



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

February 16, 2017

Mr. Tom Simril  
Site Vice President  
Duke Energy Corporation  
Catawba Nuclear Station  
4800 Concord Road  
York, SC 29745-9635

**SUBJECT: ERRATA FOR CATAWBA NUCLEAR STATION - NRC INTEGRATED  
INSPECTION REPORT 05000413/2016003 AND 05000414/2016003 AND  
EXERCISE OF ENFORCEMENT DISCRETION**

Dear Mr. Simril:

The U.S. Nuclear Regulatory Commission (NRC) has identified an error in NRC Inspection Report 05000413/2016003 and 05000414/2016003, dated November 2, 2016 (ADAMS Accession No. ML16307A004). Specifically, the licensed operator requalification biennial sample (IP 71111.11) was not included in the report (Section 1R11.3). As a result, the NRC has reissued the report in its entirety to correct this error.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

**/RA/**

Frank Ehrhardt, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

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

Enclosure:  
IR 05000413/2016003 and 05000414/2016003  
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

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T. Simril

2

Letter to Tom Simril from Frank Ehrhardt dated February 16, 2017

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket Nos.: 50-413, 50-414

License Nos.: NPF-35, NPF-52

Report No.: 05000413/2016003 and 05000414/2016003

Licensee: Duke Energy Carolinas, LLC

Facility: Catawba Nuclear Station, Units 1 and 2

Location: York, SC 29745

Dates: July 1, 2016 through September 30, 2016

Inspectors: J. Austin, Senior Resident Inspector  
C. Scott, Resident Inspector  
M. Toth, Project Engineer  
J. Montgomery, Senior Reactor Inspector (Section 4OA3)  
R. Williams, Senior Reactor Inspector (Sections 1R07, 1R08)  
R. Kellner, Senior Health Physicist (Sections 2RS1, 2RS3)  
C. Dykes, Health Physicist (Sections 2RS2, 2RS4)  
J. Panfel, Health Physicist (Sections 2RS5, 4OA1)  
R. Baldwin, Senior Operations Engineer (Section 1R11)  
D. Bacon, Senior Operations Engineer (Section 1R11)  
J. Cruz, Senior Project Manager (Section 1R11)

Approved by: Frank Ehrhardt, Chief  
Reactor Projects Branch 1  
Division of Reactor Projects

Enclosure

## **SUMMARY**

IR 05000413/2016003 and 05000414/2016003, July 1, 2016 through September 30, 2016; Catawba Nuclear Station, Units 1 and 2; Integrated Inspection Report

The report covered a three-month period of inspection by the resident inspectors and regional inspectors. No findings were identified during this inspection period. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," (SDP) dated April 29, 2015. The cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas" dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated August 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

## REPORT DETAILS

### Summary of Plant Status

Unit 1: Operated at or near 100 percent rated thermal power for the entire inspection period.

Unit 2: Operated at or near 100 percent rated thermal power through September 9. On September 10, the unit commenced refueling outage 2EOC21 and remained in the outage throughout the report period.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

##### 1R01 Adverse Weather Protection (71111.01)

###### a. Inspection Scope

###### .1 Impending Adverse Weather Conditions

The inspectors reviewed the licensee's preparations to protect risk-significant systems from tropical storm Hermine expected September 2-3, 2016. The inspectors evaluated the licensee's implementation of adverse weather preparation procedures and compensatory measures, including operator staffing, before the onset of the adverse weather conditions. The inspectors reviewed the licensee's plans to address the consequences that may result from the tropical storm. The inspectors verified that operator actions specified in the licensee's adverse weather procedure maintained readiness of essential systems. The inspectors verified that required surveillances were current, or were scheduled and completed, if practical, before the onset of anticipated adverse weather conditions. The inspectors also verified that the licensee implemented periodic equipment walkdowns or other measures to ensure that the condition of plant equipment met operability requirements. Documents reviewed are listed in the Attachment.

###### b. Findings

No findings were identified.

##### 1R04 Equipment Alignment (71111.04)

###### a. Inspection Scope

###### .1 Partial Walkdown

The inspectors verified that critical portions of the selected systems were correctly aligned by performing partial walkdowns. The inspectors selected systems for assessment because they were a redundant or backup system or train, were important for mitigating risk for the current plant conditions, had been recently realigned, or were a single-train system. The inspectors determined the correct system lineup by reviewing plant procedures and drawings. Documents reviewed are listed in the Attachment.

The inspectors selected the following three systems or trains to inspect:

- 2A diesel generator (DG) with the 2B DG out of service (OOS) for planned maintenance
- 2B motor driven auxiliary feedwater (CA) pump with the 2A CA pump OOS for service water to auxiliary feedwater flow measurement
- 1B containment spray (NS) pump with the 1A NS pump OOS for maintenance

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05AQ)

a. Inspection Scope

.1 Quarterly Inspection

The inspectors evaluated the adequacy of selected fire plans by comparing the fire plans to the defined hazards and defense-in-depth features specified in the fire protection program. In evaluating the fire plans, the inspectors assessed the following items:

- control of transient combustibles and ignition sources
- fire detection systems
- fire suppression systems
- manual firefighting equipment and capability
- passive fire protection features
- compensatory measures and fire watches
- issues related to fire protection contained in the licensee's corrective action program

The inspectors toured the following five fire areas to assess material condition and operational status of fire protection equipment. Documents reviewed are listed in the Attachment.

- Auxiliary building 594' Level, fire area 22
- 2A DG room, fire area 27
- Unit 1, Essential Switchgear Room level 577', fire area 15
- Unit 1, Essential Switchgear Room level 560', fire area 8
- Unit 1, Turbine Building 594' level, fire zone N

b. Findings

No findings were identified.

## 1R06 Flood Protection Measures (71111.06)

### a. Inspection Scope

#### .1 Internal Flooding

The inspectors reviewed related flood analysis documents and walked down the area listed below containing risk-significant structures, systems, and components susceptible to flooding. The inspectors verified that plant design features and plant procedures for flood mitigation were consistent with design requirements and internal flooding analysis assumptions. The inspectors also assessed the condition of flood protection barriers and drain systems. In addition, the inspectors verified the licensee was identifying and properly addressing issues using the corrective action program. Documents reviewed are listed in the Attachment.

- Unit 1, turbine building

### b. Findings

No findings were identified.

## 1R07 Heat Sink Performance (71111.07T)

### a. Inspection Scope

#### Triennial Review of Heat Sink Performance

The inspectors reviewed operability determinations, completed surveillances, vendor manual information, associated calculations, performance test results, and cooler inspection results associated with the service water pump upper bearing oil cooler (SWUBOC) and the auxiliary feedwater pump motor coolers (AFWPMC). These coolers were chosen based on their risk significance in the licensee's probabilistic safety analysis, their important safety-related mitigating system support functions and their relatively low margin.

For the SWUBOC, the inspectors determined whether testing, inspection, maintenance, and monitoring of biotic fouling and macrofouling programs were adequate to ensure proper heat transfer. This was accomplished by determining whether the test method used was consistent with accepted industry practices, or equivalent; the test conditions were consistent with the selected methodology; the test acceptance criteria were consistent with the design basis values; and reviewing results of heat exchanger performance testing. The inspectors also determined whether the test results appropriately considered differences between testing conditions and design conditions, whether the frequency of testing based on trending of test results was sufficient to detect degradation prior to loss of heat removal capabilities below design basis values, and whether test results considered test instrument inaccuracies and differences.

For the AFWPMC, the inspectors reviewed the methods and results of heat exchanger performance inspections. The inspectors determined whether the methods used to



inspect and clean heat exchangers were consistent with as-found conditions identified and expected degradation trends and industry standards; the licensee's inspection and cleaning activities had established acceptance criteria consistent with industry standards; and the as-found results were recorded, evaluated, and appropriately dispositioned so that the as-left condition was acceptable.

In addition, the inspectors determined whether the condition and operation of the SWPUBOC and the AFWPMC were consistent with design assumptions in heat transfer calculations, and as described in the final safety analysis report. This included determining whether the number of plugged tubes was within pre-established limits based on capacity and heat transfer assumptions. The inspectors determined whether the licensee evaluated the potential for water hammer and established adequate controls and operational limits to prevent heat exchanger degradation due to excessive flow induced vibration during operation. In addition, visual inspection records were reviewed to determine the structural integrity of the heat exchanger. For the AFWPMC, the inspectors determined whether the licensee's chemical treatment programs for corrosion control were consistent with industry norms, and implemented accordingly.

The inspectors determined whether the performance of the safety-related ultimate heat sink, identified as the standby nuclear service water pond (SNSWP), and its subcomponents such as piping, intake screens, pumps, valves, etc., was appropriately evaluated by tests or other equivalent methods, to ensure availability and accessibility to the in-plant cooling water systems. The inspectors determined whether the licensee's inspection of the SNSWP was thorough and of sufficient depth to identify degradation of the shoreline protection or loss of structural integrity. This included determination whether vegetation present along the slopes was trimmed, maintained, and was not adversely impacted the embankment. In addition, the inspectors determined whether the licensee ensured sufficient reservoir capacity by trending and removing debris, or sediment buildup, in the SNSWP.

The inspectors reviewed the licensee's operation of the service water system and SNSWP. This included a review of licensee's procedures for a loss of the service water system or SNSWP; a verification that instrumentation, which is relied upon for decision making, was available and functional; and a review of design changes made to the service water system and the SNSWP. In addition, the inspectors determined whether macrofouling was adequately monitored, trended, and controlled by the licensee to prevent clogging. The inspectors determined whether the licensee's biocide treatments for biotic control were adequately conducted and whether the results were adequately monitored, trended, and evaluated. The inspectors also reviewed whether the licensee maintained adequate pH, calcium hardness, etc.

The inspectors reviewed the licensee's performance testing of service water system and SNSWP results. This included a review of the licensee's performance test results for key components and service water flow balance test results. In addition, the inspectors compared the flow balance results to system configuration and flow assumptions during design basis accident conditions. The inspectors also determined whether the licensee ensured adequate isolation during design basis events, consistency between testing methodologies and design basis leakage rate assumptions, and proper performance of risk significant non-safety related functions.

The inspectors performed a system walkdown of the service water systems to determine whether the licensee's assessment on structural integrity was adequate. In addition, the inspectors reviewed available licensee testing and inspections results, the licensee's disposition of any active through wall pipe leaks, and the history of through wall pipe leakage to identify any adverse trends since the last NRC inspection. For buried or inaccessible piping, the inspectors reviewed the licensee's pipe testing, inspection, or monitoring program to determine whether structural integrity was ensured and that any leakage or degradation was appropriately identified and dispositioned by the licensee.

The inspectors performed a system walkdown of the service water intake structure to determine whether the licensee's assessment of structural integrity and component functionality was adequate and that the licensee ensured proper functioning of traveling screens and strainers, and structural integrity of component mounts. In addition, the inspectors determined whether service water pump bay silt accumulation was monitored, trended, and maintained at an acceptable level by the licensee, and that water level instruments were functional and routinely monitored. The inspectors also determined whether the licensee's ability to ensure functionality during adverse weather conditions was adequate.

In addition, the inspectors reviewed condition reports related to heat exchanger, cooler and heat sink performance issues to determine whether the licensee had an appropriate threshold for identifying issues and to evaluate the effectiveness of the corrective actions. The documents that were reviewed are included in the Attachment.

These inspection activities constituted three heat sink inspection samples as defined in IP 71111.07-05.

b. Findings

No findings were identified.

1R08 In-service Inspection Activities (71111.08)

a. Inspection Scope

Non-Destructive Examination Activities and Welding Activities

From September 19 through September 29, 2016, the inspectors conducted an onsite review of the implementation of the licensee's in-service inspection (ISI) program for monitoring degradation of the reactor coolant system boundary, risk-significant piping and component boundaries, and containment boundaries in Unit 2.

The inspectors either directly observed or reviewed the following non-destructive examinations (NDEs) mandated by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code of Record: 1998 Edition with 2000 Addenda) to evaluate compliance with the ASME Code, Section XI and Section V requirements and, if any indications or defects were detected, to evaluate if they were dispositioned in accordance with the ASME Code or an NRC-approved alternative

requirement. The inspectors also reviewed the qualifications of the NDE technicians performing the examinations to determine whether they were current and in compliance with the ASME Code requirements.

- Ultrasonic Examination (UT) of weld 2NI106-14, Pipe to tee weld, ASME Class 2 (observed)
- Liquid Penetrant Examination (PT) of weld 2492NW158-10, Pipe to valve weld, ASME Class 2 (reviewed)
- PT of weld 2SM-005, Access hole plug weld, ASME Class 2 (observed)
- Magnetic Particle Examination (MT) of weld C2.C5.51.0002, Pipe to elbow weld, ASME Class 2 (reviewed)
- MT of weld C2.C5.51.0001, Elbow to pipe weld, ASME Class 2 (reviewed)
- Visual Examination (VT) of 2RPV-BMI-NOZZLES, ASME Class 1 (reviewed)
- VT of 2RPV-HEAD-SURFACE-MULTIPLE, ASME Class 1 (reviewed)

The inspectors either directly observed or reviewed the following welding activities, qualification records, and associated documents in order to evaluate compliance with procedures and the ASME Code, Section XI and Section IX requirements. Specifically, the inspectors reviewed the work order, repair and replacement plan, weld data sheets, welding procedures, procedure qualification records, welder performance qualification records, and NDE reports.

- Weld 2492NW158-10, Pipe to valve weld, ASME Class 2 (reviewed)
- Weld 2SM-005, Access hole plug weld, ASME Class 2 (observed)

During non-destructive surface and volumetric examinations performed since the previous refueling outage, the licensee did not identify any relevant indications that were analytically evaluated and accepted for continued service; therefore, no NRC review was completed for this inspection procedure attribute.

#### PWR Vessel Upper Head Penetration Inspection Activities

The inspectors verified that for the Unit 2 vessel head, a bare metal visual (BMV) examination and a volumetric examination were not required during this outage, in accordance with the requirements of ASME Code Case N-729-1 and 10 CFR 50.55a(g)(6)(ii)(D). The inspectors reviewed the calculation of effective degradation years, the previous examination history, and reviewed the results of the VT-2 examination performed under the vessel head insulation to verify that the examinations were performed in accordance with the requirements of ASME Code, Section XI, Article IWA-2212 requirements and the frequency was consistent with the Code Case.

The licensee did not identify any relevant indications that were accepted for continued service. Additionally, the licensee did not perform any welding repairs to the vessel head penetrations since the beginning of the last Unit 2 refueling outage; therefore, no NRC review was completed for these inspection procedure attributes.

### Boric Acid Corrosion Control Inspection Activities

The inspectors reviewed the licensee's boric acid corrosion control (BACC) program activities to determine if the activities were implemented in accordance with the commitments made in response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," and applicable industry guidance documents. Specifically, the inspectors performed an onsite records review of procedures and the results of the licensee's containment walkdown inspections performed during the current refueling outage. The inspectors also interviewed the BACC program owner, conducted an independent walkdown of containment to evaluate compliance with licensee's BACC program requirements, and verified that degraded or non-conforming conditions, such as boric acid leaks, were properly identified and corrected in accordance with the licensee's BACC and corrective action programs.

The inspectors reviewed the following engineering evaluations, completed for evidence of boric acid leakage, to determine if the licensee properly applied applicable corrosion rates to the affected components; and properly assessed the effects of corrosion induced wastage on structural or pressure boundary integrity in accordance with the licensee procedures.

- AR 01898992, Excessive / Active boron accumulation from 2-NI-VA-327 pipe
- AR 01931170, 0-WL-FE-9780 Active / Excessive boron leak from flange
- AR 01940775, 1-NM-PG-6100 Active / Excessive boron from threaded fitting
- AR 01950202, 2-KF-FS-5150 Active boron leak from fitting 30-40 dpm

The inspectors reviewed the following condition reports and associated 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 and 10 CFR Part 50, Appendix B, Criterion XVI.

- AR 02060953, 2B NC Pump main flange leak
- AR 02020057, 1-NS-VA-1B Excessive/active boron, leak increase
- AR 02047391, 1-FW-VA-45 Active Boron Leak

### Steam Generator Tube Inspection Activities

The inspectors reviewed the eddy current (EC) examination activities performed in Unit 2 steam generators A, B, C, and D during this current refueling outage to verify compliance with the licensee's Technical Specifications, ASME BPVC Section XI, and Nuclear Energy Institute 97-06, "Steam Generator Program Guidelines."

The inspectors reviewed the scope of the EC examinations, and the implementation of scope expansion criteria, to verify these were consistent with the Electric Power Research Institute (EPRI) Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7. The inspectors reviewed documentation for a sample of EC data analysts, probes, and testers to verify that personnel and equipment were qualified to detect the applicable degradation mechanisms in accordance with the EPRI Examination Guidelines. This review included a sample of site-specific Examination Technique

Specification Sheets (ETSSs) to verify that their qualification and site-specific implementation were consistent with Appendix H or I of the EPRI Examination Guidelines. The inspectors also reviewed a sample of EC data for steam generator tubes (B-R29C38, B-R25C42, B-R29C43, B-R32C33, C-R44C87, and D-R28C69), with a qualified data analyst, to confirm that data analysis and equipment configuration were performed in accordance with the applicable ETSSs and site-specific analysis guidelines. The inspectors verified that recordable indications were detected and sized in accordance with vendor procedures.

The inspectors selected a sample of degradation mechanisms from the Unit 2 Degradation Assessment report (i.e. anti-vibration bar wear and stress corrosion cracking) and verified that their respective in-situ pressure testing criteria were determined in accordance with the EPRI Steam Generator Integrity Assessment Guidelines, Revision 3. Additionally, the inspectors reviewed EC indication reports to determine whether tubes with relevant indications were appropriately screened for in-situ pressure testing. The inspectors also compared the latest EC examination results with the last Condition Monitoring and Operational Assessment report for Unit 2 to assess the licensee's prediction capability for maximum tube degradation and number of tubes with indications. The inspectors verified that the licensee's evaluation was conservative and that current examination results were bound by the Operational Assessment projections.

The inspectors assessed the latest EC examination results to verify that new degradation mechanisms, if any, were identified and evaluated before plant startup. The review of EC examination results included the disposition of potential loose part indications on the steam generator secondary side to verify that corrective actions for evaluating and retrieving loose parts were consistent with the EPRI Guidelines. The inspectors also reviewed a sample of primary-to-secondary leakage data for Unit 2 to confirm that operational leakage in each steam generator remained below the detection or action level threshold during the previous operating cycle.

The inspectors' review included the implementation of tube repair criteria and repair methods to verify they were consistent with plant Technical Specifications and industry guidelines. The inspectors verified that the licensee had selected the appropriate tubes for plugging based on the required plugging criteria. The inspectors reviewed the tube plugging procedure and directly observed tube plugging activities for tubes A-R36C37 and B-R23C104, to determine if the licensee installed the tube plugs in accordance with the applicable procedures.

Furthermore, the inspectors interviewed licensee staff and reviewed a sample of inspection results for the visual inspection conducted in the primary side bowl of Steam Generator D, to verify that potential areas of degradation based on site-specific operating experience were inspected, and appropriate corrective actions were taken to address degradation indications.

#### Identification and Resolution of Problems

The inspectors reviewed a sample of ISI-related issues entered into the corrective action program to determine if the licensee had appropriately described the scope of the problem and had initiated corrective actions. The review also included the licensee's

consideration and assessment of operating experience events applicable to the plant. The inspectors performed this review to ensure compliance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requirements.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance (71111.11)

a. Inspection Scope

.1 Resident Inspector Quarterly Review of Licensed Operator Requalification

On August 11, 2016, the inspectors observed an evaluated simulator scenario administered to an operating crew as part of the annual requalification operating test required by 10 CFR 55.59, "Requalification". The crew responded to an instrument malfunction, followed by an automatic trip without a scram, loss of A 4 kV vital bus and a safety injection signal.

The inspectors assessed the following:

- licensed operator performance
- the ability of the licensee to administer the scenario and evaluate the operators
- the quality of the post-scenario critique
- simulator performance

.2 Resident Inspector Quarterly Review of Licensed Operator Performance in the Actual Plant/Main Control Room

The inspectors observed licensed operator performance in the main control room on July 26, 2016 while responding to an increase in letdown pressure caused by an equipment issue.

The inspectors assessed the following:

- use of plant procedures
- control board manipulations
- communications between crew members
- use and interpretation of instruments, indications, and alarms
- use of human error prevention techniques
- documentation of activities
- management and supervision

Documents reviewed are listed in the Attachment.

### .3 Licensed Operator Requalification

The inspectors reviewed the facility operating history and associated documents in preparation for this inspection. During the week of August 8 - 12, 2016, the inspectors reviewed documentation, interviewed licensee personnel, and observed the administration of operating tests associated with the licensee's operator requalification program. Each of the activities performed by the inspectors was done to assess the effectiveness of the facility licensee in implementing requalification requirements identified in 10 CFR Part 55, "Operators' Licenses." The evaluations were also performed to determine if the licensee effectively implemented operator requalification guidelines established in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and Inspection Procedure 71111.11, "Licensed Operator Requalification Program." The inspectors also evaluated the licensee's simulation facility for adequacy for use in operator licensing examinations using ANSI/ANS-3.5-1985, "American National Standard for Nuclear Power Plant Simulators for use in Operator Training and Examination." The inspectors observed two crews during the performance of the operating tests. Documentation reviewed included written examinations, Job Performance Measures (JPMs), simulator scenarios, licensee procedures, on-shift records, simulator modification request records, simulator performance test records, operator feedback records, licensed operator qualification records, remediation plans, watchstanding records, and medical records. The records were inspected using the criteria listed in Inspection Procedure 71111.11. Documents reviewed during the inspection are documented in the Attachment.

#### b. Findings

No findings were identified.

### 1R12 Maintenance Effectiveness (71111.12)

#### a. Inspection Scope

The inspectors assessed the licensee's treatment of the three issues listed below to verify the licensee appropriately addressed equipment problems within the scope of the maintenance rule (10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants"). The inspectors reviewed procedures and records to evaluate the licensee's identification, assessment, and characterization of the problems as well as their corrective actions for returning the equipment to a satisfactory condition. Documents reviewed are listed in the Attachment.

- CR 2054316: 02054316-05: QCE 02054316 - Aux. switch: medium voltage
- CR 2033128, Unit 0, A controlled area chilled water chiller trip, Maintenance rule functional failure oil pump
- CR 2052366, Extended equalize charge required for battery SDSB1 safe shutdown facility (SSF)

In addition, the inspectors performed a review of the licensee's Quality Assurance Program to ensure licensee was in compliance with their program requirements.

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed the four maintenance activities listed below to verify that the licensee assessed and managed plant risk as required by 10 CFR 50.65(a)(4) and licensee procedures. The inspectors assessed the adequacy of the licensee's risk assessments and implementation of risk management actions. The inspectors also verified that the licensee was identifying and resolving problems with assessing and managing maintenance-related risk using the corrective action program. Additionally, for maintenance resulting from unforeseen situations, the inspectors assessed the effectiveness of the licensee's planning and control of emergent work activities. Documents reviewed are listed in the Attachment.

- Protected equipment plan for SSF DG control panel electrical maintenance
- Yellow risk condition for 2A DG preventive maintenance
- Yellow risk condition for maintenance on 1A2 component cooling water pump
- Yellow risk condition while inspecting 1A DG connecting rod inspection

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15)

a. Inspection Scope

.1 Operability and Functionality Review

The inspectors selected the six operability determinations or functionality evaluations listed below for review based on the risk-significance of the associated components and systems. The inspectors reviewed the technical adequacy of the determinations to ensure that technical specification operability was properly justified and the components or systems remained capable of performing their design functions. To verify whether components or systems were operable, the inspectors compared the operability and design criteria in the appropriate sections of the technical specification and updated final safety analysis report to the licensee's evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment.



- CR 2039992, 2SV-19 stroke time longer than usual (for “A” Train solenoid)
- CR 2049828, Unit 1 and Unit 2 EPL and EPQ minimum voltage calculations need revision
- CR 2053485, centrifugal charging pump 1B thrust bearing oil sight glass leak
- CR 2059121, 1B DG starting air compressor not maintaining pressure
- CR 2056751, auxiliary feedwater (CA) flow transmitters do not meet loss of coolant accident (LOCA) accuracy requirements
- CR 2060673, 2A auxiliary feedwater pump will not stop

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors verified that the plant modification listed below did not affect the safety functions of important safety systems. The inspectors confirmed the modifications did not degrade the design bases, licensing bases, and performance capability of risk significant structures, systems and components. The inspectors also verified modifications performed during plant configurations involving increased risk did not place the plant in an unsafe condition. Additionally, the inspectors evaluated whether system operability and availability, configuration control, post-installation test activities, and changes to documents, such as drawings, procedures, and operator training materials, complied with licensee standards and NRC requirements. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with modifications. Documents reviewed are listed in the Attachment.

- Engineering change (EC) 110357, Motor Lubricant Replacement for SR pumps

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors either observed post-maintenance testing or reviewed the test results for the maintenance activities listed below to verify the work performed was completed correctly and the test activities were adequate to verify system operability and functional capability.

- post maintenance test of the “E” instrument air compressor following the breaker trip on August 23, 2016

- in-service valve test following repair of 1NW-110B, NW supply to 1KC424B on July 27, 2016
- operability performance test of the 1B containment spray (NS) pump following preplanned maintenance on August 2, 2016
- operability performance test of the 1A train of auxiliary building ventilation following preventive maintenance on August 8, 2016
- operability performance test of the 1A train of auxiliary building ventilation following replacement of the exhaust fan breaker on August 23, 2016

The inspectors evaluated these activities for the following:

- acceptance criteria were clear and demonstrated operational readiness
- effects of testing on the plant were adequately addressed
- test instrumentation was appropriate
- tests were performed in accordance with approved procedures
- equipment was returned to its operational status following testing
- test documentation was properly evaluated

Additionally, the inspectors reviewed a sample of corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with post-maintenance testing. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20)

a. Inspection Scope

For the Unit 2 refueling outage from September 9, 2016 through the remainder of the inspection period, the inspectors evaluated the following outage activities:

- outage planning
- shutdown, cooldown and refueling
- reactor coolant system instrumentation and electrical power configuration
- reactivity and inventory control
- decay heat removal and spent fuel pool cooling system operation
- containment closure

The inspectors verified that the licensee:

- considered risk in developing the outage schedule
- controlled plant configuration per administrative risk reduction methodologies
- developed work schedules to manage fatigue
- developed mitigation strategies for loss of key safety functions
- adhered to operating license and technical specification requirements

The inspectors verified that safety-related and risk-significant structures, systems, and components not accessible during power operations were maintained in an operable condition. The inspectors also reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with outage activities. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the four surveillance tests listed below and either observed the test or reviewed test results to verify testing adequately demonstrated equipment operability and met technical specification and current licensing basis. The inspectors evaluated the test activities to assess for preconditioning of equipment, procedure adherence, and equipment alignment following completion of the surveillance. Additionally, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with surveillance testing. Documents reviewed are listed in the Attachment.

Routine Surveillance Tests

- PT/1/A/4350/002B, Emergency diesel generator (EDG) 1B five hour full load run
- PT/2/A/4200/009, Engineered safety features actuation periodic test
- PT/1/A/4600/001, Rod control cluster assembly (RCCA) movement test

In-Service Tests (IST)

- PT/1/A/4250/003C, Auxiliary feedwater motor driven pump 1A performance test

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

The inspectors observed the emergency preparedness drill conducted on July 28, 2016. The inspectors observed licensee activities in the simulator and/or technical support center to evaluate implementation of the emergency plan, including event classification, notification, and protective action recommendations. The inspectors evaluated the

licensee's performance against criteria established in the licensee's procedures. Additionally, the inspectors attended the post-exercise critique to assess the licensee's effectiveness in identifying emergency preparedness weaknesses and verified the identified weaknesses were entered in the corrective action program. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

2. RADIATION SAFETY (RS)

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

Hazard Assessment and Instructions to Workers: During facility tours, the inspectors directly observed radiological postings and container labeling for areas established within the radiologically controlled area (RCA) of the Unit 2 (U2) reactor building, U2 turbine building, Unit 1 (U1) and U2 auxiliary buildings, independent spent fuel storage installation (ISFSI), and radioactive waste (radwaste) processing and storage locations. The inspectors independently measured radiation dose rates or directly observed conduct of licensee radiation surveys for selected RCA areas. The inspectors reviewed survey records for several plant areas including surveys for airborne radioactivity, gamma surveys with a range of dose rate gradients, surveys for alpha-emitters and other hard-to-detect radionuclides, and pre-job surveys for upcoming tasks. The inspectors also discussed changes to plant operations that could contribute to changing radiological conditions since the last inspection. The inspectors attended pre-job briefings and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements and current radiological conditions to workers.

Control of Radioactive Material: The inspectors observed surveys of material and personnel being released from the RCA using small article monitor, personnel contamination monitor, and portal monitor instruments. The inspectors discussed equipment sensitivity, alarm setpoints, and release program guidance with licensee staff. The inspectors also reviewed records of leak tests on selected sealed sources and discussed nationally tracked source transactions with licensee staff.

Hazard Control: The inspectors evaluated access controls and barrier effectiveness for selected high radiation area (HRA), locked high radiation area (LHRA), and very high radiation area (VHRA) locations and discussed changes to procedural guidance for LHRA and VHRA controls with radiation protection (RP) supervisors. The inspectors reviewed implementation of controls for the storage of irradiated material within the spent fuel pool. Established radiological controls, including airborne controls and electronic dosimeter (ED) alarm setpoints, were evaluated for selected U2 refueling outage (2EOC21) tasks such as steam generator inspections, tasks completed in lower containment of U2, and tasks associated with lifting the reactor head. In addition, the inspectors reviewed licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations. The inspectors also

reviewed the use of personnel dosimetry including extremity dosimetry and multibadging in high dose rate gradients.

Radiation Worker Performance and RP Technician Proficiency: Occupational workers' adherence to selected RWPs and RP technician proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff. Jobs observed included work on the refueling floor, lifting the reactor head, and steam generator tasks in high radiation and contaminated areas. The inspectors also evaluated worker responses to dose and dose rate alarms during selected work activities.

Problem Identification and Resolution: The inspectors reviewed and assessed condition reports associated with radiological hazard assessment and control. The inspectors evaluated the licensee's ability to identify and resolve the issues in accordance with licensee procedures. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: Radiation protection activities were evaluated against the requirements of Updated Final Safety Analysis Report (UFSAR) Section 12, Technical Specifications (TS) Section 5.0, 10 CFR Parts 19 and 20, and approved licensee procedures. Licensee programs for monitoring materials and personnel released from the RCA were evaluated against 10 CFR Part 20 and IE Circular 81-07, "Control of Radioactively Contaminated Material". Documents and records reviewed are listed in the Attachment.

The inspectors completed the required seven samples specified in Inspection Procedure (IP) 71124.01.

b. Findings

No findings were identified.

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls (71124.02)

a. Inspection Scope

Work Planning and Exposure Tracking: The inspectors reviewed work activities and their collective exposure estimates during the U2 refueling/maintenance outage (2EOC21) and the recently completed U1 refueling/maintenance outage (1EOC22). The inspectors reviewed ALARA planning packages for activities related to the following U2 high collective exposure tasks: primary side steam generator (S/G) work (diaphragm and nozzle dam installation and removal, eddy current testing, and tube plugging); secondary side S/G work (sludge lancing, foreign object search and retrieval (FOSAR), feed ring inspection); reactor head disassembly and reassembly; temporary shielding installation; and 2B reactor coolant pump motor removal and replacement. For the selected tasks, the inspectors reviewed established dose goals and discussed assumptions regarding the bases for the current estimates with responsible ALARA planners. The inspectors evaluated the incorporation of exposure reduction initiatives and operating experience, including historical post-job reviews, into RWP requirements. Day-to-day collective dose data for the selected tasks were compared with established dose estimates and

evaluated against procedural criteria (work-in-progress review limits) for additional ALARA review. Where applicable, the inspectors discussed changes to established estimates with ALARA planners and evaluated them against work scope changes or unanticipated elevated dose rates.

Source Term Reduction and Control: The inspectors reviewed the collective exposure three-year rolling average from (2013 - 2015). The inspectors evaluated historical crud burst/cleanup results and dose rate trends for reactor coolant system piping and compared them to current 2EOC21 data. Source term reduction initiatives, including cobalt reduction and zinc injection, were reviewed and discussed with RP staff. The inspectors also reviewed temporary shielding packages for 2EOC21.

Radiation Worker Performance: As part of Inspection Procedure (IP) 71124.01, the inspectors observed pre-job ALARA briefings and radiation worker performance for various HRA jobs in the auxiliary building and containment. While observing job tasks, the inspectors evaluated the use of remote technologies to reduce dose including teledosimetry and remote visual monitoring.

Problem Identification and Resolution: The inspectors reviewed and discussed selected corrective action program documents associated with ALARA program implementation. The inspectors evaluated the licensee's ability to identify and resolve issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: ALARA program activities were evaluated against the requirements of UFSAR Section 12, TS Section 5.4, 10 CFR Part 20, and approved licensee procedures. Documents reviewed are listed in the Attachment.

The inspectors completed the required five samples specified in IP 71124.02.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

Engineering Controls: The inspectors reviewed the use of temporary and permanent engineering controls to mitigate airborne radioactivity during 2EOC21 outage tasks. The inspectors observed the use of portable air filtration units for work in contaminated areas of the RCA and reviewed filtration unit testing certificates. The inspectors evaluated the effectiveness of continuous air monitors to provide indication of increasing airborne levels and the placement of air samplers in work area "breathing zones," including accounting for alpha emitting nuclides inclusion in setpoint determination.

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. The inspectors reviewed ALARA evaluations for the use of respiratory protection for steam

generator work and other tasks performed during 2EOC21. Selected self-contained breathing apparatus (SCBA) units and negative pressure respirators (NPRs) 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 availability of air bottles. The inspectors reviewed maintenance records for selected SCBA units for the past two years 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.

The inspectors discussed training for various types of respiratory protection devices with licensee staff and interviewed radworkers and control room operators on use of the devices including SCBA bottle change-out and use of corrective lens inserts. The inspectors reviewed respirator qualification records (including medical qualifications) for several main control room operators and emergency responder personnel. In addition, inspectors evaluated qualifications for individuals responsible for testing and repairing SCBA vital components.

Problem Identification and Resolution: The inspectors reviewed and discussed selected corrective action program documents associated with airborne controls and respiratory protection activities. The inspectors evaluated the licensee's ability to identify and resolve issues. The inspectors also reviewed recent self-assessment results.

Inspection Criteria: Radiation protection program activities associated with airborne radioactivity monitoring and controls were evaluated against details and requirements documented in the UFSAR Chapters 3, 12 and 15; TS Sections 3.7, 5.5.11 and 5.5.16, 10 CFR Part 20; Regulatory Guide (RG) 8.15, "Acceptable Programs for Respiratory Protection" and approved licensee procedures. Documents reviewed are listed in the Attachment.

The inspectors completed the required four samples specified in IP 71124.03.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

Source Term Characterization: The inspectors reviewed the plant radiation characterization (including gamma, beta, alpha, and neutron) being monitored verified the use of scaling factors to account for hard-to-detect radionuclides in internal dose assessments.

External Dosimetry: The inspectors reviewed national voluntary accreditation program (NVLAP) certification data of the licensee's thermoluminescent dosimeter (TLD) processor for the years 2014 through 2017. The inspectors observed and evaluated onsite storage of TLDs. Comparisons between ED and TLD results, including correction factors, were reviewed and discussed. The inspectors also evaluated licensee

procedures for unusual dosimetry occurrences. Electronic dosimeter alarm logs were reviewed as part of Inspection Procedure 71124.01.

Internal Dosimetry: The inspectors reviewed and discussed the in-vivo bioassay program with the licensee. Inspectors reviewed procedures that addressed methods for determining internal or external contamination, releasing contaminated individuals, and the assignment of dose. The inspectors evaluated the licensee's program for in-vivo and in-vitro monitoring including passive whole body monitoring and bioassay results for diving activities. The inspectors also reviewed contamination logs and evaluated events with the potential for internal dose.

Special Dosimetry Situations: The inspectors reviewed records for declared pregnant workers (DPWs) from June 2014 through June 2016 and discussed guidance for monitoring and instructing DPWs. Inspectors reviewed the licensee's program for monitoring external dose in areas of expected dose rate gradients, including the use of multi-badging and extremity dosimetry. The inspectors evaluated the licensee's neutron dosimetry program including instrumentation used to perform neutron surveys. In addition, the inspectors reviewed the licensee's program for evaluation of shallow dose equivalent (SDE). The inspectors also reviewed contamination logs and evaluated events with the potential for SDE.

Problem Identification and Resolution: The inspectors reviewed and discussed selected corrective action program documents associated with occupational dose assessment including self-assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

Inspection Criteria: The licensee's occupational dose assessment activities were evaluated against the requirements of UFSAR Section 12; TS Section 5.4; 10 CFR Parts 19 and 20; and approved licensee procedures. Documents reviewed are listed in the Attachment.

The inspectors completed the required five samples specified in IP 71124.04.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05)

a. Inspection Scope

The inspectors reviewed the licensee's radiation monitoring instrumentation programs to verify the accuracy and operability of radiation monitoring instruments used to monitor areas, materials, and workers to ensure a radiologically safe work environment during normal operations and under postulated accident conditions.

Walkdowns and Observations: During tours of the site areas, the inspectors observed installed radiation detection equipment including the following instrument types: area radiation monitors (ARMs), continuous air monitors (CAMs), personnel contamination



monitors (PCMs), small article monitors (SAMs), and portal monitors (PMs). The inspectors observed the calibration status, physical location, material condition and compared technical specifications for this equipment with UFSAR requirements. In addition, the inspectors observed the calibration status and functional checks of selected in-service portable instruments and discussed the bases for established frequencies and source ranges with RP staff personnel. The inspectors reviewed periodic source check records for compliance with plant procedures and manufacturer's recommendation for selected instruments and observed the material condition of sources used.

Calibration and Testing Program: The inspectors reviewed calibration data for selected ARMs, PCMs, PMs, SAMs, and laboratory instruments as well as the last calibration and methodology for the whole body counter. The inspectors reviewed calibration data, methodology used and the source certification for the containment high range monitor area steam line monitors, control room area monitor, and refueling bridge monitors. The current output values for the portable instrument calibrator and the instrument certifications used to develop them were reviewed by the inspectors. The inspectors reviewed the licensee's process for investigating instruments that are removed from service for calibration or response check failures and discussed specific instrument failures with plant staff. In addition, the inspectors reviewed 10 CFR 61 data to determine if sources used in the maintenance of the licensee's radiation detection instrumentation were representative of radiation hazards in the plant and scaled appropriately for "hard to detect" nuclides.

Problem Identification and Resolution: The inspectors reviewed and discussed selected corrective action program documents associated with radiological instrumentation including licensee sponsored assessments. The inspectors evaluated the licensee's ability to identify and resolve issues.

Inspection Criteria: Operability and reliability of selected radiation detection instruments were reviewed against details documented in the following: 10 CFR Part 20; NUREG-0737, "Clarification of TMI Action Plan Requirements"; UFSAR Chapters 11 and 12, TS Sections 3.3 and 5.4, and applicable licensee procedures. Documents reviewed are listed in the Attachment.

The inspectors completed the required three samples specified in IP 71124.05.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope

The inspectors reviewed a sample of the performance indicator (PI) data, submitted by the licensee, for the Unit 1 and Unit 2 PIs listed below. The inspectors reviewed plant records compiled between July 2015 and June 2016 to verify the accuracy and

completeness of the data reported for the station. The inspectors verified that the PI data complied with guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator Guideline," and licensee procedures. The inspectors verified the accuracy of reported data that were used to calculate the value of each PI. In addition, the inspectors reviewed a sample of related corrective action documents to verify the licensee was identifying and correcting any deficiencies associated with PI data. Documents reviewed are listed in the Attachment.

Cornerstone: Initiating Events

- unplanned power changes per 7000 critical hours

Cornerstone: Mitigating Systems

- residual heat removal system

Cornerstone: Occupational Radiation Safety

- occupational exposure control effectiveness

The inspectors reviewed the occupational exposure control effectiveness PI results for the occupational radiation safety cornerstone from January 2015 through August 2016. For the assessment period, the inspectors reviewed electronic dosimeter alarm logs and condition reports related to controls for exposure significant areas. Documents reviewed are listed in the attachment.

Cornerstone: Public Radiation Safety

- radiological control effluent release occurrences

The inspectors reviewed the radiological control effluent release occurrences PI results for the public radiation safety cornerstone from January 2015 through August 2016. For the assessment period, the inspectors reviewed cumulative and projected doses to the public contained in liquid and gaseous release permits and condition reports related to radiological effluent technical specifications/ODCM issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in the attachment.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152)

.1 Routine Review

The inspectors screened items entered into the licensee's corrective action program to identify repetitive equipment failures or specific human performance issues for follow-up.

The inspectors reviewed problem identification program reports, attended screening meetings, or accessed the licensee's computerized corrective action database.

## .2 Annual Followup of Selected Issues

### a. Inspection Scope

The inspectors conducted a detailed review of the following two nuclear condition reports (NCRs):

- CR 2058838, Multiple failed barriers during maintenance task
- CR 2055501, Extended equalize required for safe shutdown facility battery SDSB2

The inspectors evaluated the following attributes of the licensee's actions:

- complete and accurate identification of the problem in a timely manner
- evaluation and disposition of operability and reportability issues
- consideration of extent of condition, generic implications, common cause, and previous occurrences
- classification and prioritization of the problem
- identification of root and contributing causes of the problem
- identification of any additional condition reports
- completion of corrective actions in a timely manner

Documents reviewed are listed in the Attachment.

### b. Findings and Observations

No findings were identified.

## 4OA3 Event Followup

(Closed) Licensee Event Report (LER) 05000413/2014-002-00, 01: Unanalyzed Condition Due to Deviations from Fire Protection Current Licensing Basis Identified During NFPA 805 Transition

### a. Inspection Scope

On June 2, 2014, the licensee submitted an LER documenting the discovery of a condition of non-compliance with the site's fire protection program (FPP). These conditions could prevent operators from achieving and maintaining safe shutdown (SSD) of the plant, in the case of a postulated fire.

The inspectors performed a detailed review of the information related to this LER. Inspectors reviewed documents, and discussed the issues with licensee personnel to gain an understanding of the issues. The inspectors assessed the licensee's compensatory measures and corrective actions to determine if they were adequate. LERs 05000413/2014-002-00, 01 are closed.

b. Findings

Introduction: The licensee identified a non-compliance with Operating License Condition 2.C.(5), for Units 1 and 2, for the failure to protect one of the redundant trains of equipment needed to achieve post-fire SSD from fire damage. Specifically, the licensee failed to use one of the means described in Branch Technical Position (BTP) Chemical Engineering Branch (CMEB) 9.5-1, Item C.5.b.2 to ensure that one of the redundant trains of equipment necessary to achieve and maintain hot shutdown conditions was protected from fire damage.

Description: On June 2, 2014, the licensee submitted LER 413/2014-002-00 with Revision 01 submitted on December 1, 2014, which documented discovery of cable routing issues and postulated fire-induced circuit failures that could prevent operation or cause maloperation of equipment required to achieve SSD in the event of a fire. This condition was identified during the licensee's transition to National Fire Protection Association Standard 805 (NFPA 805).

During the transition to NFPA 805, the licensee identified multiple instances of cables for equipment required to achieve SSD not meeting the separation requirements of the current licensing basis. The licensee determined that this condition existed for 22 fire areas (FAs) across both units. The licensee characterized these issues as variance(s) from deterministic requirements (VFDRs). The conditions identified in the LER are related to VFDRs that met the following criteria: 1) VFDRs that required a plant modification to meet the fire risk criteria of NFPA 805, or 2) VFDRs where a potential concern existed with respect to NRC Information Notice (IN) 92-18, "Potential for Loss of Remote Shutdown Capability During a Control Room Fire", dated February 28, 1992.

The licensee determined that the deficiencies existed because of latent design deficiencies in the cable routing and circuit design. This LER was applicable to Units 1 and 2. Upon discovery, the licensee entered this issue into their corrective action program as PIP C-1401427, and implemented compensatory actions in the form of fire watches and/or control of transient combustible material for the affected FAs.

Analysis. Failure to protect one redundant train of cables and equipment necessary to achieve post-fire SSD from fire damage was a performance deficiency. This finding was more than minor because it was associated with the reactor safety mitigating system cornerstone attribute of protection against external events (i.e., fire). Specifically, failure to protect safe shutdown cables and equipment from fire damage negatively affected the reactor safety mitigating systems cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Because this issue relates to fire protection and this non-compliance was identified as a part of the site's transition to NFPA 805, this issue is being dispositioned in accordance with Section 9.1, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" of the NRC Enforcement Policy.

In order to verify that this non-compliance was not associated with a finding of high safety significance (Red), inspectors reviewed qualitative and quantitative risk analyses performed by the licensee. These risk evaluations took ignition source and target

information from the licensee's fire probabilistic risk assessment to demonstrate that the significance of the non-compliances were less-than-Red (i.e.  $\Delta$ CDF less than  $1\text{E-}4/\text{year}$ ). Inspectors determined that cables associated with some of the VFDRs were not located in the zone of influence (ZOI) of any credible ignition source. For cables that were located in the ZOI of a credible ignition source, inspectors were able to perform a calculation to determine the change in conditional core damage probability (CCDP), based on the postulated fire-affected equipment not being available. Based on these screenings, inspectors determined that the significance of this non-compliance was less-than-Red. A bounding risk assessment performed by a regional Senior Risk Analyst (SRA) reviewed the licensee and inspector risk evaluations and confirmed the  $\Delta$ CDF risk increase due to this condition was less than  $1\text{E-}4$ , and therefore less than RED.

The inspectors determined that no cross cutting aspect was applicable to this performance deficiency because this finding was not indicative of current licensee performance.

Enforcement. Operating License Condition 2.C.(5), for Units 1 and 2, requires that the licensee implement and maintain in effect all provisions of the approved FPP as described in the UFSAR, as amended, for the facility and as approved in the SER through Supplement 5. BTP CMEB 9.5-1, which incorporated the guidance of Appendix A to BTP ASB 9.5-1 and the technical requirements of Appendix R to 10 CFR 50, established the regulatory and licensing requirements for the FPP at Catawba Nuclear Station (CNS). The CNS FPP was reviewed against and approved for conformance with BTP CMEB 9.5-1 in the SER through Supplement 5. BTP CMEB 9.5-1, Item C.5.b.1, requires that fire protection features be provided that are capable of limiting fire damage so that one train of systems necessary to achieve and maintain hot standby conditions from either the control room or emergency control station(s) is free from fire damage. BTP CMEB 9.5-1, Item C.5.b.2 requires one redundant train to be protected from fire damage by one of the following specified methods:

- (a) separation of cables and equipment by a fire barrier having a 3-hour rating,
- (b) separation of cables and equipment by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards and with fire detectors and an automatic fire suppression system in the fire area, or
- (c) enclosure of cables and equipment in a fire barrier having a 1-hour rating and with fire detectors and an automatic fire suppression system in the fire area.

Contrary to the above, the licensee failed to use one of the means described in BTP CMEB 9.5-1, Item C.5.b.2 to ensure that one of the redundant trains of equipment necessary to achieve and maintain hot shutdown conditions was protected from fire damage. Specifically, on April 2, 2014, the licensee identified the failure to protect equipment in accordance with the current licensing basis. The licensee determined that fire damage could prevent operation of, or cause maloperation of, components that were required to achieve and maintain SSD. This condition has existed since initial plant startup for Units 1 and 2. The licensee entered this issue into the corrective action program (PIP C-14-1427) and implemented compensatory measures in the form of fire watches and/or control of transient combustible material for the affected FAs.

Because the licensee committed to adopt NFPA 805 and change their fire protection licensing bases to comply with 10 CFR 50.48(c), the NRC is exercising enforcement and reactor oversight process (ROP) discretion for this issue in accordance with the NRC Enforcement Policy, Section 9.1, "Enforcement Discretion for Certain Fire Protection Issues (10 CFR 50.48)" and Inspection Manual Chapter 0305. Specifically, this issue was identified and will be addressed during the licensee's transition to NFPA 805, it was entered into the licensee's corrective action program, immediate corrective action and compensatory measures were taken, it was not likely to have been previously identified by routine licensee efforts, it was not willful, and it was not associated with a finding of high safety significance (Red).

#### 4OA5 Other Activities

##### .1 Operation of an Independent Spent Fuel Storage Installation (60855.1)

###### a. Inspection Scope

The inspectors performed a walkdown of the onsite independent spent fuel storage installation (ISFSI). The inspectors reviewed changes made to the ISFSI programs and procedures, including associated 10 CFR 72.48, "Changes, Tests, and Experiments," screens and evaluations to verify that changes made were consistent with the license or certificate of compliance. The inspectors reviewed records to verify that the licensee recorded and maintained the location of each fuel assembly placed in the ISFSI. The inspectors also reviewed surveillance records to verify that daily surveillance requirements were performed as required by technical specifications. Documents reviewed are listed in the Attachment.

###### b. Findings

No findings were identified.

#### 4OA6 Meetings, Including Exit

On October 24, 2016, the resident inspectors presented the inspection results to Mr. Tom Simril and other members of the licensee's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### **Licensee Personnel**

C. Abernathy, Manager, Nuclear Site Services  
S. Andrews, Sr. Engineer Regulatory Affairs,  
T. Arlow, Emergency Planning Manager  
C. Bigham, Director Nuclear Organizational Effectiveness  
M. Carwile, Chemistry Manager  
C. Cauthen, SG Inspection Program  
B. Cauthen, Lead Engineer  
C. Curry, Plant Manager  
C. Fletcher, Regulatory Affairs Manager  
N. Flippin, Work Management Manager  
B. Foster, Operations Manager  
T. Jenkins, Maintenance Manager  
A. Keller, ISI Program Owner  
L. Keller, General Manager Nuclear Engineering  
T. Koleva, Boric Acid Program Owner  
B. Leonard, Training Manager  
T. Simril, Site Vice-President  
J. Smith, Radiation Protection Manager  
S. West, Director, Nuclear Plant Security  
B. Weaver, PRA Engineer  
C. Wilson, Sr. Engineer Regulatory Affairs

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **Closed**

413/2014-002-00	LER	Unanalyzed Condition Due to Deviations from Fire Protection Current Licensing Basis Identified During NFPA 805 Transition (Section 4OA3)
413/2014-002-01	LER	Unanalyzed Condition Due to Deviations from Fire Protection Current Licensing Basis Identified During NFPA 805 Transition (Section 4OA3)

## LIST OF DOCUMENTS REVIEWED

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

OP/2/A/6350/002, D/G Valve and Breaker Checklist  
OP/1/A/6200/007, Containment Spray System  
OP/2/A/6250/002, Auxiliary Feedwater Valve Check List

### **Section 1R05Q: Fire Protection**

Fire Brigade Response Strategies for Safety-Related Areas, Rev. 039  
Fire Strategy Plan, Fire Area 22: 594' Aux. Building  
Fire Strategy Plan N: 594' Turbine Building  
Fire Strategy Plan, Fire Area 27: 2A D/G room  
Fire Strategy Plan, Fire Area 15: Unit 1 Essential Switchgear Room 577'  
Fire Strategy Plan, Fire Area 8: Unit 1 Essential Switchgear Room 560'  
PT/0/A/4400/001 P, Inspection of Portable Fire Extinguishers, Rev. 086  
PT/0/A/4400/001 T, Visual Inspection of Fire Hose Stations and Fire Hose Equipment Houses, Rev. 005  
WO 20078175 01, Monthly Inspection of Portable Fire Extinguishers, June 2016  
WO 20012734 01, Visual Inspection of Fire Hose Stations, January 2016  
AR #02048934

### **Section 1R06: Internal Flooding**

CR 2050606, Potential failure of circulation water expansion joints

### **Section 1R07 Heat Sink Performance**

#### **Procedures**

AD-OP-ALL-0105, Operability Determinations and Functionality Assessments, Rev. 003  
MP/0/A/7150/098, Nuclear Service Water (RN) Pump, Motor Upper Bearing Oil and Motor Coolers Chemical Cleaning, Rev. 012  
OP/0/A/6400/006 M, Nuclear Service Water System Unwatering Procedure, Rev. 070  
PT/0/A/4400/008 A, RN Flow Balance Train A, Rev. 063  
PT/0/A/4400/008 B, RN Flow Balance Train B, Rev. 057  
PT/0/A/4400/024, SNSWP Temperature Monitoring, Rev. 014

#### **Calculations**

CNC-1150.01-00-0001, SNSWP Thermal Analysis during One Unit LOCA and One Unit Shutdown, Rev. 019  
CNC-1150.04-00-0009, Area and Volume of the Stby. Nuclear Service Water Pond, Rev. 002  
CNC-1223.24-00-0011, Nuclear Service Water System Test Criteria, Rev. 037

#### **Drawings**

CN-1397-4, SNSW Pond Instrumentation Pier, Rev. 008  
CN-1574-01.00, Flow Diagram of Nuclear Service Water System (RN), Rev. 056  
CN-1574-01.01, Flow Diagram of Nuclear Service Water System (RN), Rev. 061  
CN-1574-01.02, Flow Diagram of Nuclear Service Water System (RN), Rev. 056  
CN-1574-02.01, Flow Diagram of Nuclear Service Water System (RN), Rev. 058  
CNSF-1574-RN.01, Summary Flow Diagram Nuclear Service Water System (RN), Rev. 006



Corrective Action Documents

AR 01554606, OEDB 60799 Subject: IER L2-12-27, Reactor Scram and Loss of Off-Site Power  
 AR 1516631, SNSWP local level indication at the end of the outfall pier  
 AR 1898305, No flow discharging from long leg discharge of either A or B  
 PIP C-99-2777, Assessment SA-99-26(CN)(PA)

Other Documents

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 CNS-1150.04-00-0001, Design Basis Specification for the Nuclear Service Water Structures, Rev. 007  
 CNS-157 4.RN-00-0001, Design Basis Specification for the Nuclear Service Water System (RN), Rev. 063  
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 Completed IP/1/B/3112/004, Calibration of Non-Safety Related RN Intake Structure Instrumentation – dated 03/10/16  
 Completed PT/0/A/4200/009 A, Auxiliary Safeguards Test Cabinet Periodic Test – dated 03/28/16  
 Completed PT/0/A/4200/009 A, Auxiliary Safeguards Test Cabinet Periodic Test – dated 06/20/16  
 Completed PT/0/A/4200/013 C, RN Shared Valves Inservice Test (QU) – dated 03/23/16  
 Completed PT/0/A/4200/013, RN Share Valves Inservice Test (QU) – dated 01/14/16  
 Completed PT/0/A/4200/013, RN Share Valves Inservice Test (QU) – dated 08/07/15  
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 Service Water System Program Manual, Rev. 009  
 WO 02123166, 1RN PU A: Clean Motor Coolers  
 WO 02129129, 1RN PU B-Clean Motor Coolers  
 WO 02131687, 2RN PU B-Clean Motor Coolers

**Section 1RO8: Inservice Inspection Activities**Procedures

03-1275284, Field Procedure for Remote Rolled Plugging Utilizing Plugging Control Box, Rev. 021  
 03-9203864, Steam Generator Channel Head Inspection per Nuclear Safety Advisory Letter (NSAL) 12-1, Rev. 002  
 54-ISI-400-021, Multi-Frequency Eddy Current Examination of Tubing, Rev. 000  
 MP/0/A/7650/040, Inspection, Assessment, and Cleanup of Boric Acid on Plant Materials, Rev. 022  
 MRS-GEN-1214, Steam Generator Channel Head Video Inspection, Rev. 002  
 NDEMAN-NDE-25, Magnetic Particle Examination, Rev. 028  
 NDEMAN-NDE-640, Ultrasonic Examination Using Longitudinal Wave and Shear Wave Straight Beam Techniques, Rev. 005  
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 NDE-NE-ALL-7203, Visual Examination of PWR Reactor Pressure Vessel Bottom Mounted Instrument Penetrations, Rev. 000  
 SM/0/A/8140/001, Welding of QA and Non QA Piping, Valves and Components, Rev. 037

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CN-2492-NW.00-158, Containment Valve Injection Water System (NW), Rev. 002  
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AD-MN-ALL-0006, Fluid Leak Management, Rev. 000  
Catawba Unit 2EOC21 Steam Generator Degradation Assessment, Rev. 001  
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PD-EG-PWR-1611, Boric Acid Corrosion Control Program, Rev. 001  
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AR 01898992, Excessive / Active boron accumulation from 2-NI-VA-327 pipe  
AR 01901090, During fit-up inspection, QC noted minimum wall thickness violation  
AR 01931170, 0-WL-FE-9780 Active / Excessive boron leak from flange  
AR 01940775, 1-NM-PG-6100 Active / Excessive boron from threaded fitting  
AR 01950202, 2-KF-FS-5150 Active boron leak from fitting 30-40 dpm  
AR 01985576, Boric Acid Corrosion Control Program - Implementation Procedure Effectiveness  
AR 02020057, 1-NS-VA-1B Excessive/active boron, leak increase  
AR 02047391, 1-FW-VA-45 Active Boron Leak  
AR 02060612, Heavy corrosion and scaling on the lower head  
AR 02060953, 2B NC Pump main flange leak  
AR 02061334, Area of exam coverage limitation encountered during UT exam  
AR 02062097, Potential misapplication of SR 3.0.2 and SR 3.0.3  
AR 02062162, Minimum wall thickness violation under WO 20025151  
AR 02062576, ISI UT Exam Coverage Limitation  
AR 02062987, Steam Generator 2D primary channel head cladding  
AR 02063362, Supports in U2 lower containment

AR 02063371, BAC walkdown in U2 containment  
 AR 02065690, Indentation in U2 reactor head next to outer O-ring groove

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WO 02129915, 1NS-01B Dry Boron at Valve Packing  
 WO 02144333, 2NW-061B: Clean Valve and Internals Delete, Bonnet Seal Weld  
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**Section 1R11: Licensed Operator Requalification**

Records:

License Reactivation Packages (5).  
 LORP Training Attendance records (9 (Shift B)).  
 Medical Files (9).  
 Remedial Training Records (7).  
 Remedial Training Examinations (4).  
 2016 LOR Exam JPM Summary Sheets (15).  
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 Feedback summaries (3)

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 AD-TQ-ALL-0068, Licensed Operator Continuing Training Program. Revision 1, 05/03/2016.  
 AD-TQ-ALL-0410, Remediation and Reevaluation, Revision 2, 11/18/2015.  
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 AD-TQ-ALL-0425, Simulator Scenario Based Testing, Revision 1, 04/30/2015  
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 OTMP 3.4, Active Simulator Exam Development Guide, Revision 20, 04/25/2016.  
 OTMP 4.1, JPM Exam Preparation and Administration, Revision 14, 07/05/2016  
 OTMP 4.7, Operator Requalification Examination Security Procedure, Revision 10, 03/07/2016  
 OTMP 6.3, Licensed Operator Requalification Program. Revision 15, 05/05/2016  
 OTMP 7.0, Simulator Configuration Management, Revision 17, 08/29/15  
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Simulator Real Time Tests:

2016 Real Time Test, 06/10/2016.

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 2016 Transient Test 12 (Steam Line Break), Revision for C1C23, 07/25/16.  
 2016 Transient Test 15 (SBLOCA/ICC), Revision for C1C23, 07/25/16.

Simulator Problem Reports & Design Change Requests:

RMS-075, Mod to install new OEMF89 in the YN system, 10/15/15  
 EQA-307, Turbine Lube Oil controller on MC-3 will not control in automatic, 4/15/16  
 CRF-040, Replace all Rod Step counters with new programmable counters, 5/10/16  
 PCS-078, During CF/CA nozzle swaps the simulator responds more drastically than the plant and results in deviation alarms, 7/14/16  
 DSG-052, The main simulator DG panel synchroscope is inoperable, 3/30/16  
 EQA-287, Replace the two recorders on the EMF panels, 3/31/16  
 SYS-251, Annunciator AD7-C1 needs reflash capability, 6/24/16

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2015 Annual Simulator Report, 01/12/16.

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 RFY-004, Manual Initiation of 1B Diesel Generator Cardox CO<sub>2</sub> System, Revision 00, 12/15/03  
 AD-014, 2A Train Hydrogen Igniters Operation from SSF, Revision 02, 08/23/2011  
 EP1-123, Respond to Inadvertent Dilution While Shutdown. Revision 00, 07/25/2016  
 CA-085, Realign CA suction Source, Revision 00, 04/08/2016  
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 IRE-103, Start M/G Set #1A, Revision 20, 02/03/2011  
 EP-016, Shifting Main Transformer Auxiliaries, Revision 3, 07/24/14  
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**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

PRT-2-16-2ADGOOS-014: 2A DG OOS  
 PRT-0-16-SSF SG WK 28-0158  
 PRT-1-16-1BNSOOS, 1A NS protected due to 1B NS tagged

**Section 1R15: Operability Evaluations**

PT/2/A/4200/031, SV Valve Inservice Test (QU), March 30, 2016  
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 AD-OP-ALL-0105, Operability Determinations and Functionality Assessments, Rev. 003  
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OMP 2-29, LCO Tracking, Rev. 061

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

#### Procedures, Guidance Documents and Manuals

AD-RP-ALL-2001, Taking, Counting, and Recording Surveys, Rev. 001  
AD-RP-ALL-2009, Personnel Contamination Monitoring and Reporting, Rev. 002  
AD-RP-ALL-2017, Access Controls for High, Locked High, and Very High Radiation Areas, Rev. 002  
AD-RP-ALL-3001, Control of Radioactive Material and Use of Radioactive Material Labels, Rev. 001  
RA/2/1100/004, Unit 2 Required Surveys for Plant Transients, Rev. 013  
RA/0/1700/003, Issuance and Return of Radioactive Sources, Rev. 001

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AD-RP-ALL-2017, Access Controls for High, Locked High, and Very High Radiation Areas: Attachment 1, 09/14/2016, 18:42.  
AD-RP-ALL-2017, Access Controls for High, Locked High, and Very High Radiation Areas: Attachment 1, 09/14/2016, 11:55.  
AD-RP-ALL-2017 Rev 2, Attachment 9 <<LHRA or VHRA Key Log >>, 09/23/2016-09/28/2016 @ 8:30  
Boundary TLD Dose Trending Report 03/01/2015 - 07/21/2016  
Catawba Nuclear Site Semiannual Source Inventory and Leak Test, 06/02/2016 (in part)  
Catawba Nuclear Station- Unit 2 EOC-21 Refueling Outage Hi level Schedule 09/26/2016 - 09/29/2016  
Confirmation Form 2016 Annual Inventory Reconciliation [NSTS Sources], 01/13/2016  
Gamma Spectrum Analyses:  
12-Sep-16-220016, E/C thimble tube inspection B/Z RWP 2108, 09/12/2016  
12-Sep-16-220015, E/C Thimble Tube Inspect HEPA exhaust RWP 2108, 09/12/2016  
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CN16091300062, U2 Rx L/C Retracting Incore Thimble Tubes RWP 2126, 09/13/2016  
CN16091400017, U2 Rx UC Cavity Seal sand-box covers RWP 2405/9  
CN16091400025, U2 Rx UC C/S Rtn RWP 2401/1  
CN16091400007, U2 Rx UC Shallow End Stud Hole Plugs RWP 2405  
CN16091400016, U2 Rx UC C/S Rtn RWP 2401  
CN16092700052, U2 RX L/C PRT Platform Rtn RWP 2101, 09/27/2016  
CN16092700035, U-2 L/C PRT Platform Routine, 09/27/2016  
CN16092700041, U2 L/C A/D CACFU Exhaust, 09/27/2016  
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CN16092700049, U2 L/C "D" Platform Rtn, 9/27/2016  
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CNS-M-20150306-34, U2 Rx Bldg\U-2 Upper Cont., 3/6/2015  
CNS-M-20160404-2, Aux Bldg\543 Elevation room 222 A-B, 04/04/2016  
Interstation Letter Subject: CNS Material Stored in Spent Fuel Pools-2015  
VSDS Standard Survey Report(s):  
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 CNS-M-20160914-30, U2 Rx Bldg\U-2 Upper Cont., 09/14/2016  
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 RA/2/1100/001, Unit 2 Outage Upper Containment Controls and Surveillance: Enclosure 5.28,  
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 02065328

#### **Section 2RS2: ALARA**

##### Procedures, Guidance Documents, and Manuals

AD-RP-ALL-2000, Preparation and Management of Radiation Work Permits (RWP), Rev. 001  
 AD-RP-ALL-2006, Radiation Protection Risk Management Process, Rev. 001  
 AD-RP-ALL-2019, TEDE ALARA Evaluations and DAC hour Tracking, Rev. 001  
 AD-RP-ALL-9000, ALARA Program, Rev. 004  
 AD-RP-ALL-9001, ALARA Planning, Rev. 001  
 AD-RP-ALL-9002, Sentinel ALARA Management, Rev. 000  
 AD-RP-ALL-9006, Failed Fuel Action Plan, Rev. 000  
 AD-RP-ALL-9007, Radiation Protection Source Term Review, Rev. 000  
 CSD-CP-CNS-0001, Catawba Primary Chemistry Strategic Plan, Rev. 001  
 Duke Fleet ALARA Manual, Various Revisions depending on Section

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 Station Review, 3/1/2016  
 ALARA Critique, Plan # C-OL-15-10, Unit 2 Repair/Replace 2BB-012, 8/31/2015  
 ALARA Critique, Plan # C1EOC22-15-02, 1EOC22 Reactor Head Activities, 3/9/2016  
 ALARA In-Progress Review, Plan # C1EOC22-15-02, 1EOC22 Reactor Head Activities; 35%  
 exposure/39% work, 11/26/2015; 85% exposure/54% work, 12/3/2015; 100% exposure/70%  
 work, 12/9/2015  
 ALARA In-Progress Review, Plan # C-OL-15-10, Unit 2 Repair/Replace 2BB-012, 73%,  
 8/31/2015  
 ALARA In-Progress Review, Plan # C2EOC21-16-02, Headwork Activities, 24% exposure/36%  
 work, 9/15/2016  
 ALARA In-Progress Reviews, Plan # 2EOC21-16-04, Steam Generator Primary Side Activities:  
 21% exposure/14% work, 9/20/2016; 50% exposure/44% work, 9/24/2016  
 ALARA In-Progress Review, Plan # C2EOC21-16-08, Steam Generator Nozzle Dam Activities,  
 58% exposure/43% work, 9/20/2016  
 ALARA In-Progress Reviews, Plan # C2EOC21-16-10, 2B NC Pump Motor Removal/  
 Replacement: 2% exposure/1.6% work, 9/12/2016; 22.7% exposure/18% work, 9/17/2016;  
 39.3% exposure/48% work, 9/20/2016; 53% exposure/58% work, 9/23/2016; 75.3%  
 exposure/76% work, 9/23/2016  
 ALARA Long Range Plan 2014-2018 (2014 Update), Catawba Nuclear Station, 2/11/2014

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 ALARA Long Range Plan 2016-2021 (2016 Update), Catawba Nuclear Station, 4/28/2016  
 ALARA Plan (AP), Plan # C-OL-15-10, Unit 2 Repair/Replace 2BB-012, 8/27/2015  
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 AP, Plan # 2EOC21-16-01, Install/Remove Temporary Shielding During 2EOC21, Rev. 000, 8/10/2016  
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 AP, Plan # C2EOC21-16-04, Steam Generator Primary Side Activities, Rev. 000, 8/9/2016  
 AP, Plan # C2EOC21-16-05, Steam Generator Secondary Side Activities, Rev. 000, 8/9/2016  
 AP, Plan # C2EOC21-16-10, 2B NC Pump Motor Removal/Replacement, Rev. 000, 8/4/2016  
 Catawba Nuclear Station ALARA Committee Meeting Minutes [Including 2EOC21 Challenge Boards], January through June 2016  
 CNS Unit 1 EOC22 Refueling & Maintenance Outage Summary of Personnel Radiation Exposures [Outage ALARA Report], 3/18/2016  
 CNS Radiation Protection Daily Status Reports/Graphs [Dose Tracking by work group and site]: 9/14/2016; 9/28/2016; and 9/29/2016  
 CNS Unit 2 EOC-21 Refueling Outage High Level Schedule(s): 9/12/2016-9/15/2016; 9/13-2016-9/16/2016; 9/15/2015-9/18/2016; and 9/26/2016-9/29/2016  
 Micro ALARA Plan, Unit 2 Dry Cask Storage for Cask 82, 6/16/2016  
 Micro ALARA Plan, Unit 2 Dry Cask Storage for Cask 82, Post Job Review, 8/3/2016  
 Radiation Work Permits (RWP): RWP #2125, Shielding Activities (Lower Containment and Annulus), Rev 22; RWP #2162, 2B NCP Motor Replacement, Rev 9; RWP # 2405, Reactor Head Activities (U/C), Rev 21; RWP #2453, RX Head Inspections Includes Shroud, Hanger, Insulation & Inspection (U/C), Rev 9; RWP #2806, S/G Remove/Install Man Ways and Diaphragms/Bowl Pumping, Rev 30; RWP #2808, S/G Install/Remove Nozzle Covers/Dams, Rev 27; RWP #2812, S/G Eddy Current Activities, Rev 43; RWP #2814, SIG Plugging Activities, Rev. 032  
 RWP List Report, Catawba Nuclear Station, RWP Status, 7/12/2016  
 Spreadsheet, 2015 Annual ALARA Estimate (by Work Group), undated  
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 TEDE ALARA Evaluations: Unit 2 Reactor Cavity Deep End-Blind Flange Install (RWP 2415), 9/12/2016; Unit 2 Reactor Cavity-Head Flange Cleaning and Cavity Seals (RWP2405), 9/9/2016; Unit 2 Seal Table-Eddy Current Activities (RWP 2108), 8/25/2016; Unit 2 S/G Bowls-Nozzle Dams (RWP 2808), 9/1/2016; Unit 2 S/G Platform-Platform Work (RWPs 2806, 2810, 2812, 2814, 2834, & 2839), 9/1/2016  
 Temporary Shielding Request (TSR), TSR 16-232, Pressurizer Surge Line for 2B RCP Motor Work, 8/10/2016; TSR 16-235, PZR Curtain@593', 3/1/2016; TSR 16-235B, PZR Curtain at 2NCOMR B, 8/10/2016; TSR 16-291, 2B Cold Leg Pipe, 8/8/2016; TSR 16-296, 2B Hot Leg, 8/10/2016; TSR 16-296B, 2B Hot Leg RTD, 8/10/2016  
 VSDS Survey # CNS-M-20150828-4, 2BB12 Job Coverage, 8/28/2015  
 VSDS Survey # CNS-M-20160912-6, U2 Rx Bldg\U2 L/C Surge line Pre Shield [TSR16-232], 9/12/2016  
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 VSDS Survey # CNS-M-20160911-14, Pre Shielding for TSR 16-235B, 9/11/2016  
 VSDS Survey # CNS-M-20160910-5, 2EOC21 Initial Entry [2B Loop], 9/10/2016  
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 1EOC22 Crud Burst Cleanup Dose Rate Data, with Graph [including comparison to previous outages], 9/13/16  
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 2015 DAW Site Composite Smear Sample for 10 CFR 61, 8/28/2015

#### Corrective Action Program (CAP) Documents

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 Self-Assessment Report G-FRPS-SA-15-22, 2015 Catawba Nuclear Station Radiation Protection Source Term Review, 10/20/2015  
 Self-Assessment Report C-RPS-SA-14-18, Assessment of CNS Dose Delta PIPs, 10/29/2014  
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#### **Section 2RS3: In-Plant Airborne Radioactivity Control and Mitigation**

##### Procedures, Guidance Documents, and Manuals

AD-RP-ALL-2019, TEDE ALARA Evaluations and DAC Hour Tracking, Rev. 001  
 AD-RP-ALL-6002, Inspections of Self-Contained Breathing Apparatus (SCBA) and Associated Equipment, Rev. 000  
 HP/0/B/1000/006, Emergency Equipment Functional Check and Inventory, Rev. 061  
 PT/0/B/4600/032, Fire Brigade Equipment Inspection/Inventory, Rev. 012  
 PT/1/A/4450/001, Containment Purge Periodic Test, Rev. 029  
 PT/1/A/4450/001, Fuel Pool Area Filtered Exhaust Filter Train Performance Test, Rev. 026  
 PT/1/A/4450/009, Spent Fuel Ventilation System Train A Operability Test, Rev. 028  
 RA/0/1100/007, Use of Portable Ventilation Systems in Radiologically Controlled Areas, Rev. 000  
 RA/0/1600/001, Respiratory Protection Equipment Receipt, Cleaning, Storage and Documentation, Rev. 008  
 RA/0/1600/004, Recharging Self-Contained Breathing Apparatus, Rev. 002

##### Records and Data

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#### CAP Documents

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#### **Section 2RS4: Occupational Dose Assessment**

##### Procedures, Guidance Documents, and Manuals

AD-RP-ALL-2009, Personnel Contamination, Monitoring and Reporting, Rev. 002  
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 Apex-InVivo Whole Body Counter Background and QA Parameter report 4/2/2016 through 9/27/2016, 9/7/2016  
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 WO 02034633-01, 2EMF-13 Area Steamline Monitor Calibration, 09/09/13  
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### **Section 40A1: Performance Indicator Verification**

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