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NL-17-122

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U.S. Nuclear Regulatory Commission
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Subject: **10 CFR 50.59(d)(2) Summary Report for Indian Point Unit No. 3 March 26, 2015 to May 18,2017**
Indian Point Nuclear Generating Unit 3
Docket No. 50-286
License No. DPR-64

Dear Sir or Madam:

Pursuant to 10 CFR 50.59(d)(2), Entergy Nuclear Operations, Inc. (Entergy) herein submits in the Attachment a 50.59 summary report of the changes, tests and experiments implemented at Indian Point Unit No. 3 between March 26, 2015 and May 18, 2017, and/or utilized in support of the UFSAR update. The 50.59 Evaluations set forth in the report represent the changes in the facilities, changes in procedures, or tests and experiments implemented pursuant to 10 CFR 50.59.

There are no new commitments made by Entergy contained in this submittal. If you have any questions or require additional information, please contact Mr. Robert Walpole, Regulatory Assurance Manager at (914) 254-6710.

Sincerely,

AJV/gd

Attachment – 50.59(d)(2) Summary Report of Changes, Tests and Experiments

cc: Mr. Daniel H. Dorman, Regional Administrator, NRC Region I
Mr. Richard Guzman, Sr. Project Manager, NRC NRR DORL
Ms. Bridget Frymire, New York State Dept. of Public Service
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ATTACHMENT

TO

NL-17-122

50.59(d)(2) Summary Report of
Changes, Tests, and Experiments

Entergy Nuclear Operations, Inc.
Indian Point Unit 3
Docket No. 50-286
License No. DPR-64

50.59(d)(2) Summary Report of Changes, Tests and Experiments

50.59 Evaluation No.	Rev. No	TITLE
16-2001-00-EVAL	0	Temporary Modification to crab in the failed 15-B Relay

Brief Description of the Change, Test or Experiment:

While performing 3-PT-M13B1 (Reactor Protection Logic Channel Functional Test) at 100% power, relay 15-B was found to be in the de-energized state when it should have been energized. Relays 15-B and 16-B are used to block the Low Power Range High Flux Reactor Trip on the "B" train of reactor protection and are normally energized when reactor thermal power (RTP) is above P-10 (approximately 10% power). A mechanical device was installed on relay 15-B as an emergency temp mod per CR-IP3-2016-00665 in order alleviate the threat to unit reliability since relay 16-B, which is the same age as the failed 15-B relay, effectively became a single point of vulnerability. With relay 15-B mechanically latched in the energized state, the automatic re-instatement (or unblock) of the Power Range Low Setting High Flux reactor trip when power goes below P-10 is not functional for train B of reactor protection. Standing Order 16-04/ TPC to 3-POP-3.1 was established by Operations which states, "Prior to operating the plant in Mode 1 with power below P-10, or in Mode 2, the relay block on relay 15-B should be removed." A temporary procedure change (TPC) to procedure 3-POP-3.1 provides guidance for removing the blocking device during plant shutdown. The issue being evaluated is the acceptability of relying on a manual action (operator removal of the relay block when required) in lieu of having the automatic relay actuation function available.

Summary of the 10 CFR 50.59 Evaluation

The Nuclear Instrumentation System (NIS) power range detectors are located external to the reactor vessel and measure reactor power through relative neutron leakage from the core. The Low Power Range High Flux Reactor Trip provides reactor protection against a positive reactivity excursion from low power or subcritical conditions in Mode 1 with power below P-10 and also in Mode 2. There are reactor protection interlocks to ensure reactor trips are in the correct configuration for the current unit status. During plant startup and power ascension the Power Range Neutron Flux (P-10) interlock is actuated at approximately 10% power to block the Low Power Range High Flux Reactor Trip. If power level falls below 10% reactor thermal power, the Low Power Range High Flux Reactor Trip is automatically reinstated. This modification will allow a manually installed mechanical locking device to hold the failed open relay in a closed position above the P-10 setpoint; the locking device will be manually removed before going below the P-10 setpoint.

The actuation and removal of the Power Range Neutron Flux-Low Trip block at the P-10 setpoint (above 10% power) is designed to be an automatic function of the Reactor Protection System. The institution of a Standing Order/TPC to 3-POP-3.1 to remove the relay mechanical device is a substitution of a manual action for an automatic action. In accordance with the guidance in the NEI 10CFR50.59 Resource Manual, the substitution of manually installing and removing the relay block in place of the automatic action of relay 15-B, would not create more than a minimal increase in the likelihood or consequences of an accident or malfunction because:

- The action is contained in Standing Order 16-04/ TPC to 3-POP-3.1 and the operators are trained to comply with and implement standing orders and procedures.

- The completion time is not critical as long as it is performed either prior to power reduction below 10% power or prior to reactor startup (entry into Mode 2).

- The substitution of manually installing and removing the relay block in place of the automatic action under Standing Order/ TPC to 3-POP-3.1 introduces the possibility that the operator could miss removing the block as required when needed (although this is unlikely since the implementation of the standing order/TPC to 3-POP-3.1 requires double verification). However, if this should occur, Technical Specifications table 3.3.1-1 Item17d requires entry into condition M with one or more P-10 channels inoperable. Since RPS Logic Train B P-10 is currently inoperable, operators will be required to "verify that interlock is in required state for existing unit conditions" within 1 hour. If the block is left in it would need to be removed or the plant would be required to go to Mode 3 within 7 hours. There is a redundant trip channel which still remains functional. Therefore, there is an already established backup action and adequate time, per Technical Specifications, to recover from an operator failing to remove the block.

- Since the installation of the block, combined with the operator action to remove it when required, does not change the function of the system, there is no effect on the function of the Reactor Protection System. This change has no effect on other plant systems.

- The actual action of installing or removing the mechanical locking device does not create a trip risk. The design of the locking device, the steps involved, the training/expertise of the operators, and the physical arrangement of affected components preclude creation of a credible trip risk.

50.59 Evaluation No.	Rev. No	TITLE
16-2002-00-EVAL	0	Temporary, short term use of jumpers to bypass the Overtemperature Delta T channel during bistable surveillance tests

Brief Description of the Change, Test or Experiment:

Recent operating experience has identified that spurious alarms associated with the bistable Overtemperature Delta T trip circuits are being received during normal operations. In addition, recently an unexpected reactor trip occurred at IP3 during the channel calibration of a Reactor Protection System channel where the trip switch for bistable being tested was placed in the tripped mode as part of a test which placed the trip (logic) relays in the de-energized (tripped) condition. This results in a partial trip condition requiring only one-out-of-three logic for actuation of the two-out-of-four logic to initiate a reactor trip. When a channel is bypassed the logic trip relays are energized to maintain the trip logic energized during Reactor Protection System analog bistable testing. This activity will temporarily modify tests that currently require tripping the Overtemperature Delta T function to bypass this channel by installing a jumper during the channel functional testing until the cause of the spurious alarms associated with Overtemperature circuitry is determined and corrected.

Summary of the 10 CFR 50.59 Evaluation

Following Technical Specification amendment 107, a permanently installed Trip Bypass feature was installed on Reactor Protection and Engineered Safety Features System Channel IV only, which permits testing of the analog instrumentation without placing the channel under test into trip. With this feature channel bistable may be placed in a bypassed mode and the two-out-of-three circuit becomes a two-out-of-two circuit and the two-out-of-four circuit becomes a two-out-of-three circuit. Testing in a bypassed mode prevents trip of the system even if a trip condition exists in a concurrent channel. The system was designed to permit any one channel to be maintained and when required, tested or calibrated during power operation without system trip. Indication is provided in the Control Room if some part of the system has been administratively bypassed or taken out of service.

When a channel is placed in the bypass condition it is declared inoperable, which requires entry into a 6 hour AOT to trip the channel according to the Overtemperature Delta T Technical Specification requirements in Table 3.1.1-1.

The concern with the use of jumpers to bypass a channel is that a jumper could be inadvertently left installed in place after the surveillance is complete. Since the described modification has not been implemented for the Channel I, II, and III Overtemperature Delta T logic, there is no indication to the operator that the channel is still in bypass in those channels, as there is in the permanently installed Channel IV. When tested in bypass using jumpers, the channel would be declared inoperable, the Technical Specification AOT would be entered and the requirement to place the channel in trip within 6 hours would be exited when the test is completed and the bypass removed or the channel would remain unable to perform its design function. Failure to remove the bypass jumper would reduce the redundancy and hence the reliability of the function since the logic would remain two-out-of-three rather than two-out-of-four.

The short term or non-routine use of jumpers to bypass the Overtemperature Delta T channel under test during surveillance testing does not result in more than a minimal increase in the likelihood or consequences of a malfunction of a structure, system, or component important to safety previously evaluated in the UFSAR or a malfunction of a different type because the implementing surveillance tests control the installation and removal of jumpers, require double verification of removal, and the activity will be performed over a short time frame (until the issue with the degraded channel is resolved) , thereby reducing the frequency and hence making it unlikely that a jumper would be left installed once the surveillance test is completed. It is judged unlikely because this is a non-routine operation that would result in increased awareness of operators and, there is double verification before leaving the test. This is judged to be basically equivalent to operator indication in the shorter term and meets single failure criteria. The only difference from the approved amendment to use an installed bypass circuit that could cause a malfunction is the potential to not remove the jumper or replace the lifted lead. The potential to place the jumper on the wrong channel is considered very low as the potential to bypass the wrong channel would be very low and these cases would be detected during removal. In addition, since this activity is being performed under a surveillance test where an ACT is being utilized with the channel inoperable and it restores the plant to its As Found configuration, it is the type of activity that would normally not be subject to the provisions of 50.59 per the NEI 50.59 Resource Guide and is being reviewed here solely because of the prohibition against using jumpers stated in the UFSAR. Also, for the case of the Overtemperature Delta T reactor trip, since it is a two-out-of-four matrix, leaving a bypass jumper installed in one channel would result in a two-out-of-three matrix, which would still provide protection from a single failure.

According to FSAR Section 7.2.1, the primary tripping functions are the overtemperature Delta T trip, the overpower DeltaT trip and the nuclear overpower trip, but additional tripping functions are provided as backups, depending on the specific accident. To support this conclusion, the Unit 3 RPS fault tree model was quantified to characterize the numerical impact on RPS unreliability. With one OTDT channel out of service (bypassed) due to testing and the potential for an additional OTDT channel to be unavailable due to failure to remove the jumper following completion of that channel's testing, quantifying the RPS fault tree model shows that the increase in RPS unreliability is less than I E-7. These results are based on assuming a conservative screening value of 3E-2 associated with the human error probability (HEP) for failing to remove the jumper on another channel's OTDT logic. The overall impact on core damage frequency (CDF) would be even less and therefore considered non-risk significant. Note that these results are based on a second trip parameter (e.g., high RCS pressure) being available in addition to the OTDT trip parameter, which is consistent with the NUREG/CR-5500 model. NUREG/CR-5500 acknowledges that this is conservative because "in general, at least three RPS parameters are available to initiate a trip signal for any type of plant upset condition requiring a reactor trip." Therefore, without even performing any quantitative analysis, it would stand to reason that the failure probability going from a two-out-of-four logic to a two-out-of-three logic is very small given that there are also other trip parameters (e.g., high pressurizer pressure) that would initiate a reactor trip.