U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-329/77-03

Docket No. 50-329 License No. CPPR-81

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Midland Nuclear Power Plant Unit 1

Inspection at: Midland, Michigan

Inspection Conducted: April 21 and 22, 1977

Inspector: I. T. Yin I. Yin 5/10/77
(date signed)

Approved by: D. W. Hayes, Chief
Projects Section
D W Hayes 5/10/77
(date signed)

Inspection Summary

Inspection on April 21 and 22, 1977 (Report No. 50-329/77-03)
Areas Inspected: Special, unannounced inspection of Unit 1 containment tendon sheath placement deficiencies identified by the licensee on April 19, 1977. Inspection areas included: (1) nature of the problem, (2) determination of the cause, (3) engineering consideration, (4) rework consideration, (5) corrective actions to prevent recurrence, and (6) independent tendon installation checks by the inspector. The inspection involved 12 inspector-hours on site by one NRC inspector.
Results: Of the six areas inspected, no items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

Consumers Power Company (CP)

*J. L. Corley, Midland Quality Assurance Superintendent
*G. L. Slagel, Field Engineer

Bechtel Power Corporation (Bechtel)

*J. F. Newgen, Project Superintendent
*A. J. Boos, Project Field Engineer
*G. L. Richardson, Lead Quality Assurance Engineer
J. P. Connoly, Project Field Quality Control Engineer
C. E. Willson, Field Engineer

Bechtel Associates Professional Corporation (BAPC)

G. Tuneson, Civil Group Supervisor
T. Thiruvengardam, Senior Engineer
*R. L. Ryden, Senior Engineer

The inspector also talked with and interviewed several other licensee and contractor employees, including members of the technical staff, and corporate QA personnel.

*denotes those attending the exit interview.

2. Nature of the Problem

The Consumers Power Company informed RIII on April 19, 1977, that two tendon sheaths were omitted and two others were misplaced around the bottom of the main steam line containment penetrations.

The errors were identified by the Bechtel Power Corporation during preparation for the placement of the next lift of containment concrete. Four horizontal tendon sheaths, if run straight, would be at the same elevation as the two four-foot, six-inch diameter main steam line penetrations installed at azimuth 77° and 103°. To clear the penetrations, two tendon sheaths are deflected above and two below. In turn, to make room for the deflected sheaths, four others, two immediately below and two immediately above, must also be deflected.

Concrete has been placed to an elevation about one foot below the penetration. Of the four tendon sheaths required to be deflected below the penetration the two lower ones were not deflected and the two upper ones were omitted. The affected tendon sheathings are H32-037, H13-037, H32-036, and H13-036. The problem and location are recorded in Bechtel NCR No. 778, dated April 19, 1977.

3. Engineering Considerations

The tendon system for Unit 1 containment building consists of 110 vertical tendons, 162 horizontal tendons (3 sets of 54 each with 240° circular arc), and 87 dome tendons (3 sets of 29 at 120° intersection). The two 4'-6" diameter main steam penetrations are not considered large openings in the 3'-6" thick wall by definition that large opening, the diameter of the hole should exceed 2½ times the wall thickness. To the best of the CP and Bechtel knowledge, no other tendon sheathings were misplaced, omitted, plugged during concrete placement or otherwise damaged. In view of total structural provisions, the present deficiencies identified were not considered significant according to BAPC design engineers.

The bases for consideration were as follows:

a. Conservative design margin applied for containing LOCA pressure.

b. Extra sets of tendons provided in accordance with Regulation Guide 1.35 requirements.

c. The prestressing loss were conservatively estimated.

4. Determination of the Cause of the Problem

The causes of the tendon sheaths to be omitted were identified as follows:

a. Craftsmen failed to install tendon sheaths in accordance with drawing requirements.

b. Bechtel Surveyor A, who normally checks the tendon sheathing locations, left job site without checking the problem area. Surveyor B, substituting for A, did not receive followup instruction, and failed to check this area, because he thought the area was checked by Surveyor C, who was supervising the work areas. Surveyor C happened to be in the problem area when B was doing the checking.

c. Bechtel Quality Control Engineers relied too heavily on the surveyor's records, and failed to independently verify the tendon sheathing installation against approved vendor drawings.

5. Rework Consideration

The inspector discussed the rework consideration with BAPC design engineers. The present plan was limited to two alternatives:

a. Arrangement Modification

(1) There appeared to be room enough to place H13-037 below the penetration, after penetration stiffener gussets were cut and modified.

(2) Relocate H32-037 from bottom of the penetration to the top.

(3) Relocate H13-039, and H32-038, above H32-037, and put them in closer spacing.

b. Leave One Out

(1) Delete H13-037

(2) Same as a.(2) above.

(3) Same as a.(3) above.

The inspector indicated that NRC will review the construction modification plans, procedures, and engineering evaluation reports during future site inspections but prior to placement of concrete in the affected area.

6. Corrective Actions to Prevent Recurrence

a. Consumers Power Company Quality Assurance Superintendent, letter to Bechtel Quality Assurance Department, dated April 21, 1977, requested investigation on tendon sheathing Quality Control inspection adequacies.

b. Bechtel issued Management Corrective Action Report No. 17, dated April 19, 1977, directing Field Engineering and Quality Control to determine corrective actions to preclude repetition.

c. Bechtel Quality Control Department issued Quality Control Corrective Action Report on April 20, 1977, formulating corrective actions.

d. Memorandum from surveyor supervisor to Field Engineering Supervisor, dated April 20, 1977, listed revised check out procedures.

e. QC Instruction C-9.00, "Installation of Post-Tensioning Components," Revision 1, was issued on April 20, 1977, to include additional tendon inspection requirements.

f. Training sessions were provided for QCEs, Surveyors, and Field Engineers. Additional trainings were considered.

The inspector stated that RIII will followup corrective action for adequacy and will check procedural implementations during future inspection.

7. Independent Tendon Installation Check

The inspector examined the vertical tendon sheathing, V19 through V33 for correct installation and spacing. The inspector also reviewed the Field Change Request (FCRs) C-137, 198, 305, 655, 671, and 781; and the Resident Engineer Memorandums (REMs) C-112, 282, 415, 460, and 546 relative to tendon sheathing problems and resolutions.

No items of noncompliance or deviations were identified.

However, in review of surveyor's records for checking tendon sheaths, the inspector suggested better procedural control of field engineers approval of minor deviations.

8. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on April 22, 1977. The inspector summarized the purpose and the scope of the inspection and discussed the inspection findings.