

ATTACHMENT 71111.06

INSPECTABLE AREA: Flood Protection Measures

CORNERSTONES: Initiating Events
Mitigating Systems

INSPECTION BASES: Flooding due to external and 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: The inspection sample should consist of:
1 external flooding area and 2 internal flooding areas where external flooding is a risk or 3 internal flooding areas where external flooding is not a risk. Inspect flood protection barriers and review procedures for coping with external flooding. It is expected that the above review should be spread throughout the assessment period, with priority given to risk-significant seasonal susceptibilities.

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 or external flooding, including water intake facilities. For external flooding, review seasonal susceptibilities such as floods caused by hurricanes, heavy rains and flash flood. 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 below

flood levels or otherwise susceptible to flooding. For sites where external flooding is a risk, use weather related information gathered during plant status reviews or from external news sources to assist in scheduling this inspection prior to the season of highest risk.

02.02 Inspection Activities

- a. Walkdown the selected areas or rooms. 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).

- b. Inspect underground bunkers/manholes subject to flooding, that contain multiple train or multiple function risk-significant cables. Consider the following attributes which are risk significant for the site specific installation:

1. Verify by record review that operable sump pumps will deliver at the expected flow rate established by the licensee's design basis documentation or FSAR.
2. Verify level alarm circuits are set appropriately.
3. Cables/splices subject to submergence appear intact.
4. Determine whether drainage is provided for the bunkers/manholes selected, or if not, why not?

NOTE: It is not the intended to inspect bunkers/manholes that are welded shut or to request extraordinary effort by the licensee to open bunkers/manholes for inspection unless a problem has been identified or is suspected that could adversely affect risk significant component(s). Inspectors should be alert for bunkers/manholes and take advantage to inspect. If such opportunity is identified, the

inspector should select the bunkers/manholes to be inspected based on the licensee's inspection activities as much as possible.

- c. 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.
- d. Evaluate implementation of flood protection preparation procedures and compensatory measures during impending conditions of flooding or heavy rains.

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 or external 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

Cornerstone	Inspection Objective	Risk Priority	Example
Mitigating Systems	Identify internal or external 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 Site specific: hurricane river/level caused flooding	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 or external 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 sample size identified under the "LEVEL OF EFFORT" section, completed over a period of one assessment cycle, will constitute completion of this procedure in the Reactor Programs System (RPS).

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.

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	01/25/07	Revision history reviewed for the last four year	None	N/A	N/A
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	IP 71111.06 has been revised to provide additional clarifications to the inspection activities concerning underground bunkers/manholes and walkdown of selected areas or rooms. In addition, the inspection resource estimate is revised to provide a band for more inspection flexibility and the inspection frequency is specified for flooding due to internal causes.	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