From:	RILEY, Jim
To:	Miller, Ed
Cc:	Cook, Christopher; Abisamra, Joe; Andrew Garrett (Andrew.Garrett@Duke-Energy.com); Attarian, George; Bell, Roderick; bolognar@firstenergycorp.com; Buman, Dan; Colin Keller; Dean Hubbard (dmhubbard@duke-energy.com); "Faller, Carl"; Gambrill, David; GASPER, JOSEPH K; Giddens, John; Hackerott, Alan; Heerman, John; Horstman, William R; "Huffman, Ken"; HYDE, KEVIN C; Jeff Brown (jeffrey.brown@aps.com); Jim Breunig (james.breunig@cengllc.com); Joe Bellini (joe.bellini@amec.com); John Lee (John.Lee@dom.com); LaBorde, Jamie; Maddox Jim (maddoxje@inpo.org); Mannai, David J; Maze, Scott; Mike Annon (annonm@dteenergy.com); Miller, Andrew; Murray, Mike; Peters , Ken; RILEY, Jim; Rob Whelan (robert.whelan@ge.com); Robinson, Mike; Rogers, James G; Rudy Gil; Scarola, Jim; Selman, Penny; Shumaker, Dennis; Snyder, Kirk; Stone, Jeff; Taylor, Bob; Terry Grebel (tlg1@pge.com); Thayer, Jay ; Vinod Aggarwal (Vinod.aggarwal@exeloncorp.com); Wrobel, George; Yale, Bob
Subject:	Flood Protection Design Basis Walkdown Guidance
Date:	Monday, April 23, 2012 1:32:43 PM
Attachments:	NEI Flood Protection Walkdown Guidance Rev M - Final Version to send NRC .docx

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Ed,

The latest version of our flood protection design basis walkdown guidance is attached. Here is an explanation of how it has changed since the last version you saw:

- I started with the version you sent me after our last meeting
- I accepted all changes in the document that were not controversial.
- I left all the marginal comments in place, including those you added during the meeting. I added explanations (blue font in the comment boxes) to these comments to indicate current status:
  - what I thought we agreed to during the meeting, or
  - items that are still open, or
  - where the document was changed
- I made changes (shown in "Track Change" mode) to address your comments and task force comments since we last met. These changes include:
  - A first draft of the walkdown report template (App D). This is a work in progress. I expect we will talk about this during our meeting this week.
  - A re-write of the training content appendix (App C)
  - Changes to Section 7 and the walkdown record form (App B) to address expectations for review.
  - Incorporation of the "Enhanced Walkdown" recommendations as App E and section 5.9
  - Inclusion of the "temporary" and "incorporated" and "exterior" terminology from RG 1.102 and addition of definitions for each.

If you have any feedback on this prior to our Wednesday meeting, please contact me.

Thanks,

Jim Riley

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NEI 12-xx 07 [Revision JM]

Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features

May 2012

Last Updated: 5/4/2012 7:09 AM

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NEI 12-xx 07 [Revision IM]

Nuclear Energy Institute

Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features

May 2012

Nuclear Energy Institute, 1776 I Street N.W., Suite 400, Washington D.C. (202.739.8000)

Last Updated: 5/4/2012 7:09 AM

ACKNOWLEDGEMENTS

NEI appreciates the invaluable assistance of the Fukushima Flooding Task Force toward development of this guideline.

NOTICE

Nuclear Energy Institute, 1776 I Street N.W., Suite 400, Washington D.C. (202.739.8000)

Last Updated: 5/4/2012 7:09 AM

TABLE OF CONTENTS

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1 INTRODUCTION

In response to the nuclear fuel damage at Fukushima Daiichi due to earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) is requesting information pursuant to Title 10 of the Code of Federal Regulations, Section 50.54 (f) (Reference 8.1). As part of this request, licensees will be required to perform walkdowns to verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained.

2 PURPOSE

This document provides guidance for assessing External Flood Protection and Mitigation Capabilities in accordance with the NRC recommendation in item 2.3 of SECY 11-0137 and enclosure 4 of the March 12, 2012 Fukushima accident near term activities 10CFR50.54(f) letter (Reference 8.1). It is intended that this approach be applied with any appropriate adjustments required to address plant specific differences.

The walkdowns will verify that permanent structures, systems, components (SSCs), portable flood mitigation equipment, and the procedures needed to install and or operate them during a flood are acceptable and capable of performing their design function as credited in the current licensing basis (CLB). The walkdowns will also verify that plant modifications implemented since original construction, such as security barrier installations and changes to topography, do not adversely affect plant flooding protection.

The specific request from SECY 11-0137 Item 2.3 is provided below. The SECY text is for information only. This Guideline provides the details for completing the actions pertaining to external floods:

1. *Engage stakeholders to inform development of a methodology and acceptance criteria for seismic and flooding walkdowns; and*

2. *Develop and issue a request for information to licensees pursuant to 10CFR50.54(f) to (1) perform seismic and flood protection walkdowns to identify and address plant specific issues (through corrective action program) and verify the adequacy of monitoring and maintenance for protection features and (2) inform the NRC of the results of the walkdowns and corrective actions taken or planned.*

In order for the walkdown effort to be as efficient as possible, it is recommended that the walkdown team be familiar with the information required to respond to SECY 11-0137 item 2.1 (new plant flooding evaluations) as well as item 2.3 as well as Reference 8.1 enclosures 2 and 4.

3 DEFINITIONS

The following definitions are provided to clarify requirements of the flood protection verification walkdowns.

3.1 **Incorporated Barrier/Feature**
Engineered passive or active flood protection features that are permanently installed in the plant that protect safety related systems, structures and components from inundation and static/dynamic effects of external flooding. Examples include pumps, seals, valves, gates, etc. that are permanently incorporated into a plant structure

3.2 **Temporary Barrier/Feature**
Passive or active flood protection features within the immediate plant area such as portable pumps, sandbags, plastic sheeting, portable panels, etc. that protect safety related systems, structures and components from inundation and static/dynamic effects of external flooding and are temporary in nature, i.e., they must be installed prior to the advent of the design basis external flood.

3.3 **Exterior Barrier/Feature**
Engineered passive or active flood protection features external to the immediate plant area and credited as part of the current licensing basis that protect safety related systems, structures and components from inundation and static/dynamic effects of external floods. Examples include levees, dikes, floodwalls, flap gates, sluice gates, duckbill valves, and pump stations.

3.4 **Current Licensing Basis (CLB)**

As defined in NRC Inspection Manual Part 9900, the Current Licensing Basis (CLB) is the set of Nuclear Regulatory Commission (NRC) requirements applicable to a specific plant, plus a licensee's docketed and currently effective written commitments for ensuring compliance with, and operation within, applicable NRC requirements and the plant-specific design basis, including all modifications and additions to such commitments over the life of the facility operating license. Design basis information, defined by 10 CFR 50.2, is documented in the UFSAR as required by 10 CFR 50.71. The design basis of safety related SSCs is established initially during the original plant licensing and relates primarily to the accident prevention and mitigation functions of safety - related SSCs. The design basis of a safety related SSC is a subset of the CLB.

Comment [jhr1]: Letter:
For the sake of consistency with the current Regulatory Guide 1.102, Flood Protection at Nuclear Power Plants, revise the active and passive flood protection definitions to use the same language.

FFTF: We cannot find a definition of active or passive in RG 1.102. What definition would the Staff propose?.

Comment [g2]: NRC Feedback: The comment was that RG 1.102 didn't contain these terms

New definitions added and associated work changes made in document.

The set of NRC requirements applicable to a specified plant CLB includes:

- NRC regulations in 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 54, 55, 70, 72, 73 and 100 and appendices there to
- Commission Orders
- License Conditions
- Exemptions
- Technical Specifications
- Plant-Specific design basis information defined in 10 CFR 50.2 and documented in the most recent UFSAR (as required by 10 CFR 50.71).
- Licensee Commitments remaining in effect that were made in docketed licensing correspondence (such as licensee responses to NRC bulletins, License Event Reports, Generic Letters and Enforcement Actions).
- Licensee Commitments documented in NRC safety evaluations

3.5 Inaccessible

Inaccessible areas are areas that cannot reasonably be inspected due to significant personnel safety hazard, Very High Radiation Areas, major equipment disassembly, or no reasonable means of access (e.g., buried).

3.6 Restricted Access

Areas that are normally not accessible for direct visual inspection are classified as “Restricted Access”. It is expected that flood protection features in these areas will be inspected when conditions allow. The following represent considerations that may make an area “Restricted Access” during the walkdowns:

1. Entry into high radiation areas
2. Locations that are not accessible from normal personnel access areas (walkways, floors, platforms, etc.) due to height or distance. Generally, these items will require erection of scaffold or use of extension ladders.
3. Opening doors of panels or cabinets containing energized equipment
4. Opening junction boxes
5. Requiring heavy machinery and coordinated efforts to gain access (yard manholes, valve pits, etc.
6. Actions that may impact on-line plant risk
7. Locations with other environmental concerns such as high heat, inadequate ventilation, or the possibility of toxic gas.
8. Flood protection features that are normally under water

3.7 Deficiency

For the purpose of this guidance, a deficiency exists when a flood protection feature is unable to perform its intended flood protection function when subject to a CLB flooding hazard. This condition may also lead to compromising the overall ability to provide protection or mitigation. This concept includes non-conforming conditions as defined in NRC Inspection Manual Part 9900.

Observations that may be potential deficiencies will be evaluated in accordance with station processes and entered into the Corrective Action Program.

Examples:

- During the walkdown of an external flooding penetration seal, the visual inspection determines that the sealing material is missing and the evaluation of the condition determines that the seal **cannot meet** its required function. – This **should** be reported as a Deficiency.

- During the procedure walk-through, an identified "flood protection feature" procedure step requires connection of a temporary pump to a piping connection that has been removed by a modification 2 years earlier. The step **cannot** be performed as written. – This **should** be reported as a Deficiency.

- During the walkdown of an active "flood protection feature" it is identified that the feature does not have an active preventive maintenance task assigned to it. Through evaluation it is determined the feature **can meet** its required function. This observation should be placed in the CAP, but **should not** be reported as a Deficiency unless it is required by the CLB.

3.8 Flood Protection Features

For the purposes of this walkdown guidance, flood protection features include both permanent incorporated and temporary structures, systems, and components and applicable procedures that are credited to protect against or mitigate the effects of CLB external floods. The features that protect against or mitigate the effects of external floods are defined in the station's CLB. These features can have either an active or passive flood protection function. Some examples follow:

- Passive permanently installedincorporated or temporary items. These include (but are not limited to) dikes, berms, sumps, drains, basins, yard drainage systems, walls, removable wall and roof panels, floors, structures, penetration seals, temporary water tight barriers, barriers exterior to the immediate plant area that are under licensee control, and cork seals.
- Active permanently installedincorporated or temporary equipment or components. These include (but are not limited to) credited sump pumps,

portable pumps, isolation and check valves, flood detection (e.g., level switches), and flood doors (e.g., watertight doors).
- Procedures and/or guidelines intended to prevent or mitigate the effects of an external flooding event.

3.9 Reasonable Simulation

Reasonable simulation is a walk-through of a procedure or activity to verify the procedure or activity can be executed as specified/written. This simulation would require; verification that:

- all resources needed to complete the actions will be available. (Note that staffing assumptions must be consistent with site access assumptions in emergency planning procedures.)
- any credited time dependent activities can be complete in the time required considering the warning time available for the applicable flood hazard,
- specified equipment/tools are properly staged and in good working condition,
- connection/installation points are accessible,
- the execution of the activity will not be impeded by the event it is intended to mitigate or prevent (for example, access to the site and movement around it can be accomplished during the flood)
- the execution of the activity will not be impeded by other adverse conditions that could reasonably be expected to simultaneously occur (for example, winds and lightning).

Reasonable simulation does not require for example; the building of temporary barriers, the actual installation of stop logs, connection of temporary equipment to permanent plant equipment, pumping of water, etc. Reasonable simulation may require the actual performance of these activities if there has never been a demonstration that the activity can be completed in the credited time.

3.10 Visual Inspection

A visual inspection is a visual comparison of the physical condition of a structure, system, or component (SSC) to an acceptance criteria.

4 SCOPE

The following section establishes the flood protection features that require walkdown in accordance with this document.

Comment [jhr3]: Consider the effect of the response of all the appropriate site organizations. Consider lessons learned from recent OE.

Consider flood event duration, how long functionality could be affected

Letter:
Whole site drills should be performed, including having personnel simulating actions to note timing of response and possible conflicts that develop between different responses. There are many instances where lessons learned from full-site drills are not discovered during small, isolated simulations –

FFTF- Changes incorporated into section 5.6.7..

Comment [jhr4]: Letter:
Cliff-Edge Effects:
1.Cliff-edge effects for flooding risks were defined by the Near Term Task Force Report as "the safety consequences of a flooding event may increase sharply with a small increase in the flooding level" (see pgs 29, 36, 37). As discussed in several public meetings, a cliff-edge elevation should be included in the guidelines for walkdowns. The cliff-edge elevation is the elevation at which water will either overtop or the hydraulic head will overwhelm the integrity of a flood barrier. In that sense, the cliff edge elevation is the available physical margin for that barrier with respect to the design basis flood. NRC staff is currently engaged with stakeholders to determine the appropriate process to report the cliff-edge elevations.

FFTF: Cliff edge effects should be reported in response to 2.1, not 2.3. This information will be collected but not reported in the walkdown report (see enhanced walkdown appendix H.

Resolution of this issue is pending steering Committee decision.

4.1 Basis for Establishing Walkdown Scope

The following criteria are used to establish the bases for the scope of the external flood protection feature walkdowns:

1. Plant configuration and procedures will be compared to the flood protection features credited in the existing current licensing basis documents for flooding events (e.g., UFSAR, current drawings, and procedures). Include the flood protection features designed to protect the spent fuel pool. Any apparent discrepancies in flood protection level that are part of the current licensing basis must be addressed and an appropriate value used for the walkdown procedure. Document the basis for the value in the walkdown report.
2. Only flooding events originating from external sources are to be considered.
3. Procedures necessary to ensure function of external flood protection features are within the walkdown scope.
4. Procedures and processes to monitor onsite above grade reservoirs that are under the control of the licensee are within the walkdown scope.
5. This guidance does not require inspecting the initiators that may cause the floods (e.g., inspection or verification of inspection reports of upstream dams are not within the scope of this walkdown process), but verifying adequate communication with the appropriate organizations is expected (see section 5.8).

4.2 Identify Flood Protection Features (Walkdown List)

Each licensee shall review existing (current) design and licensing documents including flood response procedures to identify site-specific features credited for protection and mitigation against external flooding events.

Using the CLB for the plant site:

1. Determine current site topography and any changes that may have affected the topography assumed by the licensing basis flood evaluation. Topographical changes will affect water flow on site and should have been evaluated for their effect on flooding. The need for a land survey for elevations will depend upon the accuracy of the applicable drawings and site topographical documents. (see example A.1.4 in Appendix A).
   Note that the review of changes should address both the potential for increased flood levels and the potential for extended flood conditions, if the identified changes have the potential to slow down the receding water (e.g., a new building that channelizes flow or impedes the recession of flood water). No specific analysis is required; this review should be based on field observations.
2. Determine changes to site building elevations and site configurations including which buildings that have been added or modified since the

Comment [jhr5]: Letter:
General inspection criteria that are provided in Appendix A, "Examples" should be referenced in some manner in the main body to provide more specific guidance on the level of detail of inspection required for the walkdowns. For example, Appendix A.1.3 discusses specific penetration seal guidance on how to verify integrity of penetration seals, which should be referenced in Section 4.2, to provide a reference for licensees, utilities, and sites.

FFTF – OK, see section 5.6.

Resolution appeared to be OK during 4/11 and 4/12 meeting

current licensing basis flood evaluation was completed. Note that in some designs certain buildings are expected to be inundated during a flooding event. These buildings must also be included in the walkdown scope and the walkdown must ensure that the flood protection features within such buildings will perform their credited function if the building is flooded. The need for a land survey for elevations will depend upon the accuracy of the applicable drawings and site topographical documents. (see example A.1.4 in Appendix A).

3. Determine the barriers important to resisting the effects of external flooding (e.g., structures, walls, floors, doors, etc.).
4. Identify penetrations through barriers, such as trenches and cable openings, that could provide a path for flood water to enter buildings and the means to seal these penetrations. Temporary penetrations / equipment hatches that could provide a path for floodwater to enter buildings should also be identified. (These are typically opened only during outages to move large equipment.) The means and process to isolate these penetrations, if they are open, within the required time should be identified
5. Identify instrumentation relied upon to detect water in rooms and the associated warning system
6. Identify any features or pathways credited for flood water relief (e.g., surface drainage swales, subsurface drainage system, culverts, floor/yard drains, etc.). Include these features in the verification walkdown to ensure pathways are clear and capable of performing their function, i.e. passage of water along the path assumed or described in the documents.
7. Review plant external flooding response procedures for external floods and identify any permanently installedincorporated equipment that is credited for flood protection or mitigation. Include this equipment in the verification walkdowns.
8. Identify any situations for which temporary plant equipment (e.g., portable pumps, sandbags, temporary barriers, etc.) is credited to protect or mitigate the effects of the external flooding event. Include this equipment in the verification walkdowns.
9. Include the flood response procedures assessed in items 5 7 and 6 8 above among the documents that will be reviewed to evaluate the practicality of the associated actions performed by site personnel (Reasonable Simulation).
10. Review the training provided to support implementation of plant flood procedures to determine if it is adequate (content, frequency, and participants) and reflects any time sensitive actions.
10 11. Establish critical attributes that will be used and reported in the Appendix B Walkdown Record Form, Part A, "Description".

Generic lessons learned from IER 11-1 walkdowns, NRC TI 2515-183 inspection results and IPEEE conclusions have been incorporated into this guidance. Each

Comment [g6]: NRC Comment: Include buildings that are intended to flood. Incorporate associated acceptance criteria when populating walkdown record form.

OK, see change

site should review its site specific results of these items to identify lessons learned that should be incorporated into the plant specific walkdown procedure.

5 METHODOLOGY

The following methodology is provided as guidance for performing the walkdowns.

5.1 Develop Walkdown Scope

Using the guidance provided in Section 4, develop a list of flood protection features and related operating or flood mitigation procedures credited in CLB documents for protection and mitigation against external flooding events. These items constitute the scope of the walkdowns and it is the expectation that all of these items will be subject to visual inspection, reasonable simulation, or, if necessary, functional tests.

This guidance does not require testing of any active component. For active components it is only necessary to confirm that no concerns are identified during the walkdown inspection, that they are included in a maintenance program that periodically checks their function and that the testing performed under the program is acceptable (see sections 5.7 and 6).

For temporary flood protection features and ~~permanent~~ incorporated features that require operator action, the walkdown shall also include verification through ~~reasonable~~ Reasonable ~~simulation~~ Simulation that the procedures that cover implementation of the protection strategy can be implemented as written. Verifications completed since March 2011 are acceptable provided they meet the guidance in ~~Appendix A~~this document and appropriate documentation can be obtained to support the conclusion.

Justification for delaying walkdown of a flood protection SSC that has "Restricted Access" shall be provided in the response to the 10CFR50.54(f) letter, with a schedule for when walkdown of the flood protection item will be accomplished and any special procedures necessary to complete the inspection that change this guidance.

Under very rare circumstances, an item will be "inaccessible" and cannot be visually inspected (for example, flood protection features in very high radiation areas or buried items, see example A.1.2 in Appendix A). Any items classified as "inaccessible" shall be identified in the response to the NRC 10CFR50.54(f) letter. These items shall be evaluated and justification shall be provided that there is reasonable assurance that the feature is available and ~~functional to~~will perform the external flood protection or mitigation function for the full duration of

Comment [jhr7]: Letter:
9. As part of the 50.54(f) letter, "Requested Actions", identification of actions taken or planned to further enhance the site flood protection was requested. During the walkdowns, any enhancements should be noted, whether based on a deficiency, determined cliff-edge elevation, or other new information, including new flood information

FFTF – This information will be included in the template, for the Walkdown report. A report template is included as Appendix .D to this guidance.

Comment [jhr8]: Letter:
3. Temporary penetrations equipment hatches that could provide a path for floodwater to enter buildings should be identified. (These are typically opened only during outages to move large equipment.) The means to isolate these penetrations quickly should be identified
FFTF – Added to section 4.2 as item 4..
4. A method to identify underground systems (e.g. piping, conduits) that are susceptible to movement due to inundation should be developed. These underground systems should be addressed in more detail in recommendation 2.1
5. A method to identify foundation undermining that would affect SSCs due to surface flooding should be included. These foundation issues should be addressed in more detail in Recommendation 2.1
FFTF – Comments 4 and 5 - Developing this method should not be part of the scope of design basis walkdowns as they are not part of verifying existing design basis.
All agreed with the above FFTF response during April 12, 13 meeting
6. Warning systems and other monitoring systems should be included in the scope to assess time-dependent activities
FFTF – Warning times are addressed in section 5.7.
All agreed with FFTF response during April 12, 13 meeting

Comment [jhr9]: Letter:
8. The current design basis flood (referred to as current licensing basis flood in NEI draft) at each site should be determined via the Final Safety Evaluation Reports, IPEEE inspections, and other licensing and site-specific regulatory documents. Past uncertainty among operators, NRC inspectors, and others have led to confusion regarding the flood protection level required and inspected, therefore this information needs to be verified
FFTF- Added a caution in section 4.1 item 1 to address inconsistencies in the flooding design basis. Also, the walkdown record form, App B, collects the references for the flood protection feature design basis.

Comment [g10]: NRC Comment: An example may be helpful.

OK, see change

the flood condition. This could be accomplished by a review of items such as construction records, plant documentation, inspection of similar installations that are accessible, and materials of construction / fabrication. If reasonable assurance cannot be provided, then an evaluation of the potential impact of the loss of function of the flood protection feature will be provided. If more than one "inaccessible" flood protection feature with potential loss of function is reported, then an evaluation of the aggregate effect flood protection features must be provided.

The walkdown process should also include an assessment of any manual actions that are credited for external flood protection to ensure the actions can be performed as required considering the conditions expected during a licensing basis external flood (see Section 5.8). For multi-unit sites this includes an assessment of whether all the manual actions that are credited for external flood protection at all units on the site can be performed simultaneously in response to a single flood event with the available staff and within the timeframe required.

5.2 Prepare Walkdown Packages

The following list of elements that should be considered in preparing a walkdown package:

1. Pre-Job Brief
2. Walkdown Guidance and Acceptance Criteria
3. Walkdown Record
4. Design Drawings (for Reference)
5. General Arrangement Drawings (for Reference)
6. Flood Protection Strategy Implementation Procedures

Guidance and documentation for the conduct of the walkdowns should be developed to incorporate both generic and site-specific information. Each licensee should review design and licensing documents and site procedures to establish the flood protection CLB for each items identified in Section 5.1 (Develop Walkdown Scope). A Walkdown Record Form (Appendix B) should be prepared for all flood protection features that fall within the scope of this guidance.

If an existing site procedure is ~~provided~~ available for inspection of an item and the inspection acceptance criteria is sufficient to establish that the item is capable of meeting its flood protection and mitigation requirements, the site procedure can be used to perform the walkdown.

Note that this ~~guidance~~ guideline has been endorsed by the NRC; if a site procedure is used in lieu of this ~~guidance~~guideline, it should meet the attributes provided in this guideline and the utility should be prepared to justify any substantive differences as compared to this document. The use of site specific

Comment [jhr11]: Letter:
A list of all Category 1 structures, systems and components (SSCs) that have to be protected against flooding should be provided. These include hardened structures, piping, cables, ducts, tanks, etc., below the ground surface manholes, and below and above ground penetrations, and Category 1 slopes and embankments. This would facilitate the walkdown effort and ensure that all SSCs required to be protected against flooding are covered
FFTF-The walkdowns check flood protection features credited in the existing licensing basis, not the SSCs that are protected. .

The first paragraph in Section 5.1 does recommendation creation of a list of flood protection features to be walked down.

FFTF response was discussed during the 4/12, 4/13 meetings. NRC is considering whether any additional changes will be requested.

walkdown guidance must be reported to the NRC in the utility's 90 day response to Reference 8.1.

The following list of elements that should be considered in preparing a walkdown package:

1. Pre-Job Brief
2. Walkdown Guidance and Acceptance Criteria
3. Walkdown Record
4. Design Drawings (for Reference)
5. General Arrangement Drawings (for Reference)
6. Flood Protection Strategy Implementation Procedures

5.3 Walkdown Team Selection and Training

Personnel selected to perform the walkdown inspection activities should satisfy the following requirements:

1. Possess the following experience levels:
   - Personnel providing information to establish walkdown scopes should be experienced in the current licensing basis.
   - Personnel performing visual inspections should be experienced and trained to perform visual inspections of plant structures, systems, and components.
   - Personnel performing visual inspections should be experienced and trained to read and interpret station-specific design and general arrangement drawings.
2. Fulfill the following requirements:
   - Be trained on the recommended content described in Appendix C for their assigned tasks. The specific training is at the discretion of the utility, but must be documented.
   - Be familiar with the walkdown packages they will be performing.

1. Be experienced personnel trained to perform visual inspections of plant structures, systems, and components. Expectations for this training are described in Appendix C. The specific training is at the discretion of the utility, but must be documented.
2. Be trained to this guidance,, and to the content of the March 12, 2012 50.54(f) letter on the Fukushima accident.

Be familiar with the walkdown packages they will be performing

Walkdown Personnel may be supported by craft personnel who do not need to meet the above requirements. Additional personnel assigned to review the walkdown results and perform any other related assessments should be trained to item 2 above. An outline of the recommended training content is provided in Appendix C.

It is recommended that walkdown teams performing visual inspections consist of a minimum of two people with a complimentary set of skills (such as previous walkdown experience, operations, knowledge of flooding design basis, etc.).

Comment [g12]: NRC Comment: consider other disciplines such as operators

OK, see change

The number of personnel on each walk down team is at the discretion of the utility and will depend on what items are being reviewed (i.e., procedure and PM reviews may only require one person).

The performance of flooding walkdowns should not be combined with routine walkdowns or other activities.

.

5.4 Perform Pre-Job Briefs

It is recommended that a pre-job brief be performed prior to conducting the walkdowns. A pre-job brief from existing plant human performance procedures and tailored to the walkdown task may be utilized.

The form should include the following items for discussion during the brief:

1. Positive Component Verification
2. Inspection Methodology
3. Acceptance Criteria
4. Field Documentation Requirements
5. Reporting Degraded Conditions

5.6 Inspection of Flood Protection and Mitigation Features

For each item on the walkdown list, perform the specified inspection to assess the capability of the item to perform its required function. Conduct of the inspection should conform to the following generic guidance. If another approach is used, the utility should be prepared to justify any substantive differences between it and this document. The performance of these activities should be reported on the Walkdown Record Form (Appendix B).

The results of the walkdowns conducted in response to INPO IER 11-1, "Fukushima Daiichi Nuclear Station Fuel Damage caused by Earthquake and Tsunami", or other comprehensive walkdowns conducted to validate flood protection features in 2011 may be used to satisfy the walkdown requirement for a flood protection feature if the previously performed IER 11-1 walkdown performance and documentation meets the expectations in this guideline (such as flood durations, simulation, etc.) and any changes are addressed that may have affected the feature since the time of the previously performed IER 11-1 walkdowns. This determination is at the discretion of the utility. If the previously

performed IER 11-1 results are used for any feature, the walkdown record form (Appendix B) for the associated flood protection feature should state that the previously performed IER 11-1 inspection was the source of the information and the documentation from the previously performed walkdown is either attached to or referenced on the record form.

5.6.1 General

Sections 5.6.2 through 5.6.6 describe the general approach for inspecting in-scope features. These four sections are organized as follows to describe the applicable expected inspection activities.

- Permanently InstalledIncorporated Passive Flood Protection Features
- Permanently InstalledIncorporated Active Flood Protection Features
- Temporarily InstalledTemporary Passive Flood Protection Features
- Temporarily InstalledTemporary Active Flood Protection Features

Appendix A provides some examples of each of these flood protection feature types for illustrative purposes.

Note that any walkdown observation that cannot be immediately judged as acceptable must be entered into the Corrective Action Program for disposition.

5.6.2 Permanently InstalledIncorporated Passive Flood Protection Features

1. Prior to conducting the walkdown, determine if visual inspection of the flood protection feature is relevant. For example, visual inspection of instrumentation and controls may be of no value.
2. If visual inspection of the flood protection feature is relevant, perform an external visual inspection for indications of degradation that would prevent its credited function from being performed. Conditions that should be recorded include (but are not limited to) missing flood protection feature, severe corrosion, missing fittings, missing fasteners or structural anchors, water leakage pathways through barriers (for example, conduit that is below the licensing basis flood level), degraded/missing penetration seals, degraded/missing door seals, etc. [see examples A.1.2 (concrete and steel structures) and A.1.3 (seals) in Appendix A]
3. If visual inspection is not relevant, determine if some other form of inspection (such as a functional check or verification that the function of the component is determined by a preventive maintenance program) should be performed.
4. Perform physical measurements of critical SSC dimensions required heights [see examples A.1.1 (site elevations) and A.1.4 (passive flood barriers) in Appendix A].
5. Verify by observation or by review of other documentation that the feature is functional.

Comment [jhr13]: Letter:
The 50.54(f) letter, Requested Information item 1c, requires that the guidance consider insights from any new and relevant flood hazard information as well as recent flood-related walkdowns such as the events at the Fort Calhoun site, past NRC and industry walkdowns (IPEEE), and foreign experiences, as mentioned in SECY-11-0124. Examples of issues include but are not limited to:
FFTF – OE lessons learned will be incorporated into the training module being developed to accompany this guidance. Note that only OE that is appropriate to the CLB should be considered in the walkdowns.
All agreed with FFTF responses below during April 12, 13 meeting
a. Developing inspections for relevant building penetrations, both above and below ground.
FFTF - Addressed by item A.1.3 in App A and referenced in item 2 below. OK
b. Testing of equipment during a preventative maintenance (PM) program, or during the walkdown, if not part of the PM program.
FFTF – Addressed in section 5.7 OK
c. Increased number of trained operators to increase the number of staff able to perform flood protection activities and procedures.
FFTF – Addressed by Reasonable Simulation OK
d. To ensure that all flood control systems have sufficient fuel or power, flood control systems' fuel or power supplies should be included in the definition of support equipment. For example, sufficient and available fuel oil for diesel powered flood control pumps.
FFTF Added a recommendation to section 5.6.3 OK
e. Demonstration of flood protection systems effectiveness.
FFTF – Covered in PM review and reasonable simulation. OK

Comment [g14]: NRC Comment: Possible consideration of all modes of operation and transient configurations.
FFTF – Enhanced walkdown guidance (Appendix E) addresses all configurations. Walkdown record form (App B) provides a means of capturing the observations.

6. Determine whether the feature is included in a controlled preventive maintenance (PM) program, testing program, or technical specification surveillance procedure.
7. If the feature is subject to controlled PM programs providing reasonable assurance of continuing functionality, document this observation and the relevant program in the walkdown records. Use section 5.7 to guide the assessment of the flood protection feature testing done in accordance with this program.
8. If a passive feature is not subject to a controlled PM program that provides reasonable assurance of continuing functionality, evaluate whether this is acceptable. Enter any concerns in the Corrective Action Program.
8.9. Ensure any equipment that is designed to operate, or not fail, when submerged is capable of performing its intended function under those conditions.

Comment [g15]: This may be more appropriate in another section.
OK to leave here.

5.6.3 Permanently InstalledIncorporated Active Flood Protection Features

In addition to the activities described in 5.6.2:

1. Assess the manual actions required to operate the feature to ensure they can be performed within the required time considering the conditions expected during a design basis flood. Reasonable simulation can be used for this purpose.
2. Ensure that adequate consumables exist to support the flood protection feature during the entire time its function is credited by the current licensing basis.
3. Assess the associated training to ensure its adequacy.
4. Identify the procedures used to operate this equipment in the records used to document the walkdown results.

NOTE: It is not necessary to verify function of active components by operating the system or individual component. Components with an active function can be assumed to function properly if included in a routine PM or surveillance program and the testing performed under the program is acceptable (see sections 5.7 and 6). If credit is being taken for such activities, identify the credited program in the walkdown records. If there are open issues with the feature that could preclude its function during an external flood event, enter the observation into the Corrective Action Program.

5.6.4 Temporarily InstalledTemporary Passive Flood Protection Features

In addition to the activities described in 5.6.2:

1. Verify that the equipment is properly staged and in a condition that would allow its use should it be needed for its intended purpose, or that sufficient time is available after a flood warning to move the equipment to an appropriate location. (See example A.3.1 in Appendix A)

2. Confirm that all connections necessary to hook up the temporary equipment to allow performance of its flood protection function will work in their intended application and that any supplies, seals, fasteners, etc. are of sufficient quantity, in good condition, properly staged, inventoried regularly and subject to periodic condition assessment. Reasonable simulation can be used for this purpose.
3. Assess the equipment/tools (forklifts, cranes, carts, slings, wrenches etc.) necessary to transport and install the flood protection feature. Verify that the equipment is are identified and available.
4. Assess transportability and accessibility of any credited temporary equipment to ensure that it is possible, considering the conditions expected during a licensing basis flood, to access the equipment and to readily transport the equipment to the desired location (e.g., nothing blocks or prohibits access) within the time required by the design basis flood event. For example, if movement of a temporary barrier to its installed location includes transporting it across an unpaved area, the effect of mud / soft ground that may be present during the event should be assessed.
5. Determine whether plant lay down requirements contain provisions to assure that equipment transport pathways remain free of obstructions
6. Assess the manual actions required to install the feature to ensure they can be completed within the required time considering the conditions expected during a licensing basis flood (i.e., concurrent adverse weather conditions).
7. Identify the procedures used to install this equipment in the document used to capture the walkdown Walkdown results Record Form.

5.6.5 Temporarily Installed Temporary Active Flood Protection Features

In addition to the activities described in 5.6.2, 5.6.3, and 5.6.4:

1. Verify that any needed support equipment is staged, available, and appropriate for completing the function.

5.6.6 Other Flood Protection Features

5.6.76 Procedure Walk-through and Reasonable Simulation

Procedures that have been identified as implementing procedures for flood protection features will require a procedure walk-through. Reasonable simulation can be used for this purpose. This activity includes the following:

1. Walk-through of a procedure or activity to verify the procedure or activity can be executed as specified/written.
2. Verify that any credited time dependent activities can be completed in the time required.

Comment [jhr16]: Letter:
The maintenance buildings at nuclear power plants (NPPs) may be the repositories of temporary flood protection features, e.g., sand bags, sand bagging equipment, flood doors, etc. Although the maintenance building is not one of the Category 1 SSCs to be protected, if the building is the repository of the temporary flood features, indicate how the availability of the protection features will be affected during the flooding conditions.
FFTF – Section addresses this issue.

Comment [g17]: Comment: An example would be beneficial here.

OK, see change

Comment [jhr18]: Other features not included in CLB? Additional capability.

FFTF – Guidance is intended to apply to CLB. If a utility decides to inspect more, the rest of this document can be used. This section just causes confusion. Delete this section.

All agreed with FFTF responses below during April 12, 13 meeting

Comment [jhr19]: Letter:
All flood response activities and procedures should be reviewed, with an emphasis on the level of operator actions required. Any activities and procedures that include a high level of operator actions should be examined for revision to reduce the level or amount of operator actions required.
FFTF – Reasonable simulation will validate the adequacy and feasibility of operator actions. Walkdowns are to the existing licensing basis.
All agreed with FFTF responses below during April 12, 13 meeting

3. Verify that specified equipment/tools are properly staged and in good working condition, verification that connection/installation points are accessible.
4. Verify that the execution of the activity will not be impeded by the event it is intended to mitigate or prevent. For example, movement of equipment across unpaved areas on the site could be impeded by soft soil conditions created by excessive water.
5. Review the reliance on the station staff to execute required flood protection features. If during the review several activities are identified to rely on station staff, then perform and document an evaluation of the aggregate effect of on the station staff to assure all actions can be completed as required.

To ensure that logistics associated with implementation of the procedures are properly considered, personnel/departments that have responsibility for supporting or implementing the procedure should participate in the simulation effort. The simulation should also ensure that the personnel assigned to the procedure do not have other duties that could keep them from completing their flood protection activities during an actual event. Actions that would be performed in parallel during an event should be simulated in parallel; not checked individually and the results combined.

Comment [g20]: NRC Comment: Potentially include an example.

Reasonable simulation need not require the actual performance of the necessary activities if they have been previously performed or it is periodically demonstrated that the activities can be completed in the credited time.

5.7 Review of the Maintenance and Monitoring of Flood Protection Features

Flood protection features, whether permanent or temporary, must be checked by a program to ensure that their flood protection function is adequately maintained. The review performed in accordance with this guidance should:

- Ensure that the feature is included in a periodic test, monitoring, or inspection program,
- Verify that the testing, monitoring, or inspection is being performed, and
- Determine if the scope of the test, monitoring, or inspection is adequate to confirm the credited flood protection function of the feature. (This is not intended to be a design review of the component or a review of the adequacy of all aspects of the testing/inspection/monitoring performed.)

Any questionable observations should be entered into the Corrective Action Program for disposition.

5.8 Review of Operating Procedures

Equipment operating and flood mitigation procedures should be reviewed to ensure that strategies will work as planned considering the conditions expected during a licensing basis flood combined with other adverse natural conditions (such as lightening, hail, high winds, etc.) that could reasonably be expected to simultaneously occur. The following guidance should be used.

- Ensure that appropriate procedures exist for the operation of all active flood protection features, that the procedures will work under the conditions expected during a licensing basis flood (including other concurrent adverse weather events, such as high winds) and that the procedure steps can be completed within the time allotted. Reasonable Simulation can be used for this review.
- Ensure that flood protection procedures include a process for obtaining the credited warnings with sufficient time to perform the necessary actions should a flooding event be possible. ~~These warnings should specify who the points of contact are for both the NPP, the associated dam owner, and the associated warning agencies, as appropriate. This should include the frequency of the updates~~The notification process should be captured in a memorandum of understanding, procedure, or other durable document that will ensure that critical items such as points of contact, actions, and time requirements are clearly understood.
- The instructions in the procedure should be verified for adequacy and reviewed to ensure that any needed support equipment is staged, available, inventoried, periodically assessed for functionality, and appropriate for completing the function.
- Ensure that training on the procedures is appropriate to assure continuing proficiency in their implementation.
- Verify that any procedures governing site preparation for an expected flood event are adequate and can be completed within the warning time expected for a licensing basis flood event.
- Verify that processes are in place to revise the procedures when changes occur to the associated flood protection features, plant staffing requirements, or flood hazard assessments.
- Verify that operator staff is trained to the procedures.

Comment [jhr21]: Letter: Agreements with associated off-site entities (including dam operators) should be verified or established, so as to ensure proper communication channels
FFTF – Bullet added.

Comment [g22]: Suggested wording from the meeting. Possible to refine this thought further.

OK, see change.

Comment [g23]: NRC Comment: Suggest to include coordination with other entities that may have a role. Additionally, ensure that agreement is durable.

See suggested change in second bullet of this section.

5.9 5.9 Preparation for Flood Hazard Reevaluations

The walkdowns and reviews described in this guideline can be used to prepare for the flood hazard reevaluations that will be performed in accordance with Enclosure 2 of Reference 8.1. Guidance for the other information that should be collected is in Appendix E and Appendix B, Part G. The information entered in Part G of the Walkdown Record Form (Appendix B) does not need to be reported to the NRC in the Walkdown Report (Appendix D).

5.95.10 Documenting Possible Deficiencies

All observations should be documented in the Walkdown record forms, and when the observation cannot be immediately judged as acceptable, also entered in the licensee Corrective Action Program in accordance with site procedures. All flooding walkdown observations identified as deficiencies by the Corrective Action Program (CAP) and other items identified during the walkdowns, but awaiting final disposition by the CAP, must be reported to the NRC in the walkdown report (Appendix D).

5.10 11 Restricted Access, or Inaccessible

If access to an itema flood protection feature is not available to walkdown personnel, it will be identified as such on the record form and the reason documented. Subsequent actions will be taken to either gain access for inspection of the item, or (if the item is "inaccessible") an evaluation will be performed addressing the ability of the feature to perform its credited function during the duration of the flood assumed in the licensing basis (see guidance in section 5.1). to verify flood protection capability. Any inspections that cannot be completed will be reported in the the utility response to the 50.54(f) letterflooding walkdown report (Appendix D).

6 ACCEPTANCE CRITERIA

It is not practical or desirable for this guidance to contain specific acceptance criteria for flood protection features. The large variety of protection features and functions make it impossible to capture all the possibilities. For example, some of the considerations that should be taken into account when flood protection features are reviewed include the following:

- Flood protection configuration is in accordance with as-built drawings, as-built installation records, inspection records, vendor documents, etc.
- Visual inspection does not identify any material degradation

Comment [g24]: Suggestion: Address things that are still pending resolution in the CAP.

OK, see change

Comment [g25]: NRC Comment: It would be helpful to have a reference/tie to Section 5.1. Potentially expand the definition of "evaluation" and include an example.

Comment [jhr26]: Letter:
1. The guidance document should include discussion of acceptance criteria for assessing flood control systems and procedures which include reviews of operator actions, and analysis of exterior barriers, incorporated barriers and temporary barriers.
FFTF – Appendix B (walkdown record form) includes specific questions. Added an entry for specific acceptance criteria where applicable. A template for the walkdown report is included in App D.
2.The acceptance criteria for similar flood protection systems and procedures should be evaluated in a consistent manner across all sites, with allowances for site-specific differences.
FFTF –. Endorsed generic walkdown guidance and recommended training guidance is sufficient and all that is reasonably achievable during the time provided for the walkdowns. This is a plant specific verification, plant specific differences exist.
All agreed with FFTF responses below during April 12, 13 meeting
3.The 50.54(f) letter, Requested Information item 1j, states that the walkdown guidance should include a documentation template, including peer-review requirements, so that walkdown results can be efficiently and uniformly reviewed and evaluated. The guidance document does not discuss peer-review requirements.
FFTF – A template for the walkdown report is included in Appendix D..

As discussed during our January meeting, endorsed generic walkdown guidance will provide a common approach for all licensees. Also walkdowns are common station activities, the walkdown guidance does not direct a new type of activity or evaluation method that should be tried and tested for consistency. Finally, there is not sufficient time allowed for walkdown completion to allow a peer review process to occur.
Guidance on how peer review of the walkdown package is performed to is included in section 7 item 7.

Comment [g27]: NRC Comment: Potentially include additional documents such as installation records, etc…

OK, see change

- Instructions contained within implementation procedures can be implemented as written and within allowed time considering the warning time available for the applicable flood hazard and expected conditions during the event
- When applicable, PMs or periodic inspections are in place, within their required periodicity, and of adequate scope.
- There are not unresolved adverse PM or periodic inspection implementation results.
- No topography changes, or barrier installations adversely affect the site drainage plan.

Rather, than attempt to list all the considerations, it is the intent of this guidance to have all observations that cannot be immediately judged as acceptable entered into the licensee Corrective Action Program (CAP) where an evaluation of the observation can be made. CAP disposition should use the following thought processconcept to guide the assessment of implications.

Flood protection features are considered acceptable if no conditions adverse to quality were identified during walkdowns, verification activities, or program reviews as determined by the licensee's Corrective Action Program. Conditions adverse to quality are those that prevent the flood protection feature from performing its credited function during a design basis external flooding event and are "deficiencies". Deficiencies must be reported to the NRC in the response to the 50.54(f) letter.

Note that the use of site-specific acceptance criteria (procedural, design documents, etc.) for flood protection features in lieu of the above generic guidance is at the discretion of the licensee.

8 7 EVALUATION AND REPORTING RESULTS OF THE WALKDOWN

Walkdown results shall be documented.

1. Documentation of field observations shall be recorded on a form provided in the walkdown package. A sample generic The recommended record form is provided in Appendix B. The form includes separate sections for each of the different kinds of reviews that can be done under this guidance. Only the applicable sections need to be completed for each flood protection feature.
1. 2. Section 5.3 recommends that two people participate in walkdown inspections while only one person may be used for procedure and maintenance/testing reviews. The signatures in Appendix B are consistent with these recommendations.

Comment [jhr28]: Letter:
For the walkdown, the licensee should provide records of water level rise/fall including those for flood events for the life of the plant. Rising and falling water levels could cause adverse soil foundation property changes. High water elevation data collection would assist in future flood determination studies and possible integrated assessments

FFTF: Will add discussion of scouring/undermining to 5.6.2 #2 and to Appendix A.

See example A.1.2.

3. The individual who prepares the Walkdown Record Form (Appendix B) or who performs the visual inspection or other review documented by the form should sign the “Prepared By”, “Performed By” or “Evaluated By” space in the applicable section of the form.
4. The second individual performing the visual inspection should sign in the ”Performed By” space of section B of the sheet. If a second person is not used for the walkdowns, enter “N/A” in the space.
5. The individuals reviewing the information in sections C, D, E, F, or G should sign in the ”Reviewed By” space in sections F or G of the form. The purpose of the review is to ensure:
   - No errors in the paperwork
   - Work is technically accurate
   - Comments, conclusions, and explanations are clearly stated
   - Answers to questions do not result in conflicting information
   - Conclusions are technically justified and supported by sound reasoning.
6. It is recommended that all of the Walkdown Record Sheets be packaged together with a cover page that documents Management review of the entire package.
7. The reviews described above satisfy the “peer review” activities requested in Reference 8.1, enclosure 4.
8. Photographs of visual inspection observations are recommended to create a permanent record

2.9. All failures to meet acceptance criteria will be entered into the CAP.

3.10. All flood protection features that could not be inspected because of access limitations (inaccessible or restricted access) will be evaluated using the guidance in section 5.1 and reported in the response to the 50.54(f) letter.

11. The 10CFR50.54(f) letter enclosure entitled “Recommendation 2.3: Flooding” contains a “Requested Information” section that lists all the information that must be included in licensee responses. Appendix D contains a guidance for completing the walkdown report.

At the conclusion of the walkdown, the record forms should be processed in accordance with plant procedures.

- ~~Discussion on who (including qualifications) signs the Appendix B template~~
- ~~Record sheets that were generated?~~
- ~~Describe the management review~~

Comment [jhr29]: Letter:
All aspects of the 50.54(f) letter, “Required Information”, Item 2, which defines all of the items required to be included in the final report should be included in walkdown guidelines for reporting results.
FFTF: Items to be included in the final report are included in the Response Template (App D).

Comment [g30]: NRC Comment: Suggest a discussion of how peer review is accomplished in signoff process.

Addressed in changes above.

9 8 RELATED INFORMATION SOURCES

8.1 NRC Letter to Licensees, dated March 12, 2012, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Acccident"

98.12 INPO Event Report Level 1 11-1, *Fukushima Daiichi Nuclear Station Fuel Damage Caused by Earthquake and Tsunami*

98.23 NRC Inspection Manual, Temporary Instruction 2515/183, *Follow-up to the Fukushima Daiichi Nuclear Station Fuel Damage Event*, November 2011, ML113220407.

98.34 NRC Inspection Manual, Inspection Procedure 62002, *Inspection of Structures, Passive Components, and Civil Engineering Features at Nuclear Power Plants*, Section 03.01(h), *Dams, Embankments and Canals*

98.4 5 NRC Inspection Procedures, Attachment 71111.01, *Adverse Weather Protection*, Section 02.04, *Evaluate Readiness to Cope with External Flooding*

98.5 6 NUREG/BR-0326, Rev. 1 (August 2009), *NRC Inspector Field Observation Best Practices*

98.67 Regulatory Guide 1.102, *Flood Protection for Nuclear Power Plants*

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APPENDIX A

Examples

A. Examples

The following examples of inspection considerations are provided for illustration only. The list of characteristics included and the attributes inspected for each should not be considered all inclusive. This section is organized in a manner similar to section 5.6 (permanent passive, permanent active, temporary passive, temporary active).

A.1 ~~Permanent~~ Incorporated Passive Features

A.1.1 Site Elevations and Topography

- Compare the current site topography with the topography assumed in the current licensing basis flood evaluation.
- Assess differences to determine if they could affect water flow or flood levels and create vulnerabilities in existing flood protection features.
- The need for a land survey for elevations will depend upon the accuracy of the applicable drawings and site topographical documents.

A.1.1.1 Earthen Features (i.e., flood protection berm)

- Verify that earthen features are in place as designed correct height (with no allowance for dimensional tolerances that reduce its protection function) and width, rip-rap in place if included, etc.
- No signs of leakage

A.1.2 Concrete and Steel Structures

The exterior surfaces of Category I (Safety-Related) structures are generally credited to prevent flooding of the interior spaces and to withstand the hydrostatic forces during a flood event. Adjoining non safety related structures must be included if those structures communicate with safety related buildings and structures through access openings or penetrations.

- Verify that the structure is in place and in accordance with its design configuration. Perform physical measurement or required height. Minimum required height must be met with no allowance for dimensional tolerance.
- Visually inspect all exterior exposed surfaces of the building below the analyzed maximum flood height for significant indications of structural degradation or any openings that might permit flooding of the interior spaces.
- Visible penetrations are sealed.
- Required relief paths are in place and unobstructed
- No signs of leakage on interior surfaces

- If conditions will not allow close examination, use of binoculars is permitted if 100% of the surface area below the maximum flood height can be inspected in a manner sufficient to meet the intent of this section.
- No apparent degradation in structural members that challenges their ability to withstand forces from flooding, i.e. reinforced concrete, concrete block or steel barriers, such as surface cracks greater than 0.04 inches in width.
- Interior surfaces of the structure should be inspected for signs of leakage that may be occurring as a result of non-detectible leakage thru external surfaces. Refer to the note below.
- Concrete structures should not show water stains/stalactites emanating from their surfaces.
- Surfaces of the structure/building that are buried are considered inaccessible and not subject to inspection. A visual inspection of interior surface is acceptable if the exterior surface is inaccessible. In addition, the base of structures should be inspected for evidence of scouring or undermining that may have occurred during previous high water events. This condition might need to be repaired or the underlying cause corrected.
- If a PM/surveillance exists that inspects the structure, then it is not necessary to specifically inspect individual barriers for this review (although the surface (e.g., wall), in accessible areas, must still be visually scanned for any unexpected conditions). If credit is being taken for a PM, then identify the PM number in the walkdown records.

A.1.3 Wall, Ceiling, and Floor Seals (e.g., Penetration Seals, Cork Seals)

- Perform a visual inspection of credited wall, ceiling, and floor penetration seals for indications of degradation that would allow flood waters to penetrate into the flood protected area. Conditions that should be recorded include (but are not limited to) damage, undocumented openings or holes (such as those due to abandoned equipment), etc.
- The credited side(s) (surface) of a seal must be inspected. For example, if the side of a wall penetration seal that is credited for flood protection is examined and found to be acceptable, the other side of the seal does not need to be examined.
- Visible penetrations are sealed and there are no visible through wall holes.
- Penetration sleeves, link seals, piping, and conduit should have an absence or corrosion on the exposed steel surface other than minor surface corrosion.
    1. Conduit seal material should have an absence of water stains below penetrations.

A.1.4 Passive Flood Barriers or Water Diversion Structures

- Perform an external visual inspection of passive structural barriers and water diversion structures for any condition that would prevent function of the flood protection feature. Conditions that should be recorded include (but are not limited to) severe corrosion, erosion, indications of significant structural damage, missing fasteners and anchors, undocumented holes or openings, etc.
- Critical dimensions of the structure (e.g., minimum height of a flood wall) shall be verified. Measurement of these dimensions is recommended; however, estimation is permitted when measurement is not practical and the margin is at least as large as the uncertainty of the estimate.
- The need for a land survey for elevations will depend upon the accuracy of the applicable drawings and site topographical documents.

A.1.5 Drains and Catch Basins

- Verify by visual inspection that there are no obstructions or obvious blockage to drains and catch basins credited for protection against licensing basis external flood events.
- Verify that the drains and catch basins are in the location shown on design drawings.
- Verify that any back flow prevention features (such as check valves) are functional as required.
- Verify that controls are in place to assure drains will not be unintentionally obstructed during plant laydown activities or vehicle parking.
- Inspection of the interior surface of drains, catch basins, and pipes is not required. Drain systems can be assumed to function properly if they are tested as part of a routine Preventative Maintenance (PM) program. If there are open issues with the drainage system that could prevent function during an external flood event, enter that condition into the CAP.

A.1.6 Plugs and Manhole Covers

- Verify Material Condition. Specifically, visually inspect the material condition of the plug and seal materials to determine of there is any damage that would prevent the device from performing the flood protection function. Note: Generally, the seals around plugs do not need to be watertight.
- Caulking should not have any apparent cracks or gaps.
- Only one side (surface) of a plug need be inspected. For example, if the exterior side of a concrete plug is examined and found to be acceptable, the interior side does not need to be examined.

A.1.7 Drainage Pathways (Swales, Subsurface Drainage System, Etc.)

- Verify the feature is in place and configured as designed
- Visually inspect the material condition to determine if there is any damage that might prevent the feature from performing its flood protection function.
- Verify that the plant swales are free of obstructions which could prevent the feature from performing the flood protection function and controls are in place to assure they remain obstruction free.
- Back flow prevention devices are functional

A.1.8 Piping and Cable Vaults and Tunnels, Electrical Cable Conduit

Water ingress into tunnels, vaults, and cable conduit is not a concern in the short term unless there are components in these structures with an active flood protection function that might be damaged by submergence. The concern that must be addressed during the walkdown is the possibility that these features might provide a flooding pathway into buildings and other structures.

- Visually inspect all seals or other devices that are credited to prevent water intrusion into a space that contains safety related equipment or equipment credited for flood protection during a flooding event.
- Determine if there is any damage that would prevent the seals or other devices from performing their flood protection function. See item A.1.3 above for more guidance on seal inspection.

A.1.9 Floor Hatches

- Visually inspect floor hatches that are below the analyzed maximum flood height for indications of structural degradation or any openings that might permit flooding of the interior spaces.
- Confirm any hatches in the floor of a flood barrier are capable of limiting the passage of water either above or below the barrier to an acceptable level. The basis for acceptance must be an actual test or an evaluation that includes a review of the design and walkdown of the material condition..
- Only one side (surface) of a hatch need be inspected. For example, if the exterior side of a concrete hatch is examined and found to be acceptable, the interior side does not need to be examined.

A.2 ~~Permanent~~ Incorporated Active Features

A.2.1 Doors

- Perform an external visual inspection of doors for indications of degradation that would prevent satisfactory performance of the flood protection function of the door. Conditions that should be recorded

include (but are not limited to) severe corrosion, missing fittings, missing fasteners, undocumented holes or openings, damaged jams or seals, obstructions, etc.

- Confirm that the doors are closed (or can be closed) and have the proper door swing (i.e., swing in the direction shown on design drawings).

A.2.1.1 Credited Water Tight Doors

- Verify that the door appears to be water tight (constructed in a consistent manner) and
- Door jams, fittings and fasteners are in place and functional
- Door are seals in place and with no degradation that would affect function

A.2.1.2 Credited Non-Watertight Doors

- Verify presence with acceptable gaps
- No degradation that would prevent function
- Door jams, fittings and fasteners in place and functional

A.2.2 Pumps

- Perform an external visual inspection for indications of degradation that would prevent function of the pump. Conditions that should be recorded include (but are not limited to) severe corrosion, missing fittings, etc.
- Verify by means of Reasonable Simulation that plant staff can operate the pump in the manner credited for its function
- Verify that the pump is included in a plant maintenance/testing program that periodically assesses its function

A.2.3 Water Level Indication

Certain rooms may have instrumentation or switches that are credited to indicate the presence of water during an external flood event. For those instruments:

- Verify Material Condition. Specifically, visually inspect the material condition of the instrument to determine if there is any damage that would prevent the device from performing its flood protection function or any obstructions to the sensing element that would prevent accurate readings.
- Verify that the instrument is included in a plant maintenance/testing program that periodically assesses its function

A.3 Temporary Passive Features

A.3.1 Portable Flood Barriers

- Verify that credited temporary barriers are stored as expected and in sufficient quantity, and are subject to periodic inventory and condition assessment
- Visually inspect a representative sample to ensure no physical damage or degradation that would impede their function
- Verify that the barriers can be accessed and transported to the location where they will be needed, considering the conditions that might be expected at the time of their use
- Determine if controls are in place to prevent obstruction of transport routes and whether the capability exists to clear flood induced obstructions.
- Verify that the barriers can be installed and if necessary, inflated, in the manner credited for their function
- If the barriers are subject to age related degradation, verify that they are included in a plant maintenance program that periodically assesses their condition

A.4 Temporary Active Features

A.4.1 Pumps

- Perform an external visual inspection for indications of degradation that would prevent function of the pump. Conditions that should be recorded include (but are not limited to) severe corrosion, missing fittings, missing connections, etc.
- Verify that the pumps can be accessed and transported to the location where they will be needed, considering the conditions that might be expected at the time of its use
- Determine if controls are in place to prevent obstruction of transport routes and whether the capability exists to clear flood induced obstructions.
- Verify by means of Reasonable Simulation that plant staff can install and operate the pump in the manner credited for its function
- Verify that the pump is included in a plant maintenance program that periodically assesses its condition

APPENDIX B

WALKDOWN RECORD SHEET

Last Updated: 5/4/2012 7:09 AM

WALKDOWN RECORD SHEET

Comment [g31]: NRC Comment: Potentially provide a section for clearly laying the current design/licensing basis and germane procedures/actions.
See licensing basis/acceptance criteria entry

Plant Name: _____ Unit: _____

PART A. DESCRIPTION:

Flood Protection Feature (Equipment) ID Number: _____

Description: _____

Location: Bldg. or Area _____
Elevation _____
Room _____ Column _____

Licensing Basis / Acceptance Criteria (identify any critical characteristics / parameters applicable to the flood protection feature that are verifiable by inspection, such as height, pump capacity, time (for manual actions), etc.):

_____
_____
_____
_____

Suggested parts to complete (Check those that apply. "F" always applies):

B ( ) C ( ) D ( ) E ( ) G ( )

Comments:

_____
_____
_____
_____

References: 1. _____
2. _____
3. _____

Prepared By: _____ Date: _____
Print / Sign

Reviewed By: _____ Date: _____
Print / Sign

PART B. VISUAL INSPECTION:

1. Is a visual inspection required? Y N

If No, Explain _____

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If Yes, answer questions 2 – 4 below.

2. Is the feature accessible? Y N N/A

If No, Explain (See section 5.1 and 5.11)

3. Is the Material Condition Acceptable? Y N N/A

4. Are the Critical Physical Dimensions Per Design? Y N N/A

Comments:

Performed By: Date:
Print / Sign

Performed By: Date:
Print / Sign

PART C. FUNCTIONAL TEST:

1. Is a functional test required? Y N

If No, Explain

If Yes, answer question 2 below.

2. Was the functional test satisfactory? Y N N/A

Comments:

Evaluated By: Date:
Print / Sign

PART D. ACTIVITY OR PROCEDURE WALK-THROUGH (REASONABLE SIMULATION):

1. Is a procedure walk-through (reasonable simulation) applicable? Y N

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Comment [g32]: NRC Comment: Add reference to Sections 5.1 and 5.10.

If No, Explain _____

If Yes, list the applicable procedure(s) and answer questions 2 – 5 below.

Procedure(s) _____
_____

2. Can credited time-dependent activities be completed in the time required, including manual actions?	Y	N	N/A
3. Are specified equipment/tools properly staged and in good working condition?	Y	N	N/A
4. Are connection/installation points accessible?	Y	N	N/A
5. Can the activity be executed such that it will not be impeded by the event it is intended to mitigate or prevent?	Y	N	N/A
6. If equipment is necessary to move materials or install the flood protection feature, is this equipment identified in the procedure, available, and the transport pathway is clear?	Y	N	N/A

Comments: _____
_____
_____

Evaluated By: _____ Date: _____
Print / Sign

PART E. MAINTENANCE AND MONITORING:

1. Is the flood protection feature covered by a maintenance, surveillance, or monitoring program?	Y	N	N/A

If N/A, Explain _____

If No, generate appropriate plant notification/assignment to assess this apparent programmatic deficiency..

If Yes, list the applicable maintenance, surveillance or monitoring program:

Program(s) _____
_____

Comments: _____

_____

_____

Evaluated By: _____ Date: _____
Print / Sign

PART F. CONCLUSION:

All are aspects of the flood protection feature evaluated under Parts B through E acceptable? Y N

If YES, no further action is required

If NO, DESCRIBE POTENTIAL PROBELMS THAT REQUIRE FURTHER EVALUATION. These items are to be entered into the Corrective Action Program for disposition. Provide Corrective Action Program entry information as applicable..

_____

_____

_____

_____

_____

_____

_____

_____

Evaluated By: _____ Date: _____
Print / Sign

Reviewed By: _____ Date: _____
Print / Sign

_____

Recommended Additional Information

PART G. Walkdown Enhancements:

Enter information in this section that is obtained in accordance with the guidance in Appendix E. This information should not be reported to the NRC as part of the walkdown report (Appendix D).

Margin Information

1. Licensing Basis Value: _____

2. Physical Margin

3. Potential Margin

Describe what conditions limit margin and possible means of improvement

Susceptible Plant Configurations

Describe any plant configuration changes that might adversely affect the ability of the flood protection feature to perform its credited function

Flood Duration

Describe how the flood protection feature's credited function may be affected by flood duration.

Evaluated By: _____ Date: _____
Print / Sign

~~Evaluated~~ Reviewed By: _____ Date: _____
Print / Sign

APPENDIX C

SAMPLE TRAINING CONTENT

Last Updated: 5/4/2012 7:09 AM

Scope and Purpose of Training Materials

The scope for the training outlined in this appendix is those personnel tasked to complete parts / sections of the Appendix B, Walkdown Record Sheet.

The purpose of the training outlined in this appendix is to provide persons tasked to complete parts / sections of the Appendix B, Walkdown Record Sheet, with the following so they can complete their assigned tasks in a proficient manner:

- Relevant overview and background information contained in reference 9.1 (i.e. the NRC RFI for rec 2.1, 2.3, and 9.3)
- Relevant terms and definitions contained in NEI 12-XX, Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features
- Technical information necessary to perform inspections, draw conclusions, and identify discrepant conditions when performing visual inspections, review of preventive maintenance and testing records of external flood features, and review of walkdown record sheets.

This training is not intended to:

- Provide persons with complete familiarization of materials and content in NEI 12-XX, Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features.
- Provide persons with complete familiarization of requirements and content, or ability to assemble response materials as described in reference 8.1 (i.e. NRC RFI for rec 2.1, 2.3, and 9.3)

Training Requirements:

- Individuals assigned to complete Part A, B, C, D, E, F, or G of the Appendix B, Walkdown Record Sheet, are required to be trained on applicable content as indicated in Table 1.
- The training subjects and content described in Table 1 assumes individuals assigned to complete Part A through G of Appendix B, Walkdown Record Sheet, meet the experience requirements described in section 5.3, Walkdown Team Selection and Training. If individuals do not meet these requirements, or exceed these requirements, then training subjects and content may be adjusted accordingly.
- Training provided should be developed using the Systematic Approach to Training (SAT) process.
- Content in Table 1 annotated as “Site Specific” is not included in training materials developed for the industry use at large, it is each site’s responsibility to develop such content.
- “X” indicates that listed training content is applicable to individuals assigned to complete the respective Part “A” through “G” of the Appendix B, Walkdown Record Sheet.

Table 1

		"X" indicates listed content is required to complete respective Part of Appendix B*						
Subject	**Content to Support**	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Overview and Background	• Purpose and intent of NEI 12-07 document	X	X	X	X	X	X	X
	• Relationship between the March 12, 2012 50.54(f) letter and NEI 12-XX document	X	X	X	X	X	X	X
	• Key definitions and terms in NEI 12-07 document	X	X	X	X	X	X	X
	• Overview of activities contained in NEI 12-07 Appendix B, Walkdown Record Sheet	X	X	X	X	X	X	X
	• Prerequisites for personnel assigned to conduct walkdowns	X	X	X	X	X	X	X
	• Required qualifications for personnel assigned to conduct walkdowns (Site-specific)	X	X	X	X	X	X	X
	• Overview of current licensing basis for external flooding (e.g. flood heights, protected SSCs, sources of flooding) (Site-specific)	X	X	X	X	X	X	X
Walkdown Activities	• Overview of the approach and purpose for visual inspections		X					
	• Characteristics and considerations for SSCs to be visually inspected		X					
	• Expectations for recording observations and findings during visual inspections (Site-Specific)		X					
	• Identifying functional testing procedures credited by flood protection SSC and features (Site-specific)			X				
	• Review of functional test procedure results and acceptance criteria to ensure flood protections features are adequately tested (Site-specific)			X				
	• Requirements for simulations or walk-throughs				X			
	• Required activities when conducting simulations or walk-throughs				X			
	• How to locate maintenance and monitoring requirements and results (Site-specific)					X		
	• Requirements for maintenance and monitoring of flood protection features					X		
Documentation and conclusions	• Record keeping requirements for Appendix B, Walkdown Record Sheets (Site-Specific)	X	X	X	X	X	X	X
	• Quality expectations for observations and findings during visual inspections (site specific)	X	X	X	X	X	X	X

	• Items required to be entered into the station corrective action program (CAP) system (Site-specific)	X	X	X	X	X	X	X
Identifying enhancements for flood protection	• Definitions and content in NEI 12-07 Appendix E, Walkdown Enhancements							X

APPENDIX D

Template for Walkdown Report

Introduction

Enclosure 4 of the NRC's March 12, 2012 50.54(f) letter on Near Term Task Force recommendations from the Fukushima Dai-ichi Accident contains a request for information related to the results of the flooding design basis walkdowns performed in accordance with this guideline. The purpose of this appendix is to provide additional information on the specific items in the request as an aid to preparing the report consistently across the industry and in a manner that will minimize subsequent NRC questions. The guidance in this appendix was developed during meetings with the NRC and has been endorsed by them as documented in their endorsement of this guideline.

Walkdown Report Content

The specific information requests from the NRC letter are repeated in the sections below followed by an explanation of intent.

a. **Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.**
   - A general description is expected.
   - Include information on basis for flood levels (section 4.1.1 of this document)

b. **Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.**
   - Note the distinction between design basis (requested in item a) and licensing basis (requested in this item).

c. **Describe any warning systems to detect the presence of water in rooms important to safety.**
   - What definition should be used for the term "important to safety"?

d. **Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h.**
   - The acceptance criteria for the walkdowns are described in section 6 of the guideline. This approach is consistent with item 1.h.
   - This discussion should include an evaluation of the overall effectiveness of the plant's flood protection features as determined by the results of the walkdowns. The CAP process will determine which of the walkdown

observations are deficiencies and what actions were taken or planned to address them.

e. Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures,) using the documentation template discussed in Requested Information Item 1.j, including actions taken in response to the peer review.

- Training guidance is in section 5.3
- Walkdown Record form is Appendix B and guidance on the approval process is in section 7
- For the purposes of this guidance, a peer review is interpreted as being the second person who performed the visual inspections, the reviewer of the other items on the Walkdown Record form, and the individual who reviews the entire walkdown package (see the review guidance in section 7). There is no need to perform a peer review using other resources or utilities.

f. Results of the walkdown including key findings and identified degraded, non-conforming, or unanalyzed conditions. Include a detailed description of the actions taken or planned to address these conditions using the guidance in Regulatory Issues Summary 2005-20, Rev 1, Revision to NRC Inspection Manual Part 9900 Technical Guidance, "Operability Conditions Adverse to Quality or Safety," including entering the condition in the corrective action program.

- Include the following items
  - Description of all deficiencies as determined by the CAP
  - Description of any observations reported in the CAP that were not dispositioned at the time of the report
  - Describe actions that were taken or are planned to address the deficiencies using the guidance in Regulatory Issues Summary 2005-20 Revision 1.
  - Flood protection features that could not be inspected, including
    - Features affected by restricted access (see section 5.1):
      - Justification for delay
      - Schedule
      - Any necessary special procedures
    - Inaccessible features (see section 5.1):
      - Basis for reasonable assurance that the feature is available and will perform its credited function or an assessment of the impact of non-performance of the function
      - If more than one "inaccessible" flood protection feature with potential loss of function is reported, then

an evaluation of the aggregate effect flood protection features must be provided.

- Walkdown record forms are not submitted to the NRC
- Observations that are entered into the CAP and not dispositioned as deficiencies do not need to be reported.

g. Document any cliff-edge effects identified and the associated basis. Indicate those that were entered into the corrective action program. Also include a detailed description of the actions taken or planned to address these effects.

- Cliff edge effects and physical margins do not need to be reported to the NRC as part of the Walkdown Report.
- Physical margins do need to be collected and documented in the Walkdown Record form (Appendix B). This information will be used in the flood hazard reevaluations performed in response to Item 2.1: Flooding in the 50.54(f) letter (Reference 8.1).

h. Describe any other planned or newly installed flood protection systems or flood mitigation measures including flood barriers that further enhance the flood protection. Identify results and any subsequent actions taken in response to the peer review.

- Describe changes determined to be necessary by the flood walkdowns and whether they have been completed or their schedule for completion.
- For the purposes of the flooding design basis walkdown verification, the peer review is the process described in section 7. The only actions and results that should be reported are those that resulted in a change to the walkdown process or methodology. Corrections and resolution of differences resulting from the normal process of performer / reviewer interaction are not reported.

Report Template

APPENDIX E

Walkdown Enhancements

Last Updated: 5/4/2012 7:09 AM

Flood Protection Feature Walkdown Enhancements

Introduction

The walkdowns required to respond to Enclosure 4 of Reference 1 (NRC's March 12, 2012 50.54(f) letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*) compare a plant's existing flood protection features to the plant's current licensing basis for flooding.

Enclosure 2 of the same letter requires utilities to complete a flood hazards evaluation for all their sites using the methodologies and guidance applicable to new plant applications. The results of these evaluations are to be compared to the current licensing basis for flooding to determine if the design basis flood evaluation bounds the re-evaluated flood hazard. This comparison is to be performed for all susceptible plant configurations and for the entire duration of the flood conditions. If a licensee's current design basis does not bound the reevaluated flood hazard, the licensee will need to perform an integrated assessment to identify vulnerabilities and actions to address them.
In order to provide the information required by enclosure 2 to the 50.54(f) letter without re-performing the walkdowns required by enclosure 4, it is recommended that utilities capture additional information beyond that necessary to verify conformance with the existing licensing basis. The recommended additional information is described in this document. This information need not be reported to the NRC as part of the Design Basis Walkdowns results requested by Enclosure 4.

Definitions

Cliff Edge
The "Discussion" section in Enclosure 2 of the NRC's 50.54(f) letter states that flooding risks are of concern because of a "cliff-edge" effect, in that the safety consequences of a flooding event may increase sharply with a small increase in the flooding level. For example, a flood that exceeds the height of a flood barrier by even a small amount could result in a significant amount of water in the area behind the barrier. For the purposes of this guidance, a cliff edge can be defined as the point at which a flood protection feature is impacted by a flood, resulting in potential significant effects on plant equipment and safe operation

Plant Specific Vulnerability
As defined in the referenced 50.54(f) letter, plant-specific vulnerabilities are those features important to safety that when subject to an increased demand due to the newly calculated hazard evaluation have not been shown to be capable of performing their intended functions.

Physical Margin
The Physical Margin for a flood protection feature is the difference between the licensing basis value of a flood protection feature parameter and the value at which a cliff edge effect occurs. The Physical Margin indicates how much a new plant flood evaluation result can increase beyond the current licensing basis without raising a concern about the ability of the flood protection feature to perform its credited function. For example, if the credited height of a flood barrier in the current licensing basis is 10 feet and an unsealed penetration through the barrier exists at 12 feet, the Physical Margin is 2 feet.

Potential Margin
The Potential Margin is the additional amount by which a flood protection feature can be easily improved to accommodate more challenging flood evaluation results. To continue the example above, if the credited height of a flood barrier in the current licensing basis is 10 feet, an unsealed penetration through the barrier exists at 12 feet, and the total height of the barrier is 15 feet, then the Potential Margin is 5 feet (assuming that the unsealed penetration can be readily sealed). See illustration below.

Recommendations

In addition to the information required to respond to Enclosure 4 of Reference 1, the flooding design basis walkdowns should also capture the following information. This information does not need to be reported to the NRC in the flood walkdown report.
Margin Information

- the current licensing basis value for flood protection features,
- the value at which the as-built flood protection feature parameter (such as barrier height, seal pressure rating, sump pump capacity, etc.) becomes a plant specific vulnerability. The difference between this value and its associated licensing basis value defines the Physical Margin.
- the value at which the as-built flood protection feature can no longer perform its credited function. The difference between this value and its associated licensing basis value defines the Potential Margin.

As an example, if the licensing basis of a flood barrier is 10 feet, the lowest unsealed penetration in the barrier is at 12 feet, and the total height of the barrier is 15 feet, both the Physical Margin (in this case, 2 feet) and the Potential Margin (in this case, 5 feet) should be captured. This information will be useful in assessing the implications of the new plant flood evaluation results that will be performed in response to item 2.1 of Reference 1; specifically:

It is recommended that utilities assess Potential Margin information to determine if pre-emptive plant modifications may be advisable in order to avoid a situation where the new plant flood evaluation results challenge existing flood protection features.

Physical and Potential margin information need not be reported to the NRC as part of the walkdown results report required by the response to Enclosure 4 of Reference 1.

Susceptible Plant Configurations

Enclosure 2 of Referenced 1 requires that the potential effect of flooding on the plant must consider all plant configurations that might exist when a postulated flood could occur. The plant conditions considered should include full power operations, startup, shutdown, and refueling. These different plant conditions will not only affect the status of flood protection features, they might also affect what equipment must be protected. The walkdowns are a good opportunity to identify the potential impact of susceptible plant configurations. In doing so, the licensee should consider:

- the range of flood protection feature configurations that may exist during all plant conditions including maintenance periods and
- the time duration available from the point at which a flood warning is received until flooding conditions exist that could affect the credited function of the flood protection feature.

This information does not need to be reported to the NRC in the walkdown report unless it is part of the CLB for a plant.

Flood duration

Enclosure 2 of the Referenced letter requires that the potential effect of flooding on the plant must consider the effects that could occur over the full duration of the flood. For some hazards flood conditions could persist for a significant amount of time. Extended flood duration could present concerns such as:

- Site access,
- Travel around the site,
- Equipment operating times, and
- Supplies of consumables

In order to facilitate assessing the effect of the duration of the floods determined by the new plant flood evaluations, it is recommended that the review and walk

through of plant procedures performed as part of the design basis walkdowns consider the implications of a longer flood that may be identified by new plant flood hazard evaluation methods. Flood protection feature limitations based on flood duration should be evaluated as part of the design basis walkdown records. For example, if the duration of the design basis flood is 2 hours and a diesel driven pump is credited with removing water from an area, the total amount of fuel available for the pump and the operating time it represents should be determined and recorded.

This information does not need to be reported to the NRC in the walkdown report unless it is part of the CLB for a plant.

References.

1. NRC 10 CFR 50.54(f) letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident,* dated March 12, 2012