



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

January 28, 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  
05000413/2010005, 05000414/2010005**

Dear Mr. Morris:

On December 31, 2010, 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 January 5, 2010, with you 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 NRC-identified findings of very low safety significance (Green) which were determined to involve violations of NRC requirements and one Severity Level (SL)-IV violation. Additionally, a licensee-identified violation which was determined to be of very low significance (Green) is listed in this report. 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, 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 05000413/2010005, 050004142010005  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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cc w/encl:

Division of Radiological Health  
TN Dept. of Environment & Conservation  
Electronic Mail Distribution

Randy D. Hart  
Regulatory Compliance Manager  
Duke Energy Carolinas, LLC  
Electronic Mail Distribution

Sandra Threatt, Manager  
Nuclear Response and Emergency  
Environmental Surveillance  
Bureau of Land and Waste Management  
Department of Health and Environmental  
Control  
Electronic Mail Distribution

Dhiaa M. Jamil  
Group Executive and Chief Nuclear Officer  
Duke Energy Carolinas, LLC  
Electronic Mail Distribution

C. Jeff Thomas  
Fleet Regulatory Compliance & Licensing  
Manager  
Duke Energy Carolinas, LLC  
Electronic Mail Distribution

Kathryn B. Nolan  
Senior Counsel  
Duke Energy Corporation  
526 South Church Street-EC07H  
Charlotte, NC 28202

Lara Nichols  
Associate General Counsel  
Duke Energy Corporation  
Electronic Mail Distribution

David A. Repka  
Winston Strawn LLP  
Electronic Mail Distribution

North Carolina MPA-1  
Suite 600  
P.O. Box 29513  
Raleigh, NC 27525-0513

Piedmont Municipal Power Agency  
Electronic Mail Distribution

Susan E. Jenkins  
Director, Division of Waste Management  
Bureau of Land and Waste Management  
S.C. Department of Health and  
Environmental Control  
Electronic Mail Distribution

Mark Yeager  
Division of Radioactive Waste Mgmt.  
S.C. Department of Health and  
Environmental Control  
Electronic Mail Distribution

W. Lee Cox, III  
Section Chief  
Radiation Protection Section  
N.C. Department of Environmental  
Commerce & Natural Resources  
Electronic Mail Distribution

Vanessa Quinn  
Federal Emergency Management Agency  
Radiological Emergency Preparedness  
Program  
1800 S. Bell Street  
Arlington, VA 20598-3025

Steve Weatherman, Operations Analyst  
North Carolina Electric Membership  
Corporation  
Electronic Mail Distribution

County Manager of York County  
York County Courthouse  
P. O. Box 66  
York, SC 29745-0066

Peggy Force  
Assistant Attorney General  
State of North Carolina  
P.O. Box 629  
Raleigh, NC 27602

David A. Baxter  
Vice President, Nuclear Engineering  
Duke Energy Carolinas, LLC  
Electronic Mail Distribution

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Letter to J. R. Morris from Jonathan H. Bartley dated January 28, 2011

SUBJECT: CATAWBA NUCLEAR STATION - NRC INTEGRATED INSPECTION REPORT  
05000413/2010005, 05000414/2010005

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C. Evans, RII

L. Douglas, RII

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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.: 05000413/2010005, 05000414/2010005

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station, Units 1 and 2

Location: York, SC 29745

Dates: October 1, 2010, through December 31, 2010

Inspectors: A. Hutto, Senior (Sr.) Resident Inspector  
R. Cureton, Resident Inspector  
B. Collins, Reactor Inspector (Sections 1R08 & 4OA5.1)  
C. Dykes, Health Physicist (Sections 2RS1 & 4OA5.5)  
R. Hamilton, Sr. Health Physicist (Sections 2RS2 & 4OA1)  
G. Johnson, Operations Engineer (Section 1R11.1)  
G. Laska, Sr. Operations Examiner (Section 1R11.1)  
W. Loo, Sr. Health Physicist (Sections 2RS1 & 2RS3)  
M. Meeks, Operations Engineer (Section 1R11.2)  
A. Nielsen, Sr. Health Physicist (Section 2RS5)  
R. Williams, Reactor Inspector (Sections 1R08 & 4OA5.1)

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000413/2010005, 05000414/2010005; 10/1/2010 - 12/31/2010; Catawba Nuclear Station, Units 1 and 2; Licensed Operator Requalification, Radiological Hazard Assessment and Exposure Controls, and Radiation Monitoring Instrumentation.

The report covered a three month period of inspection by two resident inspectors and nine region-based inspectors. Three Green findings, which were determined to be non-cited violations (NCV), and one Severity Level (SL)-IV NCV 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). The cross-cutting aspects were 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: Mitigating Systems

- SL-IV. An NRC-identified NCV of 10 CFR 55.25 was identified when the licensee failed to notify the NRC of a permanent change in the medical status of a licensed operator within 30 days of learning of the change.

The failure to meet the requirements of 10 CFR 55.25 was a performance deficiency (PD). The inspectors determined that the violation should be dispositioned using the Traditional Enforcement process because the PD impacted the regulatory process. The inspectors assessed the PD using the NRC's Enforcement Policy, Section 6.4, "Licensed Reactor Operators," and determined the violation should be dispositioned as a SL-IV violation. Cross-cutting aspects are not assigned to PDs dispositioned using Traditional Enforcement. (Section 1R11)

- Green. An NRC-identified NCV of 10 CFR 50, Appendix B, Criterion XVII, "Quality Assurance Records," was identified for the failure to maintain retrievable records of activities affecting quality. Several work orders from the fall of 2009 were irretrievably lost prior to electronic archiving, including records of calibrations performed on Unit 1 containment high-range area radiation monitors.

The inspectors determined that the failure to maintain quality records was a PD. The PD was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and negatively affected the cornerstone objective in that records of activities affecting quality (e.g. containment high-range radiation monitor calibrations) must be maintained in order to provide auditable assurance of system operability. The inspectors evaluated the finding and determined the finding was of very low safety significance (Green) because it was a qualification deficiency confirmed not to result in loss of operability or functionality. The cause of this finding was directly related to the cross-cutting aspect of self and peer-checking in the Work Practices component of the Human Performance area because the lost documents were destroyed prior to completion of electronic archiving. [H.4(a)] (Section 2RS5)

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Cornerstone: Occupational Radiation Safety

- Green. A self-revealing NCV of Technical Specification (TS) 5.7.1, High Radiation Area (HRA), was identified for the failure to barricade and conspicuously post HRAs inside Unit 2 lower containment.

The inspectors determined that the failure to adequately control HRAs was a PD. The PD was more than minor because it was associated with the cornerstone attribute of Program & Process (RP controls) and negatively affected the cornerstone objective in that HRAs must be posted and properly controlled to avoid unnecessary worker exposure. The finding was determined to be of very low safety significance (Green) because it was not related to As Low As Reasonably Achievable (ALARA) planning and the ability to assess dose was not compromised. The cause of this finding was directly related to the cross-cutting aspect of appropriately planning work activities in the Work Control component of the Human Performance area because the potential job site conditions (radiological hazards) associated with down-posting large areas of lower containment were not adequately identified [H.3(a)]. (Section 2RS1)

One violation of very low safety significance (Green), which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent Rated Thermal Power (RTP) and remained there until November 20 when power was reduced to 18 percent RTP to repair a steam leak on the 1D Steam Generator blow down vent line. The unit was returned to 100 percent RTP on November 22 and remained at or near 100 percent RTP until November 28 when power was reduced to 20 percent RTP to repair a steam leak on a 1A Moisture Separator Reheater drain line. The unit was returned to 100 percent RTP on November 30 and remained at or near 100 percent RTP for the remainder of the inspection period.

Unit 2 began the inspection in No Mode for a planned refueling outage. The unit was restarted and reached 100 percent RTP on October 25 and remained at or near 100 percent RTP for the remainder of the inspection period.

### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

The inspectors reviewed the licensee's preparations for adverse weather associated with cold ambient temperatures. This included field walkdowns to assess the material condition and operation of freeze protection equipment (e.g., heat tracing, instrument box heaters, area space heaters, etc.), as well as other preparations made to protect plant equipment from freeze conditions. Safety and / or Risk significant systems reviewed included the standby shutdown facility, nuclear service water pump house, auxiliary building and the refueling water storage tanks. In addition, the inspectors conducted discussions with operations, engineering, and maintenance personnel responsible for implementing the licensee's cold weather protection program to assess the licensee's ability to identify and resolve deficient conditions associated with cold weather protection equipment prior to cold weather events. 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,

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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 corrective action program. Documents reviewed are listed in the Attachment.

- 2A Train of Containment Spray while the 2B Train was out of service for preventive maintenance
- Unit 1 Auxiliary Feedwater System while the 1B train was out of service for preventative maintenance
- 1B Emergency Diesel Generator (EDG) while the 1A EDG was out of service for 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 five 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 whether 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. Documents reviewed are listed in the Attachment.

- Unit 2 Auxiliary Shutdown Panels, 543' Level
- Diesel Generator Room 2B
- Unit 2 Turbine Building 594' Level
- Unit 2 Turbine Building 568' Level
- Unit 2 Electrical Penetration Room 594' Level

b. Findings

No findings were identified.

1R06 Flood Protection Measuresa. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and flood analysis documentation and internal flood protection features associated with the Unit 1 Auxiliary Feedwater System pump room to determine the effect of flooding. Through observation and design review, the inspectors reviewed sealing of piping, sealing of room walls, testing of associated sump pump and discharge check valves, and potential flooding sources. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activitiesa. Inspection Scope

Piping Systems Inservice Inspection (ISI): The inspectors observed or reviewed records of the following nine non-destructive examinations (NDEs) 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.

- Liquid Penetrant (PT) examination of Nozzle to Safe End weld 2RPV-201-121ASE, Class I
- PT examination of Nozzle to Safe End weld 2RPV-201-121BSE, Class 1
- PT examination of Nozzle to Safe End weld 2RPV-201-121CSE, Class 1
- PT examination of Nozzle to Safe End weld 2RPV-201-121DSE, Class 1
- Magnetic Particle (MT) examination of pipe to elbow weld 2CA105-4, Class 2
- MT examination of (5) Reactor Vessel Closure Studs, Class 1
- MT examination of (5) Reactor Vessel Closure Nuts, Class 1
- Ultrasonic (UT) examination of pipe to elbow weld 2CA105-4, Class 2
- UT examination of (17) Reactor Vessel Closure Studs, Class 1

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

The inspectors reviewed the following two pressure boundary welds completed for risk-significant systems during the outage to evaluate if the licensee applied the preservice 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

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qualified in accordance with the requirements of Construction Code and the ASME Code Section IX.

- Work Order 01859752, "EC99831 U2-17 2NI-94: Install Modified Disc/Change to 09J-636"
- Work Order 01875635, "Install piping and new vent valve 2ND149"

The inspectors reviewed the results of the visual examination for the bottom-mounted instrument penetrations to ensure examinations were being performed in accordance with the requirements of ASME Code Case N-722-1 and 10 CFR 50.55a(g)(6)(ii)(E).

Reactor Pressure Vessel Upper Head Penetration Inspection: Activities for the Unit 2 vessel head, no examination was required pursuant to 10 CFR 50.55a(g)(6)(ii)(D) for the current refueling outage. The previous bare metal visual examination for the vessel upper head was performed during the fall 2007 refueling outage and next scheduled bare metal visual examination is during the spring 2012 refueling outage. The next scheduled volumetric examination is during the fall 2014 refueling outage. The current effective degradation years value for the Unit 2 reactor pressure vessel upper head is 3.67.

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 and evaluated 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 to evaluate if degraded components were documented in the corrective action system.

- Problem Investigation Program report (PIP) C-09-02583, "Active Boron Leak on 2A KF Pump Vent Line on Pump Casing"
- PIP C-09-03325, "Active Leak from Valve 2NS-NV-0097"
- PIP C-09-04422, "A Slight Packing Leak Detected On Valve Stem Around Packing Gland for 2NMVA-431"
- PIP C-09-07734, "Boron Identified in Unit 2 Lower Containment Area"

The inspectors reviewed the following corrective actions related to evidence of boric acid leakage to evaluate if the corrective actions completed were consistent with the requirements of the ASME Code Section XI and 10 CFR Part 50, Appendix B, Criterion XVI.

- PIP C-09-06935, "Valve 1ND-53 has a inactive boric acid leak at the bonnet to body connection"
- PIP C-09-03808, "Inactive Boric Acid Leakage Found at Bolted Connection 2KF-6"
- PIP C-09-03811, "Inactive Boric Acid Leakage Exists at MJ for 2KFFE5100"
- PIP C-09-03819, "Inactive Boric Acid Leakage"
- PIP C-09-04136, "Dried Boron Found on Valve 2NS-2"

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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. In particular, assessed if assumed NDE flaw sizing accuracy was consistent with data from the EPRI examination technique specification sheets 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 EC examinations.
- Reviewed the licensee's repair criteria and processes.
- 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.
- Reviewed the licensee's secondary side SG Foreign Object Search and Removal 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.

Problem Identification and Resolution: The inspectors performed a review of ISI/SG related problems entered into the licensee's corrective action program 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.

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The inspectors performed these reviews to evaluate compliance with 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requirements.

Documents reviewed are listed in the Attachment. These inspection activities constituted one inservice inspection sample.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program

.1 Routine Operator Requalification Program Reviews

a. Inspection Scope

Quarterly Resident Review: The inspectors observed Simulator Exercise S-72 to assess the performance of licensed operators during a license operator requalification simulator training session. The exercise included a large break loss of coolant accident followed by a loss of emergency cooling recirculation capability. 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.

Annual Review of Licensee Requalification Examination Results: On July 30, 2010, the licensee completed the comprehensive biennial requalification written examinations and annual requalification operating tests required to be administered to all licensed operators in accordance with 10 CFR 55.59(a)(2). The inspectors performed an in-office review of the overall pass/fail results of the written examinations, individual operating tests and the crew simulator operating tests. These results were compared to the thresholds established in Manual Chapter 609 Appendix I, Operator Requalification Human Performance Significance Determination Process.

.2 (Closed) URI 05000413, 414/2010004-02: Failure to Notify the Commission of a Change in Medical Status

a. Inspection Scope

The inspectors reviewed information provided by the licensee, and information provided by NRC medical review officers, to evaluate unresolved item (URI) 05000413, 414/2010004-02.

b. Findings

Introduction: An NRC-identified Severity Level (SL)-IV NCV of 10 CFR 55.25 was identified when the licensee failed to notify the NRC of a permanent change in the medical status of a licensed operator within 30 days of learning of the change.

Description: As documented in NRC Inspection Report 05000413, 414/2010004, the inspectors identified that the licensee did not report a permanent change in the medical status of a licensed operator. On September 13, 2006, the licensee's corporate medical director determined that the requirements of ANSI/ANS-3.4 were met; therefore, no NRC notification was required. On September 22, 2008, the licensee sent a license renewal letter to the NRC, including a NRC Form 396, for the individual. The only restriction identified on the Form 396 was that the individual required corrective lenses to be worn during performance of his licensed operator duties. On November 13, 2008, based on the information provided by the licensee, the NRC renewed the individual's operator license with one restrictive condition identified.

On September 14, 2010, the licensee submitted an updated NRC Form 396 identifying the permanent change in medical condition. The information was forwarded to the NRC medical review officer (MRO). On October 20, 2010, the MRO determined that a requirement for individual submit a medical status report every 12 months was necessary. This requirement would have required a NRC license amendment.

Analysis: The failure to meet the requirements of 10 CFR 55.25 was a performance deficiency (PD). The inspectors determined that because the PD impacted the regulatory process, the violation was dispositioned using the Traditional Enforcement process. The inspectors assessed the PD against the examples provided in the NRC's Enforcement Policy, Section 6.4, "Licensed Reactor Operators." Section 6.4.d.1.(b) stated that "Severity Level IV violations involve, for example: a licensed operator or senior operator who did not meet the requirements set forth in ANSI/ANS 3.4 ... but did not ... require additional monitoring (e.g. "must submit medical status report") based on the undisclosed medical condition." Because the MRO determined that a medical status report would be required, the inspectors initially screened the PD as greater than SL-IV. However, the inspectors noted that this PD did not directly correlate to the various examples for SL-III violations in Enforcement Policy Section 6.4.c. After the inspectors consulted with headquarters and Region II enforcement specialists, and with the Operator Licensing Branch (IOLB), it was determined the PD should be dispositioned as a SL-IV violation. Cross-cutting aspects are not assigned PDs dispositioned using Traditional Enforcement.

Enforcement: 10 CFR 55.25, "Incapacitation because of disability or illness," required, in part, that if a licensed operator develops a permanent condition that causes the licensed operator to fail to meet the requirements of 10 CFR 55.21, the facility licensee shall notify the Commission within 30 days of learning of a diagnosis. Contrary to the above, from October 12, 2006, to September 14, 2010, the licensee failed to notify the Commission within 30 days of learning of the diagnosis that a licensed operator had developed a permanent condition that caused the licensed operator to fail to meet the requirements of 10 CFR 55.21. The licensee entered this violation into their corrective

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action program as PIP C-10-04465. In accordance with Section 2.3.2 of the NRC's Enforcement Policy, this violation was classified as NCV 05000413, 414/2010005-01: Failure to Notify the Commission of a Change in Medical Status.

1R12 Maintenance Effectiveness

a. 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.

- Evaluation of various issues concerning the Instrument Air System
- PIP C-10-1955, Maintenance Rule Periodic Assessment

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the following four 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 Nuclear System Directive (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.

- Review of 91-01 Activity Plan for reduced inventory operations during Unit 2 End of Cycle (EOC) 17 refueling outage (Orange defense-in-depth)
- Emergent Yellow risk due to F instrument air compressor and A station air compressor out of service concurrently

- Review of Critical/Complex Plan for Nuclear Service Water (RN) to Diesel Cooling Water Excavation Dig #14
- Review Critical Activity Plan for 1EMXG Breaker Replacement

b. Findings

No findings were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors evaluated the technical adequacy of the five operability evaluations listed below to determine if Technical Specification (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-10-6524, Correct sequence for de-tensioning the Reactor Vessel Studs was not followed appropriately per procedure
- PIP C-10-6266, 2RN-918 and 2RN-919 are leaking by
- PIP C-10-6281, Negative ground in 125vdc 2B Diesel Generator Control Power System
- PIP C-10-8115, 1EMF-38 Count rate increase due to ambient temperature increase
- PIP C-10-8330, EDG Lube Oil Leak on 1A Diesel Generator measured at 75 gallons per week during 1A Diesel Generator run

b. Findings

No findings were identified.

1R18 Plant Modifications

a. Inspection Scope

The inspectors reviewed the following two plant modifications to verify the adequacy of the modification package and to evaluate the modification for adverse affects on system availability, reliability and functional capability. Documents reviewed are listed in the Attachment.

Permanent Modifications

- EC 099414, Split EHM Power Circuit for Ice Condenser Igniters

Temporary Modifications

- EC 102765, Isolate 2CF-33 Nitrogen Accumulator Tank 2CFAC0330

b. Findings

No findings were identified.

1R19 Post-Maintenance Testinga. Inspection Scope

The inspectors reviewed the five 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.

- RN flow balance following the 2A EDG RN to Diesel Cooling Water modifications
- Unit 2 Zero Power Physics Testing following refueling outage
- Closed Loop Feedwater Level Setpoint test following Distributive Control System installation
- Unit 1 Turbine Driven Auxiliary Feedwater Pump Performance Test following pump PMs
- Control Room Area Outside Air Pressure Filter Trains Performance Test following control room ventilation inspections, cleaning and carbon sample

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activitiesa. 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 November 6, 2010, and December 16, 2010, the following activities related to the 1EOC-18 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 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.

Surveillance Tests

- PT/2/A/4200/009, Engineered Safety Features Actuation Periodic Test, Rev. 157
- IP/2/A/3145/001 B, Containment Pressure Control System Train B Channel Operational Test, Rev. 023
- PT/2/A/4200/009 A, Auxiliary Safeguards Test Cabinet Periodic Test; Enclosures 13.12 and 13.20, Safety Injection – Train B, Rev. 196

Containment Isolation Valve

- PT/2/A/4200/001 I, As Found Containment Isolation Valve Leak Rate Test; Enclosure 13.6, Penetration No. M221 As Found Type C Leak Rate Test, Rev. 016

Ice Condenser Test

- MP/0/A/7150/005, Ice Basket Weight Determination, Rev. 029

Leakage Detection Tests

- PT/1/A/4150/001 D, NC System Leakage Calculation, Rev. 66

In-Service Tests

- PT/2/A/4200/005 C, Standby Makeup Pump Check Valve Test, Rev. 3

b. Findings

No findings were identified.

## 2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety (OS) and Public Radiation Safety (PS)

### 2RS1 Radiological Hazard Assessment and Exposure Controls

#### a. Inspection Scope

Hazard Assessment and Instructions to workers: During facility tours, the inspectors observed labeled radioactive material, postings for radiation areas and high radiation areas (HRAs) in the radiologically controlled area (RCA), and radioactive waste processing and storage locations. Inspectors also observed and evaluated labels on selected containers. 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.

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 tasks and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers. RWPs for work in airborne areas were also reviewed to assess airborne radioactive controls and monitoring.

Work Practices: The inspectors evaluated access barrier effectiveness including key control for selected Unit 1 and Unit 2 Locked High Radiation Area (LHRA) and Very High Radiation Area (VHRA) locations. Changes to procedural guidance for LHRA and VHRA controls were discussed with health physics (HP) supervisors. Controls and their implementation for storage of irradiated material within the spent fuel pool were reviewed and discussed. 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 HP technician (HPT) proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff. Electronic dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation survey results for jobs in lower containment and lower annulus. ED alarm logs were reviewed and worker response to dose and dose rate alarms during selected work activities was evaluated. HPT coverage and actions at the Unit 1 containment access point were reviewed and discussed in detail.

Control of Radioactive Material: The inspectors observed the release of potentially contaminated materials and personnel from the RCA with the use of small article monitors, personnel contamination monitor, and portal monitor instruments. The inspectors discussed equipment sensitivity, alarm setpoints, and release program

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guidance with licensee staff. In addition, the inspectors reviewed controls for hand surveying large tools and equipment for release from the RCA and the Protected Area. The inspectors also reviewed source inventory and discussed leak tests for selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Problem Identification and Resolution: The inspectors reviewed selected PIPs associated with radiological hazard assessment and control. The reviewed items included PIPs, 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, Rev. 32.

Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12, TS Section 5.7, 10 CFR 19 and 20, and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR 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 (IP) 71124.01 (sample size of 1).

b. Findings

Introduction: A Green self-revealing NCV of TS 5.7.1, High Radiation Area, was identified for the failure to barricade and conspicuously post HRAs inside Unit 2 lower containment.

Description: On September 21, 2010, a worker entered Unit 2 lower containment to perform inspection activities in areas which were not posted as HRAs. While in one of the inspection areas near the reactor building sump, the worker received multiple ED dose rate alarms. The worker immediately exited containment and reported to Radiation Protection (RP). This area had recently been down-posted from a HRA to a Radiation Area; however, follow-up surveys showed dose rates >100 millirem per hour (mrem/hr) near the NI return line and near the high pressure injection (NV) charging line which had not been detected during the down-posting surveys. Upon discovery, the entire Unit 2 lower containment was re-posted as a HRA.

Analysis: The inspectors determined that the failure to adequately control HRAs was a PD. The PD was more than minor because it is associated with the cornerstone attribute of Program & Process (RP controls) and negatively affected the cornerstone objective to ensure the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine civilian nuclear reactor operation. HRAs must be posted and controlled properly to avoid unnecessary worker exposure. The finding was evaluated using the Occupational Radiation Safety Significance Determination Process (SDP) and was determined to be of very low safety significance (Green) because it was not related to As Low As Reasonably Achievable (ALARA) planning and the ability to assess dose was not compromised. The cause of this finding was directly related to the cross-cutting aspect of appropriately planning work

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activities in the Work Control component of the Human Performance area because the potential job site conditions (radiological hazards) associated with down-posting large areas of lower containment were not adequately identified [H.3(a)].

Enforcement: TS 5.7.1, High Radiation Area, requires, in part, that each HRA in which the intensity of radiation is greater than 100 mrem/hr but less than 1,000 mrem/hr at 30 centimeters from the radiation source or from any surface which the radiation penetrates, shall be barricaded and conspicuously posted as a HRA. Contrary to the above, on September 21, 2010, the licensee failed to barricade and conspicuously post HRAs in Unit 2 lower containment in that dose rates of 150 mrem/hr were identified on safety injection piping in the area near the reactor building sump. The finding was documented in the licensee's corrective action program as PIP C-10-05975. Because this violation is of very low safety significance and was entered into the licensee's corrective action program, it is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 50-413, 414/2010005-02: Failure to Barricade and Conspicuously Post HRAs in Unit 2 Lower Containment.

## 2RS2 As Low As Reasonably Achievable (ALARA)

### a. Inspection Scope

ALARA Program Status: The inspectors reviewed and discussed plant exposure history and current trends including the site's three-year rolling average (TYRA) collective exposure history for calendar year (CY) 2007 through CY 2009. Current and proposed activities to manage site collective exposure and trends regarding collective exposure were evaluated through review of previous TYRA collective exposure data and review of the licensee's 5-year ALARA program implementing plan. Current ALARA program guidance and recent changes, as applicable, regarding estimating and tracking exposure were discussed and evaluated.

The licensee's ALARA program activities and results were evaluated against the requirements of UFSAR Section 12, TS Sections 5.4 and 5.7, 10 CFR 19 and 20, and approved licensee procedures. Documents reviewed are listed in the Attachment.

Radiological Work Planning: The inspectors reviewed planned work activities and their collective exposure estimates for the current Unit 2 EOC 17 refueling outage (RFO). Work activities, exposure estimates and mitigation activities were reviewed for the following high collective exposure tasks: reactor head disassembly and re-assembly; Unit 2 containment scaffold installation and removal; and coatings, painting and all associated work in Unit 2 containment. For the selected tasks, the inspectors reviewed dose mitigation actions and established dose goals. During the inspection, use of remote technologies including teledosimetry and remote visual monitoring were verified as specified in RWP or procedural guidance. Current collective dose data for selected tasks were compared with established estimates and, where applicable, changes to established estimates were discussed with responsible licensee ALARA planning representatives. The inspectors reviewed previous post-job reviews conducted for the Unit 2 EOC 17 RFO and verified that the items were entered into the licensee's corrective action program for evaluation.

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Verification of Dose Estimates and Exposure Tracking Systems: The inspectors reviewed select ALARA work packages and discussed assumptions with responsible planning personnel regarding the bases for the current estimates. The licensee's on-line RWP cumulative dose data bases used to track and trend current personal and cumulative exposure data and/or to trigger additional ALARA planning activities in accordance with current procedures were reviewed and discussed. Selected work-in-progress reviews for S/G secondary side activities and adjustments to cumulative exposure estimate data were evaluated against work scope changes or unanticipated elevated dose rates.

Source Term Reduction and Control: The inspectors reviewed historical dose rate trends for shutdown chemistry, cleanup, and resultant chemistry and radiation protection trend-point data against the current Unit 2 EOC 17 RFO data. Licensee actions to mitigate noble gas and iodine exposures resulting from fuel leaks were discussed in detail.

Problem Identification and Resolution: The inspectors reviewed and discussed selected PIPs associated with ALARA program implementation. The reviewed items included PIPs, self-assessments, and quality assurance audit documents. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with procedure NSD 208.

The inspectors completed all specified line-items detailed in IP 71124.02 (sample size of 1).

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation

a. Inspection Scope

Engineering Controls: The inspectors reviewed the use of temporary and permanent engineering controls to mitigate airborne radioactivity during the refueling outage. The inspectors observed the use of high efficiency particulate air ventilation and vacuums to control contamination during surface disturbing work. Use of containment purge to reduce airborne levels in general areas was reviewed. The inspectors evaluated the effectiveness of continuous air monitors and air samplers placed in work areas to provide indication of increasing airborne levels.

Respiratory Protection Equipment: The inspectors reviewed the use of respiratory protection devices to limit the intake of radioactive material. This included review of devices used for routine tasks and devices stored for use in emergency situations. Selected Self-Contained Breathing Apparatus (SCBA) units and negative pressure respirators (NPR) staged for routine and emergency use in the Main Control Room and other locations were inspected for material condition, SCBA bottle air pressure, number of units, and number of spare masks and air bottles available. The inspectors reviewed

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maintenance records for selected SCBA units and evaluated SCBA and NPR compliance with National Institute for Occupational Safety and Health certification requirements. The inspectors also reviewed records of air quality testing for supplied-air devices and SCBA bottles.

Due to limited respirator use during the period of inspection, the inspectors reviewed training curricula for various types of respiratory protection devices with licensee training representatives. Selected security guards, control room operators, and radiation protection personnel were interviewed on the use of the devices to include SCBA bottle change-out and use of corrective lens inserts. Respirator qualification records and medical fitness cards were reviewed for selected emergency responder personnel in the Maintenance, Operations, Security, Chemistry and RP departments. In addition, qualifications for individuals responsible for testing and repairing SCBA vital components were evaluated through review of selected training records.

Problem Identification and Resolution: PIPs associated with airborne radioactivity mitigation and respiratory protection were reviewed and assessed. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure NSD 208. Documents reviewed are listed in the Attachment.

The inspectors completed all specified line-items detailed in IP 71124.03 (sample size of 1).

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation

a. Inspection Scope

Radiation Monitoring Instrumentation: During tours of the auxiliary building, spent fuel pool areas, and RCA exit point, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARM)s, continuous air monitors (CAM)s, liquid and gaseous effluent monitors, personnel contamination monitors (PCM)s, small article monitors (SAM)s, and portal monitors. The inspectors observed the physical location of the components, noted the material condition, and compared sensitivity ranges with Updated Final Safety Analysis Report (UFSAR) requirements.

In addition to equipment walk-downs, the inspectors observed source checks and alarm setpoint testing of various portable and fixed detection instruments, including ion chambers, telepoles, PCMs, SAMs, and portal monitors. For the portable instruments, the inspectors observed the use of a high-range calibrator and discussed periodic output value testing with a health physics technician. The inspectors reviewed the last two calibration records and evaluated alarm setpoint values for selected ARMs, PCMs, portal monitors, SAMs, effluent monitors, and a whole body counter. This included a sampling of instruments used for post-accident monitoring such as containment high-range ARMs

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and effluent monitor high-range noble gas and iodine channels. Radioactive sources used to calibrate selected ARMs and effluent monitors were evaluated for traceability to national standards. Calibration stickers on portable survey instruments and air samplers were noted during inspection of storage areas for "ready-to-use" equipment. The most recent 10 CFR 61 analysis for dry active waste (DAW) was reviewed to determine if calibration and check sources are representative of the plant source term. The inspectors also reviewed countroom quality assurance records for gamma ray spectrometry equipment and liquid scintillation detectors.

Effectiveness and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR 20; NUREG-0737, Clarification of TMI Action Plan Requirements; TS Section 3.3.3; UFSAR Chapters 11 and 12; and applicable licensee procedures. Documents reviewed are listed in the Attachment.

Problem Identification and Resolution: The inspectors reviewed selected PIP reports in the area of radiological instrumentation. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with procedure NSD 208, PIP, Rev. 32. The inspectors also reviewed recent audit results of the EnRad radiological laboratory. Documents reviewed are listed in the Attachment.

The inspectors completed all specified line-items detailed in IP 71124.05 (sample size of 1).

b. Findings

Introduction: A Green NRC-identified NCV of 10 CFR 50, Appendix B, Criterion XVII, "Quality Assurance Records," was identified for the failure to maintain retrievable records of activities affecting quality. Several work orders from the fall of 2009 were irretrievably lost prior to electronic archiving, including records of calibrations performed on Unit 1 containment high-range area radiation monitors.

Description: When the inspectors requested records documenting the TS 3.3.3 required calibration of containment high-range area radiation monitors, the licensee provided evidence that the calibrations were performed via the licensee's work control tracking system. However, the actual calibration records for monitors 1-EMF-53A&B were among the documents that were lost in December 2009. As documented in PIP C-10-0322, the licensee discovered that a total of 233 work orders were lost prior to electronic archiving due to errors in receipt processing. The inspectors reviewed PIP C-10-0322 and noted the licensee took corrective actions to reduce the likelihood of recurrence. However, the inspectors noted that the licensee had only listed the missing work order numbers. The licensee had not identified the individual records nor evaluated the significance of each lost record in regards to TS compliance or on long-term system performance such as trending. The licensee re-opened PIP C-10-322 to perform an assessment of the lost records.

Analysis: The inspectors determined that the failure to maintain quality records was a PD. The PD was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and negatively affected the

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cornerstone objective in that records of activities affecting quality (e.g. containment high-range radiation monitor calibrations) must be maintained in order to provide auditable assurance of system operability. The inspectors evaluated the finding using the Phase 1 screening guidance in IMC 0609, Attachment 4 and determined the finding was of very low safety significance (Green) because it was a qualification deficiency confirmed not to result in loss of operability or functionality. The cause of this finding was directly related to the cross-cutting aspect of self and peer-checking in the Work Practices component of the Human Performance area because the lost documents were destroyed prior to completion of electronic archiving. [H.4(a)]

Enforcement: 10 CFR 50, Appendix B Criterion XVII, "Quality Assurance Records," states, in part, that sufficient records shall be maintained to furnish evidence of activities affecting quality and that such records shall be identifiable and retrievable. Contrary to the above, identifiable and retrievable records were not maintained to furnish evidence of activities affecting quality. On January 20, 2010, the licensee discovered that 233 work orders related to activities affecting quality were lost prior to electronic archiving. Because this violation was of very low significance and was entered into the licensee's corrective action program as PIP C-10-322, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy: NCV 05000413, 414/20100005-03: Failure to Maintain Retrievable Quality-Related Records.

#### 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 following PIs 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.

###### Cornerstone: Initiating Events

- Unplanned Scrams, Units 1 and 2

###### Cornerstone: Mitigating Systems

- Safety System Functional Failures, Units 1 and 2

###### Cornerstone: Barrier Integrity

- Reactor Coolant System Leakage, Units 1 and 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 Basis Document for Catawba. The inspectors reviewed the raw data for the PIs listed above for the period of December 1, 2009, through November 30, 2010. The inspectors also independently screened TS Action Item Logs, selected

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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 2008-2009. 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 reviewed Nuclear Energy Institute 99-02, Regulatory Assessment Performance Indicator Guideline, to verify that industry reporting guidelines were applied.

#### Occupational Radiation Safety Cornerstone

- Occupational Exposure Control Effectiveness

The inspectors reviewed the PI results for the Occupational Radiation Safety Cornerstone from September 2009 to September 2010. For the assessment period, the inspectors reviewed ED alarm logs and selected PIPs related to controls for exposure significant areas. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data.

#### Public Radiation Safety Cornerstone

- Radiological Effluent Technical Specification/Offsite Dose Calculation Manual  
Radiological Effluent Occurrences

The inspectors reviewed the PI results from September 2009 through September 2010. The inspectors reviewed PIPs, effluent dose data, and licensee procedural guidance for classifying and reporting PI events. The inspectors also interviewed licensee personnel responsible for collecting and reporting the PI data.

#### b. Findings

No findings were identified.

### 4OA2 Problem Identification and Resolution

#### .1 Daily Review

As required by IP 71152, Problem Identification and Resolution, and in order 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 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 Corrective Action Program (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 discussed in Section 4OA2.1 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the six month period of July 2010, through December 2010, 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.

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 Event Follow-up

.1 Response to Plant Events

a. Inspection Scope

The inspectors evaluated the licensee event listed below for plant status and mitigating actions. As appropriate, the inspectors: (1) observed plant parameters and status, including mitigating systems/trains and fission product barriers; (2) determined alarms/conditions preceding or indicating the event; and (3) evaluated performance of plant systems and licensee actions. Documents reviewed are listed in the Attachment.

- Unit 1 down power to 20 percent to repair a moisture separator/re-heater drain line steam leak

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report (LER) 05000413/2010-002-00, Discovery of Reactor Coolant System Pressure Boundary Leak at Thermowell 1NCTW5850 Seal Weld.

On February 18, 2010, with Unit 1 in Mode 4, a reactor coolant pressure boundary leak was identified at the 1A reactor coolant hot leg thermowell 1NCTW5850 seal weld. The licensee's immediate corrective actions were to repair the seal weld while in Mode 4 and to perform inspections on three similar welds on the three remaining Unit 1 hot legs. The licensee determined that the cause of the leak was due to a localized weakened area of the seal weld caused during a metal removal process (grinding or manual filing) during initial construction. The licensee reported this issue as a degraded principle safety barrier per 10 CFR 50.73(a)(2)(ii)(A). The inspectors reviewed the LER, licensee's root cause analysis, and corrective action documents to verify the accuracy of the LER and that the corrective actions were appropriate to restore the degraded barrier. The enforcement aspects of the event are discussed in Section 4OA7 of this report.

4OA5 OTHER ACTIVITIES

.1 (Closed) Temporary Instruction (TI) 2515/172, Revision 1, Reactor Coolant System Dissimilar Metal Butt Welds

a. Inspection Scope

The inspectors conducted a review of the licensee's activities regarding licensee dissimilar metal butt weld mitigation and inspection implemented in accordance with the industry self imposed mandatory requirements of Materials Reliability Program (MRP)-139, "Primary System Piping Butt Weld Inspection and Evaluation Guidelines." TI 2515/172, "Reactor Coolant System Dissimilar Metal Butt Welds," was issued February 21, 2008, to support the evaluation of the licensee's implementation of MRP-139. Documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings were identified. In accordance with requirements of TI 2515/172, Revision 1, the inspectors evaluated and answered the following questions:

(1) Implementation of the MRP-139 Baseline Inspections

1. Have the baseline inspections been performed or are they scheduled to be performed in accordance with MRP-139 guidance?

Yes. The licensee has performed all required baseline inspections at the time of this review. The licensee performed baseline inspections of the reactor vessel cold leg nozzle welds during this outage (Fall 2010). No indications were noted during the examination. With the completion of the cold leg nozzle weld examinations, the licensee has met the MRP-139 deadlines for baseline examinations of all welds scoped into the MRP-139 program for Unit 2.

Baseline examinations for Unit 1 were previously completed and covered in NRC Inspection Report 05000413/2008003.

2. Is the licensee planning to take any deviations from the MRP-139 baseline inspection requirements of MRP-139? If so, what deviations are planned, what is the general basis for the deviation, and was the NEI-03-08 process for filing a deviation followed?

No, the licensee has not submitted any requests for deviation from MRP-139 requirements.

(2) Volumetric Examinations

1. Were the examinations performed in accordance with the MRP-139, Section 5.1 guidelines and consistent with NRC staff relief request authorization for weld overlaid welds?

Yes. The licensee conducted the examinations per NDEMAN-EPRI-DMW-PA-1, Rev 1, a Performance Demonstration Initiative (PDI) Program qualified procedure that meets the examination requirements detailed in MRP-139, Section 5.1.

2. Were examinations performed by qualified personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity.)

Yes. The examination was conducted by PDI certified personnel qualified for procedure NDEMAN-EPRI-DMW-PA-1.

3. Were examinations performed such that deficiencies were identified, dispositioned, and resolved?

Yes. No deficiencies were identified.

(3) Weld Overlays

This portion of the TI was not inspected during the period of this inspection report, but was previously covered in NRC Inspection Report 05000414/2009002.

(4) Mechanical Stress Improvement

There were no stress improvement activities performed or planned by this licensee to comply with their MRP-139 commitments.

(5) Application of Weld Cladding and Inlays

This portion of the TI was not inspected during the period of this report.

(6) Inservice Inspection Program

This portion of the TI was not inspected during the period of this inspection report, but was previously covered in NRC Inspection Report 05000414/2008003. No new information was noted during this reporting period.

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.2 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.

.3 Operation of an Independent Spent Fuel Storage Installation (ISFSI)

a. Inspection Scope

Under the guidance of IP 60855.1, the inspectors reviewed selected completed procedures for physical inspection and inventory of the ISFSI (PT/0/A/0750/015 A, Inventory of Fuel Special Nuclear Material, Enclosure 13.13, ISFSI Inventory) and completed CNEI-400s to verify that records have been established for all spent fuel in storage in the ISFSI, duplicate records are maintained by the licensee, and that an inventory has been conducted on all spent fuel stored in the ISFSI at least every 12 months. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.4 Institute of Nuclear Power Operations (INPO) Plant Assessment Report Review

The inspectors reviewed the interim report for the Institute of Nuclear Power Operations plant assessment of Catawba Nuclear Station conducted in May 2010. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of licensee performance and to verify if any significant safety issues were identified that required further NRC follow-up.

.5 (Closed) TI 2515/179, Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System The inspectors reviewed the source inventories and identified category 1 and 2 sources that required reporting. The inspectors visually verified the presence of the applicable apparatus and verified presence of the sources by means of a radiation survey through the shielding using a handheld survey meter. The inspectors reviewed the licensees' records of the submittals to the NSTS. This activity was performed concurrently with the performance

of IP 71124.01. TI 2515/179 is complete for this licensee because no compliance issues were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On January 5, 2011, the resident inspectors presented the inspection results to Mr. Jim Morris, Catawba Site Vice President, 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.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which met the criteria of the NRC Enforcement Policy, for being dispositioned as a Non-Cited Violation.

- 10 CFR Part 50 Appendix B, Criterion III, Design Control, required, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis for safety related structures, systems and components, are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from original construction to February 2010, the licensee failed to translate the minimum weld size for hot leg Resistance Temperature Detector seal welds into system drawings or weld process control sheets. The inspectors determined that the violation was of very low significance (Green), as the system leakage would be limited to less than normal makeup capability by the threaded joint which provided the structural integrity of the Resistance Temperature Detector assembly. This issue was documented in the licensee's corrective action program as PIP C-10-1020.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

T. Arlow, Emergency Planning Manager  
W. Byers, Security Manager  
J. Caldwell, Work Control Manager  
D. Cantrell, Chemistry Manager  
J. Ferguson, Mechanical, Civil Engineering Manager  
T. Hamilton, Engineering Manager  
G. Hamrick, Station Manager  
R. Hart, Regulatory Compliance Manager  
T. Jenkins, Superintendent of Maintenance  
J. Morris, Catawba Site Vice President  
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

### **LIST OF REPORT ITEMS**

#### **Opened and Closed**

05000413, 414/2010005-01	SL-IV	Failure to Notify the Commission of a Change in Medical Status (Section 1R11)
05000413, 414/2010005-02	NCV	Failure to Barricade and Conspicuously Post HRAs in Unit 2 Lower Containment (Section 2RS1)
05000413, 414/2010005-03	NCV	Failure to Maintain Retrievable Quality-Related Records (Section 2RS5)

#### **Closed**

05000413, 414/2010004-02	URI	Failure to Notify the Commission of a Change in Medical Status (Section 1R11)
05000413/2010-002-00	LER	Discovery of Reactor Coolant System Pressure Boundary Leak at Thermowell 1NCTW5850 Seal Weld (Section 4OA3.2)

2515/172	TI	Reactor Coolant System Dissimilar Metal Butt Welds (Section 4OA5.1)
2515/179	TI	Verification of Licensee Responses to NRC Requirement for Inventories of Materials Tracked in the National Source Tracking System (Section 4OA5.5)

## LIST OF DOCUMENTS REVIEWED

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

PT/0/B/4700/038, Cold Weather Protection, Rev. 32  
 IP/0/B/3560/009, Operational Check for Winter Months and Extreme Cold Weather Surveillance of Freeze Protection Heat Trace and Instrument Box Heaters, Rev. 12  
 PT/0/B/4350/008, Heat Tracing Alignment Verification, Rev. 38  
 NSD 317, Freeze Protection Program, Rev. 3

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

Drawing CN-1563-1.0, Flow Diagram of Containment Spray System, Rev. 37  
 OP/1/A/6250/002, Auxiliary Feedwater System, Rev. 142, Encl. 4.7, Valve Checklist  
 UFSAR Section 6.5.2, Containment Spray System  
 UFSAR Section 10.4.9, Auxiliary Feedwater System  
 UFSAR Section 8.3.1.4.1, Diesel Generators

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

Station Fire Impairment Log  
 NSD 313, Control of Combustible and Flammable Material, Rev. 7  
 Catawba UFSAR Section 9.5.3.2, Emergency Lighting Systems  
 Fire Strategy Area 19, Unit 2 Switchgear Room 594' Level  
 Fire Strategy Area 28, Unit 2B Diesel Generator Room  
 Fire Strategy Area 31, Unit 2A Train Aux. Shutdown Panel 543' Level  
 Fire Strategy Area 33, Unit 2B Train Aux. Shutdown Panel 543' Level  
 Fire Strategy Area 36, Unit 2 Aux. Feedwater Pump Panels 543' Level  
 Fire Strategies O & P, Unit 2 Turbine Building 594' Level  
 Fire Strategies F & G, Unit 2 Turbine Building 568' Level

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

UFSAR Section 3.4.1, Flood Protection  
 UFSAR Section 3.6.1, Postulated Piping Failures in Fluid Systems Inside and Outside Containment  
 AP/0/A/5500/030, Plant Flooding, Rev. 8  
 PT/1/A/4700/020, WL Sump Pump Check Valve In-service Test, Rev. 12  
 Drawing CN-1565-2.2, Unit 1 Flow Diagram of Liquid Radwaste System (WL), Rev. 36

**Section 1R08: Inservice Inspection Activities****Procedures**

D5 Steam Generator Site Technique Validation for Catawba Nuclear Unit 2, Revision 7  
 Eddy Current Analysis Guidelines for Duke Energy's D5 Steam Generators, Revision 7  
 MP-0-A-7150-042 D, "Reactor Vessel Head Penetration Visual Inspection," Revision 004  
 MP-0-A-7150-042 E, "Reactor Vessel Bottom Head Visual Penetration Inspection," Revision 005  
 MP-0-A-7650-040, "Inspection, Evaluation and Cleanup of Boric Acid on Plant Materials," Revision 020  
 NDEMAN-EPRI-DMW-PA-1, "NDE Procedure Manual – Volume 4 – EPRI-DMW-PA-1 Procedure for manual Phased Array Ultrasonic Testing of Dissimilar Metal Welds," Revision 1  
 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-NDE-C, "NDE Procedures Manual – Volume 4 – Procedure NDE-C Control of Nondestructive Examination Equipment," Revision 10  
 NDEMAN-PDI-UT-5, "NDE Procedures Manual – Volume 4 – PDI-UT-5 PDI Generic Procedure for the Ultrasonic Examination of Bolts and Studs," Revision C  
 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  
 CNC-1201.01-00-0067, "Reactor Pressure Vessel Closure Head Penetration Inspection Report – 2EOC15," Revision 0  
 CNC-2201.01-00-0007, "Evaluation of Foreign Objects in the Preheater of the Catawba Unit 2 Steam Generators, Revision 3  
 CN-ISIC2-1042-0001, "Second Interval Containment Inservice Inspection Plan Catawba Nuclear Station Units 1 and 2 General Requirements," Revision 2

**Corrective Action Documents**

C-07-01183, "8 Unit 2 Steam Generator Tubes Plugged,"  
 C-07-05751, "Documentation of the Unit 2 Bare Metal Visual (BMV) Reactor Vessel Head Inspection Performed During 2EOC15,"  
 C-09-01670, Unit 2 Steam Generator Foreign Object Search and Removal Results,  
 C-09-02583, "Active Boron Leak on 2A KF Pump Vent Line on Pump Casing,"  
 C-09-02775, "Alloy 600 Project – RV Hot Legs – Weld Overlay/Inspection – Documentation of Lessons Learned,"  
 C-09-03325, "Active Leak from Valve 2NS-NV-0097,"  
 C-09-03808, "Inactive Boric Acid Leakage Found at Bolted Connection for 2KF-6,"  
 C-09-03811, "Inactive Boric Acid Leakage Exists at MJ for 2KFFE5100,"  
 C-09-03819, "Inactive Boric Acid Leakage,"  
 C-09-04136, "Dried Boron Found on Valve 2NS-2,"  
 C-09-04422, "A Slight Packing Leak Detected On Valve Stem around Packing Gland for 2NMVA-431,"  
 C-09-05152, "Failure of the Below Seat Drain Line for Valve 1SV36 as Documented in PIP C-09-5096 was Caused by Wall Thinning,"

C-09-06935, "Valve 1ND-53 has an inactive boric acid leak at the bonnet to body connection,"  
 C-09-07734, "Boron Identified in Unit 2 Lower Containment Area,"  
 C-10-05916, "Documentation of the Bottom Head Inspection,"  
 C-10-06354, "Documentation of leaks found during the 2EOC17 NRC ISI boric acid walkdown,"  
 C-10-06355, "Documentation of trend: not placing quantitative leakrate in Boric Acid Corrosion  
 Control P Engineering Evaluations,"  
 C-10-06692, "2EOC17 NRC Inspection Corrective Actions,"

#### Drawings

C-8871-107-001, "Vent Pipe," Revision 0  
 DR-4278J-D1, "Reactor Vessel Top Dome Layout D1 Insulation and Details," Revision DC  
 E-8871-101-003, "Closure Head Penetration Final Machining," Revision 0  
 E-8871-101-004, "Closure Head Final Machining," Revision 0  
 E-8871-101-005, "Closure Head Assembly," Revision C  
 E-8871-112-002, "Control Rod Mechanism Housing Assembly," Revision 4

#### Other

Anatec Eye Examination Certification (Emery), dated March 18, 2010  
 Anatec Eye Examination Certification (Howe), dated 09/07/2010  
 Anatec Personnel Certification Summary Record (Emery), dated October 23, 2009  
 Anatec Personnel Certification Summary Record (Howe), dated July 29, 2009  
 Certificate of Compliance for UT Transducer SN: 306266  
 Certificate of Calibration for Calibration Block Nos.: SI-32-CIRC-01 and SI-32-AX-01  
 Certificated of Method Qualification for Employee: 8055953, 5930529  
 Certified Test Report for Spotcheck Cleaner/Remover Batch No: 08D20K  
 Certified Test Report for Spotcheck Developer Batch No: 08A23K  
 Certified Test Report for Spotcheck Penetrant Batch No: 05L01K  
 Certified Test Report for Ultragel II-09235  
 CISI-1462.10-0030, "Third Interval Inservice Inspection Plan Catawba Nuclear Station Units 1  
 and 2 General Requirements," Revision 1  
 Infineddy, LLC Personnel Certification Record, Eddy Current (Rush), dated 04 January 2009  
 Infineddy, LLC Vision Certification Record (Rush), dated 1/21/2010  
 Instrument Certification for Infrared Thermometer MCNDE40127, MCNDE40136, MCNDE40130  
 and OCQUA33090  
 Liquid Penetrant Examination Report Nos: PT-10-183, PT-10-184, PT-10-185 and PT-10-186,  
 Magnetic Particle Examination Report Nos: MT-10-074, MT-10-075, MT-10-076, MT-10-077,  
 MT-10-080, MT-10-081, MT-10-082, MT-10-083, MT-10-084 and MT-10-085  
 Magnetic Particle System Calibration/Performance/Sensitivity Report SNs: CN-030 and ES-6-1  
 Magnetic Particle System Calibration/Performance/Sensitivity Report MT Particles Batch Nos:  
 93G031, 92J063, 314T, F20803, 00L077, F20625, 94F073, 8104T, F20589, 97H091, F21011,  
 82J069 and F20G04  
 Maintenance and Inspection Services, Inc. Certificate of Personnel Qualification in Non-  
 Destructive Testing (Bernasson), dated 2-9-10  
 Maintenance and Inspection Services, Inc. Visual Acuity Record (Bernasson), dated 8/17/2010  
 Master-Lee Certificate of Eye Examination (Tommarrello), dated August 12, 2010  
 Master-Lee NDE Certification (Tommarrello), dated 7/29/2008  
 Material Issue Record for Weld Document No. 101295  
 MISTRAS NDT Certification Form (Chevalier), dated 9/16/10

MISTRAS Visual Acuity Record (Chevalier), dated 02/16/10  
 Phased Array UT Calibration Report Nos.: CAL-10-333, CAL-10-334, CAL-10-334 and CAL-10-335  
 Procedure Qualification Record Nos: L-108, L-109, L-110D, L-112, L-138 and L-148C  
 Ultrasonic Instrument Linearity Report Nos: L-10-081, L-10-083 and L-10-084  
 UT Calibration/Examination Report Nos: UT-10-304, UT-10-305, UT-10-306, UT-10-307, UT-10-308, UT-10-309, UT-10-310, UT-10-314, UT-10-315, UT-10-316, UT-10-317, UT-10-318, UT-10-325, UT-10-326, UT-10-327, UT-10-328, UT-10-329, UT-10-333  
 UT Pipe Weld Examination Report Nos.: UT-10-334, UT-10-335, UT-10-336, UT-10-338, UT-10-339, UT-10-340, UT-10-341  
 Visual Acuity Examination Records for Employees: 15355, 16347, 27886, 23062, 23995, 26396, 31001, 51162, 51263, 270065 and 110035, 263470, 244415  
 Weld Record Document No. 101295 for Work Order 1875635  
 Welding Procedure Specification No. GTOO0808-04, Revision 0  
 Welding Procedure Specification No. GTSM0808-01, Revision 10  
 Westinghouse Eddy Current Certification Record (Patton), dated 7/7/08  
 Westinghouse Eddy Current Certification Record (Pocratsky), dated 8/9/2010  
 Westinghouse Eddy Current Certification Record (Popovich), dated 2/25/09  
 Westinghouse Eddy Current Certification Record (Smith, D.), dated 9/24/2009  
 Westinghouse Eddy Current Certification Record (Thompson), dated 7/8/08  
 Westinghouse Vision Acuity Examination Record (Patton), dated 1-15-10  
 Westinghouse Vision Acuity Examination Record (Pocratsky), dated 3-3-10  
 Westinghouse Vision Acuity Examination Record (Popovich), dated 12-03-09  
 Westinghouse Vision Acuity Examination Record (Smith, D.), dated 1-18-10  
 Work Order 01859752, "EC99831 U2-17 2NI-94: Install Modified Disc/Change to 09J-636"  
 Work Order 01875635, "Install piping and new vent valve 2ND149"

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

Simulator Exercise Guide S-72, Rev. 0  
 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**

Instrument Air System Health Reports, 2Q & 3Q  
 CNS-1605.VI-00-0001, Instrument Air System Design Specification, Rev. 22  
 PT/0/A/4450/015 A, Air Moisture Periodic Test for VI System, Rev. 021  
 PIP-C-10-2970, E & F VI Dryer trouble annunciators received in the control room  
 PIP-C-10-1291, E VI compressor failed to start after start button depressed on ASC computer diagram  
 PIP-C-10-1343, Unexpected sound when racking out E VI breaker  
 PIP-C-10-1601, Several times in the past including this occurrence, E and F VI compressors have generated dirty filter alarms  
 PIP-C-10-2970, E & F VI Dryer trouble annunciators received in the control room  
 PIP-C-10-3510, E VI Dryer alarmed due to Left and Right Valve malfunction  
 PIP-C-10-3522, Station risk changed to YELLOW status due to E VI dryer not operating properly  
 PIP-C-10-3634, VI Dryer E failed to energize when placed in service

PIP-C-10-3733, Determined that the cause of the dryer alarms was excessive water in the VI wet header

Maintenance Rule Periodic Assessment – Catawba Nuclear Station, April 2008 – October 2009

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

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

NSD 415, Operational Risk Management (Modes 1-3) per 10 CFR 50.65 (a)(4), Rev. 5

NSD 213, Risk Management Process, Rev. 8

**Section 1R15: Operability Evaluations**

NSD 203, Operability, Rev. 21

MP/2/A/7150/042, Reactor Vessel Head Removal and Replacement, Rev. 44

CNS-106.03-EPQ-001, 125 VDC Diesel Auxiliary Power Design Specification, Rev. 011

CNS-1609.LD-00-0001, Diesel Generator Lube Oil System Design Specification, Rev. 21

UFSAR Section 9.2.1, Nuclear Service Water System

**Section 1R18: Plant Modifications**

NSD 209, 10 CFR 50.59 Process, Rev. 19

EC 099414, Split EHM Power Circuit for Ice Condenser Igniters

EC 102765, Isolate 2CF-33 Nitrogen Accumulator Tank 2CFAC0330

PIP C-10-6852, Nitrogen leak on 2CF-33

Drawing CN-2735-02.01, Hydrogen Mitigation System (HMS) Typical Igniter Box, Rev. 10E

Drawing CNEE-0265-02-01, HMS Igniter Box Group A, Rev. 7B

Drawing CNEE-0265-02-02, HMS Igniter Box Group B, Rev. 5B

**Section 1R19: Post-Maintenance Testing**

PT/0/A/4400/008 A, RN Flow Balance Train A, Rev. 54

TT/2/B/9100/076, Unit 2 7300 Replacement System Startup Testing, Power Ascension Test, Rev. 1 A

PT/0/A/4150/001 J, Zero Power Physics Testing, Rev. 7

PT/1/A/4250/003 C, Turbine Driven Auxiliary Feedwater Pump #1 Performance Test, Rev. 100

PT/0/A/4450/001 B, Control Room Area Outside Air Pressure Filter Trains Performance Test, Rev. 27

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

OP/2/A/6150/006 Draining the Reactor Coolant System, Rev. 078

Catawba Nuclear Site Directive 3.1.30, Unit Shutdown Configuration Control, Rev. 35

NSD 500, Red Tags / Configuration Control Tags; Rev. 24

OP/2/A/6100/001, Controlling Procedure for Unit Startup, Rev. 149

PT/2/A/4200/002 C, Containment Closure Verification (Part I), Rev. 66

PT/0/A/4550/003 C, Post Refueling Core Verification, Rev. 11

PT/0/A/4150/022, Total Core Reloading, Rev. 46

PIP C-10-6923, RCP B Hatch plug hold down nut is missing and one out of alignment

CN-1050-78, Reactor Building 1 and 2 Hatch Covers Concrete and Reinforcing, Rev. 9

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

### Procedures, Guidance Documents, and Manuals

RPMP 10.4, Use and Control of Hoist Locks, Rev. 3

RPMP 2.4, LHRA and VHRA Documentation and Locking Hardware Control Guidelines, Rev. 13

RP Policy III-15, Access Controls for High, Locked High, and Very High Radiation Areas, Rev. 5

RA/0/1100/001, Radiation Protection Routines, Rev. 6

RA/0/1100/022, Remote Monitoring Requirements for LHRA/VHRA Access, Rev.1

HP/0/B/1004/036, Radioactive Sources, Rev.2

### Radiation Work Permit

RWP #1102 Rev. 19, OPS Activities (1EOC18 LC/Annulus/AB)

RWP #1009 Rev. 01, U-1 Reactor Building Upper Containment Crane Modification Entry During Power Operations

RWP #73 Rev. 05, U-1 Reactor Building Pipe Chase and Sear Table Entry During Power Operations

RWP #1125 Rev. 17, Shielding Activities (1 EOC18 LC/Annulus/AB)

RWP #1453 Rev. 07, RX Head Inspections Includes Shroud, Insulation & Inspection (1EOC18UC)

RWP #1190 Rev. 05, FIRP Activities (1EOC18 LC/Annulus/AB)

### Records and Data

#### Gamma Spectrum Analysis

CN10091803263, NC Filter B Change, 9/19/10

CN10092203374, Head Pull (Cavity) RWP#2405, 9/22/10

CN10092103331, Sand Boxes Breathing Zone RWP#2467, 09/20/10

CN10092103318, U2 U/C Equip. Hatch RWP#2401, 09/20/10

CN10092003296, Eddy Current Thimble Tubes, 09/19/10

CN10092103317, U/2 U/C Rx Bldg Shallow End Cavity RWP#2405, 09/20/10

CN10091903284, Seal Table U2 LC, 09/19/10

Survey #M-092010-3, U2 Rx Bldg\U-2 Upper Cont., 09/19/10

Survey #M-092110-29, U2 Rx Bldg\U-2 Upper Cont., 09/21/10

Survey #M-092010-15, U2 Rx Bldg\U-2 Upper Cont., 09/20/10

Survey #M-092210-19, U2 Rx Bldg\U-2 Upper Cont., 09/22/10

Survey #M-092010-37, U2 Rx Bldg\U-2 Upper Cont., 09/20/10

Survey #M-092110-32, U2 Rx Bldg\U-2 Upper Cont., 09/21/10

Survey #M-092210-16, U2 Rx Bldg\U-2 Upper Cont., 09/22/10

Survey #M-092110-34, U2 Rx Bldg\U-2 Upper Cont., 09/21/10

Survey #M-092110-25, U2 Rx Bldg\U-2 Lower Cont., 09/20/10

Survey #M-091910-4, U2 Rx Bldg\U-2 Lower Cont., 09/18/10

Survey #M-091810-11, U2 Rx Bldg\U-2 Lower Cont., 09/18/10

Survey #M-092010-44, Aux Bldg\577 Elevation\Room 426 Bottom, 09/20/10

Survey #M-082210-5, Aux Bldg\577 Elevation\Room 426 Bottom, 08/22/10

Survey #M-092010-42, Aux Bldg\577 Elevation\Room 426Top, 09/20/10

Survey #M-082210-9, Aux Bldg\577 Elevation\Room 426Top, 08/22/10

Survey #M-092010-18, Aux Bldg\577 Elevation\Room 109, 09/20/10

Survey #M-070910-2, Aux Bldg\577 Elevation\Room 109, 07/09/10

C-RPS-SA-10-09, Self Assessment - ALARA Planning and Controls, 07/13/10  
 C-RPS-SA-10-02, Self Assessment - Radioactive Material Control, 05/29/10

Corrective Action Program (CAP) Documents

PIP C-10-05975, Follow-up Investigation For An Unexpected Dose Rate Alarm (C-10-05945)  
 Identified Two Localized Unposted High Radiation Areas Near The 2C NCP

PIP C-10-05945, Unexpected dose rate alarm

PIP C-09-02218, Worker Was Found To Have 900 ccpm Particle On Right Sock Ankle Level At  
 GEM-5

**Section 2RS2: ALARA**

Procedures, Guidance Documents, and Manuals

Duke Energy, Fleet ALARA Manual, Section III, ALARA Program, Revision (Rev.) 15,  
 Dated 04/25/08

Duke Energy, Fleet ALARA Manual, Section IV, ALARA Planning, Rev. 18, Dated 09/25/08

Duke Energy, Fleet ALARA Manual, Section VII, Tracking and Reporting of Station Exposure,  
 Rev. 17, Dated 04/25/08

Duke Energy, Fleet ALARA Manual, Section VIII, Station ALARA Committee, Rev. 17,  
 Dated 02/10/09

NSD 208, Problem Investigation Program (PIP), Rev. 032

SH/0/B/2000/003, Preparation of a Radiation Work Permit, Rev. 009

Records and Data

RWP 2800, S/G EQMT, Movement/Safety Tours (2EOC17 LC, AB, OS), Tasks 1-3, Rev.22

RWP 2806, S/G Remove/Install Manways ( 2EOC17 LC), Tasks 1-5, Rev. 22

RWP 2808, S/G Nozzle Dams Activities (2EOC17 LC), Tasks 1-2, Rev.22

RWP 2810, S/G Remove Diaphragms (2EOC17, LC), Tasks 1-2, Rev. 24

RWP 2812, S/G ECT Activities (2EOC17 LC), Tasks 1-2, Rev. 34

RWP 2814, S/G Plugging Activities (2EOC17 LC), Tasks 1-2, Rev. 27

RWP 2467, Rx Vessel Nozzle Inspections (2EOC17 UC), Tasks 1-6, Rev 08

Two Graphs of Primary System Contact Dose Rates from 9/18/10 16:13 to 9/22/10 16:13

Spreadsheet: 2EOC17 Estimate Development Spreadsheet

Spreadsheet: 1EOC18 ALARA Exposure Summary

Spreadsheet: 2EOC16 ALARA Exposure Summary

Spreadsheet: Annual ALARA Goal 2008-2010

ALARA Package 1EOC18 CD-101536, Fibrous Insulation Replacement Project

ALARA Package 1EOC18 Fuel Movement and Cleaning

ALARA Package 1EOC18 Reactor Head Removal/Replacement

ALARA Package 1EOC18 ITC Repair

ALARA Package 1EOC18 1NC 'B' Pump Seal Replacement

ALARA Package 1EOC18 Reactor Head Bare Metal Inspection and Support Tasks

ALARA Package 1EOC18 Mass Shielding Installation and Removal

ALARA Package 1EOC18 Unit 1 Head Shroud Modification

ALARA In-Progress Review, 2EOC17 Mass Shielding Installation and Removal (RWPs 2125,  
 2442, 2623) Multiple Reviews from 9/19/10 to 10/1/10

Quarterly ALARA Committee Meeting Minutes 3<sup>rd</sup> Quarter 2009 through 3<sup>rd</sup> Quarter 2010

Self Assessment Report: 2010 Catawba Nuclear Station Radiation Protection Source Term  
 Review

White Paper: Activities Employed to Reduce Source Term  
 Temporary Shielding Requests, TSR-10-260, NV Line- Room 427  
 TSR 10-261, ND "B" Train - Room 109  
 TSR 10-262, ND "A" Train - Room 110  
 TSR 10-263, 2NS1B (Pipe Over Spray Pump)- Room 108  
 TSR 10-264FL, NV HX - Room 467  
 Self Assessment: 1EOC17 ALARA Outage Report  
 Self Assessment: Annual Assessment of RCA Entries for Work Order Input  
 Self Assessment: NRC Prep Audit 71121.02 ALARA Planning & Controls

### CAP Documents

PIP C-09-02031, Special ALARA Committee Meeting to Revise Dose Estimate for Alloy 600 Project Due to Increased Scope  
 PIP C-09-01860, Concern That ED Setpoints May Be Nonconservative  
 PIP C-09-01394, Delay in Starting Work Due to Crud Burst  
 PIP C-09-02985, Requesting More Upfront RP Involvement in Scheduling of Work  
 PIP C-10-02421, Documenting Additional Dose Received Due to Resurveying Shipment Caused by Instrument Failure  
 PIP C-10-02686, Assessment of PRC-01 for Potential Use at Catawba  
 PIP C-10-02719, Coordination and Scheduling Issues for Filter Pit Work  
 PIP C-10-03826, Documenting a Software Problem Where Program does not Wait For User Input  
 PIP C-10-06347, Documenting RP Response to Stuck BPRA in Spent Fuel Pool  
 PIP C-10-06501, Elevated Dose Rates in Spent Fuel Pool Due to Lack of Purification  
 PIP C-10-06539, Special ALARA Committee Meeting  
 PIP C-10-06578, PIP C-10-06609, PIP-C-10-6610, Work Groups Exceeding Dose Goals  
 PIP C-10-06618, In-progress Review for NC Pump/Motor Work  
 PIP C-09-07060, ED Dose Alarm (25.2 vs 25mrem)  
 PIP C-10-05111, Unexpected Dose Rate Alarm (73.6 mrem/hr vs 20 mrem/hr)

### **Section 2RS3: In-Plant Airborne Radioactivity Control and Mitigation**

#### Procedures, Guidance Documents, and Manuals

ETQS 7107.0, NANTEL Basic Respiratory Protection Training, Rev. 12  
 ETQS 7107.1, Respiratory Fit Testing, Rev. 8  
 ETQS 7108.0, Self Contained Breathing Apparatus (SCBA) Training Program, Rev. 5  
 HP/0/B/1001/018, RP Compliance Sampling, Rev. 033  
 HS0113, Advanced Basic Respiratory Protection, SCBA  
 HS0116, Advanced Basic Respiratory Protection Refresher, SCBA  
 NSD 208, Problem Investigation Program (PIP), Rev. 32  
 NSD 508, Approval and Issuance of Radiological and Non-Radiological Respiratory Protective Equipment, Rev. 1  
 Procedure 423, EnRad Laboratories, SCBA Regulator Flow Testing, Rev. 1  
 Procedure 831, EnRad Laboratories, Calibration of AMS-4, Rev. 0  
 RA 0 1100 007, Use of Portable Ventilation Systems in Radiologically Controlled Areas, Rev. 000  
 RA 0 1600 003, Set-Up and Use of Air Supplied Respiratory Protection Equipment, Rev. 016  
 RA 0 1600 004, Recharging Self-Contained Breathing Apparatus, Rev. 002

RA 0 1600 006, Respiratory Protection Equipment Issue, Rev. 004  
 RESPP-N, Duke Energy Respiratory Practical, Rev. 2  
 Safety Guideline No. 18, Determination of Grade D Air in Compressed Air Systems,  
 Rev. 1  
 SH/0/B/2003/001, Respiratory Protection, Rev. 002  
 SH/0/B/2003/002, Inspections of Self-Contained Breathing Apparatus (SCBA) and  
 Associated Equipment, Rev. 000  
 SH/0/B/2008/004, Operation of Air Sampling Equipment, Rev. 000  
 SH/0/B/2008/008, Operational Alpha Program, Rev. 006  
 SRPMP 3-1, Use of Vacuum Cleaners in Radiologically Controlled Areas, Rev. 000

#### Records and Data

EnRad Laboratories, Central Calibration Facility, Air Sampler Certificates of Calibration,  
 AMS-4/Continuous Air Monitor, S/N 2132, Dated 02/24/10 and 09/14/10  
 EnRad Laboratories, Central Calibration Facility, Flow Test Certifications, Firehawk M7,  
 S/Ns AMAA292020, Dated 05/24/10, and AMAA296088, Dated 04/20/10; and  
 Firehawk Industrial, S/N WAA339163, Dated 01/07/10  
 Inventory for Catawba Nuclear Station Emergency Kit Air Purifying Respirators,  
 Dated 01/29/10  
 Inventory for Catawba Nuclear Station Radiological Air Purifying Respirators,  
 Dated 01/29/10  
 Inventory for Catawba Nuclear Station SCBA Harnesses, Dated 10/03/10  
 Inventory for Catawba Nuclear Station SCBA Respirators, Dated 09/28/10  
 MSA C.A.R.E. Authorized Repair Center Certificates for MSA BMR/MMR Air Mask  
 Repair and Maintenance Center, Dated 05/05/10  
 MSA ProCheck3 Test Results, Complete SCBA Test, Firehawk M7 Air Mask, 4500  
 PR14, EnRad Nos. 04216, Dated 01/07/10; 04218, Dated 01/07/10; 04278,  
 Dated 12/28/09; and 04321, Dated 05/24/10  
 Nuclear Work Force Access Information Database for the HS0110, HS0111, Fit Testing,  
 SCBA Qualification and Medical Certification for selected individuals  
 SCBA Bottle Inspection/Inventory, Dated 09/23/10  
 Service Agreement No. 108060, Model BAP-BP25E3C/AP6A, S/N 75147, Annual PM for  
 Ingersoll-Rand Baron II Cylinder Refill System/Eagle Air Systems,  
 Dated 09/02/10  
 SG-18, Enclosure 5.8, VB Surveillance Sheets, Dated 06/01/10 and 08/24/20  
 SH/0/B/2003/002, Enclosure 5.2, Respirator Inspection and Maintenance Records,  
 Dated 08/31/10 and 09/29/10

#### CAP Documents

Assessment No. C-RPS-SA-10-04, 2009 Respirator User Assessment, Dated 04/08/10  
 Assessment No. C-RPS-SA-10-14, Annual Control Room Respirator Inventory  
 [10 CFR 50.47(8)], Dated 05/25/10  
 Assessment No. RPS-03-09, 2008 Respirator User Assessment, Dated 03/04/09  
 Assessment No. RPS-09-09, RIC Respiratory Protection Procedure Use and Adherence  
 Assessment, Dated 04/29/09  
 PIP C-08-01030, Questions arising from spectacle kit audit, Dated 02/20/08  
 PIP C-08-04457, Emergency Use Only SCBAs rendered unavailable following a fire  
 drill and no one on site qualified to restore availability, Dated 07/22/08

**Section 2RS5: Radiation Monitoring Instrumentation****Procedures and Guidance Documents**

RA/0/1400/006, "Inservice Radiation Protection Instrument Source Check", Rev. 21  
 Radiation Protection Policy Manual, "Quality Control of Count Room Instrumentation", Policy V-02, Rev. 1  
 HP/0/B/1000/010, "Determination of Radiation Monitor Setpoints", 58  
 NSD 208, Problem Investigation Program, Rev. 32

**Records**

Work Order 01785846 01, Radiation Monitoring System RP-2C High Range Process Channel Calibration, 1-EMF-53A  
 Work Order 01785847 01, Radiation Monitoring System RP-2C High Range Process Channel Calibration, 1-EMF-53B  
 Work Order 01726678 01, Radiation Monitoring System RP-2C High Range Process Channel Calibration, 2-EMF-53B  
 Work Order 01729740 01, Radiation Monitoring System RP-2C High Range Process Channel Calibration, 2-EMF-53A  
 Work Order 01884344 01, 1-EMF-36 Gas Monitor Channel Calibration  
 Work Order 01796772 01, 1-EMF-36 Gas Monitor Channel Calibration  
 Work Order 01794551 01, 2-EMF-36 Gas Monitor Channel Calibration  
 Work Order 01891171 01, 2-EMF-36 Gas Monitor Channel Calibration  
 Work Order 01888321 01, Flow Calibration for 0-EMF-49 and Process High Range Monitor Channel Calibration  
 Work Order 01809208 01, Flow Calibration for 0-EMF-49 and Process High Range Monitor Channel Calibration  
 Operation and Calibration of Canberra Autoscan Whole Body Counter, 3/3/10  
 GEM-5 Enrad No. 2728, Calibration Records, 11/4/09 and 6/1/10  
 GEM-5 Enrad No. 2727, Calibration Records, 6/2/10 and 6/28/10  
 GEM-5 Enrad No. 2726, Calibration Records, 2/6/09 and 1/19/10  
 GEM-5 Enrad No. 2724, Calibration Records, 8/6/09 and 5/28/10  
 ARGOS Enrad No. 2733, Calibration Records, 4/23/09 and 3/29/10  
 SAM-9/11 Calibration Worksheet, Enrad No. 01972, 5/27/09 and 5/4/10  
 SAM-9/11 Calibration Worksheet, Enrad No. 01973, 5/27/09 and 5/4/10  
 SAM-9/11 Calibration Worksheet, Enrad No. 01974, 5/27/09 and 5/4/10  
 SAM-9/11 Calibration Worksheet, Enrad No. 01976, 5/27/09 and 5/4/10  
 SAM-9/11 Calibration Worksheet, Enrad No. 01977, 12/1/08 and 11/4/09  
 RT-11 Calibrator No. 001-06, Transfer Calibration, 2/23/07  
 Certificates of Calibration, Gamma Source Nos. 80845-85, 08044-85, and 80848-85  
 Certificate of Calibration, Beta Source No. D5-437  
 Countroom QA/QC Daily Check Records, July 2010 - October 2010  
 Calibration of Perkin Elmer Tricarb 2900TR Series Liquid Scintillation Counters, 4/20/10  
 10 CFR Part 61 Analysis, Dry Active Waste, 5/29/08

**CAP Documents**

09-18, Consolidated QA Audit  
 PIP C-09-04677, Evaluate compliance with 10 CFR 20 requirements for radiation monitor calibrations  
 PIP C-09-05918, Re-assign selected radiation monitors an appropriate calibration frequency

PIP C-09-02999, Difficulty maintaining ARGOS in service due to high ambient temperatures in Monitoring Tank Building

PIP C-09-03625, Removable contamination found on survey meter

PIP C-10-00322, Work orders not available in NEDL

**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: 854.03-2, Reactor Coolant System Leakage

SRPMP 10-1, NRC Performance Indicator Data Collection, Validation, Review and Approval, Rev. 003

NSD 225, NRC Performance Indicators, Rev. 4

NEI 99-06, Regulatory Assessment Performance Indicator Guideline, Rev. 6

**Records and Data Reviewed**

SRPMP 10-1 Performance Indicator Data Submittals from September 2009 through July 2010

**Corrective Action Program**

Listings Of PIPs Generated During 2010 That Were Reviewed As Part Of Performance Indicator Submittals.

**Section 40A2: Problem Identification and Resolution**

NSD 208, Problem Investigation Program

**Section 40A3: Event Followup**

PIP C-10-1020, Reactor coolant pressure boundary leakage at seal weld on 1A hot leg RTD Root Cause Analysis Report – Failure of 1NCTW5850 (HL1A Wide Range Temp) Seal Weld, Rev. 0

Catawba Weld Process Control Sheet, Weld No. NC-1585-1

**Section 40A5: Other Activities**

PT/0/A/4550/015A, Inventory of Special Nuclear Material, Rev. 9

## LIST OF ACRONYMS

ALARA	-	As Low As is Reasonably Achievable
CAP	-	Corrective Action Program
CFR	-	Code of Federal Regulations
CY	-	Calendar Year
DAW	-	Dry Active Waste
ED	-	Electronic Dosimeter
EOC	-	End of Cycle
ET	-	Eddy Current Testing
HP	-	Health Physics
HPT	-	Health Physics Technician
HRA	-	High Radiation Area
IP	-	Inspection Procedure
ISFSI	-	Independent Spent Fuel Storage Installation
ISI	-	Inservice Inspection
LER	-	Licensee Event Report
MRP	-	Materials Reliability Program
LHRA	-	Locked High Radiation Area
MC	-	Manual Chapter
mrem/hr	-	millirem per hour
MT	-	Magnetic Particle
NCV	-	Non-Cited Violation
NDE	-	Non-destructive Examination
NEI	-	Nuclear Energy Institute
NPR	-	Negative Pressure Respirator
PDI	-	Performance Demonstration Initiative
PI	-	Performance Indicator
PIP	-	Problem Investigation Process
PT	-	Liquid Penetrant
RCA	-	Radiologically Controlled Area
RFO	-	Refueling Outage
RN	-	Nuclear Service Water
RP	-	Radiation Protection
RTP	-	Rated Thermal Power
RWP	-	Radiation Work Permit
SCBA	-	Self-Contained Breathing Apparatus
SDP	-	Significant Determination Process
SG	-	Steam Generator
SSC	-	Structures, Systems, and Components
TI	-	Temporary Instruction
TS	-	Technical Specification
TYRA	-	Three-Year Rolling Average
UFSAR	-	Updated Final Safety Analysis Report
UT	-	Ultrasonic
VHRA	-	Very High Radiation Area