

## ATTACHMENT 71111.ST

INSPECTABLE AREA: Post-Maintenance and Surveillance Testing - Pilot

CORNERSTONES:

Post-Maintenance Testing	Surveillance Testing
Mitigating Systems (90%)	Mitigating Systems (95%)
Barrier Integrity (10%)	Barrier Integrity (5%)

INSPECTION BASES: Inadequate maintenance activities that are not detected prior to returning the equipment to service can result in a significant increase in unidentified risk for the subject system.

Inspection of the surveillance testing area ensures that safety systems are capable of performing their safety function and would support the Mitigating Systems and Barrier Integrity Cornerstones. The failure to identify and resolve performance degradation of structures, systems and components, could result in long periods of unknown equipment unavailability.

These inspectable areas verify aspects of the mitigating system and barrier integrity cornerstones not measured by performance indicators.

LEVEL OF EFFORT: Review 32-40 post-maintenance and surveillance testing activities in a year. Although the number of required samples is an annual goal, inspect a minimum of four post maintenance testing (PMT) samples and four surveillance testing (ST) samples each quarter to ensure a reasonable distribution throughout the year. For multi unit sites, attempts should be made to evenly balance the PMT and ST samples between each unit on site. Where special conditions or circumstances warrant, such as unit specific PMT or ST deficiencies, deviations from evenly balanced samples may be appropriate.

### 71111.ST-01 INSPECTION OBJECTIVE

01.01 The inspection of PMT activities will verify that the post-maintenance test procedures and test activities are adequate to verify system operability, and functional capability. The inspection of ST activities will focus on verifying that surveillance testing (including inservice testing) of risk-significant structures, systems, and components (SSCs) are capable of performing their intended safety functions and assessing their operational readiness.

## 71111.ST-02 INSPECTION REQUIREMENTS

02.01 Inspection Planning. Select at least four post-maintenance testing activities each calendar quarter that affect risk significant systems or components. Sufficient preparation time should be devoted to reviews of deficiency identification and maintenance documents, and discussions with plant personnel to understand the scope and details of the maintenance activity performed. Attempt to select activities related to risk significant systems or components with a recent record of performance problems and complex maintenance activities.

Select at least four risk-significant surveillance activities each calendar quarter based risk information, and the guidance contained in the inspection guidance, Section 03. Every quarter select one inservice testing (IST) activity for a risk-significant pump or valve as one of the surveillance activities. Consider selection of the IST activity based on the component performance history (known deficiencies), or if the component had recently undergone corrective or preventive maintenance.

Include one or two containment isolation valves each refueling cycle as part of the surveillance testing samples. Also, for ice condenser containment design sites, select one or two ice condenser system surveillances to observe during each refueling outage as part of the surveillance testing samples.

Note: Review of post maintenance testing activities is generally less time consuming than the review of surveillance testing activities.

### 02.02 Post Maintenance Testing Inspection Activity

- a. For each testing activity selected, identify the affected system(s) and/or component(s), and:
  1. Review applicable licensing basis and/or design-basis documents to identify the safety function(s) of the affected system(s) and/or component(s);
  2. Review the associated maintenance activity, to identify the safety function(s) that may have been affected by that activity; and
  3. Review the licensee's test procedure to verify that the procedure adequately tests the safety function(s) that may have been affected by the maintenance activity, that the acceptance criteria in the procedure are consistent with information in the applicable licensing basis and/or design-basis documents, and that the procedure has been properly reviewed and approved.
- b. Either witness the test and/or review the test data, to verify that:
  1. The performance of the affected system(s) and/or component(s) satisfies the procedure's acceptance criteria;
  2. The effects of testing on the plant have been adequately addressed;

3. The measuring and test equipment is calibrated, and is within its current calibration cycle;
4. The measuring and test equipment used is within its required range and accuracy;
5. The applicable prerequisites described in the test procedure are satisfied;
6. The affected systems or components are removed from service in accordance with approved procedures;
7. The test is performed in accordance with the test procedure and other applicable procedures;
8. Jumpers installed and/or leads lifted during testing are controlled and restored;
9. The test data/results are accurate, complete, and valid;
10. The test equipment is removed after testing;
11. After completion of testing, equipment is returned to the positions/status required to maintain the system operable, in accordance with the current operating mode using approved procedures;
12. Any problems noted during testing are appropriately documented.

Note: Licensee PMT is often conducted by performing a related, existing surveillance procedure for operability determination. Inspectors should assure that the testing performed not only provides a snapshot of SSC operability, but actually evaluates the adequacy of the maintenance or repairs to the SSC being tested.

Note: As a minimum, perform a review of the completed test procedure and the recorded data. However, for most inspection samples the inspector should also attend the prejob briefing, witness the test when it's performed, and attend any post-test critiques, as applicable.

#### 02.03 Surveillance Testing Inspection Activity

- a. Verify by witnessing surveillance tests and/or reviewing the test data, that SSCs selected meet the Technical Specifications, Updated Final Safety Analysis Report (UFSAR), and licensee procedure requirements, and demonstrate that the SSCs are capable of performing their intended safety functions (under conditions as close as practical to accident conditions or as required by Technical Specifications) and their operational readiness.
- b. Significant surveillance test attributes for consideration include the following:
  1. Preconditioning does not occur.

2. Effect of testing on the plant has been adequately addressed by control room and/or engineering personnel.
3. Acceptance criteria is clear and demonstrates operational readiness and is consistent with the supporting design calculations and other licensing documents.
4. Measuring and test equipment range and accuracy are consistent with the application and has current calibration. Verify the plant equipment calibration is correct, accurate, properly documented and the calibration frequency is in accordance with TS, UFSAR, licensee procedures and commitments.
5. Test is performed in sequence and in accordance with written procedure.
6. Jumpers installed or leads lifted during testing are properly controlled.
7. Test data is complete, verified and meets procedure requirements.
8. Test frequency was adequate to demonstrate operability (meets Technical Specification requirements), and reliability.
9. Test equipment is removed after testing.
10. After completion of testing, equipment is returned to the positions/status required for the performance of its safety function.
11. For IST activities, testing methods, acceptance criteria, and required corrective actions are in accordance with the applicable version of the ASME Code, Section XI. Review reference values or changes to reference values for consistency with the design bases.
12. For test results that do not meet the acceptance criteria, results of an adequate operability determination are acceptable.
13. For selected safety related instrumentation and control surveillance test (i.e. RPS, NIs, etc.) verify that reference setting data has been accurately incorporated to the test procedure.

02.04 Problem Identification and Resolution. Verify that the licensee is identifying post-maintenance and surveillance testing problems at an appropriate threshold and entering them in the corrective action program. For a sample of significant post-maintenance and surveillance test problems documented in the corrective action program, verify that the licensee has identified and implemented appropriate corrective actions. See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

#### 71111.ST-03 INSPECTION GUIDANCE

The following tables outline general inspection guidance for Post-Maintenance and Surveillance testing.



### POST-MAINTENANCE TESTING GUIDANCE

Cornerstone	Inspection Objective	Risk Priority	Example
Mitigating Systems Barrier Integrity	Identify any system, credited by the licensee as operable or available, which is adversely impacted by failure to adequately test, realign, or remove test equipment after maintenance.	<p>Select activities with potential for common mode failures and activities where there is a recent record of maintenance &amp; testing errors.</p> <p>Select activities across technical disciplines [electrical, mechanical, I&amp;C]</p> <p>Select activities that are more difficult to test at power.</p>	<p>Post maintenance testing of:</p> <p>on-line emergency diesel generator engine repairs</p> <p>newly installed electrical/instrumentation components that control integrated multiple systems, for example LOOP/LOCA circuits</p> <p>containment air lock leakage</p>

## SURVEILLANCE TESTING GUIDANCE

Cornerstone	Inspection Objective	Risk Priority	Example
Mitigating Systems	Identify any mitigating system, credited by the licensee as operable when assessing risk, which is adversely impacted by surveillance testing related failures such as failure to adequately test, failure to meet test criteria or, failure to realign equipment after the surveillance.	<p>Focus in areas with potential for common mode failures.</p> <p>Select surveillance tests which cross technical disciplines (electrical, mechanical, I&amp;C)</p> <p>IST of pumps and valves that perform important functions in mitigating systems.<sup>1</sup></p>	<p>Integrated safeguards testing</p> <p>Emergency diesel start/load testing</p> <p>Battery performance testing</p> <p>Reactor protection and safety injection instrumentation testing</p> <p>Safety bus loss of voltage and degraded voltage relay testing</p> <p>Pumps that provide injection water flow and valves that change position to provide injection water flow to the reactor coolant system.</p>
Barrier Integrity	Identify any containment integrity supporting system, credited by the licensee as operable when assessing risk, which is adversely impacted by surveillance test failures such as failure to adequately test, failure to meet test criteria or failure to realign equipment after the test.		Containment isolation valve testing, ventilation/filtration system testing

<sup>1</sup> For additional guidance on IST inspection refer to IP 73756, "Inservice Testing of Pumps and Valves" and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

#### 71111.ST-04      RESOURCE ESTIMATE

The annual resource expenditure is estimated to be 56 to 70 hours for the review of post-maintenance testing activities at a site regardless of the number of reactor units at that site.

The annual resource expenditure is estimated to be 56 to 70 hours for the review of surveillance testing activities at a site regardless of the number of reactor units at that site.

#### 71111.ST-05      COMPLETION STATUS

Inspection of the minimum sample size will constitute completion of this procedure in the Reactor Programs Systems (RPS). That minimum sample size will consist of 16 post-maintenance testing activities and 16 surveillance testing activities in a year regardless of the number of reactor units at the given site.

During the pilot, samples for post-maintenance testing activities will be recorded under 71111.19 in RPS.

During the pilot, samples for surveillance testing activities will be recorded under 71111.22 in RPS.

#### 71111.ST-06      REFERENCES

Inspection Procedure 71111.12, "Maintenance Rule Implementation"

Inspection Procedure 71111.13, "Maintenance Risk Assessments and Emergent Work Control"

Inspection Procedure 73756, "Inservice Testing of Pumps and Valves"

Inspection procedure 61720, "Containment Local Leak Rate Testing"

Inspection Procedure 71152, "Identification and Resolution of Problems"

Bulletin 88-04, "Potential Safety-Related Pump Loss," May 5, 1988.

Code of Federal Regulations, Title 10, Part 50, Section 50.55a, "Codes and Standards."

Generic Letter 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," April 3, 1989.

Information Notice 97-90, "Use of Nonconservative Acceptance Criteria in Safety-Related Pump Surveillance Tests," December 30, 1997

10CFR50, Appendix J including Option B.

NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants"



ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components"

Inspection Manual Part 9900, Technical guidance, "Maintenance - Preconditioning of Structures, Systems, and Components Before Determining Operability"

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