

1.0 IMPACT ON MAINTENANCE RULE (A)(4) PROGRAM FOR ASSESSMENT AND MANAGEMENT OF RISK

The technical basis for the preferred end states initiative is contained in NEDC-32988, Rev. 2, “Technical Justification to Support Risk-Informed Modification to Selected Required Action End States for BWR Plants,” (Reference 1) and the associated NRC Safety Evaluation (Reference 2). The report concluded, and the NRC concurred, that for short duration operation, Mode 3 (hot shutdown) is a risk neutral or risk beneficial end state compared to Mode 4 (cold shutdown). A “short duration” encompasses the time BWRs are most physically capable of remaining in hot shutdown - 2 to 3 days to at most a week. The risk benefit from this change is largely due to the availability of increased heat removal resources in Mode 3.

The analyses described in Reference 1 were used to create TSTF-423, “Technical Specifications End States, NEDC-32988-A” (Reference 3). TSTF-423 modified NUREGs 1433 and 1434, the Improved Standard Technical Specifications (ISTS) for BWR/4 and BWR/6 plants. TSTF-423 modifies the end state for a limited set of Technical Specifications (TSs) which are applicable in Modes 1, 2, and 3 to allow indefinite operation in Mode 3 with equipment governed by the TS inoperable.

Implementation of the preferred end states initiative requires some modification of the current program to implement 10 CFR 50.65(a)(4), the Maintenance Rule. This guidance is intended (1) to preclude preventative maintenance and operational activities on equipment combinations leading to reduced defense-in-depth and potentially high risk configurations and (2) to identify actions to exit expeditiously a risk-significant configuration should it occur. These modifications are discussed below:

- 1) Plants implementing TSTF-423 must commit to the guidance of NUMARC 93-01 (Reference 4), Section 11 for Maintenance Rule risk assessments. Currently, NRC Regulatory Guide 1.182 (Reference 5) states that the NUMARC guidance is one acceptable approach to implement 10 CFR 50.65(a)(4). The guidance provides flexibility with respect to risk assessment and management approaches and allows for a combination of qualitative and quantitative evaluations as well as use of bounding assessments.
- 2) Use of the preferred end state to perform maintenance will require a risk assessment consistent with 10 CFR 50.65(a)(4). Qualitative assessments that recognize the contemporaneous configuration and refer to insights identified in the Topical Report (Reference 1) are acceptable as are bounding quantitative assessments. Assessments may credit existing analyses, and insights drawn from Reference 1 as they apply to the current plant operating conditions.
- 3) Should contemporaneous risk assessments result in the identification of a high risk configuration, risk management actions should be taken. These actions may include exiting MODE 3 to a MODE in which the risk is reduced.

- 4) If Primary Containment is NOT OPERABLE, in order to remain in MODE 3 Secondary Containment and Standby Gas Treatment must be verified OPERABLE, unless a plant specific risk evaluation is prepared.
 - 5) If Secondary Containment is NOT OPERABLE, in order to remain in MODE 3 Primary Containment must be verified OPERABLE, unless a plant specific risk evaluation is prepared.
 - 6) While it is extremely unlikely that any BWR could remain in MODE 3 longer than several days, any entry into MODE 3 using this TS allowance must be limited to no more than seven days, unless a plant specific risk evaluation is prepared.
- 7) Plants submitting a license amendment to adopt the preferred end states described in Reference 1 and TSTF-423 must commit to implementing the guidance in this document.

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2.0 RISK ASSESSMENT AND MANAGEMENT CONSIDERATIONS

This section describes considerations for risk assessment and management relative to implementation of TSTF-423.

2.1 Methods of assessment

NUMARC 93-01 provides separate guidance for risk assessment during power operations (section 11.3.4), and during shutdown conditions (section 11.3.6). Thus, section 11.3.6, shutdown conditions, of NUMARC 93-01 contains the appropriate guidance for performing risk assessments of maintenance while utilizing the preferred end states. The NUMARC 93-01 guidance is based on maintaining defense-in-depth for key safety functions necessary for safe shutdown. Reference 1 uses a qualitative and quantitative evaluation of representative plants to demonstrate risk impacts for Mode 3 are maintained or reduced relative to Mode 4, and that extended operation in Mode 3 is acceptable.

It is expected that consideration of the risk impacts of maintenance performed while in the preferred end state will generally be performed qualitatively, or through a combination of quantitative and qualitative methods. For those plants capable of quantification, the risk impact of maintenance while in the preferred end state may be quantified, compared to risk management thresholds provided in section 11.3.7.2 of NUMARC 93-01 and appropriate risk management actions can be implemented.

In performing the risk assessments of maintenance while in Mode 3, the use of a key safety function defense-in-depth approach, as discussed in NUMARC 91-06 (Reference 6) and Section 11 of NUMARC 93-01 is considered an acceptable approach to satisfy the requirements regarding risk assessment and management. In performing this assessment, it should be ensured that adequate defense-in-depth for key safety functions will be preserved when performing maintenance while utilizing the preferred end state Mode. Application of the key safety function approach to Mode 3 may require additional considerations relative to the reactor coolant being at

higher temperature and being above atmospheric pressure. Quantitative lower Mode risk assessments may also be used provided appropriate tools and models are available.

2.2 Considerations from BWROG Topical Report

When implementing the Mode 3 allowance, the BWROG Topical Report (Reference 1) and the NRC safety evaluation (Reference 2) contain valuable information with respect to remaining in Mode 3. This information should be incorporated in plant operating procedures and practices as applicable.

2.3 General guidance

The following general guidance is provided for performing risk assessments of maintenance performed while remaining in Mode 3 as allowed by TSTF-423.

1. When performing risk assessments and risk management of maintenance performed while in the Mode 3 end state, the licensees must consider all maintenance being performed, regardless of whether the maintenance is related to restoring the inoperable equipment which lead to the use of the Mode 3 end state.
2. If plant conditions change during performance of maintenance, 10 CFR 50.65(a)(4) requires the new condition to be evaluated, and if necessary, risk management actions to be taken. The actions may include stopping the maintenance activity, completing the activity, transitioning the plant to a lower Mode, or other risk management actions. These actions are implemented in plant procedures.

3.0 DOCUMENTATION

Programs for risk assessment and management are required to be proceduralized in accordance with NUMARC 93-01. However, documentation of each individual use of the risk assessment and risk management actions for maintenance performed while utilizing the preferred end state is not required by NRC. However, it may be prudent to document these activities for internal reasons, including communication between plant organizations, turnover of operating crews, consistency of application, and clear communication of risk management actions to appropriate plant personnel.

4.0 REFERENCES

1. NEDC-32988, Rev. 2, "Technical Justification to Support Risk-Informed Modification to Selected Required Action End States for BWR Plants"
2. NRC September 27, 2002 Safety Evaluation of Topical Report NEDC-32988, Rev 2.
3. TSTF-423, "Technical Specifications End States, NEDC-32988-A."
4. NUMARC 93-01, Industry Guideline For Monitoring The Effectiveness Of Maintenance At Nuclear Power Plants," Revision 3, July 2000.

5. NUREG 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants," May 2000.
6. NUMARC 91-06, "Shutdown Risk Management," December 1991.