

U. S. ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS

REGION III

Report of Construction Inspection

RO Inspection Report No. 050-329/74-11
RO Inspection Report No. 050-330/74-11

Licensee: Consumers Power Company
1945 West Parnell Road
Jackson, Michigan 49201

Midland Plant, Units 1 and 2
Midland, Michigan

License No. CPPR-81
License No. CPPR-82
Category: A

Type of Licensee: PWR (B&W) - Unit 1, 492 MWe
Unit 2, 818 MWe

Type of Inspection: Routine, Announced

Dates of Inspection: December 11-13, 1974

Dates of Previous Inspection: October 2-3, 1974 (Construction)

Principal Inspector:

T. E. Vandell
T. E. Vandell

1-15-75
(Date)

Accompanying Inspectors:

G. M. Erb
G. M. Erb

1/15/75
(Date)

I. T. Yin
I. T. Yin

1-15-75
(Date)

Other Accompanying Personnel: None

Reviewed By:

D. W. Hayes
D. W. Hayes, Senior Reactor Inspector
Construction Projects

1-15-75
(Date)

8006200 686

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

One violation was identified during the inspection and is considered to be of Category II severity.

10 CFR Part 50, Appendix B, Criterion XVI, states, in part, that: "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, nonconformances, are promptly identified and corrected".

Contrary to the above, nonconformances identified by the licensee during a QA audit had neither been identified by the contractor QC personnel nor corrected, even though the QC inspection had been signified as being complete and acceptable. Licensee QA personnel, following identification of the nonconformance, initiated appropriate corrective action to resolve the deficiency. (Report Details, Paragraph 10)

B. Safety Matters

No safety matters were identified during the current inspection.

Licensee Action on Previously Identified Enforcement Action

No previously identified enforcement matters remain unresolved.

Design Changes

None.

Unusual Occurrences

RO:III was informed by the licensee by telephone, on November 21, 1974, of the occurrence of a fire inside Unit 2 containment. No injuries were experienced as a result of the fire, and the licensee is presently evaluating the possible damage to the containment liner plate and concrete. (Report Details, Paragraph 9)

Other Significant Findings

A. Current Project Status

1. Percent Facility Completion

Engineering - 46%
Construction - 9.5%

2. Concrete Placed in Cubic Yards

Unit 1 - 5,783
 Unit 2 - 16,653
 Auxiliary Building and common facility - 11,962

3. Percent Liner Plate Completion

Unit 1 - 25%
 Unit 2 - 55%

4. Delivery of Babcock & Wilcox Company NSSS Components for Unit 2 From Mt. Vernon, Indiana

Awaiting Delivery - 1 steam generator
 1 pressurizer
 1 remaining piece of coolant pipe

Delivered at site - 1 reactor vessel
 1 closure head
 1 steam generator
 Coolant piping except one spool piece

5. Liner Plate Coating Status

Unit 1	1st Lift	P*	Complete
		F*	One of the two coats done
	2nd Lift	P	None
		F	None
Unit 2	1st Lift	P	Complete; possible fire damage
		F	None
	2nd Lift	P	Approximately 33% done; possible fire damage
		F	None

*P - Prime coating,
 Carbozinc 11

F - Finished Coating,
 Phenoline 305

B. Unresolved Matters

1. Storage of NSSS Equipment

Inspection of the internals of the steam generator, and other NSSS equipment onsite, to be made prior to finalizing storage and protection procedures. (Report Details, Paragraph 4)

2. Water in Unit No. 1 Containment

Considerable water was present on the metal floor plates, where welding was in progress. Further review of this item is planned for future inspections. (Report Details, Paragraph 8)

C. Status of Previously Reported Unresolved Matters

No outstanding unresolved matters existed.

Management Interview

- A. The following persons attended the management interview at the conclusion of the inspection:

Consumers Power Company (CP)

W. E. Kessler, Project Manager
G. S. Keeley, Director of Quality Assurance Services
G. W. Somsel, Acting Project Superintendent
H. W. Slager, Project Quality Assurance Supervisor
J. L. Corley, Field Quality Assurance Engineer

Bechtel Corporation (Bechtel)

P. A. Martinez, Project Manager
J. L. Hurley, Assistant Project Engineer
G. L. Richardson, Lead Quality Assurance Engineer
T. C. Valenzano, Project Field Engineer
B. A. Burgener, Project Quality Control Supervisor

- B. Matters discussed and comments, on the part of management personnel, were as follows:

1. The inspector stated that, during recent RO:III liner plate repair audits, some difficulty was encountered in retrievability of documents. Since then, evidence has shown improvement in this area. During this inspection, the inspector experienced no difficulty in retrievability of inspection documents. (Report Details, Paragraph 1)
2. The inspector discussed a letter from AEC DL to CP in regard

to PSAR Amendment 27 and indicated that compression tests performed on aggregate with 2% fines appear to be satisfactory. In a previous RO:III inspection, the inspector had been informed that tension tests were performed on aggregate samples having in excess of 1.5% fines, but less than 2% fines. Test reports reviewed confirmed the AEC letter content, and the inspector stated that he had no further questions. (Report Details, Paragraph 2)

3. The inspector commented that Commitment No. 17 has been considered to be implemented satisfactorily in the following ways:
 - a. There is sufficient evidence to show that CP has reviewed and approved Bechtel work procedures before start of Class I construction work activities.
 - b. The Bechtel Engineering Department Procedures Manual, for writing specifications, does include requirement for a PSAR/FSAR check to insure no conflicts between documents.
 - c. Bechtel work procedures show minimum amount of cross references. They are illustrative and easy to read.
4. The inspector stated that long-term storage and protection is required for the steam generators, reactor vessel and other NSSS equipment. The licensee agreed and stated that their long-term storage procedures for the interior of these items would require that the desiccant used in shipment be replaced by a nitrogen atmosphere. The inspector asked if the internal areas of the onsite steam generator had been inspected, and the licensee said it had not been opened for inspection. The inspector pointed out that knowledge of the "as received" condition of the interior surfaces would be important in assessing the condition after two or three years of storage. The licensee stated they would determine "as received" condition and would factor results of such inspections into their storage and surveillance procedures.
5. The inspector noted that considerable water was observed standing on the Unit 1 containment floor plates. He added that gas-fired torches were being used to dry areas where welding was to be performed. The licensee stated that a cover would be installed over containment to exclude rain or snow. The inspector stated this item would be checked on a future inspection.
6. The inspector commented that the action taken in reporting the experience of the fire and in evaluating the resultant damage appears to be adequate. The testing work indicated as having been performed and to be completed appears to be adequate. The

licensee stated that an interim report would be submitted to meet the 30-day requirement which would outline information gathered to date and that they expected to complete the final report early in 1975.

7. The licensee was informed that the Unit 2 containment rebar spacing nonconformance will be identified as a violation in the RO:III inspection report. It was noted that the licensee's QA program control that identified the nonconformance and initiated the corrective action would be recognized in the report as being considered adequate and that no response to the violation would be required. The licensee stated that a report is to be submitted as required by Part 50, Paragraph 50.55(e) and that the complete report should be available within the 30-day reporting period.

REPORT DETAILS

Persons Contacted

The following persons, in addition to the individuals listed under the Management Interview Section of this report, were contacted during this inspection.

Consumers Power Company (CP)

D. E. Horn, Field Quality Assurance Coordinator - Civil
D. R. Keating, Field Quality Assurance Coordinator - Mechanical
B. H. Peck, Field Supervisor
W. H. Benkert, Quality Assurance Engineer - Electrical
K. R. Kline, Project Control Supervisor

Bechtel Corporation (Bechtel)

A. L. Boulden, Lead Welding Quality Control Engineer
R. L. Bowren, Assistant Project Field Quality Control Engineer
D. C. Thompson, Lead Quality Control Engineer - Electrical
K. O. Anderson, Welding Quality Control Engineer
S. E. Tucker, Welding Quality Control Engineer
W. E. Ferriss, Quality Assurance Supervisor
W. F. Holub, Project Quality Assurance Engineer
W. J. Key, Quality Assurance Engineer
L. R. Albert, Lead Quality Control Engineer - Civil
R. E. Sevo, Quality Assurance Engineer
H. D. Foster, Quality Control Engineer
W. Shively, Quality Control - Civil
R. Lussier, Quality Control - Welding
P. Carpenter, Quality Control - Concrete

Champion, Incorporated (Champion)

P. E. Schmanski, Superintendent - Batch Plant
K. R. Rademacher, Supervisor - Concrete Laboratory

Results of Inspection

1. Liner Plate Repair Work Documentation

A record review was conducted by the inspector of a selected liner plate fabrication. The review included: (1) material identification, (2) welding procedures used, (3) QC inspection records, (4) NDT records, (5) repair records, (6) welder qualification records, and (7) current qualified personnel list.

The liner plate assemblies (Inspection Plan) C-111-19 and C-111-26, were selected for the documentation check, and no deficiencies were identified.

In addition, the inspector reviewed: (1) a letter from CP QA to Bechtel QA, dated October 17, 1974 and (2) a letter from Bechtel to CP QA, dated December 10, 1974. This correspondence indicated that improvements of Bechtel QA record retrievability had been put into effect and that the inspectors' previous concerns had been resolved.

2. Aggregate Fines

During a previous inspection, the inspector had discussed with the licensee the proposed aggregate specification change and PSAR Amendment No. 27 being reviewed by AEC DL. (RO Inspection Reports No. 050-329/74-10 and No. 050-330/74-10, Paragraph 4, Report Details). Subsequently, a letter from AEC DL to CP, dated October 30, 1974, indicated satisfactory results of compression tests of sample consisting of as high as 2.0% fines.

Information provided to the inspector during the previous inspection indicated that tension tests, on samples having less than 2% fines, had been performed. The following reports were reviewed by the inspector, and no conflicts with the DL letter were identified.

- a. Bechtel Associates Professional Corporation, Ann Arbor, Michigan, report, "Use of Coarse Aggregate With Varied Percentage of Material Passing the #200 Sieve", dated July 24, 1974.
- b. Pittsburgh Testing Laboratory, Detroit, Michigan, reports, "Flexure Tests of Concrete Beams", dated September 13, 1974/November 5, 1974, and September 13, 1974/November 7, 1974.

3. Commitment No. 17 Per RO Inspection Reports No. 050-329/74-01 and No. 050-330/74-01

CP commitments from Bechtel, relative to full attention to QA/QC program requirements in regard to Midland construction activities, include the following:

- a. A review of procedures by Bechtel prior to the start of each specific Class I work activity to assure clarity.

The inspector reviewed a number of related correspondence including: (1) Bechtel to CP letter, dated January 28, 1974, consisting of a list of special procedures reviewed by Bechtel and for which CP review and approval was requested, (2) CP to Bechtel letter, dated February 7, 1974, subject "Work Plans", (3) Bechtel to CP letter, dated February 22, 1974, subject "Special Work Process Summary List", and (4) Bechtel to CP letter, dated December 9, 1974, subject "Special Work Process Index List". The above correspondence indicated that the commitment had been met.

- b. A system established by Bechtel to assure that work procedures are reviewed to contain quality information consistent with requirements, such as those contained in the Midland Plant PSAR.

The inspector reviewed the Bechtel Engineering Department Manual, Volume 1, issued on March 11, 1974. A checklist was provided in Exhibit I to insure that the contents of a specification will not be in conflict with the Midland PSAR/FSAR. If any conflict is identified, corrective action will be initiated, and the resolutions will be approved by the responsible engineer.

- c. Revision of work and inspection procedures to lessen reliance on, and cross reference to, other general documents.

The inspector reviewed related documents including: (1) Bechtel Cadweld Rebar Splicing Instruction for the Operator, Vertical and Horizontal Positions, "T" and "B" Series Splice, for Midland 1 and 2; and (2) Bechtel Concrete Placing Instruction for the Placing Crew, Midland 1 and 2. The above documents are easy to read, and contained a minimum of cross references. The illustrations were also clear. The inspector considered that the commitment has been met.

4. Outside Storage of Class 1 Materials

The primary coolant piping spools, one steam generator, and the Unit 2 reactor vessel and head are stored outdoors. The outside surfaces are coated with a strippable coating, "Spray Lat", which appeared to provide protection from corrosion. The piping spools are made of a low alloy steel, which has been clad on the inside surfaces.

The following spools were examined and appeared to be in good condition, although further inspection may be required to establish internal conditions.

- a. Primary coolant pipe, 28-inch, Identification 620-0012-50
B40-2012-50-1
- b. Primary coolant pipe, 36-inch, Identification 620-0012-50
A24-2012-50-1

These piping spools contain desiccant, and each spool has an indicator which is monitored daily. Procedures F-7220-C-61 and -101 were used by the Reliance Trucking Company (Reliance) to off load the steam generator. This procedure, together with storage procedures FPG-3, F-1-62, Revision 4, and Q.C.FSP-11 appear to meet specification requirements.

The desiccant indicators still showed a dry internal atmosphere, but the "as received" condition of internal surfaces of the steam generator had not been determined. The licensee stated that an internal inspection would be made prior to changing over from desiccant protection to the inert gas, nitrogen.

5. Concrete and Rebar Quality Assurance

Champion operates the batch plant, and U. S. Testing Company

performs the laboratory tests on the rebar and concrete. All rebar is Grade 60 and is furnished by Ryerson Company. All sizes of rebar and cadwelds are pulled to destruction on a 600,000-pound capacity tester. This "Forney" machine was calibrated and tagged on June 24, 1974. Temperatures of concrete (allowable range of 45 - 65°F) are checked in the trucks, and slump tests are made at point of placement. The following specifications control the various concrete operations:

- a. Production - 7220-C-230, Revision 5
- b. Placement - 7220-C-231
- c. Testing - 7220-C-208

Proper adherence to receiving specification for rebar and to concrete procedures was also reviewed.

6. Sheath and Tendon Receipt and Installation

Storage of sheath tubes for the tendons was examined onsite. These tubes are plated and are stored outside. Installation in the containment wall is governed by Specification 7220-C2, Revision 5.

No tendons have been received onsite; however, the specifications are available. Specification ASTM-A421, Type BA, wire is used in the prestress assemblies. Stresses in the tendons will be controlled by ACI-318-63, Section 2606. Specification 7220-C-300 and 722-C-301 govern the prestress requirements for the containment wall and roof section, respectively. After the installation of tendons in the sheaths, corrosion protection will be assured by adding, at 100 psi pressure, Visconorust 2090P2.

Sheath specifications appear to have been met to date.

7. Site Preparation (Lakes and Ponds)

The excavations for foundations and cooling ponds were started in 1969 to Specification 7220-C-210. Several shallow wells existed in the area and were sealed off by grouting to Specification 7220-C-210, Revision 0. There are 880 acres in the entire pond, with an inner emergency cooling reservoir of approximately 24 acres which has been excavated to a depth about six feet below the surrounding grade and which is surrounded by a berm, so that water for emergency cooling would be retained even though the water in the surrounding pond was lost.

There are six main zones of soil, including surfaces, and the specification governing compaction is D1557-66T. The soil preparation and landfill appear to have been performed in accordance with applicable specifications.

8. Steel Liner for Unit No. 1 Containment

The inspector observed work in this area which included welding and quality control activities. One welder (B125) was identified on a vertical seam using weld Procedure PLAA1H. This procedure is a shielded metal arc procedure utilizing a backing strip and 7018 weld rod. A vacuum box was used in testing the welds, and a magnetic particle inspection was performed on 10% of the welds made by each welder.

On floor sections of the structure, a modified metal inert gas method was used. The coiled weld rod contained an internal flux, and carbon dioxide gas was used to further protect the weld puddle. These welds and welders were protected by plastic canopies which minimized wind currents and, thus, insured maintenance of the gas blanket over the weld puddle.

These activities appeared to be carried on in conformance to welding and QC procedures. Radiography was not possible in some areas but, where possible, 100% RT of the floor liner welds was performed although only 10% RT is required.

The inspector noted that a torch was being used to dry up wet areas of plate about to be welded in the containment floor. Waterproofing of the roof is planned and, while a temporary cover will be installed on containment No. 1, this had not yet been done. The inspector pointed out that moisture in weld preparations, or on the underside of welds is not conducive to quality welding. The licensee agreed that water in the containment should be removed and a cover placed over the top as soon as possible.

9. Fire in Unit 2 Containment

The licensee reported to RO:III, by telephone, the occurrence of a fire experienced on November 21, 1974. Insulating blankets (described as fire retardant) were used on the inside containment wall against the metal liner to protect newly poured concrete. The blankets were inadvertently set on fire by welding activities on the metal liner overhead. Suspension ropes were cut, allowing the blankets to fall to the floor area, where the fire was extinguished with the aid of the Midland Fire Department.

Damage caused by the fire included primer coating discoloration and some blistering on approximately 180° of the containment liner and a number of metal liner bulges approximately three feet above the liner knuckle weld joint. The bulges, elongated between the vertical retainer ribs, were of varying sizes - the largest being approximately four feet long and slightly in excess of one foot wide, with the maximum of 3/16-inch bulging away from the concrete at a small central area.

The inspector observed a 4" x 4" square opening cut into the largest bulge in the liner plate, and the concrete surface adjacent to the metal liner was visible. The concrete appeared sound, with no discoloration or flaking. In addition, the inspector was informed that Swiss Hammer Tests were made on the areas of concrete in the opening and also on concrete on the direct opposite outside surface of the opening. There was no appreciable difference in the results indicating sound concrete.

In response to questioning, the licensee informed the inspector that metalographic tests are being made on the cut out section of liner plate. These tests, including hardness and macroetch, will demonstrate the soundness of the liner plate material.

The licensee added that the results of the examination is to be reported to the AEC, with an interim report being issued to meet the 30-day reporting requirement and a final report to be issued in early 1975. The report is also to indicate the corrective action to be taken, as determined by the test results.

10. Unit 2 Containment Liner Rebar Spacing Nonconformance

The inspector was informed that CP has been performing audits of concrete activities approximately once a month and that the latest audit was conducted on December 5, 1974, of the readiness to pour for lift No. 6 (El. 642' - 7" to 652' - 9"). The results of this audit, performed by the CP Field QA Coordinator - Civil, was the issuance of CP nonconformance report, No. QE-36, dated December 5, 1974, and the issuance of a stop work order covering concrete placement activities, No. FSW-6, dated 9:00 a.m., December 6, 1974.

The nonconformance identified approximately 50 instances of rebar spacing that exceeded the specified requirement and stipulated four items of recommended corrective action. In addition, correspondence was reviewed which requested Bechtel to perform a safety evaluation (assuming rebar spacing was uncorrected) for reporting purposes. A preliminary copy of the Bechtel analysis letter was brought from Ann Arbor to be available for review on the last day of the inspection. However, the licensee stressed that it was not finalized and was subject to further evaluation.

Lift No. 6 was visually examined by the inspector. The following items of observation were noted.

- a. The lift is a rebar transition lift where a rebar size change was being accomplished. The change was from previously No. 18 bar to No. 11 bar. Spacing difficulties resulted from the 12" spacing for No. 18 bar, and only 8" spacing for No. 11 bar.
- b. Some instances of spacing problems were result of construction requirements, such as form attachment and spacing brackets, also concrete piping, hoses, and elephant trunk installation.
- c. Corrections of spacing had been effected wherever it was possible to make adjustments, and the inspector was informed that further correction would be made as required in the next lift.
- d. The outer ring of vertical rebar was the only area of spacing

problems. The horizontal and inner ring vertical rebar apparently had proper spacing.

- e. Concrete expected to be used for the pour is specified to have a maximum size aggregate of 3/4", and there appeared to be no areas where the smaller spacing would be a limitation to concrete access.

Results of audits by both Bechtel and CP were discussed, and it was established that no previous problem areas had been identified relative to concrete pouring activities. CP had audited a previous pour (lift No. 4) and had found no problems. The inspector was also informed that the preplacement inspection plan had been signed by the QC inspector indicating acceptable conditions, and that the QC inspector believed that the specification allowed such construction deviations. In addition, it was felt that since there was one rebar installed in excess of the number required by the spacing that no problem existed.

The licensee informed the inspector that the final report should be issued in time to meet the 30-day reporting requirement of 10 CFR Part 50, Section 50.55(e).

11. CP QA Program Modifications

A licensee representative outlined the present plans for the CP QA program modifications which included the following:

- a. Volume I Policies - Revision 1 presently under review, with completion and issuance anticipated by January 1, 1975.
- b. Volume II - Procedures for Design and Construction Activities - Procedures now being issued for review; scheduled completion planned for early February 1975.
- c. Volume III - Procedures for Operation are also to undergo modification, to be completed at a later date.
- d. Expansion of the QA Services Department procedures provides for the addition of six new procedures.

Attachment:
Attachment A

ATTACHMENT A

Midland Plant Nonconformance Reports

Bechtel and CP Nonconformance Reports (NCR's) Review

The following NCR's submitted by CP to RO:III, were audited at the site. The corrective action was considered appropriate, and the documentation appeared adequate.

1. Bechtel NCR No. 88 - Dike Fill Test Frequency Deviation
(April 17, 1974)

This NCR was closed on May 15, 1974. The decision was based on letter BEBC-376 (Bechtel engineering to construction) dated June 10, 1974, and a summary report.

2. Bechtel NCR No. 89 - Containment No. 2 Base Mat Nonconforming Concrete
(April 24, 1974)

This NCR was closed on July 12, 1974. Bechtel Project Engineering Department has accepted a field recommendation to use as it was.

3. Bechtel NCR No. 90 - Underweight Cement Placed in Auxiliary Building
and Containment No. 2 (April 25, 1974)

This NCR was closed on July 12, 1974. Bechtel Project Engineering Department has accepted a field recommendation to use as is.

4. Bechtel NCR No. 91 - Linear Plate Thickness Deviation
(April 30, 1974)

This NCR was closed on May 20, 1974. Bechtel Project Engineering Department approved field recommended repair procedures. Assembly Record C-111-14 provided records of work activity and QC inspections.

5. Bechtel NCR No. 137 - Excessive Concrete Slumps (July 1, 1974)

This NCR was signed off, based on cylinder test results of average, 90-day strength on set No. 206F that exceeds 5,000 psi. Test data of 28-day test was listed in this NCR, but no information about the 90-day test. The inspector obtained the 90-day test results at the site and had no further questions.

6. CP QF-28 Containment Liner Plate Coating Material Storage
(October 11, 1974)

This NCR was closed on October 13, 1974. The inspector inspected the Carbozine 11 and Phenoline 305 storage trailer and agreed that adequate protection had been provided for these materials.