

FAQ 16-04, Browns Ferry Safety System Functional Failure (Final NRC Response)

Plant: Browns Ferry Nuclear Plant Unit 2

Date of Event: March 19, 2016

Submittal Date: November 8, 2016

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NRC Contact: _____ Tel/email: _____

Performance Indicator:

MS05 Safety System Functional Failure (SSFF)

Site-Specific FAQ (Appendix D)? No

FAQ requested to become effective: When approved.

Question Section:

1. If a condition on a single train safety system that could have affected operability is created during maintenance while the equipment is out of service (OOS), such that the condition did not exist prior to the equipment being declared inoperable for maintenance, was discovered during post-maintenance testing (PMT) prior to surveillance (SR) testing, and accident conditions or operation cannot produce the observed degradation or equipment failure, should it count as a SSFF against the Reactor Oversight Process (ROP) Performance Indicator (PI)?

NEI 99-02 Guidance needing interpretation (include page and line citation):

1. Section 2.2, Safety System Function Failures: The guidance is silent regarding how to count a condition created while a system, structure, or component (SSC) was OOS for maintenance, which would have affected Operability, and was outside the scope of the planned maintenance. (page 30)

Event or circumstances requiring guidance interpretation:

Browns Ferry (BFN) entered Technical Specification (TS) Limiting Conditions for Operation (LCO) 3.5.1, Emergency Core Cooling Systems (ECCS) – Operating, Condition C on March 17, 2016. Condition C was entered due to High Pressure Coolant Injection (HPCI) inoperability for planned maintenance to repack the steam admission valve. The purpose of the HPCI system is to provide high pressure core cooling in the event of a Loss of Coolant Accident or in the event of a reactor isolation and failure of the Reactor Core Isolation Cooling (RCIC) system. Besides vessel injection, another safety function of the HPCI system is to maintain structural integrity regarding Primary and Secondary Containment pressure boundaries. On March 19, 2016, Operations personnel received a ground alarm during performance of valve diagnostic (MOVATS) testing on the Unit 2 HPCI Steam Admission Valve. The valve motor breaker was opened and the alarm cleared. The thermal overload relay was found tripped, resulted in the alarm, and was reset. Later on March 19, 2016, Operations attempted to stroke the valve from the Control Room for PMT using a hand switch and the valve failed to stroke due to a stuck contactor in the breaker.

FAQ 16-04, Browns Ferry Safety System Functional Failure (Final NRC Response)

Troubleshooting later revealed that the breaker thermal overloads had tripped and that a breaker contactor in the valve closing circuit had become hot enough to fuse its contacts together, which prevented the valve from opening. There was no vendor specific service life for these contacts. The cause of the equipment failure was determined to be due to excessive valve stroking during the earlier PMT on March 19, 2016. The cause was not reviewed by a vendor or an independent party. The corrective actions are to revise procedures to limit the number of strokes per hour for the applicable piece of equipment.

BFN received a NRC-identified Severity Level IV non-cited violation (NCV) of 10 CFR 50.72(b)(3)(v) and 10 CFR 50.73(a)(2)(v) for the licensee's failure to notify the NRC within 8 hours and submit a Licensee Event Report (LER) within 60 days of discovery of a condition that could have prevented the fulfillment of a safety function. Specifically, the licensee failed to notify the NRC that the HPCI system had been rendered inoperable due to an equipment failure. BFN submitted LER 50-260/2016-002-00, High Pressure Coolant Injection System Failure Due to Stuck Contactor, to the NRC in response to this NCV. BFN did not deny the violation but is advocating at the ROP TF that the condition should not count against the SSFF PI.

If licensee and NRC resident/region do not agree on the facts and circumstances explain:

BFN's NRC Senior Resident Inspector's perspective is the valve motor breaker failure was not part of the HPCI planned maintenance; therefore, the failure should count as a SSFF due to it not being part of the planned maintenance.

Potentially relevant existing FAQ numbers: There are no relevant FAQ numbers.

Response Section:

Proposed Resolution of FAQ:

The SSFF PI should only count failures that occur or potentially existed while there was an expectation that the SSC was Operable. Conditions affecting operability created during a maintenance OOS period that did not exist while the SSC was considered Operable and were identified and corrected while still in a maintenance state do not count for purposes of the SSFF PI. This exemption applies even if the condition created required repairs outside of the scope of planned maintenance and those repairs were required in order to return the equipment back to Operable status.

Examples of conditions that would not count as a SSFF under this resolution would include:

- An electrician transposes connecting leads to terminals in the actuation panel for a single train safety system causing a failed PMT. The condition was created during the maintenance activity and corrected while still in a maintenance state within the LCO window.

FAQ 16-04, Browns Ferry Safety System Functional Failure (Final NRC Response)

- During MOVATS testing, while a single train system is OOS for unrelated maintenance, a valve technician overheats the contactors causing them to stick. Replacement of the contactor is not part of the original scope of the planned maintenance activity but is identified and completed prior to SR Operability testing.
- A nearby instrument required to maintain operability of a single train safety system is damaged while breaking a bolt loose for an unrelated maintenance activity on the same system. This condition was not part of the preplanned maintenance. Correcting this condition requires an additional 4 hours of LCO time.

This proposed change applies similar treatment from MSPI failure guidance on page F-29 of NEI 99-02 to SSFF criteria.

“Failures identified during post maintenance tests (PMT) are not counted unless the cause of the failure was independent of the maintenance performed” ... “System or component failures introduced during the scope of work are not indicative of the reliability of the equipment, since they would not have occurred had the maintenance activity not been performed.”

This failure was not counted by BFN as a MSPI failure and similarly should not count as a SSFF.

If appropriate, provide proposed rewording of guidance for inclusion in next revision:

Add the following on Page 30, section 2.2, starting after the period on line 7:

If the following elements are met for a condition affecting Operability of a SSC, then the condition does not count for purposes of the SSFF PI:

- Created during a maintenance OOS period and it did not exist while the SSC was considered Operable,
- Not possible and/or reproducible during accident conditions, and
- Identified and corrected while still in a maintenance state.

This exemption applies even if the condition:

- Required repairs outside of the scope of planned maintenance, and
- Repairs were required in order to return the equipment back to Operable status.

PRA update required to implement this FAQ? No

MSPI Basis Document update required to implement this FAQ? No

NRC Response:

The staff reviewed the guidance found in NUREG 1022 Revision 3 to determine if additional exclusions of reported SSFFs should be considered for inclusion in NEI 99-02. The following was found:

FAQ 16-04, Browns Ferry Safety System Functional Failure (Final NRC Response)

reports are not required when systems are declared inoperable as part of a planned evolution for maintenance or surveillance testing when done in accordance with an approved procedure and the plant's TS (unless a condition is discovered that would have resulted in the system being declared inoperable).

Revision 0 of NUREG 1022 contained an example of this that further clarified the staff's intent:

For example, if the licensee removes part of a system from service to perform maintenance, and the Technical Specifications permit the resulting configuration, and the system or component is returned to service within the time limit specified in the Technical Specifications, the action need not be reported under this paragraph. However, if, while the train or component is out of service, the licensee identifies a condition that could have prevented the whole system from performing its intended function (e.g., the licensee finds a set of relays that is wired incorrectly), that condition must be reported.

The intent of this example is to clarify that if the licensee discovers a condition during the maintenance that existed prior to the maintenance, it is reportable. However if the licensee creates a new condition during the maintenance that would have rendered the system inoperable, that is not reportable as long as it is repaired prior to restoration of operability in accordance with Technical Specifications. The licensee proposed change to NUREG 1022 includes the following key attribute:

- Created during a maintenance OOS period and it did not exist while the SSC was considered Operable,

This proposed NEI 99-02 criteria is already covered by NUREG 1022. As such, it is not required.

The staff does not concur with the recommended change to NEI 99-02. Since a SSFF report was made, barring meeting some separate criteria for excluding the SSFF PI found in the NEI 99-02 guidance, this SSFF should count towards the SSFF PI.