

APPENDIX  
U. S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-285/84-14

License: DPR-40

Docket: 50-285

Licensee: Omaha Public Power District  
1623 Harney Street  
Omaha, Nebraska 68102

Facility Name: Fort Calhoun Station

Inspection At: Fort Calhoun Station, Blair, Nebraska

Inspection Conducted: June 1-30, 1984

Inspector: L. A. Vandell 7/13/84  
L. A. Vandell, Senior Resident Reactor Inspector Date

Inspector: D. P. Tomlinson 7/18/84  
D. P. Tomlinson, Reactor Inspector Date

Approved: D. P. Jaudon 7/18/84  
D. P. Jaudon, Acting Chief, Project Section A, RPB2 Date

Inspection Summary

Inspection Conducted June 1-30, 1984 (50-285/84-14)

Areas Inspected: Routine, announced inspection of operational safety verification, surveillance testing, maintenance activities, followup of NUREG 0737 (TMI) items, and followup of steam generator tube failure incident. The inspection involved 120 inspector-hours onsite by two NRC inspectors.

Results: Within the five areas inspected, no violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

- \*W. C. Gates, Manager, Fort Calhoun Station
- L. T. Kusek, Supervisor, Operations
- M. R. Core, Supervisor, Maintenance
- A. W. Richard, Supervisor, Technical
- J. J. Tesarek, Plant Engineer
- J. F. Gass, Training Supervisor
- R. J. Mueller, Supervisor, I&C and Electrical Field Maintenance
- F. E. Swihel, Training Coordinator
- \*J. J. Fisicaro, Licensing Administrator Supervisor, Nuclear Regulatory and Industry Affairs
- \*W. C. Jones, Division Manager, Production Operations
- \*K. J. Morris, Manager, Administrative Services
- T. J. McIvor, Manager, Operations-Technical Support Services
- K. Gronberg, Quality Control Inspector
- D. C. Dale, Senior Quality Control Inspector
- J. Tucker, Electrical Engineer-GSE
- K. A. Miller, Maintenance Engineer
- C. W. Norris, Licensing Engineer

\*Denotes attendance at the exit interview.

The NRC inspectors also talked with and interviewed, other licensee employees during the inspection. These employees included licensed and unlicensed operators, craftsmen, engineers, and office personnel.

### 2. Operational Safety Verification

The NRC inspector performed activities as described below to ascertain that the facility is being maintained in conformance with regulatory requirements and that the licensee's management control system is effectively discharging its responsibilities for continued safe shutdown.

- a. The NRC inspector made several control room observations to verify proper shift manning, operator adherence to approved procedures, and adherence to selected Technical Specifications specific to the shutdown condition. Selected logs, records, recorder traces, annunciators, panel indications, and switch positions were reviewed to verify compliance with regulatory requirements. Radiation controlled area access points were observed at various times to verify that they were being maintained in accordance with approved procedures. The licensee's equipment control was reviewed for proper implementation by reviewing the maintenance order and tag-out logs, and by verifying selected safety-related tag-outs. The NRC inspector observed several shift turnovers and attended a number of the outage planning meetings.

- b. The NRC inspector toured the plant at various times to assess plant and equipment conditions. The following items were observed during these tours:
- . general plant conditions
  - . vital area barriers not degraded or appropriately manned by security personnel
  - . adherence to requirements of radiation work permits (RWPs)
  - . proper use of protective clothing and respirators
  - . plant housekeeping and cleanliness practices including fire hazards and the control of combustible material
  - . work activities being performed in accordance with approved activities
  - . physical security
  - . HP instrumentation is operable and calibrated
- c. The NRC inspector observed portions of Discharge No. 84136 for "B" Monitor Tank, No. 84200 for "A" Monitor Tank, and reviewed the discharge permits. For each permit the following items were verified:
- . the permit was properly filled out and approved
  - . chemical/radiological analyses were performed
  - . all chemical/radiological discharge limits were within specification at the discharge tunnel
  - . tank was in recirculation 30 minutes prior to sampling
  - . the functional test of RM-055A was performed to verify that HCV-691 and HCV-692 would shut on a high alarm
  - . maximum release rate was established
  - . the required recorders were operational
  - . three circulating water pumps were in operation
  - . initial and final tank levels and totalizer readings were recorded
  - . OI-WDL-3, Section IV.A was completed and attached to the discharge permit

- d. During this report period, the licensee completed work on both steam generators (see paragraph 6), closed up the primary system, and initiated reactor coolant system filling in accordance with OI-RC-2A, "Reactor Coolant Fill Instruction." The NRC inspector reviewed the prerequisites and verified that reactor coolant boron concentration was in specification, that Checklist OI-RC-2A-CL-A, had been completed, and that reactor coolant temperature was within limits with the shutdown cooling system operational. At the close of this report period, the licensee was in the process of completing OP-1, "Master Checklist for Startup or Trip Recovery," Sections IV.A.1 and 2 in preparation for taking the plant out of mode 5 (RCS temperature more than 210° F.), and was holding temperature below 150° F., while bringing RCS oxygen below .10 ppm. The NRC inspector reviewed the master checklist and the completed valve lineups that had been performed, and verified that the prerequisites for venting the reactor coolant system in accordance with OI-RC-2B had been performed and signed off.

No violations or deviations were identified.

### 3. Surveillance Testing

The NRC inspector witnessed portions of the following surveillance tests:

- a. ST-RM-2, F.2 (Monthly) Process Monitor Checks
- b. ST-DC-2, F.1 (Monthly) Battery Charger Check
- c. CP-VA-81A-M, "Hydrogen Analyzer Monthly Calibration, VA-81A," and CP-VA-81B-M, "Hydrogen Analyzer Monthly Calibration, VA-81B"
- d. ST-FD-1, F.3 (Six Months) Fire Detection Panel AI-54B Functional Check and F.5 (Six Months) Fire Detection Zones Calibration
- e. ST-VA-4, F.2 (Monthly) Filter Circuit Operation, Safety Injection Pump Room
- f. ST-ESF-6, F.1 for Diesel Generator No. 1. This test is required by Step IV.3.f of OP-1 as a prerequisite before going above 300° F.

In the above surveillance tests, the NRC inspector verified, where applicable that:

- . testing was scheduled in accordance with Technical Specification requirements
- . procedures were being followed
- . calibrated test equipment was being used

- . qualified personnel were performing the tests
- . limiting conditions for operation were being met
- . test data were being accurately recorded

No violations or deviations were identified.

#### 4. Maintenance Activities

The NRC inspector witnessed portions of the work performed on the following maintenance items:

- a. Maintenance Order (MO) 842234, "HFA Relay Inspection." In response to IE Bulletin 84-02, Item 1.b(2), the licensee is inspecting all HFA relays in accordance with Preventative Maintenance Procedure PM-HFA-1, "HFA Relay Inspection." The concern is that continuously energized coils may reach a temperature that will cause insulating materials to fail and the coil spool to melt. This has led to armature damage and failure of the relay. The NRC inspector observed part of the inspections and discussed with the technician what he was to examine for and what criteria he was following. It was noted that QC had randomly selected a sample of relays to observe with the technician, and the NRC inspector verified that these QC inspections were performed.
- b. MO 22650, "Replace RP-102." This valve in the fire protection system needed to be replaced and this required that part of the fire suppression system be made inoperable. The NRC inspector verified that the licensee properly identified the 24-hour limitation of Technical Specification 2.19(4)b and that the work was performed within this time frame. In conjunction with this work, MO 840757 was processed to repair another fire suppression system valve, FP-400, that was also leaking through. In both cases, the NRC inspector noted that PRC approved procedures were used to accomplish this work, QC hold points were identified and observed, and that fire watches were established in appropriate locations during the time of this maintenance. Spare parts were recorded on the MO for record purposes, and precautions/instructions were given to describe a method for returning a fire pump to operation if required. A safety evaluation (FC-154) was completed for both jobs.
- c. MO 842544, "Auxiliary Building Deluge Valve." The alarm for the auxiliary building deluge valve (Zone 38) was on at CB-20 and AI-54A but no valve actuation occurred. The auxiliary building operator was dispatched to investigate the problem, while the MO was prepared to cover any work necessary to correct the problem. The NRC inspector observed the preparation and signoff of the MO, noted that a QC hold point was established, and qualified personnel were assigned to troubleshoot the problem.

- d. MO 842290, "Clean and Inspect Gasket Surfaces on "B" Steam Generator." The NRC inspector accompanied the QC inspector into the containment to observe stoning and cleaning of RC-2B gasket surfaces and the initial cleaning of the stud holes in preparation for closing out the steam generator. The entry was made under RWP 328 and the NRC inspector noted that all personnel were properly dressed, that extra dosimetry was provided, and that continuous HP coverage was provided. The NRC inspector verified that all radiac equipment used was in calibration.
- e. SRDCO 84-60/MR-FC-84-108, "Replacement/Reinsulation of Teflon Insulated Wires for Electrical Penetrations." The licensee was informed by a testing laboratory that preliminary results from environmental qualification tests showed that the teflon insulation on the containment penetration lead wires to the rockbestos cable could fail under the harsh environment (temperature, humidity, and radiation) of a large break loss of coolant accident. With the plant already shutdown, the licensee elected to correct the problem rather than wait for final test results. The licensee established a list of those cables affected and developed a cable splice design using qualified Raychem sleeves that shielded the lead wire teflon insulation from the harsh containment environment. Forty-eight cables, involving a total of about 638 splices, had to be repaired. The NRC inspector reviewed the list of components requiring resplicing of penetration lead wires and the work priority list established by plant conditions. The NRC inspector reviewed the licensee's receipt inspection document and the certificate of compliance for part of the Raychem Corporation shipment. The NRC inspector reviewed the design package and noted the following:
- . a separate signoff sheet existed for each piece of equipment; identified by penetration and cable
  - . a PRC approved procedure, "Replacement/Reinsulation of Teflon Insulated Wire," was provided
  - . QC hold/inspection points were randomly selected on approximately ten percent of the sheets
  - . Drawing SK-MR-FC-84-108 was attached to the procedure showing cable splice detail from the penetration to the existing rockbestos cable
  - . GSEE-0512, "Cable Splicing Procedure," was attached to the design package

The NRC inspector observed work in progress in the containment at Penetrations E-2 and E-9. It was verified that splices were being made in accordance with the procedure, that approved materials were used, and that copies of the individual signoff sheets were present at their re-

spective penetration assemblies. In conjunction with this work, the licensee has requested by OPPD Letter LIC-84-207, dated July 3, 1984, from R. L. Andrews to H. R. Denton an extension to November 30, 1985, for completion of the environmental qualification of safety-related electrical equipment at Fort Calhoun Station.

No violations or deviations were identified.

C. Followup of NUREG 0737 (TMI) Items

Item III.D.3.4, "Control Room Habitability Requirements."

NRC letter of December 30, 1981, from R. A. Clark to W. C. Jones, transmitted the safety evaluation on this subject and determined that "the licensee's proposed design meets the criteria identified in Item No. III.D.3.4, "Control Room Habitability," of NUREG 0737 and is, therefore, acceptable."

Items 1 and 2, as identified in OPPD Letter LIC-83-054 from W. C. Jones to R. A. Clark, have been completed and closed out in NRC Inspection Report 50-285/83-23. Item 3, electrical and mechanical modifications to the HVAC, was discussed in OPPD Letter LIC-83-174 in which the licensee determined that no design changes were required to enable the system to meet NUREG 0737 requirements. The NRC is presently reviewing the analysis performed by OPPD to support this conclusion.

Item 4 identified a commitment to provide instrumentation for monitoring of toxic chemical gases. The licensee has issued SRDCO 84-55/FC-80-84B, "Control Room Habitability-Toxic Gas Monitors," for the installation and testing of equipment to meet this NRC commitment. The design package calls for the installation of redundant monitors for ammonia, hydrazine, chlorine, and acid gases (HF, H<sub>2</sub>SO<sub>4</sub>, HCL) with automatic isolation of the control room ventilation at appropriate alarm levels. The NRC inspector has observed the installation and testing of the system, and reviewed the design package. The following items were reviewed and/or noted:

- . MR-FC-80-84B, "Installation of Toxic Gas Detectors and the Sample Tubing," provided the procedure for installation of four toxic gas detector panels (YI-6285 A&B, YI-6286 A&B) and the associated tubing.
- . Drawings 11405-M-94, Rev. C, D-4079, Sheets 1, 3, 8, and 9 of 9, Rev. 0, SK-TGM-1, and 7000-FAN-GA, Sheet 1 of 3 were referenced in the design package and present at the jobsite.
- . The material list had been signed off by QC with two items on "hold" for lack of certification. Temporary CQE storage was established in Room 81 and verified acceptable by QC.
- . Fire Barriers 1118, 1119, 1120, and 1121 had been inspected by QC and signed off in accordance with MP-FP-3, "Temporary Fire Barrier Penetra-

tion Seals." These penetrations have since been grouted and signed off complete by QC, allowing them to be removed from the temporary fire barrier list.

- . Procedure GSEE-0517, "Installation of Seismic Supports for CQE and Limited CQE Electrical Equipment," provided instructions for installing equipment supports. Attachment A, "Electrical Equipment Seismic Support Data Sheet," included 14 sheets with QC hold points and signoffs for installation checks and recording of torque values on fastener bolts. For one installation, a calculation sheet was attached to evaluate the acceptability of one embedment that did not achieve the depth called for in GSEE-0517. One torque wrench ID number was missing from a data sheet but QC was able to correct that deficiency by cross-referencing to their equipment checkout log.
- . A safety evaluation (FC-154), Work Order No. 585, and a PRC approved installation procedure were attached to the work package.
- . The SRDCO form was attached and properly signed off by QA/QC, the plant manager, and the shift supervisor. Procedure Changes 12884, 12886, 12962, and 12978 were attached and verified to be properly approved and entered into the procedure.

The NRC inspector reviewed the initial Calibration Procedures CP-6285A-M, "Chlorine Monitor A," and CP-6287A-M, "Hydrazine Monitor A," and observed the calibration in progress. It was verified that calibrated test equipment was being used, and that the work was being performed by a qualified technician. Neither procedure could be completed because of equipment failure and procedure shortcomings, and additional work had to be performed in both areas.

The NRC inspector attended the Systems Acceptance Committee meeting to discuss FC-80-84B and noted that the licensee recommended that the system be "not accepted." Although the components had been installed, neither the electronic nor the gaseous calibrations were completed, system operating procedures had not been approved, no system description had been issued or training conducted, and the work package had not been completely signed off. This meeting did enable the licensee to review status of the work and provided needed information for a telecon with the NRC to discuss a revised completion date.

This item remains open pending final review of OPPD's HVAC analysis and successful operation of the toxic gas system.

#### 6. Followup of Steam Generator Tube Failure

OPPD Letter LIC-84-160, dated May 31, 1984, from W. C. Jones to J. T. Collins, RIV Administrator, outlined the licensee's proposed plans and commitments to



test and repair RC-2B in preparation for startup and return to operation. On June 1, 1984, Messrs. Miller, Jones, and Andrews of OPPD met in the Region IV office in Arlington, Texas with Messrs. Collins, Denise, Johnson, Tomlinson, and Miller of the NRC staff to discuss this and other matters. As a result of this meeting, the NRC issued a confirmatory letter on June 5, 1984, from J. T. Collins to W. C. Jones outlining the actions and conditions required of OPPD prior to requesting permission to leave cold shutdown (mode 5).

One of the actions included an augmented steam generator inspection program which required that OPPD perform eddy current testing of all accessible uninspected tubes in both generators, that an independent verification of the results be performed (including profilometry examination), and that a safety evaluation be prepared.

The NRC inspector observed the data analysts during their review of the 100 percent inspection. The data accumulated was being independently evaluated by two qualified persons on separate computers. Four data analysts were being utilized on two shifts. One analyst from CE and one from Zetec were paired on each of the shifts to assure independence. The NRC inspector reviewed approximately 20 report sheets and noted that each had been signed by both analysts and that no reportable indications were recorded. During most of this inspection period, there was a one-shift delay between the gathering of the data and the entering of the evaluations on the report forms. The tube inspection and data evaluation was completed in about five days except for those tubes selected for profilometry inspection. The data for the profilometry examination was delayed since it had to be forwarded to CE at Windsor, Connecticut for computer analysis and evaluation.

The NRC inspector reviewed the personnel qualification and certification records for those performing the 1984 partial and complete inspections. The educational and experience requirements appear to have been met for each level of certification. Interviews with inspection personnel and data analysts indicated that all have a thorough knowledge of the examination being performed and the procedures being used.

The results of this complete eddy current test are contained in OPPD's Steam Generator Tube Failure Report, Section 3.2.2 transmitted on June 19, 1984, under Letter LIC-84-196 from W. C. Jones to J. T. Collins. A total of 13 tubes (2 of which were considered defective) were plugged in RC-2A, and 12 tubes (2 of which were considered defective) were plugged in RC-2B.

The NRC inspector attended the job briefing and reviewed the Tube Plugging Procedure SP-RC-2, "Plugging Steam Generator Tubes." It was noted that RWP 329 was issued for this work, ventilation had been established, and a tank entry permit had been issued. Continuous HP coverage was planned for the job and QC representatives were present.

During completion of this work, the NRC staff was reviewing the licensee's submittal of June 19th and preparing a response. With regards to sampling for leakage, operations, and training the NRC inspector performed the following:

- . Reviewed Procedure CMP-4.68, "Steam Generator Primary-Secondary Leak Rate: FC-396," to verify that instructions were provided to calculate the leak rate by gamma isotopic and boron analysis.
- . Reviewed Fort Calhoun Station Special Order No. 35 in which the licensee fulfilled a commitment to reduce the maximum allowable primary-to-secondary leak rate through the steam generator tubes from 1 gpm total for both generators to 0.3 gpm. The licensee committed to the action statement of Technical Specification 2.1.4(3) if primary-to-secondary leakage exceeded 0.3 gpm total.
- . Reviewed Surveillance Test ST-RLT-3, "Reactor Coolant System Leak Rate Calculation," to ensure that this revised leak rate criterion was incorporated into the daily leak rate determination.
- . Reviewed Emergency Procedures EP-30, "Steam Generator Tube Leak/Rupture (PPLS Unblocked)," and EP-30A, "Steam Generator Tube Rupture (PPLS Blocked)," for adequacy to ensure that the operators are provided sufficient information and guidance to take proper action during such an event. During this report period the NRC regional license examiner was onsite to examine three RO candidates. As part of his examination he reviewed these emergency procedures, discussed them in some detail with the candidates, and found no apparent deficiencies with the documents. The NRC inspector also attended the licensee's training session covering these revised procedures to ensure that lessons from the May 16th incident and the Ginna tube rupture incident were incorporated and emphasized.

The NRC completed its review of the OPPD submittal and on June 22, 1984, in a letter from J. T. Collins to W. C. Jones, issued the safety evaluation relating to the restart of the Fort Calhoun Station and authorized the plant to be returned to service.

During this period the licensee made an attempt to remove a section of Tube 3718 near the tubesheet in RC-2A. This process involved cutting the section, then collapsing or shrinking the segment to allow it to be brought out through the tubesheet on the primary side. A subcontractor was hired to perform this task, and the NRC inspector attended the briefing session held by the licensee. After several attempts, the licensee abandoned the effort and elected to "stake" the cut segment in place and plug the tube. This work was performed under MO 842305, using PRC Procedure MO 842305-1, "Removal and Reinstallation of Tube Sheet Plug/Stake Assembly In RC-2A." A separate RWP was issued for the job, and OPPD provided QA/QC coverage for the work performed by contractor personnel. After several unsuccessful

attempts, the segment was "staked" and this final tube plugged. Both steam generators were closed and at the end of this reporting period, the licensee was filling and venting the primary system and bringing the O<sub>2</sub> level within limits in preparation to heatup.

7. Emergency Response Support

The Fort Calhoun Station Senior Resident Inspector (SRI) was assigned to the Cooper Nuclear Station during the period June 14-17, 1984, in support of the NRC's response to the Unusual Event at the plant due to high water levels from the Missouri River. The inspector worked in conjunction with the Cooper Nuclear Station SRI and regional inspectors to provide round-the-clock coverage during the period of peak high water level. See NRC Report 50-298/84-15 for additional details.

8. Exit Interview

The NRC inspector met with licensee representatives on June 29, 1984, to summarize the scope and findings of the inspection.