APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

NRC Inspection Report No. 50-285/92-06

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, Blair, Nebraska

Inspection Conducted: February 24-28 and March 2-5, 1992

Inspectors: L. D. Gilbert, Reactor Inspector, Materials and Quality Programs Section, Division of Reactor Safety

W. M. McNeill, Reactor Inspector, Materials and Quality Programs Section, Division of Reactor Safety

R. C. Stewart, Reactor Inspector, Materials and Quality Programs Section, Division of Reactor Safety

Approved: Samuel J. Collins for I. Barnes, Chief, Materials and Quality Programs Section, Division of Reactor Safety — 3/17/92 Date

Inspection Conducted February 24-28 and March 2-5, 1992 (Report 50-285/92-06)

Areas Inspected: Routine, announced inspection of Licensee Event Report followup and inservice inspection work activities.

Results: Within the areas inspected, no violations or deviations were identified. The followup on Licensee Event Report 90-028 found the corrective actions completed and acceptable. A review of inservice inspection work activities indicated, that such activities were well defined and effectively implemented. Some discussions were held with the licensee on program improvements which included revision of procedures and implementation of a future ASME Code requirement.

DETAILS

1. PERSONS CONTACTED

OPPD

*B. Blome, Supervisor, Corporate Quality Assurance (QA)
#*C. Bloyd, Lead Special Services Engineer-Programs Group
#*C. Boughter, Supervisor, Special Services Engineering
#*G. Cook, Supervisor, Site Licensing
*D. Dale, Supervisor, Quality Control (QC)
*D. Eid, Station Licensing Engineer
#*S. Gambhir, Division Manager-Engineering
#*W. Gates, Division Manager, Nuclear Operations
*J. Gasper, Manager, Training
#*P. Hamer, Special Services Engineer
#*R. Jaworski, Manager, Station Engineering Nuclear
#J. Herman, Supervisor, Operations Training
#*L. Kusek, Manager, Nuclear Safety Review
#R. Lippy, Inservice Inspection Coordinator
#W. Orr, Manager, QA/QC
#*T. Paterson, Manager, Fort Calhoun Station
#R. Phelps, Manager, Design Engineering
R. Ruhge, QC Engineering
#*R. Short, Manager, Nuclear Licensing and Industry Affairs
*H. Sefick, Manager, Security Services
#*C. Simmons, Station Licensing Engineer

Ebasco Services Inc.

W. Chabotte, Level II
R. Dill, Level II
D. Griebel, Level II
H. Pollard, Level II
R. Purvis, Level II
E. Suddick, Trainee
T. Spelde, Level III

Southwest Research Institute

A. Anderson, Project Manager
C. Barrera, Team Supervisor, Level III
J. Delgado, Level II
J. Godwins, Level III
D. Kling, Level II

Hartford Steam Boiler Inspection and Insurance Company

N. Grabow, Authorized Nuclear Inservice Inspector (ANII)

NRC

#*R. Mullikin, Senior Resident Inspector
R. Azua, Resident Inspector

The inspectors also interviewed other employees during the inspection.

*Denotes those persons that attended the exit meeting on February 28, 1992.
#Denotes those persons that attended the exit meeting on March 5, 1992.

2. LICENSEE EVENT REPORT (LER) FOLLOWUP (92700)

(Closed) LER 90-028: Leakage through a control element drive mechanism (CEDM) housing.

This LER addressed the discovery of leakage of reactor coolant from a spare CEDM because of two axial cracks in the bottom flange of the housing. The cause of this event was a lack of venting, which created conditions conducive to transgranular stress corrosion cracking. The absence of venting allowed oxygen levels to be present in the bottom flange which had an area of weld overlay and accompanying residual stresses. A previous inspection (50-285/91-02) reviewed the failure analysis that was conducted immediately following this event and that report concluded the licensee's actions to be comprehensive and commendable.

The corrective actions included removal of the leaking spare CEDM housing (No. 9) and another spare CEDM housing (No. 13), which had also cracked, but not leaked, and replacement with blind flanges. The licensee performed an ultrasonic examination (UT) of the remaining spare CEDM housings (Nos. 7 and 11) which had heated junction thermocouple probes installed, and a sample of other CEDM housings (nonspares). The startup procedure, OI-RC-3, was revised to add a step to assure venting. The licensee implemented an enhanced reactor coolant system leakage action plan. In addition to the above, the licensee had a meeting with the NRC to review the corrective actions.

The inspectors verified implementation of the corrective actions. Operating Instruction Procedure No. OI-RC-3, "Reactor Coolant System Startup," Revision 10, contained Step 6.1.11.k, which required the CEDMs with installed heated junction thermocouple probes to be manually vented after the reactor coolant pumps are jogged and the reactor coolant pump seals are vented. The enhanced reactor coolant system leakage action plan was detailed in Surveillance Test Procedure No. OP-ST-RC-3001, "Reactor Coolant System Leak Rate Test," Revision 1, which increased the sensitivity of the licensee to leak rates. The enhancements consisted of various items, such as, daily monitoring by system engineering and daily reports to senior management of leak rates. Leakage rates were also reported as part of the "Plan of the Day" meetings and limits were established for reporting rates to the Plant Review Committee, as well as, actions to be taken by the Plant Review Committee when certain limits were exceeded. In addition, the inspectors reviewed the reports of the UT examination performed during the current outage on spare

CEDM housings (Nos. 7 and 11). This UT examination was a recommendation made by ABB-Combustion Engineering Nuclear Power, and became a commitment made to the NRC during a meeting held in the NRC Region IV office on August 14, 1991, regarding the LER corrective actions.

It was noted that this examination was performed by personnel qualified to perform intergranular stress corrosion cracking detection and sizing; however, the procedure used was not a qualified intergranular stress corrosion cracking procedure. Higher than normal sensitivity was used for the examination, but it was not possible to compare the achieved sensitivity to that which would have been required by a qualified procedure. In any event, the examination found no reportable indications and did give some measure of assurance that there was no development of cracking. It was assumed that, while not procedurally required, the spare CEDM housings with heated junction thermocouple probes were manually vented during startups, thus no cracking occurred.

3. INSERVICE INSPECTION WORK ACTIVITIES (73753)

The objectives of this area of the inspection were to ascertain whether performance of inservice inspection (ISI) examinations and repair or replacement of components was in accordance with regulatory and ASME Code requirements as well as correspondence between the NRC and the licensee concerning relief requests.

3.1 ISI Examinations

The inspectors reviewed the current NRC approved ISI Program Plan, the Ten Year Examination Plan which was a computerized data base, and the implementing ISI procedures (see Attachment 1). FCS was in the third period of the second 10-year interval with one more outage scheduled during this period. About 305 examinations were scheduled for the current outage of which 265 were to be performed by Ebasco Services Inc., and the other 40 were to be performed by Southwest Research Institute. Ebasco Services Inc., was contracted to perform the liquid penetrant examinations (PTs), magnetic particle examinations (MTs), manual ultrasonic examinations (UTs), and visual examinations (VTs). Southwest Research Institute was contracted to perform the automated UT of the reactor vessel.

The inspectors established a sample of components and verified that the ISI Program Plan and Ten Year Examination Plan identified the sampled components, isometric drawings, and the methods to be used for the examinations. The isometric drawings identified the calibration blocks to be used for UT. The calibration blocks used for examinations were visually examined and the applicable inspection reports were reviewed by the inspectors. The inspectors established that the blocks conformed to ASME Code requirements for configuration and materials.

The inspectors examined the current Ten Year Examination Plan and found that the testing frequency for the sample of components complied with the ASME Code

and ISI program requirements. The inspectors observed the performance of 15 inservice inspection examinations identified in Attachment 2. The sample selected for observation included: remote VT of the core barrel and bolted attachments, PT of pipe and valve body welds, MT of reactor vessel closure head nuts, manual UT of heat exchanger welds, and automated UT of reactor vessel nozzles and welds. The inspectors verified that the personnel performing the examinations were appropriately qualified and that the examinations were being performed in accordance with requirements of the applicable nondestructive examination procedure.

The manual and automated UT, including required UT system calibrations, were satisfactorily performed in accordance with the applicable nondestructive examination procedure. The UT electrical instruments were found to be calibrated for screen height linearity and amplitude control linearity as required by the procedures. The automated UT was performed using "state of the art" equipment for data acquisition and evaluation. The inspectors observed the preparation and use of proper UT distance amplitude correction curves, and verified that the proper surface preparation, lighting levels, and temperature of the metal surfaces were satisfactory. The inspectors also verified the size, frequency, and angles of the search units used as well as the scanning techniques, directions, sensitivity, rate, overlap, and coverage. The inspectors observed the application and removal techniques of PT materials, as well as dwell, drying, and development times. The inspectors, prior to the performance of MT, observed the lift test of the yoke used, the fluorescent suspension centrifuge testing of particle concentration, and the blacklight intensity verification. The observation also included verification of the magnetic field directions. The inspectors observed that the MT of the reactor vessel closure head nuts was not successful at first because the required field strength and the field strength of the fixed coil could not be established. However, a later inspection with a yoke proved acceptable. The inspectors determined that the proper acceptance criteria was being used by discussing the examination and procedure requirements with the person performing the examination and the evaluation examiner. The inspectors verified the documentation of the examination results, evaluations, and limitations, by review of the applicable examination reports. The inspectors noted the identification of the UT couplant and PT materials used during the examinations and verified that the manufacturer's certifications for these materials conformed to the requirements regarding halogen and sulfur content. The inspectors observed the oversight of the contractor ISI activities by QC and the ANII and also reviewed a QC surveillance report on a sample of ISI activities.

The inspectors found that the personnel performing the examinations were certified at the appropriate level for performing and evaluating the examination method. The inspectors also established that other personnel who were designated as qualified to perform the examinations were properly certified in accordance with the applicable industry standards (i.e., SNT-TC-1A) by reviewing the personnel certification records, including the certifying Level III's records. This review included verification of the

experience, training, and test grades as well as the scope and period of qualification.

The inspectors noted that the procedures used by the contractors were approved by the licensee and the ANII. The licensee had revised administrative procedures, such as QP-33 and SEI-27, so that program documents such as the ISI Program Plan and the Ten Year Examination Plan were consistently referenced, and it was clear which documents had been submitted to NRC.

Discussions were held with the licensee on the marking of weld locations. The inspectors were concerned whether the requirements of IWA-2610, found in the Winter 1981, and later addenda and editions of Section XI of the ASME Code and which would be a future requirement for FCS, could be presently complied with. The concern pertained to what appeared to be the questionable location of certain of the sample welds and to the lack of assurance that future ISI examinations would be in the same locations.

The inspectors also reviewed the work activities associated with the inspection and repair of the reactor vessel thermal shield. Based on the licensees previous thermal shield monitoring program, it was established that some loss of preload on the thermal shield positioning pins (24) had occurred; therefore, the licensee elected to perform inspections and necessary repairs during this refueling outage. By means of a measuring coil and hydraulic jacks, the as-found preload values for each of the lower sixteen (16) positioning pins were determined. It was found that 7 of the 16 lower pins required readjustment or replacement. Adjustment required removal of the positioning pin welded locking collar using the electric discharge machine process.

The inspectors reviewed the video tape cassettes which were the results of the external visual inspection of the reactor core support barrel and thermal shield while the units were supported on the rotatable inspection stand in the flooded refueling pool. Only two minor defects were identified during the visual inspection of the thermal shield. One defect was attributed to an original fabrication mark and the other was identified as a broken weld that resulted from the removal of an accelerometer mounting bracket subsequent to hot functional testing. The evaluation and disposition of these findings are documented in the inservice inspection, indication notification report, FC-92-VT3-128, dated March 3, 1992. Aside from the two minor defects, the thermal shield appeared to be in very good condition.

The inspection and repair of the reactor vessel thermal shield appeared to be well planned, with each phase being reviewed, and required concurrence obtained from members of the management review team.

Based on the above observations, the ISI program was being effectively implemented and the scheduled examinations were performed and evaluated by qualified personnel using qualified procedures.

3.2 Repair and Replacement Related Examinations

The inspectors were provided a listing of ASME Section XI, repair/replacement work orders scheduled to be completed during the current outage. During review of the schedule with the cognizant licensing engineer, it was determined that no ISI related repair/replacements were scheduled during the inspection period. As an alternate, the inspectors reviewed the NDE records regarding the welding performed during replacement of the 20-inch safety injection valves, LCV-383-1 and 2. The inspectors reviewed radiographs IC-205 and IC-206 for Field Weld W9, and corresponding PT reports 92-0984 and 92-1034, dated March 3 and March 4, 1992, respectively. There were no discrepancies observed by the inspectors during this review.

4. EXIT INTERVIEWS

The inspectors conducted exit interviews on February 28 and March 5, 1992, with those personnel denoted in paragraph 1, during which the inspectors summarized the findings. The licensee did not identify as proprietary any information presented to the inspectors.

ATTACHMENT 1

DOCUMENTS REVIEWED

Technical Specifications, Amendment 140, dated December 23, 1991

Inservice Inspection Program Plan, Revision 5, dated October 1, 1990

Ten Year Examination Plan

Procedures

FC-MT-1, "Magnetic Particle Examination of Welds and Bolting," Revision 3 with Addendum 1

FC-PT-1, "Liquid Penetrant Examination," Revision 2 with Addenda 1 and 2

FC-UT-CP-2, "Procedure for Inspection System Performance Checks," Revision 1

FC-UT-1, "Ultrasonic Examination of Class 1 and 2 Piping Welds Joining Similar and Dissimilar Materials," Revision 5

FC-VT-3/4, "Visual Examination: VT-3 and VT-4 (Limited)," Revision 2

FCL-AUT14, "Automated Ultrasonic Examination of Austenitic and Dissimilar Pressure Piping Welds," Revision 0

FCL-AUT15, "Automated Inside Surface Ultrasonic Examination of Ferritic Vessels Greater than 2.0 Inches in Thickness," Revision 0

General Engineering Instruction No. GEI-55, "Instructions for ASME Section XI Repair/Replacement Plan," Revision 1

Quality Procedure No. QP-27, "Repair/Replacement Program," Revision 2

Quality Procedure No. QP-33, "Inservice Inspection and Test Program," Revision 1

Quality Control Procedure No. 11QCP-230, "Surveillance and Monitoring of Special Processes," Revision 4

Station Engineering Instruction SEI-22, "Inservice Inspection Equipment/Personnel Verification," Revision 0

Station Engineering Instruction SEI-27, "Inservice Inspection and Test Program," Revision 1

ATTACHMENT 2

Isometric Drawing	Component Identification	Method	Description
A-01	RPV-N-1-B	Auto UT	RV Outlet Nozzle to Shell Weld
A-01	RPV-N-1-B-1R	Auto UT	RV Outlet Nozzle Inner Radius
A-01	RPV-N-2-A	Auto UT	RV Inlet Nozzle to Shell Weld
A-01	RPV-N-2-A-1R	Auto UT	RV Inlet Nozzle Inner Radius
A-01	RPV-N-2-D	Auto UT	RV Inlet Nozzle to Shell Weld
A-01	RPV-N-2-D-1R	Auto UT	RV Inlet Nozzle Inner Radius
A-01	RPV-N3-CSS-1	Remote VT	Core Support Structure
A-01A	RPV-G1-N-16/31	MT	RV Closure Head Nuts
A-02	RPVLH-2-411	Auto UT	RV Lower Head Dollar Weld
A-16	3-PSL-1A	PT	Pressurizer Safety Line Welds
A-16	3-PSL-1/01	PT	Pressurizer Safety Line Welds
A-16	3-PSL-1/06	PT	Pressurizer Safety Line Welds
A-16	3-PSL-1/07	PT	Pressurizer Safety Line Welds
A-43	2-CL-1/CH-3*5	PT	Valve Body Weld
B-44	SDHE-AC-4A-C-1	UT	Shutdown Heat Exchanger Head to Shell Weld