UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 5, 2007

Duke Power Company LLC
d/b/a Duke Energy Carolinas, LLC
ATTN: Mr. J. R. Morris
Site Vice President
Catawba Site
4800 Concord Road
York, SC 29745-9635

SUBJECT: CATAWBA NUCLEAR STATION – SPECIAL INSPECTON REPORT 05000413/2006010 AND 05000414/2006010

Dear Mr. Morris:

On December 6, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed a Special Inspection at your Catawba Nuclear Station Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed at the exit meeting on December 6, 2006, with you and other members of your staff.

The determination that the Special Inspection would be conducted was made by the NRC on November 22, 2006. This determination was based on the risk and deterministic criteria specified in Management Directive 8.3, "NRC Incident Investigation Program." The Special Inspection Team (SIT) was dispatched to the site on November 27, 2006 and conducted in accordance with Inspection Procedure 93812, "Special Inspection." The purpose of this inspection was to inspect and assess your corrective actions for degraded seals on safety related and risk-important below grade electrical penetrations. The inspection focus areas are detailed in the Special Inspection Team Charter (Attachment 5).

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The report documents two NRC-identified findings of very low safety significance (Green). One of these findings was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because it is entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the NCV in this report, you should provide a written response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC, 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC, 20555-0001; and the NRC Senior Resident Inspector at the Catawba Nuclear Station.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at *www.nrc.gov/reading-rm/adams.html* (the Public Electronic Reading Room).

Sincerely,

/RA By Harold Christensen For/

Charles A. Casto, Director
Division of Reactor Projects

Docket Nos.: 50-413, 50-414
License Nos.: NPF-35, NPF-52

Enclosure: Special Inspection Report 05000413/2006010 and 05000414/2006010
w/Attachments:
1. Key Points of Contact
2. List of Items Opened, Closed and Discussed
3. List of Documents Reviewed
4. List of Acronyms
5. Special Inspection Team Charter
6. Simplified Catawba Site Layout Drawing
7. Potential impact of flooding on the transformers or terminal cabinets within the turbine building basement floodwall enclosures
8. Potential impact of flooding in the Standby Shutdown Facility (SSF) on equipment within the structure
9. Turbine Building Floodwall Enclosure drawings
10. Standby Shutdown Facility floor plan drawings

cc w/encl: (See page 3)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-413, 50-414
License Nos.:	NPF-35, NPF-52
Report Nos.:	05000413/2006010 and 05000414/2006010
Licensee:	Duke Energy Corporation
Facility:	Catawba Nuclear Station, Units 1 and 2
Location:	4800 Concord Road York, SC 29745
Dates:	November 27 – December 6, 2006
Team Leader:	Ryan Taylor, Reactor Inspector Engineering Branch 1 Division of Reactor Safety
Inspectors:	A. Sabisch, Senior Resident Inspector, Catawba S. Sanchez, Resident Inspector, St. Lucie
Approved by:	Charles A. Casto, Director Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000413/2006010, 05000414/2006010; 11/27/06-12/1/06; Catawba Nuclear Station, Units 1 and 2; Special Inspection.

This inspection was conducted by a team consisting of inspectors from the NRC's Region II office and resident inspectors from the Catawba and St. Lucie Nuclear Stations. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000. A Special Inspection Team was established in accordance with NRC Management Directive 8.3, "NRC Incident Investigation Program" and implemented using Inspection Procedure 93812, "Special Inspection Team."

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green: A Non-Cited Violation (NCV) of Technical Specification (TS) 5.4.1.b was identified for failing to establish procedures required by Regulatory Guide 1.33, Appendix A, Section 6, Procedures for Combating Emergencies and Other Significant Events. Specifically, no procedure existed to combat or mitigate the consequences from an external flooding event.

The finding is greater than minor because the failure to establish appropriate procedures to cope with an external flood affects the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609, Appendix A, Attachment 1, "Significance Determination Process," Phase 1 Worksheet, the finding is determined to have very low safety significance because it only affected the mitigating systems cornerstone and did not result in the total loss of any safety function that contributes to external event initiated core damage accident sequences. (4OA5.4)

Green: An NRC-identified finding was identified for the licensee's failure to conduct adequate extent of condition reviews following multiple water intrusion events at the site by limiting the focus of the reviews to only safety-related structures, systems, and components (SSC's) and excluding those identified as being risk significant.

The finding is greater than minor as it was associated with the Protection Against External Factors and Equipment Performance attributes of the Mitigating Systems cornerstone in that by narrowly focusing extent of condition reviews to only encompass safety-related SSC's and excluding risk-significant SSC's, systems required to respond to and mitigate initiating events could be adversely affected. It was determined to be of very low safety significance because, while limiting extent of condition reviews to safety-related SSC's has the potential to adversely affect the ability of the station to respond to initiating events, failing to include risk significant equipment in the reviews conducted for the water intrusion events in 2006 after the 1A DG conduit seals were repaired did not result in an overall increase in plant risk in excess of the green/white threshold. The vulnerabilities of other risk-significant SSC's to flooding have been addressed by the station. (4OA5.7)

B. Licensee Identified Findings

None.

An NRC Special Inspection Team was dispatched to the site on November 27, 2006 to review the water intrusion events that have occurred at Catawba in 2006. The team found that the licensee's response to the water-intrusion events was limited in the scope of the extent of condition reviews that had been performed following each event. As a result, the licensee missed several opportunities to identify and address deficiencies prior to subsequent water intrusion events. The team identified one issue that has been dispositioned as a non-cited violation, one issue that has been dispositioned as a finding and one unresolved item that is still under review by Region II personnel.

REPORT DETAILS

Summary of Plant Events

On May 22, 2006, water overflowing from the Unit 2 cooling towers as a result of clogged screens entered the 1A diesel generator (DG) room through unsealed electrical conduits resulting in the 1A DG being declared inoperable. Following repairs of the conduit seals, inspection of DG support equipment and functional testing, the 1A DG was returned to operable status on May 24, 2006. The licensee reviewed additional below-grade electrical conduits in the diesel generator and auxiliary buildings through an extent of condition review conducted prior to restarting both units. Due to this flooding event and an unrelated dual unit loss of offsite power (LOOP), the NRC dispatched an Augmented Inspection Team (AIT) to the site on May 23, 2006. The inspection results are documented in Inspection Report 05000413, 414/2006009.

In mid-2006, due to extensive construction projects on-site, Engineering recalculated maximum standing water level in the power house yard that would result from the Predicted Maximum Precipitation event defined in the licensing basis for Catawba. Following this reanalysis, the station assessed the impact that the higher water level would have on safety-related structures, systems and components (SSC's) through a corrective action program document. Other non safety-related risk-significant SSC's were not included in this review.

On August 30, 2006, following a period of severe rain activity on the site, flooding occurred at several locations in the Unit 1 and Unit 2 turbine buildings, including within floodwalls that had been recently constructed to protect station 6.9kV transformers and associated terminal cabinets from damage due to a flood from piping internal to the turbine building. Prompt operator action of opening drain lines installed in the floodwalls prevented the loss of any equipment within the enclosures. The flooding had been caused by plugged drain lines in transformer yard cable pits and unsealed electrical conduit penetrations that entered the turbine building from these pits and other external locations.

During the week of October 30, 2006, an NRC flooding inspection was conducted by a regional inspector and the Catawba resident inspector. During this inspection, it was identified that the below-grade penetrations that entered the Standby Shutdown Facility (SSF) were not sealed properly and water had the potential to enter the structure through these degraded seals and beneath the doors resulting in a potential loss of the SSF.

Inspection Scope

Based on the probabilistic risk and deterministic criteria specified in Management Directive 8.3, "NRC Incident Investigation Program," Inspection Procedure 71153, "Event Follow-up," and the significance of the operational events which occurred, a Special Inspection was initiated in accordance with Inspection Procedure 93812, "Special Inspection Team." The inspection focus areas included the following charter items:

- Develop a sequence of events related to the conditions.
- Conduct an extent of condition review of the SSF flooding vulnerability. As appropriate, provide any new information that is identified that would affect the risk analysis, to the Region II, Senior Reactor Analyst.

- Identify corrective actions taken by the licensee in response to the SSF flooding vulnerability and evaluate their timeliness and effectiveness.

- Evaluate Catawba's preparedness to cope with a Predicted Maximum Precipitation (PMP) event. Specifically, determine if plant procedures provide adequate guidance to cope with the event and operator training is adequate to support the level of detail provided by the plant procedures for the event.

- Determine and assess the licensee's previous corrective actions and lessons learned associated with the flooding from unsealed below-grade electrical and/or mechanical penetrations.

- Determine if other site structures were adversely affected and have become susceptible to flooding as a result of the change in PMP level.

- Evaluate the licensee's decision making process associated with their extent of condition review conducted for the 1A diesel generator room and turbine building flooding events; including their understanding of the risk associated with the conditions.

- Brief the Regional Administrator and Regional management daily.

- Document the inspection findings and conclusions in an inspection report within 30 days of the inspection.

4. OTHER ACTIVITIES

4OA5 Special Inspection (93812)

.1 Develop a sequence of events related to the conditions.

a. Inspection Scope

For the purposes of this Special Inspection, the team identified the major water intrusion events that have occurred at Catawba in 2006 and documented the specific events and the corrective actions that were developed following the events in chronological order. In order to develop this sequence of events, the inspection team reviewed corrective action documents, unified control room logs, and an event chronology developed by licensee personnel prior to the inspection team arriving on-site. The inspection team also interviewed several licensee staff members in the Engineering and Operations departments in order to validate and further establish the sequence of events documented in this report.

b. Findings and Observations

Background Information

The Catawba Nuclear Station is located on a site situated on a peninsula bounded directly by Lake Wylie on two sides. The power house yard general ground elevation is

approximately 594 feet above mean sea level (MSL). The electrical switchyard is located on a hill to the west of the power house and is at 632 feet MSL. The cooling towers for the station are located on a hill to the east and are at 620 feet MSL. The plant itself was constructed with much of the actual facility located below the grade of the power house yard. The lowest elevation in the plant is at 522 feet MSL or approximately 72 feet below grade. The site layout and below-grade construction of Catawba results in flooding being the major contributor to the core damage frequency calculations developed in the Catawba Probabilistic Risk Assessment model.

Site construction and engineering drawings provide details on how below-grade penetrations are to be constructed to prevent water intrusion into plant structures. Drawing CN-1938-01; Catawba Nuclear Station Electrical Equipment Layout, Outdoor Area General Plan, contains a note which states "All conduits shall be sealed at the entrances to buildings; i.e., diesel, auxiliary, nuclear service water, turbine, etc., to prevent water drainage from entering the buildings."

The SIT member inspection activities were formulated based on the importance of flood mitigation and protection at Catawba and several water intrusion-related events that occurred at the site in 2006. A summary of the 2006 events is provided below:

May 22, 2006

During recovery actions following a dual-unit loss-of-offsite power (LOOP) that occurred on May 20, 2006, water was reported entering the Unit 1 "A" DG room. Operators responding to the notification determined that the source was external to the room and worked to identify the source of the flooding and remove the water to minimize any impact on the DG. The water was found to have been a result of overflow from the Unit 2 cooling towers which traveled through unsealed conduit trenches and entered the DG room though below-grade penetrations in the outer wall containing safety-related cabling. Prior to returning the units to service, the licensee inspected other below-grade electrical conduits entering the Auxiliary and Diesel Generator buildings. Numerous electrical conduit seals were found to have degraded seals which required repair in order to restore their functionality. The NRC identified that the licensee had not established a preventative maintenance program to periodically inspect below-grade hydrostatic seals which had a finite lifetime.

The issues of the missing seals on the conduits entering the 1A DG room and the degraded seals on other conduits were dispositioned in NRC Inspection Reports 05000413,414/2006-03 and 05000413,414/2006-04.

June 2006

The licensee identified the need to reassess the depth of water in the power house yard following a PMP event as a result of site topography changes that had occurred over recent years. These changes were due to major projects such as the raw water piping upgrade, the Independent Spent Fuel Storage (ISFSI) haul road, and relocation of the security fence. The calculation determined that an increase in PMP level would be observed and a Problem Investigation Process (PIP) document was initiated to determine the impact this increased water level would have on plant equipment. The

areas identified within the scope of this review were limited to those containing safety-related SSC's. This condition was entered into the licensee's corrective action program and was closed out once the review of safety-related SSC's had been completed.

August 30, 2006

A heavy rain occurred which resulted in the site receiving almost 4 inches of rain in less than 45 minutes. This rainfall overwhelmed the yard drain system in several locations around the plant and allowed water to enter four (4) cable pits in the Unit 1 and Unit 2 transformer yards. Unsealed penetrations in these pits, as well as other below-grade locations around the turbine building foundation, allowed water to enter the turbine building basement, which is 26 feet below the power house yard. Some water entered the recently-constructed flood wall enclosures surrounding the 6.9kV transformers and associated terminal cabinets. These transformers provide normal and alternate power to the 4.16kV vital busses. The flood walls had been constructed to reduce the overall risk exposure from an internal pipe break in the turbine building, which could cause loss of the 6.9kV transformers. However, the potential influent of water inside of the flood walls from electrical penetrations had not been adequately assessed during the design and construction phase as evidenced by the water entering the enclosures through unsealed electrical penetrations. This condition was entered into the licensee's corrective action program and is being tracked for resolution.

November 4, 2006

An inspection of flood vulnerability was conducted the week of October 30, 2006 as a part of the baseline inspection program. During this inspection, the inspectors identified that the Standby Shutdown Facility (SSF) had not been included in extent of condition reviews performed after the previous flooding events in 2006. The inspectors identified that the seals for the below-grade electrical penetrations entering the SSF were degraded and had allowed some water to enter the cable trench inside the building. In addition, the doorways entering the building had ~0.5 inch gaps beneath them which would have allowed water to enter the structure in the event of a PMP event based on the floor of the SSF being 9 inches below the predicted maximum water level in the power house yard. This condition was entered into the licensee's corrective action program and is being tracked for resolution.

December 1, 2006

Inspectors on the SIT conducted a walkdown of the site within the protected area and identified several storm water catch basins that were entirely or partially obstructed with gravel, silt fencing or other debris blocking water from entering the drainage system. The site has 88 committed catch basins, of which 80 are required to fully operable in order to ensure the storm drain system can fulfill its design function and maintain standing water in the power house yard at levels accounted for in the plant flooding analysis. A subsequent walkdown and analysis by licensee personnel determined that two catch basins were 100% non-functional and three additional catch basins were 50% non-functional. The apparent cause for these conditions developing at the site and not being identified was a breakdown in the implementation of a station procedure that had

been developed to address a similar condition in 2001. This condition was entered into the licensee' s corrective action program and is being tracked for resolution.

.2 Conduct an extent of condition review of the SSF flooding vulnerability. As appropriate, provide any new information that is identified that would affect the risk analysis, to the Region II, Senior Reactor Analyst.

a. Inspection Scope

The inspectors reviewed licensee calculations that had been used in the PRA-based justification to construct the floodwall enclosures in the turbine building basement around the 6.9kV transformers and their associated terminal cabinets. The enclosures were designed to reduce the overall station core damage probability identified in the PRA model resulting from flooding events damaging these components. The flood walls were constructed on April 6, 2005 (Unit 1) and March 31, 2005 (Unit 2). Prior to the construction of the floodwalls, flooding had been determined to be a 25% contributor to core damage at Catawba.

In addition to reviewing the effect a turbine building basement flooding event could have on the station, the inspectors also reviewed several sections of the Updated Final Safety Analysis Report (UFSAR) and Design Basis Document (DBD) to confirm the assumptions made in the aforementioned calculations as well as identify what other equipment could be affected by a flooding event in additional site buildings such as the Standby Shutdown Facility (SSF).

A tabulation of equipment that would be affected by flooding of the individual turbine building floodwall enclosures and the SSF was developed by the inspectors and provided to the Region II Senior Reactor Analyst (SRA). (See Attachment 7 and 8 for the list of affected equipment)

Discussions are continuing between the licensee's PRA group in the corporate office and the Region II SRA's to validate assumptions made in the risk models maintained by both organizations regarding equipment that could have been affected by a flooding event based on the as-found condition of below grade penetrations at Catawba prior to and subsequent to the 1A DG room flooding on May 22, 2006. The likelihood of the events needed to produce water levels used in the PRA models was also discussed.

b. Findings and Observations

Following the flooding of the 1A DG room that occurred on May 22, 2006, the licensee's PRA staff worked with the Region II SRA's to determine the risk significance that resulted from this event. The flooding event was documented as Unresolved Item (URI) 05000413/2006009-03 in the AIT report issued on June 29, 2006. The URI was opened to review the root and contributing causes, the extent of condition, and the corrective actions associated with the failure to seal conduits into manholes and the 1A DG room as required by design and construction documents. The issue was dispositioned as a Green NCV in Inspection Report 05000413,414/2006-04. It was determined to be of very low safety significance (Green) based on the results of the Significance Determination Process Phase 1 screening, the Phase 2 evaluation using the Catawba

Plant Notebook, and the Phase 3 evaluation. The team identified Unresolved Item 05000413,414/2006010-01 to re-quantify the station risk resulting from the cumulative effect of the missing conduit seals, degraded conduit seals and water ingress paths that have been identified as being present over the time period of April 6, 2005 and May 22, 2006.

.3 Identify corrective actions taken by the licensee in response to the SSF flooding vulnerability and evaluate their timeliness and effectiveness.

a. Inspection Scope

The inspectors reviewed the permanent and interim corrective actions taken to address potential water ingress into the SSF. The inspectors also conducted a walk-down of the SSF to asses the effectiveness of the licensee's actions and reviewed design documents to determine what flooding vulnerabilities existed in relation to the SSF.

b. Findings and Observations

Once the issue of potential SSF flooding was identified during the November 2006 flooding inspection, actions were taken to inspect and refurbish the seals associated with the below-grade cable trench penetrations that entered the SSF.

The licensee performed a flood routing study to identify paths for water to enter the SSF based on a PMP event. In addition to the path through the below-grade electrical conduits identified by the NRC, additional entry points including the SSF door thresholds and the diesel air intake plenum were identified. The study demonstrated that the water level would rise high enough to adversely affect components in the SSF diesel control panel as well as compartments in the SSF diesel generator output load center following a PMP event. As a result, the licensee took immediate compensatory actions to stage sandbags at both SSF exterior doors to limit water intrusion in the event of a severe rainfall. The licensee intends to use the flood routing study information as inputs into a risk evaluation to determine SSF vulnerability to severe rainfall events ranging from a full PMP event to lesser rainfalls typically experienced at the site.

.4 Evaluate Catawba's preparedness to cope with a PMP event. Specifically, determine if plant procedures provide adequate guidance to cope with the event and operator training is adequate to support the level of detail provided by the plant procedures for the event.

a. Inspection Scope

Inspectors reviewed plant procedures intended to address flooding conditions on-site. These included Abnormal Operating Procedures (AP), Response Procedures (RP) and Operator Aid Computer response procedures. In addition, inspectors conducted interviews with Operations, Engineering, and Emergency Planning personnel with a focus on what guidance and training was available to respond to the flooding of plant SSC's, particularly from external sources.

b. Findings and Observations

There is only one abnormal procedure which deals with plant flooding, AP/0/A/5500/030, Plant Flooding. The stated purpose of this procedure is "*To provide guidance to mitigate the effects of internal flooding in the Auxiliary, Diesel, Turbine or Service Buildings that threatens essential plant equipment from leakage from systems including RC, RF, RY, RN, RL or CS*." This procedure, and the corresponding training provided to Operations personnel, focuses all actions on combating leakage from systems internal to the aforementioned structures.

Procedure RP/0/A/S000/007; Natural Disaster and Earthquake, contains an enclosure to be used when lake levels exceed 593.5 feet or a sudden lake tidal wave is spotted. Enclosure 4.5, Flooding Due to High Lake Level or Lake Tidal Wave, is administrative in nature and, with the exception of ensuring the Auxiliary Building roll-up doors are closed, provides no specific guidance to address flooding from sources external to the affected building. The majority of this enclosure addresses offsite notifications that would be required, direction to shutdown the units and the need to assess the extent of damage caused by the flooding once the immediate concern is over.

Interviews with Operations personnel, particularly those that had been involved in responding to the May 22, 2006 1A DG room flooding event, confirmed that procedural guidance and training was focused solely on addressing flooding of SSC's from systems internal to the buildings. Operators used their experience and familiarity with the plant design in responding to the May 22 event once it was determined that the water was coming from an external source and that AP/0/A/5500/030 would not provide any assistance in mitigating the flooding.

Introduction: The inspectors identified a Green Non-Cited Violation (NCV) of Technical Specification (TS) 5.4.1.b, for failure to adequately establish procedures required by Regulatory Guide 1.33, Appendix A, Section 6, Procedures for Combating Emergencies and Other Significant Events. Specifically, no procedure existed to combat or mitigate the consequences from an external flooding event.

Description: On May 22, 2006, the control room was notified of water flooding into the 1A DG room. Operators were dispatched and identified that the flooding was coming in through below-grade electrical conduits on the south wall. The source of the water was determined to be overflow from the Unit 2 cooling towers, through the cooling tower cable trench, into two safety-related manholes, and finally into the 1A DG room. Once the cooling towers had been secured, the in-leakage stopped. The water flowed over the starting air compressors, the DG battery enclosure and load sequencer cabinets, and collected in the DG room sump. The rate of flooding exceeded the capacity of the installed DG sump pumps. Additional sump pumps had to be brought in to keep the water from reaching the lube oil sump tank and the generator. The 1A DG was declared inoperable and the applicable TSs were entered.

The inspectors reviewed several licensee procedures that were related to plant flooding. Procedure AP/0/A/5500/030, Plant Flooding, provides guidance to the operators to mitigate the effects of internal flooding in the Auxiliary, Diesel, Turbine, and/or Service Buildings. Procedure RP/0/B/5000/030, Severe Weather Preparations, is implemented

by Emergency Planning and provides direction when either high winds or ice accumulation is expected to occur. Procedure RP/0/A/5000/007, Natural Disaster and Earthquake, provides direction when high lake level results in flooding, however this direction is more general in nature than what would be necessary for operators to combat or mitigate the consequences of a flood. In addition, neither internal flooding or high lake level are considered UFSAR described Predicted Maximum Precipitation events.

After discussions with NRC personnel who responded to the site during the event and licensed operators who were on-shift during the event, the inspectors determined that no procedure was utilized or available to the operators to cope with the external flood event. Instead, the operators had to rely on skill-of-the-craft abilities and fortuitously available sump pumps to aide in combating the effects of water intrusion into the 1A DG room.

Analysis: The inspectors determined that the licensee's failure to establish a procedure to combat or mitigate an external flooding event was a performance deficiency. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Disposition Screening." The failure to establish appropriate procedures to cope with an external flood affects the Mitigating Systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding involved the attribute of protection against external factors (i.e., flood hazard). Using Manual Chapter 0609, Appendix A, Attachment 1, "Significance Determination Process," Phase 1 Worksheet, the finding is determined to have very low safety significance because it only affected the mitigating systems cornerstone and did not result in the total loss of any safety function that contributes to external event initiated core damage accident sequences.

Enforcement: TS 5.4.1.b requires that written procedures as described in RG 1.33, Revision 2, Appendix A, be established, implemented, and maintained. Reg Guide 1.33, Appendix A, Section 6, Procedures for Combating Emergencies and Other Significant Events, Subsection W, requires that procedures be developed to combat emergencies and other significant events, such as acts of nature (e.g., flood). Contrary to the above, on November 30, 2006, the inspectors determined that the licensee had not established a procedure to combat or mitigate the consequences from an external flooding event. Because this violation was determined to be of very low safety significance and was placed in the corrective action program as PIP C-06-08287, this violation is being treated as a NCV in accordance with Section VI.A.1 of the Enforcement Policy, and is identified as NCV 05000413,414/2006010-02, Failure to Establish a Procedure for Mitigating the Consequences of an External Flooding Event.

.5 Determine and assess the licensee's previous corrective actions and lessons learned associated with the flooding from unsealed below-grade electrical and/or mechanical penetrations.

a. Inspection Scope

The inspectors reviewed the permanent and interim corrective actions taken by the licensee in response to flooding from unsealed below-grade electrical penetrations and

mechanical penetrations. Inspectors also reviewed the corporate level specification for penetration seals, the site specific specification with detailed vendor information for penetration seals, and the seal installation procedure.

b. Findings and Observations

Following each of the water intrusion events in 2006 the licensee implemented corrective actions which involved inspection and repair of penetration seals and flood barriers. The repair of penetration seals involved the application of new sealant over the degraded seals.

The vendor recommendations for penetration sealing gave instruction for preparation and application of new seals, however, it did not address preparation and application of new sealant over existing sealant material that might be degraded. The corporate design specification for sealant and the station's seal installation procedure included the vendor recommendations for sealant application, however, there was no discussion as to the application of new sealant over existing, degraded seals. The licensee initiated PIP C-06-8341 to review the process used to reseal existing conduits and develop guidance to ensure they are properly prepared prior to applying the sealant. The individual corrective actions implemented as a result of the 2006 water intrusion events are identified below.

May 22, 2006

Actions taken by the licensee in response to this event and completion dates are listed below:

ACTION DESCRIPTION	COMPLETION DATE
Inspected/repaired conduits between conduit manholes (CMH) and all four DG Rooms	5/24/06
Inspected/repaired conduits / cable penetrations in the Auxiliary Building and Unit 1 & 2 4.16kV vital switchgear Rooms	5/26/06
Installed redundant seal between the cooling tower cable trench and CMH 4 at the CMH interface	7/31/06
Reviewed design configuration of subterranean mechanical piping penetrations into the Auxiliary Building to validate water intrusion not applicable	8/3/06
Inspected/repaired cooling tower, WC Pond, and Switchyard cable trench flood barriers and berms	8/7/06
Established a model WO to perform annual inspection of cooling tower, WC Pond, and Switchyard cable trench flood barriers and berms	10/17/06
Develop and implement a preventative maintenance program to periodically inspect penetration seals credited for flood mitigation	In Progress
Initiated assessment of cumulative effect of site topography changes on flooding design basis & updated UFSAR	In Progress

August 30, 2006

Actions taken by the licensee in response to this event and completion dates are listed below:

ACTION DESCRIPTION	COMPLETION DATE
Inspected/repaired conduits between transformer yard conduit manholes & Unit 1 / Unit 2 Turbine Building	9/8/06
Inspected/cleaned transformer yard conduit manhole drains	9/906
Inspected/repaired penetrations in all Unit 1 / Unit 2 Turbine Building and Service Building substructure walls	11/26/06

November 4, 2006

Actions taken by the licensee in response to the additional flooding related inspection and completion dates are listed below:

ACTION DESCRIPTION	COMPLETION DATE
Inspected/repaired SSF cable trench penetrations	11/8/06
Performed flood routing study to determine maximum water level in each SSF room during PMP	11/23/06
Implemented temporary procedure to install sand bags at SSF exterior doors in the event of severe rainfall	11/25/06
Perform PRA risk analysis of SSF vulnerability during rainfall events	In Progress

.6 Determine if other site structures were adversely affected and have become susceptible to flooding as a result of the change in PMP level.

a. Inspection Scope

Inspectors conducted site walk downs and reviewed site layout drawings to determine additional structures or components had become vulnerable to flooding from external sources as a result of the change in PMP level. The inspectors reviewed flood level calculations, flood protection requirements and procedures. This review was compared to the results of the assessment conducted by the licensee.

b. Findings and Observations

The inspectors did not identify any additional plant structures that might be susceptible to flooding that had not been evaluated by the licensee following the water intrusion events between May and November, 2006.

During the site walk down, the inspectors noted extensive construction in-progress to support the ISFSI haul road, the new security fence modification and other minor

projects. Some of this activity was in close proximity to site yard drains and catch basins. There were two types of catch basins at Catawba, a Type I and a Type II device. There were 88 Type I catch basins on-site and these were included in Catawba's flood level calculations. In order for the calculation to remain valid, a minimum of 80 were required to be operable to ensure water drained away from the plant as expected. The inspectors noted several catch basins which had berms built around them, as well as dirt, debris or covers partially or totally blocking others. This prompted the inspectors to discuss the program used to control and maintain these flood mitigation features with the licensee.

The licensee performed an independent walkdown of the area noted by the inspectors and concurred that the programmatic controls that had been instituted following similar occurrences in 2001 and documented in PIP C-01-4230 had not been followed. Station Procedure EWP 8.1, Pre-Project Planning, described how work was to be planned and executed in the vicinity of yard drains and catch basins to ensure they were not blocked. If blockage was required to keep debris or oil from entering it, Engineering was required to evaluate the impact this blockage would have on the site flooding analysis. In addition, Environmental, Health and Safety personnel were to notify Engineering when any catch basin blockage was identified during the performance of their weekly walkdown of construction areas. These guidelines had not been rigorously followed.

The station's Civil Engineering group conducted a full inspection of the Type I catch basins after the blockage issue was raised by the inspection team. This walkdown identified six catch basins that were at least partially blocked. Calculations determined that the as-found condition resulted in a loss of 4.5 catch basins.

The licensee initiated PIP C-06-8179 for this condition.

.7 Evaluate the licensee's decision making process associated with their extent of condition review conducted for the 1A diesel generator room and turbine building flooding events; including their understanding of the risk associated with the conditions.

a. Inspection Scope

The inspectors reviewed the corrective action documents associated with the water intrusion-related events that had occurred at Catawba in 2006 and are described in Section 4OA5.1 of this report to evaluate the extent of condition reviews that had been conducted for each event. In addition to reviewing the associated PIP's, the inspectors reviewed design specifications, construction drawings, risk models, and licensing documents pertaining to internal and external flooding vulnerabilities and protection. The inspectors also conducted interviews with Engineering, Operations and Licensing personnel to discuss the extent of condition assessments and corrective actions developed for the specific events.

b. Findings and Observations

Following each of the water intrusion-related events that occurred in 2006, the licensee performed an extent of condition review to identify appropriate corrective actions in order to address the specific problem that occurred. The sole focus of these reviews was to

ensure safety-related SSCs were either unaffected, or if the potential for adversely impacting these SSCs existed, that corrective actions needed to mitigate that impact were identified an implemented. While the extent of condition reviews that the licensee conducted were timely, their narrow focus on safety-related SSCs resulted in risk-significant SSCs remaining vulnerable to damage or loss in the event of a flooding event.

Introduction: The inspectors identified a Green Finding for the licensee's failure to conduct adequate extent of condition reviews following flooding events on May 22, 2006, and August 30, 2006.

Description: On May 22, 2006, while returning Unit 2 to service following a dual-unit LOOP, water from the cooling towers overflowed due to flow channel blockage caused by a build-up of freshwater clams and heavy winds. Water entered the cable trench leading towards the plant and entered an adjacent safety-related conduit manhole bunker due to missing conduit seals in the below-grade penetrations. The water flowed from the manhole bunker through additional unsealed penetrations into the 1A diesel generator room resulting in the diesel generator being declared inoperable while repairs were conducted. Following the flooding event, the licensee inspected additional below-grade electrical conduit seals in the remaining three diesel generator rooms and the common auxiliary building. These inspections identified a number of degraded conduit seals, which were repaired prior to returning the units to service. The licensee narrowly defined the scope of the additional inspections performed at this time as only those areas which contained safety-related SSCs and documented the results of these inspections in corrective action program document PIP C-06-3902.

On August 30, 2006, Following a period of heavy rain, water entered the Unit 1 and Unit 2 turbine buildings at several locations. Four of these locations were from unsealed electrical conduits that connected the 22kV main transformer output to the 6.9kV transformers located in the turbine building basement. The 6.9kV transformers supply normal and alternate power to the station's 4.16kV vital busses. Due to the risk significance of these transformers and their associated terminal cabinets, the licensee had installed 5-foot high flood walls in 2005 to protect them from flooding if a circulating water leak occurred inside the turbine building. Rainwater entered these enclosures through the unsealed electrical conduits. The level in two enclosures (surrounding 1ATC22/1ATC30 and 2ATC22) reached the high level alarm setpoint, which required immediate operator actions to prevent the loss of the loads controlled through the cabinet. Subsequent investigation determined that these conduits had been unsealed since initial construction. Potential leak paths into the flood wall enclosures had not been evaluated when the flood walls were constructed in 2005 or following the May 22, 2006 flooding event associated with the 1A DG despite the fact that they contained risk-significant equipment. The corrective actions developed following the turbine building flooding event and documented in PIPs C-06-6197, C-06-6201 and C-06-6224 focused on ensuring other below-grade penetrations in the turbine buildings were sealed, but did not include other risk-significant SSC's on the plant site in the extent of condition review.

During the week of October 20, 2006, an NRC inspection identified that below-grade electrical conduit penetrations entering the SSF were not adequately sealed to prevent water in-leakage in the event the cable trench filled with water. Additionally, the

inspectors determined that water could enter the SSF during a PMP flooding event through the building's two doors and diesel room ventilation panels. The degraded conduit seals had not been inspected following either of the two previous 2006 flooding events due to the licensee failing to recognize the risk-significance of the SSF. The fact that the SSF would be rendered inoperable in the event of a PMP was not identified by the licensee following the revision of the calculated PMP flood level because the SSF is not designed to be a safety-related structure and site engineering personnel did not recognize the risk significance that the SSF had in terms of the Catawba PRA model.

Duke Energy Procedure NSD 208, Problem Investigation Process (PIP), describes the nuclear organization's corrective action program. This NSD defines a PIP as the mechanism used to identify and document problems that are Conditions Adverse to Quality as well as other issues. The NSD defines "conditions adverse to quality" as abnormal or unexpected conditions, including malfunctions, involving safety-related, risk-significant or power generation significant SSCs." NSD 208, section 208.10, Problem Evaluation, requires an extent of condition determination be performed on PIP's coded as Category 1, 2 or 3 generated for "conditions adverse to quality." The licensee's assessment of the May 22 and August 30, 2006, events diesel generator flooding event failed to adequately assess the potential for the flooding of other risk-significant SSCs in addition to the SSCs included in the PIP's assessment. This omission was continued in the review and analysis done as part of the assessment of the revised PMP flood level calculation in June 2006.

Analysis: The inspectors determined that failure to conduct an adequate extent of condition review following multiple water intrusion events and the revision of the calculated maximum PMP flood level at the station to identify plant vulnerabilities was a performance deficiency. The inspection team determined that the finding was of more than minor significance since the finding was associated with the Protection Against External Factors and Equipment Performance attributes of the Mitigating Systems cornerstone in that by narrowly focusing extent of condition reviews to only encompass safety-related SSCs and excluding risk-significant SSCs, systems required to respond to and mitigate initiating events could be adversely affected.

The finding was determined to be of very low safety significance because, while limiting extent of condition reviews to safety-related SSC's has the potential to adversely affect the ability of the station to respond to initiating events, failing to include risk significant equipment in the reviews conducted for the water intrusion events in 2006 after the 1DG conduit seals were repaired did not result in an overall increase in plant risk in excess of the green/white threshold. The vulnerabilities of other risk-significant SSCs to flooding have been addressed by the station.

This finding has a cross-cutting aspect (Corrective Action Program) in the area of Problem Identification and Resolution, in that the licensee failed to conduct adequate extent of condition reviews as delineated by the corrective action program's implementing procedure and thereby prevent similar, subsequent events from occurring.

Enforcement: The failure to conduct an adequate extent of condition review and include risk-significant SSCs did not constitute a violation of regulatory requirements. This finding is identified as FIN 05000413,414/2006-010-3, Failure to Conduct an Adequate

Extent of Condition Review Following Multiple Water Intrusion Events to Ensure Risk-Significant SSCs Were Protected From Loss Due To Flooding. The licensee has conducted an assessment to ensure all risk-significant and power-generation related SSCs, in addition to safety-related SSCs, have been reviewed and found to be protected from flooding events. The licensee has captured the issue of conducting appropriate extent of condition reviews in PIPs C-06-8246 and C-06-8311.

4OA6 Meetings

Exit Meeting Summary

On December 6, 2006 the inspection team presented the Special Inspection results to Mr. Morris and members of his staff. Mr. Morris acknowledged the findings and observations of the team at that time. All proprietary information reviewed by the team was returned to the licensee.

ATTACHMENT - SUPPLEMENTAL INFORMATION

1. Key Points of Contact
2. List of Items Opened, Closed and Discussed
3. List of Documents Reviewed
4. List of Acronyms
5. Special Inspection Team Charter
6. Simplified Catawba Site Layout Drawing
7. Potential impact of flooding on the transformers or terminal cabinets within the turbine building basement floodwall enclosures
8. Potential impact of flooding in the Standby Shutdown Facility (SSF) on equipment within the structure
9. Turbine Building Floodwall Enclosure drawings
10. Standby Shutdown Facility floor plan drawings

Key Points of Contact

Licensee Personnel

G. Hamrick, Mechanical / Civil Engineering Manager
R. Hart, Regulatory Compliance
W. Hogan, Fire Protection Engineer, Civil Engineering
D. Kaul, Civil Engineer
J. Morris, Catawba Site Vice President
T. Pitesa, Station Manager
R. Repko, Engineering Manager
G. Strickland, Regulatory Compliance Specialist
D. Ward, Civil Engineering Section Head

NRC Personnel

C. Casto, Director DRP, Region II
J. Moorman, Branch Chief, Branch I, DRP, RII
W. Rogers, RII Senior Reactor Analyst
R. Bernhard, RII Senior Reactor Analyst

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000413, 414/2006010-01	URI	Assess the Overall Increase In Station Risk Resulting From the Combination Of Unsealed Electrical Conduits Entering the 1A DG Room And Turbine Buildings and Floodpaths Into the SSF (Section 4OA5.2)

Opened and Closed

05000413, 414/2006010-02	NCV	Failure to Establish a Procedure for Mitigating the Consequences of an External Flooding Event (Section 4OA5.4)
05000413, 414/2006010-03	FIN	Failure to Conduct an Adequate Extent of Condition Review Following Multiple Water Intrusion Events to Ensure Risk Significant SSC's Were Protected From Loss Due to Flooding (Section 4OA5.7)

List of Documents Reviewed

Licensing Basis and Design Basis Documents

- UFSAR Chapter 2, Section 2.4; Hydrologic Engineering SSF Design Basis Document; CNS-1560.SS-00-0001; Rev. 21

Drawings

- CN-1938-01; Catawba Nuclear Station Electrical Equipment Layout, Outdoor General Plan
- CN-1145-8; Turbine and Service Building Substructure, Construction Layout, 566' 9"; Rev. 3
- CN-1148-1; Turbine and Service Building Unit 1 Substructure; Rev. 8
- CN-1148-2; Turbine and Service Building Unit 1 Substructure; Rev. 10
- CN-1148-3; Turbine and Service Building Unit 1 Substructure; Rev. 3
- CN-2148-1; Turbine and Service Building Unit 2 Substructure; Rev. 7
- CN-2148-2; Turbine and Service Building Unit 2 Substructure; Rev. 4
- CN-2148-3; Turbine and Service Building Unit 2 Substructure; Rev. 5
- CN-1100-07-02; Turbine Building Unit 2 General Arrangement Basement Floor Elevation 568'; Rev. 29
- CN-1100-07-03; Turbine Building Unit 2 General Arrangement Basement Floor Elevation 568'; Rev. 16
- CN-1151-11.02; Turbine Building Unit 1 Flood Wall Details; Rev. 0
- CN-2925-01; Electrical Equipment Layout – Turbine Building – Unit 2, Below Mezzanine level; Rev. 05
- CN-1022-17; Powerhouse Yard Drainage Layout; Rev 6A
- CN-1022-18; Cooling Tower Yard Area Drainage Layout; Rev 0

Procedures / Surveillances

- Environmental Work Practice 8.1; Pre-Project Planning; Rev. 8
- AP/0/A/5500/030; Plant Flooding, Rev. 07
- RP/0/A/5000/007; Natural Disaster and Earthquake; Rev. 25
- RP/0/B/5000/030; Severe Weather Preparations; Rev. 05
- OP/1/A/6100/010I; Alarm Response Procedure for Panel 1AD-8; Windows A/4, B/4
- OP/1/B/6100/010N; Alarm Response Procedure for Panel 1AD-13; Windows D/1, D/2 and D/3
- OP/2/A/6100/010I; Alarm Response Procedure for Panel 2AD-8; Windows A/4, B/4
- OP/2/B/6100/010N; Alarm Response Procedure for Panel 2AD-13; Windows D/1, D/2 and D/3
- AM/0/B/5100/008, Enclosure 6.4, RC Recovery Submersible Pump Setup

- NSD 208, Problem Investigation Process; Rev. 27
- NSD 210; Corrective Action Program, Rev. 4
- NSD 223; Trending Program; Rev. 5

Work Orders

- 01064006; Model work order to perform annual inspections of the yard drains and catch basins
- 00880635; Model work order to remove vegetation and debris from yard drains and catch basins on a semi-annual basis
- 00966988; Inspect cable pull box in the Unit 2 B DG sequencer hallway to inspect for source of water leakage
- 00966988; Properly seal the conduits entering the pull box in the 2B DG load sequencer hallway
- 01712134-01; Model work order to pump down the 1B DG WN sump
- 00966988; Inspect pull box in 2B DG sequencer hallway leaking water
- 01131411; Seal conduits to 1A DG
- 01131423; Seal conduit sleeves in CMH-02
- 01131420; Seal conduit sleeves in CMH-18A
- 01131419; Seal conduit sleeves in CMH-18B
- 01132080; Seal conduit sleeves in CMH-4A
- 01131422; Seal conduit sleeves in CMH-4A at the trench
- 01131703; Reseal conduit with Duxseal and RTV732 in Aux Bldg
- 01131705; Reseal conduit with Duxseal and RTV732 in Aux Bldg
- 01131702; Inspect conduits at AA-49, 577’ Aux Bldg
- 01131706; Reseal conduit with Duxseal and RTV732 in Aux Bldg
- 01131649; Miscellaneous walls between Unit 1 and 2 – inspect water barrier
- 01131741; Cooling tower yard berms need to be validated
- 01132823; Inspect or repair the barriers in the waste water pond and switch yard
- 01709667; Seal conduit at 1A manhole adjacent to the Unit 1 Turbine Building RR Bay
- 01709669; Seal conduit at 1B manhole adjacent to the Unit 1 Turbine Building RR Bay
- 01709676; Seal conduit at 2A manhole adjacent to the Unit 2 Turbine Building RR Bay
- 01709677; Seal conduit at 2A manhole adjacent to the Unit 2 Turbine Building RR Bay
- 01709547; Install seal plate in 6” sleeve in Unit 1 Turbine Building
- 01720514; Seal unsealed pipe sleeves in the Unit 2 turbine building walls

PIPs

- C-01-4230; Documentation of partial blockage of 7 Type I yard drains
- C-06-8179; NRC inspectors identified that the requirements in Environmental Work Practice 8.1 related to routine yard drain and catch basin inspections were not being followed
- C-06-6197; Water intrusion into the Unit 1 and Unit 2 turbine buildings following a major thunderstorm on 8/30/06
- C-06-3902; Water intrusion into the 1A DG room through unsealed electrical conduits
- C-06-6224; Water intrusion into the floodwall enclosures in the turbine building basement areas
- C-06-7420; Questions raised by the NRC related to SSF flooding
- C-06-8195; Assessment of vulnerability to flooding issues identified at McGuire
- C-00-3784; Yard drains at cooling towers covered with grass clippings and would not drain
- C-04-6921; Potential DG room WN sump clogging issue
- C-05-1544; In order to update the Catawba PRA model, information is needed regarding the new flood wall enclosures in the turbine building basement
- C-05-1992; PRA recommends changing NSD-403 to incorporate flooding concerns per PIP G-03-0087
- C-05-4922; WL isolation valves discussed in the WL DBD to isolate the Service Building from the Auxiliary Building in case of flooding due to tornado are not proceduralized
- C-06-4824; EIT team associated with water entering the 1A DG room identified two procedure improvements
- C-06-6192; Site access was flooded following heavy rains
- C-06-7160; PMP flood analysis revision shows that the maximum flood level in the powerhouse yard is higher than previously calculated
- C-96-2001; The turbine building sump was flooded due to heavy rains
- C-06-4447; Re-evaluate the changes to the site topography
- C-06-7846; Breakdown in communication occurred between the PA group, Catawba Regulatory Compliance and Engineering when preparing the LER on the 1A DG flooding event

Miscellaneous Documents

- Dow Corning 732 Multi-Purpose Sealant Product Data Sheet
- AP-30 Flooding Lesson Plan, Rev. 0
- Emergency Plan 2 Lesson Plan, CN0080, Rev. 3
- Sump Systems Lesson Plan, Rev. 25
- Standby Shutdown Facility Lesson Plan, Rev. 30

LIST OF ACRONYMS

AIT	Augmented Inspection Team
AP	Abnormal Operating Procedure
CFR	Code of Federal Regulations
CMH	Conduit Manhole
CS	Condensate Storage System
DBD	Design Basis Document
DG	Emergency Diesel Generator
DRS	Division of Reactor Safety
EIT	Event Investigation Team
EP	Emergency Operating Procedure
FIN	Inspection Finding
ISFSI	Independent Spent Fuel Storage Installation
IMC	Inspection Manual Chapter
KV	Kilovolt
LOOP	Loss of Offsite Power
MSL	Mean Sea Level
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OP	Normal Operating Procedure
PIP	Problem Investigation Process (report)
PMP	Predicted Maximum Precipitation
PRA	Probabilistic Risk Analysis
RC	Circulating Water System
RF	Fire Water System
RL	Low Pressure Service Water System
RN	Nuclear Service Water System
RP	Response Procedure
RY	Fire Protection System
SDP	Significance Determination Process
SIT	Special Inspection Team
SRA	Senior Risk Analyst
SSC	Systems, Structures and Components
SSF	Standby Shutdown Facility
TS	Technical Specification
TSAIL	Technical Specification Action Item Log
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
WO	Work Order
WR	Work Request

November 22, 2006

MEMORANDUM TO: Ryan Taylor, Team Leader
Special Inspection Team

FROM: William D. Travers
Regional Administrator

SUBJECT: CATAWBA SPECIAL INSPECTION TEAM CHARTER

A Special Inspection Team (SIT) has been established for Catawba to inspect and assess the facts surrounding the licensee's corrective actions for degraded seals on safety-related and risk-important below-grade electrical penetrations. Additional team members will be assigned, as appropriate, based on the issues identified. Your inspection should begin on November 27, 2006.

The objectives of the inspection are to: (1) review the facts surrounding degraded seals on below-grade electrical penetrations and lack of watertight seals on the Standby Shutdown Facility doors; (2) assess the licensee's response and investigation of these conditions; (3) identify any generic issues associated with the event; and (4) conduct an extent of condition review.

For the period during which you are leading this inspection and documenting the results, you will report directly to me. The guidance in Inspection Procedure 93812, "Special Inspection" and Management Directive 8.3, "NRC Incident Investigation Procedures," applies to your inspection.

If you have any questions regarding the objectives of the enclosure charter, contact Charles A. Casto at (404) 562-4500

Docket Nos.: 50-413 and 50-414
License Nos.: NPF-35 and NPF-52

Enclosure: Special Inspection Team Charter

SPECIAL INSPECTION TEAM (SIT) CHARTER

CATAWBA UNSEALED BELOW-GRADE ELECTRICAL PENETRATIONS RESULT IN FLOODING

Basis for the Formation of the SIT - On May 22, 2006, water overflowing from the Unit 2 cooling towers traveled through unsealed electrical conduits in cable trenches and manholes and entered the 1A diesel generator room through unsealed, below-grade electrical penetrations. This resulted in the 1A diesel generator being declared inoperable. An extent of condition review determined that other electrical conduits and below-grade electrical penetrations had degraded seals. The licensee corrected some of the degraded penetration seals. The licensee corrected these degraded penetration seals prior to restarting both units which had been removed from service following a dual-unit LOOP event on May 20, 2006. No additional inspections of below grade penetrations into other plant buildings were performed at that time.

On August 30, 2006 unsealed below-grade electrical penetrations in the turbine building allowed water from a heavy rainstorm to enter the turbine building and accumulate inside of the flood barriers surrounding the transformers from offsite power which provide normal and alternate power to the 4.16lV vital buses. The flood walls had been constructed to protect the transformers and terminal cabinets from possible flooding caused by a break in one of the secondary cooling systems located in the turbine building basement based on the adverse impact a flood event had on the station's PRA risk model.

During the week of November 6, 2006, further inspection of susceptible below-grade electrical penetrations determined that the Standby Shutdown Facility was susceptible to flooding from two possible sources. The first source was through below-grade electrical penetrations that had degraded sealing material surrounding the cables. The second source was flooding through unsealed doors to the SSF located at ground level. The threshold of the doors is at elevation 594 feet. The predicted maximum precipitation (PMP) flood level had been changed from an original elevation of 594 feet to 594 feet, 8 inches due to changes in the characteristics of the facility yard and a re-analysis of the predicted maximum rainfall that the site could experience.

Objectives of the SIT - (1) review the facts surrounding degraded seals on below-grade electrical penetrations and lack of watertight seals on the Standby Shutdown Facility doors; (2) assess the licensee's response and investigation of these conditions; (3) identify any generic issues associated with the event; and (4) conduct an extent of condition review. To accomplish these objectives, the following will be performed:

a. Develop a sequence of events related to the conditions.

b. Conduct an extent of condition review of the SSF flooding vulnerability. As appropriate, provide any new information that is identified that would affect the risk analysis, to the Region II, Senior Reactor Analyst.

c. Identify corrective actions taken by the licensee in response to the SSF flooding vulnerability and evaluate their timeliness and effectiveness.

d. Evaluate Catawba's preparedness to cope with a PMP event. Specifically, determine if plant procedures provide adequate guidance to cope with the event

and operator training is adequate to support the level of detail provided by the plant procedures for the event.

e. Determine and assess the licensee's previous corrective actions and lessons learned associated with the flooding from unsealed below-grade electrical and/or mechanical penetrations.

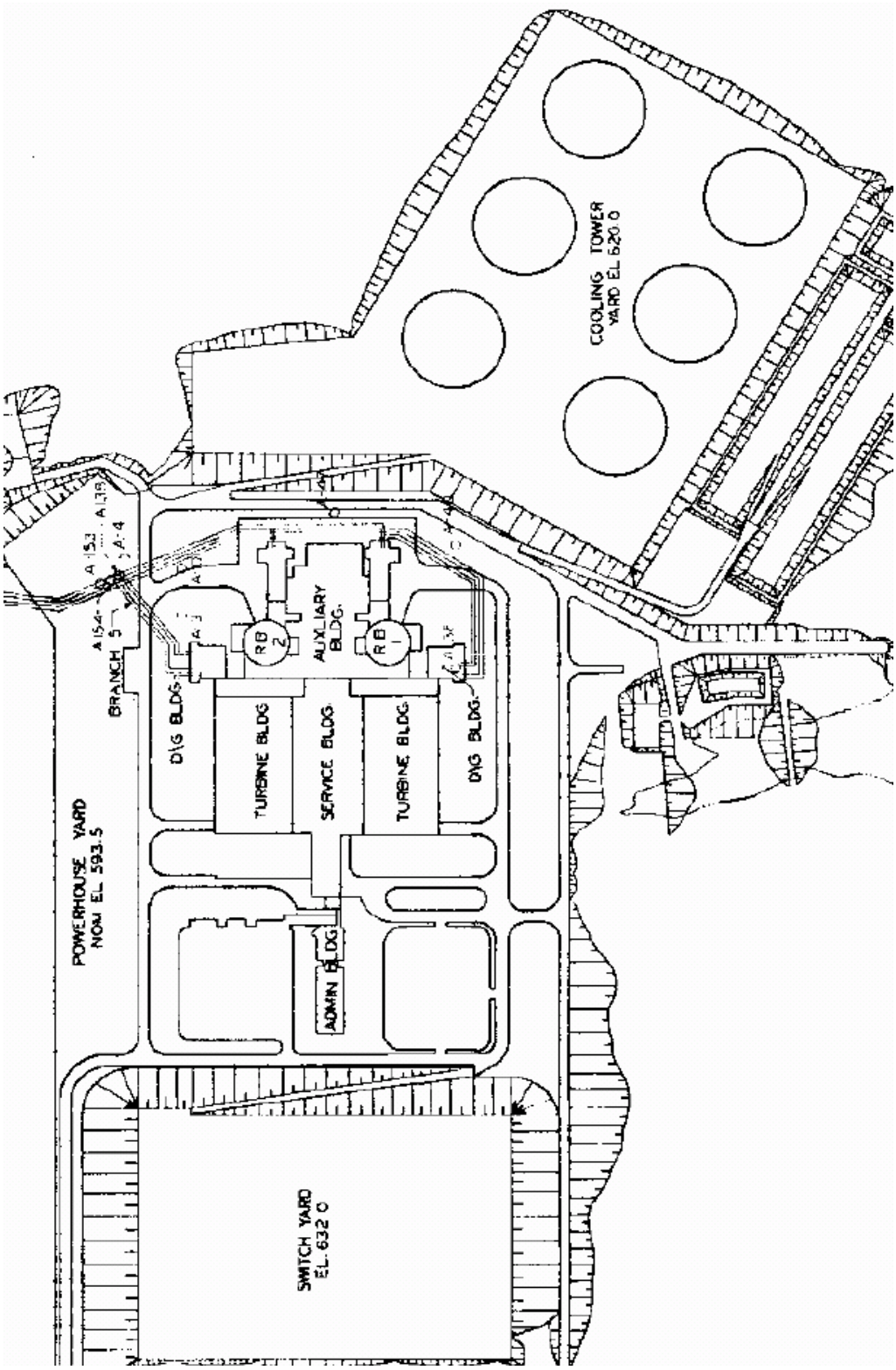
f. Determine if other site structures were adversely affected and have become susceptible to flooding as a result of the change in PMP level.

g. Evaluate the licensee's decision making process associated with their extent of condition review conducted for the 1A diesel generator room and turbine building flooding events; including their understanding of the risk associated with the conditions.

h. Brief the Regional Administrator and Regional management daily.

I. Document the inspection findings and conclusions in an inspection report within 30 days of the inspection.

SIMPLIFIED CATAWBA SITE LAYOUT DRAWING



Attachment 6

Potential Impact of Flooding On the Transformers or Terminal Cabinets Within The Turbine Building Basement Floodwall Enclosures

There are three (3) floodwall enclosures in each unit's turbine building basement designed to protect transformers 1ATC, 2ATC, 1ATD, 2ATD, SATA and SATB along with their associated terminal cabinets 1ATC22, 2ATC22, 1ATC23, 2ATC23, 1ATC30 and 1ATC31. The floodwalls were constructed to reduce the PRA model's risk that resulted from a postulated break of a pipe within the turbine building and subsequent loss of these components. The following summarizes what the impact could be on station operation if one of these components was lost due to flooding. Attachment 9 contains drawings showing the floodwalls for each unit, what equipment is enclosed by each and the water ingress flow paths that existed prior to their repair in September 2006.

I. Flood within Unit 1, Floodwall A which encloses Terminal Cabinets 1ATC23 and 1ACT31

Water entering a terminal cabinet enclosure is unpredictable and could vary based on the water's condition (i.e. temperature, pressure, flow) and the operating state of enclosed equipment (i.e. cabinet cooling fans on/off). Once moisture enters a terminal cabinet enclosure, the assurance of equipment reliability cannot be guaranteed.

A review of circuits contained in 1ATC23 & 1ATC31 was performed to identify the potential effected circuit loss. Based on the licensee's detailed review of electrical and instrumentation drawings associated with 1ATC23 and 1ATC31, the following scenarios were determined to be plausible in the event the terminal cabinets were lost due to flooding.

- Unit 1 - Zone B Lockout
- Unit 1 - Zone G Lockout
- Loss of Busline 1B (Switchyard Breakers 14 & 15)
- Loss of Busline 2B (Switchyard Breakers 23 & 24)
- Generator Breaker 1B Trip (50% Runback)
- Switchyard to Plant Transfer Trip (86TT/2B) - Trip PCB 2B, Trip 6.9 kV Switchgear Breakers 2TB & 2TD fed from Transformer 2T1B, Trip 6.9 kV Switchgear Breakers 2TA & 2TC fed from Transformer 2T2B
- Switchyard to Plant Transfer Trip (86TT/1B) - Trip PCB 1B, Trip 6.9 kV Switchgear Breakers 1TB & 1TD fed from Transformer 1T1B, Trip 6.9 kV Switchgear Breakers 1TA & 1TC fed from Transformer 1T2B
- Generator Breaker 1A Trip (50% Runback) Ref CNEE-189-02.02
- Loss of 125VDC due to Short Circuit - CDA FDR F07 & CDB FDR F07 (Power to Main Protective Relaying – Panel board 1A & 1B)

II. Flood within Unit 1, Floodwall B which encloses transformers 1ATC, SATA and 1ATD

Flooding within Floodwall B could lead to the loss of Transformers 1ATD, 1ATC, & STA and switchgear 1GTA & 1GTB. The transformers and switchgear are not sealed and thus would likely be lost during a flooding event. Based on the licensee's detailed review of electrical and instrumentation drawings associated with 1ATC, 1ATD and SATA, the following scenarios were determined to be plausible in the event they were lost due to flooding.

- Loss of 1ATC, SATA & 1GTA (4 kV Essential & Blackout Aux Power - Train A) & Loss of 1ATD & 1GTB (4 kV Essential & Blackout Aux Power - Train B) will lead to the following:

- Unit 1 LOOP due to loss of Transformers 1ATC & 1ATD (Primary feeds to Train A (1ETA) and Train B (1ETB))

- Blackout on the 1ETA bus and starting / loading of the 1A Diesel Generator which is tied to the 1ETA bus. The 1ETA bus provides power for equipment necessary for plant safety during a LOCA or blackout.

- Blackout on the 1ETB bus and starting / loading of the 1B Diesel Generator which is tied to the 1ETB bus. The 1ETB bus provides power for equipment necessary for plant safety during a LOCA or blackout.

- Loss of 4160 V Blackout System (Bus 1FTA). Under normal shut down conditions following a blackout, 1FTA supplies power to non-essential loads necessary to achieve normal shutdown following a blackout, but not required during a LOCA. The blackout bus (1FTA) can be fed from switchgear 1ETA or 1GTA. The Breaker in switchgear 1GTA is electrically interlocked with the switchgear breakers 1ETA-2 & 1FTA-1. Flooding of switchgear 1GTA (Primary feed for Blackout Bus 1FTA) could prevent the swap-over from 1GTA to the alternate feed (Switchgear breakers 1ETA-2 & 1FTA-1) since these breakers are electrically interlocked and thus a loss of the 1FTA blackout bus would occur.

- Loss of 4160 V Blackout System (Bus 1FTB). Under normal shut down conditions following a blackout, 1FTB supplies power to non-essential loads necessary to achieve normal shutdown following a blackout, but not required during a LOCA. The blackout bus (1FTB) can be fed from switchgear 1ETB or 1GTB. The Breaker in switchgear 1GTA is electrically interlocked with the switchgear breakers 1ETB-2 & 1FTA-1. Flooding of switchgear 1GTB (Primary feed for Blackout Bus 1FTB) could prevent the swap-over from 1GTB to the alternate feed (Switchgear breakers 1ETB-2 & 1FTB-1) since these breakers are electrically interlocked and thus a loss of the 1FTB blackout bus would occur.

III. Flood within Unit 1 Floodwall C which encloses Terminal Cabinets 1ATC22 and 1ATC30)

A review of circuits contained in 1ATC22 & 1ATC30 was performed to identify the potential effected circuit loss. Based on the licensee's detailed review of electrical and instrumentation drawings associated with 1ATC22 and 1ATC30, the following scenarios were determined to be plausible in the event terminal cabinets were lost due to flooding.

- Loss of Busline 2A (PCBs 20 & 21)
- Zone A Lockout
- GCB 1A Trip
- Switchyard to Plant Transfer Trip (86TT/1A) - Switchyard PCB Breaker Failure Lock-out, Trip PCB 1A, Trip 6.9 kV Switchgear Incoming Breakers 1TC & 1TD fed from Transformer 1T1A, Trip 6.9 kV Incoming Switchgear Breakers 1TA & 1TB fed from Transformer 1T2A, Trips 13.8 kV Switchgear 1HTA Incoming Breaker fed from 1ATE
- GCB 1B Trip
- EHC 50% Runback
- Loss of Busline 1A (PCBs 17 & 18)
- Switchyard to Plant Transfer Trip (86TT/2A): Switchyard PCB Breaker Failure Lock-out, Trip PCB 1A, Trip 6.9 kV Switchgear Breakers 2TC & 2TD fed from Transformer 2T1A, Trip 6.9 kV Switchgear Breakers 2TA & 2TB fed from Transformer 2T2A, Trips 13.8 kV Switchgear 1HTA Incoming Breaker fed from 2ATE
- Spurious IPB, Zone A Transformer, Generator PCB 1A alarms
- Spurious Switchyard Event Recorder Points

IV. Flood within Unit 2, Floodwall A which encloses Terminal Cabinet 2ATC23

A review of circuits contained in 2ATC23 was performed to identify the potential effected circuit loss. Based on the licensee's detailed review of electrical and instrumentation drawings associated with 2ATC23, the following scenarios were determined to be plausible in the event terminal cabinets were lost due to flooding.

- Unit 2 - Zone B Lockout
- Unit 2 - Zone G Lockout
- Loss of Busline 1B (Switchyard Breakers 14 & 15)
- Loss of Busline 2B (Switchyard Breakers 23 & 24)
- Generator Breaker 2B Trip (50% Runback)
- Switchyard to Plant Transfer Trip (86TT/2B) - Trip PCB 2B, Trip 6.9 kV Switchgear Breakers 2TB & 2TD fed from Transformer 2T1B, Trip 6.9 kV Switchgear Breakers 2TA & 2TC fed from Transformer 2T2B
- Switchyard to Plant Transfer Trip (86TT/1B) - Trip PCB 1B, Trip 6.9 kV Switchgear Breakers 1TB & 1TD fed from Transformer 1T1B, Trip 6.9 kV Switchgear Breakers 1TA & 1TC fed from Transformer 1T2B
- Generator Breaker 2A Trip (50% Runback)

- Possible Loss of 125VDC due to Short Circuit - Power to Main Power Protective Relaying

V. Flood within Unit 2, Floodwall B which encloses transformers 2ATD, SATB and 2ATC)

Flooding within Floodwall B could lead to the loss of Transformers 2ATD, 1ATC, and STA and switchgear 2GTA & 2GTB. The transformers and switchgear are not sealed and thus would likely be lost during a flooding event.

- Unit 2 LOOP due to loss of Transformers 2ATC & 2ATD (Primary feeds to Train A (2ETA) and Train B (2ETB))

- Blackout on the 2ETA bus and starting / loading of the 2A Diesel Generator which is tied to the 2ETA bus. The 2ETA bus provides power for equipment necessary for plant safety during a LOCA or blackout.

- Blackout on the 2ETB bus and starting / loading of the 2B Diesel Generator which is tied to the 2ETB bus. The 2ETB bus provides power for equipment necessary for plant safety during a LOCA or blackout.

- Loss of 4160 V Blackout System (Bus 2FTA). Under normal shut down conditions following a blackout, 2FTA supplies power to non-essential loads necessary to achieve normal shutdown following a blackout, but not required during a LOCA. The blackout bus (2FTA) can be fed from switchgear 2ETA or 2GTA. The Breaker in switchgear 2GTA is electrically interlocked with the switchgear breakers 2ETA-2 & 2FTA-1. Flooding of switchgear 2GTA (Primary feed for Blackout Bus 2FTA) could prevent the swap-over from 2GTA to the alternate feed (Switchgear breakers 2ETA-2 & 2FTA-1) since these breakers are electrically interlocked and thus a loss of the 2FTA blackout bus would occur.

- Loss of 4160 V Blackout System (Bus 2FTB). Under normal shut down conditions following a blackout, 2FTB supplies power to non-essential loads necessary to achieve normal shutdown following a blackout, but not required during a LOCA. The blackout bus (2FTB) can be fed from switchgear 2ETB or 2GTB. The Breaker in switchgear 2GTA is electrically interlocked with the switchgear breakers 2ETB-2 & 2FTA-1. Flooding of switchgear 2GTB (Primary feed for Blackout Bus 2FTB) could prevent the swap-over from 2GTB to the alternate feed (Switchgear breakers 2ETB-2 & 2FTB-1) since these breakers are electrically interlocked and thus a loss of the 2FTB blackout bus would occur.

VI. Flood within Unit 2, Floodwall C which encloses terminal cabinet 2ATC22

A review of circuits contained in 2ATC22 was performed to identify the potential effected circuit loss. Based on the licensee's detailed review of electrical and instrumentation drawings associated with 2ATC22, the following scenarios were determined to be plausible in the event terminal cabinets were lost due to flooding.

- Loss of Busline 2A (PCBs 20 & 21)
- Zone A Lockout
- GCB 2A Trip
- Switchyard to Plant Transfer Trip (86TT/1A) - Switchyard PCB Breaker Failure Lock-out, Trip PCB 1A, Trip 6.9 kV Switchgear Incoming Breakers 1TC & 1TD fed from Transformer 1T1A, Trip 6.9 kV Incoming Switchgear Breakers 1TA & 1TB fed from Transformer 1T2A, Trips 13.8 kV Switchgear 1HTA Incoming Breaker fed from 1ATE
- GCB 2B Trip
- EHC 50% RUNBACK
- Loss of Busline 1A (PCBs 17 & 18)
- Switchyard to Plant Transfer Trip (86TT/2A): Switchyard PCB Breaker Failure Lock-out, Trip PCB 1A, Trip 6.9 kV Switchgear Breakers 2TC & 2TD fed from Transformer 2T1A, Trip 6.9 kV Switchgear Breakers 2TA & 2TB fed from Transformer 2T2A, Trips 13.8 kV Switchgear 1HTA Incoming Breaker fed from 2ATE
- Spurious IPB, Zone A Transformer, Generator PCB 1A alarms
- Spurious Switchyard Event Recorder Points

Potential Impact Of Flooding In The Standby Shutdown Facility (SSF) On Equipment Within The Structure

The licensee conducted an assessment of what the impact water intrusion into the SSF would have on equipment in each of the four (4) rooms within the facility. Attachment 10 to this inspection report shows the floor plan of the SSF and should be referred to when reviewing the equipment affected listed below by room. The calculation looked at the recently revised PMP level and then a 70% PMP level used in PRA modeling.

The postulated impact on the SSF's equipment following a PMP event was determined to have been as follows:

- **MCC / Switchgear Room**: Approximately 2 inches of water would result in the tripping of breakers in SLXG which provide power to the normal and standby battery chargers. Water entering into a 600V MCC could likely cause additional failures.

- **Battery Room**: No impact identified with up to 9" of water in the room

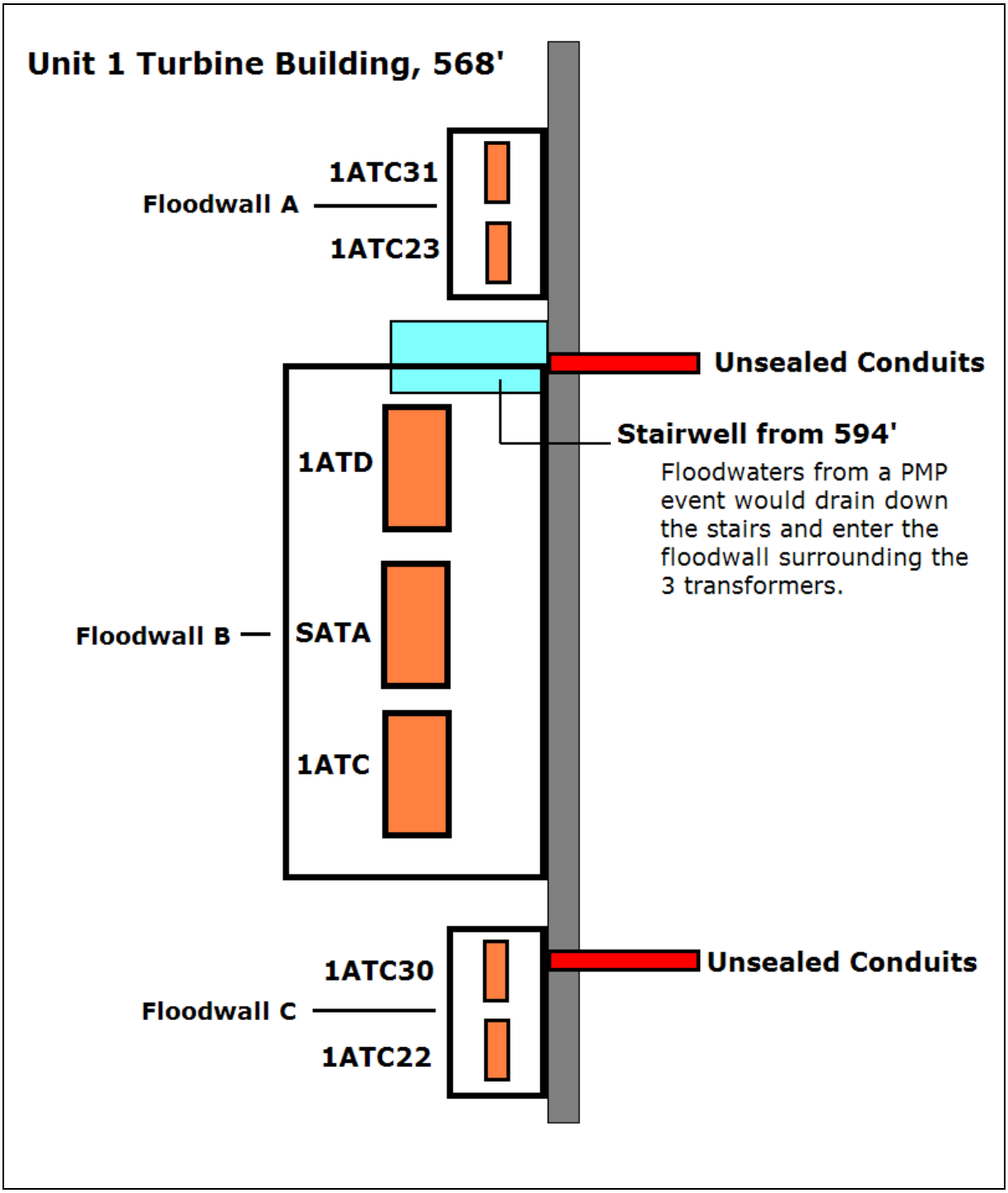
- **Control Room**: Approximately 6.5 inches of water would result in the failure of fuses that would disable the primary system instrumentation on the SSF control console affecting the ability to control both units.

- **DG Room**: Approximately 2.25 inches of water would cause blowing of fuses associated with transformers in the bottom of the DG control panel as the panel is not water tight. Water could leak through the door at 3.35 inches and additional water would enter at 4.25 inches through vent panels in the side of the room. The loss of these fuses would cause the DG to trip if running or keep it from starting if it was not yet operating.

The licensee's calculation shows that on a 70% PMP event there will be no loss of function in any of the rooms within the SSF; however, the SSF would be adversely impacted following a PMP event.

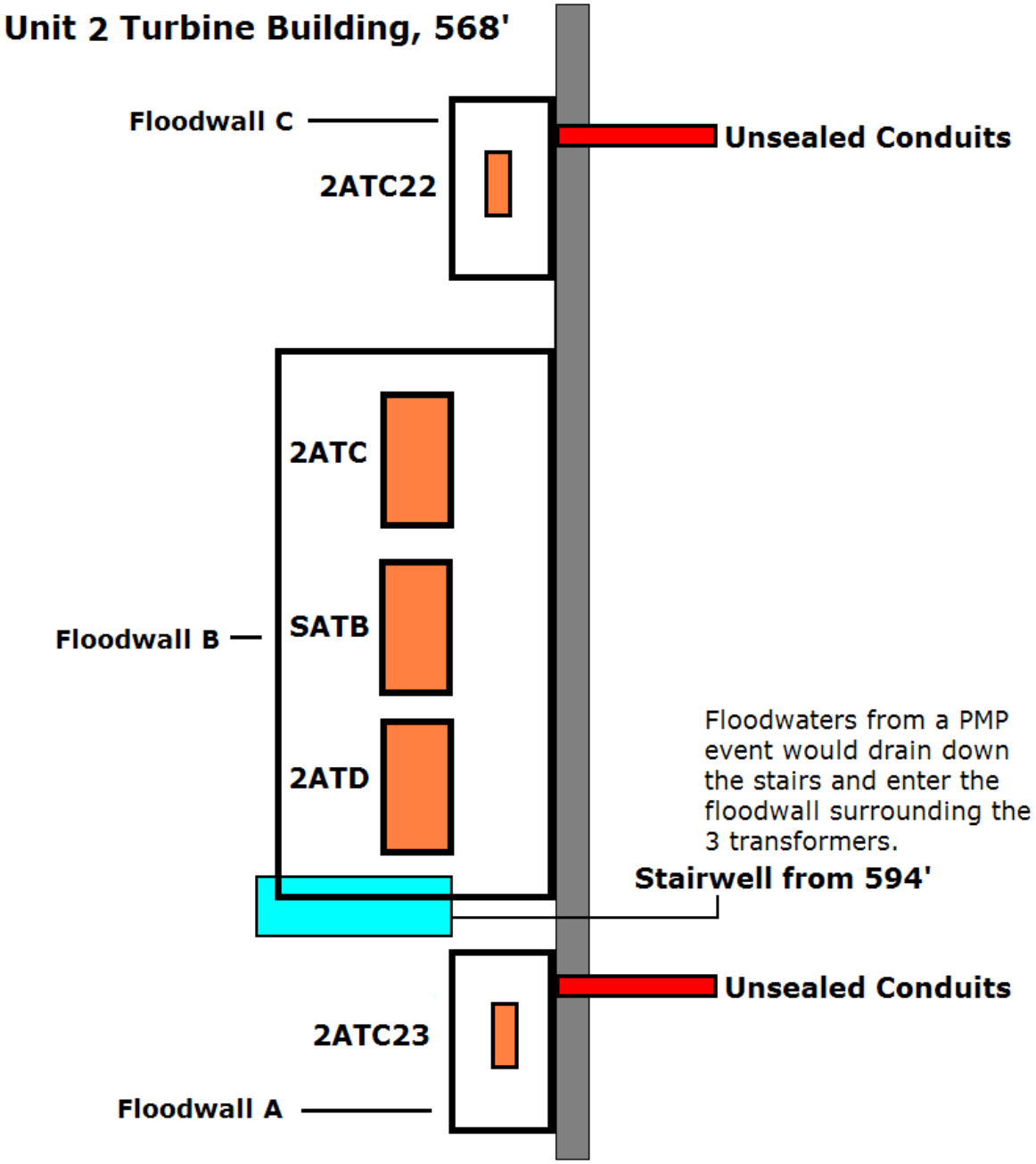
Turbine Building Floodwall Enclosure drawings

UNIT 1



Turbine Building Floodwall Enclosure drawings

UNIT 2



Attachment 9

Standby Shutdown Facility Floor Plan Drawings

NOTE: The floor elevation of the SSF is at 594' above Mean Sea Level (MSL). The PMP flood level at Catawba is currently 594' 9" above MSL.