ATTACHMENT 71111.06

INSPECTABLE AREA: Flood Protection Measures

CORNERSTONES: Initiating Events
Mitigating Systems

INSPECTION BASES: Flooding due to internal causes has been shown to be a significant contributor to risk at some facilities. Flooding has the potential to make multiple trains of equipment and support equipment inoperable. Flooding may also affect operator mitigation and recovery actions.

LEVEL OF EFFORT: Annually, perform 2 samples for internal flooding. Each inspection sample should consist of at least 1 internal flooding area. The selected area could consist of one room or multiple rooms depending upon plant layout.

In addition, perform an annual review of cables located in underground bunkers/manholes. The annual review should assess 2 to 4 bunkers/manholes.

71111.06-01 INSPECTION OBJECTIVE

01.01 This inspection will focus on verifying that the licensee's flooding mitigation plans and equipment are consistent with the licensee's design requirements and the risk analysis assumptions.

71111.06-02 INSPECTION REQUIREMENTS

02.01 Document Review and Inspection Area Selection.

a. Review the final safety analysis report (FSAR) and related flood analysis documents to identify those areas that can be affected by internal flooding, including water intake facilities. Review licensee documentation that shows the design flood levels for areas containing safety-related equipment. Review problem reports and corrective actions for past flooding events.

b. Based on licensee's flooding risk studies, select plant areas containing risk significant structures, systems, and components (SSCs) which are susceptible to flooding.

c. Select bunkers/manholes subject to flooding that contain multiple train or multiple risk-significant cables. Bunkers/manholes containing more risk-

significant cables should be inspected prior to those containing less risk-significant cables. Inspectors should rotate through the bunkers/manholes until all are inspected; and then the cycle should be recommenced.

02.02 Inspection Activities.

a. Walkdown the selected area(s) or room(s). By observation/design review, including reviews of preventive maintenance (PM) activities, consider the following attributes. Give priority to those attributes which are risk significant for the site specific installation:

1. Sealing of equipment below the floodline, such as electrical conduits.

2. Sealing of equipment floor plugs, holes or penetrations in floors and walls between flood areas.

3. Adequacy of watertight doors between flood areas.

4. Common drain system and sumps, including floor drain piping and check valves where credited for isolation of flood areas within plant buildings.

5. Verify that the drain system has adequate protection (screens/covers) to prevent debris from disabling the drain system or components in the drain system.

6. Operable sump pumps, level alarm and control circuits including maintenance and calibrations of flood protection equipment.

7. Sources of potential internal flooding that are not analyzed or not adequately maintained, for example failure of flexible piping expansion joints, failure of fire protection system sprinklers, roof leaks, rest room backups, and failure of service water lines.

8. Condition and availability of temporary or removable flood barriers (i.e., gaskets).

9. Verify critical equipment such as equipment necessary to perform Emergency Operating Procedure (EOP) actions, is not below the maximum room water level calculated for flooding events as described in EOPs (as applicable).

b. For those areas where operator actions are credited, verify that the procedures such as abnormal or emergency procedures for coping with flooding can reasonably be used to achieve the desired actions, including whether the flooding event could limit or preclude the required operator actions.

c. Inspect underground bunkers/manholes subject to flooding that contain cables whose failure could disable risk-significant equipment. Two (2) to four (4) bunkers/manholes should be inspected on an annual basis under this

procedure. Inspectors should rotate through the bunkers/manholes until all are inspected; and then the cycle should be recommenced.

NOTE: Inspection efforts should not create undue burden on the licensee. The intent is to coordinate bunker/manhole access in advance in order to minimize the impact on licensees. Whenever possible, inspection activities should be arranged such that NRC inspectors accompany plant personnel on the licensee's periodic inspections. If necessary, boroscopes/cameras can be used to inspect the bunkers/manholes in lieu of bunker/manhole cover removal. Additional guidance on reviews/tours of normally inaccessible areas is provided in Inspection Manual Chapter 2515, Appendix D.

1. Verify by direct observation that the cables are not submerged in water.

2. Verify by direct observation that cables and/or splices appear intact. Observe the condition of cable support structures. Verify the integrity of cables with degraded or missing support structures.

3. If applicable, verify proper dewatering device (sump pump) operation and verify level alarm circuits are set appropriately to ensure that the cables will not be submerged. If dewatering devices are not installed, determine whether drainage is provided and is functioning for the bunkers/manholes selected. If the bunkers/manholes have neither installed, ensure that the cables are in an environment that they are qualified for.

4. Inspections only need to be detailed enough to determine the condition of the cables located within the bunker/manhole. If problems are identified, or questions arise during the course of the inspection, inspectors should contact the Electrical Branch (EEEB) in NRR for guidance. EEEB will assist the inspectors in the determination of the acceptability or unacceptability of any problems.

02.03 Problem Identification and Resolution.

Flooding has the potential to cause common mode failure of equipment in multiple areas. Verify that the licensee has entered the problems identified during the inspection in the licensee's corrective action program. Verify that the licensee is identifying issues at an appropriate threshold and entering them in the corrective action program. Verify that problems included in the licensee's corrective action program are properly addressed for resolution. See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

71111.06-03 INSPECTION GUIDANCE

Cornerstone	Inspection Objective	Risk Priority	Example
Initiating Events	Identify internal flooding which could cause initiating events	Potentials for common-cause failures Barriers between flood areas Unanalyzed sources of internal flooding Areas below the flood plane	Adequate maintenance of expansion joints on high volume/low pressure systems Firewater sprinkler maintenance Unusual testing configurations for large volume water systems
Mitigating Systems	Identify internal flooding events which could cause loss of safe-shutdown equipment	Locations containing high volume/low pressure systems, such as firewater, service water and component cooling water, especially in areas contain flexible piping expansion joints	Water-tight doors, sump pumps, and alarms Adequate sealing of safe-shutdown electrical equipment below the flood line Check valves in open drain systems common to different flood areas

71111.06-04 RESOURCE ESTIMATE

The annual resource expenditure for this inspection procedure is estimated to be 17 to 23 hours to review internal flood protection features based on inspector's discretion at a site regardless of the number of units at that site.

71111.06-05 COMPLETION STATUS

Inspection of the minimum sample size will constitute completion of this procedure in the Reactor Program System (RPS). That minimum sample size will consist of 2 internal flooding samples per section 02.02 of this procedure in a year, and 1 review of cables located in underground bunkers/manholes per section 02.02, regardless of the number of reactor units at a site.

71111.06-06 REFERENCES

Inspection Procedure 71152, “Identification and Resolution of Problems.”

Regulatory Guide 1.102, “Flood Protection for Nuclear Power Plants.”

Circular 78-06, “Potential Common Mode Flooding of ECCS Equipment Rooms at BWR Facilities,” May 31, 1978.

Information Notice 83-44, “Potential Damage to Redundant Safety Equipment as a Result of Backflow Through the Equipment and Floor Drain System,” July 1, 1983.

Information Notice 83-44s1, “Potential Damage to Redundant Safety Equipment as a Result of Backflow Through the Equipment and Floor Drain System,” August 30, 1990.

Information Notice 87-49, “Deficiencies in Outside Containment Flooding Protection,” October 9, 1987.

NRC Information Notice 88-60, "Inadequate Design and Installation of Watertight Penetration Seals," August 11,1988.

Information Notice 92-69, “Water Leakage from Yard Area Through Conduits into Buildings,” September 22, 1992.

Information Notice 94-27, “Facility Operating Concerns Resulting from Local Area Flooding,” March 31, 1994.

Information Notice 98-31, “Fire Protection System Design Deficiencies and Common-Mode Flooding of Emergency Core Cooling System Rooms at Washington Nuclear Project Unit 2,” August 18, 1998.

Information Notice 05-11, “Internal Flooding/Spray-Down of Safety-Related Equipment Due to Unsealed Equipment Hatch Floor Plugs and/or Blocked Floor Drains,” May 6, 2005.

Information Notice 05-30, "Safe Shutdown Potentially Challenged by Unanalyzed Internal Flooding Events and Inadequate Design,” November 07, 2005.

NRC Generic Letter 2007-01, “Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients.”

NRC Information Notice 2002-012, “Submerged Safety Related Electrical Cables”

NRC Information Notice 2007-01, “Recent Operating Experience Concerning Hydrostatic Barriers”

END

ATTACHMENT 1
Revision History For 71111.06

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	04/03/00 CN-00-003	71111.06 has been issued to provide the minimum inspection oversight for determine the safety performance of operating nuclear power reactors.	None	N/A	N/A
N/A	01/17/02 CN-02-001	71111.06 has been issued to provide the minimum inspection oversight for determine the safety performance of operating nuclear power reactors.	None	N/A	N/A
N/A	01/25/07 CN-07-003	IP 71111.06 has been revised to address feedback form 71111.06-889 to update procedure based on inspection and operating experience. Also, the Level of Effort and Inspection Basis sections were changed to give the flexibility to select either internal or external samples based on inspectors' discretion.	None	N/A	ML063470279

N/A	01/31/08 CN-08-005	IP 71111.06 has been revised to address the 2007 ROP realignment, shifting external flooding review to IP 71111.01, and to correct typographic errors.	None	N/A	ML073520328
N/A	08/19/08 CN 08-024	IP 71111.06 has been revised to clearly state that an inspection sample is one area. This addresses feedback form 71111.06-1267.	None	N/A	N/A
N/A	06/25/09 CN-09-016	IP 71111.06 has been revised to address feedback form 71111.06-1294. A revision has also been made to the inspection requirements associated with underground cables. This inspection was changed from an optional sample to a mandatory sample as a result of information gathered from GL 2007-01.	None	N/A	ML090700224