INSPECTION PROCEDURE 71111 ATTACHMENT 04

EQUIPMENT ALIGNMENT

Effective Date: July 1, 2021

PROGRAM APPLICABILITY: IMC 2515 A

CORNERSTONES: Initiating Events
Mitigating Systems
Barrier Integrity

INSPECTION BASES: See Inspection Manual Chapter (IMC) 0308, "Reactor Oversight Process Basis Document," Attachment 2, "Technical Basis for Inspection Program"

SAMPLE REQUIREMENTS:

Sample Requirements		Minimum Baseline Completion Sample Requirements		Budgeted Range	
Sample Type	Section(s)	Frequency	Sample Size	Samples	Hours
Partial Walkdown*	03.01	Annual	12 per site	12–16	80 +/- 12 per site
			2 at Vogtle Units 3 & 4	2–4 at Vogtle Units 3 & 4	
Complete Walkdown**	03.02	Annual	2 per site	2	8-40 at Vogtle Units 3 & 4
		Annual	0 at Vogtle Units 3 & 4***	0-2 at Vogtle Units 3 & 4***	

* Each partial walkdown sample is budgeted at 4 hours.
** Perform one complete walkdown sample approximately every 6 months. Each complete walkdown sample is budgeted at 12 hours.
*** At least one complete Equipment Alignment inspection sample is required to be completed unless plant conditions or other circumstances impact sample performance.

71111.04-01 INSPECTION OBJECTIVES

01.01 To verify equipment alignment and identify any discrepancies that impact system safety function(s).

01.02 To verify that the licensee has properly identified and resolved equipment alignment problems that could cause initiating events or impact the availability and functional capability of mitigating systems or barriers.

71111.04-02 GENERAL GUIDANCE

Select a reasonable distribution of partial walkdown samples each quarter and on each unit at multiple unit sites throughout the year.

With regard to sample selection, the most risk-significant system may not be the redundant or backup train (for example, the most risk-significant system could be the electrical bus that provides power to the redundant or backup train). If available, consider risk insights regarding significant initiating events for the given plant equipment configuration. Such insights should be used to assess the licensee's awareness of the need for compensatory measures pursuant to Title 10 of the *Code of Federal Regulations* 50.65(a)(4). Refer to Inspection Procedure (IP) 71111.13, "Maintenance Risk Assessments and Emergent Work Control," for more information.

The following tables provide general inspection guidance for sample selection.

Initiating Events Cornerstone	
Inspection Objective: Identify any equipment alignment discrepancies that could result in a risk-significant initiating event and impact the availability and functional capability of plant equipment.	
Risk Priority	Examples
Operating—Equipment lineups affecting initiating event frequencies or functional capabilities of plant equipment	Maintenance which leaves only one operating feed pump providing feed Instrument air lineup
Shutdown—Equipment lineups during special tests or evolutions	System lineups during pressurized-water reactor (PWR) midloop operation or boiling-water reactor (BWR) vessel draindown Misalignment of electrical equipment during shutdown that could cause loss of offsite power and affect decay heat removal

Mitigating Systems Cornerstone	
Inspection Objective: Identify any equipment alignment discrepancies that could impact the availability and functional capability of a risk-significant mitigating system.	
Risk Priority	Examples
Operating—Equipment lineups following system restoration or equipment lineups that support another alternate system/train when a Maintenance Rule system is out of service	Safety trains on the remaining emergency bus when one emergency diesel generator (EDG) is out of service or failed

Shutdown—Equipment lineups that affect shutdown risk or equipment lineups that support another alternate system/train when a Maintenance Rule system is out of service	Safety trains on the remaining emergency bus when one EDG is out of service or failed

Barrier Integrity Cornerstone	
Inspection Objective: Identify any equipment alignment discrepancies that could degrade the integrity of the fuel barrier, reactor coolant system, or containment.	
Risk Priority	Examples
Operating—Fuel cladding degradation can result from both inadequate human and equipment performance. Reactivity control systems must be properly configured to prevent and/or mitigate adverse reactivity transients and neutron flux distributions.	Reactivity control systems (e.g., BWR recirculation pump controls, PWR loss-of-letdown response, rod drives, rod block monitors, rod worth minimizers) Containment isolation valves (e.g., containment purge valves)
Shutdown—Equipment lineups that affect reactor coolant system inventory and containment	Containment configuration during risk-significant evolutions (e.g., PWR midloop operation, BWR cavity draindown) Spent fuel pool and alternate decay heat removal system (BWR only) operation

Select systems or trains with a high risk significance for the current plant configuration (considering out-of-service, inoperable, or degraded condition); or a risk-significant system/train that was recently realigned following an extended system outage, maintenance, modification, or testing; or an out-of-service risk-significant system/train.

When selecting a system or train walkdown sample, consider the following:

- risk-informed insights from site-specific risk studies
- operator actions and access during potential accident sequences
- operating experience
- performance history
- equipment configuration (e.g., out of service, inoperable, or degraded)
- past walkdown samples
- recently realigned equipment following an outage, maintenance, modification, or testing Consider walking down a protected operable train when the other train is out of service.

For AP1000 designs, SSCs classified as regulatory treatment of non-safety systems (RTNSS) will be inspected consistent with how other nonsafety-related SSCs are inspected in currently operating plants. In currently operating plants, inspectors can select inspection activities involving nonsafety-related SSCs based on risk significance or on the potential for impact on steady-state plant operations in accordance with guidance contained in Inspection Procedure (IP) 71111, “Reactor Safety-Initiating Events, Mitigating Systems, Barrier Integrity.” Since licensing documents specifically discuss RTNSS SSCs for AP1000 plants, the staff has

updated program guidance to clarify that RTNSS SSCs will be treated as any other nonsafety-related SSCs. Consistent with risk-informed principles, inspectors are expected not to routinely focus inspection resources on RTNSS SSCs and other nonsafety-related systems but rather examine these nonsafety-related systems when site activities make them samples of value consistent with the risk-informed sample selection guidance. As a practical example, the contribution to total plant risk for the RTNSS normal residual heat removal system is expected to be higher during outage periods. Using guidance from IP 71111 for risk-informed sample selection, it would be appropriate for inspectors to select the normal residual heat removal (RNS) system for sampling during periods of elevated RNS risk importance.

For each sample, routine review of problem identification and resolution activities should be conducted using IP 71152, "Problem Identification and Resolution."

71111.04-03 INSPECTION SAMPLES

03.01 Partial Walkdown Sample

Walkdown and verify that the critical portions of a selected system/train are correctly aligned.

Specific Guidance

a. Review documents to determine the correct system/train lineup for the selected system/train. Consider plant procedures; abnormal and emergency operating procedures; the updated final safety analysis report; vendor technical manuals; piping and instrument drawings; valve, switch, and breaker lineups; and plant tagout logs.

b. During the walkdown, identify any discrepancies. Verify that systems/trains credited as being operable or functional were not rendered inoperable, nonfunctional, or degraded by maintenance. As appropriate, consider items in Section 03.02e.

c. For the offsite power system, verify the licensee has established and continues to implement periodic walkdown activities to detect visible open phase conditions for switchyard equipment such as insulators, disconnect switches, and transmission line and transformer connections, associated with the offsite power circuits. [C1]

03.02 Complete Walkdown Sample

Walkdown and verify that the selected mitigating system is correctly aligned and able to perform its intended safety function(s).

Specific Guidance

Mitigating systems should not be constrained to systems covered by the Mitigating Systems Performance Indicator or IMC 0609, Attachment 4, "Initial Characterization of Findings."

a. Review documents to determine the correct system lineup. Consider plant procedures; abnormal and emergency operating procedures; the updated final safety analysis report; vendor technical manuals; piping and instrument drawings; valve,

switch, and breaker lineups; and plant tagout logs.

b. Review any outstanding maintenance work requests on the system and any deficiencies that could affect the system's ability to perform its function(s).

c. Review any outstanding design issues, including temporary modifications, operator workarounds, and items that are tracked by the engineering department.

d. If appropriate, review available inspection records (e.g., written reports, photographs, or video) associated with normally inaccessible areas that cannot be walked down. In the past, the licensees may have performed and documented inspections of normally inaccessible areas.

e. Perform the walkdown inspection. Identify any discrepancies between the existing alignment of the system equipment and the correct alignment. Verify the following:

1. Systems, structures, and components (SSCs) do not exhibit defects, such as corrosion, cracks, missing fasteners, and degraded insulation that would impact function.

2. When applicable, degraded SSCs have been entered into the licensee's corrective action program at the appropriate threshold, and, when applicable, degraded SSCs are being appropriately managed consistent with aging management programs and commitments (e.g., the External Surfaces Monitoring Program, Boric Acid Corrosion Program). Aging management program notebooks and scoping documents developed during the license renewal process are potential inspection resources.

3. Valves are correctly positioned and do not show leakage that would impact the function(s) of any given valve.

4. Valves are locked as required by the licensee's locked valve program.

5. Electrical power is available as required. *For the offsite power system, verify the licensee has established and continues to implement periodic walkdown activities to detect visible open phase conditions for switchyard equipment such as insulators, disconnect switches, and transmission line and transformer connections, associated with the offsite power circuits. [C1]*

6. Major system components are correctly lubricated, cooled, and ventilated.

7. As-built configuration matches plant documentation. For example, isometric drawings reflect the same nomenclature as found in the actual plant labeling.

8. Hangers and supports are correctly installed as designed and are functional.

9. Essential support systems are operational.

10. Ancillary equipment, temporary services, blocked doors, disassembled components, or debris does not interfere with inservice system performance.

11. Boundaries or features intended to mitigate initiating events, such as high-energy line breaks, flooding, fire, and security incidents, remain operable or functional as required.

12. Tagging clearances or maintenance isolation boundaries do not disable required functions.

13. Components subject to harsh environments, including high-energy line breaks, have the appropriate environmental qualification.

14. Components potentially vulnerable to threats such as tornado-generated missiles (e.g., steam exhaust piping, emergency diesel generator exhaust piping) are appropriately protected.

71111.04-04 REFERENCES

IMC 2515, Appendix A, “Risk-Informed Baseline Inspection Program”

IMC 0308, Attachment 2, “Technical Basis for Inspection Program”

IMC 0609, Attachment 4, “Initial Characterization of Findings”

IP 71111.13, “Maintenance Risk Assessments and Emergent Work Control”

IP 71152, “Problem Identification and Resolution”

Cross Reference of Generic Communications to IP 71111.04 and Inspection Resources: http://drupal.nrc.gov/nrr/ope/33980 (nonpublic)

Operating Experience Gateway: http://drupal.nrc.gov/nrr/ope (nonpublic)

IHS Codes and Standards: http://www.internal.nrc.gov/TICS/library/standards/ihs.html (nonpublic)

U.S. Nuclear Regulatory Commission Technical Library: http://www.internal.nrc.gov/TICS/library/index.html (nonpublic)

END

Attachment 1
Revision History for IP 71111.04

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 Information)
N/A	ML003729327 04/03/00 CN 00-003	711111.01 has been issued to provide the minimum inspection oversight for determine the safety performance of operating nuclear power reactors.	None	
N/A	ML020380500 01/17/02 CN 02-001	IP 71111.04 has been revised to provide clarifications to the inspection requirements concerning partial walkdowns and identification and resolution of problems. In addition, inspection resource estimates and level of effort are revised to provide a band for more inspection flexibility.	None	
N/A	ML070370430 02/27/07 CN 07-007	IP 71111.04 has been revised to address feedback form 71111.04-721 to clarify the wording in the Inspection Requirements section to address systems of high risk significance. Revision history reviewed for the last four years.	None	
N/A	ML11201A173 10/28/11 CN 11-025	The sample size for IP 71111.04 has been revised to reflect the 2011 ROP Realignment.	None	
N/A	ML13025A338 04/24/13 CN 13-012	Revised to allow the flexibility to perform one of the two complete system walkdowns outside of the mitigating systems cornerstone.	None	ML13060A500 FF 71111.04-1856

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 Information)
N/A	ML13338A243 09/24/14 CN 14-022	Added additional guidance related to mitigating system sample selection, incorporated ROP Enhancement Initiative Improvements (ML14017A340 & ML14017A381), incorporated license renewal age management guidance, and addressed a Fort Calhoun lesson learned recommendation.	None	ML14233A087 71111.04-1935 ML14266A021 71111.04-1990 ML14266A026 71111.04-2054 ML14266A037
N/A	ML18047A019 12/20/18 CN 18-044	Reformatted inspection procedure. Restored requirement to complete two mitigating system walkdowns.	None	ML18047A017 71111.04-2324 ML18346A566
N/A	ML19291A216 10/05/20 CN 20-049	Added AP1000 inspection requirements. Added reference documents.	None	ML20233A725
C1 SRM-SECY 16-0068	ML21032A255 03/29/21 CN 21-015	Revised to incorporate Commission direction in SRM-SECY-16-0068 to update the ROP to provide periodic oversight of the industry's Open Phase Condition initiative	None	ML21035A181