

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

REGION III

Report No. 50-329/77-04; 50-330/77-07

Docket No. 50-329, 50-330 License No. CPPR-81, CPPR-82

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

Facility Name: Midland Nuclear Power Plant Units 1 and 2

Inspection At: Midland Plant Units 1 and 2, Midland, MI

Inspection Conducted: May 4, 1977

Inspectors:

R. E. Shewmaker
R. E. Shewmaker, IE:HQ

6/7/77
date signed

D. W. Hayes
D. W. Hayes

6/7/77
date signed

Approved By:

R. F. Heishman
R. F. Heishman, Chief
Reactor Construction and
Engineering Support Branch

6/8/77
date signed

Inspection Summary

Inspection on May 4, 1977 (Report No. 50-329/77-04; 50-330/77-07)

Areas Inspected: Special inspection to: (1) examine misplaced hoop tendon sheaths on Unit 1 containment building and (2) inspect preparation and work in progress on the Unit 2 liner plate bulge area for subsequent repairs. The inspection involved twelve inspector-hours onsite by two NRC inspectors.

Results: Of the two areas inspected, no items of noncompliance or deviations were identified.

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DETAILS

Persons Contacted

Consumers Power Company (CP)

B. W. Marguglio, Manager of Quality Assurance
*T. C. Cooke, Project Superintendent
J. L. Corley, Quality Assurance Superintendent
*D. E. Horn, Field QA Engineer
*D. P. Keating, Quality Assurance Engineer
*G. Keeley, Midland Project Engineer
*G. L. Siagel, Senior Engineer

Bechtel Power Company - Ann Arbor (B)

*K. Wiedner, Manager of Engineering
*P. A. Martinez, Project Manager
*F. E. Meyer, Chief Civil-Structural Engineer
J. Milandin, QA Manager
*J. M. Klacking, Project QA Engineer
*J. C. Hink, Assistant Project Engineer
*C. Wilson, Field Survey Chief
*D. Yuam, Senior Engineer
*F. Teague, Field Project Civil Engineer
*A. Boos, Lead Field Engineer

The inspectors also talked with and interviewed several other contractor employees, including members of the technical staffs, craft supervision and craftsmen.

*Denotes those attending the exit interview.

Functional or Program Areas Inspected

1. Tendon Sheath Placement Errors Unit 1

- a. A discussion was held to understand the events which led to the discovery of the error on the Unit 1 containment which resulted in two hoop tendon sheaths being misplaced and two hoop tendon sheaths being omitted in the concrete placement to elevation 703'-7". The sequence of events apparently was as follows:

- (1) The locations of tangent points for deflected tendons were marked by felt pen or paint at the correct elevation

on the nearest piece of vertical reinforcing or embedded vertical channel without tagging the tendon mark number associated with that elevation.

- (2) The labor force then installed tendon sheathing, but apparently neglected two elevations on the centerline below each of the main steam line penetrations and confused the two remaining with two lower tendons; this labor crew apparently did not have the Inland-Ryerson shop drawing which showed the exact layout, tendon mark numbers and all other needed information at the work area, but the drawing was available in the foreman's shed at the work site.
- (3) Prior to concrete placement the survey crews were to check the final location of the tendons to a tolerance of $\pm \frac{1}{2}$ inch elevation on the main steam line penetration. The tolerance for location within the thickness of the wall was to be maintained at $\pm 1\frac{1}{2}$ inches; the survey crew chief in this case left for time off prior to sign-off and final documentation. Apparently, without the documentation, the acting survey crew chief believed the tendons had all been checked and signed off the embedments as ready for concrete placement QC did not detect the error prior to the placement.
- (4) Subsequent to the placement of concrete to Elevation 703'-7" the error was found as crews began to prepare for placement of sheaths, reinforcing steel, and embedments for the next lift. Further discussion centered on the actions taken by the licensee's engineer, Bechtel, to evaluate the omission and recommend corrective action.
- (5) An evaluation had been completed to ascertain the significance of actually deleting the two tendons whose sheaths had been omitted. This resulted in the conclusion that the structure could perform its intended function, however, since there appeared to be better alternatives those were pursued.
- (6) Bechtel's final evaluation resulted in a proposed corrective action. This corrective action will meet all original design criteria, including the minimum radius of curvature of the tendon sheaths equal to 25'-0", the

centerline spacing of tendon sheaths equal to six inches, and the clear space between penetrations and sheaths of six inches.

(7) Corrective action proposed consisted of leaving the two misplaced tendon sheaths as straight, undeflected tendons; relocating the omitted tendon sheaths. The relocations involve placing one tendon (H13-037) below the barrel of the penetration and one above (H32-037). This geometry would require cutting some radial stiffener plates on the penetration assembly and replacing the barrel stiffeners on the outside. The repair also involved cutting some reinforcing steel.

b. An inspection was conducted of existing conditions at the locations of the tendon sheath placement error. The following was observed:

- (1) A total of five (three at the top and two at the bottom) radial stiffeners on the main steam line penetration assembly had been cut to provide a large circular notch to allow the placement of the tendon sheaths on the revised location.
- (2) At least five No. 11 reinforcing bars and two No. 18 reinforcing bars had been cut to provide for relocation of the tendon sheaths. These bars were basically vertical reinforcing associated with the penetration. In addition, there was at least one No. 11 hoop bar which was cut but was in such a location that replacement would be the easiest corrective action.
- (3) It was apparent that without the use of the Inryco drawing showing the tendon locations and tendon mark numbers on each point located in the field by surveying that a placement mistake could be made. It was ascertained that neither the construction crews or the quality control personnel used the Inryco drawings. The marked locations made by the survey crew were to be used by construction, and the QC personnel and were to be checked against the survey crew field notes.

2. Unit 2 Liner Plate Bulge Repair Preparations

Existing conditions on the Unit 2 liner bulge area was viewed from the containment floor elevation to examine the trench being cut into the containment floor concrete. The size of the trench cut was 8" wide by approximately 4" deep with the ultimate depth to be 8". The top portion of the circumferential leak chase channel over the wall to knuckle butt weld was visible. No areas of distress or distortion were noted in the region of the leak channel. The inward distortion was concentrated at what was the top of the concrete floor. The second area where work in preparation for repairs had progressed since the last inspection was the lower assembly of four penetrations in the bulge area. The thickened liner plate had been generally removed except for a perimeter section around each of the four barrels. There was evidence of some crushing of concrete around approximately one fourth of the circumference of the barrel closest to the bulge location as well as failure of the concrete around some of the anchorage structural steel which had been welded to the thickened plate assembly. Final investigation into the extent of damage was still not complete in this area.

Exit Interview

The inspectors met with licensee representatives (denoted above under persons contacted) at the conclusion of the inspection on May 4, 1977.

1. The inspector indicated that the proposed corrective action outlined for relocating the two omitted tendons in Unit 1 appeared to be an acceptable solution and could be resolved as a 10 CFR 50.55(e) item within IE. It was indicated that the final report should address the following areas:
 - a. Inclusion of sketches to show the original and revised geometry of the tendon layout in the region of the main steam line penetrations and data indicating horizontal and vertical location of all tangency points.
 - b. Inclusion of data listing friction losses and tendon seating forces for six tendons (H13-036 through H32-039) in the affected area for the original design case and for the revised location.
 - c. Information on the repair method(s) to be used for the cut reinforcing steel which is to be identified with regard to exact location, point of cutting bar size and configuration;

prior to any repairs being completed RIII is to be notified of the repair method(s).

- d. Identification of all material cut out of the penetration assemblies with sketches.
 - e. Information and discussion supporting the modifications necessary for the main steam line penetration assemblies (the extension ring) to support the fact that the penetration assembly can function as originally designed.
 - f. Information to substantiate that the concrete structure in the area of the penetrations still meets the original criteria.
2. With regard to the progress of repair preparations for the Unit 2 liner bulge, the inspector noted that IE was awaiting the final results of all associated investigations and finalized repair procedures. It was noted that it is IE's understanding that this information may be ready for an early June meeting.