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John A Ventosa
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NL-12-169

November 27, 2012

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Flooding Walkdown Report - Entergy's Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident
Indian Point Unit Nos. 2
Docket No. 50-247
License No. DPR-26

REFERENCE:
1. NRC letter to Entergy, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, dated March 12, 2012 (ML12053A340).
2. Entergy's Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendations 2.1 and 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, June 8, 2012 (NL-12-081)

Dear Sir or Madam:

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

Pursuant to Required Response 2 of Reference 1, Enclosure 4, Entergy is providing the Flooding Walkdown Report for Indian Point Unit 2 (IP2) in the enclosure.

A001

This letter contains new regulatory commitments, which are identified in the attachment. Should you have any questions regarding this submittal, please contact Robert Walpole, Manager, Licensing at (914) 254-6710.

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

Respectfully,

Patrick W. Conway, acting for John A. Ventosa

JAV/sp

Enclosure: 1. Indian Point Unit 2 Flooding Walkdown Report
Attachment: 2. List of Regulatory Commitments

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William M. Dean, Regional Administrator, NRC Region 1
NRC Resident Inspectors
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA
Ms. Bridget Frymire, New York State Dept. of Public Service

ENCLOSURE TO NL-12-169

INDIAN POINT UNIT 2

FLOODING WALKDOWN REPORT

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

Entergy

ENTERGY NUCLEAR
Engineering Report Cover Sheet

Engineering Report Title:
Indian Point Energy Center Unit 2 Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding

Engineering Report Type:

New ☒ Revision ☐ Cancelled ☐ Superseded ☐

Applicable Site(s)

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

EC Number 40676

Report Origin: ☐ Entergy ☒ Vendor
Vendor Document Number: IP-RPT-12-00036
Quality-Related: ☐ Yes ☒ No

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

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

Reviewed by: John Skonieczny / _____ Date: 11-15-12
Reviewer (Print Name/Sign)

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

Approved by: Richard Drake/ _____ Date: 11/15/12
Supervisor (Print Name/Sign)

ENGINEERING REPORT

INDIAN POINT ENERGY CENTER UNIT 2 FLOODING WALKDOWN SUBMITTAL REPORT FOR RESOLUTION OF FUKUSHIMA NEAR TERM TASK FORCE RECOMMENDATION 2.3: FLOODING

Prepared By: Frank Kenny — Date: 11-14-12
Frank Kenny (Enercon Services)

Reviewed By: Paul M Hansen — Date: 11/14/12
Paul Hansen (Enercon Services)

Peer Reviewed By: Atwood O. Browning — Date: 11/14/2012
Atwood Browning (Enercon Services)

Approved by: Gloria Guerra — Date: 11/14/2012
Gloria Guerra (Enercon Services)

IP2 Flooding Walkdown Submittal Report for Resolution of Fukushima Near-Term Task Force Recommendation 2.3: Flooding

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1.0 SCOPE AND OBJECTIVE

This report was developed to provide information requested by the United States Nuclear Regulatory Commission (NRC) pursuant to Title 10 of the Code of Federal Regulations, Section 50.54(f) on March 12, 2012 for Indian Point Energy Center (IPEC) Unit 2. In response to the NRC request, Entergy performed walkdowns to verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained. The walkdowns were performed to verify that structures, systems, and components (SSCs), portable flood mitigation equipment, and the procedures needed to install and or operate them during a flood are acceptable and capable of performing their design function as credited in the CLB.

This report presents the findings of the flooding walkdown inspections completed at IPEC Unit 2 (IP2). The walkdowns were completed in accordance with the United States Nuclear Regulatory Commission (NRC) endorsed guidance of NEI 12-07, Rev. 0A, *Guidelines for Performing Verification of Plant Flood Protection Features*, dated May 31, 2012 and Entergy Nuclear procedure EN-DC-170 that was developed to provide instructions for implementation of the NRC endorsed guidelines. The walkdowns completed at IP2 were performed to verify that the structures, systems, and components (SSCs) credited for flood protection are capable of performing their design function as described in the current licensing basis. The walkdowns were also used to verify that plant modifications implemented since original construction, such as changes to topography, do not adversely affect flooding protection.

This report identifies the flooding hazards that comprise the current licensing basis and the protection and mitigation features that are credited with preventing the ingress of external water into SSCs important to safety at IP2. The effectiveness of the flood protection features is evaluated against a set of acceptance criteria. Results of the walkdowns, including key findings, available physical margin, and any identified degraded, or nonconforming conditions are addressed and a description of the actions taken or planned to address these conditions is provided.

2.0 DESIGN BASIS FLOOD HAZARD LEVEL

UFSAR Section 2.5 describes the hydrology, including the most severe flooding conditions at the IPEC site.

Indian Point is a multiunit site consisting of approximately 239 acres of land on the east bank of the Hudson River at Indian Point, village of Buchanan, in upper Westchester County, New York. Indian Point Units 2 and 3 are located north and south respectively, of Unit 1, which has been retired. The site is about 24-miles north of the New York City boundary line. The nearest city is Peekskill, located 2.5-miles northeast of Indian Point, with a population of about 20,000.

The Hudson River below the Federal Dam at Troy is a tide-influenced, estuarine waterway. Fresh water from the combined Hudson and Mohawk Rivers, as well as from numerous tributaries, discharges directly into the tidal portion of the river. Flow in the Hudson River is controlled more by the tides than by the runoff from the tributary watershed. River width opposite the plant ranges from 4500 to 5000-ft. Water depths within 1000-ft of the shore near the site are variable with an average depth of 65-ft; at some points the depth exceeds 85-ft. River cross-sectional areas in the vicinity of the site range from 165,000 to 170,000-ft2. Tidal flow past the plant is about 80 million gpm about 80-percent of the time, and it has been estimated that this frequency flow is at least 9 million gpm in a section 500-600-ft wide immediately in front of the facility. Mean tidal flow in the vicinity of the site is over 70 million gpm.

The flood hazards considered for the IPEC site are the flooding of the Hudson River and the probable maximum precipitation (PMP) event. The PMP event, although not part of the CLB at IP2, was evaluated as a flood hazard to take a proactive approach to assessing the plant flooding protection.

2.1 Flood Hazards Identified

2.1.1 Hudson River Flood

The most severe flooding condition at IPEC results from the simultaneous occurrence of a standard project flood, a failure of the Ashokan Dam and a storm surge in New York Harbor at the mouth of the Hudson River resulting from a standard project hurricane. The water level under these conditions would reach 14-ft above MSL. Local wave action due to wind effects has been determined to add 1-ft to the river elevation producing a maximum water elevation of 15-ft above MSL at the Indian Point Site.

This is below what the UFSAR refers to as the "critical control elevation" of 15-ft-3-in. This "critical control elevation" is defined in the UFSAR as the elevation the river water elevation would have to reach before it would seep into any of the Indian Point buildings. The UFSAR noted that flooding from the Hudson River does not present a hazard to Indian Point 2.

2.1.2 Probable Maximum Precipitation

The Indian Point 2 IPEEE assessed the effect of applying the Probable Maximum Precipitation (PMP) criterion provided in Generic Letter 89-22 in terms of onsite flooding and roof ponding (in accordance with Section 6.2.2.2 of NUREG-1407) to

determine if it would lead to severe accidents. The roofs of the PAB, Aux FW Building, Turbine Building and Control Building were evaluated by converting the water depth to a loading and comparing to the allowable roof loading, where it was determined that these structures would retain their integrity. Ponding at grade level was evaluated to determine if there was significant ponding in various areas that could result in an ingress of water that could affect safety related equipment.

2.2 Assumptions

2.2.1 Hudson River Flood

No specific assumptions were identified for the Flood analysis.

2.2.2 Probable Maximum Precipitation

No specific assumptions were identified for the PMP.

2.3 Methodology

2.3.1 Hudson River Flood

To determine the maximum flood level several flooding conditions governing the maximum water elevation at the site were investigated, including:

a. Flooding resulting from runoff generated by a Hudson River Probable Maximum Precipitation (PMP)

b. Flooding caused by the occurrence of the Ashokan Dam failure concurrent with heavy runoff generated by a Hudson River Standard Project Flood (SPF). This condition was considered because the previous condition did not result in a dam failure.

c. Flooding due to the occurrence of a Probable Maximum Hurricane (PMH) for the New York Harbor area concurrent with spring high tide.

The determination of the most severe water surface elevations at the site was based upon the simultaneous occurrence of the above flooding conditions with several critical boundary conditions in the Hudson River including:

a. Mean Sea Level Water Elevation

b. High tide Water Elevation

c. Low tide Water Elevation

d. Standard Project Hurricane (SPH)

e. Probable Maximum Hurricane (PMH)

To calculate this flood level, backwater curves were calculated using the standard step method as well as numerical method of computing gradually varied flow profiles starting with several assumed water-surface elevations at a control point on the river. The hydrodynamic and physical characteristics of the Hudson River dictated the use of the ocean entrance at the Battery as the control section.

The tidal variation in the Hudson River Estuary influence the choice of the proper boundary conditions as well as the value of the discharge for which the flow profile is desired. The tidal variation was treated as an integral part of the system and its influence was simultaneously coupled with the other relevant hydraulic occurrences.

In the evaluation of the maximum water surface elevation at Indian Point resulting from the above flooding and boundary conditions, the local oscillatory short period waves produced by the wind were considered. The computed Indian Point stages corresponding to the various flooding conditions were conservatively increased by one foot to account for this effect. Thus, the resulting maximum flood level calculated at Indian Point is 15' above mean seal level.

2.3.2 Probable Maximum Precipitation

The Indian Point 2 site was evaluated for six storm events (Reference 10.8), although not part of the CLB, one of which was a 100 year – 24 hour storm event which is intended to be used as a benchmark for comparison purposes. The six storms analyzed were as follows:

PMP (in)	Duration (Min.)
6.0	5 minutes
9.3	15 minutes
13.3	30 minutes
17.5	60 minutes
33.0	24 hours
8.0	24 Hours (100 year -24 hour storm event)

The 1 hour PMP rainfall depth, as shown above, was derived from Figure 24 of HMR 52 (Reference 10.6). This figure is the basis for calculating the shorter duration rainfall depths based on Figures 36 through 38 of HMR 52. The all-season PMP for a 24-hour period was derived from Figure 20 of HMR 51 (Reference 10.7). Each storm event had relevance to the study and unique

characteristics. The five and fifteen minute storms, in most cases, created the greatest rate of run-off from the subcatchment areas. The storm event from which the peak flooding elevations were calculated varied from the thirty minute event to the 24 hour event.

The benchmark analysis and the 24 hour PMP analysis were accomplished using the USDA Soil Conservation Service TR-20 analysis method. The shorter duration analyses were completed using the Rational Method.

The PMP analysis determined the locations and maximum depths of ponds which form on the roofs of various site structures, and in various areas around the site. The roofs were evaluated by converting the water depths to a loading and comparing with the allowable roof loadings. The effect of ponding in areas around the site were evaluated by first determining if water could potentially flood any safety related equipment given the maximum expected pond depths.

The stormwater model accounted for subcatchments, reaches and ponds. Subcatchments are the land area and building surface area that collect rainfall and contribute runoff to a point of concentration. The drainage reaches represent culverts, drainage ditches and subsurface drainage. In most cases, a reach is either a culvert or a swale. Ponds are areas of significant water accumulation. The subsurface structures were considered to be no longer effective when the storm event exceeded the 100 year-24 hour event.

The roofs were evaluated by converting the water depth to a loading and comparing with the allowable roof loadings. The Buildings which contain safety related equipment and which were also considered to be susceptible to ponding are the Primary Auxiliary Building, the Auxiliary Feedwater Building, the IP2 Turbine Building and the Control Building. Using the maximum allowable live loading for these buildings, and equivalent maximum allowable height of water accumulation was calculated and compared against the maximum height of accumulated rainfall on those buildings determined for each of the PMP storms.

The results are summarized:

Building	**Maximum Allowable Water Buildup (feet of water)**	**Worst Case PMP Buildup (feet of water)**
Primary Auxiliary Building	1.1	0.4
Auxiliary Feedwater Building	1.1	0.9
Turbine Building	1.3	1.3
Control Building	1.6	Parapet less than 1.6 feet on the Control Building Roof, therefore significant

		ponding is precluded.

Although the Turbine Building roof could experience loading at or close to yield, given the conservatisms in the hazard calculation, the likelihood of yielding, if any, being localized and the remaining margin between yield and actual failure, it was judged that the structure would retain its integrity. All other buildings were well below their maximum allowable height.

Several areas will experience ponding at grade level due to the various PMP situations. Based on the PMP analysis, the following areas experience ponding at grade level:

Area	**Pond**	**Level (ft)**
Ponding in Transformer Area	Pond #3	0.7
Ponding in Transformer Area Exit	Pond #4	0.7
Ponding NW of Unit 2 Behind 4 Story Building & Retaining Wall	Pond #5	0.7
Depth of Flow West of Turbine Building	Reach #6	0.3
Ponding NW of Unit 1, South of EDG Building	Pond #10	1.9
Ponding SW of Unit 1	Pond #12	1.0
Ponding East of Chemical Systems Building	Pond #13	1.8

These areas were reviewed to determine the potential to affect safety related equipment. The areas with safety related equipment are discussed below:

The ponding of water in the Transformer yard east of the Turbine Building was calculated to be as high as 0.7 feet. The following exterior building openings will see some head of water from this pond. The bottom of the openings are approximately at grade, or slightly above grade:

- Double doors on the west side of the PAB
- Exterior door of the Radiation Monitor Enclosure
- Exterior door on the south side of the AFW building
- Double doors on the north side of the Control Building

Water which enters the PAB from leakage through the west side doors could potentially damage the RHR pumps, which are below grade at elevation 15'-0".

Since the PMP event was not postulated to cause an initiating event and the plant can be safely maintained in a hot shutdown conditions without the RHR pumps for at least 24 hours, this event was not considered to be risk significant. No other critical equipment exists in the PAB in the area below the top of the pond.

The radiation monitor enclosure does not contain any safety related equipment, therefore flooding in the area is not a concern.

The maximum allowable depth of flooding in the AFW building is 14" above the floor, based on the bottom of the AFW pump motors. The floor level is approximately 2 inches above grade at the south end of the AFW Building. With the maximum height of the pond being 0.7 feet, flooding in the AFW building during the PMP event is not a concern.

The ponding of water at the exit from the transformer yard leading to the roadway at the north end of the Turbine Building was determined to be 0.7 feet. The following exterior openings would see some head from this pond:

- Exterior doors on the east side and north side of the Turbine Building.
- Exterior door on the west side of the enclosure in the north portion of the AFW building

Egress from this pond area will flow down the road on the north side of the turbine building towards the river. Any leakage through the doors of the Turbine Building will spread out over the large area of the Turbine Building ground floor at elevation 15'-0". The only safety related items in this area that could be exposed to water leakage is MCC 24A. This MCC is protected by permanent dikes which are adequate to protect it from flooding. The only adverse consequence of the in-leakage could be flooding of the 6.9kV switchgear which could result in loss of offsite power. This scenario has already been addressed in the internal flooding analysis for a more severe event and therefore is not a concern.

As stated previously, the maximum allowable depth of flooding in the AFW building is 14" above the floor, based on the height of the bottom of the AFW pump motors. The floor level is approximately 5 inches above grade at the exterior door leading to this pond area. Since the maximum height of the pond in this area is 0.7 feet (8.4. inches) above grade, flooding in the AFW building due to ponding from the PMP is not a concern.

With the exception of potential leakage into the 480V Switchgear room, the PMP evaluation determined that ponding at grade level is not a concern due to the fact that either the ponding level is below the height of the safety related equipment; or ponding occurs in areas where this is not safety related equipment; or it was determined that the flooding was not risk significant and would not affect the ability of the plant to maintain a hot shutdown condition.

Leakage into the 480V Switchgear room, located at the 15' Elevation of the Control Building, could travel under the double doors on the north side of the Control

Building. Based on the PMP analysis it was determined that water could enter the 480V Switchgear room during the PMP under the following scenarios:

- Ingress through the gap under the exterior double doors could occur due to ponding in the transformer area.

- Should the subsurface drainage system become surcharged and not allow free flow of Control Building roof drainage, some or all of the flow from the Control Building roof drains (which would normally exit through the yard drainage system) could be diverted into the switchgear and deluge rooms through the floor drains (which are tied together for those two rooms).

Based on fluid flow calculations assuming both of the above conditions exists, (i.e. ingress through the double doors from a maximum PMP flood accumulation of 0.7 feet in the transformer yard and a full diversion of roof drains into the switchgear rooms), the level in the switchgear room could reach a height where it could impact safety related equipment in approximately 68 minutes without operator actions. Therefore the double doors were modified to minimize the gap. The remaining leakage, together with the maximum backup from the floor drains will result in a maximum steady state level in the room below the critical height.

One additional potential flooding scenario was postulated. The outlet drain for the combined Control Building roof and switchgear room/deluge room drains connect to a dedicated transformer yard manhole. The pipe into the manhole is furnished with a flapper valve. If the flapper valve were to fail in the open position, and a PMP conditions occurs such that the drainage system were surcharged, water could back up into the switchgear and deluge rooms directly from the manhole. The IPEEE evaluation judged that the probability of the valve being substantially off its seat and sticking open such that substantial back leakage could occur is low enough to preclude this from being risk significant scenario. Nevertheless, in order to assure this probability remains low, the IPEEE evaluation included a commitment to add this valve to the periodic surveillance schedule of the plant preventive maintenance program. Thus, the flapper valve is currently subject to periodic surveillance.

2.4 Non Conformance

No differences or contradictions in flood hazard levels were found in design or licensing basis documentation.

3.0 EXTERNAL FLOOD PROTECTION AND MITIGATION FEATURES

3.1 Flooding Licensing Basis

The safety-related facilities, systems, and equipment at IP2 are capable of withstanding the most severe flooding condition in the Hudson River and the Probable Maximum Precipitation (PMP) event which results in rainwater collecting next to buildings in the power block, roof ponding, and flooding of manholes. The PMP event, although not part

of the CLB at IP2, was evaluated as a flood hazard to take a proactive approach to assessing the plant flooding protection.

The most severe flooding condition at IPEC results from the simultaneous occurrence of a standard project flood, a failure of the Ashokan Dam and a storm surge in New York Harbor at the mouth of the Hudson River resulting from a standard project hurricane. The water level under these conditions would reach 14-ft above MSL. Local wave action due to wind effects has been determined to add 1-ft to the river elevation producing a maximum water elevation of 15-ft above MSL at the Indian Point Site.

One area was identified as a potential flooding concern in the PMP evaluation of the ponding at grade level, though not part of the CLB. The PMP evaluation determined that the ponding in the transformer area could be as high as 0.7 feet. It was determined that water could enter the 480V Switchgear Room under the following scenarios:

- Ingress through the gap under the exterior double doors could occur due to ponding in the transformer area.

- Should the subsurface drainage system become surcharged and not allow free flow of the Control Building roof drainage, some or all of the flow from the Control Building roof drains (which would normally exit through the yard drainage system) could be diverted into the switchgear and deluge rooms through the floor drains (which are tied together for those two rooms).

Note that under this ponding scenario in the transformer yard, through the west side doors of the PAB could potentially damage the RHR pumps, however this event was not considered to be risk significant because PMP event was not postulated to cause an initiating event and the plant can be safely maintained in a hot shutdown conditions without the RHR pumps for at least 24 hours.

In addition to the ponding in the transformer yard, another flooding scenario for Control Building during the PMP event is the condition where the drainage system in the yard becomes surcharged, and water backs up into the switchgear and deluge rooms directly through the Control Building outlet drain to the manhole in the transformer yard.

As a result of the PMP, the drain flapper valve, located in the manhole to which the Control Building drains flow, was added to the preventive maintenance surveillance inspection program. In addition, weather stripping was added to the doors leading into the switchgear room from the transformer area to reduce the bottom door gap and screens were to be placed on the equipment room hub drains located in the 480V switchgear room to precluded foreign material intrusion. Based on the above improvements, the NRC staff considered the GSI-103 resolved for IP2. The PMP evaluation did not identify any significant ponding or roof drainage issues associated with the Intake Structure.

The current licensing basis at IP2 does not directly discuss the specific mode of operation in which the plant is to be maintained during a flooding event. However, the incorporated passive features and the actions listed in the Abnormal Operating Procedures which are to be taken in the event of plant flooding caused by natural phenomena at the site would provide the same level of protection in all modes. It should

be noted that the TRM 5.4.A requires that appropriate action be taken to ensure the plant is in the cold shutdown condition prior to the arrival on site of a hurricane with winds in excess of 87 knots.

3.2 Flood Duration

The duration of the maximum flood level event was not specified. Flooding from the PMP event is based on the maximum ponding levels for PMP events ranging from 5 minutes to 24 hours.

3.3 Flood Protection Features

The flood protection features that protect against the maximum flood level include both incorporated/exterior and temporary features. The incorporated/exterior features are exterior walls and floors of structures containing safety related SSCs, backflow prevention valves, penetration seals, and conduit seals. The temporary features include portable gas-powered pumps and submersible electric pumps. There is no distinction between Hudson River flooding mitigating features and PMP flooding mitigating features.

Based on the current licensing basis, the Intake Structure and Control Building contain safety related equipment at or below the 15' elevation that requires protection in the event of a CLB flood. The 1' dike around MCC 24A in the Turbine Building protects this MCC during flooding events. Due to the PMP event for the Transformer Yard, although not part of the CLB at IP2, the north wall of the Control Building (480V Switchgear and Air Conditioning Equipment Room) is inspected to a height of 18'-8.4". Note that the PAB walls and floor are not considered as flood protection features, since the RHR pumps, the only safety-related equipment on the 15' level of the PAB, are at least 2' feet above the CLB flood level, and flooding of this elevation due to ponding in the transformer yard during the PMP, though not part of the CLB, was not considered to be risk significant.

In some instances, conduits penetrating exterior walls of a building of interest were not sealed internally. These conduits generally connect to an electrical manhole outside of the structure. According to site drawings and other plant documents, the conduits are sealed at the manhole end. Thus, Manhole 21 (Intake Structure conduit) and Manhole 24 (Control Building conduit) are considered flood protection features since the conduit only needs to be sealed at one end.

The roof drains assure that loading resulting from the accumulation of rainwater from an intense precipitation would not exceed the design loading of those buildings that house safety related equipment.

3.4 Procedures

The flooding procedure for Unit 2 provides steps to mitigate flooding from possible sources both inside and outside the plant on the conventional side, nuclear side and inside containment. With respect to external flooding, the entry conditions for this procedure are: rising river water levels (greater than 4.5'); a high tide advisory; or a NOAA flood warning. This procedure has the actions to plug the floor drains on the 12' elevation in the Turbine Building, open the breaker on the feed to the Service Water

Strainer Pit heaters, and to install temporary pumps as necessary to assist the sump pump in maintaining the strainer pit dry. When the river level reaches 5'-8", the procedure has an action to close the Zurn Strainer Pit drain valve (MD-501) and to continuously monitor the strainer pit for leakage.

3.5 Adverse Weather

The procedural steps in the IP2 flooding procedure would presumably have to be carried out while there was intense precipitation and potentially high winds. The majority of the actions are performed where the operators are not directly exposed to the elements. The operators would have to transport the temporary pumps and hoses from the flood equipment storage area on the 33' elevation of the Unit 1 Turbine Building to the intake structure; however this would be done before the river flood elevation reaches grade level. Thus, it is concluded that the adverse weather conditions would not prevent the operators from taking the required actions.

4.0 INTERNAL WARNING SYSTEMS

4.1 Room Water Level Warning Systems

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

5.0 EFFECTIVENESS OF FLOOD PROTECTION SYSTEMS

5.1 Acceptance Criteria

Visual inspections of the external flood protection features were performed with the objective of comparing the observed condition of the feature to the acceptance criteria as defined in Section 6 of NEI 12-07 and Section 5.4[6](a) of EN-DC-170. The acceptance criteria for each feature was defined on the walkdown record forms prior to performing the walkdown to provide the walkdown team with the conditions of the feature that required documentation based on field observations. This approach provided the basis for assessing the feature's ability to perform its intended external flood protection function and identifying conditions warranting entry into the corrective action program.

The acceptance criteria for the exterior walls and floors are: no signs of leakage on interior surfaces, no apparent degradation or cracks greater than 0.04", no undocumented holes or openings, and penetrations are sealed. The acceptance criteria for temporary sump pumps are: no corrosion or degradation on pumps, free from obstructions preventing pumps from being moved to applicable area, and verifying pumps are staged in correct location. The acceptance criteria for penetration seals are to ensure seal between outer surface of conduit/pipe and concrete will not allow a flow path for water and no visible signs of water intrusion. The acceptance criteria for the door to the Transformer Yard from the Control Building are the latch and hinges allow proper door closure and the weather stripping is intact around the door. Note that the plugs for the floor drains at the 12' elevation of the Turbine Building were not included in

the scope of this walkdown effort since there is no safety related equipment affected by backflow of external flood water through these drains.

5.2 Discussion

5.2.1 Overall Effectiveness

Based on the walkdowns completed at IP2 and the results of the operability determinations associated with the observations entered in the corrective action program (CAP), IP2 is determined to have sufficient protection available at the site to ensure the safe operation of the plant in the event of an external flood.

Except where noted in Sections 7.1 and 7.2, walls and penetrations at or below the CLB flood level of 15 ' MSL were walked down to ensure no cracks or openings were present which would allow water to leak into the structure. The north wall of the 480V switchgear room (which is adjacent to the transformer yard) was inspected up to an elevation of 18.7' (external grade plus ponding).

Site topography, although not a credited flood protection feature, was verified against site drainage drawings and was determined to not direct flood waters towards protected features and was found to be consistent with the flood and PMP analyses.

The reasonable simulation of the procedural actions to protect the Service Water Strainer Pit (i.e., close the Zurn Strainer Pit drain valve and install temporary pumps to assist the strainer pit sump pump) were completed successfully. The procedure was executed as written. These actions were completed in less than 12 minutes. Though the procedure does not specify criteria for the time of completion, and no basis for the time of the event was found, the completion time was judged to be sufficient. The required temporary pumps and associated equipment were properly staged on the 33' elevation in the Unit 1 Turbine Building. The execution of the activity would not be impeded by the event they are intended to mitigate, as movement of the equipment from the Unit 1 Turbine Building to the Intake Structure was across a paved surface, and therefore it would not be impeded by soft soil conditions created by excessive water. In addition, it was determined that the actions could be completed with the minimum staffing. The Non License Operators receive initial training on the flooding procedures and are requalified every 3 years.

During the walkdowns, conditions that did not meet the acceptance criteria discussed in Section 5.1 above were entered into the Corrective Action Program.

5.2.2 Other SSCs and Procedures

Although not credited in the CLB, the Service Water Strainer Pit has a sump pump (Sump Pump 26) that will assist in removing inleakage.

Entergy Corporate procedures associated with Maintenance Rule walkdowns at IPEC Unit 2 provide the guidance and requirements for conducting a structural condition monitoring program to meet the requirements of 10 CFR 50.65, Maintenance Rule. At IPEC Unit 2 the Maintenance Rule walkdowns are

conducted a minimum of every five (5) years and are completed in accordance with the respective procedures. This program provides a systematic approach for evaluation of plant SSCs which will provide a reasonable assurance that the structures are capable of fulfilling their intended 10CFR 50.65 functions. The program consists of periodic reviews of the condition of the plant structures via periodic inspections, routine walkdowns, surveillance tests, and ongoing review of the effect of the condition of plant structures on significant plant equipment. The program consists of defining and performing periodic structural evaluation which will ensure the timely identification, assessment, and repair of degraded structural elements. Concrete structures and penetration seals are inspected for cracking, spalling, erosion, corrosion of reinforcing bars, settlement, deformation, leaching, discoloration, groundwater leakage, rust stains, exposed rebar, rust bleeding, and other surface irregularities. All flood barriers and seals, with the exception of the switchgear room door weather stripping, backflow valve, and internal conduit seals, were determined to be within the scope of the Maintenance Rule and are therefore examined in accordance with these procedures. Maintaining the structures and materials monitored under these procedures provides a reasonable assurance that those structures that fall under the program will be able to perform their intended function.

6.0 IMPLEMENTATION OF WALKDOWNS

6.1 NEI-12-07 Guidance

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

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

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

Prior to each walkdown, a pre-job brief was conducted. All walkdown results were documented in accordance with the recommendations of Section 7 of NEI 12-07 on the

Flooding Walkdown Record Form provided in Attachment 9.3 of EN-DC-170. The walkdown record form provided in Attachment 9.3 is consistent with the record form template provided in Appendix B of NEI 12-07.

6.2 Team Organization

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

6.3 Training Approach

Consistent with Section 5.3 of NEI 12-07 and Section 4.1 of EN-DC-170, personnel selected to perform walkdown inspection activities were experienced and knowledgeable of the site current licensing basis. Personnel were also trained to perform the visual inspections and met the knowledge requirements specified in EN-DC-170 and Appendix C of NEI 12-07. Team members associated with the flooding walkdowns also satisfactorily completed the NANTEL Generic Verification Walkdowns of Plant Flood Protection Features lesson and were knowledgeable of the 50.54(f) letter dated March 12, 2012.

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

7.0 WALKDOWN RESULTS

The walkdown scope included a total of 32 walkdown packages of features credited for flood protection, with some of the packages containing multiple features. Multiple features are identified as attributes. For example, a duct bank entering a room through a blockout is the feature, and the internal conduit seals for each conduit in the duct bank are the attributes. The second column of Table #1 identifies the number of walkdown packages, and the third column identifies the total number of attributes. There are no temporary passive flood protection features at IPEC Unit 2.

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

Flood Protection Type	Total Number of Features	Total Number of Attributes
Passive – Incorporated	29	189
Passive – Temporary	0	0
Active – Incorporated	2	2
Active – Temporary	1	1

7.1 Deficiencies

There were some observed conditions of features that did not meet the NEI 12-07 acceptance criteria. These conditions were entered into the Corrective Action Program; however, only two of these observations were determined to be deficiencies as defined in NEI 12-07. The operability determinations for these deficient conditions concluded that the features did not pose a threat to operability.

A feature found to be deficient was door IP2-CTL-001. It was observed that the bottom seal on the east section of the double door between the 480V switchgear room and the transformer yard was degraded. Light could be seen and air cold be felt coming through the seal area A work order was created to repair the deficient condition that did not meet the NEI 12-07 acceptance criteria. This was documented in Condition Report CR-IP2-2012-6146.

An existing observation in the CAP identified an incident of water intrusion into the 480V Switchgear room in the Control Building during a volumetric data test of the #22 moat. In leakage was observed near the north east corner of this room. During the test, the water level in the moat was at El. 16'. Since the elevation of the moat is higher than the maximum flood level, the moat is not impacted by the external flood and there will be no in leakage during an external flood. The water collected in the moat associated with a PMP event will be negligible and will not result in leakage.

There were several conduits whose internal seals are currently not part of a preventive maintenance program. These include the conduits that run from Manhole 24 to the 480V Switchgear room and those that run from Manhole 21 to the Zurn Strainer Pit.

7.2 Observations

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

7.3 Corrective Actions

Based on the operability determinations for the degraded seals on the bottom of the double door between the 480V switchgear room and transformer yard, there is no risk to the site. At the time this report was written no action had been taken to correct the deficient seals.

A corrective action was issued to address the condition of the observed leakage into the 480V switchgear room. The action to assess the condition and assign actions to correct the problem is scheduled for completion on 11/20/2012.

A PMCR will be created to perform periodic inspections of the internal seals of the conduits that run from the Manhole 24 into the 480V Switchgear Room and those conduits that run from Manhole 21 to the Zurn Strainer Pit.

7.4 Flood Protection Features Not Inspected

Table #2 identifies the features classified as restricted access. These features could not be inspected during the scheduled walkdowns due to industrial safety concerns and the plant configuration/operating mode. These features will be inspected at a later date when conditions permit. Work Requests have been initiated for performance of these inspections. There were no flood protection features classified as inaccessible.

Feature	Scheduled Date
Electrical Manhole #24 in Transformer Yard	12/13/2012
Cabinet WJ6 on the North Wall of the 480V Switchgear room of the Control Building	2R21*
Roof and associated drains on Primary Auxiliary Building	6/3/2013
Roof and associated drains on the Auxiliary Feedwater Building	6/3/2013
Roof and associated drains on the Turbine Building	6/3/2013
Roof and associated drains on the Control Building	6/3/2013
Six Service Water Pump Conduits that Penetrate the Floor of the 480V Switchgear Room underneath the Switchgear	2R21

*If inspection of Manhole #24 shows that the conduits are sealed, this item will satisfy the walkdown criteria. If the conduits are not sealed a work order will be created to open cabinet WJ6.

8.0 AVAILABLE PHYSICAL MARGIN

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

9.0 NEW FLOOD PROTECTION SYSTEMS

No new flood protection enhancements or mitigation measures have been installed at IPEC Unit 2, and no additional enhancements or measures are planned.

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

10.0 REFERENCES

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

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

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

10.4 Indian Point 2 UFSAR Revision 22.

10.5 Letter from Jeffrey F. Harold, Project Manager, Office of Nuclear Reactor Regulation to A. Alan Blind, Vice President, Consolidated Edison Power Company, "Review of Indian Point Nuclear Generating Unit No. 2 Individual Plant Examination of External Events (IPEEE) Submittal (TAC No. M83631)", August 13, 1999.

10.6 Hydrometeorological Report No. 52, Application of Probable Maximum Precipitation Estimates, United States, East of the 105th Meridian, August 1982.

10.7 Hydrometeorological Report No. 51, Probable Maximum Precipitation Estimates, United States, East of the 105th Meridian, June 1978.

10.8 Individual Plant Examination of External Events for Indian Point Unit No. 2 Nuclear Generating Station. December 1995.

11.0 ATTACHMENTS

None

ATTACHMENT TO NL-12-169

LIST OF REGULATORY COMMITMENTS

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 2
DOCKET NO. 50-247

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check One)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Entergy will perform walkdowns for equipment that could not be inspected as identified in Section 7.4 of the Flooding Walkdown Report.	✓		On a schedule specified in Section 7.4 of the Flooding Walkdown Report