INSPECTION PROCEDURE 71111 ATTACHMENT 04

EQUIPMENT ALIGNMENT

Effective Date: July 1, 2026

PROGRAM APPLICABILITY: IMC 2515 A

CORNERSTONES: Initiating Events
Mitigating Systems
Barrier Integrity

INSPECTION BASES: See IMC 0308, Attachment 2

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	8 per site	8 to 14 per site	72 to 88 per site 20 to 28 at Vogtle Units 3 & 4
			2 at Vogtle Units 3 & 4	2 to 4 at Vogtle Units 3 & 4	
Complete Walkdown	03.02	Annual	1 per site	1 per site	

* Each partial walkdown sample is budgeted at 7 hours. The complete walkdown sample is budgeted at 16 hours.

71111.04-01 INSPECTION OBJECTIVES

01.01 To verify system alignment and confirm the functionality of system support systems and structural components such as sumps and room plugs/seals, water-tight doors etc.

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.

01.03 To verify that any recently installed temporary modifications that are located on systems that were selected for inspection, have not affected the safety functions of those systems and that the design bases, licensing bases, and performance capability of supporting risk-significant structures, systems, and components (SSCs) have not been degraded by the modifications.

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. If possible and potentially risk significant, select a system or systems that have been changed through recent installation of a temporary or permanent plant modification or may be required to operate during impending adverse weather or potential internal flood conditions.

Since the functionality of a system may be adversely impacted by an inadvertent initiation of a fire protection system or an actual fire, consider verifying the functionality of the fire protection features in fire protection zones of a selected system per IP 71111.05, "Fire Protection" during this inspection.

For additional inspection related insights regarding internal flooding, inspectors should consult the OpE hub and IP 71111.06, "Flood Protection Measures."

Regarding sample selection, the most risk-significant system may not necessarily 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 from both internally and externally generated 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.

Inspection Considerations for Systems and Supporting Structures

Initiating Events Cornerstone—Systems	
Inspection Objective: Identify any equipment alignment or structural 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 activities which leaves only one operating feed pump providing feed water Maintenance activities on structures or support equipment such as water-tight doors, sump pumps, floor seals, expansion joints etc. that could impact the ability of a safety train to properly function under all design conditions Instrument air lineup
Shutdown: Equipment lineups during special tests or evolutions	System lineups prior to 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—Systems	
Inspection Objective: Identify any equipment alignment or structural discrepancies that could impact the availability and functional capability of a risk-significant mitigating system.	
Risk Priority	Examples
Operating: Equipment lineups 1) following system restoration/installation, 2) prior to a system being relied on because the opposite train will be taken out of service, or 3) prior to a system increasing in risk significance because of a proposed plant configuration	Safety trains on the remaining emergency bus when one emergency diesel generator (EDG) is out of service or failed. Prior to or during maintenance activities on structures or support equipment such as water-tight doors, sump pumps, floor seals, expansion joints etc. that could impact the ability of a safety train to properly function under all design conditions
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 Prior to or during maintenance activities on structures or support equipment such as water-tight doors, sump pumps, floor seals, expansion joints, etc. that could impact the ability of a safety train to properly function under all design conditions

Barrier Integrity Cornerstone—Systems	
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

Inspection Considerations for Modifications

Affected Parameter	Inspection Considerations
Energy Needs: • Electricity • Steam • Fuel + Air • Air	Energy requirements supplied by supporting systems when required under accident/event conditions. Energy requirements of modified SSCs will not deprive other SSCs of required energy under accident/event conditions.
Materials/ Replacement Components: • Material Compatibility • Functional Properties • Environmental Qualification • Seismic Qualification • Classification	Materials/replacement components are compatible with physical interfaces. Material/replacement component properties serve functional requirements under accident/event conditions. This includes potential post loss-of-coolant accident debris sources and blockage mitigation. Materials/replacement components are environmentally qualified for application. Replacement components are seismically qualified for application. Code and safety classification of replacement SSCs is consistent with design bases. Replacement schedule consistent with inservice/equipment qualification life. New SSCs added to the plant have been reviewed for inclusion in the maintenance rule scope.
Timing: • Sequence • Response Time • Duration	Sequence changes are bounded by accident analyses and loading on support systems are acceptable. SSC response time is sufficient to serve accident/event functional requirements assumed by design analyses. Modified SSC response time does not cause an unintended interaction with other SSCs. Equipment will be able to function for the duration required under accident/event conditions.
Heat Removal	Heat removal requirements will be addressed by support systems under accident/event conditions.
Control Signals: • Initiation • Shutdown • Control • Logic / Interlocks	Control signals will be appropriate under accident/event conditions.

Affected Parameter	Inspection Considerations
Equipment Protection: • Fire • Flood • Missile • High Energy Line Break • Freeze	Equipment protection barriers and systems have not been compromised.
Operations	Affected operation procedures and training have been identified and necessary changes are in process. Plant simulator has been updated as required. Annunciator and alarm response updated as required.
Flowpaths	Revised flowpaths serve functional requirements under accident/event conditions.
Pressure Boundary	Pressure boundary integrity is not compromised.
Ventilation Boundary	Changes to ventilation boundaries do not increase risk of spreading contamination. Changes to ventilation boundaries do not adversely affect functionality of ventilation system under accident/event conditions.
Structural	Modified SSCs structural integrity acceptable for accident/event conditions. Modified SSCs structural effects upon attachment points acceptable. Modified SSCs effect on seismic evaluations acceptable.
Process Medium: • Fluid Pressures • Fluid Flowrates • Voltages • Currents	Affected process medium properties will be acceptable for both modified SSCs and unmodified SSCs under accident/event conditions.
Licensing Basis: • 10 CFR 50.59	Necessary Technical Specification (TS) changes have been identified and NRC approvals, if required, were obtained prior to modification implementation. Acceptable licensee conclusions for those modifications where evaluations in accordance with 10 CFR 50.59 were not performed.
Failure Modes	Those failure modes introduced by the modification are bounded by existing analyses.

Affected Parameter	Inspection Considerations
Probabilistic Risk Assessment (PRA): • ASME Code Case N-752 • 10 CFR 50.69 • TS Surveillance Frequency Control Program (SFCP) • TS Risk-Informed Completion Time (RICT)	The PRA model is appropriately updated to reflect plant modifications. Note: A regional senior reactor analyst may be contacted if support is needed.

Select systems or trains with a high risk significance for a planned/scheduled or 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:

a. risk-informed insights from site-specific risk studies
b. operator actions and access during potential accident sequences
c. operating experience and NRC generic communications related to the selected system-visit the NRC OpE Hub for further information
d. performance history
e. equipment configuration (e.g., out of service, inoperable, or degraded)
f. past walkdown samples
g. recently realigned equipment following an outage, maintenance, modification, or testing
h. walking down a protected operable train when the other train is out of service
i. systems that may be required to operate during the onset of adverse weather or in response to an internal flooding event.
j. Completed maintenance on support systems or structural components such as floor drain systems, sumps, watertight doors or room plugs.

For AP1000 designs, SSCs classified as regulatory treatment of non-safety systems (RTNSS) should be inspected consistent with how other non-safety-related SSCs are inspected in currently operating plants. Inspectors can select inspection activities involving non-safety-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 should be treated as any other non-safety-related SSCs. Consistent with risk-informed principles, inspectors are expected not to routinely focus inspection resources on RTNSS SSCs and other non-safety-related systems but rather examine these non-safety-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 system for sampling during periods of elevated RNS risk importance.

For each sample, baseline 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

Partially walkdown the system and verify that portions of the selected system/train and support system(s) are correctly aligned and able to perform their intended function(s).

Specific Guidance

a. Inspectors have flexibility in determining the portions of the selected system/train and support systems to be sampled.

b. Consider review of 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.

c. For any discrepancies identified during the partial walkdown, verify whether systems/trains credited as being operable or functional were not rendered inoperable, nonfunctional, or degraded.

d. As appropriate, during the partial walkdown consider the items discussed in Section 03.02c or 03.02f of this document.

03.02 Complete Walkdown Sample

Completely walkdown accessible areas and verify that the selected system and its support systems and structures are correctly aligned and able to perform their intended function(s).

Specific Guidance

a. Consider review of 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. Consider review of any outstanding maintenance work requests on the system and any deficiencies that could affect the system’s ability to perform its function(s).

c. Consider review of any outstanding design issues, including temporary modifications, operator workarounds, and items that are tracked by the engineering department. For any temporary modifications that are installed, consider the following:

1. Review the temporary modification and associated 10 CFR 50.59 documentation against the system design bases documentation, including Updated Final Safety Analysis Report and Technical Specifications (TS). Verify that the modification did not affect system operability/availability.

2. Verify that the installation of the temporary modification (if accessible) is consistent with the modification documents. Also, if applicable, confirm that any temporary modifications have been removed and that the system has been returned to its original configuration.

3. Also, if applicable, verify restoration of the temporary modification (if accessible).

4. Verify configuration control of the modification is adequate by verifying that the plant documents, such as drawings and procedures, are updated including adequacy of applicable procedures.

5. Verify that the temporary modification is identified on Control Room drawings and appropriate tags are placed on equipment being affected by the temporary modifications.

6. Review post-installation test results to confirm that the tests were satisfactory and the actual impact of the temporary modification on the permanent system(s) and interfacing systems have been adequately verified by test. Also, if applicable, review planned testing after removal of the temporary modification. If installation of a temporary modification is in progress or has been installed, verify that modification preparation, staging, and implementation does/did not impair the following:

   (a) In-plant emergency/abnormal operating procedure actions

   (b) Key safety functions

   (c) Operator response to loss of key safety functions

d. For the selected system, inspectors should walk down all normally accessible areas. For planning purposes, inspectors should coordinate with the licensee to allow for walkdowns of normally inaccessible areas should they become accessible. However, the inspection schedule is not required to be developed solely based on the availability of normally inaccessible areas. In addition, it is not the intent to force licensees to make a normally inaccessible area of the plant accessible or to place inspectors in harm's way unnecessarily during performance of this inspection sample. Consider review of 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. IMC 2515, Appendix D, "Plant Status," contains additional guidance on normally inaccessible areas.

e. For any discrepancies identified during the complete walkdown, verify whether systems/trains credited as being operable or functional were rendered inoperable, nonfunctional, or degraded.

f. Consider 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. Support systems such as drainage and fire protection systems, and structures that provide flood protection, such as flood doors are functional and capable of meeting their design requirements.

2. When applicable, degraded SSCs have been entered into the licensee's corrective action program at the appropriate threshold, and, when applicable, degraded SSCs, including degraded insulation which potentially can result in corrosion under insulation, 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. If installation of a permanent plant modification is in progress, verify that modification preparation, and staging, does not impair the following:

   (a) In-plant emergency/abnormal operating procedure actions

   (b) Key safety functions

   (c) Operator response to loss of key safety functions

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

9. Essential support systems such as ventilation, fire protection, sumps and floor drainage systems are operational.

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

11. Boundaries or features such as floor seals or plugs, sumps, alarm systems that are intended to mitigate initiating events, 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, or radiation fields, 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 0308, Attachment 2, “Technical Basis for Inspection Program”

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

IP 71111, “Reactor Safety-Initiating Events, Mitigating Systems, Barrier Integrity”

IP 71111.05, “Fire Protection”

IP 71111.06, “Flood Protection Measures”

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, available at Microsoft Power BI (powerbigov.us) (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	71111 has been issued to provide the minimum inspection oversight to 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
N/A	ML22123A169 08/01/22 CN 22-015	Samples revised per NRR direction using Enclosure 2 (ML19070A040) of SECY-19-0067 (ML19070A050) as guidance.	None	N/A Issued as final.
N/A	ML23121A148 09/19/23 CN 23-028	Revised to 1) address OIG Case Number 20-025 as discussed in Enclosure 1 of the NRC staff's response (ML22108A161), and 2) clarify requirements vs guidance per OIG-16-A-12 (ML16097A515).	None	ML23173A142

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)
	ML25345A230 05/01/26 CN 26-017	Added additional internal flood inspection guidance that was derived, in part, from IP 71111.06, “Flood Protection Measures.” Added inspection guidance for reviewing temporary plant modifications that may be installed or are in the process of being installed from IP 71111.18, “Plant Modifications.” Adjusted inspection samples/hours. These revisions were recommended as a result of the ADVANCE Act 507 Report to Congress that discussed the revision of the ROP Baseline Inspection Program and are summarized in ML25247A050.	N/A	ML25274A088