Duke Energy®
Carolinas

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November 27, 2012

10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
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Subject: Duke Energy Carolinas, LLC (Duke Energy)

Catawba Nuclear Station (CNS), Units 1 and 2
Docket Nos. 50-413 and 50-414
Renewed License Nos. NPF-35 and NPF-52

Flooding Walkdown Information Requested by NRC Letter, *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident*; dated March 12, 2012

Reference:

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

2. NEI 12-07, *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features*, Revision 0-A, dated May 2012

3. NRC (D. Skeen) Letter to NEI (A. Heymer), dated May 31, 2012, "Endorsement of Nuclear Energy Institute (NEI) 12-07, 'Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features'"

On March 12, 2012, the NRC staff issued Reference 1. Enclosure 4 of Reference 1 contained specific Requested Actions, Requested Information, and Required Responses associated with Recommendation 2.3 for Flooding Walkdowns. In accordance with 10 CFR 50.54, "Conditions of licenses," paragraph (f), for Flooding Recommendations 2.3, Enclosure 4 of Reference 1 states that each licensee will submit its final response which should include a list of any areas that are unable to be inspected due to inaccessibility and a schedule for when the walkdowns will be completed.

On June 8, 2012, Duke Energy responded to Reference 1 Enclosure 4 and confirmed that the industry guideline, NEI 12-07 (Reference 2), would be used as the basis for the flooding walkdowns at CNS. Duke Energy further stated CNS would submit a report documenting the results of its flooding design basis walkdowns by November 27, 2012. The Enclosure contains

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the flooding walkdown report. This letter provides Duke Energy's 180-day response to Reference 1 requiring submission of CNS final flooding walkdown report for NTTF Flooding Recommendations 2.3 for CNS Units 1 and 2.

This letter contains no new regulatory commitments.

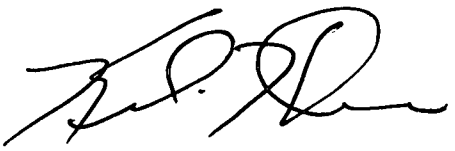
In accordance with Duke Energy's administrative procedures, the enclosed flooding report has been reviewed and approved by CNS Plant Operations and Review Committee.

Should you have any questions concerning this letter, or require additional information, please contact Adrienne F. Driver at (803) 701-3445.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on November 27, 2012.

Respectfully,



Kelvin Henderson

Enclosure

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I. Describe the design basis flood hazard levels for all flood-causing mechanisms, including groundwater ingress.

Flood Hazards for Catawba Nuclear Station are described in the site's UFSAR. Several flooding events were analyzed to determine the flood level at the site. The site yard elevation is 593.5 ft. msl (mean sea level) and the minimum external access elevation for the auxiliary, turbine, and service buildings is 594.0 ft. msl. (Flood Hazards: UFSAR 2.4.2.2)

Flood design considerations include:

1. Probable Maximum Flood (PMF) resulting from probable maximum precipitation (PMP) in the drainage area.

   a. Over the Catawba River Basin:

   Hypothetical flood characteristics are based on the historically greatest storm which occurred near the Catawba River basin on July 1916; adjustments are made to this storm to increase the magnitude and intensity including:

   - Rainfall depth-duration values are distributed in accordance with the recorded storm.
   - Storm position is transposed over the Catawba River basin to produce a maximum concentration of precipitation over a select area.
   - Precipitation amounts are increased 40%.

   The storm center location is positioned over each reservoir drainage area and routed through the Catawba River system into the Wylie Reservoir. Centering the storm over the Wylie drainage area produces the maximum flow. Water level flooding based on inflow-outflow characteristics resulting in a maximum reservoir elevation of 580.0 ft., which is below Powerhouse Yard elevation 593.5 ft.

   b. Over the tributary area of the Standby Nuclear Service Water Pond (SNSWP):

   PMP centered over SNSWP was developed using procedure outlines in the Bureau of Reclamation publication, Design of Small Dams. Positioned over the 410 acre pond drainage area and the resultant PMF was routed through the pond resulting in maximum pond elevation of 583.5 ft. Considering a maximum wave height based on 40 mph wind, the maximum flood elevation with wave runup is 584.5 ft. The crest of the SNSWP Dam is maintained at elevation 595.0 ft. with dam protected from wave action by riprap.

2. Standard Project Flood (SPF) passing through Lake Wylie combined with the failure of one of the upstream dams due to an Operating Basis Earthquake (OBE). SPF is equal to one-half of PMF.

The water level in the Wylie reservoir was evaluated for positioning the SPF over various drainage areas on the Catawba River basin, coincident with failure of an upstream dam due to an OBE. The worst case is SPF positioned over the Wateree drainage area, coupled with a seismic failure of Cowans Ford Dam (Lake Norman

control elevation set at 761.0 ft.). Resultant maximum Wylie reservoir elevation is 592.4 ft., which is below the Powerhouse Yard grade elevation of 593.5 ft.

3. Surge and seiche effects caused by Probable Maximum Hurricane.

Two hurricane tracks considered based on Weather Bureau report HUR 7-97. Maximum wind speeds for the two hurricanes were 101.5 and 116.0 mph with resultant maximum water surface elevation due to wind tide, wave runup, and barometric pressure, of 8.4 ft. Wave height combined with full pond elevation of Wylie reservoir of 569.4 ft. results in a maximum elevation of 577.8 ft., which is below Powerhouse Yard grade elevation of 593.5 ft.

4. Coincident wave runup due to a 40 mph wind.

Runup due to wind effects (40 mph) were evaluated at three locations:

1. Plant yard at the intake canal (North end plant yard)
2. Discharge structure (South end plant yard)
3. SNSWP Dam

Using maximum Wylie reservoir elevation from previous evaluations of 592.4 ft., resultant maximum elevations including wave runup is 1) 593.9 ft., 2) 593.6 ft., 3) 594.6 ft. The north end of the plant yard and the SNSWP Dam are protected from wave runup by riprap.

5. Local PMP occurring over the immediate project site.

a. HMR 33

A PMP based on US Weather Bureau Hydrometerological Report (HMR) 33 in accordance with NUREG-0800 (Standard Review Plan), section 2.4.2. A local PMP was routed through the Cooling Tower Yard, Switchyard, Construction Yard, and the Powerhouse Yard using the modified Puls method. The PMP is routed through Cooling Tower Yard assuming no outflow occurring from the area drainage system. The Cooling Tower Yard is at a higher elevation than the Powerhouse Yard and has an earthen berm on the North and West perimeter to prevent water flowing onto the power block area. Flood barriers are installed in below grade cable trenches that communicate between the Cooling Tower Yard and the Powerhouse Yard. Sheet outflow occurs at the south side when ponding reaches the outflow weir elevation. The PMP is also routed through the Switchyard assuming no outflow occurring from the area drainage system. The Switchyard is at a higher elevation than the Powerhouse Yard and has a concrete and asphalt curb on the North, South, and East perimeter preventing water from flowing onto the power block area. Flood barriers are installed in below grade cable trenches that communicate between the Switchyard and Powerhouse Yard. Sheet outflow occurs on the west side of the Switchyard when ponding reaches the overflow weir elevation. The PMP is routed through the Construction and Powerhouse Yard. Runoff from the Construction Yard travels to the Powerhouse Yard contributing to the inflow. Flooding water in the power block area is assumed to rise and fall as a "level pool."

During the local intense PMP water will pond in the power block area. Water on building roofs will drain to collection points which discharge directly into the yard drainage system. Water which ponds in the power block area will discharge into catch basins and over the sheet outflows at the northeast and south ends of the yard. Within the power block area two types of catch basins are used. Type I inlets have no slotted cover, but are protected by grating on all four sides and top to eliminate blockage by debris. Eighty Type I inlets are credited and required to satisfy flooding runoff requirements. Type II inlets have a slotted cover. All catch basin inlets are connected to the yard drainage system network piping. The yard drainage system forms a network and is designed for all pipes flowing full capacity. Each network is capable of discharging the PMP inflow. Water levels are predicted by routing the inflow hydrograph through the power block area using the modified Puls routing. Routing data consists of storage versus elevation relationship and outflow rating curves for catch basin inlets and sheet (weir) outflow areas. The resultant maximum ponding water level in the Powerhouse Yard due to the local intense PMP using HMR 33 is 593.94 ft, which is below the elevation for structures housing structures, systems, and components important to safety of 594.0 ft.

b. HMR 51 and 52

At the request of the NRC (Safety Evaluation Report NUREG-0954 Supplement 2, June 1984), Duke evaluated site drainage due to a local intense PMP using PMP values and rainfall distribution for the US Weather Bureau Hydrometerological Reports (HMR) 51 and 52. A PMP based on HMR 51 and 52 was routed through the Construction and Powerhouse Yard. Crediting 80 Type I catch basins, associated piping network, and sheet outflow areas the resultant ponding water level is 594.59 ft., which is above the entrance elevation to safety related structures. The higher yard ponding elevation was evaluated. Ponding of water remains above 594.0 ft. elevation for approximately 35 minutes. Water was routed through doors into the Auxiliary Building, Auxiliary Service Building, Exterior Doghouses, former UHI Buildings, and Turbine Buildings. Water entering the Turbine Buildings, would eventually be routed down to the Turbine and Service building basement (568.0 ft. elevation) which is separated from any structures, systems, and components important to safety by a 12 ft. high concrete flood wall. In other buildings, the water would spread across the floor areas and be intercepted by the floor drain system (WL system). The floor drain system routes the volume of water to four floor drain sumps and a floor drain tank, all located at elevation 543.0 ft. in the Auxiliary Building. The evaluation concludes that no safety related equipment is affected by this water inflow.

Recently, the Yard Flooding Analysis calculation (CNC-1114.00-00-0040) has been revised to reflect the current site topography and catch basin network. Table 1 (below) includes the ponding levels in the powerhouse yard based on the results of the Yard Flooding Analysis. The new analysis results in ponding levels that are divided and vary between Unit 1 and Unit 2.

Table 1

	HMR 33	HMR 51/52
Previous maximum ponding level (Unit 1 & 2)	593.93'	594.75'

New ponding level, Unit 1	594.0'	594.9'
New ponding level, Unit 2	594.8'	595.9'

The flood levels used for evaluating the site's flood protection features and procedures were 594.9 ft. for Unit 1 and 595.9 ft. for Unit 2.

The current revision to the Yard Flooding Analysis is based on an aerial topographic survey performed in March 2010. This survey allowed a more accurate model of the storage volumes and location and elevation of outflow weirs. The analysis showed that water will overtop the switchyard curb. The calculation concluded that it was appropriate to include the Switchyard drainage area in the Powerhouse drainage area. The west Switchyard outflow area is neglected in the current analysis.

Current design basis recognizes that external flood water will flow through gaps under exterior doors. This flow is evaluated in calculation CNC-1206.03-00-0142 (Flooding of Safety Related Structures Due to Excessive Rainfall).

II. 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.

The following are protection features that are credited in the licensing basis to protect safety-related systems, structures, and components against external sources of flooding.

Yard Drainage Type I Catch Basins

Surface water drainage is accomplished through the yard drainage catch basin inlets and piping networks. Type I catch basins do not have a slotted cover, but are protected by steel grating on four sides and top to prevent blockage. The total effective opening in the grating on any one side is at least equal to the effective opening of the pipe inlet. Eighty nine Type I catch basins are provided in the power block area and only eighty are required to be operable.

Sheet Outflows

The Powerhouse yard has two sheet outflow areas, one on the south side of the Powerhouse yard and one on the North east side of the powerhouse yard near the Low Pressure Service Water intake area.

A sheet outflow area is provided on the west side of the Switchyard.

Protective Berm and Curbs

The Cooling Tower Yard is at a higher elevation than the Powerhouse Yard. An earth berm on the North and West perimeter with minimum top elevation 620'+6" is provided to route water away from the power block area.

The Switchyard is at a higher elevation than the Powerhouse Yard. A concrete and asphalt curb on the North, South, and East perimeter with minimum top elevation 632'+8" prevent water from flowing onto the power block area.

Flood Barriers in Cable Trenches

Flood Barriers are installed in below grade trenches at berm and curb locations. These trenches communicate between the Cooling Tower Yard and Switchyard, and the Powerhouse Yard.

Designated Doors

For the time period during the local intense PMP when the yard level is above elevation 594.0 ft. designated doors are credited to remain closed to limit water inflow. The designated doors are:

- Auxiliary Service Building: AX664D, AX605D, AX617, AX671, AR 5, AR 6, AX666A
- Auxiliary Building (Electrical Pen Rooms): AX658A, AX656B
- Exterior Doghouses: AX661, AX660
- UHI Buildings: AX301A, AX300A
- Fuel Receiving Building: AX600, AX600B, AX627, AX629, AX629B
- Diesel Generator Buildings*: AX302B, AX304B, AX306B, AX308B

*Entrances for these doors have flood barriers with a top elevation of 597+0 (AX302B and AX304B) and 597+1 ½ (AX306B and AX308B) that are credited to minimize inflow.

All doors entering safety related buildings are pressure doors (designed for 3 psi). All normally used exterior doors are equipped with automatic closures, except for equipment access doors, AR6 and AR5. These doors are controlled from inside the Auxiliary Service Building, and cannot be opened from the outside. Station Security, by procedure, ensures that the Auxiliary Building and Auxiliary Service Building exterior doors are closed in the event of severe weather.

Designated Below Grade Conduit Seals

Electrical conduits in Conduit Manholes (CMH) 2, 3, 18A, 18B, and 21 are sealed to prevent water intrusion into safety related buildings. Electrical conduits which communicate between safety related structures and miscellaneous yard areas are sealed or enclosed to prevent water intrusion.

Trench Cover Seals

Trench covers in the Refueling Water Storage Tank Pipe trenches and the Monitor Tank Building Pipe trench which communicate with the Auxiliary Building area are sealed to prevent water intrusion.

Access Hatch Seals in Diesel Generator Building Roofs

Roof hatches at grade (elevation 594.0 ft.) and penetration sleeves in the Diesel Generator building roofs are sealed to prevent water intrusion.

Turbine/Service Building Flood Wall

A 12 ft. high concrete wall (top elevation 577'+6") along column line 34 in the Turbine/Service Building retains water entering the Turbine/Service Building preventing water from entering safety related areas. Water ponds at a maximum elevation of 568'+6" in the Turbine Building basement (elevation 568'+0").

Groundwater Drainage System

A permanent Category I groundwater drainage system is installed to permanently maintain a normal groundwater level at or near the base of the foundation mat and basement walls, eliminating the uplift and hydrostatic forces on the Auxiliary and Reactor Buildings. The groundwater drainage system consists of foundation underdrains and continuous exterior wall drains. The testing and inspection on the ground drainage system are performed in accordance with SLC 16.7-8.

Auxiliary Building Roof

Roofs of safety related structures are designed with no obstructions so that water flows directly off roofs and there is no accumulation.

Note: The Auxiliary Building Roof at elevation 594' is at ground elevation. Local intense PMP flood levels will accumulate on roof. All roof penetrations should be sealed to prevent water intrusion.

Site Topography

The site topographic survey is an input into the Site PMP analysis to determine site flood levels. Any major changes to the topography are controlled by the modification process. The last site topography survey was in March 2010 and there have been no major activities implemented since the survey was performed.

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

There are no warning systems credited as a flood protection function in the plant's external flooding licensing basis.

IV. Discuss the effectiveness of flood protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers are evaluated using the acceptance criteria developed as part of Requested Information Item 1.h.

Acceptance Criteria for the flood protection features was defined by the requirements in the current licensing basis using guidance from NEI 12-07. Flood protection features were visually inspected to identify any material degradation as well as verifying the configuration with design documents.

Flood protection features are considered acceptable if no conditions adverse to quality were identified during walkdowns and verification activities as determined by the corrective action program (CAP). Conditions adverse to quality are those conditions that prevent the flood

protection feature from performing its credited function during a design basis external flooding event. This adverse condition would be a deficiency.

No deficiencies were identified. All features were found to be available and functional.

Yard Drainage Type I Catch Basins

Type I catch basins were inspected for correct configuration and integrity and no blockage. A total of 95 Type I catch basins were inspected and 92.25 Type I catch basins were considered available. It was determined that six Type I catch basins were only partially effective due to the proximity to adjacent permanent structures. To account for the partially effective catch basins, 2.75 equivalent Type I catch basins were deducted from the available amount. Per UFSAR Section 2.4.2.3.3.1, eighty Type I catch basins are required to be operable at any given time. No deficiencies were identified with the yard drainage Type I catch basins.

Sheet Outflows

Sheet outflow areas were verified to have no permanent obstructions. Some obstructions were identified in the switchyard outflow area and were removed. Sheet outflow areas, including the south and northeast area of the powerhouse yard and switchyard, were acceptable. No deficiencies were identified with the outflow areas.

Cooling Tower Yard Protective Berm

The Cooling Tower Yard Protective berm integrity was verified with no degradation present. No deficiencies were identified with the cooling tower yard berm.

Switchyard Protective Concrete and Asphalt Curbs

The Switchyard curb integrity was verified with no degradation present. No deficiencies were identified with the switchyard curbs.

Flood Barriers in Cable Trenches between Cooling Tower and Switchyard

The flood barriers were not inspected since this is done as part of the preventative maintenance (PM) program. PMs were verified to perform an inspection equivalent to what is being requested per this 10CFR50.54(f) letter. All flood barriers have been inspected within the past 12 months.

Designated Doors in Auxiliary Building, Auxiliary Service Building, Exterior Doghouses, UHI Buildings, Fuel Receiving Buildings, Diesel Generator Buildings

The bottom, left and right gaps of designated doors were measured to compare to previously analyzed/collected data for water from an external flood entering the doors. Side, bottom and, if

applicable, middle gaps were measured. Through the CAP, gaps for doors that were found to be greater than previously analyzed will be incorporated into the appropriate calculation. All designated doors were inspected and acceptance criteria were met.

Due to the recently revised ponding levels described in the design basis section of this report, a potential deficiency with the Unit 2 Auxiliary Building 594' Electrical Penetration Room door was identified. The water entering through the gap of the Unit 2 Electrical Penetration Room door routes to the Unit 2 Auxiliary Feedwater (CA) Pump Room and the resulting water level in the CA Pump Turbine pit may be higher than the pump shaft.

Designated Below Grade Conduit Seals

The conduit seals were not inspected since this is done as part of the preventative maintenance program. PMs were verified to perform an inspection equivalent to what is being requested per this 10CFR50.54(f) letter. All conduit seals have been inspected within the past 18 months.

Trench Cover seals in the Refueling Water Storage Tank and Monitor Tank Building Pipe Trenches

Trench cover seals should have seals in place to prevent water from entering safety related areas. Several minor areas of the trench cover seals were identified to be resealed. Work orders were written to have the trench cover seals resealed. No deficiencies were identified with the trench cover seals.

Access Hatch Seals in Diesel Generator Building Roofs

Roof penetrations and hatch covers should have seals in place to prevent water from entering safety related areas. Diesel Generator access hatch and penetration seals were found to be acceptable and in good condition. No deficiencies were identified with the hatch and penetration seals.

Turbine/Service Building Flood Wall

The Turbine/Service Building Flood Wall has all openings sealed to prevent water from entering safety related systems. The Flood Wall was found to be acceptable. No deficiencies were identified with the flood wall.

Diesel Generator Building Vents

Diesel Generator vents openings were measured to verify the height of the opening and available margin for flood levels. Unit 1 Diesel Generator vents were found to be acceptable and the lowest vent opening was at elevation 596+7", yielding a margin of 1' – 9 ½". The Unit 1 Diesel Generator Crankcase Vacuum (ZD) vents were not accessible at the time of the walkdown since they are enclosed in a tornado missile barrier but drawings indicate an opening at elevation 595+0", yielding a margin of 1". A modification was implemented after the walkdown took place increasing the height of these vents (EC 108015). The Unit 2 Diesel Generator vents were found to be acceptable and the lowest vent opening was at elevation

596+4 ¾", yielding a margin of 5 ¾". No deficiencies were identified with the Diesel Generator Roof vents.

Control Room Intake

The control room intakes were measured to verify the height of the opening and available margin for flood levels. Control Room Intakes of Unit 1 and 2 were found to be acceptable. The openings were 4 feet above the roof membrane, yielding at least a 2' margin. No deficiencies were identified with the Control Room intakes.

Groundwater Drainage System

The Groundwater Drainage (WZ) system is underground and not accessible. Visual inspection around the Auxiliary Building checked for any conditions that should be corrected to maintain integrity of the Groundwater Drainage system. The interface between the ground and the Auxiliary Building was inspected and a few expansion joint areas were identified between buildings to be resealed to provide an extra barrier for the groundwater drainage system. The Groundwater Drainage (WZ) "B" sump room door (T400C2) has not been evaluated for water entering the "B" WZ Sump. The threshold of this door is at elevation 595.0', the calculated maximum flood level would be 11" above the door threshold. The gap between the bottom of the door and the concrete threshold was measured and will be evaluated for inflow into the WZ "B" sump room. This issue has been entered into the CAP. No deficiencies were identified with the groundwater drainage system.

Auxiliary Building Exterior Wall ground elevation to elevation 598'+0"

The Auxiliary Building Exterior wall was inspected to identify any pathways that would allow water from an exterior flood to enter safety related areas. The Auxiliary Building Exterior wall was found to be acceptable, no degradation or pathways were identified. No deficiencies were identified with the exterior wall.

Auxiliary Building Roof Elevation 594+0

The Auxiliary Building Roof at elevation 594+0 should have no pathways for water from an external flood to enter safety related areas. All roof penetration seals were found to be in good condition. The roof is in good condition and no pathways were identified. No deficiencies were identified with the Auxiliary Building roof at elevation 594+0.

Auxiliary Building Roof Elevation 611+0

Building roofs should be clear of obstructions allowing water to flow directly off the roofs preventing accumulation of water. All roof penetration seals were found to be in good condition. The roof drains are clear. The roof has a 2 foot high plate along the west edge with an average 1" gap between the plate and the roof edge. The plate will be evaluated, through the CAP, to determine the maximum water height due to a PMP event on the Auxiliary building elevation 611 roof and the possible effects. The rainfall distribution and duration are such that the maximum accumulation of water on the roof is expected to be no more than 1 foot. This produces a live load of 62.4 lb per square foot. The roof structure is more than adequate to

carry this load. No deficiencies were identified with the Auxiliary Building roof at elevation 611+0.

Auxiliary Service Building Roof Elevation 625+0

Building roofs should be clear of obstructions allowing water to flow directly off the roofs preventing accumulation of water. This roof has a parapet wall approximately 14" high all around. There are scuppers at various locations along the east wall to allow ponding water to be discharged to the plant yard. This roof will be evaluated for effects of a PMP event and has been entered into the CAP. No deficiencies were identified with the Auxiliary Building roof at elevation 625+0.

Diesel Generator External Door Flood Barrier

The Diesel Generator External Door Flood Barriers were found to be in excellent condition. As an enhancement, predefined work orders will be created to ensure the flood barriers are restored if removed. No deficiencies were identified with the Diesel Generator external flood door barriers.

Procedure RP-07 and AP-30

Procedures AP/0/A/5500/030 (Plant Flooding) and RP/0/A/5000/007 (Natural Disaster and Earthquake) each include include an enclosure for flooding from external sources. Part of these procedure enclosures is to confirm credited exterior doors are closed by Security and doors AR5 and AR6 are closed by Maintenance SPOC. If AR5 and/or AR6 is open during a flooding event, the doors are required to be closed or blocked to a specified height. No procedural guidance is given for manually closing the doors, but a manual closure device is available. No procedural guidance is given for blocking the doors if they cannot be closed. These tasks are simple and can be completed by skill of the craft. Recommendations for adding manual closure guidance and a method for blocking the doors have been included in the CAP.

AP/0/A/5500/030 and RP/0/A/5000/007 currently require a flood barrier to be 7.5" at the opening of AR5 and AR6; this height should be corrected to 1' for AR6 and 2' for AR5. Corrective actions have been initiated to change the ponding level in AP-30 and RP-07 from 594.74' to 594.9' (Unit 1) and 595.9' (Unit 2). These corrections have been entered into CAP.

Training for the procedures is not required because the steps consist of simple tasks and procedure revisions are validated by Operations and Maintenance if training is determined to be needed in the future.

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

Walkdowns of flood features were performed in conformance with the guidance of NEI 12-07 (Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features). Section

A and B of the Walkdown Record Forms were completed before performing the Visual Inspection of the walkdowns.

The walkdown team consisted of two civil engineers for inspection of flood protection features. These engineers have experience in performing visual inspections of plant structures, systems, and components and are knowledgeable of the site's current flood licensing basis. Duke personnel were qualified to perform/assist in the flooding walkdowns by completion of NANTel and site specific training as identified in NEI Report 12-07. These qualifications are documented in training reports by the individual's name, employee ID, and the courses taken. These courses and attendees will be tracked by Duke Legacy course numbers in LMS (Course #TTC1051-N).

The walkdowns did not require the CO-ENG-110 (Perform a System/Equipment Walkdown) engineering qualification. This qualification is for system equipment walkdowns to support system health reports. The walkdown to produce the flooding report is not to identify issues with the plant system or the equipment's condition related to operability, but will identify any issues with the potential to be submerged by external flooding. Training requirements for developing, performing, and evaluating the flood feature walkdowns were assessed by training through the site's CAP program (PIP C-12-2195).

Operations and Engineering searched the procedure database for procedures which are used to address an external flood. Emergency Planning was also consulted. AP/0/A/5500/030 (Plant Flooding) and RP/0/A/5000/007 (Natural Disaster and Earthquake) were identified.
A team was also used for the reasonable simulation of two procedures (AP/0/A/5500/030 and RP/0/A/5000/007). The team consisted of two engineers, a former Senior Reactor Operator, and two maintenance SPOC personnel. Both engineers are knowledgeable of the site's current flood licensing basis. Other personnel are experienced in performing activities required per procedures.

VI. 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.

A potential deficiency with the Unit 2 Auxiliary Building 594' Electrical Penetration Room door was identified. Due to the recently revised ponding levels described in the design basis section of this report, the water flow rate thru the gap under the door will increase. The water entering through the gap under this door routes to the Unit 2 CA Pump Room. A review of the calculation for flooding of safety related structures due to external flooding identified that this may result in the water level in the CA Pump Room rising and then overflowing into the Turbine Driven CA Pump pit. Preliminary results show that the water level in the Turbine Driven CA Pump pit may rise to a level that would be above the bottom of the turbine driven pump shaft.

As a conservative measure, an interim action has been incorporated to reduce the water input to the CA Pump Room from the Waste Solidification Building sump in the event of an external flooding event. The Waste Solidification Building Sump Pump discharge valve is normally

closed. Operation of this sump pump is directed per the annunciator response procedure for a high level in this sump. This procedure has been revised to include a step to contact Operations to ensure an external flooding event is not occurring or expected prior to placing the Waste Solidification Building sump pump in service. An additional interim action has been incorporated into AP/0/A/5500/030 (Plant Flooding) to provide a barrier to reduce the water flow under the Unit 2 Auxiliary Building 594' Electrical Penetration Room door. These actions will prevent the water level in the Turbine Driven CA Pump pit from reaching a level which would threaten the Turbine Driven CA Pump.

An ECR (engineering change request) has been created to install a flood gate (barrier) to block the Unit 2 Electrical Penetration Room door during an external flooding event.

During the procedure walkthrough for AP/0/A/5500/030 and RP/0/A/5000/007 it was observed that for the two Auxiliary Service Building doors (AR5 and AR6) required to be closed or have the opening blocked, there is no guidance on how to manually close the doors. Also, no equipment or supplies are staged to block the door opening if the door cannot be closed. An action was entered in to the CAP to add steps to the procedure for closing the doors manually. Another action was entered in CAP to have an appropriate temporary barrier available to block the door openings, if the doors cannot be closed.

Flood features that were not inspected were electrical conduit seals, cable trench flood barriers, and Diesel Generator Maintenance Access Hatch seals. Electrical conduit seals are part of the preventative maintenance program. The seals are inspected on an 18 month frequency, which consists of a visual check of the seal. The personnel who perform this inspection are qualified to inspect and install these seals. If any problems are noted during the inspection, engineering is contacted for appropriate action to take. Seals are located in concrete manways which are covered by hatches and protected from the outside environment. Flood barriers in cable trenches that communicate between the cooling towers, switchyard and powerhouse yard are part of the preventative maintenance program. The flood barriers are visually inspected once a year by qualified Maintenance personnel. Engineering is contacted if any damage or degradation of the barrier is found to determine further action. Diesel Generator maintenance access hatch seals are uncovered only when work requires the removal of the hatches. Preventative maintenance is in place to reseal the hatches when work is complete. The seals are installed by qualified maintenance personnel.

VII. 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.

Based on Available Physical Margin gathered during the walkdown process, no cliff-edge effects were identified.

VIII. 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.

The modification (EC 108015) to increase the height of the Unit 1 ZD vents at the Diesel Generator Building roof (elevation 594') was completed after the flood feature walkdown. The modified height of the ZD vents opens at elevation 598+0 (1A) and 598+0.5" (1B). The openings are at least 3'-1" above the flood level of 594+11.

Flood barriers for the Unit 1 and Unit 2 594' Electrical Penetration Room doors have been identified and placed in CAP. Other exterior designated doors with low margin are also identified in CAP and being evaluated.

IX. References

A. Updated Final Analysis Report (UFSAR), Revision 16, Effective Date: April 17, 2012
   1. Section 2.4 Hydrologic Engineering
   2. Section 3.4 Water Level (Flood) Design
B. CNS-1465.00-00-0011, Plant Design Basis Specification for the Flooding From External Sources, Revision 5, October 10, 2012
C. CNC-1114.00-00-0040, Yard Drainage Results of PMP
D. CNC-1206.03-00-0142, Flooding of Safety Related Structures Due to Excessive Rainfall
E. NEI 12-07, Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features, Revision 0-A
F. PIP C-12-2195
G. AP/0/A/5500/030, Plant Flooding, Revision 12
H. RP/0/A/5500/007, Natural Disaster and Earthquake, Revision 35
I. Walkdown Record Forms, Performed: September 18 -26, 2012