Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-3093
Tel 504-739-6660
Fax 504-739-6678
djacob2@entergy.com

Donna Jacobs
Vice President - Operations
Waterford 3

10 CFR 50.54(f)

W3F1-2012-0101

November 27, 2012

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: Flooding Walkdown Report - Entergy's Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

REFERENCES:
1. NRC 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. (ADAMS Accession No. ML12053A340)
2. *Entergy's Response to NRC Request for Information (RFI) Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendations 2.1 and 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident (Waterford 3)*, dated June 7, 2012. (ADAMS Accession No. ML12164A676)

Dear Sir or Madam:

On March 12, 2012, the NRC issued Reference 1 to all power reactor licensees. Enclosure 4 of Reference 1 contains specific requested actions, requested information, and required responses associated with Recommendation 2.3 for flooding walkdowns. Entergy Operations, Inc. (Entergy) confirmed in Reference 2 that it would use the flooding walkdown procedure (Nuclear Energy Institute 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*) as endorsed by the NRC as the basis to conduct the walkdowns and develop the needed information at Waterford Steam Electric Station, Unit 3 (Waterford 3).

Pursuant to Required Response 2 of Reference 1, Enclosure 4, Entergy is providing the Flooding Walkdown Report for Waterford 3 in the Attachment.

Should you have any questions regarding this submittal, please contact Michael Mason, Licensing Manager (acting), at 504.739.6673.

This letter contains no new regulatory commitments.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 27, 2012.

Sincerely,

Kirk Rucker for Donna Jacobs

DJ/WH

Attachment: Waterford 3 Flooding Walkdown Report

cc: w/ attachment

Director, Office of Nuclear Reactor Regulation
U. S. NRC
RidsNrrMailCenter@nrc.gov

Mr. Elmo E. Collins, Jr., Regional Administrator
U. S. NRC, Region IV
RidsRgn4MailCenter@nrc.gov

NRC Program Manager for Waterford 3
Kaly.Kalyanam@nrc.gov

NRC Senior Resident Inspector for Waterford 3
Marlone.Davis@nrc.gov

ATTACHMENT to

W3F1-2012-0101

WATERFORD 3
FLOODING WALKDOWN REPORT

Entergy

ENTERGY NUCLEAR
Engineering Report Cover Sheet

Engineering Report Title:
Waterford Steam Electric Station Unit 3 Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding

Engineering Report Type:

New ☐ Revision ☒ Cancelled ☐ Superseded ☐

Applicable Site(s)

IP1	☐	IP2	☐	IP3	☐	JAF	☐	PNPS	☐	VY	☐	WPO	☐
ANO1	☐	ANO2	☐	ECH	☐	GGNS	☐	RBS	☐	WF3	☒	PLP	☐

EC Number 41244

Report Origin: ☐ Entergy ☒ Vendor
Vendor Document Number: WF3-CS-12-00004
Quality-Related: ☐ Yes ☒ No

Prepared by: Enercon Services, Inc. Date: _____
Responsible Engineer (Print Name/Sign)

Design Verified/ N/A Date:
Design Verifier (if required) (Print Name/Sign)

Reviewed by: Greg Ferguson/ Greg Ferguson Date: 11/27/12
Reviewer (Print Name/Sign)

Reviewed by*: N/A Date: _____
ANII (if required) (Print Name/Sign)

Approved by: Mark Adams/ Mark Adams Date: 11/27/12
Supervisor (Print Name/Sign)

FUKUSHIMA FLOODING WALKDOWN REPORT

ENGINEERING REPORT
FOR
ENTERGY
WATERFORD STEAM ELECTRIC STATION UNIT 3
NTTF RECOMMENDATION: 2.3 FLOODING

Prepared By: Kelly Wilson — Kelly Wilson (Enercon Services) — Date: 11/27/12

Reviewed By: Ryan Thomas — Ryan Thomas (Enercon Services) — Date: 11-27-12

Peer Reviewed By: Kelly Wilson for Tom O'Reilly per telecon — Tom O'Reilly (Enercon Services) — Date: 11/27/12

Approved by: Atwood A. Browning — Atwood Browning (Enercon Services) — Date: 11-27-12

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RECORD OF REVISION

Revision	Revision Summary
0	Initial issue.
1	Record of Revision was added to the report. Updated text in 2nd paragraph of Section 5.1 to provide clarification regarding flood protection for the NPIS.
2	Section 3.4.1 was edited to provide clarification regarding flooding of safety related equipment. Sections 3.4.2 and 7.2 were updated to reflect a new CAP entry regarding the FHB valves.

1.0 SCOPE AND OBJECTIVE

This report was developed to provide information requested by the United States Nuclear Regulatory Commission (NRC) pursuant to Title 10 of the Code of Federal Regulations, Section 50.54(f) on March 12, 2012 for Waterford Steam Electric Station Unit 3 (WF3). In response to the NRC request, Entergy performed 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. The walkdowns were performed to verify that structures, systems, and 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 CLB.

This report presents the findings of the flooding walkdown inspections completed at WF3. The walkdowns were completed in accordance with the United States Nuclear Regulatory Commission (NRC) endorsed guidance of NEI 12-07, Rev. 0A, Guidelines for Performing Verification of Plant Flood Protection Features, dated May 31, 2012 and Entergy Nuclear procedure EN-DC-170 that was developed to provide instructions for implementation of the NRC endorsed guidelines. The walkdowns completed at WF3 were performed to verify that the structures, systems, and components (SSCs) credited for flood protection are capable of performing their design function as described in the current licensing basis. The walkdowns were also used to verify that plant modifications implemented since original construction, such as changes to topography, do not adversely affect flooding protection.

This report identifies the flooding hazards that comprise the current licensing basis and the protection and mitigation features that are credited with preventing the ingress of external water into SSCs important to safety at WF3. The effectiveness of the flood protection features is evaluated against a set of acceptance criteria. Results of the walkdowns, including key findings, available physical margin, and any identified degraded, or nonconforming conditions are addressed and a description of the actions taken or planned to address these conditions is provided.

2.0 DESIGN BASIS FLOOD HAZARD LEVEL

Sections 2.4 and 3.4 of the WF3 FSAR describe the design basis flood and flood protection features provided at WF3 for protection against an external flood.

2.1 Flood Hazards Identified

The safety-related Structures, Systems, and Components at WF3 are capable of withstanding the worst flooding caused by a combination of several hypothetical events. These events are: Probable Maximum Precipitation (PMP over the plant site); Levee failure during Probable Maximum Flood (PMF) and Probable Maximum Hurricane (PMH) at the mouth of the Mississippi River; PMH surge through Barataria Bay; Probable Dam Failures, Seismically Induced; Probable Maximum Surge and Seiche Flooding; Probable Maximum Tsunami Flooding; Ice Effects; and Cooling Water Canals.

WF3 does not have any manholes outside in the yard that are credited for flood protection or manholes that contain any conduits that could be a potential pathway through the protected flood barrier.

2.1.1 General Site Information

Waterford 3 is located on the west (right descending) bank of the Mississippi River near Taft, Louisiana in the northwest portion of St. Charles Parish. About three miles westward is the eastern boundary of St. John the Baptist Parish. Kenner, the nearest population center is 13 miles east of the site. Approximately 25 miles east-southeast of the site is the city of New Orleans. The site area consists of over 3,000 acres of flat land extending from the Mississippi River to the St. Charles Drainage Canal. The site includes 7,500 feet of river frontage.

The primary hydrologic feature with which the plant interacts is the Mississippi River. The plant uses the river as a heat sink and is protected from the river flooding by levees adjacent to the plant. The low-lying land surrounding the site landward of the levees is part of the Mississippi River Delta Basin. This drainage basin is bounded by the Atchafalaya River basin to the west, the Gulf of Mexico to the south, and the Mississippi River basin to the north and east, starting at the river side of the levees.

Flood protection in the vicinity of the site includes levees, bypass channels, and channel stabilization that can effectively confine flood flows except for very severe floods. Structures housing safety-related equipment are flood protected to elevation +30 ft. (29.25 ft.) MSL.

Note: During the initial phase of construction from 1975 to 1978 the plant settled approximately 9 in. Elevations at the top of the basemat which were established in the early part of this phase were used to determine the other elevations throughout the Nuclear Plant Island Structure (NPIS). These elevations were not adjusted as the mat settled; therefore, the established elevations of the plant on design drawings are higher by approximately 9 in. than the actual elevations.

A potential cause of flooding in the Mississippi River Delta Basin is hurricane-induced surge flooding. Although the plant is approximately 60 miles from the open coast, hurricane surges have historically flooded large portions of the Lower Mississippi River Delta area. A failure of the levees adjacent to the plant site was analyzed for the high water levels resulting from the probable maximum flood (PMF) in the Mississippi River and the Corps of Engineers Hypo Flood – 52A in the river coincident with the probable maximum hurricane (PMH) surge at the mouth of the river, which is the event that controls the plant's flood design basis.

2.1.2 Probable Maximum Precipitation

The plant site is located such that runoff-produced flooding from local intense precipitation will not affect the safety of Waterford 3. The site is drained externally by drainage ditches around the plant. The exterior walls of the plant are flood protected up to EL. +30 ft. (29.25 ft.) MSL (12.5 to 15.5 ft. above grade) which is far above any ponding that could be expected due to a severe rainfall up to and including the PMP and assuming blocked culverts.

The effects of the PMP on the roofs of structures are discussed in FSAR Subsection 2.4.2.3.3. The Fuel Handling Building (FHB), Reactor Auxiliary Building (RAB), and Reactor Building are provided with roof drains which exceed normal code design requirements. The FHB and RAB can accommodate the PMP for its duration, while the Reactor Building drain can accommodate the PMP with the exception of the fourth hour (40 percent of the water will spill onto RAB roof and remainder will spill into Cooling Tower "A" and "B" areas). Cooling Tower Areas "A" & "B" were considered one large roof with regard to rainwater contribution from open areas, wet cooling tower overflow, and partial spill-over from the Reactor Building parapet. A maximum of 1.6 ft. of water will pond in the cooling tower areas and the FHB during a PMP event, as the cooling tower areas at EL. -35 ft. MSL are connected to the FHB basement at EL. -35 ft. MSL with four 4 inch pipes for both "A" and "B" areas. The ponding of 1.6 ft. of water is less than the maximum height which water can pond in the cooling tower areas before flooding of essential portions of station service transformers and motor control centers would occur.

2.1.3 Levee Failure during PMF & PMH

The failure of the levees adjacent to the plant site was analyzed for the high water levels resulting from the PMF in the Mississippi River and the Corps of Engineers Hypo Flood – 52A in the river coincident with the PMH surge at the mouth of the river. This resulted in a maximum water level of +25.4 ft. MSL at the North Wall of the Nuclear Plant Island Structure (NPIS). Additional consideration of a hypothetical river stage of 30 ft. MSL resulted in a maximum effective water level of 27.6 ft. MSL.

2.1.4 PMH surge through Barataria Bay

The effects of a hurricane surge passing through Barataria Bay are analyzed coincident with the PMP. The maximum still water level from this analysis is computed to be +18.1 ft. MSL. The maximum effective water level from hurricane

induced wind waves was computed to be +23.7 ft. MSL, while the peak surge from a PMH on the Mississippi River results in a river stage of +25.2 ft. MSL at WF3.

2.1.5 Other Possible Hazards

Probable Dam Failures, Seismically Induced

The nearest flood control reservoir to the site on the Mississippi River Basin is the Grenada Reservoir on the Yalobusha River in northern Mississippi. Three additional reservoirs reside further upstream from the site. Although the combined storage of those reservoirs is considerable, the stream distance and resulting channel storage between the reservoirs and the plant site is considered to be great enough to attenuate any flood wave from the failure of any of these dams to a level below that resulting from the PMF, or a PMH at the mouth of the Mississippi River. Therefore, the seismic failure of upstream dams does not present a threat to the site.

Probable Maximum Tsunami Flooding

The Gulf Coast near the site will not experience any significant tsunami flooding. Any tsunami effects that may be postulated will be minor in comparison to the hurricane surge flooding.

Ice Effects

The appearance of ice on the lower reach of the Mississippi River is a rare occurrence, especially below the vicinity of Baton Rouge. The mild to moderate quantity of drift ice which has been observed in this region has an estimated frequency of occurrence of two or three times in the past 100 years, and has never resulted in ice jams. Therefore, it is concluded that the Waterford site will not experience any difficulties or problems which might arise from ice flooding or ice flow blockage.

Cooling Water Canals and Reservoirs

There are no cooling water canals or reservoirs at the Waterford 3 site. Therefore, flooding caused by canals and reservoirs is not analyzed for the site.

2.2 Assumptions

2.2.1 Probable Maximum Precipitation

The calculated PMP is a hypothetical indication of the extreme upper limit of precipitation events.

The effect of the PMP on the plant site assumed there were blocked culverts. It is also assumed that one-third the drainage capacity is blocked for the roof drains and 4" pipes connecting the Cooling Tower areas at EL. -35 ft. MSL to the FHB basement at EL. -35 ft. MSL during the PMP. This assumption does not apply to the cooling tower area drains.

2.2.2 Levee Failure during PMF & PMH

The levee is assumed to fail completely and instantaneously, and the length of the breach is sufficiently great that spreading effects are negligible at the center of the flow, in which the NPIS is located. Instantaneous levee failure is hypothesized to occur as a result of either piping or toe erosion which undermines the embankment. No credit has been taken for the presence of the elevated roadway parallel to the levee. Although this is an engineered structure nearly equal in height and cross section to the levee, it is conservatively assumed to fail along with the levee.

2.2.3 PMH surge through Barataria Bay

The Mississippi Delta region of Louisiana is prone to high winds and flooding associated with hurricanes. Although the site is 129 miles above Head of Passes, and approximately 60 miles north of the open waters of the Gulf of Mexico, there exist possible pathways by which a severe hurricane surge could approach the site or aggravate a preexisting river flood. Therefore a Probable Maximum Hurricane is hypothesized. The assumption is that "a hypothetical hurricane having that combination of characteristics which will make it the most severe that can probably occur in the region involved. The hurricane should approach the point under study along a critical path and at optimum rate of movement."

2.3 Methodology

2.3.1 Probable Maximum Precipitation

The PMP is calculated by a method which uses a combination of a physical model and several estimated meteorological parameters to yield the theoretically greatest depth of precipitation for a given duration which is physically possible over a particular area. The value is estimated by maximizing all the physical parameters responsible for extreme precipitation in previously observed heavy storms and transposing the storm orientations and trajectories to produce the greatest possible precipitation over the area of concern.

2.3.2 Levee Failure during PMF & PMH

The PMF on the Mississippi River at Waterford 3 was determined by increasing the Corps of Engineers Project Design Flood (PDF) at the latitude of Red River Landing by 67 percent. This resulted in a peak discharge of approximately 5 million cfs at that latitude. A flow of this magnitude would result in extensive overtopping of the levees above Waterford 3 and a reduction in flow at the site to levels equal to or less than those associated with the PDF. It was considered possible that a flood less severe than a PMF but more severe than the PDF might cause the greatest danger in the event of a levee failure adjacent to Waterford 3. Upon consultation with the NRC staff, a river water level of EL. +27 ft. MSL was determined to provide acceptable conservatism for the levee failure analyses during a PMF. However, the upper-limit river stage of 30.0 ft. MSL was used due to the difficulty of establishing the expectation of flow diversion (from PDF river stage of 24 ft. MSL) and the possibility of future channel changes. The velocity along the water profile can be computed, ultimately calculating the static and

dynamic heads from which flood elevations are determined. From a river stage of 30 ft. MSL, the maximum effective water level against the north wall of the NPIS is 27.6 ft. MSL.

2.3.3 PMH surge through Barataria Bay

The open coast surge hydrograph was calculated according to the bathystrophic storm tide theory, as developed by Marinos and Woodward and programmed by the Coastal Engineering Center Research Center. The theory describes the phenomenon of storm tide rise along the coast caused by: (1) the direct wind stress acting on the surface of the water and (2) the additional effect created by the earth's rotation on the along-shore current known as the Coriolis and Bathystrophic effect. The effects of a PMH surge passing through Barataria Bay are analyzed to coincide with the PMP. The maximum still water level from this analysis is computed to be +18.1 ft. MSL. The maximum effective water level from hurricane induced wind waves was computed to be +23.7 ft. MSL. Therefore, a PMH surge through the Barataria Bay is not the controlling design basis flooding event at WF3.

To establish the peak surge of the Mississippi River at the Waterford 3 site, the PMH is assumed to coincide with a moderate river flood. An early summer design flood discharging 1.25 million cfs south of Red River Landing was chosen for this purpose. Utilizing the HEC-II computer program with adjusted Manning coefficient (from Venice to New Orleans), and the Corps of Engineers' Manning coefficient (from New Orleans to the site), using the 1973-1975 cross-sectional profiles, the resulting river stage at the site without local wind effect is found to be +25.2 ft. MSL. The river stage without the effect of PMH is +21.5 ft. MSL, a difference of approximately 4 ft.

2.4 Non Conformance

During the initial phase of construction from 1975 to 1978 the plant settled approximately 9 in. Elevations at the top of the basemat which were established in the early part of this phase were used to determine the other elevations throughout the Nuclear Plant Island Structure (NPIS). These elevations were not adjusted as the mat settled; therefore, the established elevations of the plant on design drawings are higher by approximately 9 in. than the actual elevations.

The top of the exterior walls (flood walls) of the NPIS were surveyed in 1991 to be at EL. 29.27 ft. MSL. The flood protection level of the NPIS is reduced to EL. 29.25 ft. MSL from EL. 30 ft. MSL, a 9 in. difference. The safety-related equipment which is housed within the NPIS is still protected from disastrous floods since the highest level the water will reach at the NPIS is EL. 27.6 ft. MSL in the most severe conditions.

Additionally, FSAR Section 3.4.1 states there are eight flood protection doors, but plant documents indicate there are seven flood protection doors. The FHB rail bay door is required to be closed per the off normal event procedure, but is not credited to prevent water intrusion.

3.0 EXTERNAL FLOOD PROTECTION AND MITIGATION FEATURES

3.1 Flooding Licensing Basis

The safety-related Structures, Systems, and Components at WF3 are designed to withstand the worst flooding caused by a combination of several hypothetical events. These events considered in detail are: the probable maximum precipitation over the plant site; levee failure during PMF and PMH at the mouth of the Mississippi River; and PMH surge through Barataria Bay.

The design basis flooding event at WF3 is a levee failure during a PMF and PMH at the mouth of the Mississippi River. This results in a maximum Design Basis Flood elevation level of +27.6 ft. MSL at the NPIS north wall. Based on the current licensing basis at WF3, as previously discussed in Section 2.0, the NPIS at WF3 is flood-protected to +29.25 ft. MSL.

3.2 Flood Duration

3.2.1 Probable Maximum Precipitation

The 10 square mile PMP depths for 6, 12 and 24 hours are 30.7, 34.6, and 39.4 inches respectively.

3.2.2 Levee Failure during PMF & PMH

A total duration for the levee failure during PMF and PMH is not discussed in the plant's current licensing basis.

3.3 Flood Protection Features

Safety-related systems and components are flood protected because they are enclosed in a rectangular box-like reinforced concrete structure 380 ft. long, 267 ft. wide, and extending 64.5 ft. below grade known as the Nuclear Plant Island Structure (NPIS). Its common foundation mat and exterior wall system are designed to withstand all loadings and postulated floods as well as to minimize water intrusion.

All exterior doors of the NPIS at plant grade or below the PMF elevation, which lead to areas that house and protect safety-related equipment, are designed as flood protection doors to withstand the hydrostatic pressures due to the PMF and prevent water intrusion. There are a total of seven exterior, flood-protected access doors below elevation +29.25 ft. MSL which prevent flood waters from entering the NPIS. In the Reactor Auxiliary Building there are three doors located in the east exterior wall, and two located in the west exterior wall above elevation +21 ft. MSL. In the Component Cooling Water System area there are two flood doors located in the west exterior wall above elevation +21 ft. MSL. In the Fuel Building area there is one removable flood-protected gate (modified to be welded shut) located by the spent fuel cask decontamination area above elevation +20 ft. MSL. Four valves form the flood barrier for the Fuel Handling Building by providing a barrier between the Spent Fuel Pool Cask Decontamination Area (open to the train bay which is not flood protected) and the FHB sump.

Additionally, each dry cooling tower cell, and open area adjacent to the cells, is provided with area drains. The wet cooling towers are provided with overflows at their high water level elevations, which spill onto the open areas adjacent to them. All area drains in each Cooling Tower area are interconnected by a network of drainage piping which terminates at an area drain sump for Cooling Tower area "A" and at an area drain sump for Cooling Tower area "B". Each drain area sump is provided with a set of motor driven sump pumps. Each cooling tower area is also provided with a diesel powered sump pump.

The lowest elevation of the Fuel Handling Building (FHB) on EL. -35 ft. MSL was considered as rain water storage capability for the Cooling Tower areas. Water level equalization between the two areas occurs through four 4 inch pipes installed under two door sills located at each side of the FHB. To maintain negative pressure in the FHB, these pipes have two flappers installed, one per train. These flappers do not impede the flow of water into the FHB. Two-thirds of the pipes need to remain unblocked to maintain the necessary equalization rate.

The Fuel Handling Building (FHB), Reactor Auxiliary Building (RAB), and Reactor Building, have roof drains. There are a combined 21 drains of various sizes (4, 5, and 6 inch) credited for these three buildings. There are also 14 scuppers on the RAB roof. The FHB and RAB must maintain two-thirds of their roof drainage capacity.

3.4 Procedures

3.4.1 Off-Normal Event Procedures

WF3 currently has an Off-Normal Event Procedure which describes actions to be taken in the event of severe weather and flooding. This procedure provides for actions to be taken based on various severe weather (severe thunderstorm, tornado, tropical storm, or hurricane) watches/warnings or Mississippi River flooding ($\geq$24 ft. MSL) which could have the potential for site flooding. This procedure specifies actions, such as closing flood doors, which are credited in the current licensing basis. Additionally, the procedure verifies credited valves are closed and ensures credited sump pumps are operable. A Surveillance Procedure provides instructions for monitoring the Mississippi River level during flood stages exceeding +27 ft. MSL, as required by Technical Specification 4.7.5. When the river level is $\geq$24 ft. MSL and <27 ft. MSL, the procedure requires Mississippi River level monitoring at least once every 24 hours as indicated by the River Water Level Indicator, adjacent to the intake structure. If the water level is $\geq$27 ft. MSL as indicated by the level indicator, then recording the river level is required every two hours.

In the event of a failure of one of the motor driven sump pumps, the backup diesel driven sump pumps are required to be started within three hours to ensure safety related equipment is not flooded. This three hour time frame assumes the total inoperability of all motor driven sump pumps during PMP. The three hours was considered adequate time to start the pumps and was not simulated. Additionally, the pumps are defense in depth as there are already two motor driven sump pumps for each dry cooling tower area.

3.4.2 Plant Maintenance

An existing Plant Door Maintenance procedure provides instructions for performing maintenance on plant doors and plant door equipment installed at WF3. This includes the seven flood doors credited in the licensing basis. The lack of preventive maintenance on the valves in the FHB was entered into the CAP at WF3.

3.5 Adverse Weather

The current licensing basis requires securing flood tight doors when the Mississippi River exceeds 27 ft. MSL. Per WF3 Off Normal Event Procedures, securing flood-protected access doors below EL. +29.25 ft. MSL is also required during severe weather watches/warnings (hurricanes) along with verifying four valves which form the flood barrier for the design basis flood in the Fuel Handling Building are closed.

4.0 INTERNAL WARNING SYSTEMS

4.1 Water Level Warning Systems

No interior water level warning systems or alarms are credited for external flood protection in the plant's current licensing basis.

5.0 EFFECTIVENESS OF FLOOD PROTECTION SYSTEMS

5.1 Acceptance Criteria

The flood protection features credited in the current licensing basis for Waterford Steam Electric Station Unit 3 are incorporated passive and active features and include the walls and basemat of the NPIS, seven flood-protection doors, penetration seals through NPIS exterior walls, the site topography, sump pumps, four valves, and roof and floor drains. These flood protection features were visually inspected in accordance with the acceptance criteria described in Section 6 of the NEI 12-07 document and as discussed below.

The maximum design flood height is EL. +27.6 ft. MSL. All safety related components are housed in the NPIS, which is flood protected up to EL. +29.25 ft. MSL. The external (above grade) and interior (below grade) surface of the walls were visually inspected to verify the features will prevent water intrusion. Indications of degradation of the walls that would allow flood waters to penetrate into the flood protected area are not present. The basemat of the NPIS (at EL. -35 ft. MSL) was visually inspected for signs of water leakage emanating from the surface.

The flood-protection doors installed above grade at WF3 are credited to be water-tight to prevent water intrusion inside the NPIS during a flood. The doors were visually inspected to ensure they are obstruction free and swing in the right direction, and there was minimal corrosion or no damaged jams, seals, or missing parts.

Penetrations through the NPIS wall are documented by plant drawings. The drawings were used as a basis to help locate all through-wall penetrations in the NPIS. Visual inspection verified the penetrations are sealed and contain no visible potential water

seepage pathway. The credited side of a seal, where available (above grade), was inspected up to EL. 29.25 ft. MSL.

The site topography was visually inspected using plant drawings for site grading and drainage along with plot and drainage plans. These drawings were used to visually verify that topography of the site allowed water to drain as depicted in the drawings. Any changes to the topography, including the installation/modification of structures, and changes to security barriers were also reviewed to ensure they were not prohibiting flood water from exiting the site. All culverts are assumed to be blocked. For conservatism, culverts and drain ditches were inspected for signs of debris build-up and blockage.

The Dry Cooling Tower areas "A" and "B" contain sumps, permanent and backup sump pumps, hoses, and level indicators which were required to be visually inspected. Each tower contains a backup diesel pump which can be utilized to discharge water through hoses over the NPIS exterior floodwall and provides defense in depth. An external visual inspection searched for indications of severe corrosion, missing fittings, or missing connections.

There are four valves which make up the flood barrier at WF3. These valves are credited for flood protection between the Spent Fuel Cask Decontamination Pit and the Fuel Handling Building sump. An external visual inspection was performed looking for severe corrosion of the valve body, piping connections, and valve actuator. Verification that manual valves are free of obstructions which could prevent an operator from closing them was also performed.

The drains on the Reactor Auxiliary Building and Fuel Handling Building roofs and the 4 inch pipes in the Cooling Tower areas (connecting to the Fuel Handling Building at EL. -35 ft. MSL) are credited as maintaining two-thirds of their drainage capacity. The drains and surrounding areas were visually inspected to verify there are no obstructions or obvious blockage to the drains.

All observations which were not immediately able to be judged as acceptable on the walkdowns were entered into the Waterford 3 Corrective Action Program (CAP) to allow for a more detailed evaluation to be completed.

5.2 Discussion

5.2.1 Overall Effectiveness

Based on the walkdowns completed at WF3 and the results of the operability determinations associated with the CRs entered into the CAP, WF3 is determined to have sufficient protection available at the site to ensure the safe operation of the plant in the event of an external flood. The flood protection height at the Nuclear Plant Island Structure (EL. +29.25 ft. MSL) is 1.65 ft. above the maximum flood design level (EL. +27.6 ft. MSL). Through-wall penetration seals that were visually inspected did not show signs of degradation and were generally in good condition. Floor barrier walls that were visually inspected showed no signs of visible water seepage or cracks that were greater than 0.04 inches. Flood-protection doors located below the maximum flood elevation for the site were visually inspected and it was verified that water would not leak into the structure and flood safety-related

equipment because the flood doors were obstruction free, swung in the correct direction, and there were no damaged or corroded jams or seals. The sump pumps which were inspected did not contain severe corrosion or missing fittings. The valves considered part of the flood barrier were observed to be free of severe corrosion to the valve body and piping connections, and the valve actuator and the valve operators were free of obstructions. The credited roof and pipe drains between the cooling tower areas and FHB were observed to have more than the required two-thirds drainage capacity.

During the walkdowns, conditions that do not meet the acceptance criteria discussed in Section 5.1 above were observed in a few locations requiring condition reports to be entered into the Corrective Action Program at WF3. The operability reviews of these conditions determined that the issue did not prevent safe plant operation or create a flooding risk for any safety-related equipment at the site. Based on the results of the visual inspections and the information provided in the current licensing basis at WF3, safe operation of the plant would be maintained in the event of a design basis external flooding event.

5.2.2 Other SSCs and Procedures

WF3 currently has two procedures, one for an off normal event and one for surveillance, which address plant actions to be taken in the event of severe weather and flooding conditions at the site. The surveillance procedure provides instructions for monitoring the Mississippi River level, while the off normal event procedure provides instructions for operator actions in the event of severe weather and river flooding. Per the off normal event procedure, flood-protected doors around the site must be closed within 12 hours after the Mississippi River level reaches +27 ft. MSL as stated in Technical Specification 3.7.5. The procedures are required in order to meet the site's flooding licensing basis design. The flood-protected doors were secured during the last severe weather warning due to Hurricane Isaac in August of 2012.

Even though not credited in the CLB, Entergy Corporate procedures provide the guidance and requirements for conducting a structural condition monitoring program to meet the requirements of 10 CFR 50.65, the Maintenance Rule. This program provides a systematic approach for evaluation of plant systems/structure which will provide a reasonable assurance that the structures are capable of fulfilling their intended 10 CFR 50.65 functions. The program consists of periodic reviews of the condition of the plant structures via periodic inspections, routine walkdowns, surveillance tests, and ongoing review of the effect of the condition of plant structures on significant plant equipment. The program consists of defining and performing periodic structural evaluation which will ensure the timely identification, assessment, and repair of degraded structural elements. Concrete structures and penetration seals are inspected for cracking, spalling, erosion, corrosion of reinforcing bars, settlement, deformation, leaching, discoloration, groundwater leakage, rust stains, exposed rebar, rust bleeding, and other surface irregularities. All flood barrier walls and basemat structures were determined to be within the scope of the Maintenance Rule and are therefore examined in accordance with these procedures. Maintaining the structures and materials

monitored under these procedures provides a reasonable assurance that those structures that fall under the program will be able to perform their intended function.

6.0 IMPLEMENTATION OF WALKDOWNS

6.1 NEI-12-07 Guidance

The verification walkdowns were performed in accordance with the NRC endorsed guidance of NEI 12-07, Rev. 0A, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features" dated May 31, 2012, and Entergy Nuclear procedure EN-DC-170 that was developed to provide instructions for implementation of the NRC endorsed guidelines. Additional guidance for implementation was also obtained from the Flooding Walkdown Frequently Asked Questions (FAQs) and NRC responses, which are based on discussions between NEI and the NRC.

The basis for establishing the walkdown scope and the flood protection features included the preparation of a walkdown list in accordance with the guidance provided in Section 4 of NEI 12-07. As part of this preparation, the current licensing basis was reviewed to determine the flood protection features and actions that are necessary to prevent an external flooding event at the site from adversely impacting safety-related SSCs. In addition to the identification of passive and active protection features, existing site and Entergy Corporate procedures were reviewed to determine if any procedures were necessary to ensure existing flood protection features would be functional in the event of a flood at the site.

Walkdown packages were prepared in accordance with the guidance provided in Section 5.2 and walkdown team personnel were selected based on the requirements provided in Section 5.3 of NEI 12-07.

Prior to each walkdown, a pre-job brief was conducted. All walkdown results were documented in accordance with the recommendations of Section 7 of NEI 12-07 on the Flooding Walkdown Record Form provided in Attachment 9.3 of EN-DC-170. The walkdown record form provided in Attachment 9.3 is consistent with the record form template provided in Appendix B of NEI 12-07.

6.2 Team Organization

Consistent with Section 5.3 of NEI 12-07, the walkdown team consisted of two trained individuals with a complementary set of skills. The walkdown team consisted of two degreed engineers (or equivalent) and had familiarity with the site. The walkdown team was supplemented as required by plant maintenance and/or operations personnel.

6.3 Training Approach

Consistent with Section 5.3 of NEI 12-07 and Section 4.1 of EN-DC-170, personnel selected to perform walkdown inspection activities were experienced and knowledgeable of the site current licensing basis. Personnel were also trained to perform the visual inspections and met the knowledge requirements specified in EN-DC-170 and Appendix C of NEI 12-07. Team members associated with the flooding walkdowns also

satisfactorily completed the NANTEL Generic Verification Walkdowns of Plant Flood Protection Features lesson and were knowledgeable of the 50.54(f) letter dated March 12, 2012.

Plant maintenance and/or operations personnel who supplemented the walkdown teams were not required to be qualified to the aforementioned requirements.

7.0 WALKDOWN RESULTS

A total of 22 work packages were associated with the walkdowns completed at WF3, with several packages containing multiple features. Based on the walkdown packages a total of 22 features were walked down. The features and attributes walked down as part of this effort are broken down into flood protection type (incorporated passive, temporary passive, incorporated active, and temporary active) as shown in the table below.

Table #1: Summary – Features Included in the Walkdown Scope

Flood Protection Type	Total Number of Features	Total Number of Attributes
Passive – Incorporated	19	155
Passive – Temporary	0	0
Active – Incorporated	3	15
Active – Temporary	0	0

7.1 Deficiencies

There were some observed conditions of features that did not meet the NEI 12-07 acceptance criteria. These conditions were entered into the Corrective Action Program; however, none of these observations were determined to be deficiencies as defined in NEI 12-07. The operability determinations for these conditions concluded that the feature could perform its intended flood protection function when subject to its design basis flooding hazard.

7.2 Observations

Observations during the walkdowns that did not meet the NEI 12-07 acceptance criteria were documented in the Corrective Action Program (CAP). The features were determined to be operable and none of the observations were determined to be deficiencies, however, the RAB roof drains and valves in the FHB need to be entered into the preventive maintenance program. All observations entered into the Corrective Action Program as a result of the flooding walkdowns have been dispositioned as of the writing of this report.

7.3 Corrective Actions

There were no observations identified that required actions to address a deficiency associated with a physical flood protection feature. Since the CAP has determined that there are no deficiencies, there are no planned actions pending.

7.4 Inaccessible Flood Protection Features

One through-wall penetration and the exterior wall inside of a pipe chase between EL. -4 ft. and +21 ft. along the west and south walls in the Reactor Auxiliary Building is inaccessible. There is a permanent filter skid situated on top of the floor plug on EL. 21 ft., which is the only personnel access point. The permanent filter skid would require major disassembly to be able to open the floor plug. Additionally, penetration and exterior walls are below grade and cannot be inspected from outside the NPIS.

The spent resin tank room, located on floor EL. -35 ft. MSL of the Reactor Auxiliary Building, is inaccessible. The spent resin tank room west wall and basemat are part of the NPIS flood boundary and cannot be inspected above grade elevation. The spent resin tank room is a Locked High Radiation area and is inaccessible per Section 3.6 of NEI 12-07. Based on drawing reviews, no through-wall penetrations have been identified in the room and the walls of the room span less than 10% of the entire NPIS west walls.

The HVAC air intake area between columns 5FH and 6FH, located on floor EL. +1 ft. MSL of the Fuel Handling Building, is inaccessible. The intake areas extend from column 1FH to column 7FH, but one bay between columns 5FH and 6FH has a chiller permanently installed on top of the bay opening. The permanent chiller would require major disassembly to be able to access the flood protection wall. The north wall between columns 5FH and 6FH in the HVAC intake area is part of the NPIS flood boundary and cannot be inspected from outside the NPIS below grade level.

The majority of the exterior walls were inspected without any deficiencies being identified. Design documents indicate the penetration is grouted, and other grouted penetrations that were visually inspected were found to be in good condition. Additionally, the walls are a continuous concrete barrier that will protect against water ingress. Based on this, the inaccessible portions are considered with reasonable assurance to be available and functional.

8.0 AVAILABLE PHYSICAL MARGIN

As indicated in Section 3.12 of NEI 12-07, Rev. 0A, the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns to include an evaluation of the cliff-edge effects at the site. The available physical margin (APM) has been determined and documented on the walkdown record forms. The APMs provided on the walkdown record forms will allow flood hazard reevaluations completed in response to Recommendation 2.1: Flooding to be completed.

No available physical margins documented in the record forms were considered to be small APMs at WF3.

9.0 NEW FLOOD PROTECTION SYSTEMS

There are no known planned or newly installed flood protection systems or flood mitigation measures at WF3.

10.0 REFERENCES

10.1 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 Daiichi Accident."

10.2 Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features (NEI 12-07 [Rev. 0-A]), NEI, dated May 2012.

10.3 EN-DC-170, "Fukushima Near Term Task Force Recommendation 2.3 Flooding Walkdown Procedure"

10.4 Waterford 3 Steam Electric Station Final Updated Safety Analysis Report (FSAR), Revision 306

10.5 Waterford 3 SES Response to Generic Letter 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities"

11.0 ATTACHMENTS

None