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CENG
a joint venture of
Constellation Energy
EDF

November 27, 2012

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

ATTENTION: Document Control Desk

SUBJECT: **Calvert Cliffs Nuclear Power Plant, Units 1 and 2**
Renewed Facility Operating License Nos. DPR-53 and DPR-69
Docket Nos. 50-317 and 50-318
Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and NPF-69
Docket Nos. 50-220 and 50-410
R.E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
Docket No. 50-244

Response to 10 CFR 50.54(f) Request for Information, Recommendation 2.3, Flooding

REFERENCES:

(a) Letter from E. J. Leeds (NRC) and M. R. Johnson (NRC) to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, dated March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

(b) Letter from S. L. Belcher (CENG) to Document Control Desk (NRC), dated June 8, 2012, Ninety-Day Response to Flooding Recommendations 2.1 and 2.3 of 10 CFR 50.54(f) Request for Information

As a result of the nuclear fuel damage at the Fukushima Dai-ichi power plant due to the March 11, 2011 earthquake and subsequent tsunami, the Nuclear Regulatory Commission (NRC) established the Near Term Task Force (NTTF) to conduct a systematic review of NRC processes and regulations, and to make recommendations to the Commission for its policy direction. The NTTF reported a set of recommendations that were intended to clarify and strengthen the regulatory framework for protection against natural phenomena.

On March 12, 2012, the NRC issued Reference (a) to request in Enclosure 4 that licensees perform flood protection walkdowns to identify and address through the corrective action program plant-specific degraded,

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nonconforming, or unanalyzed conditions and cliff-edge effects and verify the adequacy of monitoring and maintenance programs.

Reference (b) confirmed that Constellation Energy Nuclear Group licensees will use the flooding walkdown procedure Nuclear Energy Institute (NEI) 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features* and would respond within 180 days of NRC's endorsement of the flooding walkdown procedure.

Attachments 1 - 4 are the responses for R.E. Ginna Nuclear Power Plant, Nine Mile Point Nuclear Station, and Calvert Cliffs Nuclear Power Plant, which include a list of areas that were unable to be inspected due to inaccessibility and the schedule to complete the walkdowns.

There are no Regulatory Commitments in this letter.

If there are any questions concerning this letter, please contact Everett (Chip) Perkins at everett.perkins@cengllc.com or 410-470-3928.

Sincerely,

Mary G. Korsnick

Mary G. Korsnick

STATE OF MARYLAND :
: **TO WIT:**
CITY OF BALTIMORE :

I, Mary G. Korsnick, state that I am the Chief Nuclear Officer of Constellation Energy Nuclear Group, LLC and that I am duly authorized to execute and file this document on behalf of this company and its subsidiaries Calvert Cliffs Nuclear Power Plant, LLC, Nine Mile Point Nuclear Station, LLC, and R.E. Ginna Nuclear Power Plant, LLC. To the best of my knowledge and belief, the statements contained in this document with respect to these companies are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by employees and/or consultants of the companies. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Mary G. Korsnick

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and City of Baltimore, this 27th day of Nov., 2012.

WITNESS my Hand and Notarial Seal:

Lynn J. Conant
Notary Public

My Commission Expires:

1/7/15
Date

LYNN J. CONANT
NOTARY PUBLIC
BALTIMORE CITY, MARYLAND
MY COMMISSION EXPIRES JULY 7, 2015

MGK/EMT/bjd

Attachments:
(1) R.E. Ginna Nuclear Power Plant Response to Recommendation 2.3 Flooding
(2) Nine Mile Point Nuclear Station Unit 1 Response to Recommendation 2.3 Flooding
(3) Nine Mile Point Nuclear Station Unit 2 Response to Recommendation 2.3 Flooding
(4) Calvert Cliffs Nuclear Power Plant Response to Recommendation 2.3 Flooding

cc: B. K. Vaidya, NRC
M. C. Thadani, NRC
N. S. Morgan, NRC
W. M. Dean, NRC
Resident Inspector, Calvert Cliffs
Resident Inspector, Ginna
Resident Inspector, Nine Mile Point
S. Gray, DNR

ATTACHMENT (1)

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

Constellation Energy Nuclear Group, LLC
November 27, 2012

ATTACHMENT 1

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

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ATTACHMENT 1

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

1. INTRODUCTION

In response to the nuclear fuel damage at Fukushima Dai-ichi power facility resulting from an earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) requested information pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54 (f). As part of this request, the R.E. Ginna Nuclear Power Plant (Ginna) was required to perform flood feature walkdowns to field-verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained.

2. PURPOSE

a. Background

This report provides the information requested in Reference 3; specifically, the information listed under the 'Requested Information' section of Enclosure 4, paragraph 2 ('a' through 'h'). The 'Requested Information' section of Enclosure 4, paragraph 1 ('a' through 'j'), regarding flooding walkdown procedures, was addressed via Constellation Energy's June 8, 2012 acceptance (Reference 1) of the industry walkdown guidance (Reference 2).

b. Site Description

Ginna is located in Wayne County, near Rochester, New York. The Ginna reactor is a pressurized light water moderated and cooled system designed by Westinghouse. A renewed operating license was issued to R.E. Ginna Nuclear Power Plant by NRC letter dated May 19, 2004. The renewed operating license is effective from the date of issuance through September 18, 2029.

The site's major structures are founded on sound bedrock or lean overfill and the site is located in a seismologically quiet region. The site, in open, rolling terrain, is well ventilated and is not generally subject to severe flooding. Liquids released to Lake Ontario from the site will move predominately eastward and diffuse slowly. Hurricanes have not seriously affected the site region and tornadoes and severe ice storms are rare. Onsite measurements indicate that ground water within the site will flow to Lake Ontario and no flow toward offsite wells is expected.

3. RESPONSE

a. Requested Information Item 2(a)

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

Probable Maximum Flood on Streams and Rivers:

Deer Creek overflow is the bounding design basis flood for Ginna. The Deer Creek discharge flow rate of 26,000 cubic-feet per second (cfs) corresponds to an elevation of 273.8 feet msl on the south wall of the Auxiliary Building, 272 feet msl in the main plant area between the Auxiliary Building and Turbine Building, and an elevation of 256.6 feet msl in the north yard area between the Screen House and the Turbine Building.

The possibility of ice blockage of the Deer Creek discharge is considered remote. In the event of such an occurrence combined with maximum surface runoff into Deer Creek, the site topography is such as to prevent flooding the plant. There is a large area immediately east of the plant, where the grade levels are 225 to 260 ft, over which the discharge of Deer Creek would spill and reach the lake before the water level would

rise to the 270-ft grade level of the plant. The 270-ft grade level of the plant is also interposed between the channel of Deer Creek and the Screen House and the surrounding area between the plant and the lake.

Methodology used to develop the Design Basis Flooding Hazard:
The design basis flood corresponds to a peak Deer Creek flow of 26,000 cfs, which.corresponds to a level of 273.8 feet msl at the Auxiliary Building south wall. An evaluation has been performed to estimate the probability of flooding to this level. The estimate is based on the following assumptions:

A. The flood flow in Deer Creek corresponding to elevation 273.8 feet is 25,000 cfs as determined by the NRC staff. (The RG&E-determined value is 26,000 cfs.)
B. The occurrence probability of the probable maximum flood is no greater than 10^{-5} per year.
C. A conservative estimate of the probable maximum flood is 38,700 cfs.
D. The 100-year flood is about 3000 cfs.
E. The probability of any flow between the 100-year flood flow and the probable maximum flood can be approximately estimated by a straight-line interpolation on log-normal probability paper.

From the plot of the 100-year flood and the probable maximum flood on log-normal probability paper, the probability of a flood flow reaching 25,000 cfs on Deer Creek was determined to be about 5×10^{-5} per year. Therefore, the NRC has accepted RG&E's proposal to provide plant protection to levels calculated to occur for a 26,000 cfs Deer Creek flood.

The Deer Creek discharge was determined using the HEC-1 surface runoff modeling routine. This computer program uses the Soil Conservation Services Runoff Curve Number concept and a developed unit response hydrograph in combination with a selected total storm depth and a rain storm distribution (obtained from the U.S. Corps of Engineers) to estimate the watershed flood hydrograph. The 24-hour rainfall depths having return periods of 5 to 100 years were obtained from a rainfall frequency atlas and return periods of 500 years and greater were estimated from a straight line projection on Gumbel extreme probability paper. HEC-1 was then used to predict peak discharge rates for various rainfall depths. Flooding elevations about the plant were then predicted using the HEC-2 flood routing routine.

Key Assumptions:
The flooding analysis performed by NUS Corporation assumed a hydrological soil group C which is used for soils having low infiltration rates (Reference 16). Land use was assumed to be row crops and the Antecedent Moisture Condition AMC-II was used.

Differences or Contradictions in Flood Hazard Levels:
The design basis flood corresponds to a peak Deer Creek flow of 26,000 cfs which corresponds to an elevation of 273.8 feet as calculated by Ginna. The NRC contractor, Franklin Research Center, validated the Ginna flooding analysis but concluded that a Deer Creek discharge of 25,000 cfs corresponded to a flood elevation of 273.8 feet.

Groundwater Ingress:
The current design-basis groundwater elevation is 265.0 feet msl (Section 2.4.10.1 of Reference 5).

Methodology used to develop the Design Basis Flooding Hazard:
As a result of monitoring of groundwater levels over a 4-year period from 1983 through 1987, the design-basis groundwater level was determined to be at elevation 265.0 ft msl. The design basis groundwater elevation was based on a peak groundwater level of 264.69 feet and using a 2% maximum expected error in the recording system.

Key Assumptions:
A 2% maximum expected error was assumed in the recording system that was used to determine the design basis groundwater level. In addition, a groundwater elevation at grade (270 feet msl) was assumed to determine pressure loads on structures (Section 2.4.10, Reference 5).

Differences or Contradictions in Flood Hazard Levels:
A groundwater monitoring program was established in response to SEP Topic III-3.A to validate the original design basis groundwater elevation of 250 feet msl. Groundwater level was monitored over the 4 year time period between 1983 and 1987. As a result of this monitoring, the design basis groundwater level was changed to 265 feet msl.

Lake Ontario Surge Flooding:
The design basis maximum Lake Ontario surge level is 253.28 feet. The plant is protected to elevation 261.0 feet from wave action by a two-section stone revetment on the east and west sides of the discharge canal.

Methodology used to develop the Design Basis Flooding Hazard:
In 1973, based on the US Army Corp of Engineers projection, the probable maximum lake level was determined to be 253.28 feet. This level would result from a Tropical Storm and the associated phenomena. The maximum wave run-up elevation was calculated to be 260.94 feet (Reference 15).

Key Assumptions:
Storm Surge, rainfall and wave effect were added to normal stillwater level to obtain the maximum lake level (Reference 15).

Maximum Precipitation:
The design basis storm for Ginna is a 24 hour rainfall totaling 19.17 inches of rain with a 1 hour maximum of 6.11 inches.

Methodology used to develop the Design Basis Flooding Hazard:
The probable maximum precipitation for the Deer Creek Watershed was estimated from a generalized chart of the United States east of the 105th meridian.

Key Assumptions:
The determination of the probable maximum storm was determined using Hydrometeorological Report (HMR) number 51. All assumptions within this report are applicable to the determination of the probable maximum precipitation.

b. Requested Information Item 2(b)

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

Flooding Licensing Basis and Duration:
The Ginna CLB flood levels due to the flooding from Deer Creek and surge flooding from Lake Ontario are not associated with time duration. The hydrograph calculated by Franklin Research Center (Reference 14) shows a flood duration of approximately 6.5 hours (associated with 12,000 cfs overbank condition). The amount of time elapsed between initial site flooding and water recession does not have an adverse impact on the current protection methodology, and it does not have an adverse impact on equipment; therefore, for the purposes of this walkdown, the flood duration is irrelevant.

ATTACHMENT 1

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

Flood Protection Features Credited in the CLB:

Flooding from Deer Creek:
Flood protection for Ginna was promulgated in a supplement to the Integrated Plant Safety Assessment Report (Reference 12). Flood protection requirements in the Current Licensing Basis are as follows.

1. Install a water seal over the 3 inch rattle space between the Containment and the Auxiliary Building walls.
2. Install a 1 ½ foot curb in front of the two access doors to the Auxiliary Building or provide portable 1 ½ foot high dam sections for these doors. Provide procedures for installation.
3. Provide a portable 1 ½ foot high dam section in front of the rollup door in the Auxiliary Building and procedures for installation.
4. Modify concrete masonry block walls on the south side of the plant to withstand the hydrostatic loading.
5. Modify exterior door in the relay room to prevent water from entering.
6. Modify exterior doors in the Diesel Generator Building to prevent water from entering. Ensure structural adequacy of the exterior walls to resist loads imparted by the floodwater. These modifications and analyses would be performed as part of the structural upgrade program that incorporates other aspects such as tornado missile protection.

Items 2 and 3 were subsequently increased based on detailed calculations to provide protection to 273.8 feet msl.

Item 4 above pertains to a modification to the Auxiliary Building walls. The wall was analyzed, and it was determined that no modifications were required for the wall to be capable of resisting the hydrostatic loading resulting from a design basis flood.

Ginna was also required to develop emergency procedures and implement these procedures within 45 minutes of reaching a discharge of 10,000 cfs in Deer Creek.

Lake Ontario Surge Flooding:
As a condition of the Full-Term Operating License for Ginna, the NRC required the placement of additional shoreline erosion protection (Section 2.4.4 of Reference 5). This protection was added to ensure minimum wave overtopping of the concrete wall fronting the plant and lower water levels in the vicinity of the Screen House. The plant is protected from lake surges and wind-driven waves by a shoreline revetment with a top elevation of 261.0 feet msl.

Roof Integrity due to Precipitation:
The low roof sections of the Auxiliary Building, Control Building, and Diesel Generator Building have been provided with scuppers designed to ensure that any rainwater resulting from a design-basis storm would not accumulate on the roofs and cause damage. The scuppers are located so that their outflow will not damage any surrounding plant structures or equipment. The flow from the scuppers will not discharge onto equipment or structures required for safe shutdown.

Weather Conditions or Flood levels that Trigger Procedures and Associated Actions for Providing Flood Protection and Mitigation:
Ginna institutes flood protection procedures when Deer Creek reaches the level of the handrails of the access road over Deer Creek (Reference 6) which is significantly below the plant elevation of 271 feet. This provides operators with adequate time to install flood protection equipment prior to site inundation. These

technical procedures provide for installation of the flood barriers (SC-3.17, Reference 7) and for connection of the alternative cooling water supply to the Diesel Generator, assuming Service Water will be lost as a result of flooding of the Screen House (ER-SC.2, Reference 6).

Conditions Assumed Concurrent with Flood and Associated Actions:
The mode of operation for Ginna could impact how the plant is protected from external flooding as well as maintenance activities which could impact flood barriers (plant configuration). Plant mode of operation and potential maintenance activity changes to the plant configuration were therefore considered during the flooding walkdowns. The effects of changes in plant configuration were assessed as appropriate, and are contained within the applicable walkdown record form.

Coincidental damage from the effects of natural phenomena (seismic activity (earthquakes), tornadoes, lighting, hurricanes (winds) and wave damage) or other flooding conditions are not assumed in the current licensing basis; therefore, it assumed that flood barriers and seals are intact throughout the external flooding event. Additionally, flooding and other external events are not considered concurrently.

c. Requested Information Item 2(c)

Describe any warning systems to detect the presence of water in rooms important to safety.

There are no credited external flooding warning systems installed in rooms important to safety at Ginna..

d. Requested Information Item 2(d)

Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h [in Enclosure 4 of the March 12, 2012, 50.54(f) letter]

Acceptance Criteria Development:
The flood protection features were inspected to an acceptance criteria and inspection guidance that was developed based on the following information and contained within the NEI 12-07 Appendix B Walkdown Forms.

1. Ginna Procedure FPS-3 (Reference 10)
2. NEI 12-07 Section 6 and Appendix A (Reference2

Evaluation of the overall effectiveness of the plant's flood protection features:
All potential issues identified during the walkdown were discussed with a site engineering representative at the time of discovery. Condition Reports were generated by site engineering representatives as necessary. The Condition Report numbers were incorporated into the walkdown record forms. All Condition Reports related to the flooding walkdown have been evaluated, and no deficiencies exist that would prevent the flood protection feature(s) from performing their intended CLB function(s).

Standby Auxiliary Feedwater Building:
The flood level at the Standby Auxiliary Feedwater Building is 273.0 feet which is 2 feet above grade. The Standby Auxiliary Feedwater Building is not protected from flooding by flood barriers, but by the height of the equipment in the Standby Auxiliary Feedwater Building. All the critical components in the Standby Auxiliary Feedwater Building were inspected and are adequately protected from flooding.

Auxiliary Building:
The Auxiliary Building houses components required for Safe Shutdown as well as the Spent Fuel Pool Cooling System. The Auxiliary Building is protected to Elevation 273.8 feet on south side and to Elevation 273.0 feet on the east and north side when the portable flood barriers are installed in the doorways (grade elevation is approximately 271 feet). The Design Basis flood from Deer Creek will produce the maximum allowable hydrostatic load on the Auxiliary Building south wall as calculated in design analysis EWR 3317A (Reference 9). Two block wall configurations were evaluated (8 inch thick hollow block wall and a 4 inch thick hollow block wall plus a 4 inch thick brick wall). The analysis concluded the following:

- An 8 inch thick hollow block wall can support a 3 foot water depth
- A 4 inch thick hollow block wall plus a 4 inch thick brick wall can support a 2.8 foot water depth

All the block walls in the Auxiliary Building which are not supported (backed) by a poured concrete wall meet or exceed the wall thickness listed above. The maximum flood height at the Auxiliary Building south wall is 273.8 feet. The Auxiliary Building floor elevation is 271 feet. There would be a maximum flood water height of 2.8 feet on the exterior block walls of the Auxiliary Building; thus, the block walls in the Auxiliary Building can support the hydrostatic loads due to flooding of Deer Creek.

Flood Doors from Turbine Building to Diesel Generators, Battery Rooms, and Air Handling Room:
The Turbine Building, Diesel Generator Building, and lower portions of the Control Building (Battery Rooms and Air Handling Room) are at elevation 253 feet 6 inches on the North side of the plant. The doors from the Turbine Building to the Diesel Generator Building, Control Air Handling Room, Battery Room A, and Battery Room B are sufficient to protect against flooding (References 11 and 13). In addition, the Air Handling Room dewatering flapper valve is gagged (sealed closed) as part of the flooding mitigation features for the Control Building.

Shoreline:
The armor stone revetment (breakwall) will protect the plant to Elevation 261.0 feet from lake wave action.

Reasonable Simulation:
Operator actions needed to install the Ginna flooding mitigation features (Auxiliary Building portable flood barriers, Air Handling Room Flapper valve, Diesel Generator Alternate Cooling, and SAFW alternate source alignment) were found to be feasible during the reasonable simulations documented in Part D of the Appendix B walkdown record forms. All actions required to be completed in less than the required 45 minutes were successfully accomplished within that time period.

Other features that may be used to mitigate the effects of an external flood:
Sealant tape is placed over the existing seals between the Turbine Building and the Diesel Generator Building as well as between the Turbine Building and the Control Building. This seal tape is not credited to ensure that the doors are watertight. This is a defense-in-depth measure.

e. Requested Information Item 2(e)

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j [in Enclosure 4 of the March 12, 2012, 50.54(f) letter], including actions taken in response to the peer review.

The walkdowns were conducted in accordance with guidance contained in NEI 12-07. This included review of the site's UFSAR, procedures, preventive maintenance procedures, and calculations prior to conducting the walkdown. In addition, each participant of the walkdown received training as described below. For this flooding walkdown report and for completing the Appendix B walkdown record forms, the flood barrier features were inspected to the design basis flood level for Ginna in accordance with the site procedures, training, and NEI 12-07 guidance.

Team Selection:
The walkdown team was comprised of experienced Sargent & Lundy (S&L) personnel (one to three at a time) and was assisted by Ginna staff (one or two at a time). There were at least two qualified walkdown team members present during the walkdowns. The education and experience of walkdown personnel are described below.

Sargent and Lundy

- Civil Engineer with B.S. in Civil Engineering (2008) – 6 years of experience
- Nuclear Engineer with M.S in Nuclear Engineering (1978) – 34 years of experience
- Mechanical Engineer with B.S. in Mechanical Engineering (2010) – 2 years of experience

Ginna

- Mechanical Engineer with B.S. and M.Eng (2009) – 3 years of experience
- Project Lead with B.S. and M.S. (1977) – 41 years of experience (34 years at Ginna)

NRC involvement:

The Ginna NRC Resident Inspectors observed one of the pre-job briefs, the reasonable simulation of the portable flood barriers installation in the Auxiliary Building and the flooding walkdown (inspections) of various flood protection features.

Compliance with NEI 12-07 section 5.3:
The walkdown personnel are familiar with the flooding related guidance in NEI 12-07 and NUREG/BR-0326 (References 2 and 4) and all the walkdown team members had completed the NANtel training (trained to NEI 12-07) prior to conducting the flooding walkdowns (inspections) at Ginna. Site Specific Training for NTTF Recommendation 2.3 Flooding Walkdown was also conducted prior to conducting the flooding walkdowns (inspections) at Ginna. The site specific training assured that the walkdown team members were knowledgeable of the site current licensing basis regarding flooding issues and layout of Ginna. Pre-job briefs were conducted before the flooding walkdowns. The pre-job briefs discussed which areas of the plant were to be included in the walkdown and what hazards might be encountered during the flooding walkdown. Thus, these briefs provided familiarization with basis for the walkdown scope and items to be inspected and preliminary analysis activities related to the features to be inspected.

Exceptions:
No exceptions are taken to the guidance provided in NEI 12-07 Sections 5.3, 7, and Appendix B. The Appendix B walkdown record forms were modified to aid in completing the forms. Check boxes were added as well as tables which list the penetrations and/or components inspected; however, none of the questions were modified. The Appendix B walkdown record forms will be retained and are available for NRC audits and inspections.

f. Requested Information Item 2(f)

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

Condition Reports were generated as a result of the observations during the walkdowns. All of these Condition Reports have been evaluated, and it was determined that no deficiencies exist that could adversely impact the design basis function(s) of the external flooding protection features credited in the CLB. All equipment was determined to be available, functional, and properly maintained. In addition, the reasonable simulation was performed and completed with no deficiencies.

Restricted Access:
There were four areas that were determined to be restricted access as defined by NEI 12-07. For each of these items, a work order was generated. The table below shows the inspection schedule.

ATTACHMENT 1

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

Table 1

Area	Justification for Delay	Maintenance Work Order No.	Completion Date	Remarks
Diesel Generator 1A Room Vault	Confined space / Energized equipment	C92024709	10/14/2013	
Diesel Generator 1B Room Vault	Confined space / Energized equipment	C92024715	4/4/2013	
Transformer Yard	Confined space / Energized equipment	C92024716	5/20/2013	Manholes near the Relay Room in the Control Building
Relay Room Sump	Equipment disassembly required for inspection	C92052121	5/20/2013	Minor equipment disassembly is required

Inaccessible:

1. **Air Handling Room Walls**

   Reason Inaccessible:
   The portion of the Air Handling Room that is not able to be inspected is below grade. Large ductwork is in contact with the exterior walls along column/row 11 and G'. The ductwork is part of the Control Room HVAC system.

   Functional Requirements:
   The Air Handling Room exterior walls must prevent water intrusion from exterior sources.

   Location:
   The Air Handling Room is located in the Control Building Basement. The exterior walls of this room that were not accessible were on the west side between rows G^1 and F^1 as well as a small portion of the south wall near the west corner.

   Basis for Reasonable Assurance that Feature is Available and Functional:
   Drawing D-403-065 shows that this wall does not contain penetrations between rows G^1 and F^1, and there are no penetrations at the inaccessible portion of the south wall. The walls are below grade and are constructed of reinforced concrete. The building is also Seismic Category I and there is no evidence of leakage from these walls. For these reasons, there is reasonable assurance that the wall will prevent flood water from entering the Control Building.

2. **Spent Resin Tank Room Walls**

   Reason Inaccessible:
   The Spent Resin Tank Room is a locked high radiation area with extremely high dose rates. There is no expected time in the future when the radiation levels would decrease to acceptable levels for entry.

Functional Requirements:
The Spent Resin Tank Room exterior walls must prevent water intrusion from exterior sources.

Location:
The Spent Resin Tank Room is located in the Auxiliary Building in the Basement. The exterior wall of this room is on the east side of the Intermediate level between rows N[1] and Q.

Basis for Reasonable Assurance that Feature is Available and Functional:
Drawing D-422-011 shows that this wall does not contain penetrations (drawing elevation L-L) between rows N[1] and Q. The walls are below grade and are constructed of reinforced concrete. The exterior grade elevation is paved, and the permeability is therefore negligible. The building is also Seismic Category I and there is no evidence of leakage from these walls. For these reasons, there is reasonable assurance that the wall will prevent flood water from entering the Auxiliary Building.

3. **Demineralizer Vault Walls**

Reason Inaccessible:
The Demineralizer Vault is a Locked High Radiation Area with extremely high dose rates. There is no expected time in the future when the radiation levels would decrease to acceptable levels for entry.

Functional Requirements:
The Demineralizer Vault exterior walls must prevent water intrusion from exterior sources.

Location:
The Demineralizer Vault is located in the Auxiliary Building on the Intermediate level. The exterior wall is on the north side on the Intermediate level between columns 9a and 11a.

Basis for Reasonable Assurance that Feature is Available and Functional:
Drawing D-422-011 shows that this wall does not contain penetrations (drawing elevation K-K) between columns 9a and 11a. The wall is below grade, and the exterior grade elevation is paved (Containment Hatch Area). The permeability is therefore negligible. The building is also Seismic Category I, and there is no evidence of leakage from these walls. For these reasons, there is reasonable assurance that the wall will prevent flood water from entering the Auxiliary Building.

Aggregate effects of Inaccessible features:
The Demineralizer Vault and Spent Resin Tank rooms are both in the Auxiliary Building, and the Control Room Air Handling Room is in the Control Building. Design documentation has been reviewed as noted above, and it has been determined that there are no flood protection features with common mode failure mechanisms that would impact flooding of the buildings during a design basis flood. The walls that were not inspected were all below grade, and the buildings are both Seismic Category I. There is reasonable assurance that there would be no aggregate impact of these inaccessible features.

g. Requested Information Item 2(g)

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

As indicated in Section 3.12 of NEI 12-07 (Reference 2), the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns of the 50.54(f) letter (Reference 3) to include an evaluation of cliff-edge effects. The available physical margin (APM) has been estimated and documented, as applicable, in the walkdown record forms. The guidance provided in FAQ-006 was also followed. This information will

be used in the flood hazard reevaluations performed in response to Item 2.1: Flooding in the 50.54(f) letter (Reference 3).

h. Requested Information Item 2(h)

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

Ginna is currently in the design phase of protecting the Standby Auxiliary Feedwater System from flooding beyond that described in the Current Licensing Basis. In addition to enhanced protection, a Condensate Storage Tank that will provide an additional 24 hours of condensate inventory and an air-cooled diesel generator are planned.

All the Appendix B walkdown record forms (Part A through E) were peer reviewed per the guidance in NEI 12-07. The peer review was conducted by a member of the station flooding walkdown team. The peer reviewer found all walkdown record forms in compliance with the NEI 12-07 guidance. The plants response to any open issues which are outlined in Table 1 or have been determined to be inaccessible were also determined to meet the guidance contained in NEI 12-07.

4. CONCLUSIONS

The flooding walkdown procedure provided in NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A (Reference 2) which was endorsed by the NRC in a letter dated May 31, 2012 (Reference 8) was used as the basis for the flooding walkdowns at the R.E. Ginna Nuclear Power Plant (Ginna). NEI 12-07 Appendix B walkdown forms were used during the flooding walkdowns.

The Appendix B walkdown record forms were completed and available physical margins for the flood protection features were identified as applicable during the flooding walkdowns and recorded on the Appendix B walkdown record forms. Acceptance criteria were developed based on the information in NEI 12-07 Section 6 and Appendix A. All observations were recorded on the flooding walkdown record forms and photographs were incorporated as appropriate into the forms to document the as found conditions. Condition Reports were generated as necessary. The Condition Reports numbers were incorporated into the Appendix B walkdown record forms.

The identified plant flood-protection physical features, the majority of which were incorporated passive protection features, were found to be as described in the CLB (available, functional, and maintained). The flood protection features in aggregate would perform their design function as credited in the CLB. A summary of the findings is below.

Per Section 3.8 of NEI 12-07, a deficiency would exist when a flood protection feature is unable to perform its intended flood protection function when subject to a design basis flooding hazard. During the flooding walkdowns, observations that may be potential deficiencies were entered to the corrective action program (Condition Reports were generated) and have been evaluated in accordance with the station processes. The Condition Reports have been evaluated, and no deficiencies exist. The flooding walkdown observations are recorded on the Appendix B walkdown record forms, and in most cases, there are photographs of the observations.

ATTACHMENT 1

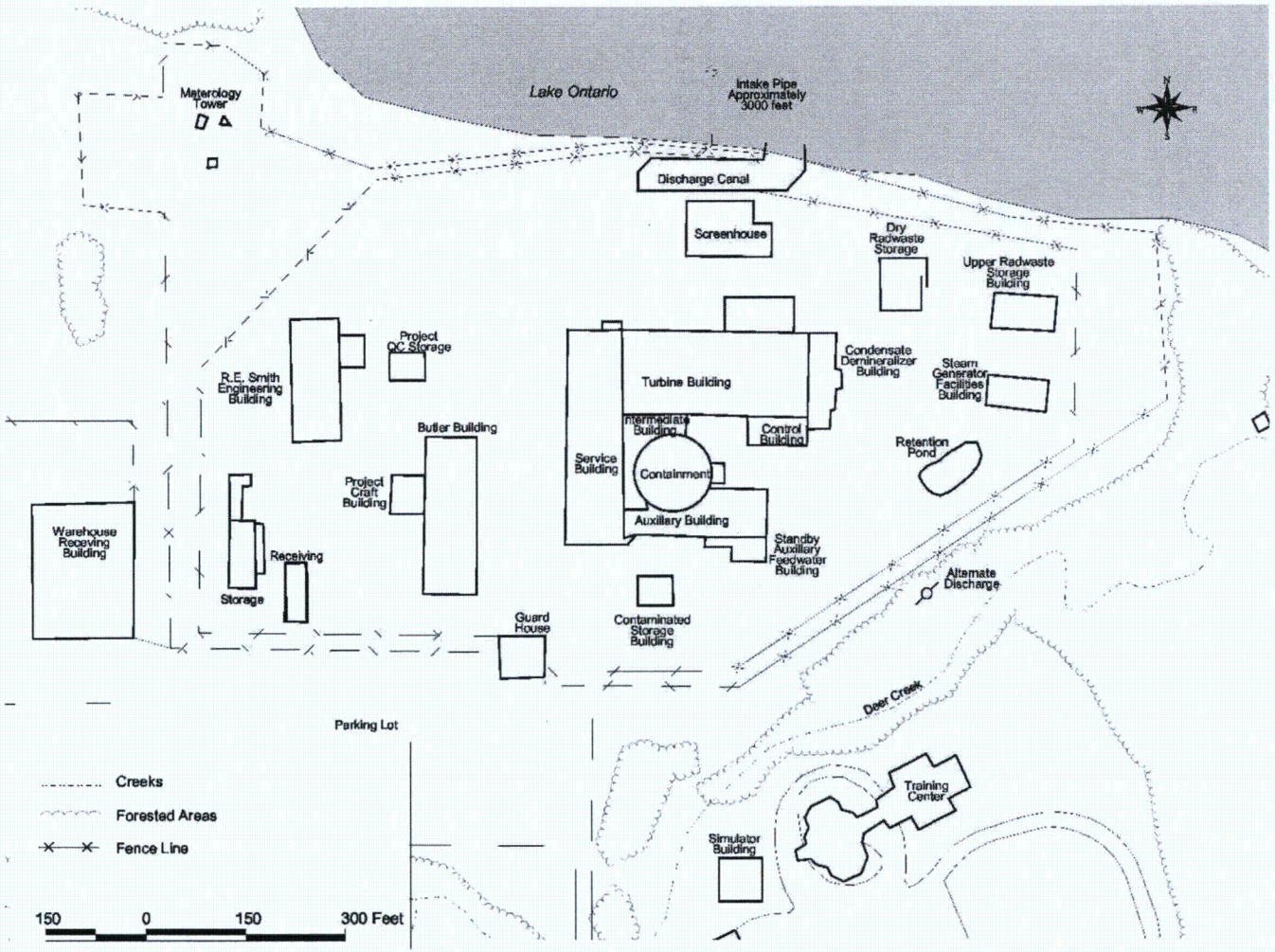
R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

5. REFERENCES

1. Constellation Letter to the NRC, dated June 8, 2012, "Ninety-Day Response to Flooding Recommendations 2.1 and 2.3 of 10 CFR 50.54(f) Request for Information," [Acknowledging acceptance of the industry flooding walkdown guidance (NEI 12-07)]
2. NEI Report 12-07 [Rev 0-A], *Guidelines for Performing Verification Walkdowns of Plant Protection Features*, May 2012 [NRC endorsed May 31, 2012; updated and re-issued June 18, 2012]
3. NRC Letter to Licensees, dated March 12, 2012, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*
4. NUREG/BR-0326, Rev. 1 (August 2009), *NRC Inspector Field Observation Best Practices*
5. *R.E. Ginna Nuclear Power Plant, Updated Final Safety Analysis Report,* UFSAR, Revision 23, December 6, 2011
6. R.E. Ginna Nuclear Power Plant, Technical Procedure ER-SC.2, *High Water (Flood) Plan,* Revision 00800
7. R.E. Ginna Nuclear Power Plant, Technical Procedure SC-3.17, *Auxiliary Building Flood Barrier Installation/Removal/Inspection,* Revision 00201
8. Letter from D.L. Skeen (NCR) to A.P. Heymer (NEI), dated May 31, 2012, Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features"
9. EWR 3317A, *Design Analysis Ginna Station Protection of Auxiliary Building Against Flooding by Deer Creek,"* Revision 0, February 13, 1987
10. R.E. Ginna Nuclear Power Plant, Station Administrative Procedure FPS-3, *Periodic Inspection of Fire Barrier Penetration Seals,* Revision 00100
11. R.E. Ginna Nuclear Power Plant, Technical Procedure O-6.11, *Surveillance Requirement/Routine Operations Check Sheet,"* Revision 16402
12. Letter from D.M. Crutchfield (NRC) to J.E. Maier (RGE), dated August 31, 1983, *Supplement to the Integrated Plant Safety Assessment Report for the R.E. Ginna Nuclear Power Plant*
13. NUREG-1786, May 2004, *Safety Evaluation Report, Related to the License renewal of R.E. Ginna Nuclear Power Plant*
14. Letter from Mr. Dennis M. Crutchfield (NRC) to Mr. John E. Maier (RGE) dated May 27, 1982, *Ginna Nuclear Power Plant – Final Evaluation of SEP Topics II-3.A, II-3B, II-3C, and II-4.D*
15. Letter from Keith W. Amish (RGE) to Mr. Donald J. Skovholt (NRC) dated May 15, 1973, *Armor Stone Addition to Ginna Breakwall Docket No. 50-244*
16. Letter from John E. Maier (RGE) to Mr. Crutchfield (NRC) dated August 18, 1981, *SEP Topics II-3.A, II-3.B.1, III-3.A R.E. Ginna Nuclear Power Plant Docket No. 50-244*

ATTACHMENT 1

R.E. GINNA NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING



ATTACHMENT (2)

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

Constellation Energy Nuclear Group, LLC
November 27, 2012

ATTACHMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

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ATTACHMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

1. INTRODUCTION

In response to the nuclear fuel damage at the Fukushima Dai-Ichi power facility resulting from an earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) requested information pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54(f). As part of this request, Nine Mile Point Nuclear Station Unit 1 (NMP1) was required to perform flood feature walkdowns to field-verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained.

2. PURPOSE

a. Background

This report provides the information requested in the March 12, 2012, 50.54(f) letter; specifically, the information listed under the 'Requested Information' section of Enclosure 4, paragraph 2 ('a' through 'h'). The 'Requested Information' section of Enclosure 4, Paragraph 1 ('a' through 'j'), regarding flooding walkdown procedures, was addressed in Constellation Energy's June 8, 2012, acceptance (Reference 1) of the industry walkdown guidance (Reference 2).

b. Site Description

NMP1 is situated on the southeast shore of Lake Ontario, in Oswego County, NY, and shares the site with the existing Nine Mile Point Nuclear Station Unit 2 (NMP2). NMP1 has a Type 2 boiling water reactor with a Mark I containment by General Electric.

The site property consists of partially-wooded land formerly used almost exclusively for residential and recreational purposes. Grade elevation at the site is approximately 10 feet above the record high lake level (249 feet), while underlying rock structure is among the most structurally stable in the United States from the standpoint of tilting and folding (Reference 6). There is no record of wave activity, such as seiche or tsunami, of such a magnitude as to make inundation of the site likely. A shore protection dike composed of rock fill from the excavation separates the buildings and the lake. The natural ground elevation at the NMP1 site generally slopes toward Lake Ontario, and the natural drainage is into the lake.

3. RESULTS

a. Requested Information Item 2(a)

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

Probable Maximum Flood:

NMP1 was not designed to satisfy the requirements stated in the NRC "Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants – LWR Edition," NUREG-75/087, December 1975 criteria for external floods (Reference 4), and the NMP1 Individual Plant Examinations for External Events (IPEEE) (References 11 & 13) process was used to find vulnerabilities with respect to the SRP external flooding criteria. Various possible flood scenarios were considered and information from calculations for NMP 2 were utilized to show that the only flooding scenario of concern for the plant was one involving a probable maximum precipitation (PMP) event. The PMP given in Hydrometeorological Reports (HMR)-51 and HMR-52 was used to calculate a flood depth of 262.5 feet for NMP2 resulting from PMP (Reference 12). The maximum PMP flood level in the vicinity of NMP1 was 261.75 feet as stated in Reference 13. The analysis shows that the maximum 20 minute, 9.9 inch PMP is the most critical rainfall for the plant area. This is in combination with the historical maximum lake level of 250.19 feet (References 7 & 11).

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NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

Flood Hazard Probable Maximum Precipitation (PMP):

Methodology used to develop the Design Basis Flooding Hazard:
The PMP values were computed using two publications of the NOAA, U.S. Department of Commerce: HMR No. 51, "Probable Maximum Precipitation – United States East of the 105th Meridian" and HMR No. 52, "Application of Probable Maximum Precipitation – United States East of the 105th Meridian", June 1978 and August 1982, respectively.

The U.S. Army Corps of Engineers (COE) HEC-1, Flood Hydrograph Package, was used to compute peak runoff rates from the watershed (Reference 7). Peak water surface elevations were determined using the U.S. COE HEC-2, Water Surface Profiles Program (Reference 7).

Key Assumptions:
The maximum PMP flood level is derived from the NMP2 analyses and is based on the conservative assumption that the storm sewer is inoperable and the culverts southwest of the NMP1 switchyard are not blocked (Reference 7).

Differences or Contradictions in Flood Hazard Levels:
The maximum lake level stated in the NMP1 UFSAR is Elevation 249 feet (Reference 6). For the PMP, which was determined from NMP2's design documents, the historical maximum lake level of 250.19 feet is used (Reference 11).

Groundwater Ingress:
The design basis groundwater level used to determine static and dynamic conditions on subsurface portions of the safety-related structures is elevation 249 feet. The flood hazard analysis assumes no groundwater ingress.

Flood Hazard - Lake Flooding:
The available design basis information implies that the maximum level of water from a flooding standpoint is the indicated maximum lake level (elevation 249 feet). The grade elevation at the site is ten feet above the record high lake level (Reference 8).

Methodology used to develop the Design Basis Flooding Hazard:
Historical maximum lake level is used (Reference 8).

Key Assumptions:
None

Differences or Contradictions in Flood Hazard Levels:
The maximum lake level stated in the NMP1 UFSAR is 249 feet, while NMP2 USAR uses the probable maximum lake level of 254 feet. Since the NMP1s rock dike was not re-assessed under the IPEEE program, the NMP1 UFSAR value of 249 feet is used (Reference 6).

Groundwater Ingress:
Not applicable to lake flooding.

Flood Hazards that were Screened Out:
There are no major streams or rivers within the drainage area that contains the site. Therefore, there is no historical stream or river flooding at the site. There is no historical record available to indicate that overland drainage of the site area resulted in any flooding situations (Reference 7).

There are no dams on water courses upstream of the site. There are two dams on the St. Lawrence River, downstream of Lake Ontario (Reference 7).

The plant site is not in an area that is susceptible to tsunami flooding (Reference 8).

b. Requested Information Item 2(b)

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

Flooding Licensing Basis:
The NMP1 flooding CLB is based on the Principal Design Criteria that was issued by United States Atomic Energy Commission (USAEC) on November 22, 1965. Criterion 1 states that: those features of reactor facilities which are essential to the prevention of accidents or to the mitigation of their consequences must be designed, fabricated, and erected to performance standards that will enable the facility to withstand, without loss of the capability to protect the public, the additional forces imposed by the most severe earthquakes, flooding conditions, winds, ice and other natural phenomena anticipated at the proposed site (Reference 6).

The NMP1 UFSAR (Reference 6) states that the principal structures and equipment which may serve either to prevent accidents or to mitigate their consequences are designed, fabricated, and erected in accordance with applicable codes to withstand the most severe flooding conditions which can be expected to occur at the site. Various parts of the NMP1 UFSAR in Section III discuss design features of NMP1 buildings to mitigate floods. This includes the Turbine Building grade floor, which at 261 feet, is 12 feet above maximum lake water level of 249 feet and the control room, which is 16 feet above yard grade and 28 feet above maximum lake level.

NMP1 was not designed to satisfy the requirements of NUREG-75/087 SRP (Reference 4) and therefore, the evaluation and documentation to satisfy the SRP external flooding criteria was not required. However, in the original IPEEE submittals to the NRC (References 17 & 18), the worst flood height of 261.75 feet resulting from the PMP for NMP1 is based on the NMP2 flood analysis, and this flood height was used to calculate core damage frequency (CDF). The NRC's Technical Evaluation Report on the NMP1 IPEEE submittal concluded that no vulnerabilities with respect to external flooding are present (Reference 13).

The site is protected from flooding resulting from maximum water level of 249 feet from Lake Ontario by a rock dike system.

Since the site is adequately designed to the CLB for all postulated flooding conditions, no emergency procedures are required for flood effects. No mode of operation is part of the licensing basis.

Flood Duration:
Since the IPEEE for NMP1 (Reference 17) uses the NMP2 PMF design basis information, the flood duration above 261 feet is a short duration event of 20 minutes.

Flood Protection Feature Credited in the Licensing Basis:

Rock Dike
A rock dike 1000-feet long at the shoreline protects the Station from lake wave action or possible ice accumulation. The dike is 2 feet higher than yard grade (263 feet) and is constructed of rock from the Station excavation. Large rocks face the lake side of the dike and have proven very effective in wave damping and as a barrier to floating ice (Reference 6).

Structures Housing Safety-Related Equipment
The floor of the Control Room is 16 feet above yard grade and 28 feet above maximum lake level (elevation 249 feet). Therefore, the possibility of flooding or inundation is not credible (Reference 6).

The exterior walls of the Waste Disposal Building substructure and the base slab are designed to resist hydrostatic pressure and uplift due to exterior flooding to elevation 249 feet (Reference 6).

The Turbine Building grade floor at elevation 261 feet is 12 feet above maximum lake level (elevation 249 feet). Poured-in-place concrete foundations enclose the Turbine Building below grade floor level, and preformed rubber water stops are incorporated in the concrete construction joints for water-tightness (Reference 6).

The Reactor Building grade floor at elevation 261 feet is 12 feet above maximum lake level (elevation 249 feet). Protection of the building from possible inundations, ice accumulation and lake wave action is provided by a rock dike 1,000-feet long at the shoreline (Reference 6).

Operation Procedures:
There are no Technical Specification or emergency operation requirements at NMP1 as a result of adverse hydrological events.

Temporary Barrier:
NMP1 has no temporary flood barriers or specific action plan in the event of severe flooding (References 6, 8, and 15).

Weather Conditions or Flood Level that Trigger Procedures and Associated Actions for Providing Flood Protection and Mitigation:
Operating Procedure N1-OP-64, Meteorological Monitoring (Reference 15), provides the response plan for potential multiple meteorological events. Section H.3.1 of this procedure addresses Heavy Rain.

Conditions Assumed Concurrent with Flood and Associated Actions:
NMP1 has no temporary flood barriers or specific action plan in the event of severe flooding. There are no Technical Specification or emergency operation requirements at NMP1 as a result of adverse hydrological events.

c. Requested Information Item 2(c)

Describe any warning systems to detect the presence of water in rooms important to safety.

There are no credited external flooding warning systems installed in rooms important to safety at NMP1.

d. Requested Information Item 2(d)

Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h [in Enclosure 4 of the March 12, 2012, 50.54(f) letter]

Acceptance Criteria Development:
The flood protection features were inspected to an acceptance criteria/inspection guidance that was developed based on the following information and contained within the NEI 12-07 Appendix B Walkdown Forms.

1. NEI 12-07 Section 6 and Appendix A (Reference 2)

ATTACHMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

Evaluation of the overall effectiveness of the plant's flood protection features:
All flood protection features identified in Request for Information Item 2b of this report were inspected with satisfactory results. All issues and potential issues were addressed using the Corrective Action Process. No condition reports were generated. The walkdown inspection results are documented below.

Rock Dike:
The rock dike was visually inspected in accordance with Reference 2. These inspections determined that there were no deficiencies that would adversely impact the hydrologic design of this feature to protect the site from the lake flooding events credited in the CLB.

Structures Housing Safety-Related Equipment:
The exterior walls of various buildings housing safety related equipment (e. g., Reactor Building, Turbine Building, Screen House, etc.) required for safe shutdown were visually inspected in accordance with Reference 2. No deficiencies were found that would adversely impact their design basis function credited in the CLB and evaluated in NMP1 IPEEE (References 11 & 13).

The main power block buildings were designed with a floor elevation of 261 feet. However, the maximum PMP flood level in the vicinity of the plant buildings, based on Reference 13, is expected to be elevation 261.75 feet. The personnel entrance and equipment access to buildings important to safety are provided at or above elevation 261 feet. Once the flood level exceeds elevation 261 feet, water may seep into the buildings through the doors. Per the NMP1 IPEEE (Reference 11), there is a potential for flooding in the Diesel Generator Building if water level reaches 261.75 feet. Consequently, a PMP could lead to a loss of offsite power and diesel generator failure, if the water in the diesel generator rooms rose to 261.75 feet. However, NMP1 analysis for the core damage frequency for the PMP event, as it relates to the loss of diesel generators and offsite power, and subsequent evaluation by the NRC (Reference 13), indicated that the flooding of the Diesel Generator Building from the PMP event does not constitute severe accident vulnerability.

Other features that may be used to mitigate the effects of an external flood:
From NMP2 - Exterior Barriers - Flood Control Berms, Culvert, and Railroad Stop Logs (Reference 7):

The NMP2 site, which is inclusive of the NMP1 site, is protected from the local probable maximum flood (PMF), resulting from the probable maximum precipitation. The site, in the immediate vicinity of the plants, is graded to carry the runoff of the PMP to the lake. In addition, exterior barriers (e.g. berms) located on all three land sides of the immediate plant are in place and will divert PMF flow from the watershed adjacent to the plant to prevent the PMF flow from reaching the plant site. These features were inspected as part of NMP2's response to 50.54(f) letter (Reference 3).

The flood control berms which protect offsite PMF from entering the site area also prevent onsite PMF from leaving the site in most directions. The water elevations inside the flood control berms, and directly adjacent to plant facilities, due to the PMP, are basically controlled by two outlets: the culverts under the railroad tracks and the access road southwest of the NMP1 switchgear, and overland flow to the north, next to the structures.

The west berm, Lake Road berm, southeast berm, and east berm direct the majority of the PMP flood flows around the plant perimeter. Reinforced concrete retaining walls and wood stop logs are placed at the NMP1 railroad track where the west berm crosses to prevent the flood water from flowing down the railroad tracks into the immediate plant area. The concrete retaining walls are 18 inches thick and are placed to provide a clear opening of 15 feet with the top elevation at 275.5 feet. The walls hold 8 inch x 8 inch pressure-treated wooden stop logs in steel-lined slots from elevation 271.56 feet to 275.2 feet (minimum). Steel hold-down angles are provided at both retaining walls to secure these logs in place.

The NMP2 revetment ditch structure will also help remove water from the site.

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NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

e. Requested Information Item 2(e)

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j [in Enclosure 4 of the March 12, 2012, 50.54(f) letter], including actions taken in response to the peer review.

The flooding walkdowns were conducted in association with the guidance contained in NEI 12-07 (Reference 2). This included review of the site's UFSAR, procedures, PMs (Reference 16), and calculations prior to conducting the walkdown. In addition, each participant of the walkdown received training as described below. For this flooding walkdown report and for completing the Appendix B walkdown record forms, the flood barrier features were inspected to the design basis flood level for the NMP1 site in accordance with the site procedures, training, and NEI 12-07 guidance.

Team Selection:
The walkdown team was comprised of experienced Sargent & Lundy (S&L) personnel (at least two) and was assisted by NMP1 staff (one to two at a time). There were at least three walkdown team members present during the walkdowns. The education and experience of the walkdown personnel are described below:

Sargent & Lundy LLC
- Civil Engineer with B.S. in Civil and Environmental Engineering (1978) –34 years of experience
- Mechanical Engineer with B.S. in Mechanical Engineering (2006) –six years of experience
- Civil Engineer with B.S. Civil Engineering (2008) – four years of experience

Nine Mile Point
- Mechanical Design Engineer with B.S. in Nuclear Science (1977) – 35 years of experience (28 years at NMPNS)
- Mechanical Engineer with M.S. in Mechanical Engineering (1992) – 25 years of experience (six years at NMPNS)

NRC Involvement:
The NMP NRC Resident Inspector was informed of the flooding walkdowns (inspections).

Compliance with NEI 12-07 Section 5.3:
The walkdown personnel were familiar with the flooding related guidance in NEI 12-07 (Reference 2) and NUREG/BR-0326 (References 5) and all the S&L walkdown team members had completed the NANtel training (trained to NEI 12-07) prior to conducting the flooding walkdowns (inspections) at NMP1. Site Specific Training for NTTF Recommendation 2.3 Flooding Walkdown was also conducted prior to conducting the flooding walkdowns at NMP1. The site specific training assured that the walkdown team members were knowledgeable of the site current licensing basis regarding flooding issues and layout of NMP1. Pre-job briefs were conducted before the flooding walkdowns. The pre-job briefs discussed which areas of the plant were to be included in the walkdown and what hazards might be encountered during the flooding walkdown. Thus, these briefs provided familiarization on the basis for the walkdown scope, the items to be inspected and preliminary analysis activities related to the features to be inspected.

Exceptions:
No exceptions are taken to the guidance provided in NEI 12-07 Sections 5.3, 5.7, and Appendix B. The Appendix B walkdown record forms were modified to aid in completing the forms. Check boxes were added, as well as tables, which list the penetrations and/or components inspected; however, none of the questions were modified. The Appendix B walkdown record forms will be retained and are available for NRC inspection.

f. Requested Information Item 2(f)

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

Observation Dispositioned by CAP:
No Condition Reports (CRs) identifying deficiencies were generated as a result of the observations during the walkdowns. All equipment was determined to be available, functional, and properly maintained.

Inaccessible Areas:
The one inaccessible area feature noted is the building wall/foundation interface. The wall/foundation interface connections and seals could not be viewed on any of the subject buildings. Due to the original construction of this interface, flood water entry is considered to be a very low risk.

g. Requested Information Item 2(g)

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

As indicated in Section 3.12 of NEI 12-07 (Reference 2), the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns of the 50.54(f) letter (Reference 3) to include an evaluation of cliff-edge effects. The Available Physical Margin (APM) has been estimated and documented, as applicable, in the walkdown record forms. The guidance provided in FAQ-006 was also followed. This information will be used in the flood hazard reevaluations performed in response to Item 2.1: Flooding in the 50.54(f) letter (Reference 3).

h. Requested Information Item 2(h)

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

To cope with design basis external flood levels, no changes to the NMP1 flood protection features were determined to be necessary during the flooding walkdowns.

All the Appendix B walkdown record forms (Part A through E) were peer reviewed per the guidance in NEI 12-07. The peer review was conducted by a member of the station flooding walkdown team. The peer reviewer found all walkdown record forms in compliance with the NEI 12-07 guidance.

4. CONCLUSIONS

The flooding walkdown procedure provided in NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A (Reference 2) which was endorsed by the NRC in a letter dated May 31, 2012 (Reference 10) was used as the basis for the flooding walkdowns at NMP1. NEI 12-07 Appendix B walkdown forms were used during the flooding walkdowns.

The Appendix B walkdown record forms were completed and available physical margins for the flood protection features were identified as applicable during the flooding walkdowns and recorded on the Appendix B walkdown record forms. Acceptance criteria were developed based on information in NEI 12-07 Section 6 and Appendix A. All observations were recorded on the flooding walkdown record forms and photographs were incorporated as appropriate into the forms to document the as found conditions. Condition

Reports were generated as necessary. The Condition Report numbers were incorporated into the Appendix B walkdown record forms.

The identified plant flood-protection physical features, the majority of which were incorporated passive protection features, were found to be as described in the CLB (available, functional, and maintained). The flood protection features in aggregate would perform their design function as credited in the CLB. A summary of the findings is provided below.

Per Section 3.8 of NEI 12-07, a deficiency exits when a flood protection feature is unable to perform its intended flood protection function when subject to a design basis flooding hazard. This condition may also lead to compromising the overall ability of the feature to provide protection or mitigation. During the flooding walkdowns, observations that may be potential deficiencies were entered into the Corrective Action Program, if necessary (Condition Reports were generated) and have been evaluated in accordance with the station processes. During the flooding walkdowns, no condition reports were generated. The observations of potential deficiencies have been evaluated and no deficiencies exist. The flooding walkdown observations are recorded on the Appendix B walkdown record forms, and in most cases, there are photographs of the observations.

ATTACHMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

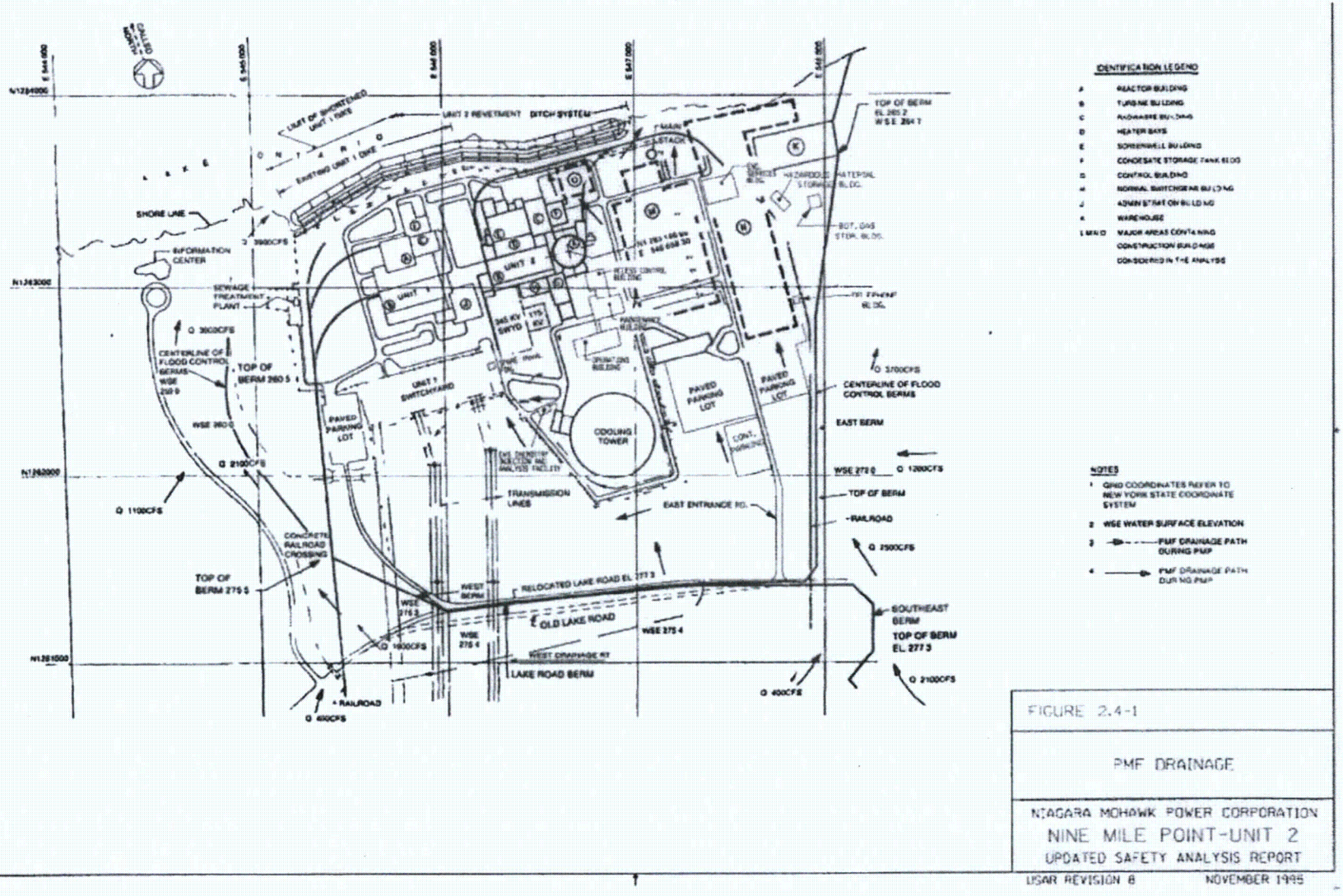
5. REFERENCES

1. Constellation Letter to the NRC, dated June 8, 2012, "Ninety-Day Response to Flooding Recommendations 2.1 and 2.3 of 10 CFR 50.54(f) Request for Information," [Acknowledging acceptance of the industry flooding walkdown guidance (NEI 12-07)]
2. NEI Report 12-07 [Rev 0-A], *Guidelines for Performing Verification Walkdowns of Plant Protection Features*, May 2012 [NRC endorsed May 31, 2012; updated and re-issued June 18, 2012]
3. NRC Letter to Licensees, dated March 12, 2012, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*
4. U.S. NRC NUREG-75/087, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants – LWR Edition," December 1975 (SRP)
5. NUREG/BR-0326, Rev. 1 (August 2009), *NRC Inspector Field Observation Best Practices*
6. Nine Mile Point Unit 1, Rev. 22, UFSAR, *Updated Final Safety Analysis Report*
7. Nine Mile Point Unit 2, Rev. 19, USAR, *Updated Safety Analysis Report*
8. Nine Mile Point Unit 1 Design Criteria Document, DCD-120, Rev. 1, *External Events*
9. SECY-11-0137, *Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned*, October 3, 2011
10. Letter from D.L. Skeen (NRC) to A.P. Heymer (NEI), dated May 31, 2012, Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features"
11. SAS-TR-96-001, August 1996, *Nine Mile Point Nuclear Station Unit 1 Individual Plant Examination for External Events (IPEEE)*
12. SAS-TR-95-001, June 1995, *Nine Mile Point Nuclear Station Unit 2 Individual Plant Examination for External Events (IPEEE)*
13. NRC Technical Evaluation Report, *The High Winds, Floods, Transportation and Other Events (HFO) Portion of the Nine Mile Point Unit 1 IPEEE Submittal*
14. Attachment 4, Revision 2, 06/06/05, *CLB Summary Document*
15. Operating Procedure N1-OP-64, Rev. 00602, *Meteorological Monitoring*
16. Maintenance Rule Manual S-MRM-REL-0102, Rev. 00800, *Structural Monitoring Program*
17. LC000899, May 18, 1998, *Generic Letter 88-20 Supplement 4, Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities – 10CFR50.54(f), Response to RFI*
18. LC000571, April 12, 1999, Generic Letter 88-20, Individual Plant Examination of External Events, Response to RFI

ATTACHMENT 2

NINE MILE POINT NUCLEAR STATION UNIT 1 RESPONSE TO RECOMMENDATION 2.3 FLOODING

Figure 1 – Primary Site Drainage Paths



ATTACHMENT (3)

NINE MILE POINT NUCLEAR STATION UNIT 2 RESPONSE TO RECOMMENDATION 2.3 FLOODING

ATTACHMENT 3

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1. INTRODUCTION

In response to the nuclear fuel damage at the Fukushima Dai-Ichi power facility resulting from an earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) requested information pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54(f). As part of this request, Nine Mile Point Nuclear Station Unit 2 (NMP2) was required to perform flood feature walkdowns to field-verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained

2. PURPOSE

a. Background

This report provides the information requested in the March 12, 2012, 50.54(f) letter; specifically, the information listed under the 'Requested Information' section of Enclosure 4, paragraph 2 ('a' through 'h'). The 'Requested Information' section of Enclosure 4, paragraph 1 ('a' through 'j'), regarding flooding walkdown procedures, was addressed via Constellation Energy's June 8, 2012, acceptance (Reference 1) of the industry walkdown guidance (Reference 2).

b. Site Description

NMP2 is situated on the southeast shore of Lake Ontario, in Oswego County, NY. NMP2 shares the site with the existing Nine Mile Point Nuclear Station Unit 1 (NMP1) which has been in commercial operation since 1969. NMP2 has a nuclear steam supply system (NSSS) consisting of a single-cycle, forced circulating boiling water reactor (BWR) with Mark II containment by General Electric. The balance of the plant was designed and constructed by Stone & Webster Engineering Corporation. The site property consists of partially-wooded land formerly used almost exclusively for residential and recreational purposes. Grade elevation at the site is 10 feet above the record high lake level, while underlying rock structure is among the most structurally stable in the United States (U.S.) from the standpoint of tilting and folding. There is no record of wave activity, such as seiche or tsunami, of such a magnitude as to make inundation of the site likely. A shore protection dike composed of rock fill from the excavation separates the buildings and the lake. The natural ground elevation at the NMP2 site generally slopes toward Lake Ontario, and the natural drainage is into the lake. Figure 1 from the NMP2 Updated Safety Analysis Report (USAR) shows the primary drainage paths and the major flood protection features for the plant site.

3. RESULTS

a. Requested Information Item 2(a)

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

Probable Maximum Flood:

The probable maximum flood (PMF) level in the vicinity of the plant buildings is elevation 262.5 feet (Reference 5). The maximum water level was determined from the local probable maximum precipitation (PMP). The analysis shows that the maximum 20 minute, 9.9 inch PMP is the most critical rainfall for the plant area. This is in combination with the historical maximum lake level of 250.19 feet.

Other Design Basis Flood Hazards:

The historical maximum precipitation, combined with the probable maximum lake level, including wave action, results in a constant water level of 259.7 feet (Reference 14) in the ditch immediately south of the

revetment. This combination of events creates a maximum flood level north of the plant buildings of elevation 260.4 feet, which is less than the probable maximum flood level caused by the PMP.

The site is protected from lake flooding during the combined event of the probable maximum surge (PMS) and a probable maximum surge and seiche due to a probable maximum wind storm (PMWS) by the revetment ditch system. The wave runup is an estimated elevation of 261 feet and the revetment is at elevation 263 feet which will prevent waves from flowing over the dike with some spray being carried to the ditch.

Flood Hazard Probable Maximum Precipitation (PMP):

Methodology used to develop the Design Basis Flooding Hazard:
The design bases floods for NMP2 are in accordance with NRC Regulatory Guide 1.59, Design Basis Floods for Nuclear Power Plants. The evaluation of the conditions resulting in the worst site-related flood probable at NMP2 has been made in conformance with American National Standards Institute (ANSI) N170-1976/American Nuclear Society (ANS) 2.8.

The PMP values were computed using two publications of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce: Hydrometeorological Report (HMR) No. 51, Probable Maximum Precipitation – United States East of the 105th Meridian and HMR No. 52, Application of Probable Maximum Precipitation – United States East of the 105th Meridian, June 1978 and August 1982, respectively.

The U.S. Army Corps of Engineers (U. S. ACOE) HEC-1, Flood Hydrograph Package, was used to compute peak runoff rates from the watershed. Peak water surface elevations were determined using the U.S. ACOE HEC-2, Water Surface Profiles Program.

Key Assumptions:
The maximum PMP flood level is based on the conservative assumption that the storm drains are inoperable and the culverts southwest of the NMP1 switchyard are not blocked.

Differences or Contradictions in Flood Hazard Levels:
There are no contradictions in flood hazard level as described in the NMP2 USAR.

Groundwater Ingress:
The design groundwater flood level used to determine static and dynamic loadings on subsurface portions of safety-related structures is elevation 261 feet. The flood hazard analysis assumes no groundwater ingress.

Flood Hazard – Historical Maximum Precipitation:

Methodology used to develop the Design Basis Flooding Hazard:
The design bases floods for NMP2 are in accordance with NRC Regulatory Guide 1.59, Design Basis Floods for Nuclear Power Plants. The evaluation of the conditions resulting in the worst site-related flood probable at NMP2 has been made in conformance with ANSI N170-1976/ANS 2.8.

The PMP values were computed using publication of the NOAA, U.S. Department of Commerce: Hydrometeorological Report (HMR) No. 33. This report determined a maximum PMP of 8.4 in/hr at the time of the site's construction permit and determined that the walls and foundations of all Category 1 structures be designed for a flooding elevation of 261 feet.

Key Assumptions:
The maximum flood level is based on the conservative assumption that the storm drains are inoperable and the culverts southwest of the NMP1 switchyard are not blocked.

Differences or Contradictions in Flood Hazard Levels:
The site's flood level was re-evaluated using HMR Report No. 51 and 52. However, there are no contradictions in flood hazard level as describe in NMP2 USAR.

Groundwater Ingress:
The design groundwater flood level used to determine static and dynamic loadings on subsurface portions of safety-related structures is elevation 261 feet. The flood hazard analysis assumes no groundwater ingress.

Flood Hazard – Lake Flooding:

Methodology used to develop the Design Basis Flooding Hazard:
The design bases flooding analyses for NMP2 were performed in accordance with the then proposed NRC Regulatory Guide 1.59, Design Basis Floods for Nuclear Power Plants, Revision 2 (August 1977). The evaluation of the conditions resulting in the worst site-related flood probable at NMP2 has been made in conformance with ANSI N170-1976/ANS 2.8.

The Probable Maximum Windstorm (PMWS) model used is the same model presented in the proposed American Nuclear Society (ANS) Standards for Determining Design Basis Flooding at Power Reactor Sites. The PMWS model is based on historical storms that caused surges on Lake Ontario at the probable maximum lake level of 254 feet.

The wave runup at the main stack was calculated by using the composite slope method in the U.S. Army Corps of Engineers Shore Protection Manual (SPM), 1973.

Key Assumptions:
Two basic assumptions were employed to determine the severity of the PMWS. The maximum overwater wind speed was set at 100 mph. The lowest pressure within the PMWS was assumed to be 950 mb. This pressure is slightly below the lowest pressure ever observed in the U.S. outside of a hurricane, and is 954.96 mb recorded in Canton, NY, on January 2 and 3, 1913.

Differences or Contradictions in Flood Hazard Levels:
There are no contradictions in flood hazard level as describe in the NMP2 USAR.

Groundwater Ingress:
Not applicable to lake flooding.

Flood Hazards that were Screened Out:
There are no major streams or rivers within the drainage area containing the site. Therefore, there is no historical stream or river flooding at the site. There is no historical record available to indicate that overland drainage of the site area resulted in any flooding situations.

There are no dams on water courses upstream of the site. There are two dams on the St. Lawrence River, downstream of Lake Ontario. The plant is not sited in an area that is susceptible to tsunami flooding (Ref. 5).

b. Requested Information Item 2(b)

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

Flooding Licensing Basis:
The current licensing basis for NMP2 is designed to prevent the loss or failure of safety-related equipment required to achieve and maintain cold shutdown resulting from the most severe flood conditions predicted for the site. All safety-related facilities, systems, and equipment are protected against flood damage resulting from the following combinations of events:

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1. Probable Maximum Precipitation (PMP) and historical maximum lake level
2. Historical maximum precipitation and probable maximum lake level
3. Surge with wind-wave action from Probable Maximum Windstorm (PMWS)

The site is protected from flooding during the combined event of the PMP and the coincidental wind-wave activity on Lake Ontario due to the PMWS by a revetment ditch system. Physical hydraulic prototype testing of the design of this system was performed to assure that the design is adequate.

The site is also protected from the local Probable Maximum Flood (PMF), resulting from the PMP. The site, in the immediate vicinity of the plant, is graded to carry the runoff of the PMP to the lake. In addition, exterior barriers (e.g., berms) located on all three land sides of the immediate plant area divert PMF flow from the watershed adjacent to the plant to prevent the PMF flow from reaching the plant site. The exterior barriers are designed to take the summer and winter PMF with ice effects. Walls and foundations of all Category 1 structures are designed for a flooding elevation of 261 feet. Since the PMF level calculated from PMP values developed using Hydrometeorological Reports No. 51 and 52 exceeds this elevation for a brief period, further analyses (Ref. 15) were carried out to determine the effect of the higher water surface elevation on the Category 1 structures. The additional analyses included a determination of the storm water inflow quantity into each building during a PMF event and an evaluation of the impact of the inflow to the building equipment. These analyses considered the building drains and sumps to be inoperable. The diesel generator building is the only case in which the inflow was significant. In this case, the inflow was postulated to pass through the stop logs which have been designed for equipment removal. To remedy this situation, a flexible caulking material (dymeric or equivalent) has been installed in all horizontal and vertical joints of the concrete stop logs of the diesel generator building below elevation 263 feet. This material is compatible with concrete and can withstand mechanically-induced vibration and movement and the temperature extremes expected at NMP2. The design life expectancy of such caulking exceeds 20 years under the conditions to which it will be exposed; however, it was replaced after 20 years of service. The caulking will continue to be replaced after every subsequent 20 years of service or when the concrete stop logs are removed, whichever occurs first (Ref. 11). Any equivalent caulking utilized which has a different life expectancy than dymeric will be replaced before that life expectancy is exceeded. All caulking will be applied in accordance with the manufacturer's instructions.

Since the site is adequately designed for all postulated flooding conditions, no emergency procedures are required for flood effects and no mode of operation is part of the licensing basis.

Flood Duration:
A maximum 20-minute, 9.9-inch PMP is the licensing and design basis.

Flood Protection Features Credited in the Current Licensing Basis (CLB):

Revetment Ditch System
The shorefront revetment is designed to protect the plant from surge and wind-wave activity from Lake Ontario. Although the wave run-up is an estimated elevation of 261 feet, the revetment at elevation 263 feet will prevent waves from flowing over the dike with some spray carried into the ditch. The purpose of the revetment-ditch structure is to protect the plant fill and foundation for maximum still water elevation of 254 feet. The revetment-ditch structure is Seismic Category 1 and is designed to withstand the impact of waves. With the fill in place, waves cannot impact Category 1 structures because of the lack of sufficient depth of water to sustain such waves. The revetment-ditch structure can sustain a high degree of damage and still perform its function, protecting the site fill from erosion (Reference 8). Under these conditions, the water behind the revetment in the interior ditch will be at an average elevation of 254 feet with occasional wave flow cycles that may enter and exit the southwestern ditch opening creating top water elevations in the ditch averaging 254 feet. Water spray will fall into the interior ditch and flow southwest back to the lake.

The lake shore is approximately 200 feet from the nearest safety-related or station blackout (SBO) building. The intermediate area, starting from the shoreline, includes a shore protection dike constructed using rock and soil fill to an elevation of 263 feet, 50 feet wide, and an interior drainage ditch averaging 24 feet wide to an elevation of 251 feet inside the dike. The ditch allows crashing waves to break and flow back to the lake to the southwest end of the dike. Finally, the plant grade rises along the protected area security fence, 80 feet to 100 feet from the shoreline to at least elevation 260 feet.

The existing revetment constructed along the lakefront, based on recent survey data, indicates actual top elevations ranging from 263 feet to 265 feet. Therefore, there is no site flooding due to Lake Ontario.

Topography Grading

The site, in the immediate vicinity of the plant, is graded to carry the runoff of the PMP to the lake.

Exterior Barriers - Flood Control Berms, Culvert, and Railroad Stop Logs

The site is protected from the local probable maximum flood (PMF), resulting from the probable maximum precipitation. The site, in the immediate vicinity of the plant, is graded to carry the runoff of the PMP to the lake. In addition, exterior barriers (e.g. berms) located on all three land sides of the immediate plant area divert PMF flow from the watershed adjacent to the plant to prevent the PMF flow from reaching the plant site.

The flood control berms which protect offsite PMF runoff from entering the site area also prevent onsite PMF runoff from leaving the site in most directions. The water elevations inside the flood control berms, and directly adjacent to plant facilities, due to the PMP, are basically controlled by two outlets: the culverts under the railroad tracks and the access road southwest of the NMP1 switchgear, and overland flow to the north, next to the plant structures.

The west berm, Lake Road berm, southeast berm, and east berm direct the majority of the PMP flood flows around the plant perimeter. Reinforced concrete retaining walls and wood stop logs are placed at the NMP1 railroad track where the west berm crosses to prevent the flood water from flowing down the railroad tracks into the immediate plant area. The concrete retaining walls are 18 inches thick and 15 feet apart with the top elevation at 275.5 feet. The walls hold 8 inch x 8 inch pressure-treated wooden stop logs in steel-lined slots from elevation 271.56 feet to 275.2 feet (minimum). Steel hold-down angles are provided at both retaining walls to secure these logs in place.

Structure Housing Safety-Related Equipment

The structures housing safety-related equipment and systems, such as the reactor building, diesel generator building, and control building are constructed with reinforced concrete walls below grade level. The personnel entrance and equipment access to these buildings are provided at or above elevation 261 feet LSD (Lake Survey Datum of 1935). All penetrations through the exterior walls below grade level have watertight penetration sleeves. Underground cables are protected from wetting or flooding by being housed in watertight conduits which are enclosed in reinforced concrete encasements to form electrical ductlines. As electrical ductlines enter the structure, the joints are provided with water stops to prevent in-leakage from the design basis groundwater or floodwater levels into the structures. The structures housing safety-related equipment, systems, and components are as follows:

- Reactor Building including Auxiliary Bay
- Control Building
- Diesel Generator Building
- Screenwell Building
- Main Stack
- Standby Gas Treatment Building
- Turbine Building Main Steam Tunnel Area
- Piping and Electrical Tunnel

Operation Procedures
There are no Technical Specifications or emergency operation requirements at NMP2 as a result of adverse hydrological events.

Temporary Barrier
NMP2 has no temporary flood barriers or specific action plan in the event of severe flooding.

Weather Conditions or Flood Levels that Trigger Procedures and Associated Actions for Providing Flood Protection and Mitigation:
Operating Procedure N2-OP-102, Meteorological Monitoring (Reference 12) provides the response plan for multiple potential meteorological events. Section H.1.3 and Attachment 8 of the procedure address Heavy Rain and invoke procedure EPIP-EPP-26 (Reference 16). With respect to flooding, the procedure includes closing all exterior doors and vents, walkdowns to observe potential water intrusion, including catchment rigs to protect equipment, confirmation of operability, and availability.

Station Administrative Procedure EPIP-EPP-26, Natural Hazard Preparation and Recovery, (Reference 16) addresses response plan steps to address a security improvement that could potentially increase localized flooding elevations. The North Security Delay Barrier Fence Gate would need to be opened to prevent the possibility of debris accumulation on the fence during a flood event. Reasonable simulation for this activity is not applicable or time critical because the trigger implementation is a forecast of greater than 6 inches of precipitation in a 24 hour period. Such warning would be predicted greater than 24 hours in advance allowing sufficient time to open the gate. This procedure also calls for preparation of sand bags to be placed if needed and obtaining portable pumps if rain is forecasted to be greater than the six inch criteria.

Conditions Assumed Concurrent with Flood and Associated Actions:
Coincidental damage from the effects of natural phenomena (seismic activity (earthquakes), tornadoes, lightning, hurricanes (winds) and wave damage) or other flooding conditions is not assumed in the current licensing basis. Therefore, it is assumed that flood barriers and seals are intact throughout the external flooding event. Additionally, flooding and other external events are not considered concurrently.

c. Requested Information Item 2(c)

Describe any warning systems to detect the presence of water in rooms important to safety.

There are no credited external flooding warning systems installed in rooms important to safety at NMP2.

d. Requested Information Item 2(d)

Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h [in Enclosure 4 of the March 12, 2012, 50.54(f) letter]

Acceptance Criteria Development:
The flood protection features were inspected to an acceptance criteria/inspection guidance that was developed based on the following information and contained within the Appendix B Walkdown Forms:

1. N2-MSP-GEN-V001 (Reference 9)
2. N2-MPM-GEN-A016 (Reference 10)
3. N2-MPM-GEN-017 (Reference 11)
4. Calculation WH-C-001 (Reference 15)
5. NEI 12-07 Section 6 and Appendix A (Reference 2)

Evaluation of the overall effectiveness of the plant's flood protection features:
All potential issues identified during the walkdown were discussed with site engineering representatives at the time of discovery. Condition Reports were generated by site engineering representatives as necessary. The Condition Report numbers were incorporated into the walkdown record forms. All Condition Reports related to the flooding walkdown have been evaluated, and no deficiencies exist that would prevent the flood protection feature(s) from performing their intended CLB function(s).

Revetment/Ditch and Flood-Control Berms:
The revetment/ditch system and flood-control berms were visually inspected in accordance with References 9 and 10. These inspections determined that there were no deficiencies that would adversely impact the hydrologic design of these features to protect the site from the combined flooding events.

Diesel Generator Building:
The equipment stop logs on the diesel generator building were visually inspected in accordance with Reference 11. The review of the work orders confirmed that the equipment stop logs were caulked in accordance with site procedures to prevent building flooding due to PMP based on HMR Report No. 51 and 52.

Doors:
Three out of 14 exterior doors (credited non-watertight doors) entering safety related buildings that are used to evaluate building flooding due to PMP in Hydrometeorological Reports 51 and 52 (Reference 5, Table 2.4-15), have no weather stripping and one door has a deteriorated seal. These doors are evaluated in CR-2012-009738 and CR-2012-009745, respectively. The Condition Report (CR) evaluations by NMP Engineering determined that the additional water volume would have no adverse impact on equipment required for safe shutdown and the doors may be repaired as necessary.

Other features that may be used to mitigate the effects of an external flood:
Station Administrative Procedure EPIP-EPP-26, Natural Hazard Preparation and Recovery (Reference 16), calls for preparation of sand bags to be placed, if needed, and obtaining portable pumps if rain is forecasted to be greater than the six inches.

A non-safety related permanent dewatering system is provided for the Reactor Building and vicinity area to control the groundwater drainage around the reactor building.

e. Requested Information Item 2(e)

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j [in Enclosure 4 of the March 12, 2012, 50.54(f) letter], including actions taken in response to the peer review.

The flooding walkdowns were conducted in association with the guidance contained in NEI 12-07 (Reference 2). This included review of the site's USAR, procedures, PMs, and calculations prior to conducting the walkdown. In addition, each participant of the walkdown received training as described below. For this flooding walkdown report and for completing the Appendix B walkdown record forms, the flood barrier features were inspected to the design basis flood level for the NMP2 site in accordance with the site procedures, training, and NEI 12-07 guidance.

Team Selection:
The walkdown team was comprised of experienced Sargent & Lundy (S&L) personnel (two to three at a time) and was assisted by NMP2 staff (one to two at a time). There were at least three walkdown team

members present during the walkdowns. The education and experience of the walkdown personnel are described below.

Sargent & Lundy LLC

- Civil Engineer with B.S. in Civil and Environmental Engineering (1978) – 34 years of experience
- Mechanical Engineer with B.S. in Mechanical Engineering (2006) – six years of experience
- Civil Engineer with B.S. Civil Engineering (2008) – four years of experience

Nine Mile Point

- Mechanical Design Engineer with B.S. in Nuclear Science (1977) – 35 years of experience (28 years at NMPNS)
- Mechanical Design Engineer with M.S. in Mechanical Engineering (1992) – 25 years of experience (six years with NMPNS)

Nine Mile Point team members also served as peer reviewers. Peer review is documented in Section 3.h.

NRC Involvement:
The NMP NRC Resident Inspector was informed of the flooding walkdowns (inspections).

Compliance with NEI 12-07 Section 5.3:
The walkdown personnel were familiar with the flooding related guidance in NEI 12-07 (Reference 2) and NUREG/BR-0326 (Reference 4) and all the S&L walkdown team members completed the NANtel training (trained to NEI 12-07) prior to conducting the flooding walkdowns (inspections) at NMP2. Site specific training for NTTF Recommendation 2.3, Flooding Walkdown, was also conducted prior to conducting the flooding walkdowns at NMP2. The site specific training assured that the walkdown team members were knowledgeable of the current site licensing basis regarding flooding issues and the layout of NMP2. Pre-job briefs were conducted before the flooding walkdowns. The pre-job briefs discussed which areas of the plant were to be included in the walkdown and what hazards might be encountered during the flooding walkdown. Thus, these briefs provided familiarization on the basis for the walkdown scope, the items to be inspected and preliminary analysis activities related to the features to be inspected.

Exceptions:
No exceptions are taken to the guidance provided in NEI 12-07 Sections 5.3, 5.7 and Appendix B. The Appendix B walkdown record forms were modified to aid in completing the forms. Check boxes were added, as well as tables, which list the penetrations and/or components inspected; however, none of the questions were modified. The Appendix B walkdown record forms will be retained and are available for NRC inspection.

f. Requested Information Item 2(f)

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

Observation Dispositioned by CAP:
Four Condition Reports (CRs) were generated as a result of the observations during the walkdowns. All of these Condition Reports have been evaluated by Engineering, and it was determined that no deficiencies exist that could adversely impact the design basis function(s) of the external flooding protection features credited in the CLB.

Inaccessible Areas:

Table 1 - Inaccessible Areas

Location	Form No.	Facing	Description	Recommendation / Resolution
Storm Drain Culvert from Lake Road to 10,000 yr. ditch	N/A	N/A	Culvert is buried approximately 15 feet.	This culvert is assumed to be blocked in the current flooding analysis. Blockage would reduce flood flow into the site and would be considered a flood reduction. No issue.
Building Wall/Foundation Interface	N/A	N/A	Wall/foundation interface seals could not be observed.	Due to the original construction of this interface and observations of floors near interface showing no signs of leakage, flood water entry is considered to be a very low risk. No issue.

Inaccessible:
The two inaccessible areas listed in Table 1 are the storm drain culvert between the south side of Lake Road to the 10,000 yr. ditch and the building wall/foundation interface. Blockage of the storm drain culvert from Lake Road to the 10,000 yr. ditch, buried approximately 15 feet, would reduce the flood flow onto the site and would be considered as a flood reduction. The wall/foundation interface connections and seals could not be viewed on any of the subject buildings. Due to the original construction of this interface and the lack of any observed significant leakage, flood water entry is considered to be a very low risk.

g. Requested Information Item 2(g)

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

As indicated in Section 3.12 of NEI 12-07 (Reference 2), the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns of the 50.54(f) letter (Reference 3) to include an evaluation of cliff-edge effects. The Available Physical Margin (APM) has been estimated and documented, as applicable, in the walkdown record forms. The guidance provided in FAQ-006 was also followed. This information will be used in the flood hazard reevaluations performed in response to Item 2.1: Flooding in the 50.54(f) letter (Reference 3).

h. Requested Information Item 2(h)

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

To cope with design basis external flood levels, no changes to the NMP2 flood protection features were determined to be necessary during the flooding walkdowns.

All the Appendix B walkdown record forms (Part A through E) were peer reviewed per the guidance in NEI 12-07. The peer review was conducted by a member of the station flooding walkdown team. The peer reviewers found all walkdown record forms in compliance with the NEI 12-07 guidance. The plant's response to any open issues which are outlined in Table 1 or have been determined to be inaccessible were also determined to meet the guidance contained in NEI 12-07.

4. CONCLUSIONS

The flooding walkdown procedure provided in NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A (Reference 2), which was endorsed by the NRC in a letter dated May 31, 2012 (Reference 7), was used as the basis for the flooding walkdowns at NMP2. NEI 12-07 Appendix B walkdown forms were used during the flooding walkdowns.

The Appendix B walkdown record forms were completed and available physical margins for the flood protection features were identified as applicable during the flooding walkdowns and recorded on the Appendix B walkdown record forms. Acceptance criteria were developed based on information in NEI 12-07 Section 6 and Appendix A. All observations were recorded on the flooding walkdown record forms and photographs were incorporated as appropriate into the forms to document the as found conditions. Condition Reports were generated as necessary. The Condition Report numbers were incorporated into the Appendix B walkdown record forms.

The identified plant flood-protection physical features, the majority of which were incorporated passive protection features, were found to be as described in the CLB (available, functional, and maintained). The flood protection features in aggregate would perform their design function as credited in the CLB. A summary of the findings is provided below.

Per Section 3.8 of NEI 12-07, a deficiency exits when a flood protection feature is unable to perform its intended flood protection function when subject to a design basis flooding hazard. This condition may also lead to compromising the overall ability of the feature to provide protection or mitigation. During the flooding walkdowns, observations that may be potential deficiencies were entered into the Corrective Action Program (Condition Reports were generated) and have been evaluated in accordance with the station processes. The Condition Reports have been evaluated and no deficiencies exist that could adversely impact the design basis functions of the external flooding protection features credited in the CLB.

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5. REFERENCES

1. Constellation Letter to the NRC, dated June 8, 2012, *Ninety-Day Response to Flooding Recommendations 2.1 and 2.3 of 10 CFR 50.54(f) Request for Information*, [Acknowledging acceptance of the industry flooding walkdown guidance (NEI 12-07)]
2. NEI Report 12-07 [Rev 0-A], *Guidelines for Performing Verification Walkdowns of Plant Protection Features*, May 2012 [NRC endorsed May 31, 2012; updated and re-issued June 18, 2012]
3. NRC Letter to Licensees, dated March 12, 2012, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*
4. NUREG/BR-0326, Rev. 1 (August 2009), *NRC Inspector Field Observation Best Practices*
5. Nine Mile Point NMP2, Rev. 19, USAR, *Updated Safety Analysis Report,* October, 2010
6. SECY-11-0137, *Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned*, October 3, 2011
7. Letter from D.L. Skeen (NRC) to A.P. Heymer (NEI), dated May 31, 2012, Endorsement of Nuclear Energy Institute (NEI) 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*
8. Technical Requirements Manual, TRM 3.7.6, *Revetment-Ditch Structure*
9. Mechanical Surveillance Procedure N2-MSP-GEN-V001, Rev. 00501, *Revetment Ditch Structure Inspection*
10. Mechanical Preventive Maintenance Procedure N2-MPM-GEN-A016, Rev. 00501, *Probable Maximum Precipitation (PMP) Flood Berm and 10,000 Year Culvert Inspection*
11. Mechanical Preventive Maintenance Procedure N2-MPM-GEN-017, Rev. 00001, *Diesel Generator Building Missile Protection Stop Logs Dymeric Caulk Inspection/Repair*
12. Operating Procedure N2-OP-102, Rev. 01102, *Meteorological Monitoring*
13. SAS-TR-95-001, June 1995, *Nine Mile Point Nuclear Station NMP2 Individual Plant Examination for External Events (IPEEE)*
14. NMP2 Calculation WH-B-043, Rev. 0, *Flood Level Due to PMWS on Lake and Maximum Historical Storm on Site*
15. NMP2 Calculation WH-C-001, Revision 1, *Storm Water Inflow Into Building From Probable Maximum Flood*
16. Station Administrative Procedure EPIP-EPP-26, Rev. 00301, EPIP-EPP-26, *Natural Hazard Preparation and Recovery*
17. NMP2 Drawing EA-006D, Rev. 13, *Door Schedule and Details*
18. NMP2 Drawing 009550827036, Rev. C.00, *3 Pound per Square Inch Tornado Door LHR*
19. NMP2 Specification S208G, Rev. 4, Special Door

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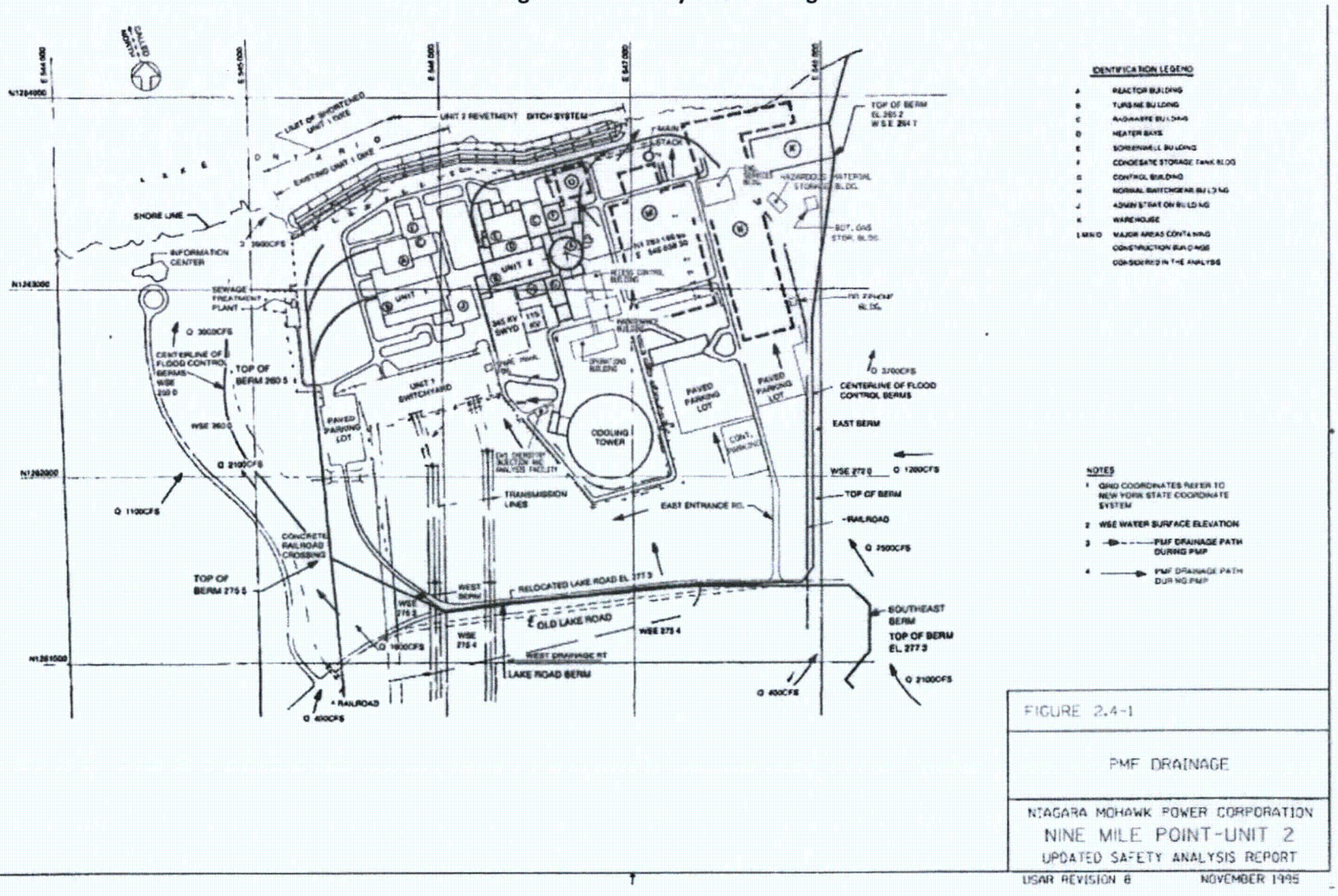
Figure 1 – Primary Site Drainage Paths



ATTACHMENT (4)

CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

ATTACHMENT 4

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ATTACHMENT 4

CALVERT CLIFFS NUCLEAR POWER PLANT RESPONSE TO RECOMMENDATION 2.3 FLOODING

1. INTRODUCTION

In response to the nuclear fuel damage at Fukushima Dai-ichi power facility resulting from an earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) requested information pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54 (f). As part of this request, the Calvert Cliffs Nuclear Power Plant (CCNPP) was required to perform flood feature walkdowns to field-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 (Reference 2).

2. PURPOSE

a. Background

This report provides the information requested in the March 12, 50.54(f) letter; specifically, the information listed under the 'Requested Information' section of Enclosure 4, paragraph 2 ('a' through 'h'). The 'Requested Information' section of Enclosure 4, paragraph 1 ('a' through 'j'), regarding flooding walkdown procedures, was addressed via Constellation Energy's June 8, 2012, acceptance (Reference 1) of the industry walkdown guidance (Reference 2).

b. Site Description

The site for CCNPP consists of approximately 962 acres on the western shore of the Chesapeake Bay, in Calvert County, about 10-1/2 miles southeast of Prince Frederick, Maryland. The site is characterized by densely wooded, low, flat to gently rolling terrain of low to moderate relief. The ground surface elevations at the site range from sea level to about 130 feet; with the average elevation of the site at about 100 feet above mean seal level. Nearly vertical cliffs, over 100 feet high in places, are located along the shore of the Chesapeake Bay. The plant is located in an area near the east edge of the site where the preexisting ground elevation was about 65 feet. The final grade elevation is about 45 feet (Reference 5).

The turbine building for the CCNPP is oriented parallel and adjacent to the shoreline of the Chesapeake Bay with the twin containment structures and the auxiliary building located on the west, or landward, side of the turbine building. The service building and the intake and discharge structures are on the east, or bay side, of the turbine building.

A safety-related building houses the Societe Alsacienne De Constructions Mecaniques De Mulhouse (SACM) emergency diesel generator. The fuel oil storage tank and auxiliary equipment for this diesel generator are also housed in this building. An augmented quality building houses the SACM station blackout diesel generator. Auxiliary equipment for this diesel generator is housed in this building.

The site is well drained and not susceptible to flooding. Surface runoff is moderately high and accounts for about 35% of the total annual precipitation. Average annual precipitation in the region ranges from about 40.6" at the Patuxent Naval Air Test Center (NATC) to about 44" at Prince Frederick. A drainage divide extends across the site in a general north-south direction. The area east of the divide (20% of the site) drains into the Chesapeake Bay, whereas the area to the west drains into local tributaries and eventually into the Patuxent River. The plant is located east of the divide where surface drainage is toward the Chesapeake Bay.

The original groundwater surface was between +15 feet and +20 feet MSL in the plant area; however, a permanent pipe drain system, subsurface drain system, surrounding the plant maintains the ground water below Elevation +16 feet.

The plant structures are built across three terraces rising from the Chesapeake Bay at Elevations 10 feet, 45 feet, and 70 feet. The Intake Structure is located on the Elevation 10-foot terrace. The remainder of the

safety-related SSCs are located on the Elevation 45-foot terrace with below-grade portions as deep as Elevation (-)15 feet in the auxiliary building. The intake structure is connected to these SSC below grade via the service building and turbine building. The transition between the Elevation 10-foot terrace and the 45-foot terrace is an embankment with a slope of approximately 2.5 horizontal(H):1 vertical(V). The eastern wall of the service building and the intake building protrude from this embankment facing the Chesapeake Bay. Based on this layout the probable maximum precipitation (PMP) and probable maximum hurricane (PMH) events would impact the plant in different fashions.

3. RESPONSE

a. Requested Information Item 2(a)

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

External flood hazards from the PMH, PMP, and groundwater are evaluated in the CCNPP CLB documents. The site is not considered to be susceptible to flooding on rivers and streams and dam failures as none of these are present on or near the site, thus the probable maximum flood (PMF) was not considered. The site is also not susceptible to Tsunami flooding according to the UFSAR "It is not expected that the plant will be subjected to a significant tsunami effect. The maximum expected tsunami would not result in more than minor wave action at the site and, thus, was not significant in the design (Section 2.6.1, Reference 5)."

Probable Maximum Hurricane:
The design basis flood for CCNPP Unit 1 and 2 is the PMH to Elevation 27.5 feet mean sea level (MSL). This flood event is caused by a hurricane storm surge in the Chesapeake Bay, which forms the eastern boundary of the plant.

Methodology used to develop the Design Basis Flooding Hazard:
Procedures used in the tidal surge analysis for the open ocean across the Continental Shelf are those described in the U.S. Army Coastal Engineering Research Center publication, "Shore Protection - Planning and Design," Technical Report No. 4 (Section 2.8.3.5, Reference 5).

Key Assumptions:
It was assumed the normal high tide at shore would occur coincident with the peak hurricane surge. Assume PMH forward speed = 23 mph. Speed of free wave in Chesapeake Bay for 40 to 50 feet average bay depth = 24 to 27 mph (Section 2.8.3.5, Reference 5).

Differences or Contradictions in Flood Hazard Levels:
Section 2.8.3.6 of the UFSAR states that the calculated wave run-up is to Elevation 27.1 feet MSL. Section 2.8.3.5 states that the maximum wave run-up at the intake structure is 27.5 feet MSL. The more conservative of the two, 27.5 feet MSL, is used as the design basis flood level (Section 2.8.3.5, Reference 5).

Probable Maximum Precipitation:
The plant is also susceptible to intense local precipitation; known, as the PMP to Elevation 44.8 feet MSL near the diesel generator 1A building. The PMP for the remainder of the yard area is unknown.

Methodology used to develop the Design Basis Flooding Hazard:
Probable maximum precipitation at the plant site was from Hydrometeorological Reports (HMR) # 51 and HMR # 52 (National Weather Service, National Oceanic and Atmospheric Administration (NOAA)), as per NRC GL 89-22. Peak discharges were determined using the U.S. Army Corps of Engineers (USACE) computer program HEC-1. The peak water levels in the ditches and swales are computed using USACE computer program HEC-2 (Reference 11).

Key Assumptions:
No key assumptions concerning the PMP were encountered.

Groundwater Ingress:
The original groundwater surface was between Elevation 15 feet and 20 feet MSL in the plant area; however, a permanent pipe drain system, subsurface drain system, surrounding the plant will maintain the ground water below Elevation 16 feet (Section 2.7.3.2, Reference 5).

Methodology used to develop the Design Basis Flooding Hazard:
The depth of ground water at the site was measured in piezometers installed in seven of the Dames & Moore exploratory borings. The piezometers consisted of small-diameter steel pipe equipped with a well point, or perforated PVC pipe. Representative samples extracted from the exploratory borings were subjected to a laboratory testing program in order to evaluate the permeability characteristics of the natural soils and the physical properties of the material for correlation purposes (Section 2.5.3.3, Reference 5).

Key Assumptions:
No key assumptions concerning groundwater ingress were encountered.

b. Requested Information Item 2(b)

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

Flooding Licensing Basis:
The CLB design basis flood levels due to the flooding from the PMH with wave run-up from the Chesapeake Bay or from the PMP is not impacted by the mode of operation of CCNPP, nor is mode of plant operation considered in the CLB design basis external flood levels. The mode of operation for CCNPP could impact how the plant is protected from external flooding, as well as, maintenance activities which could impact flood barriers (plant configuration). Plant mode of operation and potential maintenance activities due to changes to the plant configuration were considered during the flooding walkdowns. If the plant configuration changes due to mode of operation or maintenance activities impacted flood protection features, the impact is noted on the Appendix B walkdown record forms.

Flooding Duration:
The CCNPP CLB design basis flood levels due to the flooding from PMH with wave run-up from the Chesapeake Bay or from the PMP are not associated with any time duration. During the flooding walkdowns, it was assumed that the CCNPP site was flooded for a long enough time duration where the external flood level was at a static level equal to the maximum flood level for that area of the plant.

Flood Protection Features Credited in the CLB:
The saltwater cooling system pump motors, located in the intake structure, are protected against the maximum hurricane tide and storm surges including wave action by the intake structure floor, walls, and roof. Maximum design wave run-up is 27.5' above mean sea level.

The roof and roof hatches of the intake structure are designed for live load (250 psf), dead load (150 psf), tornado uplift (100 psf), PMH waves (250 psf) and seismic load of 10% of the dead load acting downwards.

For all major structures below finish grades, a heavy waterproofing membrane of 40 mils thickness is provided at the exposed face of the exterior walls and below the base slab. Rubber waterstops are also provided at all construction joints up to grade elevation. Subsurface drains are provided to lower the

elevation of ground water around the plant. All of these provisions are made to eliminate any possibility of flooding, by ground water infiltration, of equipment located below the elevation of highest flood water level.

Weather Conditions or Flood levels that Trigger Procedures and Associated Actions for Providing Flood Protection and Mitigation:

Station Administration Procedure EP-1-108, Severe Weather Preparation (Reference 13) provides minimum requirements to CCNPP site personnel for preparations, staff augmentation, and compensatory measures necessary should a severe weather pattern be projected to or actually affect the site. Weather conditions include high winds, tornados, excessive rain, flooding, snow, or ice accumulation. Severe weather includes any weather related event that could cause loss of offsite power. No flood protection or mitigation actions are included in this procedure.

Conditions Assumed Concurrent with Flood and Associated Actions:

Coincidental damage from the effects of natural phenomena (seismic activity (earthquakes), tornadoes, lighting, hurricanes (winds) and wave damage) or other flooding conditions is not assumed in the current licensing basis; therefore, it assumed that flood barriers and seals are intact throughout the external flooding event. Additionally, flooding and other external events are not considered concurrently.

c. Requested Information Item 2(c)

Describe any warning systems to detect the presence of water in rooms important to safety.

There are no credited external flooding warning systems installed in rooms important to safety at CCNPP.

d. Requested Information Item 2(d)

Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h [in Enclosure 4 of the March 12, 2012, 50.54(f) letter]

Acceptance Criteria Development:
The flood protection features were inspected to an acceptance criteria and inspection guidance that was developed based on the following information and contained within the NEI 12-07 Appendix B Walkdown Forms.

1. CCNPP Procedure F-591-1(2) "Inspection of Fire Doors and Watertight Doors" (References 7 and 8)

2. CCNPP Procedure F-592-1(2) "Penetration Fire Barrier Inspection" (References 9 and 10)

3. NEI 12-07 Section 6 and Appendix A (Reference 2).

Evaluation of the overall effectiveness of the plant's flood protection features:

All potential issues identified during the walkdown were discussed with site engineering representative at the time of discovery. Condition Reports were generated by site engineering representative as necessary. The Condition Report numbers were incorporated into the walkdown record forms. All Condition Reports related to the flooding walkdown have been evaluated, and no deficiencies exist that would prevent the flood protection feature(s) from performing their intended CLB function(s).

Intake Structure:
The plant is well protected against the design basis flood level of Elevation 27.5 feet and up to a foot above at Elevation 28.5 feet, the roof of the intake structure.

The intake structure would become susceptible to flooding at flood levels beyond Elevation 28.5 feet. Flooding would occur (at approximately Elevation 30.6 feet) through the twelve (12) circulating water pump exhaust vents and the six (6) air supply units above the salt water pumps on the intake structure roof.

The interior wall between the intake structure and the service building (GG-Wall) protects against interior flooding to the intake structure affecting other plant structures, systems, and components (SSC) up to Elevation 16 feet. At this elevation six (6) HVAC ducts in the wall that exhaust through the east service building wall provide a flood path to the service building and turbine building and ultimately through to the east wall of the auxiliary building (K-Wall).

Auxiliary Building:
Grades vary on the 45-foot terrace with some low areas at Elevation 42 feet. Flooding would first occur through electrical manholes with ductbanks leading into the auxiliary building. The Unit 1 and 2 containment purge fan rooms would flood through the approximately thirty-two (32) underground conduits that enter each room at Elevation 37.2 feet. These conduits are tied to electrical manholes at Elevation ±45 feet. Previous signs of leakage were noted in the Unit 1 Containment Purge Fan Room and are documented by CR 2010-010344 and CR 2010-010347.

1A Diesel Generator Building:
The 1A diesel generator building is well protected against flooding. The finished floor elevation of the building is 45.5 feet and the PMP flood elevation is 44.8 feet. It is also protected by a system of swales that convey flood waters to the bay. Conduits entering from the exterior were inspected and no open or unsealed conduits were encountered.

e. Requested Information Item 2(e)

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j [in Enclosure 4 of the March 12, 2012, 50.54(f) letter], including actions taken in response to the peer review.

The walkdowns were conducted in accordance with guidance contained in NEI 12-07. This included review of the site's UFSAR, procedures, PMs, and calculations prior to conducting the walkdown. In addition, each participant of the walkdown received training as described below. For this flooding walkdown report and for completing the Appendix B walkdown record forms, the flood barrier features were inspected to the design basis flood level for the CCNPP Unit Nos. 1 and 2 in accordance with the site procedures, training, and NEI 12-07 guidance.

Team Selection:

The walkdown team was comprised of experienced Sargent & Lundy (S&L) personnel (one to three at a time) and was assisted by CCNPP staff (one or two at a time). There were at least two qualified walkdown team members present during the walkdowns. All S&L walkdown team members completed NANtel training (trained to NEI 12-07) before walkdowns were conducted. The education and experience of walkdown personnel are described below.

Sargent and Lundy

- Civil Engineer with B.S. in Civil Engineering (2008) – 6 years of experience
- Nuclear Engineer with M.S in Nuclear Engineering (1978) – 34 years of experience
- Mechanical Engineer with B.S. in Mechanical Engineering (2010) – 2 years of experience

CCNPP

- Mechanical Engineer with BS and MS (1981) – 30 years of experience
- Principal Engineering Analyst - 24 years of experience

NRC involvement:

The CCNPP NRC Resident Inspector observed one of the pre-job briefs and the flooding walkdown (inspections) of various flood protection features.

Compliance with NEI 12-07 Section 5.3:

The flooding walkdown personnel are familiar with the flooding related guidance in NEI 12-07 and NUREG/BR-0326 (References 2 and 4) and all the walkdown team members had completed the NANtel training (trained to NEI 12-07) prior to conducting the flooding walkdowns (inspections) at CCNPP. Site Specific Training for NTTF Recommendation 2.3 Flooding Walkdown was also conducted prior to conducting the flooding walkdowns (inspections) at CCNPP. The site specific training assured that the walkdown team members were knowledgeable of the site current flooding licensing basis and layout of CCNPP. Pre-job briefs were conducted before the flooding walkdowns. The pre-job briefs discussed which areas of the plant were to be included in the walkdown and what hazards might be encountered during the flooding walkdown. Thus, these briefs provided familiarization with basis for the walkdown scope and items to be inspected and preliminary analysis activities related to the features to be inspected.

Exceptions:

No exceptions are taken to the guidance provided in NEI 12-07 Sections 5.3, 5.7, and Appendix B. The Appendix B walkdown record forms were modified to aid in completing the forms. Check boxes were added as well as tables that list the penetrations and/or components inspected; however, none of the questions were modified. The Appendix B walkdown record forms will be retained and available for NRC audits and inspections.

f. Requested Information Item 2(f)

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

Condition Reports were generated as a result of the observations during the walkdowns. All of these Condition Reports have been evaluated, and it was determined that no deficiencies exist that could adversely impact the design basis function(s) of the external flooding protection features credited in the CLB. All equipment was determined to be available, functional, and properly maintained.

Restricted Access:

There were two areas that were determined to be restricted access as defined by NEI 12-07. For each of these items, a condition report was generated. The table below shows the inspection schedule.

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Table 1

Table 1 – Restricted Access Areas				
Area	**Justification for Delay**	**Maintenance Work Order No.**	**Completion Date**	**Remarks**
Unit 1 27-Foot West Piping Penetration Room	Locked High Radiation	CR-2012-008662	6/25/14	Unit 1 27-Foot West Piping Penetration Room was partially inspected during the March 23rd 2012 preliminary flooding walkdowns and no deficiencies were encountered.
Unit 2 27-Foot West Piping Penetration Room	Locked High Radiation	CR-2012-008663	6/25/13	No deficiencies were encountered during Unit 1 inspection; it is assumed Unit 2 is similarly configured.

Inaccessible:

1. **Waterproof membranes, waterstops, and waterproof expansion joints**

   Reason Inaccessible:
   Waterproof membranes, waterstops, and waterproof expansion joints were inaccessible as they are buried or embedded in concrete.

   Functional Requirement:
   Rubber waterstops and waterproof expansion joints prevent or limit water intrusion at expansion joints so that safety-related equipment is not impacted by the flood level. Waterproof membranes protect walls and floors from water infiltration.

   Location:
   Waterproof membranes are located at the bottom of the intake structure and auxiliary building and the exterior walls of each structure. Waterstops are installed at all expansion joints of the intake structure and auxiliary building. Expansion joints are also protected with waterproof expansion joint material.

   Basis for Reasonable Assurance that Feature is Available and Functional:
   There is reasonable assurance that these features are performing their intended function as no signs of leakage through the floors, walls, and expansion joints were encountered. These features and their continued performance are encompassed under station administrative procedure MN-1-139 "Structure and System Walkdowns (Reference 12).

g. Requested Information Item 2(g)

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

As indicated in Section 3.12 of NEI 12-07 (Reference 2), the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns of the 50.54(f) letter (Reference 3) to include an evaluation of cliff-edge effects. The available physical margin (APM) has been estimated and documented, as applicable, in the walkdown record forms. The guidance provided in FAQ-006 was also followed. This information will be used in the flood hazard reevaluations performed in response to Recommendation 2.1: Flooding in the 50.54(f) letter (Reference 3).

h. Requested Information Item 2(h)

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

To cope with design basis external flood levels, no changes to the CCNPP flood protection features were determined to be necessary during the flooding walkdowns.

All the Appendix B walkdown record forms (Part A through E) were peer reviewed per the guidance in NEI 12-07. The peer review was conducted by a member of the station flooding walkdown team. The peer reviewers found all walkdown record forms in compliance with the NEI 12-07 guidance. The plant's response to any open issues which are outlined in Table 1 or have been determined to be inaccessible were also determined to meet the guidance contained in NEI 12-07.

4. CONCLUSIONS

The flooding walkdown procedure provided in NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A (Reference 2) which was endorsed by the NRC in a letter dated May 31, 2012 (Reference 6) was used as the basis for the flooding walkdowns at the Calvert Cliffs Nuclear Power Plant (CCNPP). NEI 12-07 Appendix B walkdown forms were used during the flooding walkdowns.

The Appendix B walkdown record forms were completed and available physical margins for the flood protection features were identified as applicable during the flooding walkdowns and recorded on the Appendix B walkdown record forms. Acceptance criteria were developed based on the information in NEI 12-07 Section 6 and Appendix A. All observations were recorded on the flooding walkdown record forms and photographs were incorporated as appropriate into the forms to document the as found conditions. Condition Reports were generated as necessary. The Condition Report numbers were incorporated into the Appendix B walkdown record forms.

The identified plant flood-protection physical features, the majority of which were incorporated passive protection features, were found to be as described in the CLB (available, functional, and maintained). The flood protection features in aggregate would perform their design function as credited in the CLB. A summary of the findings is below.

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Per Section 3.8 of NEI 12-07, a deficiency exits when a flood protection feature is unable to perform its intended flood protection function when subject to a design basis flooding hazard. This condition may also lead to compromising the overall ability of the feature to provide protection or mitigation. During the flooding walkdowns, observations that may be potential deficiencies were entered to the corrective action program (Condition Reports were generated) and have been evaluated in accordance with the station processes. The Condition Reports have been evaluated, and no deficiencies exist. The flooding walkdown observations are recorded on the Appendix B walkdown record forms, and in most cases, there are photographs of the observations.

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5. REFERENCES

1. Constellation Letter to the NRC, dated June 8, 2012, "Ninety-Day Response to Flooding Recommendations 2.1 and 2.3 of 10 CFR 50.54(f) Request for Information," [Acknowledging acceptance of the industry flooding walkdown guidance (NEI 12-07)]
2. NEI Report 12-07 [Rev 0-A], *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, May 2012 [NRC endorsed May 31, 2012; updated and re-issued June 18, 2012]
3. 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*
4. NUREG/BR-0326, Rev. 1 (August 2009), *NRC Inspector Field Observation Best Practices*
5. *Calvert Cliffs Nuclear Power Plant, Updated Final Safety Analysis Report,* UFSAR, Revision 45, October 2, 2012
6. Letter from D.L. Skeen (NCR) to A.P. Heymer (NEI), dated May 31, 2012, Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features"
7. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedure STP-F-591-1, *Inspection of Fire Doors and Watertight Doors,* Revision 01100, Unit 1
8. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedure STP-F-591-2, *Inspection of Fire Doors and Watertight Doors,* Revision 01100, Unit 2
9. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedure STP-F-592-1, *Penetration Fire Barrier Inspection,* Revision 01000, Unit 1
10. Calvert Cliffs Nuclear Power Plant Surveillance Test Procedure STP-F-592-2, *Penetration Fire Barrier Inspection,* Revision 01000, Unit 2
11. Calvert Cliffs Diesel Generator Project, Calculation No. D-C-92-018, *PMP Runoff and Water Level Analysis, Issued For Use,* August 20, 1992
12. Calvert Cliffs Nuclear Power Plant Station Administrative Procedure MN-1-319, *Structure and System Walkdowns*, Revision 00800
13. Calvert Cliffs Nuclear Power Plant Station Administrative Procedure EP-1-108, *Severe Weather Preparation,* Revision 00500