Entergy

Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

Michael Perito
Vice President, Operations
Grand Gulf Nuclear Station
Tel. (601) 437-6409

GNRO-2012/00140

November 26, 2012

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852-0001

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

Grand Gulf Nuclear Station, Unit No. 1
Docket No. 50-416
License No. NFP-29

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 (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, dated June 8, 2012 (GNRO-2012/00053)

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 Grand Gulf Nuclear Station (GGNS).

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

Should you have any questions regarding this submittal, please contact Jeffery A. Seiter at 601-437-2344.

This letter contains no new regulatory commitments.

I declare under penalty of perjury that the foregoing is true and correct; executed on November 26, 2012.

Sincerely,

MP / jas

Attachments: 1. Grand Gulf Nuclear Station (GGNS) Flooding Walkdown Report

cc: (see next page)

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U. S. Nuclear Regulatory Commission
Attn: Director, Office of Nuclear Reactor Regulation
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

U. S. Nuclear Regulatory Commission
ATTN: Mr. A. Wang, NRR/DORL
Mail Stop OWFN/8 G14
11555 Rockville Pike
Rockville, MD 20852-2378

U. S. Nuclear Regulatory Commission
ATTN: Robert J. Fretz Jr.
OWFN, Mailstop # 4A15A
11555 Rockville Pike
Rockville, MD 20852-2378

U. S. Nuclear Regulatory Commission
ATTN: Robert L. Dennig
OWFN, Mailstop # 10E1
11555 Rockville Pike
Rockville, MD 20852-2378

U. S. Nuclear Regulatory Commission
Attn: Ms. Jessica A. Kratchman
OWFN, Mailstop # 9D2
11555 Rockville Pike
Rockville, MD 20852-2378

U. S. Nuclear Regulatory Commission
Attn: Mr. Eric E. Bowman
OWFN, Mailstop # 12D20
11555 Rockville Pike
Rockville, MD 20852-2378

U. S. Nuclear Regulatory Commission
Attn: Ms. Eileen M. Mckenna
TWFN, Mailstop # 10D5
11555 Rockville Pike
Rockville, MD 20852-2378

ATTACHMENT 1

GNRO-2012/00140

GRAND GULF NUCLEAR STATION (GGNS)

FLOODING WALKDOWN REPORT

Entergy

ENTERGY NUCLEAR
Engineering Report Cover Sheet

Engineering Report Title:
Grand Gulf Nuclear Station 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 40711

Report Origin: ☐ Entergy ☒ Vendor
Vendor Document Number: GGNS-CS-12-00003
Quality-Related: ☐ Yes ☒ No

Prepared by: ENERCON / SEE PAGE 2 Date: _____
Responsible Engineer (Print Name/Sign)

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

Reviewed by: Mark Locke / Mark D Locke Date: 11/15/12
Reviewer (Print Name/Sign)

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

Approved by: Thomas Thurmon/ Thomas J. Thurmon Date: 11-15-12
Supervisor (Print Name/Sign)

ENGINEERING REPORT

GRAND GULF NUCLEAR STATION FLOODING WALKDOWN SUBMITTAL REPORT FOR RESOLUTION OF FUKUSHIMA NEAR TERM TASK FORCE RECOMMENDATION 2.3: FLOODING

Prepared By: _____ Date: 11/14/12
Nathan Cox (Enercon Services)

Reviewed By: _____ Date: 11-14-12
Michael Jones (Enercon Services)

Peer Reviewed By: _____ Date: 11/14/12
Tom O'Reilly (Enercon Services)

Approved by: _____ Date: 11-14-12
(Enercon Services) ATWOOD A. Browning

GGNS Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding

TABLE OF CONTENTS

Section	Title	Page
1.0	**SCOPE AND OBJECTIVE**	**4**
2.0	**DESIGN BASIS FLOOD HAZARD LEVEL**	**5**
2.1	Flood Hazards Identified	5
2.2	Assumptions	8
2.3	Methodology	9
2.4	Non Conformance	11
3.0	**EXTERNAL FLOOD PROTECTION AND MITIGATION FEATURES**	**12**
3.1	Flooding Licensing Basis	12
3.2	Flood Duration	13
3.3	Flood Protection Features	13
3.4	Procedures	14
3.5	Adverse Weather	15
4.0	**INTERNAL WARNING SYSTEMS**	**16**
4.1	Room Water Level Warning Systems	16
5.0	**EFFECTIVENESS OF FLOOD PROTECTION SYSTEMS**	**16**
5.1	Acceptance Criteria	16
5.2	Discussion	18
6.0	**IMPLEMENTATION OF WALKDOWNS**	**19**
6.1	NEI-12-07 Guidance	19
6.2	Team Organization	20
6.3	Training Approach	20
7.0	**WALKDOWN RESULTS**	**21**
7.1	Deficiencies	21
7.2	Observations	22
7.3	Corrective Actions	22
7.4	Inaccessible Flood Protection Features	22
8.0	**AVAILABLE PHYSICAL MARGIN**	**22**
9.0	**NEW FLOOD PROTECTION SYSTEMS**	**23**
10.0	**REFERENCES**	**23**
11.0	**ATTACHMENTS**	**23**

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 Grand Gulf Nuclear Station Unit 1. 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 Grand Gulf Nuclear Station (GGNS). 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 GGNS 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 GGNS. 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 GGNS UFSAR describe the design basis and flood protection features provided at GGNS for protection against an external flood.

2.1 Flood Hazards Identified

The safety-related facilities, systems, and equipment at GGNS are capable of withstanding the worst flooding caused by a combination of several hypothetical events. These events are: probable maximum flood of the Mississippi River coincident with wind generated waves; failure of upstream dams coincident with the U.S. Army Corps of Engineers design-project flood; ice flooding; and probable maximum flood of the two small streams adjacent to the plant coinciding with the Probable Maximum Precipitation (PMP) flooding of the site due to PMP rainfall on the site watershed.

2.1.1 General Site Information

Grand Gulf Nuclear Station (GGNS) is located in Claiborne County, Mississippi, on the east bank of the Mississippi River. The site is in the vicinity of river mile 406, approximately 25 miles south of Vicksburg, Mississippi and 6 miles northwest of Port Gibson, Mississippi. The site is located in the Water Resources Planning Area (WRPA) Number 7 of the Lower Mississippi River Region and is bounded on the west by the Mississippi River and on the east by loessial bluffs forming part of the hilly region extending from Vicksburg, Mississippi to Baton Rouge, Louisiana. The property boundary shown in the UFSAR encompasses approximately 2,100 acres. The property is now approximately 2,015 acres in size as a result of the loss of approximately 85 acres due to historical erosion by the Mississippi River. The Army Corps of Engineers has since stabilized the banks of the river by construction of revetments; therefore, further erosion of the eastern bank is not anticipated.

The dominant hydrologic feature in the vicinity of the site is the Mississippi River, though two small streams, located near the site, are also of immediate relevance to the plant. Stream A, to the North is perennial, draining Basin A with an area of 2.8 square miles. Stream B, to the south and adjacent to the plant facilities is intermittent, draining Basin B with an area of 0.6 square miles. The watershed associated with Stream A originates offsite, while the watershed for Stream B originates onsite. The plant yard at GGNS is in the loessial uplands with a plant yard grade elevation of 132.5ft Mean Sea Level (MSL) and finished floor elevation for plant at-grade spaces of 133.0ft MSL. The plant yard is graded to direct runoff from roofs and the yard away from the buildings into Streams A and B.

2.1.2 Mississippi River Flood

The probable maximum flood (PMF) for the Mississippi River was estimated based upon the flood defined by the United States Army Corps of Engineers design-project flood (DPF). The U.S. Army Corps of Engineers Design Project Flow Rate was determined to be 3.3 million cfs which per the UFSAR was assumed to be approximately 50 percent of the PMF. Therefore, the unregulated PMF was determined to be 6.6 million cfs at the site.

The levees on the Mississippi River (which have a maximum elevation of 103ft MSL) are capable of containing approximately 3 million cfs of water flow and would be overtopped by a peak discharge of 6.6 million cfs. The overtopping of the levees would cause the flood water to inundate the wide alluvial floodplain west of the levees. Based on a water level elevation slightly greater than 103ft MSL, the total river and floodplain discharge capacity was determined to be approximately 11 million cfs which is significantly greater than the 6.6 million cfs discharge associated with a PMF flood. Therefore, the maximum water surface elevation due to a PMF flood, in the Mississippi River, is approximately 103ft MSL, which is approximately 29ft below the plant yard elevation of 132.5ft MSL.

2.1.3 Wind Wave Activity

The maximum water surface elevation in the Mississippi River at the plant site due to wind wave activity was determined in accordance with the information provided in section 2.4.3.6 of the UFSAR. A rise in water level in the Mississippi River to an elevation of 103ft would create a lake between the bluffs and the levees which would result in the formation of wind driven waves. Based on the analysis a significant wave height of 4.4 ft, with a total run-up plus set up of 5.8ft as shown in Table 2.4-13 of the UFSAR, was determined. Based on the flood level for the Mississippi River and the wind wave activity the maximum water surface elevation, including run up, at GGNS would be 108.8ft. Therefore, wind wave run-up is approximately 23.7ft below plant grade.

2.1.4 Potential Dam Failures

The effects of dam failure for the site were analyzed based on the complete failure of the Kentucky Dam, which would have a discharge of approximately 3.0 million cfs. Using the dam breach discharge the total discharge, including the discharge for the design project flood, was determined to be 5.7 million cfs. This total is below the 6.6 million cfs determined for flooding of the Mississippi River and therefore bounded by the river flood design.

2.1.5 Probable Maximum Precipitation (PMP)

The controlling plant flooding event is based on the impacts of PMP on the watershed for the two local streams at GGNS. Distribution of local intense precipitation is based on PMP data obtained from U.S. Weather Bureau Hydrometeorological Report (HMR) Number 33. Due to the relatively small size of the basins, the rainfall values from HMR 33 were determined to be too long a duration to determine a PMP induced flood at the site. Therefore, drainage of the local intense precipitation at GGNS was evaluated in accordance with Regulatory Guide 1.59. As part of the evaluation the plant area was divided into different drainage areas, as shown on Figure 2.4-7a in the UFSAR, based on site features such as roads and railroad beds to determine the average time of concentration. Based upon an average time of concentration in the yard of approximately 30 minutes as well as the 6 hour PMP estimates from HMR Number 33 and the temporal distribution from EM-1110-2-1411 a rainfall intensity of 16.4 inches per hours was determined.

Flow rates were able to be determined and a backwater analysis was completed to determine the water surface elevations (WSEL's) near the plant structures using the Rational Formula and a rainfall intensity of 16.4 inches per hour. The PMF water levels caused by the PMP event were determined based on the water levels in Streams A and B, the backwater effects in the drainage ditches, and the hydrostatic head required to pass the peak discharges from each area through the culverts and other obstructions. Based on the analysis completed for the drainage during a PMP event the maximum calculated PMP water levels near primary Powerblock Structures are summarized in the table below and were determined to not exceed elevation 133'- 3" MSL.

Location	Water Surface EL (ft. MSL)
North of Powerblock	132.90
East of Turbine Building	133.20
East of Radwaste Building	133.20
South of Radwaste Building	133.14
West of Radwaste Building	133.25
West of Auxiliary Building	133.24
West of Control Building	133.22
At Standby Service Water Basins	132.68

2.1.6 Probable Maximum Surge and Seiche Flooding

Based on the location of the site and Section 2.4.5 of the UFSAR, GGNS is not located in a coastal region. Therefore, consideration of surge and seiche flooding is not warranted.

2.1.7 Probable Maximum Tsunami Flooding

As discussed in Section 2.4.6 of the UFSAR, the river levels at the site are not expected to be impacted by geo-seismic activity as the site is approximately 406 river miles above the Head of Passes (the river's mouth in the Gulf of Mexico).

2.1.8 Ice Effects

Based on Table 2.4-15 of the UFSAR, the water temperatures of the Mississippi River at Vicksburg are above the freezing point most of the time, and therefore a flood due to an ice jam occurring is considered remote. If an ice jam were to occur a rise in water level above the maximum 103ft MSL elevation of the levees would result in overtopping of the levees and diversion of the waters into the alluvial valley to the west of the river. Therefore, per Section 2.4.7 of the UFSAR, the plant, at an elevation of 132.5ft would not be affected.

2.1.9 Cooling Water Canals and Reservoirs

Based on Section 2.4.8 of the UFSAR there are no cooling water canals or reservoirs at the Grand Gulf site. Therefore, flooding based on canals and reservoirs is not analyzed for the site.

2.1.10 Roof Drainage

Roof systems which contain parapet walls were provided with overflow scuppers to drain water from the roof for depths in excess of 8 inches, which is likely to occur during a PMP event. Water flowing over the scuppers falls to the ground at the side of the structure and then flows across the yard surface by natural drainage. Based on calculations the SSW Pump Rooms as well as the Auxiliary, Control, and Diesel Generator Building roofs were evaluated to ensure the structural adequacy of the roofing system assuming the roof is ponded to the parapet height. Based on analysis these roofs will not fail due to roof ponding loads during a PMP event.

The Enclosure Building is not capable of withstanding ponding up to the parapet height; however the roof drainage system and scuppers are qualified for the water level associated with a PMP event. The roof of the Enclosure Building is walked down on a quarterly basis to ensure the scuppers remain clear of debris and that necessary drainage is maintained.

2.1.11 Maximum Water Table

Ground water level data has been obtained for the site since early 1972, with ground water levels recorded during specific intervals reflecting above normal conditions as a result of excessive rainfall and flooding conditions on the Mississippi River. Based on the recordings taken at the site and near Category 1 structures the maximum design ground water level is 114.5ft MSL at GGNS.

2.2 Assumptions

2.2.1 Mississippi River Flood

The US Army Corps of Engineers' Design Project Flood (DPF) used to calculate the PMF was determined using a hypothetical combination of precipitation storms, grouped into sequences. A number of hypothetical combinations and practical storm transpositions, with regard to time and location, were developed to establish flood magnitudes that have a reasonable chance of occurring. Historical data was presented in Section 2.4.2 of the UFSAR; however the flood elevations for the site due to a Mississippi River Flood were determined using the hypothetical combinations of storms.

The design project flood used in the analysis was assumed to be approximately equivalent to the standard project flood (SPF). Studies referenced in the UFSAR at GGNS stated that SPF is generally 40 to 60 percent of the PMF and based on these studies the DPF was assumed to be approximately 50 percent of the PMF for the site. At GGNS, the DPF, unregulated by reservoirs, was estimated to be approximately 3.3 million cfs. Based on the assumption that the DPF is 50 percent of a PMF, the PMF (unregulated by reservoirs) was determined to be 6.6 million cfs.

2.2.2 Wind Wave Activity

In order to determine the wind wave activity, typical characteristics of the area as well as approximate distances were required to be used. In the wave calculation it was necessary to assume an overland wind velocity of 40 miles per hour, with the

velocity over water assumed to be 1.3 times higher than over the land. The slope of the east bluff near the site was based on the approximate slope of the area with actual slopes not being used in the calculation. An effective fetch, defined as the unobstructed distance that wind can travel over water in a constant direction, of 4.3 miles and an average water depth of approximately 35 feet, for the flood plain, were used in determining the wave activity.

2.2.3 Potential Dam Failures

The actual discharge from the dam used in the analysis was an approximate value of 3.0 million cfs and was assumed to discharge near the site such that the total discharge from the dam is assumed to impact the site. The actual dam is 450 river miles upstream of the site on a tributary to the Mississippi River, and therefore the analysis for the dam break was considered conservative as the flood peaks and velocity would be attenuated due to basin storage, friction, and time required to empty the reservoir.

2.2.4 Probable Maximum Precipitation

In assessing the effects of local PMP on the plant area, several conservative assumptions were made in the analysis. With the exception of Culvert 1, which is assumed to be 45% blocked, all storm drains and culverts are assumed to be blocked/clogged, requiring run off from the site to be carried away as overland flow. No runoff is assumed to occur through the abandoned railroad bed, thereby causing all of the runoff to flow over the bed and the abandoned rails where present. The runoff coefficient for the peak discharged from subareas around the plant was assumed to be equal to 1.0 with no loss due to infiltration or retention occurring. The coefficient is considered conservative based on information from the U.S. Soil Conservation Service as the predominant soils in the region are of Type A and B, which have infiltration rates of 0.30 to 0.45 in/hr and 0.15 to 0.30 in/hr respectively. The time for peak discharge in the peripheral ditch was also assumed to coincide with the peak discharges coming from the subareas; the peak discharges will not actually occur at the same time.

2.3 Methodology

2.3.1 Mississippi River Flood

The probable maximum flood (PMF) for the Mississippi River is estimated based upon the U.S. Army Corps of Engineers design-project flood. The Corps of Engineers did not define a PMF for the Lower Mississippi, and instead the Corps of Engineers defined a design project flood (DPF). To determine the DPF for the Lower Mississippi River Basin a hypothetical combination of precipitation storms, grouped into sequences, and practical storm transpositions, with regard to time and location, were developed to establish the flood magnitudes with a reasonable chance of occurring. The flood magnitudes were then used to determine the DPF for the Lower Mississippi.

2.3.2 Wind Wave Activity

Wind wave activity was based on a static PMF elevation of 103ft and the assumptions discussed in Section 2.2.2. The PMF elevation was determined to

create a lake between the bluffs and the levees along the Mississippi River, which based on drawings, would produce a fetch of approximately 4.3 miles. The ground surface profile and the water depth were then determined along the fetch. Based on the fetch length, the wind speed, the water depth, and the wind set up it was possible to calculate the significant wave height, maximum wave height, and the wave run-up based on the information provided in the U.S. Army Corps of Engineers' *Shore Protection Manual*.

2.3.3 Potential Dam Failures

No dams are located on the Lower Mississippi River upstream of the site requiring the hypothetical dam break failure to be based on the peak discharge from failure of the nearest and largest upstream dam on a tributary to the Mississippi River. The dam used in the analysis was determined by dividing the Mississippi River Basin into six major drainage areas and reviewing the dams located in the areas such that the dams closest to the site with the greatest storage capacity could be determined. Based on the review of the dams in the drainage areas the Kentucky Reservoir was determined to be the largest in capacity and the closest to the site.

The effects of the potential dam failure on the water levels at the site were completed assuming that the Mississippi River is carrying a flood of DPF magnitude and that the Kentucky Reservoir is at the design-flood level. The peak discharge of the dam was applied to the Mississippi River DPF discharge near the site. The Kentucky Reservoir dam was considered to completely fail and the initial discharge was assumed to be released near the site, with the flood stage and velocity not being allowed to attenuate. The total discharge from the dam failure was then added to the discharge determined in the DPF which was less than the PMF discharge and was therefore bounded by the Mississippi River flooding analysis.

2.3.4 Probable Maximum Precipitation

No historical data was available for the two streams (Streams A and B) located on the site, requiring the PMF to be estimated based on methods recommended in Regulatory Guide 1.59. The distribution of the local intense precipitation was based on data obtained from U.S. Weather Bureau Hydrometeorological Report (HMR) Number 33. The rainfall values from HMR 33 were determined to be too long for the determination of a PMF or PMP induced flood. Therefore, temporal distribution completed in accordance with EM-1110-2-1411 was used to determine the PMP distributions for the site.

The plant area was divided into several drainage subareas, as shown in Figure 2.4-7a of the UFSAR, to determine the time of concentration based on overland and channel flow times. Based on the channel and overland flow times a total time of concentration for the different subareas was determined and an average time of concentration of 30 minutes was calculated. Using the time of concentration the PMP rainfall intensity was determined to be 16.4 inches of rain per hour, based on the half hour maximum precipitation of 8.2 inches calculated in accordance with HMR-33 and EM-1110-2-1411. Using the rational formula, which calculates runoff in cubic feet per second, the peak discharges from the various subareas was calculated allowing the peak discharges for the basins to be determined.

Based on the peak discharges a backwater analysis was completed, starting at Stream A and Stream B to determine the water elevations around the site. A backwater analysis for Stream A was completed using the HEC-2 program to determine the water level at the outlet of the drainage ditch into Stream A. At Stream B a headwater level was calculated for Culvert 1 which allowed a water surface profile for the Basin B stream channel to be calculated using a standard step backwater method. The PMF water level in the plant area was then determined from the water levels in Streams A and B, the backwater effects in the drainage ditches, and the hydrostatic head required to pass the peak discharges from each area through the culverts and other obstructions.

2.3.5 Maximum Ground Water Table

In order to provide a basis for the design maximum water level, a maximum expected ground water level was determined for locations adjacent to Category 1 structures. The design maximum ground water level was estimated to be EL 113.0 ft and reflects what is considered to be a naturally occurring ground water level condition. The maximum water level is based on an observed high ground water level, EL 110.2ft on February 15, 1983, and the rise in the ground water level (3ft) in response to record high precipitation between December 1982 and February 1983 that occurred in dewatering well DW-8. In addition, the highest perched water level in the power block area measured prior to and during construction is EL 113.0ft. Therefore, a conservative EL of 114.5ft was used for the maximum ground water elevation at GGNS.

The PMP event impact on the ground water level was discounted as a majority of the precipitation resulting from a PMP event does not infiltrate to the local ground water table but instead results in surface water runoff to streams and rivers.

2.4 Non Conformance

Grand Gulf's current licensing basis for the flooding of adjacent streams and the site yard is based on data published in HMR Number 33, and temporal distribution methods presented in EM-1110-1-1411. Subsequent to licensing of GGNS, the National Oceanic and Atmospheric Administration (NOAA) issued revised PMP estimates in HMR Number 51, and provided temporal distribution guidelines in HMR Number 52. In response to NRC Generic Letter 88-20 (IPEEE), Supplement 4, and as required in NUREG 1407 the effects of localized PMP on the site watershed were evaluated considering the revised PMP data and temporal distribution methods.

The flooding walkdowns and reviews completed in response to the NRC Letter to Licensees dated March 12, 2012 were based on the water surface elevations described in the CLB, which were based on HMR 33. The revised elevations based on the HMR 51 and 52 are considered beyond the design basis of the plant as stated in the IPEEE Responses.

3.0 EXTERNAL FLOOD PROTECTION AND MITIGATION FEATURES

3.1 Flooding Licensing Basis

The safety-related facilities, systems, and equipment at GGNS are capable of withstanding the worst flooding caused by a combination of several hypothetical events. These events are: probable maximum flood of the Mississippi River coincident with wind generated waves; failure of upstream dams coincident with the U.S. Army Corps of Engineers design-project flood; ice flooding; and probable maximum flood of the two small streams adjacent to the plant coinciding with Probable Maximum Precipitation (PMP) flooding of the site due to PMP rainfall on the site watershed.

Based on the current licensing basis at GGNS, as previously discussed in Section 2.0, the maximum water surface elevation level at GGNS is 133'-3" MSL. With calculated water surface elevations near the power block above elevation 133'-0" there is the potential for leakage through external doors into Unit 1 Structures. Water is also assumed to be able to enter through openings not associated with Unit 1 and flow into Unit 1 spaces through common doorways or openings.

Based on the leakage analysis completed at the site, water leaking into the Auxiliary, Turbine, Radwaste, and Water Treatment Buildings does not affect safe operation of the plant and no modifications were required to seal the doors of these buildings. However, it was determined that water leaking into the Control and Diesel Generator Building could affect safety-related equipment. Therefore, door seals are installed at the exterior doorways for these buildings to ensure safe plant operation.

Water entering the Standby Service Water (SSW) pump houses through doorways, equipment hatches, and various floor penetrations could affect floor mounted safety-related electrical equipment. Several modifications to the floor, exterior walls, and doors in the form of seals, toe plates, and curbs are installed in the SSW pump houses to prevent water from reaching the floor mounted safety-related equipment and to ensure safe plant operation.

Floor drains are installed inside the Control Building, Auxiliary Building (except for the railroad bay), Turbine Building, Diesel Generator Building, Water Treatment Building, and the Radwaste Building which carry water to existing sumps where it is pumped away by sump pumps. The sumps and pumps are discussed in Section 3.4 of the UFSAR as being able to assist if seepage occurs, however as specifically stated in Section 2.4 of the UFSAR the operation of the drains, sumps, and pumps are not credited with the lowering of the water level.

The effect of indirect leakage into Unit 1 through adjacent structures was also considered, since interconnecting (non-watertight) doorways exist at several locations at or below grade. These effects were assumed to occur along with direct leakage into Unit 1. The total accumulation resulting from the leakage into Unit 1 was distributed throughout the 93' level of the Control, Turbine, and Radwaste Building, as well as the 93' level of adjacent structures. Analysis revealed that water could accumulate in the bottom of the power block to a height no greater than elevation 99'-0". It was determined that no safety-related equipment exists below elevation 103'-0" in these buildings, except

for one secondary containment isolation valve in the Turbine Building. Per the UFSAR the flooding effects on the valve, if any, would cause the valve to fail in the safe position.

The current licensing basis at GGNS does not directly discuss the specific mode of operation in which the plant is to be maintained during a flooding event. However, existing Off-Normal Event Procedures provide actions which are to be taken in the event of plant flooding caused by natural phenomena at the site. These procedures provide actions to be taken at the site in the event of high water levels associated with the Mississippi River, which does not pose a flooding risk to the site, and due to the impact of PMP on the watershed for the two local streams. The procedure requires the plant to shutdown if the river level reaches 97ft, but does not provide any requirement for shutdown due to a PMP event. In the event of flooding due to natural phenomena, such as PMP, specific doors at the site are to be closed and the Emergency Plan is to be implemented as directed by Shift Supervision. The actions to be taken are not mode specific and no discussion on actions for different modes is provided.

3.2 Flood Duration

3.2.1 Mississippi River Flood

A total duration for the probable maximum flood of the Mississippi River is not discussed in the plant's current licensing basis. Based on Section 2.3 of IPEEE and Section 2.4.3.6 of the UFSAR the maximum water height, including wind wave run-up, is 108.8ft MSL which is approximately 23.7ft below the plant grade elevation.

3.2.2 Probable Maximum Precipitation

Based on Section 2.4.3.5.3 and Section 2.4.10 of the GGNS UFSAR, water levels resulting from a PMP event at GGNS could exceed the 133'-0" elevation for approximately 7 hours.

3.3 Flood Protection Features

Safety-related systems and components are flood protected either because of their location above the postulated maximum flood level, or because they are enclosed in reinforced concrete Category 1 structures. The Category 1 structures that may be affected by a design basis flood at the site are designed to withstand the postulated floods for the site using the "hardened" flood protection approach. The hardened protection approach means structural provisions are incorporated in the plant's design that will protect safety-related structures, systems, and components from the static and dynamic effects of a flood. As part of the hardened approach watertight doors and equipment hatches are installed below the maximum flood level and watertight piping and electrical penetrations are provided below the maximum flood level.

Drainage of local intense precipitation from a design basis PMP rainfall over the GGNS site watershed is the controlling plant flood design at GGNS. Based on Section 2.4.2.3.3 of the UFSAR finished grade in the site area is sloped away from buildings to carry rainfall away from the plant area, while local intense precipitation up to the severity of a PMP will be carried largely by the site drainage ditches surrounding the power block. Flow beyond the design capacity of the ditches is carried away from the site as overland flow. Runoff in the yard to the south and southeast of the plant is carried into Stream B,

while the runoff on the north and northeast side of the plant is carried by overland flow into a concrete ditch discharging into Stream A. All storm drains and culverts are assumed to be 100% blocked in the analysis, with the exception of Culvert 1 (45% blocked), causing water to be carried from the site as overland flow. Culvert 1 and the channel draining into Stream B are designed to safely pass the PMF from Basin B without endangering safety-related facilities.

Based on the in-leakage analysis associated with a PMP event, water leaking into the Auxiliary Building (Railroad Bay only), Turbine, Radwaste, and Water Treatment Building would not impact safe operation of the plant. The Auxiliary Building, with the exception of the Railroad Bay, does not have any exterior doors below flood elevation. Therefore, the Control Building, Diesel Generator Building, and the Standby Service Water Pump Houses are the only structures at GGNS which are required to be designed to prevent in-leakage through exterior doors from a PMP rainfall event. In order to prevent a design basis PMP rainfall from having a detrimental effect on safety related SSCs a total of 11 watertight seals were installed on the exterior doors of these structures. The doors requiring PMP seals are as follows: OC313 and OCT5 in the Control Building; doors 1D301, 1D308, 1D309, 1D310, and 1D312 in the Diesel Generator Building; and doors 1M110, 1M111, 2M110, and 2M111 in the Standby Service Water Pump Houses.

Two different door seal systems are used at GGNS, with door OC313 being the only door required to have both seals installed. The first system is a redundant "flap" gasket system which is only required to be installed on door OC313. The second gasket system consists of a neoprene gasket which is compressed between the door and its frame/threshold and is installed on all eleven doors, including OC313. The gasket systems are designed to extend a minimum of 14" up the sides of each door; and are expected to limit leakage due to a 12" water head to 2 pints per hour. Due to interference with other door hardware, the redundant flap seals (first system) installed on door OC313 extend only 9" up the sides of the door, while the as-built seal heights for the primary seals (second system) equal or exceed 15" on all doors. The seals on door OC313 provide protection to a maximum elevation of 133'-9" (conservatively based on the first system seal height), while all other doors provide protection to a maximum elevation of 134'-0".

Due to the presence of equipment hatches and floor penetrations in the SSW pump house, toe plates and curbs were required to be installed to prevent water from reaching floor mounted safety-related equipment. The curbs and toe plates were installed around the structure to isolate the safety-related equipment from potential flooding. The curbs and toe plates inside the basin provide protection for internal equipment to a maximum elevation of 133'-7.5".

3.4 Procedures

3.4.1 Off-Normal Event Procedures

GGNS currently has Off-Normal Event Procedures which provide actions to be taken in the event of plant flooding caused by natural phenomena. The Off-Normal Event Procedures provide actions, such as the closing of doors and installation of sandbags, which are to be completed in the event of a PMP storm. Per the procedures sand bags are to be installed at all PMP doors whenever the 24 hour forecast calls for a rainfall amount of 12 inches or more and exterior doors are to

be confirmed shut during adverse weather at the site. The PMP doors are Security doors at GGNS which are typically closed and require notification of Security personnel prior to propping the doors open. If the doors are propped open Security personnel are stationed at the door and could close the doors prior to adverse weather impacting the site. The sand bags are to be installed based on the weather forecast and would be installed prior to the storm or adverse weather impacting the site. Therefore, the procedure provides additional assurance to plant personnel that the doors are closed and adequate flood protection is provided.

3.4.2 General Maintenance Instruction

Existing Plant General Maintenance Instructions provide the requirements for the inspection of the PMP door seals installed at GGNS. The inspection interval of the doors and seals is not associated with a specific water level or flood situation at GGNS; however requirements during a PMP event are specified in this procedure in the event that the seals are determined to be deteriorated or damaged during the inspection.

If a seal on a PMP door is determined to be deteriorated or damaged to the point that it cannot prevent water from entering the door, and the seal cannot be immediately replaced, sandbags must be obtained and placed in the vicinity of the affected door. The Operations Shift Manager is to be notified to allow the affected doors to be monitored during periods of intense rainfall. In the event that a PMP storm occurs before the seal is reworked or replaced then the sandbags are to be placed around the door to prevent water in-leakage. The sandbags are to be placed around the doors when water reaches a level within 1 inch of the damaged seal door threshold.

3.5 Adverse Weather

In accordance with the current licensing basis, temporary active flood protection measures are not required to be installed for protection of safety-related SSCs during flooding conditions at GGNS. Passive features are required to be installed per existing Off-Normal Event Procedures. These procedures require sand bags to be installed around all PMP sealed doors whenever the 24 hour weather forecast calls for rainfall amounts of 12 inches or more. This action provides defense in depth. A storm capable of producing this level of rainfall would be forecasted prior to reaching the site, thus allowing personnel to place the necessary sandbags prior to adverse weather impacting the site. Therefore, no adverse weather conditions are assumed in the placement of the sandbags.

Based on the current licensing basis, several Unit 1 doors including the SSW basin pump house doors are assumed to remain closed during a PMP event; however no discussion is found in the licensing basis requiring personnel to close these doors. Off-Normal Event Procedures at GGNS do require personnel to ensure the doors are closed during severe weather and all doors with the exception of the SSW pump house doors can be accessed without requiring personnel to travel outdoors. However, the SSW Pump House doors are security doors which are maintained closed and require Security notification prior to being propped open. If the door is to be propped open Security personnel are to be stationed at the door to monitor it and in the event of adverse weather near the site the officer stationed at the door could ensure its closure.

4.0 INTERNAL WARNING SYSTEMS

4.1 Room 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 Grand Gulf Nuclear Station are incorporated and temporary passive features and include 11 PMP door seals, sandbags installed around PMP doors, curbs and toe plates, exterior structural walls, penetration seals through exterior walls, the site topography, and existing drainage ditches and culverts. 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 existing General Maintenance Instructions for the inspection of the PMP seals, as well as the seal description provided in the UFSAR, were used as a reference to determine the acceptance criteria necessary for the doors. Based on the instruction, the seals are to be installed between the door and the frame, with the seal being slightly compressed and maintaining solid contact at all locations. Therefore, with the door closed, the individual door seal was visually inspected to ensure no visible cracks are seen between the seal and the door. The door was then opened to inspect the seal and ensure that no visible cracks or deterioration was present. The heights of the seals were also measured from finished floor grade to ensure that the seal protected the door, at a minimum, to the elevations provided in the UFSAR (133'-9" for OC313 and 134'-0" for all other doors). The seal was determined to be acceptable if there appeared to be contact between the seal and door at all points, no degradation or deterioration on the seal was observed, and the seals on the doors were installed to an elevation that ensures the door was protected to the maximum elevations provided in the UFSAR.

The curbs and toe plates installed in the SSW pump room are credited with preventing flooding of safety-related equipment up to an elevation of 133'-7.5" in accordance with the UFSAR. Therefore, the curbs installed in the rooms were measured from finished floor grade (133'-0") to ensure that they were a minimum of 7.5" tall, such that they would protect the equipment as specified. The curbs and toe plates were visually inspected to ensure that no cracks through which water could leak were present and all joints were inspected to ensure that they were sealed and no leakage pathways were present.

Category I structures at GGNS are protected from the effects of a design basis flood based on the hardened flood protection approach and include the following structures: the Containment Building, the Control Building, the SSW Water Cooling Towers, the Auxiliary Building, and the Diesel Generator Building. The hardened approach requires structural provisions, such as watertight doors and penetrations to be incorporated into the plant design to protect safety-related structures, systems, and components from the effects of a flood. Based on the hardened approach the following Category I walls, including the associated penetrations, were required to be walked down as they were

located on the exterior of the structure and were not shielded from potential flooding by other structure: the North, South, and West wall of the Diesel Generator Building; the North and South Walls of the Unit 1 Auxiliary Building; the West Wall of the Control Building; all walls associated with the Standby Service Water Pump Houses. These walls and penetrations are on the exterior of structures which act as a flood barrier around safety-related SSCs and prevent water intrusion into safety related structures.

Based on the GGNS UFSAR, the maximum design water table elevation of 114'-6" is not considered an external flooding event; however if penetrations below the 114'-6" elevation had cracks or openings water would be able to leak into the structures. Therefore, conservatively the exterior walls and penetrations located below grade were visually inspected to a maximum elevation of 115'-0" to ensure that no cracks or openings were observed through which water could enter the structure.

The maximum water surface elevation, above grade, is calculated to be 133'-3" and is based on the PMP flooding event for the site. Therefore, exterior walls and penetrations which are located above grade and below elevation 133'-3" are required to be water-tight to prevent water from leaking into safety-related structure. Based on the 133'-3" water surface elevation all penetrations below elevation 135'-0" were conservatively walked down to ensure no openings or cracks existed through which water could leak into the structure.

The site topography was visually inspected using the PMP drainage drawings provided in the GGNS IPEEE responses. The figured provided in the responses provided the flow paths associated with the PMP drainage analysis as well as the acceptable laydown and storage areas. These drawings were used to visually verify that the topography of the site allowed water to drain as depicted in the drawings and that laydown and storage areas around the site were in acceptable locations. Any changes to the topography, including the installation/modification of structures and changes to security barriers were also reviewed to ensure that they did not prevent water from traveling along the flow paths shown in the drawings. Major drainage swales, such as the reaches on the north and south side of the SSW towers, were also visually inspected to ensure that no obstructions prevent water flow through swales and into the drainage ditches around the site. Calculations and engineering changes completed since construction were reviewed to ensure that any obstructions or changes made to the site addressed potential PMP impacts.

During a PMP event at GGNS water flows into the drainage ditches located outside the Protected Area (PA); however all culverts, with the exception of Culvert 1 (45% blocked), are assumed to be 100% blocked causing the ditches to back up and fill with water. Based on the blockage of the culverts and the backup of water in the ditches, flow through the ditch is not credited with preventing flooding during a PMP event at GGNS. The ditches are credited with the storage of water and therefore flow into the ditches is to be maintained at the site. Based on this all drainage ditches, with the exception of Culvert 1 and the associated channel, were visually inspected to ensure water could enter the ditch though inspections of these ditches did not verify that water would flow through the ditch and off site.

The PMP drainage analysis at GGNS does assume that water will be able to flow through Culvert 1 and the channel leading to the culvert during a flooding event.

Therefore, water is required to be able to enter and flow away from the site through the channel and Culvert 1. Inspections of Culvert 1 and the associated channel are required to be inspected in accordance with an existing site Surveillance Procedure. Per the procedure, visual inspections are to inspect for blockage caused by sedimentation or debris, slope sloughing, erosion or exposure of less wave resistant material, cracking, heaving, lateral movement, leaking, tilting, or joint misalignment. Any issues as described in the procedure were documented if observed.

Based on the Off-Normal Event Procedures at GGNS, sandbags are to be installed in front of all 11 PMP doors when the weather forecast calls for 12 inches of rain in a 24 hour period. Therefore, a reasonable simulation was required to ensure that the sand bags could be installed to a height greater than the maximum PMP flood elevation (133'-3" MSL) prior to adverse weather impacting the site. As part of the simulation it was necessary to ensure a sufficient number of sandbags are available onsite to protect all 11 PMP doors and that the sand bags are maintained in a condition which would allow them to be installed and meet their flood protection function. As part of the simulation one PMP door was sandbagged and then the total time necessary was multiplied by 11 to ensure that all 11 doors could be protected within a 24 hour time frame.

Due to the buildup of water in the yard during a PMP event it is possible for water to enter manholes located at grade and then leak through conduits into structures at the site. Electrical Manhole 1 (MH01) at GGNS has conduits routed from the manhole into the Unit 1 Control Building, and therefore the conduits are required to be sealed to prevent water from flowing into the structure. The conduits from Manhole 1 were required to be inspected to ensure that seals were provided in the conduit to prevent water leakage from entering the structure. Internal conduit seals were required to be visually inspected to ensure the seals are installed and that no cracks or openings in the conduit are visible through which water could leak into the Control Building.

All observations which were not immediately able to be judged as acceptable on the walkdowns were entered into the Grand Gulf Nuclear Station Corrective Action Program to allow for a more detailed evaluation to be completed.

5.2 Discussion

5.2.1 Overall Effectiveness

Based on the walkdowns completed at GGNS and the results of the operability determinations associated with the CRs entered into the system, GGNS 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. Plant grade is approximately 23.7' above the maximum flood, including wave run up, for the Mississippi River, and walls and penetrations located below the maximum water table elevation of 114'-6", as discussed in Section 5.1, were walked down to ensure no cracks or openings were present which would allow water to leak into the structure. During the walkdowns no cracks or leaks were observed below the 114'-6" elevation which would allow flooding of the structures included in the walkdown scope.

The PMP flooding event is the event which controls plant flood design and based on calculations and analysis completed at the site the maximum PMP water surface elevation for the site will not be greater than 133'-3". The flood protection

features installed at the site were designed to ensure sufficient margin is present between the top of the water surface elevation and the top of all seals and flood protection barriers.

During the walkdowns, conditions that did not meet the acceptance criteria discussed in Section 5.1 above were observed requiring the conditions to be entered into the Corrective Action Program at GGNS. The operability reviews for the seals on doors OC313 and 1M110 determined the seals to be non-functional; however the plant was determined to remain operable due to the installation of sandbags required by the Off-Normal Event Procedures.

5.2.2 Other SSCs and Procedures

Entergy Corporate procedures associated with Maintenance Rule walkdowns at GGNS provide the guidance and requirements for conducting a structural condition monitoring program to meet the requirements of 10 CFR 50.65, the Maintenance Rule. At GGNS the Maintenance Rule walkdowns are conducted a minimum of every five (5) years and are completed in accordance with the procedures. 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 10CFR 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 barriers and seals, with the exception of the PMP door and internal conduit seals, were determined to be within the scope of the Maintenance Rule for Structures 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.

The Control Building, Auxiliary Building (except for the Railroad Bay), Turbine Building, Diesel Generator Building, Water Treatment Building, and the Radwaste Building are all equipped with floor drainage systems. Water entering these structures, with the exception of the Auxiliary Building Railroad Bay, would flow across sloped floors and enter the floor drainage systems to be collected in sumps at the bottom floor elevations. However, per Section 2.4.10 of the UFSAR, no credit was taken for the lowering of water levels by the operation of the floor drainage system. The floor drainage system would assist in the lowering of water levels caused by in-leakage at GGNS and would prevent water from pooling inside structures as assumed in the analysis.

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) that 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 did not need to be qualified the aforementioned requirements.

7.0 WALKDOWN RESULTS

A total of 15 work packages were associated with the walkdowns completed at GGNS, with several packages containing multiple features. Based on the walkdown packages a total of 46 features were walked down. The features and attributes walked down as part of this package 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	46	87
Passive – Temporary	0	0
Active – Incorporated	0	0
Active – Temporary	0	0

7.1 Deficiencies

Based on the definition of deficiency provided in Section 3.8 of NEI 12-07, Rev 0A, a deficiency exists when a flood protection feature is unable to perform its intended flood protection function when subject to a design basis flooding hazard. During the walkdowns at GGNS the observations, as described below, were made which were determined to not meet the acceptance criteria stated in Section 5.1. Based on the CR operability determination the following flood protection features were determined to be non-functional and are therefore considered a deficiency at GGNS.

7.1.1 Door 1M110 PMP Seal

During the walkdowns of the SSW "A" Pump House the door seal on door 1M110 was determined to have a gap of approximately 1/16" between the seal and the door, which does not meet the acceptance criteria for the door seals provided in Section 5.1 of this report. The 1/16" gap between the seal and the door prevents a good seal from being made and would allow water to enter the structure in the event of a PMP flood at GGNS. The observed gap and degraded door seal were documented in the CAP and based on the operability determination for the CR the door seal is determined to be non-functional based on the gap observed during the walkdowns.

7.1.2 Door OC313 PMP Seal

During visual inspection of door OC313, at EL 133'-0" of the Control Building, the PMP seal on the door was observed to be degraded and broken, requiring the seal to be replaced. A review of the corrective action program at GGNS showed that the degradation of the seal had previously been observed during seal inspections completed per existing site General Maintenance Instructions. A CR had recently been written, and the operability determination associated with the CR determined that the door is non-functional as a PMP door.

7.1.3 Topography West of Control Building

During the visual inspections of the topography west of the Control Building, the ground located behind transformers ESF11 and ESF12 was observed to slope towards the Control Building. Based on the UFSAR the topography of the site is to be designed to slope away from safety-related structures and systems, requiring this condition to be documented in the CAP at GGNS. The operability determination associated with the CR determined that no flooding concerns exist at this location due to the existing flood barriers being sufficient to provide necessary protection. However, the condition is considered to be a deficiency as the ground is supposed to slope away from safety-related SSCs at the site and based on the current condition this requirement is not met.

7.2 Observations

All condition reports that were written due to observed conditions not meeting the acceptance criteria were input into the corrective action program and an operability determination to address the observation was completed prior to this report being written. Based on the operability determinations, none of the conditions observed during the walkdowns were determined to pose a risk to the safe operation of the plant.

7.3 Corrective Actions

Based on the operability determinations for the degraded PMP door seals, a risk to the site does not exist and necessary compensatory measures are in place to prevent water from entering the structures at either door location. At the time this report was written no action had been taken to correct the deficient seals.

7.4 Inaccessible Flood Protection Features

A large number of conduits which start in Electrical Manhole 1 at GGNS are known to traverse through existing ductbanks and enter the west wall of the Control Building between EL 115' and EL 133'. The penetrations through which these conduits enter the Control Building are located below grade and are above the maximum water table elevation associated with the site. However, the manhole cover is located on grade and is not sealed creating the potential for water to enter the manhole and then continue into the Control Building through the conduits. Based on information contained in the wall and floor penetration schedule drawings these conduits are installed with internal conduit seals to prevent water from leaking into the building. These internal seals are inaccessible for visual inspection from the manhole and due to the seals being internal; they cannot be inspected from inside the Control Building.

During the walkdowns, visual signs of leakage were obvious around three conduits installed between Manhole 1 and the Control Building west wall. Water staining was observed on the concrete wall below several conduits and based on a review of the CAP at GGNS the condition had already been identified. The condition report determined that there was no degraded or non-conforming issue and the leak does not present an operability concern at the site. Based on a review of the CR the leak has been repaired and therefore does not pose a risk to safe operation of the plant. No other signs of water intrusion were observed at any elevations in

the structures walked down, and based on existing plant design drawings the conduits are sealed with internal seals to prevent water from flowing from the manhole into the structure. Therefore, based on site documentation and no leakage being observed during the walkdowns, besides what is documented in the existing CR, the internal seals of the conduits appear to be installed and acceptable.

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 GGNS.

9.0 NEW FLOOD PROTECTION SYSTEMS

No new flood protection enhancements or mitigation measures have been installed at GGNS, and no additional enhancements or measures are planned.

The peer review, as described in Section 7 of NEI 12-07, was completed with station staff to ensure that the actions required could be completed. The results of the reviews resulted in no change to the walkdown process or methodology.

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"

11.0 ATTACHMENTS

None