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NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NEW REACTORS
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June 13, 2018

NRC INFORMATION NOTICE 2018-08: FAILURE TO ENTER THE REQUIRED TECHNICAL SPECIFICATIONS ACTION STATEMENT FOR OPERATION DURING RECENT SURVEILLANCE TESTING WHILE USING A REACTOR PROTECTION SYSTEM TEST BOX

ADDRESSEES

All holders of operating licenses or construction permits for nuclear power reactors under the provisions of 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 vessels.

All holders of or applicants for an early site permit, standard design certification, standard design approval, manufacturing license, or combined license issued 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 recent instances where operators of boiling water reactors (BWRs) allowed multiple instrument channels in the reactor protection system (RPS) circuitry to be bypassed without entering the appropriate action statement required by the licensee's technical specifications (TS). These conditions existed during the periodic surveillance testing of main steam isolation valve (MSIV) and turbine stop valve (TSV) logic while using an RPS test box.

The NRC expects recipients to review the information and to consider actions, as appropriate, to avoid similar problems. Suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

BACKGROUND

Most BWR RPS designs have four trip logics (A1, A2, B1, and B2) and two RPS trip systems, A and B. Each trip logic in the two RPS trip systems is capable of producing a half scram signal when the required number of sensors detect a condition exceeding pre-established setpoints. Either automatic trip logic, A1 or A2, would cause a trip signal in trip system A. A trip condition in trip system A would de-energize all of the A scram solenoid valves for each and every control rod resulting in what is referred to as a half scram. Likewise, trip logic B1 or B2 being in a trip condition will cause a half scram from trip system B. If both trip systems are in a trip status, a full scram is initiated. This type of logic arrangement that satisfies a full scram is called "one-out-of-two taken twice."

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During typical RPS periodic surveillance testing, one trip logic is placed in test in order to conduct the required TS channel functional test for the RPS function. Placing a trip logic in test in either of the two RPS trip systems generates a half scram, leaving the other RPS trip system available to complete the logic for a full scram. While this arrangement is conservative from a system function perspective, it also increases the likelihood of a full scram during the surveillance activity.

In 2008, the BWR Owner's Group began an initiative to reduce the number of preventable scrams caused during surveillance testing and other activities. One recommendation resulting from this initiative was the use of an RPS test box to prevent the generation of a half scram during RPS testing. The RPS test box is used in a similar fashion as an electrical jumper, but is designed to allow monitoring of contact state while maintaining electrical continuity across the contact being tested. This configuration thus prevents the generation of a half-scram signal when a contact or contacts are opened (de-energized) during surveillance testing.

Many RPS scram functions consist of contacts arranged in series for each trip logic. However, the MSIV closure function senses the position of two main steam lines (MSLs) on each trip logic, and the TSV closure function senses the position of two TSVs on each trip logic, with the channel output contacts in each trip logic arranged in parallel. Therefore, placing the RPS test box across the MSL or TSV contacts in a parallel circuit bypasses both contacts and impacts the inputs from MSIV/TSVs closure channels in two MSLs.

DESCRIPTION OF CIRCUMSTANCES

Fermi, Unit 2

In 2016, DTE Electric Company (the licensee) revised the RPS logic MSIV/TSV surveillance to allow the use of an RPS test box in order to prevent insertion of a half scram when testing a logic channel.

The licensee failed to recognize that the use of the RPS test box would bypass multiple instrument channels, rather than one channel, and require entry into the appropriate TS conditions during RPS logic testing for MSIV and TSVs. Therefore, in September 2016, during at-power periodic surveillance testing of the RPS instrumentation for its MSIVs, the licensee bypassed multiple contacts in a parallel logic string and inadvertently defeated the scram function associated with certain MSIV closure combinations. Similarly, the licensee also inadvertently defeated the scram function during TSV logic testing since TSV contacts were also arranged in parallel. In both instances, the licensee did not recognize the applicability of Conditions "A" ("One or more required channels inoperable") and "C" ("One or more Functions with RPS trip capability not maintained") of TS 3.3.1.1, "Reactor Protection System (RPS) Instrumentation." On January 6, 2017, the licensee identified the error and subsequently revised their testing procedures for MSIV and TSV testing to discontinue the use of the RPS test box until they can identify lessons learned and implement a future application of the RPS logic test box.

Further details on this event appear in the Fermi 2 Licensee Event Report (LER) 201700100, dated March 6, 2017, and in NRC Inspection Report 05000341/2017002, dated August 9, 2017. These documents are available on the NRC's public website under Agencywide Documents Access and Management System (ADAMS) Accession Nos. [ML17065A226](#) and [ML17221A215](#), respectively.

Oyster Creek Nuclear Generating Station

On August 31, 2017, Exelon Generation Company, LLC (the licensee) performed a review of industry operating experience from Fermi, Unit 2 (LER 201700100 under ADAMS Accession No [ML17065A226](#)). During their review, the licensee determined that the prior use of an RPS test box at Oyster Creek during periodic surveillance testing (associated with the turbine trip RPS trip function) resulted in bypassing multiple contacts in parallel circuits. The use of the RPS test box rendered two of four instrument channels for the turbine trip function inoperable.

In 2013, the licensee revised their surveillance procedures for RPS logic testing to implement the use of an RPS test box in order to minimize unwanted scrams that may occur. However, the licensee did not recognize that use of the RPS test box during testing of the turbine trip function would not satisfy the requirements of the TS limiting condition for operation. Specifically, Table 3.1.1, Function 11, turbine trip scram, in the licensee's TS, specifies that the minimum number of instrument channels needed to remain operable (four channels), and with fewer than that number, various TS actions statements are applicable. With the RPS test box installed, two of the four required turbine trip scram inputs were bypassed. Technical Specifications Table 3.1.1, note (nn) requires the licensee to verify within one hour that the remaining channels were operable. The action to verify sufficient channels remained operable was not completed within one hour, and therefore, a violation of TS occurred. The ability to initiate a full scram due to TSV closures among valve combinations (TSV closures in 3 of 4 different steam lines) when the RPS test box is installed was not inhibited since the other trip system within the RPS protection logic was unaffected.

Further details on this event appear in the Oyster Creek LER 201700400, dated October 27, 2017 (ADAMS Accession Number [ML17306A068](#)) and in their revised LER 201700401 (ADAMS Accession Number [ML18046A076](#)), dated February 16, 2018.

DISCUSSION

For some RPS trip functions, the use of an RPS test box during periodic surveillance testing results in bypassing multiple instrument channel's output contacts and creates a configuration in which one or more TS conditions and associated required actions may apply. For typical BWR RPS designs with four MSLs, the logic for the MSIV closure function is arranged such that either the inboard or the outboard valve on three or more of the MSLs must close in order for a scram to occur. Similarly, the logic for the TSV closure function is arranged such that three or more TSVs must be closed to produce a scram. Thus, maintaining the MSIV/TSV scram functions requires both trip systems to have two trip logics associated with MSIVs and TSVs operable or in trip.

In cases where a trip logic includes two or more channel output contacts that are in parallel, bypassing these contacts results in the instrument channel inputs for two of the four MSLs being inoperable, thus creating a situation where the associated function is not capable of maintaining trip scram capability for all postulated combinations of valve closures, and appropriate TS conditions and associated required actions must be met. While closure of certain combinations of MSIVs or TSVs would still initiate a full scram, the ability of both trip systems to generate a scram signal from the affected functions on a valid signal was not maintained for all combinations of MSIV or TSV closures.

CONTACTS

Please direct any questions about this matter to the technical contact listed below,

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OFFICE	NRR/DIRS/IOEB/TL*	QTE*	NRR/DSS/STSB/TL*	NRR/DE/EICB/TL*	NRR/DE/EICB/BC*	NRR/DIRS/IOEB/BC*
NAME	JThompson	KAzariah-Kribbs	MChernoff	RStattel	MWaters	RElliott
DATE	4/10/18	01/22/18	4/11/18	4/12/18	4 /12/18	4/13/18
OFFICE	NRR/DSS/STSB/BC*	NRO/DCIP/QVIB-1/BC*	NRR/DE/D*	NRR/DSS/D*	NRR/DIRS/IRGB/PM*	NRR/DIRS/IRGB/LA
NAME	VCusumano	TJackson (KKavanagh for)	EBenner	MGavrilas	TMensah	ELee
DATE	4/12/18	4/13/18	4/19/18	4/25/18	4/25/18	4/25/18
OFFICE	NRR/DIRS/IRGB/BC	NRO/DCIP/D	NRR/DIRS/D			
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