

JAN 12 1983

MEMORANDUM FOR: Richard Soessard, Director
Division of Engineering &
Technical Programs
Region III, NRC

FROM: Darrell G. Eisenhut, Director
Division of Licensing, NRR

SUBJECT: STOPWATCHES CALIBRATION AND ASME REQUIREMENTS ON
TRANSIENTS ANALYSES

In your letter of September 7, 1982, you requested NRR assistance to evaluate the use of uncalibrated timing devices in safety-related applications and to clarify an apparent inconsistency between transient analyses and ASME requirements regarding valve closure times which are defined in the Technical Specifications. Our Reactor Systems Branch evaluated the main steam isolation valves (MSIV) closure, and its impact on minimum critical power ratio (MCPR) as determined in the FSAR analyses. Our Procedure and Test Review Branch provided the requirements for the stopwatches. This review was performed pursuant to TIA 82-58.

The ASME code allows rounding of measured closure times for MSIV's to the nearest 1.0 second or the use of a timing device with an accuracy of 1.0 second. This makes it possible for a measured closing time of 2.0 seconds to appear as 3.0 seconds which would satisfy the allowable technical specification value and the FSAR analyses.

We evaluated the impact of a 2.0 second closure time versus a 4.0 second closure time on vessel pressure and MCPR for the MSIV closure event. In the analysis, an MSIV position switch scram was assumed for the effect on MCPR and a high flux scram was assumed for the assessment of the effect on overpressure protection.

The results of these analyses indicate that for closure times of 2.0 seconds or greater, the impact on MCPR and vessel pressure is insignificant and will not challenge safety limits. For the limiting cases, vessel dome pressure was calculated to increase 170 psi and the MCPR was calculated to be four percent of the initial MCPR value. For a typical boiling water reactor operating at 1100 psig and an initial MCPR of 1.24, this results in a peak vessel pressure (bottom of pressure) of less than 1300 psig and a MCPR of 1.19. The respective safety limits are: pressure must be less than 1375 psig and MCPR must be greater than 1.06. On this basis, we conclude that the interpretation of the ASME code which allow as much as 1.0 second error in MSIV closure time is of no safety concern for plants with a technical specification minimum allowable MSIV closure time of 3.0 seconds or greater.

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With respect to the use of stopwatches for measurement of time intervals for validating operability of safety-related equipment, this method is acceptable where it can be shown that this method of measurement provides the required accuracy. Therefore, the results of the above analyses indicates that a 1.0 second total deviation on MSIV closure time is acceptable. The stopwatches must be calibrated and controlled as required by 10 CFR Part 50, Appendix B, Article XII, and the the required accuracy is determined from the technical specification bases. ANSI/ANS-58.4-1979, "American National Standard Criteria for Technical Specifications for Nuclear Power Plants," paragraph 5.1.(6) states:

"Errors, from instrumentation or other sources, assumed in the development of the technical specification limits shall be discussed in the bases to provide a clear relationship between the technical specification and the safety analysis values."

Our technical specification basis does not provide a discussion of measurement error, and the limit does not include an allowance for measurement error. It is necessary to include a measurement error allowance in the surveillance test acceptance criteria.

For the operator error component of the error associated with the use of stopwatches, we consider 200 milliseconds to be an acceptable assumption.

We trust that the information provided is responsive to your concern, and the NRR responsibilities under TIA No. R2-58 have been completed.

Original signed by:

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

cc: P. Starostacki, P-I
J. Nishinski, P-II
J. Gauffardo, P-IV
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XI-77-02

Interpretation: XI-77-02

Subject: Section XI, Division 1, Subsection IWV

Date Issued: February 18, 1977

File: BC-76-433

Question 1: The reactor coolant pressure boundary extends to the second valve. These are two check valves in series, two manual valves, two auto isolation valves, and the pressurizer pressure control valve backed up by a remote manual isolation valve. Is it the intention of IWV-3420 to measure leakage of each of these valves including the pressurizer pressure control valve and safety relief valves?

Reply 1: In accordance with Subarticles IWV-1100 and IWV-1300, all Code Classes 1, 2, and 3 valves as stated therein must be tested. The intent of the Code is to test all valves required to be in operational readiness.

Question 2: Reg. Guide 1.26, page 1.26-2 footnote implies that check valves on all influent lines do not have high leaktight integrity and that with additional valve with high leaktight integrity the line can be classified as group D. It is likely that RCPB check valve leakage will exceed leakages allowed in IWV-3420 Table I and may cause costly shutdown time for repairs. These valves are not isolatable from the primary coolant loops for testing or repair. Is it permissible to avoid testing these check valves and extend the RCPB to the next leaktight valve for category A leakage measurement?

Reply 2: Same as Reply 1.

Question 3: IWV-3420 allows testing using pressure differentials less than the functional pressure. Will you provide a formula that can be used to interpret the paragraph?

Reply 3: In accordance with paragraph IWV-3420(c)(5), the adjusted leakage equals observed leakage times $(\text{function pressure over test pressure})^{1/2}$.

Question 4: Is it the intent of Section XI to include all containment isolation valves or only those lines Classed 2 or 3 that extend beyond the containment boundary?

Reply 4: Same as Reply 1.

Question 5: If containment boundary valves are tested according to Appendix J, is it the intent to also test these valves in accordance with Section XI?

Reply 5: Yes. Specific permissible leakage rates for individual valves are required to be determined by the plant owner in accordance with IWV-3420(f).

Question 6: Does Section XI accept reasons, such as high temperatures, airborne activity, lack of complete visibility of masks, and lack of oxygen, for not performing tests on valves inside containment during operation if it is necessary to enter in order to perform the test?

Reply 6: No.

Question 7:

(a) Does a manual valve used for containment boundary fall into Category A and require leak testing?

(b) Does a check valve on the discharge of a pump require functional testing?

- (c) Can sample line (~ 3/8 in.) remote operated valves be excluded?
- (d) Can test lines with remote operated valves be excluded since they are not directly related to operation?

Reply 7: Same as Reply 1.

Question 8: Since specific maximum leakage for individual valves are not listed in technical specifications should they be disregarded altogether? If not please provide examples.

Reply 8: Specific individual leak rates shall not be disregarded. Specific permissible leakage rates for individual valves are required to be determined by the plant owner in accordance with IWV-3420(f).

Question 9: Does IWP include turbine driven auxiliary feedwater pumps or only motor driven pumps?

Reply 9: Determination of whether turbine driven auxiliary feedwater pumps is included in the scope of IWP is contained in the words of IWP-1100, "... are provided with an emergency power source." The type of driver is not a consideration.

Interpretation: XI-77-04

Subject: Section XI, Division 1, Article IWP-4000

Date Issued: March 21, 1977

File: BC-76-669

Question: What kind of instrumentation should be procured and used by the owner of the power plant in order to conduct the periodic inservice testing of pumps to measure the differential pressure and bearing temperature?

Reply: Instruments that satisfy the requirements of Article IWP-4000 may be used to measure differential pressure and bearing temperature.

Interpretation: XI-1-79-18

Subject: Section XI, Division 1, Testing Inaccessible Valves, IWV-3300

Date Issued: December 12, 1979

File: BC-79-130

Question: Is it the intent of Section XI, Division 1 to require that those valves which are accessible be directly observed at each valve exercising to confirm that remote valve indications accurately reflect valve operations?

Reply: It is the intent of Section XI, Division 1 to require that all valves, accessible and inaccessible, that have remote valve indicators be visually checked at least once every 2 years to verify that remote valve indications accurately reflect valve operation.

XI-1-79-19, XI-1-79-20

Interpretation: XI-1-79-19

Subject: Section XI, Division 1, Operability Limits of Pumps, IWP-3210

Date Issued: December 12, 1979

File: BC-79-150

Question: IWP-3210 of the 1977 Edition of Section XI, Division 1 states that "In the event these ranges (specified in Table IWP-3100-2 for the differential pressure across pump) can not be met, the Owner shall specify in the pump record the reduced range limits to allow the pump to fulfill its function in lieu of the ranges given in Table IWP-3100-2".

Do the Alert Ranges specified in Table IWP-3100-2 refer to pump test data that falls outside the specified range, or does it refer to a system analysis which may indicate that the required Action Range be less restrictive than those ranges specified in the Table?

Reply: IWP-3210 refers to Table IWP-3100-2 which specifies three ranges – Acceptable Range, Allowable Range, and Required Action Range. The limits within each of these ranges refers to the pump and not to the system, that is, the ranges are for the pump test data. If these ranges cannot be met, the Owner can specify new range limits (e.g., from a range of 0.93 to 1.02 to a range of 0.89 to 1.03 for ΔP). Using the less conservative ranges the Owner shall show that the overall pump performance has not degraded from its intended function.

Interpretation: XI-81-01

Subject: Section XI, Division 1, IWV-2200(a) Categorization of Containment Isolation Valves

Date Issued: April 17, 1981

File: BC-81-9

Question: Is it the intent of Section XI, Division 1 that Category A as defined in IWV-2200(a), 1977 Edition, Summer 1978 Addenda, applies to containment isolation valves only, or is this definition intended to be applied to pressure isolation valves?

Reply: IWV-2200(a) defines Category A valves. The definition applies to the use of the valve by the Owner, not the type of valve involved. If an Owner requires that containment isolation valve leakage is to be limited to a specific amount, then by definition, containment isolation valves would be classified as Category A. This would also apply to pressure isolation valves, if the Owner specifies a specific limit to the amount of leakage of that valve.