

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 71111 ATTACHMENT 18

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### PLANT MODIFICATIONS

Effective Date: January 1, 2017

INSPECTABLE AREA: Plant Modifications

CORNERSTONES: Initiating Events  
Mitigating Systems  
Barrier Integrity

INSPECTION BASES: Modifications to risk-significant structures, systems, and components (SSCs) can adversely affect their availability, reliability, or functional capability. Modifications to one system may also affect the design bases and functioning of interfacing systems. Similar modifications to several systems could introduce potential for common cause failures that affect plant risk. A temporary modification may result in a departure from the design basis and system success criteria. Modifications performed during increased risk configurations could place the plant in an unsafe condition. This inspectable area verifies aspects of the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstones for which there are no indicators to measure performance. Potential issues regarding the impact that changes have on Emergency Preparedness and Security should be raised and addressed under their respective Inspection Programs.

LEVEL OF EFFORT: Annually, review 3 to 7 temporary and/or permanent modifications as described in Section 71111.18-02.

#### 71111.18-01 INSPECTION OBJECTIVE

This inspection will verify that modifications have not affected the safety functions of important safety systems. To verify that the design bases, licensing bases, and performance capability of risk significant SSCs have not been degraded through modifications. To verify that modifications performed during increased risk-significant configurations do not place the plant in an unsafe condition.

## 71111.18-02 INSPECTION REQUIREMENTS

### 02.01 Selection of Temporary and Permanent Modifications

Inspectors shall use risked informed insights together with other factors, such as engineering analysis and judgment, and performance history, to determine which temporary and permanent modifications will be selected for review.

### 02.02 Inspection

NOTE: NEI 96-07, Revision 1, Appendix E shall not be used by NRC staff in evaluating compliance with the provisions of 10 CFR 50.59.

#### a. Temporary modifications.

1. Review the temporary modifications and associated 10 CFR 50.59 screening against the system design bases documentation, including Updated Final Safety Analysis Report (UFSAR) and Technical Specifications (TS). Verify that the modifications have not affected system operability/availability.
2. Verify that the installation of the temporary modifications (if accessible) are consistent with the modification documents. Also, if applicable, verify restoration of the temporary modification (if accessible).
3. Verify configuration control of the modification is adequate by verifying that the plant documents, such as drawings and procedures are updated including adequacy of operating and maintenance procedures.
4. Verify that temporary modifications are identified on Control Room drawings and appropriate tags are placed on equipment being affected by the temporary modifications.
5. Review post-installation test results to confirm that the tests are satisfactory and the actual impact of the temporary modifications on the permanent systems and interfacing systems have been adequately verified by test. Also, if applicable, review planned testing after removal of the temporary modifications.

#### b. Permanent modifications.

1. Verify the design adequacy of the modification.
2. Verify that modification preparation, staging, and implementation 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

3. Verify that post-modification testing will maintain the plant in a safe configuration during testing. Verify that post-modification testing establishes operability.
4. (Optional) Verify that design and licensing documents have either been updated or are in the process of being updated to reflect the modifications. Verify that significant plant procedures are updated to reflect the effects of the modification prior to being used.

02.03 Problem Identification and Resolution. Verify that problems associated with modifications are being identified by the licensee at an appropriate threshold and are properly addressed for resolution in the licensee corrective action program. (Optional) In addition to the above, verify appropriateness of the corrective actions for selected sample of problems documented by the licensee involving plant modifications.

#### 71111.18-03 INSPECTION GUIDANCE

##### 03.01 Selection of Temporary and Permanent Modifications

Preference should be given to reviewing modifications as they occur and that occur during at power operations or increased shutdown risk configurations.

- a. Selected temporary modifications may include jumpers, lifted leads, temporary systems, repairs, design modifications and procedure changes which can introduce changes to plant design or operations. Although the focus of this inspection is on active modifications, inspectors may choose to review a recently removed temporary modification for adequate restoration and testing. The focus should be on identifying temporary modifications not previously identified by the licensee if there is no existing program tasked with making interested parties aware of the existence of all temporary modifications. See Table A, "Sample Selection of Temporary Modifications" for additional guidance.
- b. Selected permanent modifications may include permanent plant changes, design changes, set point changes, procedure changes, aging management changes, equivalency evaluations, suitability analyses, calculations, and commercial grade dedications. See Table B, "Sample Selection of Permanent Modifications" for additional guidance.

TABLE A – Sample Selection of Temporary Modifications

<u>Cornerstone</u>	<u>Inspection Objective</u>	<u>Risk Priority</u>	<u>Example</u>
Mitigating Systems	<p>Identify temporary modifications which could affect the design basis or the functional capability of plant mitigating systems</p> <p>Emphasize modifications which affect high safety significant Maintenance Rule SSCs/functions or modifications which affect SSCs/functions with high PRA rankings</p>	<p>Temporary modifications which could affect the design bases and functional capability of interfacing systems</p>	<p>Use of alternate material when specified replacement parts are not available</p> <p>During outages: Temporary electrical power to equipment required to minimize shutdown risk</p> <p>Alternate water sources for equipment cooling or fire protection of equipment required to minimize shutdown risk</p>
Barrier Integrity	<p>Identify temporary modifications which could affect the design basis or the functional capability of containment or reactor coolant system boundaries</p>	<p>Multiple temporary modifications to a single system or train, especially during outages</p> <p>Temporary modifications which require operator workarounds</p>	<p>Temporary changes to containment isolation motor operated valve designs.</p> <p>During outages: Temporary power improperly routed into containment when the ability to establish containment integrity is still required.</p>

TABLE B – Sample Selection of Permanent Modifications

<u>Cornerstone</u>	<u>Inspection Objective</u>	<u>Risk Priority</u>	<u>Examples</u>
Initiating Events	Verify modifications have maintained system availability, reliability, and functional capability.	Modifications that increase the likelihood of initiating events	Modifications to reactor coolant pressure boundary  Modifications to switchyard or feedwater controls
Mitigating Systems		Modifications which affect <ul style="list-style-type: none"> <li>• protection against external events such as fire, weather, and flooding</li> <li>• risk-significant design features and assumptions</li> <li>• functionality of mitigating systems used during risk-significant accident sequences</li> </ul>	Modification of reactor building drain system  Replacement of a low pressure safety injection system injection valve with a valve of a different design
Barrier Integrity		Modifications which affect fuel cladding, reactor coolant system, or containment	Modification of personnel access hatch seal

03.02 Inspection

Regulatory Guide (RG) 1.187 “Guidance for Implementation of 10 CFR 50.59, Changes, Test, and Experiments,” states that Revision 1 of Nuclear Energy Institute (NEI) 96-07, “Guidelines for 10 CFR 50.59 Evaluations” provides methods that are acceptable to the NRC staff for complying with the provisions of 10 CFR 50.59. NEI has also published a NEI 96-07, Revision 1, Appendix E, “User’s Guide for NEI 96-7, Revision 1, Guidelines for 10 CFR 50.59 Implementation.” However, NEI 96-07, Revision 1, Appendix E has not been reviewed or endorsed by the NRC. If needed, questions regarding potential 10 CFR 50.59 issues as a result of a licensee’s use of Appendix E can be raised with the DORL PM.

The review of the design aspects of the modification should focus on conformance to relevant design criteria not the programmatic elements of licensee programs. See Table C, “Inspection Guidance for Parameters Affected by Modification” for additional guidance. Consider informing the Regional Senior Reactor Analyst if the plant modification added or deleted functions that could affect the plant specific significance determination process worksheets.

The review of the installation (and, if applicable, the restoration from a temporary modification) ensures that the impact on the operation of other equipment is what is expected and previously analyzed, and to verify all other unexpected effects were subsequently evaluated with the results being there is no significant impact on the safe operation of plant or equipment.

The review of the post-installation test results is to ensure that the parent system remains operable and that its safety function has not been impaired. Licensees often use existing procedures, such as surveillance procedures, for post-modification testing. Although performance of existing procedures may have been reviewed by inspectors for other inspectable areas, inspectors should consider the appropriateness of using the existing procedures for validating the modification (as opposed to simply confirming continued operability).

In addition, for temporary modifications, identification of temporary modifications on drawings and at placement of appropriate tags equipment being affected by the temporary modification should make operators aware of their impact on the operation of plant equipment and components. The synergistic effects of outstanding temporary modifications is best judged based on whether there are new impediments to the safety functions of mitigating safety systems, degradation of radiological barriers, an increase in the likelihood or consequences of accidents previously evaluated in the FSAR, or the possibility for an accident of a different type than any previously evaluated in the final safety analysis report.

If an optional document and procedure updating review is conducted, examples of design documents which could be affected by modifications are: UFSAR, drawings, supporting calculations and analyses, plant equipment lists, and vendor manuals. Examples of significant plant procedures which could be affected by modifications are normal, abnormal, alarm response, and emergency operating procedures, severe accident management guidelines, testing and surveillance procedures, and licensed operator training manuals.

Table C contains a list of parameters potentially affected by the modification. Consider inspecting only those parameters which are significant for the particular modification being reviewed.

TABLE C – Inspection Guidance for Parameters Affected by Modification

<u>Affected Parameter</u>	<u>Inspection Considerations</u>
<u>Energy Needs</u> <ul style="list-style-type: none"> <li>• <u>Electricity</u></li> <li>• <u>Steam</u></li> <li>• <u>Fuel + Air</u></li> <li>• <u>Air</u></li> </ul>	<u>Energy requirements supplied by supporting systems when required under accident/event conditions.</u>  <u>Energy requirements of modified SSCs will not deprive other SSCs of required energy under accident/event conditions.</u>

<u>Affected Parameter</u>	<u>Inspection Considerations</u>
<u>Materials/ Replacement Components</u> <ul style="list-style-type: none"> <li>• <u>Material Compatibility</u></li> <li>• <u>Functional Properties</u></li> <li>• <u>Environmental Qualification</u></li> <li>• <u>Seismic Qualification</u></li> <li>• <u>Classification</u></li> </ul>	<u>Materials/replacement components are compatible with physical interfaces.</u>  <u>Material/replacement component properties serve functional requirements under accident/event conditions. This includes potential post LOCA debris sources and blockage mitigation.</u>  <u>Materials/replacement components are environmentally qualified for application.</u>  <u>Replacement components are seismically qualified for application.</u>  <u>Code and safety classification of replacement SSCs is consistent with design bases.</u>  <u>Replacement schedule consistent with inservice/equipment qualification life.</u>  <u>New SSCs added to the plant have been reviewed for inclusion in the maintenance rule scope.</u>
<u>Timing</u> <ul style="list-style-type: none"> <li>• <u>Sequence</u></li> <li>• <u>Response Time</u></li> <li>• <u>Duration</u></li> </ul>	<u>Sequence changes are bounded by accident analyses and loading on support systems are acceptable.</u>  <u>SSC response time is sufficient to serve accident/event functional requirements assumed by design analyses.</u>  <u>Modified SSC response time does not cause an unintended interaction with other SSCs.</u>  <u>Equipment will be able to function for the duration required under accident/event conditions.</u>
<u>Heat Removal</u>	<u>Heat removal requirements will be addressed by support systems under accident/event conditions.</u>
<u>Control Signals</u> <ul style="list-style-type: none"> <li>• <u>Initiation</u></li> <li>• <u>Shutdown</u></li> <li>• <u>Control</u></li> <li>• <u>Logic / Interlocks</u></li> </ul>	<u>Control signals will be appropriate under accident/event conditions.</u>

<u>Affected Parameter</u>	<u>Inspection Considerations</u>
<u>Equipment Protection</u> <ul style="list-style-type: none"> <li>• <u>Fire</u></li> <li>• <u>Flood</u></li> <li>• <u>Missile</u></li> <li>• <u>High Energy Line Break</u></li> <li>• <u>Freeze</u></li> </ul>	<u>Equipment protection barriers and systems have not been compromised.</u>
<u>Operations</u>	<u>Affected operation procedures and training have been identified and necessary changes are in process.</u>  <u>Plant simulator has been updated as required.</u>  <u>Annunciator and alarm response updated as required.</u>
<u>Flowpaths</u>	<u>Revised flowpaths serve functional requirements under accident/event conditions.</u>
<u>Pressure Boundary</u>	<u>Pressure boundary integrity is not compromised.</u>
<u>Ventilation Boundary</u>	<u>Changes to ventilation boundaries do not increase risk of spreading contamination.</u>  <u>Changes to ventilation boundaries do not adversely affect functionality of ventilation system under accident/event conditions.</u>
<u>Structural</u>	<u>Modified SSCs structural integrity acceptable for accident/event conditions.</u>  <u>Modified SSCs structural effects upon attachment points acceptable.</u>  <u>Modified SSCs effect on seismic evaluations acceptable.</u>
<u>Process Medium</u> <ul style="list-style-type: none"> <li>• <u>Fluid Pressures</u></li> <li>• <u>Fluid Flowrates</u></li> <li>• <u>Voltages</u></li> <li>• <u>Currents</u></li> </ul>	<u>Afected process medium properties will be acceptable for both modified SSCs and unmodified SSCs under accident/event conditions.</u>
<u>Licensing Basis</u> <ul style="list-style-type: none"> <li>• <u>10 CFR 50.59</u></li> </ul>	<u>Necessary Technical Specification changes have been identified and NRC approvals, if required, were obtained prior to modification implementation.</u>  <u>Acceptability of licensee's conclusions for those modifications where evaluations in accordance with 10 CFR 50.59 were not performed.</u>
<u>Failure Modes</u>	<u>Failure modes introduced by the modification are bounded by existing analyses.</u>



### 03.03 Problem Identification and Resolution

See Inspection Procedure (IP) 71152, "Problem Identification and Resolution," for additional guidance.

#### 71111.18-04 RESOURCE ESTIMATE

The inspection procedure is estimated to take 36 to 48 hours a year at a site regardless of the number of units.

#### 71111.18-05 PROCEDURE COMPLETION

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 3 temporary and/or permanent modification reviews. Refer to IMC 2515, "Light-Water Reactor Inspection Program - Operations Phase" for further guidance on procedure completion.

#### 71111.18-06 REFERENCES

IP 71111.17, "Permanent Plant Modifications"

IP 71152, "Problem Identification and Resolution"

IMC 2515, "Light-Water Reactor Inspection Program - Operations Phase"

10 CFR 50.59, "Changes, tests, and experiments."

NRC Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Test, and Experiments," Nov 2000 (ML003759710).

NEI 96-07, Revision 1, "Guidelines for 10 CFR 50.59 Evaluations," Nov 2000 (ML003771157).

[Reactor Oversight Process Changes to Address Severe Accident Management Guidelines with Enclosure containing Commitment Letters by Site \(ML16032A029\).](#)

[RIS 2016-03, "10 CFR 50.59 Issues Identified in NRC's San Onofre Steam Generator Tube Degradation Lessons Learned Report," April 2016. \(ML15196A575\)](#)

END

Attachment 1 – Revision History for IP 71111.18

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number (Pre-Decisional, Non-Public)
N/A	01/31/08 <a href="#">CN 08-005</a> <a href="#">ML073050453</a>	New procedure. Combined contents of IP 71111.17A and IP 71111.23 into IP 71111.18	No	N/A
N/A	10/31/08 <a href="#">CN 08-031</a> <a href="#">ML082670330</a>	Revise to include consideration of GS –191 issue related to potential sump blockage. Editorial.	No	N/A
N/A	12/21/10 <a href="#">CN 10-028</a> <a href="#">ML101320542</a>	Changed the minimum sample requirement from 3 temporary and 1 permanent modification reviews to 3 to 7 temporary and/or permanent modifications (feedback form 71111.18-1475).	No	N/A

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number (Pre-Decisional, Non-Public)
N/A	<a href="#">ML15208A031</a> 11/13/15 CN 15-024	<p>Revisions are made in order to: (1) ensure that security related issues identified as a result of changes are raised so that they may be considered under the Security Inspection Program; (2) ensure that there is awareness that changes to aging management programs associated with 10 CFR 54.21(d) are within scope of this IP; and (3) ensure that there is awareness that NEI 96-07, Revision 1, Appendix E has not been reviewed or endorsed by the NRC.</p> <p>Feedback forms incorporated into this revision: 71111.17-2145.</p> <p>Feedback forms reviewed but not incorporated: 71111.18-1851, 2063, and 2110.</p>	No	<a href="#">ML15208A095</a> 71111.18-1851 <a href="#">ML15306A013</a> 71111.18-2063 <a href="#">ML15306A015</a> 71111.18-2110 <a href="#">ML15306A017</a> 71111.17T-2145 <a href="#">ML15306A011</a>

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number (Pre-Decisional, Non-Public)
N/A	ML16306A185 11/17/16 CN 16-031	<p>Revisions are made to:</p> <p>(1) Provide oversight of licensee commitments to consider Severe Accident Management Guidelines (SAMGs) within plant configuration management processes in order to ensure that the SAMGs reflect changes to the facility over time. Additional background information can be found in SRM SECY-15-0065 (ML15239A767) and a February 23, 2016 letter from the NRC to NEI (ML16032A029). The February 23, 2016 letter, which also references the SRM, is added to the References section.</p> <p>(2) Address use of mandatory and discretionary language concerns and recommendations found in OIG-16-A-12 (ML16097A515).</p>	No	ML16146A057  71111.18-2212 ML16188A244