UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report of Operations Inspection

IE Inspection Report No. 050-155/76-11

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Big Rock Point Nuclear Plant
Charlevoix, Michigan

License No. DPR-6
Category: C

Type of Licensee: BWR GE 240 MWt

Type of Inspection: Special. Announced

Dates of Inspection: May 6-7 and 19-22, 1976

Principal Inspector: R. J. Cook

6/17/76
(Date)

Accompanying Inspectors: None

Other Accompanying Personnel: None

Reviewed By: W. S. Little, Chief
Nuclear Support Section

6/17/76
(Date)

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SUMMARY OF FINDINGS

Inspection Summary

Inspection of May 6-7, and 19-22, 1976 (76-11): Examined code safety valve components. Reviewed procedures, blue prints and pertinent documentation for the safety valve nozzle replacemen and refurbishing. Witnessed hydrostatic testing of installed replacement nozzles, safety valve assembly and set point testing.

Enforcement Items

None.

Licensee Action on Previously Identified Enforcement Items

None inspected.

Other Significant Items

A. Systems and Components

None.

B. Facility Items (Plans and Procedures)

None inspected.

C. Managerial Items

None.

D. Noncompliance Identified and Corrected by L ensee

None.

E. Deviations

None.

F. Status of Previously Identified Unresolved Items

None inspected.

Management Interview

A management interview was conducted with Mr. Hartman, Plant Superintendent and other members of the staff including members of the corporate staff on May 21, 1976. The following items were discussed:

A. Inadequacies in the safety valve assembly and testing procedures were discussed. The licensee acknowledged the comments. (Paragraphs 5 and 6, Report Details)

B. The physical condition of the valves was discussed. The inspector stated that the inspection would continue until more valves were assembled and set. The licensee acknowledged the comments. (Paragraph 3, 4 and 6, Report Details)

REPORT DETAILS

1. Persons Contacted

C. Hartman, Plant Superintendent
J. Fynn, Maintenance Superintendent
G. Szczotka, Quality Assurance Superintendent
J. Popa, Maintenance Engineer
H. Black, Maintenance Supervisor
D. Wilks, Assistant Maintenance Supervisor
R. Brzezinski, Associate Engineer
E. Dziedzic, Quality Control Inspector
C. Kellogg, Machinist
J. Leja, Crosby Valve and Gage Company, Field Representative
C. Ansorge, Hartford Boiler Inspector

2. General

During inservice inspection of the six installed drum code safety valves, crack indications were noted in the proximity of the nozzle seal weld heat affected zone when the area was dye penetrant tested. One nozzle had crack indications in the throat area about 1 inch to 2 inches below the seating surface. All nozzles, including the nozzle from the spare valve were removed and replacement nozzles installed. When the replacement nozzles were seal welded crack indications were noted (by dye penetrant testing) in the valve body base metal in the proximity of the heat affected zone.

An inspection was performed to review licensee efforts pertinent to the repair, refurbishing and testing of the code safety valves.

Removed nozzles with crack indications have been sent to laboratory facilities for metallographic examinations and further testing. A future inspection is planned to review the results of these examinations.

3. Valve Body Cracks

The crack indications in the valve body base metal were all primarily located in the same quadrant when viewing the valve from the inlet side. Using a quadrant reference and with the valve outlet pointed downward with the flange face parallel to a horizontal plane, the body crack indications were located at nominally the one to three o'clock position and near the fillet seal weld.

The following is a summary of the site quality records showing the relative size of the body cracks and the final disposition for each valve.

a. Valve Number 5000

This valve is designated as the spare valve. A replacement nozzle was not installed in this valve as complete certification and traceability of nozzle material could not be established for the nozzle intended for this valve. Therefore, no post weld body cracking has occurred in this valve. The licensee plans to refurbish this valve at some later time.

b. Valve Number 5001

The crack indications required local grinding to a depth of 0.550 inches to remove any indications. The ground cavity was filled using tungsten inert gas (TIG) techniques. No cavity traces or crack indications existed after the repair.

c. Valve Number 5002

The crack indications in this valve were located at the 3 o'clock position and required local grinding to a depth of 0.194 inches to remove any indications. No filling of the ground out cavity was performed.

d. Valve Number 5003

The crack indications in the body base initial required local grinding to a depth of 0.190 inches to remove any indications. No filling of the ground out cavity was performed.

e. Valve Number 5004

The crack indications in the body base metal required local grinding to a depth of 0.201 inches to remove any indications. No filling of the ground out cavity was performed.

f. Valve Number 5045

The crack indications required local grinding to a depth of nominally 0.100 inches to remove any indications. No filling of the ground out cavity was performed.

g. Valve Number 5046

The fillet seal weld was taken out by machining. This increased the inside radius at the fillet weld by 0.520 inches. A crack like indication still existed which was removed by local grinding an additional depth of 0.125 inches. Rewelded the seal weld using a wider fillet of 5/8 inch.

An analysis to evaluate the inlet minimum wall thickness was performed by the safety valve manufacturer. This analysis states that the minimum wall thickness must be 7/8 inch. The minimum wall thickness was determined to be nominally 1 3/16 inch. Using a casting quality factor of 0.8 the allowable maximum stress for 1700 psig at 614°F is 1400 psi. The maximum encroachment of this allowable stress was a calculated stress of 12,274 psi in the flange area.

The cause of the post weld body cracking is attributed to imposing additional residual stresses on the body casting from the nozzle seal welding process.

4. Safety Valve Assembly

During the inspection, essentially all aspects of valve assembly were observed. Some dimensional checks were made to establish conformity of the replacement nozzles with intended design. No indications of stem extremity thread interference with the adjusting bolt bearing (guide brushing) were observed. No indications of interference or binding between the guide and disc holder were noted when the valve internal components were examined. The valve manufacturer's representative was involved in assisting the licensee during the assembly of some of the valves.

During the examination of valve components, a full length 0.010 inch longitudinal crack indication was noted in all the stems. This was attributed to a manufacturing defect. All stems were replaced with four stems manufactured from stainless steel and two stems made of Monel. The stems were supplied by the valve manufacturer. Other replacement parts used in the valves were three disc holders, three discs and all nozzles.

Two of the nozzles were outside the limits of parallelism with the component translational axis of the valve after the seal welds were completed. The nozzle seating surfaces were

remachined and lapped by the valve manufacturer's representative. Parallelism and concentricity of the seating surface was brought within manufacturer recommended tolerances.

All the nozzles were hydrostatically tested prior to valve assembly at 2380 psig to test boundry integrity. The hydrostatic tests on two of the nozzles (seal welded in the valve body) were witnessed by the inspector. No leakage or discrepancies were noted. The Hartford Boiler Inspector was present to witness these hydrostatic tests.

5. Assembly Procedure

The assembly procedure was reviewed and some subtle symantic discrepancies were noted which were corrected by the licensee. The severest objections to the procedure were in not supplying enough detail such that a novice could perform a given step. The licensee relied heavily on the knowledge and experience of the plant machinist to perform procedural steps. The inspector recommended that the licensee incorporate more detailed instructions in the procedure with the details of how a given procedural step is performed being supplied by the plant machinist. Some of these details were approved and incorporated into the safety valve assembly and test procedure during the period that the valves were assembled. The licensee plans to further improve the safety valve assembly and test procedure during the assembly and testing of the spare valve.

6. Safety Valve Set Point Testing

The safety valve lift set points were established using nitrogen. The testing rig had the capability of supplying a relatively large volume as an accumulator was changed with nitrogen and then brought to lift pressure by pumping water into the accumulator. The setting of four safety valves was witnessed by the inspector. The valve manufacturer's representative assisted in the setting of two of the safety valves. The valves accepted for service showed sharp opening and closing characteristics without any evidence of seal leakage.