UNITED STATES
NUCLEAR REGULATORY COMMISSION
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May 8, 2000

MEMORANDUM TO: Geoffrey E. Grant, Director
Division of Reactor Projects
Region III

FROM: Jon R. Johnson
Associate Director for Inspection and Programs
Office of Nuclear Reactor Regulation

SUBJECT: CLOSEOUT OF TASK INTERFACE AGREEMENT 99-029, KEWAUNEE TESTING OF PRESSURE ISOLATION VALVES PRIOR TO REACHING COLD SHUTDOWN MODE (TAC NO. MA6907)

INTRODUCTION:

The Office of Nuclear Reactor Regulation (NRR) staff has reviewed your request for technical assistance, dated October 22, 1999, pertaining to the adequacy of testing pressure isolation valves prior to reaching cold shutdown mode. Specifically, Region III sought to determine if the licensee's technical specification (TS) interpretation (TSI) regarding pressure isolation valves is acceptable. The licensee's TSI concludes that testing of pressure isolation valves can be performed prior to reaching COLD SHUTDOWN mode for a refueling outage. Region III, in the October 22, 1999 TIA, stated that it disagrees with the licensee's interpretation and believes that the licensee is in non-compliance with the TS requirements in that testing is required after reaching COLD SHUTDOWN mode.

DESCRIPTION OF THE ISSUE:

On or about 10/20/99, during a review of Kewaunee's Updated Safety Analysis Report (USAR), the licensee discovered that a past practice in testing a check valve may not have met the literal requirements of the TS. Past practice has been to leak test pressure isolation check valve SI-22B prior to reaching cold shutdown for each refueling outage while TS 4.2.a.3.a states the following:

Surveillance testing of pressure isolation valves:

Periodic leakage testing on each valve listed in Table TS 3.1-2 shall be accomplished prior to entering the OPERATING mode after every time the plant is placed in the COLD SHUTDOWN condition for refueling, after each time the plant is placed in a COLD SHUTDOWN condition for 72 hours if testing has not been accomplished in the preceding 9 months, and prior to returning the valve to service after maintenance, repair, or replacement work is performed.

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TS Table 3.1-2 identifies five valves which serve as reactor coolant system pressure isolation valves: SI-303A/B, SI-304A/B, and SI-22B (all are swing-type check valves).

The licensee initially declared the component inoperable based on the conjecture that the component may not have met the literal requirements of the TS. In accordance with TS 4.0.c, the action statement for SI-22B can be delayed up to 24 hours to perform the surveillance. During this 24-hour period, the licensee pursued three-concurrent paths for resolution: 1) TS interpretation to clarify TS 4.2.a.3.a; 2) development of a procedure to test the valve on line; and 3) prepare a Notice of Enforcement Discretion (NOED) request for an one-time exemption from TS 4.2.a.3.a.

On 10/21/99, the licensee provided its interpretation of TS 4.2.a.3.a which concluded that the TS does not specifically require a test at a particular plant mode (i.e., cold shutdown). This interpretation, the licensee argued, is supported by the TS qualification that if testing the check valves had been accomplished within the preceding 9 months, no testing is required.

BACKGROUND:

The subject TS 4.2.a.3.a was issued in an Order to the licensee dated April 20, 1981, which modified the Kewaunee TS to require periodic testing of five reactor coolant system pressure isolation valves. The purpose for the surveillance requirements was to address concerns regarding WASH-1400 Event V valve configurations at Kewaunee. The concern was the high/low pressure system boundaries for potential intersystem loss-of-coolant accident (LOCA). Similar Orders were issued to all pressurized-water reactors (PWRs) with WASH-1400 Event V configurations.

The WASH-1400 study had identified that certain isolation valve configurations in systems connecting the high-pressure primary coolant system to lower-pressure systems extending outside containment are potentially significant contributors to an intersystem LOCA. Such configurations have been found to represent a significant factor in the risk computed for core melt accidents. The sequence of events leading to the core melt is initiated by the concurrent failure of two in-series check valves to function as a pressure isolation barrier between the high-pressure and a low-pressure system extending beyond containment. This failure can cause an overpressurization and rupture of the low-pressure system, resulting in a LOCA that bypasses containment.

The staff's concern had been exacerbated due not only to the large number of plants which have an Event V configuration(s) but also because of unsatisfactory operating experiences up to early 1980. For example, at Davis Besse, a pressure isolation check valve in the low-pressure injection system (LPIS) failed and the ensuing investigation found that valve internals had become disassembled. At Sequoyah, two residual heat removal (RHR) injection check valves and one RHR recirculation check valve failed because valves jammed open against valve over-travel limiters. It was, therefore, determined that the probability of gross failure of these check valves as a pressure isolation barrier can be significantly reduced if each valve is periodically inspected by leakage testing.

EVALUATION:

In response to this TIA, the NRR staff focused its review on: 1) the intent of the TS 4.2.a.3.a; 2) potential technical concerns with testing prior to reaching COLD SHUTDOWN mode; and 3) interpretation of TS 4.2.a.3.a.

While evaluating TS 4.2.a.3.a as a complete LCO, we realized that there are several focal points at which one could generalize a plausible TSI. With this in mind, the staff took a top down approach in that we would determine the overall intent of this entire TS and how it links to other supporting documentation.

The Order (as mentioned above) which was issued to the licensee included a Safety Evaluation Report (SER) and an associated Franklin Technical Evaluation Report (TER). The TER documented the technical basis for the required TS operability and surveillance requirements for pressure isolation valves. This TER states in Section 2.2.1 that periodic hydrostatic testing of each check valve shall be accomplished "each time any check valve may have been moved from the fully closed position." In addition, the Standard Technical Specification (STS) NUREG-1431, Revision 1, requires specifically that periodic testing of the reactor coolant system pressure isolation valve (PIV) shall be tested every time the valve is cycled.

The NRR staff evaluated each of the three individual parts of the TS as to how they relate to the above mentioned Franklin TER and STS. The first line of TS 4.2.a.3.a states "Periodic leakage testing on each valve listed in Table TS 3.1-2 shall be accomplished prior to entering the OPERATING mode after every time the plant is placed in the COLD SHUTDOWN condition for refueling." At first glance, one might infer that because of the term "after," this passage would require the licensee to test the PIV after it is cycled which is clearly the intent of the surveillance requirement. This supposition is not necessarily true as illustrated by the following examples.

In the first scenario, the plant is assumed to be in the cold shutdown condition and the RHR line-up is in place. In this example the licensee then has determined that they have completed the outage and are making preparations to go to the OPERATING mode. As they ascend to the OPERATING mode, they perform the surveillance. At this point, the above inference of testing the valve after cycling is met. Let's assume however, that for whatever reason, power ascension is suspended and the plant returns to RHR conditions at which point the PIVs are cycled. According to TS 4.2.a.3.a, no further testing for the PIVs are required and the plant could be allowed to return to the OPERATING mode without testing the PIVs. The literal compliance to the term "after" has been met, but not the intent of testing the PIV after cycling as stated in the TER or the STS.

Our second example also assumes that the plant is to be in COLD SHUTDOWN for refueling. Again, for whatever reason, after the plant reaches the point to where reactor coolant system (RCS) Tave $\leq$ 200 °F the licensee decides to ascend to a power and pressure level acceptable to perform the surveillance requirement. They perform the surveillance and return to the RHR line up, at which point the PIVs are then cycled. According to TS 4.2.a.3.a, no further testing for the PIVs are required and the plant can be returned to power operations. The literal compliance to the term "after" has been met, but not the intent of testing the PIV after cycling as

stated in the TER or the STS. Although these examples would not necessarily be practical or economical to the licensee, they are indeed realistic and possible.

The second line of TS 4.2.a.3.a states "after each time the plant is placed in a COLD SHUTDOWN condition for 72 hours if testing has not been accomplished in the preceding nine months." This passage allows cycling of the PIV as long as the testing has occurred within the preceding nine months. The third line of TS 4.2.a.3.a states "and prior to returning the valve to service after maintenance, repair, or replacement work is performed." This passage also does not include testing the PIV after cycling as mentioned in the TER and STS. All of these examples demonstrate that although we can infer that the TS would require the licensee to do the surveillance requirement after the PIV is cycled, the TS as a whole clearly does not mandate this requirement. This presentation of the linkage between the TS and the supporting documentation is offered to demonstrate that various readers of this TS and supporting documentation could focus on certain areas to support multiple opinions.

In an attempt to better understand the intent of TS 4.2.a.3.a, we have consulted the subject matter experts from the Office of Research and Idaho National Laboratory, and reviewed pertinent background information including, among others, WASH-1400, Franklin TER, and NUREG-0677, "The Probability of Intersystem LOCA: Impact Due to Leak Testing and Operational Changes," dated March 1980. Based on this review, we believe that the intent of TS 4.2.a.3.a was to establish the test frequency (i.e., at least once per cycle, once per nine months (or twice per cycle), or each time the valves are cycled) to reduce the probability of intersystem LOCA. The intent of TS 4.2.a.3.a as documented in the Order package, as well as the Westinghouse Standard TS (NUREG-1431, Revision 1) clearly requires testing after the valve is cycled.

We have concluded that the licensee was not in compliance with their TS because they were not in conformance with the requirements of the first clause. However, the licensee's different interpretation of this requirement was in part due to the different requirement in the second clause as noted by the licensee in their interpretation. The overall TS requirements could be made more clear and neither interpretation meets the STS. Therefore, for licensees which have not adopted the wording of the improved Standard Technical Specifications, revision of the TS is preferred.

To determine whether or not the issue raised in the TIA is an isolated case, we have surveyed all PWR project managers on his/her plant's TS requirement and their licensee's surveillance practices. The survey results indicate that D.C. Cook and Fort Calhoun conduct their surveillance on the RCS pressure isolation valves prior to reaching the cold shutdown condition. However, the TSs for both D.C. Cook and Fort Calhoun are worded such that conducting the surveillance prior to reaching cold shutdown is allowed.

Given the potential lack of clarity of the requirement, enforcement action in this case is not warranted for past noncompliance. Discretion should be exercised consistent with Section VII.B.6 of the Enforcement Policy for this case. Consistent with the Policy, prior approval from the Office of Enforcement is required for implementation of VII.B.6 discretion.

Docket No. 50-305

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