

# NRC INSPECTION MANUAL

APOB

---

## INSPECTION PROCEDURE 71111 ATTACHMENT 13

---

### MAINTENANCE RISK ASSESSMENTS AND EMERGENT WORK CONTROL

EFFECTIVE DATE: January 1, 2020

PROGRAM APPLICABILITY: IMC 2515 Appendix A

CORNERSTONES:       Initiating Events  
                          Mitigating Systems  
                          Barrier Integrity

INSPECTION BASES:    See IMC 0308, Attachment 2

#### SAMPLE REQUIREMENTS:

Sample Requirements		Minimum Baseline Sample Completion Requirements		Budgeted Range	
Sample Type	Section(s)	Frequency	Sample Size	Samples	Hours
Risk Assessment and Management	03.01	Annual*	14 per site	14 to 24	90 +/-10
			1 per AP1000 two-unit site	1 to 2 per AP1000 site	5 +/- 3 per AP1000 site

\*If appropriate, perform one-fourth of the yearly planned samples every quarter.

#### 71111.13-01 INSPECTION OBJECTIVES

To verify that appropriate risk assessments (RAs) and corresponding work controls and risk management actions (RMAs) (including the use of risk-informed completion times (RICTs) if applicable) are implemented during planned and emergent maintenance activities.

#### 71111.13-02 GENERAL GUIDANCE

This inspection procedure (IP) shall be used to examine plant configuration changes associated with scheduled or emergent maintenance activities that may be planned, in progress, or completed. The plant configuration changes to be inspected are those involving structures, systems, or components (SSCs) within the scope of the Maintenance Rule or the limited scope as allowed by Title 10 of the Code of Federal Regulations (10 CFR) 50.65(a)(4)) and certain other risk-significant SSCs.

If a licensee has received NRC approval to adopt risk-informed technical specifications (TS) initiative 4b risk-managed technical specifications (RMTS), the licensee may extend the duration in which the plant may be operating in a single failure vulnerable plant configuration. As described in 10 CFR 50.36(c)(2)(i), limiting conditions for operation (LCO) are the lowest

functional capability or performance levels of equipment required for safe operation of the facility. Although 10 CFR 50.36(c)(2) does not describe any specific safety standard for the remedial actions permitted by the TS, both the common standards for licenses in 10 CFR 50.40(a) and those specifically for issuance of operating licenses in 10 CFR 50.57(a)(3) state that there must be “reasonable assurance” that the activities at issue will not endanger the health and safety of the public.

Before performing this procedure, develop an understanding of the licensee’s program for conducting RAs and managing risk and become familiar with the associated procedures. Although it is not within the scope of this inspection to perform a programmatic review of the licensee’s 10 CFR 50.65(a)(4) procedures, it would be appropriate to question and bring to the licensee’s attention anything in the procedures discovered during this familiarization that is not clear or appears to be incorrect.

Considering opportunities, risk, and judgment, select appropriate scheduled or emergent work activities for sampling. During plant tours and plant status, look for potential activities that increase plant risk or that may not have been fully evaluated.

Licenses that have adopted technical specification RICTs can, under certain circumstances, determine completion times for maintenance and emergent work. Additional information for inspection of RICTs is provided in Appendix A.

For emergent work activities, verify that work schedules and work plans are being followed and that precautions are being taken to preclude affecting adjacent SSCs. Observe equipment lineups and tagging when potential errors could affect other operating systems. When appropriate, verify that redundant components remain operable and available to perform the safety function. Reference IP 71111.04, “Equipment Alignment,” for additional guidance. Consider whether potential maintenance errors could initiate an event or affect defense in depth when selecting work activities to review. When work activities involve the replacement of safety-significant parts, verify the appropriateness of using commercial-grade parts. Limit the review to emergent work activities that could cause an initiating event or affect the functional capability of mitigating systems or barrier integrity.

Each quarter, ensure that a portion of the inspection effort is directed at conducting a routine review of problem identification and resolution activities using IP 71152, “Problem Identification and Resolution.”

## 71111.13-03 INSPECTION SAMPLES

### 03.01 Risk Assessment and Management Sample

- a. **Verify that RAs are appropriately performed to address planned or emergent plant configuration changes.**

#### Specific Guidance:

1. Verify the performance of RAs when required by 10 CFR 50.65(a)(4), with emphasis on higher safety/risk-significant configurations and in accordance with licensee procedures, promptly before emergent work and before changes in plant

configuration for maintenance activities, including preventive maintenance, surveillance, and testing, during all modes of plant operation.

2. For emergent work, verify that the licensee performs the RA (to the extent practicable and commensurate with safety) before changing the plant configuration further but, in any case, promptly and to the extent practicable concurrently with, but without delaying, plant stabilization and restoration.
3. Verify by walkdowns that work activities do not introduce new configuration risk, such as by breaching fire, flooding, or security barriers or blocking sprinklers, fire hose stations, or security response equipment, and that they do not introduce temporary systems that create flooding hazards, violate electrical separation, or otherwise present new risk.

**b. Verify that RAs are complete and accurate.**

Specific Guidance:

1. Verify the accuracy and completeness of the information considered in the RA.
2. Verify that the RA tool is appropriately used, that is, that the licensee uses it in a manner consistent with (1) its capabilities and limitations, (2) plant conditions and evolutions, (3) external events and containment status, and (4) licensee procedures. Engage the licensee when necessary to ensure that inadequate RAs are promptly addressed.
3. For completed work for which the normal plant configuration has been restored, the licensee may still need to perform (or correctly re-perform) an omitted (or inadequate) RA, or the NRC may need to independently evaluate the configuration in question, if possible, in order to determine the associated change in plant risk for significance determination purposes.

**c. Verify that appropriate work controls or RMAs are implemented in response to RAs.**

Specific Guidance:

1. Verify that the licensee recognizes and enters as applicable the appropriate licensee-established risk category or band according to RA results and licensee procedures.
2. Verify that normal work controls or RMAs are promptly and effectively implemented as required, commensurate with the risk band in effect and in accordance with licensee procedures.
3. Verify that RMAs are effectively implemented in the plant and remain implemented over the course of the entire required period.
4. Verify that the key safety functions for the plant mode of operation are preserved.

5. Re-verify the implementation of RMAs (or different RMAs) that may now be required by licensee procedures following performance (or re-performance) of previously omitted (or inadequate) RAs.
6. During emergent work (combined with scheduled work in progress or alone), verify that the licensee takes actions to minimize the probability of initiating events, maintain the functional capability of mitigating systems, and maintain barrier integrity.
7. Review emergent work-related activities such as troubleshooting, work planning and scheduling, establishing plant conditions and aligning equipment, tagging (clearances), temporary modifications, and equipment restoration to ensure that the plant is not placed in an unacceptable configuration (including violation of technical specifications).

#### 71111.13-04 REFERENCES

Cross-Reference of Generic Communications to IP 71111.13 and Inspection Resources:  
<http://nrr10.nrc.gov/rop/ip71111-13.html>

Operating Experience:  
<http://nrr10.nrc.gov/ope-info-gateway/index.html>

IHS Codes and Standards:  
<http://www.internal.nrc.gov/TICS/library/standards/ihs.html>

NRC Technical Library:  
<http://www.internal.nrc.gov/TICS/library/index.html>

Maintenance Effectiveness:  
<http://www.nrc.gov/reactors/operating/ops-experience/maintenance-effectiveness.html>

END

Appendices:  
Appendix A, "Risk-Informed Technical Specifications (TS) Initiative 4b Risk-Managed Technical Specifications (RMTS) Guidelines"

Attachment 1:  
Revision History Table

## APPENDIX A

### RISK-INFORMED TECHNICAL SPECIFICATIONS (TS) INITIATIVE 4b RISK-MANAGED TECHNICAL SPECIFICATIONS (RMTS) GUIDELINES

#### 71111.13A-01 OBJECTIVE

The objective of this Appendix is to support the review of licensees' implementation of the risk-informed TS initiative 4b. Some licensees have been issued license amendments that revise technical specification (TS) requirements to permit the use of risk-informed completion times (RICTs) for actions to be taken when limiting conditions for operation (LCOs) are not met. The licensees' submittals were developed using guidance provided in Technical Specifications Task Force (TSTF) Traveler TSTF-505. The U.S. Nuclear Regulatory Commission (NRC) issued a model safety evaluation (SE) approving use of the TSTF-505, however information concerning individual licensees' approvals are documented in the plant specific safety evaluation report (SER).

#### 71111.13A-02 INSPECTION GUIDANCE

- a. It is recommended that inspectors who perform some portion of this inspection procedure increase their general familiarity with the licensee's risk model, configuration risk management program (CRMP), and the plant specific SER issued for the implementation of the RMTS 4b initiative. During the licensee's first implementation of a RICT following approval, the inspector should be aware of and verify any limitations or conditions outlined in the SER.
- b. It is also recommended that the inspector become familiar with the plant specific standardized plant analysis risk (SPAR) model to gain insights on equipment configurations and risk important equipment coincident with application of a RICT. Assistance with the use of the SPAR model can be obtained from a Senior Reactor Analyst or Risk Analyst.
- c. If the RICT has significant margin (more than one order of magnitude) from the incremental core damage probability thresholds of E-6 for risk management action time and RICT, then this should be taken into consideration when prioritizing inspection and engagement. Stated differently, if the calculation even with significant non-conservatism added to the calculated value would remain in the normal work-controls level, this condition may not warrant inspection effort. On the contrary, if the licensee has or plans to use RICTs using newly-developed PRA methods or changes to key assumptions, such RICTs should receive priority in sampling.
- d. If a RICT is or has been in effect, verify equipment capable of performing the (specified) safety function of the inoperable equipment remains OPERABLE\*. If the licensee credits PRA functionality of inoperable equipment, verify that the functionality and associated RICT are consistent with licensee procedures. Verify that all the constraints specified in the TS Administrative Section and individual technical specifications, as applicable, are met. If required, verify additional RMAs are promptly and effectively implemented in accordance with licensee procedures.

\*Note that if the plant specific TS for the RICT has included loss of function, equipment to perform the SSC must satisfy the additional constraints on loss of function that are specified in the TS Administrative Controls.

- e. Verify that the licensee is using the “zero-maintenance” state in their PRA model; (delta-core damage frequency and delta-large early release frequency would be artificially lowered in the calculations if this is not true); this can be easily done by reviewing the cutsets and verifying no test & maintenance terms exist in either the base results or the ‘non-conforming’ results.
- f. For emergent conditions, ensure the licensee takes appropriate actions to account for the change in plant configuration. For example, if a high degree of confidence cannot be established that there is no common cause failure that could affect the redundant components prior to exceeding the completion time, the RICT shall account for the increased possibility of common cause failure (CCF) by either: 1) numerically accounting for the increased possibility of CCF in the RICT calculation, or 2) implementing additional RMAs not already credited in the RICT calculation.
- g. Consider performing a partial equipment walkdown for SSCs that are modeled in the licensee’s PRA and which are supposed to be functional/available during the RICT; the goal is to verify that no risk-significant, credited equipment is in fact unavailable with the licensee unaware of it.
- h. Verify that where equipment declared as “inoperable” is being classified as “functional” for purposes of a RICT calculation, the reasoning behind such a consideration is justified in the documentation of the RICT assessment. This reasoning should be credible and technically defensible.
- i. Verify that a total loss of function has not inadvertently been created. See Nuclear Energy Institute (NEI) 06-09 Rev. 0-A, Section 3.2.2.
- j. Verify that the licensee tracks the risk associated with all entries beyond the front-stop completion time to ensure cumulative risk remains within Regions II or III of Figures 3 and 4 of RG 1.174 for a 52-week period. See NEI 06-09 Rev. 0-A, Section 3.2.5.

#### 71111.13A-03 REFERENCES

NRC Regulatory Guide (RG) 1.174, Rev. 3, “An Approach for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant Specific Changes to the Licensing Basis” (ML17317A256)

NRC RG 1.177, Rev 1, “An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications” (ML100910008)

NRC RG 1.200, Rev.2, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk Informed Activities” (ML090410014)

Electric Power Research Institute 1009474, Dec 2004 RMTS Guidelines.

Licensee Safety Evaluation Report (SER) for the license amendment adopting RMTS 4b.

NEI 06-09 Revision 0-A, "Risk-Informed Technical Specifications Initiative 4b, Risk-Managed Technical Specifications (RMTS) Guidelines" (ML12286A322).

Technical Specification Task Force (TSTF) comments on Draft Safety Evaluation for Traveler TSTF-505, "Provide Risk-Informed Extended Completion Times" and Submittal of TSTF-505, Revision 2 (ML18183A493).

Final Revised Safety Evaluation by the Office of Nuclear Reactor Regulation Technical Specifications Task Force Traveler TSTF-505, Revision 2 (ML18267A259).

NEI (formerly Nuclear Management and Resources Council (NUMARC)), NUMARC 93-01, Revision 4F, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (ML18120A069)

General Design Criteria in 10 CFR Part 50, Appendix A.

Summary of Licensing and Oversight Strategies for Risk-Informed Initiatives (ML19221B678)

END

ATTACHMENT 1 - Revision History for IP 71111.13

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public)
N/A	3/13/2007	Revision history reviewed for the last four years - no generic requirements incorporated during this period.	None	N/A
[C1] SRM M050426	03/23/07 CN 07-011	This IP is revised to incorporate inspections for the offsite power system and the alternate AC power source.	Yes 12/13/2006	ML070680061
N/A	01/31/08 CN 08-005	This IP is revised to incorporate results of the ROP realignment in 2007, the references were updated to reflect the deletion of TI 2515/165 in CN 07-28 and minor typographical errors were corrected.	None	N/A
N/A	11/16/09 CN 09-027	This IP is revised to incorporate results from the ROP realignment in 2009. Recommendations from ROPFF 71111.13-1360 and 71111.12-1407 were also added. The table in the General Guidance section was deleted and editorial corrections were made.	None	ML093010336
N/A	ML11201A172 10/28/11 CN 11-025	This revision modifies the resource estimate to reflect the 2011 ROP Realignment.	None	
N/A	ML15023A099 02/03/16 CN 16-005	Revision 3 to RG 1.160 and Revision 4A to NUMARC 93-01 were recently issued. IP 71111.12 has been revised to update references to the new revision numbers.  Changes made in accordance with ROP Enhancement Project (see ML14017A381).		ML16007A383  71111.13-1951 ML16033A375 71111.13-2135 ML16033A384



Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional, Non-Public)
N/A	ML17194A934 12/20/17 CN 17-030	Adding inspection of RICT times and risk management actions. These are a subset of maintenance activities and are included in the samples. This change includes information to facilitate inspection of RICT and PRA functionality.  Streamline IP formatting		ML17205A097 71111.13-2261 ML17205A261
	ML19198A075 DRAFT CN 19-XXX	Made publicly available to discuss at the July 31, 2019, public meeting.		
N/A	ML19197A096 11/13/19 CN 19-035	Additional guidance for inspecting RICTs added for clarity.		ML19210C938  71111.13-2358 ML19301A004