

SSER

Task: Allegation Nos. A-88, A-89, A-90, A-91, A-315

Reference Number: 4-83-A-88; 4-84-A-12

Characterization: It is alleged that the hydrostatic testing required by the ASME Code for instrumentation and control tubing (ASME Code Class 2 and 3 piping) systems installed by the Mercury Construction Company had three different but related problems: (1) that EBASCO Nonconformance Report (NCR) W3-6719 concerning hydrostatic test pressures was improperly closed, (A-315); (2) that test data sheets were missing or had incorrect static head calculations, and were unsigned during field tests (A-88, A-89, A-90); and (3) that test gauge readings were improperly recorded (A-91).

Assessment of Allegation: According to the ASME Code, at the completion of assembly work on a piping system, a hydrostatic test must be performed to verify the integrity of the system, by introducing water into the system at a pressure that is 1.25 times greater than the design pressure for the piping. Prior to the test, a test instruction sheet describing the steps to be taken during the startup, running, and completion of the test is prepared; any special notes are included. A hydrostatic test data sheet is also made, which includes specific information about the system being tested, such as design pressure, test pressure, and minimum test pressure. During the test, the readings from two gauges located in close proximity are recorded on the test data sheet.

First, it was alleged that an ASME Code violation occurred because of underpressurization of some systems.

The NRC staff learned that NCR W3-6719 resulted from an EBASCO letter that questioned whether the additional pressure resulting from the static head of water present during the hydrostatic test had been considered in determining the system test pressure. The accompanying examples were based on the principle that the minimum hydrotest pressures should occur throughout the whole system.

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EBASCO Site Support Engineering (ESSE) responded to the NCR by stating that the hydrostatic pressure had been adequate. They based their rebuttal on ASME Code Interpretation III-1-78-11, which states that "for piping systems it is a requirement of NB, NC, ND, NE, NF, NG-6221(b) of Section III that all items within a designated and protected system be hydrostatically tested at 1.25 times the system design pressure at the location that determined the design pressure." This is considered the system's lowest point. The system design pressure at this point includes the pressure created by the static head of water present in the system.

The NRC staff agreed that this interpretation always results in the lowest design pressure and corresponding lowest test pressure at the highest point in the system. The staff believes that the appropriate pressure was considered in determining the system test pressure. Thus, this part of the allegation has neither safety significance nor generic implications.

Second, it was alleged that neither the information needed to determine the static head pressure nor the resulting calculation were available or included in the record package, and that not all the forms were signed.

The NRC staff found that most test instruction sheets contain statements that "static head pressure for this test is within the \pm tolerance given for test pressure on Attachment A (Hydrotest Data Sheet) and that if the test is conducted within these tolerances then neither maximum or minimum pressures will be violated." The NRC staff reviewed the test instruction sheets and agreed that there was no information, as alleged, in the hydrotest package; however, the staff found that static head pressure was included in the hydrotest pressure, and concluded that determination of the static head pressure was not necessary and was only important to keep the hydrotest pressure within the tolerances specified. Thus, this part of the allegation has neither safety significance nor generic implications.

Third, it was alleged that gauge readings during the hydrostatic test were improperly recorded, because the gauges should not have read the same pressure due to the deviations found during calibration readings.

The NRC staff believes it was very possible for the same recorded readings to occur, because both gauges were parallel (side by side). EBASCO kept sufficient control on gauge calibration to assure that at least one gauge was operational during all tests. EBASCO NCR W3-6719 stated that both test gauges were documented as having the same pressure readings, and that these pressure readings were "usually the same suggested pressure listed at the top of the test data sheet."

The NRC staff determined that, at the start of each test, EBASCO calibrated the gauges and verified the results. At the completion of the test, a second calibration was made. When the posttest results were out of tolerance, the performance of that gauge was discarded. Also, only one operational gauge was needed to verify the hydrostatic test pressure. In all cases reviewed by the NRC staff, at least one value was within the tolerances required. Also, the NRC staff determined that any errors that might have occurred, such as loss of calibration, would have done so after the test, because EBASCO used needle valves to adjust the test pressure and to obtain close control of the exact test required. Thus, this part of the allegation has neither safety significance nor generic implications.

In assessing this allegation, the NRC staff also reviewed calculations and assumptions contained in the ESSE response to the EBASCO NCR, and found that the NCR was properly closed out. An interpretation by the ASME Code group which defined the method of calculating the hydrotest pressure negated the need for static head pressure calculations. The staff also reviewed Mercury hydrostatic test procedures and analyzed the validity of EBASCO's engineering calculations used in justifying the NCR closeout. The staff found the test procedures and calculations acceptable and in conformance with ASME Code requirements.

This allegation has neither safety significance nor generic implications.

[Potential Violations: None.]

Action Required: None.

References

1. Test Instruction Sheet.
2. Hydrostatic Test Data Sheet.
3. EBASCO Letter W3QA1RG-0705, August 4, 1983.
4. ASME Code Interpretation III-1-78-11, January 5, 1978.

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