

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NEW REACTORS
WASHINGTON, DC 20555-0001

February 26, 2018

NRC INFORMATION NOTICE 2018-03: OPERATING EXPERIENCE REGARDING
FAILURE TO MEET TECHNICAL
SPECIFICATIONS REQUIREMENTS FOR
CHANGING PLANT CONDITIONS

ADDRESSEES

All holders of an operating license or construction permit for a nuclear power reactor under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," except those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of an operating license for a nonpower reactor (research reactor, test reactor, or critical assembly) under 10 CFR Part 50, except those that have permanently ceased operations.

All holders of and applicants for a combined license under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of several recent events in which operators failed to ensure that the requirements of the plant technical specifications (TS) were met as the plant conditions changed. The NRC expects recipients to review the information for applicability to their facilities and to consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

Watts Bar Nuclear Plant, Unit 1

On October 22, 2015, the operating crew at the Watts Bar Nuclear Plant, Unit 1 (Watts Bar) determined that both source range (SR) level trip channels (N-31 and N-32) were in the bypass position with the reactor at 27-percent rated thermal power (RTP). The SR level trip switches were left in bypass, outside of their required configuration, thereby removing a trip function required by the TS during rod withdrawal. An incident prompt investigation led by Tennessee Valley Authority (the licensee) determined that the SR trip functions were inoperable from the time the reactor trip breakers (RTBs) were closed in Mode 3 on October 19, 2015, until reactor power exceeded the P-6 permissive interlock (1.66×10^{-4} percent RTP) on October 21, 2015.

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TS 3.3.1, "Reactor Trip System Instrumentation," requires these SR trip functions to be operable with the RTBs closed in Modes 5, 4, 3, and 2 until reactor power exceeds the P-6 (the SR block permissive) interlock. On October 21, 2015, at 0346 Eastern Daylight Time, the plant entered Mode 2 with both SR level trip channels inoperable. This was a mode change violation in accordance with limiting condition for operation (LCO) 3.0.4. Under these conditions, TS 3.3.1, Required Actions 4.1, 1.1 and J.1, required that the operators take immediate actions to suspend operations involving positive reactivity additions and open the RTBs. Two lit annunciators on the main control board indicated the bypass condition, but the operators did not take immediate action to open the RTB because they did not notice that the SR level trip channels were bypassed. In addition, operators failed to note the lit annunciators during shift turnovers and board walkdowns from October 19 through October 22, 2015, and during completion of the mode change checklist board walkdown on October 20, 2015, to transition from Mode 3 to Mode 2. By the time the operators recognized the improper configuration, reactor power was above the P-6 permissive interlock, and the SR trip functions were no longer a TS requirement.

The licensee identified that the operators failed to identify a bypassed safety function during reactor testing and start-up due to inadequate tracking and validation of essential information. Inadequate operating procedures used to control SR level trip switches prior to core reload were identified as a contributing cause that led to this event. Specifically, on October 7, 2015, before core reload, the SR level trips had been placed in bypass, in accordance with the licensee's procedure for power escalation testing to avoid spurious trips and alarms during the core reload process. On October 9, 2015, core reload was completed, at which point the switches should have been returned to the normal position. However, a revision to the procedure for power escalation testing back in July 2013 had inadvertently omitted the step to return the switches to normal. This issue was entered into the licensee's corrective action program.

Further details appear in Watts Bar Licensee Event Report 05000390/2015-006-00, dated December 21, 2015, and in NRC Integrated Inspection Report 05000390, 05000391/2015004, dated February 12, 2016. These documents are available on the NRC's public Web site under Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML15355A525 and ML16043A214, respectively.

Davis-Besse Nuclear Power Station, Unit 1

On May 10, 2016, at approximately 0528 hours, the Davis-Besse Nuclear Power Station (Davis-Besse) was at approximately 53 percent power and was increasing power following a refueling outage. During a walkdown of control room indications, a Davis-Besse senior manager determined that all four anticipatory reactor trip system (ARTS) instrumentation channels were in bypass. The ARTS initiates a reactor trip following a turbine trip or loss of both main feed pumps in order to reduce the magnitude of pressure and temperature transients on the reactor coolant system and lower the probability of a pressurizer pilot-operated relief valve actuation during these events.

The turbine trip function trips the reactor when the main turbine is lost at high power levels in anticipation of the associated loss of heat sink. TS 3.3.16, "Anticipatory Reactor Trip System Instrumentation," requires the ARTS turbine trip function to be in normal when the plant is operating above 45 percent power. As with the Watts Bar event discussed above, the ARTS channels had been placed in bypass to support work during a refueling outage; however, the procedure did not address the need to restore the system to a normal state upon completion of the work.

FirstEnergy Nuclear Operating Company (the licensee) investigated this event and determined that multiple operators were aware that the ARTS was in bypass. Other operators were aware that the annunciator alarm for the ARTS in bypass was lit and that it remained lit after the main feed pump trip input for the ARTS was taken from bypass to normal during the startup. All of the operators involved assumed that the startup procedure would direct the system to be placed in normal. In fact, the applicable procedures required an operator to verify that the system was returned to normal before the reactor reaches 40 percent power. However, the operator on shift at that time misinterpreted the requirement as not applicable because the reactor had not yet reached 40 percent power.

The licensee determined that the operators failed to work together effectively as a team to ensure that the ARTS was operable before the plant entered the mode of applicability during startup. The system was placed in normal upon discovery at 53 percent power to restore operability. This issue was entered into the licensee's corrective action program.

Further details on this event appear in Davis-Besse Licensee Event Report 05000346/2016-005-00, dated July 11, 2016 (ADAMS Accession No. ML16194A343), and in NRC Integrated Inspection Report 05000346/2016003, dated November 4, 2016 (ADAMS Accession No. ML16309A098).

Grand Gulf Nuclear Station, Unit 1

On September 8, 2016, Entergy Operations, Inc. (the licensee), manually shut down the Grand Gulf Nuclear Station (Grand Gulf, Unit 1) reactor to replace pump A of the residual heat removal (RHR) system after a failed TS surveillance. Grand Gulf TS 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System—Cold Shutdown," requires two trains of RHR to be operable when the reactor is shut down. With the A train of the RHR system inoperable for the pump replacement, the TS requires verification that an alternate method of decay heat removal is available. This action must be completed within 1 hour of one RHR pump being taken out of service and once every 24 hours thereafter while the plant is in Mode 4. To meet this requirement, the licensee placed the alternate decay heat removal (ADHR) system in standby after the plant reached Mode 4 on September 9, 2016, and verified its availability daily until the A train of the RHR system was restored to operability on September 23, 2016.

Following replacement of the A RHR system pump and while attempting to place the ADHR system in operation, licensee personnel identified that the ADHR system had not actually been available as an alternate method of decay heat removal. Since August 10, 2016, the ADHR heat exchanger tube-side cooling water system had been clearance tagged as closed to support cleaning of the heat exchanger tubes. The licensee's daily verification of the availability of the ADHR system in accordance with the TS action statement had been administrative in nature. The licensee did not require a physical walkdown of the ADHR system to verify its availability.

In addition, although the operators verified that no clearance tagouts were impacting the ADHR system, they failed to consider that a clearance tagout on the plant service water system could also affect the availability of the ADHR system. The licensee determined that when the work requiring the tagout had been completed on August 10, 2016, the "work complete" box had never been checked; therefore, the tags were left hanging. The licensee's procedure for placing the ADHR system in standby did not specify that the plant service water isolation valves for the ADHR heat exchanger needed to be open. This issue was entered into the licensee's corrective action program.

Additional information appears in the Grand Gulf Licensee Event Report 05000416/2016-008-01, dated August 16, 2017 (ADAMS Accession No. ML17228A233), and in NRC Special Inspection Report 05000416/2016008, dated October 27, 2017 (ADAMS Accession No. ML17303B200).

DISCUSSION

As specified in 10 CFR 50.36, "Technical specifications," plant TS are derived from the analysis and evaluation included in the plant safety analysis report and constitute a part of the license authorizing operation of each reactor plant. Each LCO in the TS lists the mode(s) of applicability for that condition and the actions to be taken if the conditions are not met. In each event summarized above, the licensees took systems out of service for activities while the plants were in a mode that did not require the systems. In doing so, the licensees failed to ensure that the systems were restored to operable when required by TS LCOs.

Multiple administrative practices, including maintenance tracking systems, operating procedures, operational checklists, and operator walkdowns, aid operators in maintaining an understanding of the configuration of plant systems to ensure TS operability before entering a mode of applicability that requires a system. In each case discussed in this IN, these practices failed to accomplish their intended function when procedures were incomplete or misunderstood and when plant personnel failed to effectively and aggressively communicate concerns about unexpected tags, alarms, or indications. Industry operating experience has shown that best practices, such as noting "conditional LCOs" when taking equipment out of service that is required in another mode, "caution-tagging" equipment in an abnormal alignment, and issuing "return-to-service" checklists to ensure that systems are returned to their expected condition when work is complete, provide additional barriers to configuration control issues and noncompliance with TS operability requirements. When followed appropriately, these practices may significantly reduce the potential for TS violations.

CONTACT

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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Note: NRC generic communications may be found on the NRC public Web site, <http://www.nrc.gov>, under NRC Library.

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*via email

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