



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 27, 2011

Mr. J. R. Morris  
Site Vice President  
Duke Energy Carolinas, LLC  
Catawba Nuclear Station  
4800 Concord Road  
York, SC 29745-9635

**SUBJECT: CATAWBA NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT  
05000413/2011003, 05000414/2011003**

Dear Mr. Morris:

On June 30, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Catawba Nuclear Station Units 1 and 2. The enclosed inspection report documents the inspection results which were discussed on July 12, 2011, with Mr. George Hamrick and other members of your staff.

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

This report documents two findings of very low safety significance (Green) which were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any 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 United States Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at Catawba. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at Catawba.

DEC

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) 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 Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Jonathan H. Bartley, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

Docket Nos.: 50-413, 50-414, 72-45  
License Nos.: NPF-35, NPF-52

Enclosure: Integrated Inspection Report 05000413/2011003, 05000414/2011003  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

DEC

2

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Letter to J. R. Morris from Jonathan H. Bartley dated July 27, 2011

SUBJECT: CATAWBA NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT  
05000413/2011003, 05000414/2011003

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-413, 50-414, 72-45

License Nos.: NPF-35, NPF-52

Report Nos.: 05000413/2011003, 05000414/2011003

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station, Units 1 and 2

Location: York, SC 29745

Dates: April 1, 2011, through June 30, 2011

Inspectors: A. Hutto, Senior Resident Inspector  
R. Cureton, Resident Inspector  
B. Collins, Reactor Inspector (Section 1R08)  
M. Coursey, Reactor Inspector (Section 1R08)  
K. Ellis, Resident Inspector, Oconee  
W. Loo, Senior Health Physicist (Section 2RS1)

Approved by: Jonathan H. Bartley, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000413/2011-003, 05000414/2011-003; 4/1/2011 – 6/30/2011; Catawba Nuclear Station, Units 1 and 2; Fire Protection, Maintenance Effectiveness

The report covered a three month period of inspection by three resident inspectors and three region-based inspectors. Two Green findings were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Cross-cutting aspects are determined using IMC 0310, "Components Within The Cross-Cutting Areas." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process."

### Cornerstone: Initiating Events

- Green. An NRC-identified non-cited violation of the Fire Protection Program (FPP) was identified when the licensee failed to evaluate 600V temporary power sources installed in a housekeeping area with approved transient combustibles as required by NSD 313, Control of Combustible and Flammable Material. This issue was entered into the licensee's corrective action program (CAP) and corrective actions included immediately removing the transient combustibles from the housekeeping area.

The failure to evaluate the energized 600V temporary power sources as an ignition source while located in a housekeeping area with approved transient combustibles was a performance deficiency (PD). The PD was more than minor because it was associated with the Initiating Events cornerstone attribute of Protection Against External Factors - Fire, and adversely affected the cornerstone objective in that a failure of the 600V temporary power source could ignite the transient combustibles causing damage to equipment located in the 1A Diesel Generator (DG) room. The finding was determined to be of very low safety significance (Green) because the transient combustibles did not involve low flash point liquids or self igniting material. This finding was associated with the aspect of appropriately planning work activities by incorporating job site conditions which may impact plant systems, of the Work Control component in the Human Performance cross-cutting area in that the licensee did not consider the effect of energized 600V temporary power cables on transient combustibles in a housekeeping zone. [H.3(a)] (Section 1R05)

### Cornerstone: Mitigating Systems

- Green. A self-revealing non-cited violation was identified for the licensee's failure to provide adequate instructions for obtaining oil samples on the 2B safety injection (NI) pump. As a result, maintenance technicians inserted a plastic tube into the pump gear box introducing foreign material (FM) into the bearing oil system. This issue was entered into the licensee's CAP and corrective actions included labeling of the oil sampling tube and establishing a written pre-job briefing for taking oil samples.

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The licensee's failure to provide adequate instructions to perform oil sampling on the 2B NI pump was a PD. The PD was more than minor because it affected the Procedure Quality attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective in that FM was introduced into the pump's bearing oil system that could have resulted in the 2B NI pump not performing its safety function. The finding was determined to be of very low safety significance (Green) because the finding did not represent an actual loss of safety function of a single train for greater than its Technical Specifications (TS) allowed outage time. This finding had a cross-cutting aspect of human error prevention techniques in the Work Practices component of the Human Performance cross-cutting area because a detailed pre-job brief or an appropriate questioning attitude by the technicians would have prevented this condition. [H.4(a)] (Section 1R12)

## REPORT DETAILS

### Summary of Plant Status

Unit 1 operated at or near 100 percent Rated Thermal Power (RTP) until April 23 when the unit was shut down for a planned refueling outage. The unit was restarted and reached 100 percent RTP on June 11 and remained at or near 100 percent RTP for the remainder of the inspection period.

Unit 2 operated at or near 100 percent RTP for the entire inspection period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

Adverse Weather Preparation: The inspectors reviewed the licensee's preparations for adverse weather associated with hot ambient temperatures including a review of procedures and work orders implemented by the licensee to ensure plant equipment was adequately protected during the hot weather season. The inspectors also performed field walkdowns to assess the material condition and operation of ventilation and cooling equipment as well as other preparations made to protect plant equipment from high seasonal temperatures. In addition, the inspectors conducted discussions with licensee personnel responsible for implementing the hot weather protection program to assess the licensee's ability to identify and resolve deficient conditions associated with hot weather protection equipment prior to seasonal high temperatures.

Evaluation of Summer Readiness of Offsite and Alternate AC Power Systems: The inspectors reviewed the licensee's procedures and measures designed to monitor and maintain availability and reliability of both the offsite AC power system (grid) and the onsite alternate AC power systems prior to the onset of summer weather conditions and the resulting higher load demand on the grid. This included the review of the licensee's station, nuclear division, and power delivery group procedures defining the coordination of activities that could impact the onsite and offsite AC power systems and the communication protocols established between the power delivery group and Catawba to verify that the appropriate information is exchanged when issues arise that could impact the AC power systems.

Flood Protection Measures - External: The inspectors performed a walkdown of external site areas including designated Type I inlet catch basins onsite, cooling tower yard berms, and diesel generator room access curbs and seals which were designed to protect safety-related facilities from flooding during a local probable maximum precipitation event. The walkdown included observing that the steel gratings on four sides and top of the basins were intact. To the extent possible, the inspectors visually observed the basins and pipe cavities to determine that the areas were free of debris accumulation and that no significant blockage of the drains was apparent. The

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inspectors also observed the condition of berms and seals to verify that their physical condition had not degraded and were capable to fulfill their designed functions. The inspectors reviewed the CAP documents to verify that the licensee was identifying issues at a low threshold and resolving them. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

a. Inspection Scope

Partial Walkdowns: The inspectors performed three partial system walkdowns during the activities listed below to assess the operability of redundant or diverse trains and components when safety-related equipment was inoperable. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increased risk. The inspectors reviewed applicable operating procedures and walked down system components, selected breakers, valves, and support equipment to determine if they were in the correct position to support system operation. The inspectors reviewed protected equipment sheets, maintenance plans, and system drawings to determine if the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP. Documents reviewed are listed in the Attachment.

- A train of control room area ventilation and control area chilled water while the B train was inoperable due to a chiller pump overhaul
- Unit 2 B train of nuclear service water (RN) while the A train header was drained to support Unit 1 outage modifications
- 1B DG while the 1A DG was unavailable due to planned maintenance

b. Findings

No findings were identified.

1R05 Fire Protection

a. Inspection Scope

Fire Protection Walkdowns: The inspectors walked down accessible portions of the four plant areas listed below to assess the licensee's control of transient combustible material and ignition sources, fire detection and suppression capabilities, fire barriers, and any related compensatory measures. The inspectors observed the fire protection suppression and detection equipment to determine if any conditions or deficiencies existed which could impair the operability of that equipment. The inspectors selected the

areas based on a review of the licensee's safe shutdown analysis probabilistic risk assessment and sensitivity studies for fire-related core damage accident sequences.

- 1A DG room
- Unit 1 auxiliary feedwater pump room and motor driven auxiliary feedwater pump pits
- Unit 1 electrical penetration room 560' elevation
- Unit 2 switchgear room 594' elevation

Fire Drill Observations: The inspectors observed a drill conducted on June 17, 2011, involving a simulated fire in the 1A DG room. The inspectors verified the fire brigade's use of protective gear and firefighting equipment; that fire fighting pre-plan procedures and appropriate fire fighting techniques were used; that the directions of the fire brigade leader were thorough, clear, and effective; and that control room personnel responded appropriately to the simulated fire events. The inspectors also attended the drill critique to assess if the licensee was appropriately critical, included discussions of drill observations, and identified any areas requiring corrective actions. Documents reviewed are listed in the Attachment.

b. Findings

Introduction: An NRC-identified Green NCV of the FPP was identified when the licensee failed to evaluate 600V temporary power sources installed in a housekeeping area with approved transient combustibles as required by NSD 313, Control of Combustible and Flammable Material.

Description: During a walkdown of the 1A DG room, the inspectors observed a housekeeping area which contained energized 600V temporary power sources for welding equipment being used in an ongoing plant modification. The housekeeping area also contained approved transient combustibles; however, the transient combustibles were located directly next to the energized 600V temporary power sources. NSD 313 required that transient combustibles shall not be located directly next to or directly on an ignition source such as energized electrical equipment. The inspectors noted that the fire loading evaluation did not include these temporary power sources as an ignition source. The inspectors discussed this condition with the licensee who determined the storage of the transient combustibles would not have been approved based on the temporary power sources as an ignition source. The licensee immediately removed the transient combustibles from the housekeeping area.

Analysis: The failure to evaluate the energized 600V temporary power sources as an ignition source while located in a housekeeping area with approved transient combustibles was a PD. The PD was more than minor because it was associated with the Initiating Events cornerstone attribute of Protection Against External Factors - Fire, and adversely affected the cornerstone objective in that a failure of the 600V temporary power source could ignite the transient combustibles causing damage to equipment located in the 1A DG room. The finding was determined to be of very low safety significance (Green) using IMC 0609, Appendix F, Attachment 1, because the transient combustibles did not involve low flash point liquids or self igniting material. This finding

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was associated with the aspect of appropriately planning work activities by incorporating job site conditions which may impact plant systems, of the Work Control component in the Human Performance cross-cutting area in that the licensee did not consider the effect of energized 600V temporary power cables on transient combustibles in a housekeeping zone. [H.3(a)]

Enforcement: 10 CFR 50.48 stated that each operating nuclear power plant must have a FPP that satisfies Criterion 3 of 10 CFR 50, Appendix A. Catawba Unit 1 License Condition 2.C.5 stated that the licensee shall implement and maintain in effect all provisions of the approved FPP as described in the Updated Final Safety Analysis Report (UFSAR). Catawba UFSAR, section 9.5.1.2, stated in part that administrative controls were included in NSDs to manage control of flammable and combustible materials. NSD 313 required that transient combustibles shall not be located directly next to, or directly on, an ignition source such as energized electrical equipment and cables. Contrary to the above, from about February 28, 2011, until March 1, 2011, the licensee failed to adequately implement the FPP as required by NSD 313 in that energized 600V temporary power sources were not included as an ignition source when evaluating transient combustibles stored in a housekeeping area in the 1A DG Room. Because this condition is of very low safety significance (Green) and is in the licensee's CAP as Problem Investigation Program (PIP) C-11-1611, this violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000413/2011003-01, Failure to Adequately Control Energized Temporary Power Sources with Transient Fire Loads Present.

#### 1R06 Flood Protection Measures

##### a. Inspection Scope

The inspectors reviewed the UFSAR, Individual Plant Examination, and flood analysis documentation associated with internal plant areas to determine the effect of flooding. The inspectors reviewed the licensee's internal flood protection features for the flood walls constructed in the 568 foot elevation in the Unit 1 and Unit 2 Turbine Buildings to protect electrical switchgear and transformers against flooding caused by the rupture of piping or components associated with the circulating water system. The internal areas were selected and walked down based on the flood analysis calculations. Through observation and design review, the inspectors reviewed sealing of doors, holes in penetrations, potential flooding sources, and water intrusion detection instrumentation. The inspectors reviewed corrective action program documents to verify that the licensee was identifying issues and resolving them. Documents reviewed are listed in the Attachment.

##### b. Findings

No findings were identified.

## 1R08 Inservice Inspection (ISI) Activities

The inspectors conducted a review of the implementation of the licensee's ISI program for monitoring degradation of the reactor coolant system, steam generator tubes, emergency feedwater systems, risk-significant piping and components and containment systems. These reviews constituted one ISI inspection sample as defined in Inspection Procedure 71111.08.

### a. Inspection Scope

Piping Systems ISI: The inspectors observed and reviewed records of the following non-destructive examinations mandated by the ASME Code Section XI to evaluate compliance with the ASME Code Section XI and Section V requirements and, if any indications and defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative requirement.

- Ultrasonic Testing (UT) of Reducer to Tee 1CA105-9
- Magnetic Particle Test (MT) of Reducer to Tee 1CA105-9
- Penetration Test (PT) of CA105-47 Valve to Pipe weld

The licensee did not identify any recordable indications during non-destructive surface and volumetric examinations performed since the previous refueling outage. Therefore, no NRC review was completed for this inspection procedure attribute.

The inspectors reviewed the following pressure boundary welds completed for risk-significant systems during the outage to evaluate if the licensee applied the pre-service non-destructive examinations and acceptance criteria required by the construction code, NRC-approved code case, NRC-approved code relief request or the ASME Code Section XI. In addition, the inspectors reviewed the welding procedure specification and supporting weld procedure qualification records to evaluate if the weld procedures were qualified in accordance with the requirements of construction code and the ASME Code Section IX.

- Work Order 0189698-1, 1NI PP SYS - Cut out and Replace Weld 1NI235-42
- Work Order 01702926, CE101873 1KD-024: Replace W/05B-490

Reactor Pressure Vessel Upper Head Penetration Inspection Activities For the Unit 1 reactor vessel head, a bare metal visual examination (BMVE) was required this outage by 10 CFR 50.55a(g)(6)(ii)(D). The inspectors reviewed records of the BMVE at penetrations to evaluate if the activities were conducted in accordance with the requirements of ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). The inspectors reviewed the following documentation and observed the following activities:

- Evaluated if the required BMVE scope/coverage was achieved and limitations (if applicable) were recorded in accordance with the licensee procedures.
- Evaluated if the licensee's criteria for BMVE quality and instructions for resolving interference and masking issues were adequate.

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Boric Acid Corrosion Control (BACC): The inspectors performed an independent walkdown of portions of the borated systems which recently received a licensee boric acid walkdown to evaluate if the licensee's BACC visual examinations emphasized locations where boric acid leaks could cause degradation of safety-significant components. The inspectors reviewed the following licensee evaluations of reactor coolant system components with boric acid deposits or evidence of active boric acid leakage to evaluate if degraded components were documented in the CAP. The inspectors also evaluated the corrective actions for any degraded reactor coolant system components against the component ASME Code Section XI, and other licensee committed documents.

- PIP-C-09-6895 – Inactive boric acid leak on valve IND-68
- PIP-C-09-6897 – Inactive boric acid leak on valve IND-44
- PIP-C-09-6915 – Inactive boric acid leak on valve INV-849
- PIP-C-10-1376 – Recurring Leak Problem
- PIP-C-10-2996 – This PIP is generated to identify 4 active Boron Leaks
- PIP-C-10-4856 – Valve 1NV-827 has an Active Leak

Steam Generator (SG) Tube Inspection Activities: The inspectors observed the following activities and/or reviewed the following documentation and evaluated them against the licensee's technical specifications, commitments made to the NRC, ASME Section XI, and Nuclear Energy Institute (NEI) 97-06 (Steam Generator Program Guidelines):

- Reviewed the licensee's in-situ SG tube pressure testing screening criteria and assessed if the assumed NDE flaw sizing accuracy was consistent with data from the EPRI examination technique specification sheets (ETSS) or other applicable performance demonstrations.
- Interviewed Eddy Current Testing (ET) data analysts and reviewed five samples of ET data.
- Compared the numbers and sizes of SG tube flaws/degradation identified against the licensee's previous outage Operational Assessment.
- Reviewed the SG tube ET examination scope and expansion criteria.
- Evaluated if the licensee's SG tube ET examination scope included potential areas of tube degradation identified in prior outage SG tube inspections and/or as identified in NRC generic industry operating experience applicable to the licensee's SG tubes.
- Reviewed the licensee's implementation of their extent of condition inspection scope and repairs for new SG tube degradation mechanism(s). No new degradation mechanisms were identified during the ET examinations.
- Reviewed the licensee's repair criteria and processes.
- Verified primary-to-secondary leakage (e.g., SG tube leakage) was below three gallons per day, or the detection threshold, during the previous operating cycle.
- Evaluated if the ET equipment and techniques used by the licensee to acquire data from the SG tubes were qualified or validated to detect the known/expected types of SG tube degradation in accordance with Appendix H, Performance Demonstration for Eddy Current Examination, of EPRI Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7.

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- Reviewed the licensee's secondary side SG Foreign Object Search and Removal (FOSAR) activities.
- Reviewed the licensee's evaluations and repairs for SG tubes damaged by foreign material or tubes surrounding inaccessible foreign objects left within the secondary side of the steam generators.
- Reviewed ET personnel qualifications.

Identification and Resolution of Problems: To evaluate compliance with 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, the inspectors performed a review of ISI/SG related problems entered into the licensee's CAP listed in the Attachment and conducted interviews with licensee staff to determine if:

- the licensee had established an appropriate threshold for identifying ISI/SG related problems;
- the licensee had performed a root cause (if applicable) and taken appropriate corrective actions; and
- the licensee had evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

a. Inspection Scope

The inspectors observed an annual requalification examination scenario on June 30, 2011, to assess the performance of licensed operators during a license operator requalification simulator exam session. The inspection focused on high-risk operator actions performed during implementation of the abnormal and emergency operating procedures, and the incorporation of lessons-learned from previous plant and industry events. The classification and declaration of the Emergency Plan by the Shift Technical Advisor and Operations Shift Manager was also observed during the scenario. The post-scenario critique conducted by the training instructor and the crew was observed. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

The inspectors reviewed the two activities listed below for items such as: (1) appropriate work practices; (2) identifying and addressing common cause failures; (3) scoping in accordance with 10 CFR 50.65(b) of the Maintenance Rule; (4) characterizing reliability issues for performance; (5) trending key parameters for condition monitoring; (6) charging unavailability for performance; (7) classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and (8) appropriateness of performance criteria for Structures, Systems, and Components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). For each item selected, the inspectors performed a detailed review of the problem history and surrounding circumstances, evaluated the extent of condition reviews as required, and reviewed the generic implications of the equipment and/or work practice problem. Documents reviewed are listed in the Attachment.

- PIP C-11-2334, 2B NI pump oil sample tube cut off in oil pump gear
- PIP C-11-3215, An adverse trend has been identified on the hydrogen mitigation system for excessive igniter failures

b. Findings

Introduction: A self-revealing Green NCV was identified for the licensee's failure to provide adequate instructions for obtaining oil samples on the 2B NI pump. As a result, maintenance technicians inserted a plastic tube into the pump gear box introducing FM into the bearing oil system. Corrective actions included labeling of the oil sampling tube and establishing a written pre-job briefing for taking oil samples.

Description: On March 26, 2011, maintenance technicians attempted to obtain a 2B NI pump lube oil sample during a pump surveillance test. The pump has an oil sample tube extending from the top of the oil reservoir which was located under the oil pump gear box. The pump gear box has a breather tube extending from the top of the gear box similar in appearance to the oil sample tube. When obtaining the oil sample, technicians inserted a plastic tube into the pump gear box breather tube instead of the oil sample tube. Because the pump was running at the time, the gears inside the pump gear box shredded about three inches of the plastic tube which introduced FM into the bearing oil system. The licensee determined that the potential impact of the FM would have been to damage the gear drive for the oil pump or the oil pump itself. Also, the FM could clog or impede function of bearing oil system components such as the regulating valve to maintain desired oil supply pressure leading to severe pump damage including complete bearing failure. The licensee removed the pump from service and flushed the bearing oil system to remove the FM which rendered the pump inoperable for approximately 60 hours.

The licensee considered taking oil samples a skill-of-the-craft activity; therefore, neither the work order nor procedure MP/0/A/7650/002, Lubrication of Station Equipment, provided specific details about the oil sample location. Additionally, human error

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reduction tools were not used as the oil sample location was not covered in the pre-job brief and the technicians did not question the correct sample location on the pump.

Analysis: The licensee's failure to provide adequate instructions to perform oil sampling on the 2B NI pump was a PD. The PD was more than minor because it was associated with the Mitigating Systems cornerstone attribute of Procedure Quality and adversely affected the cornerstone objective in that FM was introduced into the pump's bearing oil system that could have resulted in the 2B NI pump not performing its safety function. The finding was assessed using IMC 0609, Attachment 4, Table 4a, Characterization Worksheet for IE, MS, and BI Cornerstones, and determined to be of very low safety significance (Green) because the finding did not represent an actual loss of safety function of a single train for greater than its TS allowed outage time. This finding had a cross-cutting aspect of human error prevention techniques in the Work Practices component of the Human Performance cross-cutting area because a detailed pre-job brief or an appropriate questioning attitude by the technicians would have prevented this condition. [H.4(a)]

Enforcement: TS 5.4.1 required that procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide (RG) 1.33. RG 1.33, Appendix A, Section 9, Procedures for Performing Maintenance, recommended that maintenance that can affect the performance of safety related equipment should be properly pre-planned and performed in accordance with written procedures, documented instructions, or drawings appropriate to the circumstances. Contrary to the above, as of March 26, 2011, the licensee failed to adequately establish written instructions for obtaining lube oil samples resulting in the introduction of FM into the 2B NI pump bearing oil system which could have prevented the 2B NI pump from performing its safety function. Because the finding was determined to be of very low safety significance and was entered into the licensee's CAP as PIP C-11-2334, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000414/2011003-02, Inadequate Procedures for Obtaining Lube Oil Samples from the 2B NI Pump.

#### 1R13 Maintenance Risk Assessments and Emergent Work Control

##### a. Inspection Scope

The inspectors reviewed the following five activities to determine if the appropriate risk assessments were performed prior to removing equipment for work. When emergent work was performed, the inspectors reviewed the risk assessment to determine that the plant risk was promptly reassessed and managed. The inspectors reviewed the use of the licensee's risk assessment tool and risk categories in accordance with NSD 415, Operational Risk Management (Modes 1-3), to verify there was appropriate guidance to comply with 10 CFR 50.65(a)(4). Documents reviewed are listed in the Attachment.

- Unit 1 end-of-cycle (EOC)19 Outage Risk Assessment
- Critical activity plan for RN to DG engine cooling water piping replacement for 1A DG during 1EOC19
- Risk evaluation during planned maintenance of the 1A DG

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- Complex activity plan for replacement of component cooling (KC) discharge crossover valves
- Emergent yellow risk due to inoperable 2B DG ventilation damper failure

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors evaluated the technical adequacy of the six operability evaluations or functionality assessments listed below to determine if TS operability was properly justified and the subject components and systems remained available such that no unrecognized increase in risk occurred. The inspectors reviewed the operability determinations to verify that they were made as specified by NSD 203, Operability. The inspectors reviewed the UFSAR to determine that the systems and components remained available to perform their intended function. Documents reviewed are listed in the Attachment.

- PIP C-11-2789, 1A steam generator power operated relief valve solenoid fuse F-10 blown
- PIP C-11-2511, Steam leak on end of auxiliary feedwater pump turbine
- PIP C-11-2623, Control area chilled water pump shaft replaced with non-quality assured shaft until a quality assured shaft is obtained
- PIP C-11-3561, Valcor solenoid valves environmental qualification service life
- PIP C-11-3393, Some solenoid valves on Unit 2 had new electrical connectors installed that do not meet the environment qualification requirements noted on the connection diagrams and environment qualification maintenance manual
- PIP C-11-5074, A train KC crossover valves closed

b. Findings

No findings were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed the four post-maintenance tests listed below to determine if procedures and test activities ensured system operability and functional capability. The inspectors reviewed the licensee's test procedures to determine if the procedures adequately tested the safety function(s) that may have been affected by the maintenance activities, that the acceptance criteria in the procedures were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedures had been properly reviewed and approved. The inspectors also

witnessed the tests and/or reviewed the test data to determine if test results adequately demonstrated restoration of the affected safety function(s). Documents reviewed are listed in the Attachment.

- Containment spray pump 2B performance test following preventative maintenance
- 1A DG following outage maintenance
- 1RN-846A test following maintenance due to failure during 1A auxiliary shutdown panel testing
- Zero power physics testing following Unit 1 core reload during refueling outage 1EOC19

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities

a. Inspection Scope

The inspectors conducted reviews and observations for selected outage activities to ensure that: (1) the licensee considered risk in developing the outage plan; (2) the licensee adhered to the outage plan to control plant configuration based on risk; (3) that mitigation strategies were in place for losses of key safety functions; and (4) the licensee adhered to operating license and TS requirements. Between April 23, 2011, and June 11, 2011, the following activities related to the 1EOC19 refueling outage were reviewed for conformance to applicable procedures and selected activities associated with each evaluation were witnessed. Documents reviewed are listed in the Attachment.

- Clearance activities
- Reactor coolant system instrumentation
- Shutdown decay heat removal and inventory control
- Containment closure
- Refueling activities
- Plant heatup/mode changes from No Mode to Mode 1
- Core physics testing
- Power escalation

b. Findings

No findings were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the seven tests listed below, the inspectors witnessed testing and/or reviewed the test data to determine if the SSCs involved in these tests satisfied the requirements

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described in the TS, the UFSAR, and applicable licensee procedures, and that the tests demonstrated that the SSCs were capable of performing their intended safety functions. Documents reviewed are listed in the Attachment.

#### Surveillance Tests

- MP/0/A/7150/072, Main Steam Valve Safety Valve Setpoint Test, Rev. 018
- PT/0/A/4400/008 A, RN Flow balance Train A, Rev. 056
- PT/1/A/4200/009, Engineered Safety Features Actuation Periodic Test, Rev. 181

#### In-Service Tests

- PT/2/A/4200/005 B, Safety Injection Pump 2B Performance Test, Rev. 040

#### Ice Condenser Test

- MP/0/A/7150/005, Ice Basket Weight Determination, Rev. 030

#### Containment Isolation Valve

- PT/1/A/4200/001 C, As Left Containment Isolation Valve Leak Rate Test, Rev. 118; Enclosure 13.27, Penetration No. M386 As Left Type C Leak Rate Test
- PT/1/A/4200/001 C, As left Containment Isolation Valve Leak Rate Test, Rev. 118; Enclosure 13.46, Penetration No. CNIP-1EMF(IN) As Left Type C Leak Rate Test

#### b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

#### 1EP6 Drill Evaluation

##### a. Inspection Scope

The inspectors observed and evaluated the licensee's emergency planning performance during a drill conducted on April 7, 2011. The drill scenario commenced with an anticipated transient without scram resulting in an alert, followed by a site area emergency as a result of a loss on an emergency bus and several equipment failures. The scenario eventually progressed to a loss of all AC power. The inspectors reviewed licensee activities that occurred in the simulator and the Technical Support Center during a simulated event. The inspectors' assessment focused on the timeliness and accuracy of the event classification, notification of offsite agencies and the overall response of the personnel involved in the drill from an operations and emergency planning perspective. The performance of the Emergency Response Organization was evaluated against applicable licensee procedures and regulatory requirements. The inspectors attended the post-exercise critique for the drill to evaluate the licensee's self-assessment process for identifying potential deficiencies relating to failures in classification and notification. The inspectors reviewed the completed critique developed by the licensee documenting the overall performance of the Emergency Response Organization.

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b. Findings

No findings were identified.

2. RADIATION SAFETY (RS)

Cornerstones: Occupational Radiation Safety, Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls

a. Inspection Scope

Hazard Assessment and Instructions to Workers: During walkdowns, the inspectors observed labeled radioactive material, postings for radiation areas and high radiation areas (HRAs) in the radiologically controlled area (RCA) radioactive materials control tent, Independent Spent Fuel Storage Installation, and other storage locations. Inspectors also observed and evaluated labels on selected containers in those locations. The inspectors reviewed survey records for several plant areas including surveys for alpha emitters, hot particles, airborne radioactivity, gamma surveys within areas of high dose rate gradients, and pre-job surveys for upcoming tasks. Inspectors independently surveyed areas in the plant and compared results to radiological conditions and postings in the plant. Inspectors also reviewed air sample records and observed work in potential airborne areas to assess the location of air monitors. This included the activities associated with the removal of the 1A reactor coolant pump (RCP) impeller, 1NV892 valve, and "A" and "D" Steam Generator work platforms.

The inspectors discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. Inspectors attended pre-job briefings for selected Unit 1 refueling tasks and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers to include radiography, steam generator eddy current testing, and 1A RCP activities. RWPs for work in airborne areas were also reviewed to assess airborne radioactive controls and monitoring to include the 1A RCP impeller, 1NV892 valve, and "A" and "D" Steam Generator work platforms.

Hazard Control and Work Practices: The inspectors evaluated access barrier effectiveness including key control for selected Unit 1 and Unit 2 Locked HRAs (LHRA), and Very HRAs (VHRA) locations. Changes to procedural guidance for LHRA and VHRA controls were discussed with Radiation Protection (RP) supervisors and Control Room Operators. Controls and their implementation for storage of irradiated material within the spent fuel pool (SFP) were reviewed and discussed with the SFP Reactor Engineer. Areas where dose rates could change significantly as a result of plant shutdown and refueling operations were also discussed.

Occupational workers' adherence to selected RWPs and RP technician (RPT) proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff of selected Unit 1 refueling activities. Electronic dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation

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survey results for jobs in upper and lower containment, lower annulus, and the Auxiliary Building. ED alarm logs were reviewed and worker response to dose and dose rate alarms for selected work activities was evaluated. RPT coverage and actions at the Unit 1 containment single point of access (SPA) were reviewed and discussed in detail.

Control of Radioactive Material: The inspectors observed the release of potentially contaminated materials and personnel from the RCA and SPA with the use of small article monitors, personnel contamination monitors, and portal monitor instruments. The inspectors discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. In addition, the inspectors reviewed controls for hand surveying large tools and equipment for release from the RCA and SPA. The inspectors compared recent 10 CFR Part 61 results for the Dry Active Waste radioactive waste stream with radionuclides used in calibration sources to evaluate the appropriateness and accuracy of release survey instrumentation. The inspectors also reviewed source inventory and discussed leak tests for selected sealed sources and discussed nationally tracked source transactions with RP staff.

Problem Identification and Resolution: The inspectors reviewed selected PIPs associated with radiological hazard assessment and control. The reviewed items included selected PIP reports, self-assessments, and quality assurance audit documents. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure NSD 208, Problem Investigation Program, Revision 32. RP activities were evaluated against the requirements of Updated Final Safety Analysis Report Chapter 12; Technical Specifications Section 5.7; 10 CFR Parts 19 and 20; and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA and SPA were evaluated against 10 CFR Part 20, and IE Circular 81-07, Control of Radioactively Contaminated Material.

Documents reviewed are listed in the Attachment. The inspectors completed all specified line-items detailed in Inspection Procedure 71124.01 (sample size of 1).

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification

a. Inspection Scope

The inspectors sampled licensee data to confirm the accuracy of reported performance indicator (PI) data for the six indicators during periods listed below. To determine the accuracy of the reported PI elements, the reviewed data was assessed against PI definitions and guidance contained in Nuclear Energy Institute 99-02, Regulatory Assessment Indicator Guideline, Rev. 5. Documents reviewed are listed in the Attachment.

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Cornerstone: Mitigating Systems

- Emergency AC Power, Units 1 & 2
- High Pressure Safety Injection, Units 1 & 2
- Auxiliary Feedwater, Units 1 & 2

The inspectors reviewed the licensee's procedures and methods for compiling and reporting the PIs including the Reactor Oversight Program Mitigating Systems Performance Indicator (MSPI) Basis Document for Catawba. The inspectors reviewed the raw data for the PIs listed above for the period of April 1, 2010, through March 31, 2011. The inspectors also independently screened TS Action Item Logs, selected control room logs, work orders and surveillance procedures, and maintenance rule failure determinations to determine if unavailability/unreliability hours were properly reported. The inspectors compared the licensee's raw data against the graphical representations and specific values contained on the NRC's public web page for 2010-2011. The inspectors also reviewed the past history of PIPs for systems affecting the Mitigating Systems Performance Indicators listed above for any that might have affected the reported values.

The inspectors also reviewed the licensee's activities related to submission of updated MSPI data in June 2011 for the Unit 1 Cooling Water Systems PI that resulted in a color change from White to Green for 1<sup>st</sup> Quarter 2011. The licensee determined that a 1B1 KC pump start failure was erroneously counted in the unreliability index as the failure was due to a defective control room switch and not a breaker failure as originally thought. As a result, the pump would have auto-started to perform its safety function. The inspectors reviewed the licensee's root cause, material investigation report, and system wiring diagrams to verify the validity and accuracy of the data revision. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution: Operating Experience Smart Sample (OpESS) FY 2010-01, Recent Inspection Experience for Components Installed Beyond Vendor Recommended Service Life.

.1 Daily Review

As required by Inspection Procedure 71152, Problem Identification and Resolution, and to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed screening of items entered into the licensee's corrective action program. This was accomplished by reviewing copies of PIPs, attending selected daily Site Direction and PIP screening meetings, and accessing the licensee's computerized database.

## .2 Focused Review

### a. Inspection Scope

The inspectors performed an in-depth review of PIP C-11-2709, 1A SG PORV 1SV19 Solenoid Ground, which was within the Mitigating Systems cornerstone. The inspectors reviewed the actions taken to determine if the licensee had adequately addressed the following attributes:

- Complete, accurate and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with safety significance
- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue
- Components and subcomponents have applicable PMs for replacement consistent with vendor recommendations, or components that are beyond recommended vendor service life have an engineering evaluation that has accounted for environmental effects

### b. Findings

No findings were identified

## .3 Semi-Annual Trend Review

### a. Inspection Scope

As required by IP 71152, Problem Identification and Resolution, the inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screenings, licensee trending efforts, and licensee human performance results. This review nominally considered the six month period of January 2011 through June 2011 although some examples expanded beyond those dates when the scope of the trend warranted. The review also included issues documented outside the normal CAP in major equipment problem lists, plant health team vulnerability lists, focus area reports, system health reports, self-assessment reports, maintenance rule reports, and Safety Review Group Monthly Reports. The inspectors compared and contrasted their results with the results contained in the licensee's latest quarterly trend reports. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified. In general, the licensee has identified trends and has appropriately addressed the trends within their CAP and no new trends were identified.

4OA3 Follow-up of Events and Notices of Enforcement Discretion

a. Inspection Scope

Entry into Abnormal Operating Procedure due to Primary Chemistry Out of Specification

On April 18, 2011, Operations was notified by Chemistry that the lithium concentration in the Unit 2 reactor coolant system (RCS) placed them in Action Level 1. Operations entered AP/0/A/5500/035, Primary Chemistry out of Specification. A cation bed was placed in service for approximately one hour to lower the concentration of lithium in the RCS to within normal operating parameters. The resident inspectors observed the decision making process and reviewed the actions required to return primary chemistry within specifications.

b. Findings

No findings were identified.

4OA5 Other Activities

.1 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted observations of security force personnel and activities to ensure that the activities were consistent with licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours. These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status reviews and inspection activities.

b. Findings

No findings were identified.

.2 Independent Spent Fuel Storage Installation Radiological Controls

a. Inspection Scope

The inspectors reviewed the licensee's procedures and observed operations associated with storing spent fuel in the Independent Spent Fuel Storage Installation in accordance with Inspection Procedure 60855. The inspectors observed selected licensee activities

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related to the loading of cask number 39 to verify that they performed these activities in a safe manner and in compliance with approved procedures. The inspectors reviewed the cask loading verification video for each of the above casks to verify that the alpha-numeric identification numbers stamped on the loaded fuel assemblies and burnable poison assemblies matched the identification numbers designated in the associated documentation packages. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

.3 (Closed) NRC Temporary Instruction 2515/183, Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event

a. Inspection Scope

The inspectors assessed the activities and actions taken by the licensee to assess its readiness to respond to an event similar to the Fukushima Daiichi nuclear plant fuel damage event. This included (1) an assessment of the licensee's capability to mitigate conditions that may result from beyond design basis events, with a particular emphasis on strategies related to the spent fuel pool, as required by NRC Security Order Section B.5.b issued February 25, 2002, as committed to in severe accident management guidelines, and as required by 10 CFR 50.54(hh); (2) an assessment of the licensee's capability to mitigate station blackout conditions, as required by 10 CFR 50.63 and station design bases; (3) an assessment of the licensee's capability to mitigate internal and external flooding events, as required by station design bases; and (4) an assessment of the thoroughness of the walkdowns and inspections of important equipment needed to mitigate fire and flood events, which were performed by the licensee to identify any potential loss of function of this equipment during seismic events possible for the site.

b. Findings

Inspection Report 05000413/414/2011008 (ML111330185) documented detailed results of this inspection activity. Following issuance of the report, the inspectors conducted detailed follow-up on selected issues. No findings were identified.

.4 (Closed) NRC Temporary Instruction 2515/184, Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)

On May 27, 2011, the inspectors completed a review of the licensee's severe accident management guidelines (SAMGs), implemented as a voluntary industry initiative in the 1990's, to determine (1) if the SAMGs were available and updated, (2) if the licensee had procedures and processes in place to control and update its SAMGs, (3) the nature and extent of the licensee's training of personnel on the use of SAMGs, and (4) licensee personnel's familiarity with SAMG implementation.

The results of this review were provided to the NRC task force chartered by the Executive Director for Operations to conduct a near-term evaluation of the need for agency actions following the Fukushima Daiichi fuel damage event in Japan. Plant-specific results for Catawba Nuclear Station were provided in the Enclosure to a memorandum to the Chief, Reactor Inspection Branch, Division of Inspection and Regional Support, dated June 2, 2011 (ML111530328).

40A6 Meetings, Including Exit

Exit Meeting Summary

On July 12, 2011, the resident inspectors presented the inspection results to Mr. George Hamrick, Catawba Station Manager, and other members of licensee management, who acknowledged the findings. The inspectors confirmed that any proprietary information provided or examined during the inspection period had been returned.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

T. Arlow, Emergency Planning Manager  
W. Byers, Security Manager  
J. Caldwell, Work Control Manager  
W. Callaway, Corporate Design Engineer  
D. Cantrell, Chemistry Manager  
C. Cauthen, Steam Generator Component Engineer  
P. Downing, Steam Generator Maintenance & Engineering Manager  
J. Ferguson, Mechanical, Civil Engineering Manager  
T. Hamilton, Engineering Manager  
G. Hamrick, Station Manager  
R. Hart, Regulatory Compliance Manager  
A. Henson, Boric Acid Corrosion Control Program Owner  
E. Hurley, Steam Generator Maintenance & Engineering  
T. Jenkins, Superintendent of Maintenance  
D. Mayes, Steam Generator Maintenance & Engineering  
J. Morris, Catawba Site Vice President  
T. Pasour, Licensing Administrator  
K. Phillips, Training Manager  
S. Putnam, Safety Assurance Manager  
M. Sawicki, Regulatory Compliance Engineer  
R. Simril, Operations Superintendent  
J. Smith, Radiation Protection Manager  
W. Suslick, Modifications Engineering Manager  
T. Thulien, Steam Generator Maintenance & Engineering  
T. Wright, Supervising Scientist

### **LIST OF REPORT ITEMS**

#### **Opened and Closed**

05000413/2011003-01	NCV	Failure to Adequately Control Energized Temporary Power Sources with Transient Fire Loads (Section 1R05)
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05000414/2011003-02	NCV	Inadequate Procedures for Obtaining Lube Oil Samples from the 2B NI Pump (Section 1R12)
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#### **Closed**

2515/183	TI	Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event (Section 4OA5.3)
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2515/184	TI	Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs) (Section 4OA5.4)
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Attachment

## LIST OF DOCUMENTS REVIEWED

### **Section 1R01: Adverse Weather Protection**

PT/0/B/4700/039, Hot Weather Protection, Rev. 018  
PIP C-11-03866, Operations cannot complete the procedure for aligning site systems for Hot Weather due to equipment issues associated with the Aux Building supply units  
DPC 1381.06-00-0001/CNC-1381.06-00-0062, Degraded Grid Voltage Alarm Setpoints for Real Time Contingency Analysis Initiation, Rev. 13  
PIP C-11-01972, Update for 2011 Degraded Grid Voltage alarm values for the OAC  
NSD 417, Nuclear Facilities/Generation Status Communications, Rev. 13  
NSD 415, Operational Risk Management (Modes 1-3) per 10 CFR 50.65(a)(4), Rev. 7  
AP/1(2)/A/5500/037, Generator Voltage and Electric Grid Disturbances, Rev. 001  
CN-1022-17; Powerhouse Yard Area Drainage Layout, Rev. 12  
CN-1024-01; Yard Drainage Section Details and Schedules, Rev. 34  
CN-1024-02; Yard Drainage Section Details and Schedules, Rev. 46  
CN-1024-04; Yard Drainage C.B. Schedule, Rev. 38  
Catawba USFSAR, Section 2.4; Hydrologic Engineering  
Catawba UFSAR, Section 3.4; Water Level (Flood) Design  
CNS-1465.00-00-0011, Design Basis Specification for Flooding from External Sources, Rev. 3

### **Section 1R04: Equipment Alignment**

CN-1574-1.0, Unit 1 & 2 Flow Diagram of Nuclear Service Water System, Rev. 52  
CN-1574-2.0.01, Unit 1 Flow Diagram of Nuclear Service Water System, Rev. 54  
CN-1578-1.0, Flow Diagram of Control Room Area Ventilation, Rev. 30  
CN-1578-2.0, Flow Diagram of Control Area Chilled Water System, Rev. 12  
UFSAR Section 9.2.1, Nuclear Service Water System  
UFSAR Section 9.4.1, Control Room Area Ventilation  
UFSAR Section 8.3.1.4.1, Diesel Generators  
OP/1/A/6350/002, Diesel Generator Operation; Enclosure 4.8, D/G 1B Checklist for ES Actuation, Rev. 151

### **Section 1R05: Fire Protection**

Station Fire Impairment Log  
NSD-313, Control of Combustible and Flammable Material, Rev. 7  
Fire Strategy Area 3, Unit 1 CA Pump Room and Motor Driven Pump Pits  
Fire Strategy Area 6, Unit 1 Electrical Penetration Room 560' Elevation  
Fire Strategy Area 19, Unit 2 Switchgear Room 594' Elevation

### **Section 1R06: Flood Protection Measures**

UFSAR Section 3.6.1, Postulated Piping Failures in Fluid Systems Inside and Outside Containment  
CNS-1465.00-00-0020, Design Basis Specification for Flooding from Internal Sources, Rev. 0  
PIP C-11-2549, Flood door AX 676-A not labeled  
PIP C-11-2596, Area assigned for SSF submersible pump placement is blocked by scaffold on Unit 1

## **Section 1R08: Inservice Inspection (ISI) Activities**

### Procedures

D5 Steam Generator Site Technique Validation for Catawba Nuclear Unit 2, Rev. 7  
 Eddy Current Analysis Guidelines for Duke Energy's D5 Steam Generators, Rev. 7  
 MP-0-A-7150-042 D, "Reactor Vessel Head Penetration Visual Inspection," Revision 004  
 MP-0-A-7650-040, "Inspection, Evaluation and Cleanup of Boric Acid on Plant Materials,"  
 Revision 020  
 NDEMAN-NDE-25, "NDE Procedures Manual – Volume 3 – NDE-25 Magnetic Particle  
 Examination," Revision 25  
 NDEMAN-NDE-35, "NDE Procedures Manual – Volume 3 – NDE-35 Liquid Penetrant  
 Examination," Revision 23  
 NDEMAN-PDI-UT-1-FC08-05, "NDE Procedures Manual – Volume 4 – PDI Generic Procedure  
 for the Ultrasonic Examination of Ferritic Pipe Welds PDI-UT-1," Revision D Field Change 08-  
 05  
 NSD 322, "Boric Acid Corrosion Control Program," Revision 002

### Calculations

CNC-1201.01-00-0022, "Determination of Interim Inspection Requirements for the Reactor  
 Vessel Head and RV Head Inspection Documentation," Revision 012 – 014

### Corrective Action Documents

C-11-4309 – Inspection of the Unit 1 Reactor Vessel Head  
 C-10-1999 – Boron located under thermocouple 2 NV TW 5720  
 C-09-6895 – Inactive boric acid leak on valve IND-68  
 C-09-6897 – Inactive boric acid leak on valve IND-44  
 C-09-6915 – Inactive boric acid leak on valve INV-849  
 C-11-3804 – Binding of reaction nuts on tensioning equipment during manway removal  
 C-11-4008 – Two ECT analysts not wearing corrective lenses as required by their certifications  
 C-11-4011 – Some Catawba Unit 1 technical information is difficult to interpret (written in  
 Japanese)  
 C-11-4012 – SG worker personnel contamination event (PCE)  
 C-11-4062 – SG worker fatigue rule violations  
 C-11-4077 – FOSAR probe became stuck in steam generator  
 C-11-4122 – Steam generator foreign objects  
 C-11-4149 – Steam generator inspection port studs were galled  
 C-11-4286 – Documentation of steam generator inspection results

### Other

Work Order 0189698-1, 1NI PP SYS- Cut out and Replace Weld 1NI235-42  
 Work Order 01702926, CE101873 1KD-024: Replace W/05B-490  
 Work Order 01852785, 1NC Rx Head, QC Perform Bare Metal Visual Insp RV Head  
 UT calibration Examination Record for 1CA105-9 Reducer to Tee, dated 05/06/11  
 Magnetic Particle Examination Record of 1-CA105-9 reducer to Tee, dated 05/06/11  
 Liquid Penetrant Examination Record of 1CA105-47 Valve 1CA0225 to Pipe, dated 05/06/11  
 Master-Lee Certificate of Eye Examination (Dlabik), dated December 9, 2010  
 Master-Lee Certificate of Eye Examination (Padgett), dated January 6, 2011  
 Master-Lee Certificate of Eye Examination (Rehak), dated January 6, 2011  
 Master-Lee Certificate of Eye Examination (Tarr), dated December 10, 2010

Master-Lee Certificate of Eye Examination (Tomarello), dated August 12, 2010  
Master-Lee NDE Certification (Dlabik), dated 6/11/2008  
Master-Lee NDE Certification (Padgett), dated 1-6-2011  
Master-Lee NDE Certification (Rehak), dated 1/7/2011  
Master-Lee NDE Certification (Tarr), dated 9/1/2010  
Master-Lee NDE Certification (Tommarello), dated 7/29/2008  
NDE Technology, Inc. Personnel Certification Summary (Black), dated 08/03/09  
NDE Technology, Inc. Personnel Certification Summary (Brown), dated 08/03/09  
NDE Technology, Inc. Personnel Certification Summary (Case), dated 08/03/09  
NDE Technology, Inc. Personnel Certification Summary (Causby), dated 08/03/09  
NDE Technology, Inc. Personnel Certification Summary (Drumm), dated 7/28/2010  
NDE Technology, Inc. Personnel Certification Summary (Grant), dated 01/09/08  
NDE Technology, Inc. Personnel Certification Summary (Haynes), dated 01/14/08  
NDE Technology, Inc. Personnel Certification Summary (Kovalesky), dated 02/03/11  
NDE Technology, Inc. Personnel Certification Summary (Lewis), dated 01/10/08  
NDE Technology, Inc. Personnel Certification Summary (Lohner), dated 01/14/08  
NDE Technology, Inc. Personnel Certification Summary (Thompson), dated 11/19/09  
NDE Technology, Inc. Personnel Certification Summary (Wrubleski), dated 7/31/06  
NDE Technology, Inc. Personnel Vision Certification (Black), dated 7/15/2010  
NDE Technology, Inc. Personnel Vision Certification (Brown), dated 7/15/2010  
NDE Technology, Inc. Personnel Vision Certification (Case), dated 8/02/2010  
NDE Technology, Inc. Personnel Vision Certification (Causby), dated 7/20/2010  
NDE Technology, Inc. Personnel Vision Certification (Drumm), dated 7/21/2010  
NDE Technology, Inc. Personnel Vision Certification (Grant), dated 8/6/10  
NDE Technology, Inc. Personnel Vision Certification (Haynes), dated 7/22/2010  
NDE Technology, Inc. Personnel Vision Certification (Kovalesky), dated 2/03/10  
NDE Technology, Inc. Personnel Vision Certification (Lewis), dated 7/23/2010  
NDE Technology, Inc. Personnel Vision Certification (Lohner), dated 7/23/2010  
NDE Technology, Inc. Personnel Vision Certification (Thompson), dated 7/22/2010  
NDE Technology, Inc. Personnel Vision Certification (Wrubleski), dated 8/02/2010  
Westinghouse Eddy Current Certification Record (Beehner), dated 1/17/2011  
Westinghouse Eddy Current Certification Record (Bowser), dated 2/26/2010  
Westinghouse Eddy Current Certification Record (Gootz), dated 6/6/07  
Westinghouse Eddy Current Certification Record (Popovich), dated 2/25/09  
Westinghouse Eddy Current Certification Record (Skirpan), dated 8/27/08  
Westinghouse Eddy Current Certification Record (Spence), dated 2/25/09  
Westinghouse Eddy Current Certification Record (Taylor), dated 8/9/2010  
Westinghouse Eddy Current Certification Record (Terning), dated 2/19/09  
Westinghouse Eddy Current Certification Record (Tobin), dated 9/18/07  
Westinghouse Vision Acuity Examination Record (Beehner), dated 3-24-11  
Westinghouse Vision Acuity Examination Record (Bowser), dated 1/31/11  
Westinghouse Vision Acuity Examination Record (Gootz), dated 2-17-11  
Westinghouse Vision Acuity Examination Record (Popovich), dated 11-30-10  
Westinghouse Vision Acuity Examination Record (Skirpan), dated 7-19-10  
Westinghouse Vision Acuity Examination Record (Spence), dated 2-1-11  
Westinghouse Vision Acuity Examination Record (Taylor), dated 1-27-11  
Westinghouse Vision Acuity Examination Record (Terning), dated 08/06/10  
Westinghouse Vision Acuity Examination Record (Tobin), dated 1/7/11

**Section 1R11: Licensed Operator Requalification Program**

Annual Simulator Exam, ASE-47

EP/1/A/5000/ECA-1.1, Loss of Emergency Coolant Recirculation, Rev. 34

RP/0/A/5000/001, Classification of Emergency, Rev. 024

**Section 1R12: Maintenance Effectiveness**

NI System Health Report 1Q 2011

Maintenance Rule SSC Summary Report, NI System

PIP C-11-2334, 2B NI pump oil sample tube cut off in oil pump gear

Hydrogen mitigation system Health Report 4Q 2010

C-11-3102, Ignitor was found bad while performing IP/1/A/3170/001

C-11-3167, while performing W/O 01939648-01 found two hydrogen ignitors burned out #5 and #71

C-11-3230, Found Ignitors #4 and #6 burned out in group 2B

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

NSD 213, Risk Management Process, Rev. 8

SOMP 02-02 Operations Roles in Risk Management, Rev 007

Unit 1 1EOC19 Outage Risk Assessment

Critical Activity Plan for RN to DG engine cooling water piping replacement for 1A DG during 1EOC19

Complex Activity Plan for replacement of KC discharge cross-over valves

**Section 1R15: Operability Evaluations**

NSD-203, Operability/Functionality, Rev. 19

NSD 122, Temporary Configuration Changes, Rev. 00

PIP C-11-2789, 1A SG PORV solenoid fuse F-10 blown

PIP C-11-2511, Steam leak on end of CA Pump Turbine

PIP C-11-2623, YC Pump shaft replaced with non-QA shaft until a QA shaft is obtained

PIP C-11-3561, Valcor solenoid valves environmental qualification service life

PIP C-11-3393, some solenoid valves on Unit 2 had new electrical connectors installed that do not meet the EQ requirements noted on the connection diagrams and EQ maintenance manual

PIP C-11-5074, A train KC crossover valves closed

**Section 1R19: Post Maintenance Testing**

PT/1/A/4350/002 A, Diesel Generator 1A Operability Test, Rev. 122

PT/1/A/4200/013 C, RN Valve Inservice Test; Enclosure 13.24 1RN-846A Valve Inservice Test, Rev. 070

PT/0/A/4150/001 J, Zero Power Physics Testing, Rev. 8

**Section 1R20: Refueling and Other Outage Activities**

OP/1/A/6150/006 Draining the Reactor Coolant System, Rev. 078

Catawba Nuclear Site Directive 3.1.30, Unit Shutdown Configuration Control, Rev. 37

NSD 500, Red Tags / Configuration Control Tags; Rev. 25

OP/1/A/6100/001, Controlling Procedure for Unit Startup, Rev. 224

PT/1/A/4200/002 C, Containment Closure Verification (Part I), Rev. 81

PT/0/A/4550/003 C, Post Refueling Core Verification, Rev. 13  
 PT/0/A/4150/022, Total Core Reloading, Rev. 47

### **Section 1R22: Surveillance Testing**

PIP C-11-03946 1MISV5231 failed Type C leak Rate Test  
 MP/0/A/7150/072, Main Steam Valve Safety Valve Setpoint Test, Rev.018  
 PT/0/A/4400/008 A, RN Flow balance Train A, Rev. 056  
 PT/1/A/4200/009, Engineered Safety Features Actuation Periodic Test, Rev. 181  
 PT/2/A/4200/005 B, Safety Injection Pump 2B Performance Test, Rev. 040  
 MP/0/A/7150/005, Ice Basket Weight Determination, Rev. 030  
 PT/1/A/4200/001 C, As Left Containment Isolation Valve Leak Rate Test, Rev. 118; Enclosure 13.27, Penetration No. M386 As Left Type C Leak Rate Test  
 PT/1/A/4200/001 C, As left Containment Isolation Valve Leak Rate Test, Rev. 118; Enclosure 13.46, Penetration No. CNIP-1EMF(IN) As Left Type C leak Rate Test

### **Section 2RS1: Radiological Hazard Assessment and Exposure Controls**

#### Procedures, Guidance Documents, and Manuals

HP/0/B/1004/036, Radioactive Sources, Rev. 2  
 NSD 501, Temporary Storage of Radioactive Material in the Spent Fuel Pool, Rev. 7  
 PT/0/A/4550/015A, Inventory of Fuel Special Nuclear Material (Completed Procedure Stored in SNM Satellite File), Rev. 10  
 RA/0/1100/022, Remote Monitoring Requirements for LHRA/VHRA Access, Rev. 1  
 RA/0/1700/003, Issuance and Return of Radioactive Sources, Rev. 0  
 RA/1/1100/001, Unit 1 Outage Upper Containment Controls and Surveillance, Rev. 14  
 RA/1/1100/002, Unit 1 Outage Lower Containment Controls and Surveillance, Rev. 21  
 RA/1/1100/006, Unit 1 Controls and Surveillance for Loading Spent Fuel Assemblies into NAC-UMS Casks, Rev. 9  
 RD/0/B/4000/15, Duke Energy, Radiation Dosimetry and Records, Site Area Monitoring, Rev. 26  
 RP Policy III-08, Personnel Contamination Monitoring, Rev. 3  
 SH/0/B/2000/003, Preparation of a Radiation Work Permit, Rev. 9  
 SH/0/B/2000/004, Taking, Counting and Recording Surveys, Rev. 11  
 SH/0/B/2000/005, Posting of Radiation Control Zones, Rev. 9  
 SH/0/B/2000/006, Control of Radioactive Material and Use of Radioactive Material Tags, Rev. 6  
 SH/0/B/2000/007, Placement of Personnel Dosimetry for Non-Uniform Radiation Fields, Rev. 1  
 SH/0/B/2000/008, Operational Alpha Program, Rev. 7  
 SH/0/B/2000/011, Alpha Radiation Characterization Program, Rev. 2  
 SH/0/B/2000/012, Access Controls for High, Locked High, and Very High Radiation Areas, Rev.11  
 SH/0/B/2000/013, Removal of Items from RCA/RCZs, Rev. 2  
 SH/0/B/2001/002, Investigation of Unusual Dosimetry Occurrence or Possible Overexposure, Rev. 7  
 SQ/0/B/2000/009, Control and Notification of Radiography Operations, Rev. 6

#### Records and Data

Boundary Dose Report, Catawba Nuclear Station, Monitoring Period 10/26/10 – 01/26/11  
 Electronic Dosimeter Dose and Dose Rate Alarm Log from 04/23/11 to 05/12/11  
 Gamma Spectrum Analysis, Sample IDs: CN11050507756, Remove 1A RCP Impellar,

Dated 05/05/11; CN11050507757, Remove 1A RCP Impellar, Dated 05/05/11;  
 CN11050507758, Remove 1A RCP Impellar, Dated 05/05/11; CN11051007909, "C" S/G  
 Platform Routine, Dated 05/09/11; CN11051007910, "D" S/G Platform Routine,  
 Dated 05/09/11; CN11051007911, "A" S/G Platform Routine, Dated 05/09/11;  
 CN11051007913, "B" S/G Platform Routine, Dated 05/09/11;

National Source Tracking System, Annual Inventory Reconciliation Report, Dated 01/12/11  
 PT/0/A/4550/015A, Inventory of Fuel Special Nuclear Material (Completed Procedure Stored in  
 SNM Satellite File), Rev. 9, Dated 04/15/10 (Unit 1) and 05/06/10 (Unit 2); and Rev. 10,  
 Dated 04/07/11 (Unit 1) and 04/19/11 (Unit 2)

RWP No. 1117, Mechanical Valve Work (1EOC19 LC/Annulus/AB, Rev. 23  
 RWP No. 1121, Radiography Operations (U1EOC19) L/C, Annulus, Rev. 14  
 RWP No. 1125, Shielding Activities (1EOC19 LC/Annulus/AB, Rev. 18  
 RWP No. 1160, 1 A NCP Disassembly Activities (1EOC19 LC/UC/SFP), Rev. 04  
 RWP No. 1161, 1 A NCP Rebuild Activities (1EOC19 LC/UC/SFP), Rev. 13  
 RWP No. 1162, 1 A NCP LHRA Activities (1EOC19 LC/UC/SFP), Rev. 10  
 RWP No. 1165, Insulation and Coatings (1EOC19 LC/Annulus/AB), Rev. 11  
 RWP No. 1637, UNIT 1 B ND Pump and Motor Repair, Rev. 05  
 RWP No. 1812, S/G Eddy Current Activities (1EOC19 LC), Rev. 20  
 Survey No. M-042611-39, 1A Loop Downgrade Survey, Dated 04/26/11  
 Survey No. M-042611-44, 1A Loop Downgrade Survey, Dated 04/26/11  
 Survey No. M-042811-1, UNIT 1 Rx Bldg Outage\RCPCAV, Dated 04/28/11  
 Survey No. M-050311-36, 1A Loop Downgrade Survey, Dated 05/03/11  
 Survey No. M-050411-5, Aux Bldg\594 Elevation\Room 515&516, Dated 05/04/11  
 Survey No. M-050811-25, UNIT 2 Rx Bldg\U-2 Lower Cont., Dated 05/08/11  
 Survey No. M-050811-26, UNIT 2 Rx Bldg\U-2 Lower Cont., Dated 05/08/11  
 Survey No. M-050811-29, UNIT 2 Rx Bldg\U-2 Lower Cont., Dated 05/08/11  
 Survey No. M-050811-30, UNIT 2 Rx Bldg\U-2 Lower Cont., Dated 05/08/11  
 Waste Stream Report, 2008 DAW Composite, Dated 02/19/09

#### Corrective Action Program

Assessment No. C-RPS-SA-11-07, 2010 Unexpected ED Rate Alarms – Annual Review,  
 Dated 03/29/11

Problem Investigation Program (PIP) Serial Number (S/N) Activity to remove vacuum filters from  
 unit 1 upper containment took 1 hour longer than scheduled to complete

PIP C-11-03241, Worker received an ED dose alarm while installing shielding in Room 419,  
 577' unit 1 Mechanical Penetration Room

PIP C-11-03765, During the work activity to restore the orifice assembly for 1NCFE6330 to  
 its original state, Maintenance and Quality Inspection personnel entered a HRA without  
 the appropriate RWP documentation and briefings

#### **Section 40A1: Performance Indicator Verification**

NSD 225, NRC Performance Indicators, Rev. 4

NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 5

Catawba Master File CN: 854.02-1, MSPI Emergency AC Power

Catawba Master File CN: 854.02-4, MSPI Safety Injection

Catawba Master File CN: 854.02-3, MSPI Heat Removal

Duke Nuclear Generation Metallurgy File #4570, CNS – E30 Pushbutton Switch from 1B1 KC  
 Pump, Rev. 1

Drawing CNEE-0115-01.26, 4160V Switchgear 1ETB Unit #6, Component Cooling Water PMP  
MTR 1B1, Rev. 7

PIP C-11-2266, 1B1 KC Pump failed to start

**Section 4OA2: Problem Identification and Resolution**

NSD 208, Problem Investigation Program

PIP C-11-2709, 1A S/G PORV 1SV19 solenoid ground

PIP C-11-3561, Valcor solenoid valve hook up wire qualified life

Environmental Qualification Maintenance Manual, EQMM-1393.01-Q03-02, Valcor V70900-39  
Series Solenoid Valves, Rev. 4

Calculation, CNC-1381.05-00-0170, Valcor V70900-39 Solenoid Life Extension, Rev 1

**Section 4OA5: Other Activities**

MP/0/A/7650/181, Loading Spent Fuel Assemblies into NAC-UMS Casks, Rev. 019

**LIST OF ACRONYMS USED**

CAP	corrective action program
DG	diesel generator
ED	electronic dosimeter
EOC	end of cycle
FM	foreign material
FPP	fire protection program
HRA	high radiation area
KC	component cooling
LHRA	locked high radiation area
MSPI	mitigating systems performance indicator
NCV	non-cited violation
NI	safety injection
PD	performance deficiency
PI	performance indicator
PIP	problem investigation program
RCA	radiologically controlled area
RCP	reactor coolant pump
RCS	reactor coolant system
RG	regulatory guide
RN	nuclear service water
RP	radiation protection
RPT	radiation protection technician
RTP	rated thermal power
RWP	radiation work permit
SAMG	severe accident management guidelines
SFP	spent fuel pool
SPA	single point of access
SSC	structures, systems and components
TS	technical specifications
UFSAR	updated final safety analysis report
VHRA	very high radiation area