Jersey Central Power & Light Company

MADISON AVENUE AT PUNCH BOWL ROAD • MORRISTOWN, N. J. 07960 • 201-539-6111

MEMBER OF THE General Public Utilities Corporation SYSTEM

December 7, 1973
(Revised)

Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Giambusso:

Subject: Oyster Creek Station
Docket No. 50-219
Main Steam Isolation Valve Inspection and Repair

In a letter dated September 21, 1973, we reported that main steam isolation valve NS03B failed to meet the acceptable leakage rate criterion specified in Technical Specifications 4.5.F.1.D, in a test conducted during the September 1973 plant outage. The letter also outlined a course of action that would be followed to visually and dimensionally check valve NS03B to determine the failure mechanism. The purpose of this letter is to submit a summary report on the results of the extensive inspection conducted and on the repairs that were made to renovate the valve.

Before proceeding with the inspection of the valve, representatives of General Electric Company, Atwood & Morrill Company and MPR Associates met with Jersey Central Power & Light Company personnel to discuss possible failure mechanisms and methods of repair. Until the latest development, it was believed that the lack of straightness of the valve stem was responsible for the failure of NS03B to pass the air tests subsequent to power operation. However, the installation of a specially manufactured stem in the valve during the June 1973 plant outage diminished the probability that a bowed stem was the cause of the recurring leakage problem. Procedures and tests for the disassembly and reassembly of the valve and for obtaining the desired measurements and dimensional data were developed in a joint effort with the vendor, Atwood & Morrill Company. An Atwood & Morrill representative was present for the entire inspection and repair program.

Prior to disassembling the valve, special instruments were installed to indicate and/or record ambient temperature, valve body temperature, stem travel, and operator air and oil pressures. The valve was opened and closed several times to verify the repeatability of measurements. Data was obtained to enable plots of operator air pressure versus open-close stem travel to be made. During the disassembly of NS03B, dimensional data was obtained on all

critical parts. The data recorded during the inspection, along with the procedures followed for the disassembly and reassembly of the valve, are on file at the plant. Copies of this information will be made available upon request.

An analysis of the inspection data revealed that there was excess clearance between the main poppet guides and the valve body guides. The diameter of the circle formed by the body guides was measured at three elevations in the casing. The dimensions recorded were as follows: Top, 23.515 inches; Middle, 23.510 inches; and Bottom, 23.504 inches. The diameter of the circle formed by the main poppet guide pads was found to be 23.456 inches. It is believed that the large clearance between poppet and body guides, as much as .048 inches near the valve seat, permitted excessive misalignment of the poppet on the valve seat, a condition that is not favorable for a tight seal. The desired guide clearance is .027 to .030 inches on the diameter.

The repair consisted of building up the main poppet guide pads to give the desired clearance. First, the guide lugs were cleaned by machining and then built up 1/8" with Stellite 21 overlay. The guide pads were then remachined and dye checked. The diameter of the circle formed by the remachined guide pads is 23.4815 inches. The weld overlay was done in accordance with Atwood & Morrill Company Specification No. PTH-3, Revision No. 8, entitled "Procedure Specification for Gas Tungsten Arc Hard Surfacing of Valve Trim". An Atwood & Morrill welder, certified to the procedure, performed the overlay work. The fix was made to the poppet guide pads rather than to the body guides, which indicated wear, because there was no mechanism available for dimensional boring of the body guides.

Additional work performed on valve NS03B to improve sealing performance consisted of machining and lapping the pilot poppet and the main poppet seats to 46° for line contact, and machining 1/4" off of the spring seating surface on the stem spring plate to reduce the possibility of metal-to-metal contact of the spring coils while in compression.

Following the completion of the maintenance and repair work on main steam isolation valve NS03B, tests were initiated to determine the leakage rate of each of the four main steam isolation valves. The two valves, NS04A and NS04B, outside the drywell failed to meet acceptable leakage rate requirements. (Reported to the Directorate of Licensing by letter dated October 12, 1973). The leakage path in both valves was identified as being the stem packing. As a precautionary measure, all four isolation valves were repacked. In subsequent tests, the leakage rate of each of the four valves was found to be nondetectable, i.e., <0.1 SCFH.

Two major problems have now been identified and corrected in main steam isolation valve NS03B. The fixes consisted of (1) replacing the original valve stem with one that was manufactured to new specifications and (2) reducing the poppet guide to body guide clearance. We expect that the performance of this valve will be much improved in the future.

Enclosed are forty copies of this report.

Very truly yours,

Donald A. Ross

Donald A. Ross
Manager, Nuclear Generating Stations

cs

cc: Mr. J. P. O'Reilly, Director
Directorate of Regulatory Operations, Region I

Jersey Central Power & Light Company

MADISON AVENUE AT PUNCH BOWL ROAD • MORRISTOWN, N. J. 07960 • 539-6111

September 21, 1973

RECEIVED SEP 27 1973 U.S. Atomic Energy Commission Regulatory Mail Section

Mr. A. Giambusso
Deputy Director for Reactor Projects
Directorate of Licensing
United States Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Giambusso:

Subject: Oyster Creek Station
Docket No. 50-219
Failure of Main Steam Isolation Valve

The purpose of this letter is to report a failure of the main steam isolation valve NS03B to meet the acceptable leakage rate criterion as specified in Technical Specifications 4.5.F.1.D. This event is considered a violation of the Technical Specifications, paragraph 1.15.E.

This event is also considered to be an abnormal occurrence as defined in the Technical Specifications, paragraph 1.15.E. Notification of this event as required by the Technical Specifications, paragraph 6.6.2.a., was made to AEC Region 1, Directorate of Regulatory Operations, by telephone on September 10, 1973 and personally to Mr. E. Greenman on September 10, 1973.

The reactor was shut down on September 8, 1973 for the purpose of re-inspecting the Bergen-Paterson shock absorbers at the Oyster Creek station. A leakage rate test was conducted on the main steam isolation valves in accordance with previous commitments to the Atomic Energy Commission. As a result of this testing, which is partially completed, the leakage rate for NS03B was found to be approximately 200 SCFH based on the rate of pressure buildup between valves NS03B and NS04B. The allowable leakage rate limit, as detailed in the Technical Specifications, is 9.95 SCFH (5% of L_{to} [20]). The other inside valve NS03A leakage rate was determined to be nondetectable, <0.1 SCFH. The leakage measurements for the outside isolation valves will be determined once we have completed the current inspection and repair of NS03B.

This failure is similar to one reported to your office by my letter dated June 5, 1973. As a result of the failure to achieve an acceptable leakage rate measurement at that time, we disassembled NS03B, the pilot stem was removed, and replaced with a new one manufactured to new specifications and close quality controls. In addition, both the main seat and pilot seat surfaces were relapped. Following reassembly of the valve, the 20 psi air test indicated no dectable leakage through the valve (i.e., <0.1 SCFH). It was believed at that time that

DUPE
~~8103240948~~

50-219

COPY SENT REGION

7217

the failure of NS03B to pass the air test was due to the lack of straightness in the original pilot stem. The original stem, on several previous occasions, was straightened and reinstalled in the valve and acceptable leakage test subsequently performed on the valve. However, based on our investigation into the recurring leakage problems with this particular valve, it was judged that the stem was relaxing after operating for a period of time at elevated temperatures, resulting in excessive stem bowing and improper pilot valve seating. Therefore, two replacement stems were manufactured by Atwood & Morrill Company to special specifications provided by Jersey Central Power & Light Company.

The failure which is being reported by this letter reflects the results of the first test subsequent to some operating history on NS03B with the specially manufactured pilot stem.

The cause of the current valve leakage is unknown at this time.

A special meeting was held at the Oyster Creek station on September 13, 1973 to review the most recent developments with this particular valve.

The following course of action was agreed upon by Jersey Central Power & Light Company, Atwood & Morrill Company and two other companies consulting with Jersey Central Power & Light Company on this problem:

A. Prior to Disassembling of NS03B

1. Instrument with dial gauge and potentiometer to measure stem stroke at valve closure. Obtain baseline marks before operating valve.

2. Instrument cylinder to measure Δp across cylinder.

3. Perform stroke tests, measure cylinder Δp and valve stroke repeatability. As a part of this, also measure stem movement at a junction of cylinder Δp for increments from $\Delta p = 0$ to $\Delta p =$ design. Also check packing friction by loosening and checking stem motion and repeatability.

4. Determine whether stem is installed such that it is not "bottoming-out" on top or bottom of operator cylinder.

5. Check runout of coupling between valve and operator stem.

NOTE: If measurements indicate significant changes during the stroke tests, conduct leakage tests to determine effect on valve leakage.

B. After Disassembly of NS03B

1. Perform complete dimensional inspection of critical valve parts.

2. Cylinder examination for obstructions, rust, etc., and condition of seals.

3. Refurbish, as required, (Atwood & Morrill indicated they can provide qualified welders and procedures, if required, for restelliting guide surfaces.)

4. Repeat stem stroke repeatability and Δp measurements, note above, after refurbishment.

C. Long Term Action

It was agreed that a better lapping tool with bearings and internal supports is needed. Atwood & Morrill indicated that such a tool is being developed by them and is expected to be available in October 1973. Atwood & Morrill will advise Jersey Central Power & Light Company of the schedule for delivery of a lapping fixture for the Oyster Creek valves.

D. Procedures

The inspections and examinations outlined above will be performed under Atwood & Morrill's and Jersey Central Power & Light Company's supervision in accordance with written procedures. These procedures are the responsibility of Jersey Central Power & Light Company and will be reviewed by General Electric and Atwood & Morrill.

In addition, Atwood & Morrill will also furnish a representative to follow this work.

In determining the significants of this valve leakage, the rate of pressure buildup in the reactor was compared to a graph of pressure buildup where at least one valve in each steam line was leak tight. These plots compared favorably. This implies that one valve in the "B" main steam line (i.e., NS04B) is leak tight. This was confirmed when pressure buildup between the valves was observed to be approximately the same as the reactor pressure. The redundancy feature will be confirmed upon successful completion of the NS04B leak test.

It is not possible, at this time, to specify exactly what corrective actions are to be taken to prevent the reoccurrence of this situation. The course of action will be dictated upon completion of the analysis of the extensive dimensional inspection described above. It is our intention to keep your office informed informally through our Region I compliance inspector; and, following the completion of the program described herein, to forward to your office the written results of our inspection and the corrective actions dictated by this inspection.

We are enclosing forty copies of this report.

Very truly yours,

Donald A. Ross

Donald A. Ross
Manager, Nuclear Generating Stations

cs
Enclosures

cc: Mr. J. P. O'Reilly, Director
Directorate of Regulatory Operations, Region 1