code listed in the USAR. The main steam (MS) and safety injection (SI) piping and supports were also reanalyzed. A number of MS supports and SI supports were found to exceed their design-basis criteria. However, the MS and SI piping were found to be within their design basis as defined in the USAR.

Revision 0 of the LER was written February 16, 1990, to identify the overstressed AFW piping and valves between the steam generators and containment isolation valves. The plant was decreasing power as part of a planned shutdown for a refueling outage at the time of the event. On March 16, 1990, while the plant was in Mode 5 for a refueling outage, the licensee determined that the MS and SI piping supports were outside of the plant design basis, and on March 28, 1990, the SGB piping was determined to be outside the plant design basis. These events were reported in Revision 1 of the LER.

The licensee determined that the primary cause of the overstressed piping and supports was design and analysis deficiencies of the original architect/engineer and a consulting firm that reanalyzed the piping in 1979 to address concerns raised in NRC IE Bulletins 79-02 and 79-14. Both companies failed to adequately address thermal expansion. The licensee determined that a contributing factor was inadequate procedural guidance for specifying the content of documents to be used for procuring services. The licensee had not properly documented the required extent of the reanalysis of the seismic supports for the 1979 contracted reanalysis. In addition, due to the lack of personnel, OPPD relied upon the expertise of the contracting firms and did not perform an additional review of their work. This allowed the design discrepancy to remain undetected from the time the plant was constructed. The inspector found the root causes identified by the licensee to be acceptable. The inspector reviewed the Safety Analysis for Operability (SAO) 90-003 which was issued February 18, 1990. This SAO justified the use of the existing AFW piping between the steam generators and containment side isolation valves for short-term operation based on the stresses falling within the criteria of ASME Code Cases N-319 and N-47-28 and ASME Section III NB-3653.7. The licensee stated that this operability issue had been reviewed by NRR and Region IV for acceptability.

The inspector reviewed the licensee's corrective action plan. The AFW system was functionally tested on February 17, 1990, to Procedure SP-FW-14, Revision 0, "Auxiliary Feedwater Pump FW-6 Operational Test," dated February 16, 1990. This test cycled the valves in question which provided evidence of valve operability and demonstrated unobstructed flow through the AFW injection lines.

The licensee implemented a training program for design engineering personnel to address procurement of materials and services, and quality assurance. The

inspector reviewed Lesson Plan SEAD-04, Revision 0, "Quality Assurance Principles," and found it to be comprehensive in its coverage.

Magnetic particle examination of the AFW isolation control valve operator yokes, HCV-1107-A and HCV-1108-A, and piping elbows in the overstressed lines was performed to look for cracks or defects. The inspector reviewed Quality Control Procedure QCP-320, Revision 4, January 27, 1992, "Magnetic Particle Examination," and found the procedure acceptable. Maintenance Work Orders MWO900736 and MWO900737 for magnetic particle inspection of the yokes and piping elbows were reviewed and found to be complete with sufficient detail to perform the examinations. The inspector reviewed Quality Control Inspection Reports 90-2696 and 90-2697, dated April 3, 1990, for the valve operator yokes, and Reports 90-2647 and 90-2648 dated April 13, 1990, for the piping elbows in the AFW piping and determined that the magnetic particle inspection had been completed with no reportable indications or defects found.

The inspector reviewed documentation for Modifications MR-FC-90-16, Revision 0, "Containment Main Steam Support Modification," MR-FC-90-17, Revision 0, "Containment Safety Inspection Support Modification," and MR-FC-90-12, Revision 0, "HCV-1107A/1108A Support Modification." Modification MR-FC-90-16 modified 6 supports in the MS system to reduce support loads. This modification was completed and determined acceptable for operability on May 11, 1990. Modification MR-FC-90-17 modified a number of supports in the SI system. This modification was completed and determined acceptable for operability on May 11, 1990. Modification MR-FC-90-12 modified 3 supports, removed 1 support and installed 2 supports, in the AFW system to reduce stresses. In addition, 1 support in the SGB system was removed and another modified by Field Design Change Requests FDCR-90-616 and FDCR-90-592 to Modification MR-FC-90-12. The inspector determined that the licensee had met the commitment to modify the piping restraints in the SGB, MS, AFW, and SI systems in containment during the 1990 refueling outage.

The inspector reviewed Mechanical Engineering Instruction MEI-6, "Current Practice for Load Case Analysis and Component Qualification for B31.7 Class II/III Systems," Revision 0, dated August 30, 1990. This instruction provided guidelines in the analysis of pipe stress calculations. Mechanical Engineering Instruction MEI-5, "Pipe Support Qualification," Revision 0, dated December 28, 1990, was reviewed and found to contain guidelines for pipe support analysis. In addition, the inspector reviewed General Engineering Instruction GEI-32, Revision 3, dated June 15, 1990, "Instructions for Preparing Material Evaluation Reports and Material Procurement Plans." This instruction provided guidance for determining the documentation required to verify the quality and acceptability of the item being evaluated. These three instructions appeared to satisfy, in part, corrective action commitments made by the licensee.

The inspector concluded that the licensee had a comprehensive corrective action plan, which they had completed in accordance with their schedule. Consequently, this LER is considered closed.

2.2 (Closed) Open Item (285/8938-01): MOV Overthrusting (92701)

During an inspection of open items conducted in October 1989, Open Item 285/8836-03, cracks found in the gear housing of Limitorque motor-operated valve (MOVs), had been reviewed and closed out. However, the licensee's root cause analysis had determined that overthrusting had been the cause of the high pressure safety injection (HPSI) actuators cracking. The licensee's root cause analysis resulted in four recommendations that were tracked by the NRC as Open Item 285/8938-01. These recommendations are:

- o Perform a design review of HPSI motor operator requirements.
- o Establish testing procedure restraints to prevent overthrusting possibilities.
- o Develop testing procedures and/or acquisition of a more accurate set of MOV test equipment.
- o Install four rotor switching in each MOV.

For the first recommendation (perform a design review of HPSI motor operator requirements) the inspector reviewed Calculation Number C159-90-05.08, dated January 10, 1992, "HPSI Header Isolation MOVs (HCV-311/314/317/320 and HCV-312/315/318/321)," which was prepared by ERIN Engineering and Research. This calculation identified worst-case credible design-basis system conditions. Scenarios were developed from various modes of operation including normal operation, design basis accident conditions, surveillance tests, and plant transients governed by the Emergency Operating Procedures. The calculation included a compilation of the design basis of each MOV including maximum expected differential pressure, maximum line pressure, maximum flow rate, maximum fluid temperature, and valve stroke-time requirements. The calculation appeared to be well done and thorough. The inspector concluded that the calculation met the recommendation of performing a design review of HPSI MOV requirements.

For the second recommendation (establish testing procedure restraints to prevent overthrusting possibilities) the inspector reviewed Maintenance Procedure MP-MOV-3A, Revision 13, dated April 15, 1992, "Calibration and Adjustments of Motor Operated Gate and Globe Valves." The inspector found that the test procedure included a tabulation of maximum thrust values for various sizes of Limitorque actuators. The body of the procedure contained a caution note which stated that the test thrust ratings should not exceed the maximum tabulated value. An additional caution was included along with the maximum thrust caution stating that the torque switch could not be set above the limiter plate setting without involvement of the MOV engineer. In addition, the inspector reviewed Memorandum PED-92-NP-074 dated April 2, 1992, which transmitted a tabulation of stem thrust values to be met while performing MOV testing in the 1992 refueling outage. This tabulation also

included the maximum torque switch settings for each valve. Based on the above, the inspector determined that the intent of this recommendation was met.

For the third recommendation (develop testing procedures and/or acquisition of a more accurate set of MOV test equipment), the inspector discussed MOV testing with the licensee's MOV personnel. The licensee supplied a summary of testing enhancements. Among those enhancements were signature analysis training conducted in November 1991 for engineers and technicians involved in MOV testing, purchasing a MOVATS Series 3000 system, including stem load sensors for thrust measurements in the closed direction which was used during the 1992 outage, hiring MOVATS technical representative to assist in the use of the new equipment during the outage, and renting a MOVATS torque thrust cell to use on certain valves that required a more accurate system. The licensee stated that they have been involved in the MOV Users Group meetings and are currently evaluating Information Notice 92-23, March 27, 1992, to determine if additional actions are necessary. Based on the above, the inspector determined that this recommendation was met.

The fourth recommendation (to install four rotor switching in each MOV), was completed in the 1990 refueling outage. The eight HPSI MOVs were modified by Modification Package No. MR-FC-26-91 Revision 3. The inspector reviewed the modification package documents for the eight valves and determined that this recommendation was met.

The inspector determined that the four recommendations, which resulted from the root cause analysis of the HPSI actuator cracking were completed. This open item is considered closed.

2.3 (Closed) Open Item (285/9122-02): Evaluation of Vendor Communications (92701)

During the inspection (50-285/91-22) of the licensee program for meeting their commitments to Generic Letter (GL) 89-10, "Safety Related Motor-Operated Valve Testing and Surveillances," a question was raised by the inspector with regard to the licensee having reviewed Limatorque vendor technical information for impact on operability and/or maintenance activities. Five earlier Limatorque communications were referenced. Three were maintenance updates and two were letters.

In the OPPD's January 7, 1992, response to the concerns identified in NRC Inspection Report 50-285/91-22, the licensee stated that FCS Standing Order SO-G-62, "Control of Vendor Manuals," had been revised to address updates to procedures as a result of vendor manual changes. In addition, the response stated that OPPD had completed their technical review of the applicable Limatorque communications mentioned in the inspection (50-285/91-22) and had revised the appropriate procedures.

In review of this open item, the inspector found that Revision 9 to SO-G-62 added specific requirements and direction to perform technical evaluations of

changes in vendor information for incorporation into FCS vendor manuals and technical documents. The reviews are documented and assigned a specific tracking number. The Vendor Manual Unit of FCS Station Engineering Special Services Engineering has the responsibility for initiating review. The inspector was shown examples of utilization of the new system for Limitorque Maintenance Update 92-01 and Technical Update 92-01. Under Commitment Tracking CID 920308/01, dated April 4, 1992, both of these documents had been issued to FCS Nuclear Projects for review and action.

The licensee did not document the technical review referenced in their January 7, 1992, response. The primary individual involved in the review had also left the company. The inspector did verify, by discussion with other personnel involved, that the three Limitorque maintenance updates had been reviewed and that specific technical issues such as hydraulic lockup had been addressed in the FCS maintenance procedures. In addition, OPPD provided a memorandum dated May 1, 1992, to document that the two reference Limitorque letters had, based on their review, no impact on the FCS motor operated valve program.

This open item is considered closed.

2.4 (Closed) Violation (285/9001-05): Failure to Calibrate the 480 VAC Instrumentation (92702)

An NRC inspection, concerning the implementation of commitments made relative to Regulatory Guide 1.97, "Postaccident Monitoring Instrumentation," during January 1990, identified that no calibration procedures or records were available for the 480 Vac bus voltage and amperage instruments located on the main control board. The licensee's failure to establish and implement calibration procedures for the 480 Vac bus instruments constituted a violation of the Fort Calhoun Technical Specifications that require procedures to be established and implemented.

In response to this violation, the licensee issued Calibration Procedure MS-CP-07-0002 dated January 25, 1990, which provided calibration instructions for the 480 Vac bus voltmeters and ammeters. In addition, the licensee reviewed calibration procedures for other post-accident monitoring instrumentation to ensure proper calibration and committed to calibrate the 480 Vac bus voltage and amperage instrumentation on a refueling outage frequency.

The inspector reviewed Calibration Procedure MS-CP-07-0002, Revision 0, January 25, 1990, "Calibration of Type 180 Indicating Instruments," and verified that the procedure included the safety-related 480 Vac voltmeters and ammeters as part of the list of instruments to be calibrated. In reviewing the procedure, the inspector noted that the test input is applied in five increments over the full range of the meter. The desired output is listed with a tolerance, and the as-found and as-left meter readings are recorded. The inspector determined that the calibration procedure was acceptable and met

the requirements for the establishment of a procedure for calibration of the 480 Vac bus meters.

The inspector reviewed some of the calibration test data from the 1990 refueling outage. All of the 480 Vac bus ammeters and voltmeters had been calibrated during this refueling outage. The inspector found that 2 of the 45 meters (Tag Numbers A/T1B-4A-1 and V/1B4A-1-2) had been found defective and had been replaced.

Memorandum PED-SYE-90-687J, dated May 8, 1990, was reviewed. This memorandum stated that preventative maintenance tasks had been prepared for each of the 480 Vac bus meters and calibration was planned for every second refueling outage, unless the meters exhibited excessive drift and then the calibration frequency would be adjusted. The inspector reviewed the preventative maintenance work orders for the meters and found that the meters had also been calibrated during the 1992 outage and the frequency for calibration was specified as every refueling outage.

The inspector concluded that the corrective action measures taken by the licensee were adequate to ensure that the 480 Vac bus instrumentation would be calibrated. This violation is considered closed.

2.5 (Closed) Violation (285/9122-01): MOV Torque Switch Settings (92702)

An NRC motor-operated valve (MOV) inspection, conducted in August 1991, identified that two MOVs, HCV-348 and HCV-1041C, had torque switch settings above the Limitorque recommended maximum values. The torque switch settings on these MOVs had been increased in April 1990, and the licensee had not performed an engineering evaluation of the new settings. The licensee setting of torque switches above the manufacturer's maximum allowable values without adequate evaluation constituted a violation of the requirements of 10 CFR Part 50.59.

In response to this violation, the licensee reviewed the diagnostic test data on safety-related MOVs to determine the extent of the torque switch setting problems. The licensee identified ten other actuators, which had had their torque switch settings adjusted above Limitorque recommend values at some point in their documented history, and one MOV, HCV-151, that was currently set higher than the recommended value. The licensee performed an engineering evaluation and concluded that the design limits had not been exceeded for any of the MOVs.

The licensee had determined that MOV Diagnostic Test Procedure MP-MOV-3A was one of the root causes of the violation, since it did not address maximum torque switch settings. The inspector reviewed Maintenance Procedure, MP-MOV-3A, Revision 13, dated April 15, 1992, "Calibration and Adjustment of Motor Operated Gate and Globe Valves." The procedure had been revised to include a caution note to not set the torque switch above the limiter plate setting and, if it were necessary to exceed this value, to contact the MOV engineer. The inspector felt the caution note was sufficient to alert the MOV

engineer to perform an engineering evaluation when recommended torque switch settings were exceeded.

The licensee also committed to training MOV diagnostic personnel in the importance of torque switch settings and the need to perform an engineering evaluation when recommended torque switch settings are exceeded. In discussions with licensee training personnel, the inspector determined that a discussion of the violation and the importance of torque switch settings were discussed in the MOVAT courses conducted during the weeks of November 4 and 11, 1991, and in the Advanced Signature Analysis course held the week of November 11, 1991. Also, during the week of November 18, 1991, a continuing training class was held which discussed the violation. The inspector concluded that the licensee had taken adequate corrective measures through a procedure revision and training to ensure that the torque switch settings could not exceed vendor recommended values without an engineering evaluation. This violation is considered closed.

2.6 (Closed) Violation (285/9001-04): Containment Sump Level Calibration (92702)

The January 1990 inspection of the implementation of the commitments to the provisions of Regulatory Guide 1.97, "Postaccident Monitoring Instrumentation," identified that the containment sump narrow range water level instruments (LT-599 and LT-600) had not been calibrated against "known signals applied to the sensors" which is a Technical Specification 3.1 surveillance requirement. This resulted in a violation of the failure to comply with Technical Specification 3.1.

In response to the violation in Letter LIC-90-0175 dated March 12, 1990, the licensee stated that it had upgraded and issued the containment sump level calibration procedures and committed to having the revision "include steps to verify actual measured float positions against instrument indications."

The inspector reviewed Surveillance Test Procedure IC-ST-WDL-0001, Revision 0, issued February 16, 1990, "Channel Calibration of Containment Sump Level Loop L-599," and found that the new procedure included steps for measuring the actual water level. The inspector reviewed the surveillance test data for the calibration of the Level Instruments, LT-599 and LT-600, during the 1990 refueling outage and found that physical water level measurement had been performed. However, during the 1992 refueling outage, the inspector determined that Procedure IC-ST-WDL-0001 for the calibration of Loop L-599 was revised to Revision 10, and Procedure IC-ST-WDL-0002 for calibration of Loop L-600 was revised to Revision 7. These revisions deleted the requirement for the physical measurement of the water level. Testing performed on April 24, 1992, to the revised procedures was accomplished without physical water level measurement. When the inspector notified the licensee of the deletion, the licensee promptly revised the procedures to require physical water level measurement. In addition, the licensee included a statement in the procedures to ensure that the loop verification shall not be changed without PRC review of the NRC commitment, and recalibrated the narrow range water level

instruments by measuring the actual water level. This was completed on April 30, 1992. Since the procedures are now in compliance with the licensee commitment and Technical Specification requirement, Violation 285/9001-04 is considered closed.

However, the failure to maintain adequate procedures to meet Technical Specification requirements is considered an apparent violation of Technical Specification 5.8 procedures (285/9210-01).

3. EXIT INTERVIEW

An exit meeting was held with those persons denoted in paragraph 1 on May 1, 1992. The scope and findings of the inspection were summarized. Licensee personnel acknowledged the inspection findings. The licensee did not identify as proprietary any of the materials provided to, or reviewed by, the inspector during this inspection.

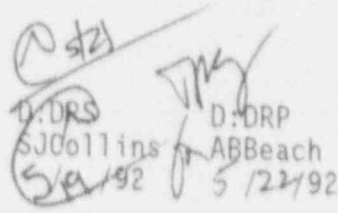
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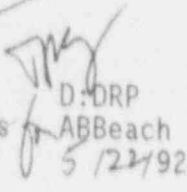
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|--|------------------------|
| R. D. Martin | Resident Inspector |
| DRSS-RPEPS | Section Chief (DRP/C) |
| MIS System | RIV File |
| DRP | RSTS Operator |
| Project Engineer (DRP/C) | Lisa Shea, RM/ALF |
| DRS | Elizabeth Hackley, NRR |
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