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

March 13, 2007

Virginia Electric and Power Company
ATTN: Mr. David A. Christian
Senior Vice President and
Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060

SUBJECT: NORTH ANNA POWER STATION - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000338/2007006, 05000339/2007006

Dear Mr. Christian:

On February 9, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your North Anna Power Station, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on February 9, 2007, with Mr. Dan Stoddard 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 license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS).

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Sincerely,

/RA/

Charles R. Ogle, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 50-338, 50-339
License Nos.: NPF-4, NPF-7

Enclosure: Inspection Report 05000338/2007006, 05000339/2007006
w/Attachment: Supplemental Information

cc w/encl:
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-338, 50-339
License Nos.:	NPF-4, NPF-7
Report Nos.:	05000338/2007006, 05000339/2007006
Licensee:	Virginia Electric and Power Company (VEPCO)
Facilities:	North Anna Power Station, Units 1 & 2
Location:	1022 Haley Drive Mineral, Virginia 23117
Dates:	December 11, 2006 - February 9, 2007
Inspectors:	R. Hagar, Senior Resident Inspector (Robinson) C. Peabody, Reactor Inspector G. Wilson, Resident Inspector J. Hamman, Reactor Inspector in Training T. Tinkel, Contractor P. Wagner, Contractor
Approved by:	Charles R. Ogle, Chief Engineering Branch 1 Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000338/2007006, IR 05000339/2007006; 12/11/2006 - 02/09/2007; North Anna Power Station Units 1 & 2; Component Design Bases Inspection.

This inspection was conducted by a team of one Senior Resident Inspector from another site, the site resident inspector, one NRC inspector from the Region II office, one NRC inspector trainee from the Region II office, and two NRC contractors. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified.

B. Licensee-Identified Violations

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems and Barrier Integrity

1R21 Component Design Bases Inspection (71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components and operator actions for review using information contained in the licensee's Probabilistic Risk Assessment (PRA). In general, this included components and operator actions that had a risk achievement worth factor greater than two or Birnbaum value greater than 1E-6. The team also selected several components from the licensee's list of components with low design or operating margins. The sample selection included 20 components, six operator actions, and five operating experience items. Additionally, the team reviewed four modifications by performing activities identified in IP 71111.17, Permanent Plant Modifications, Section 02.02.a. and IP 71111.02, Evaluations of Changes, Tests, or Experiments, as applicable.

The team performed a margin assessment and detailed review of the selected risk-significant components to verify that the design bases have been correctly implemented and maintained. This design margin assessment considered original design issues, margin reductions due to modification, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for detailed review. These included items such as failed performance test results, significant corrective action, repeated maintenance, Maintenance Rule (a)(1) status, degraded conditions, NRC resident inspector input, system health reports, industry operating experience, and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense in depth margins. An overall summary of the reviews performed is included in the following sections of this report. A specific list of documents reviewed is included in the attachment to this report.

.2 Results of Detailed Reviews

.2.1 Detailed Component Reviews

.2.1.1 Components

.2.1.1.1 Unit 1 Reactor Vessel Level Instrumentation During Shutdown

a. Inspection Scope

The team reviewed the reactor vessel level instrumentation that is used when the reactor is in a reduced inventory status to verify that the Updated Final Safety Analysis Report (UFSAR) provisions were being properly implemented. The team evaluated the precision and accuracy of the installed instrumentation and their installation locations to verify that these had been taken into account in the calculations that established the calibration factors. The team reviewed the testing and operating procedures to verify that the calculation values had been appropriately incorporated into the procedures. The team also reviewed recently completed calibrations to verify that the results were acceptable. The team reviewed the maintenance history and the corrective actions that were implemented in response to problems that were identified in order to evaluate the reliability of the instrumentation.

b. Findings

No findings of significance were identified.

.2.1.1.2 Unit 1 Residual Heat Removal (RHR) Pumps and Motors

a. Inspection Scope

The team reviewed the UFSAR and the RHR Design Basis Document (DBD) to determine RHR system functional requirements and design basis information. RHR pump calculations, procedures, and test data were reviewed to determine whether the net positive suction head (NPSH) available during recirculation operations was consistent with minimum NPSH requirements specified by the pump vendor.

The team reviewed recent inservice test (IST) records to verify that the pump flow test value was within the acceptance limits stated in the test procedure. The team also reviewed the IST test acceptance criteria for head/flow to verify that those criteria were consistent with the vendor-supplied pump characteristic curve and calculated flow requirements for the system. In addition, the team reviewed the IST procedure to verify that it tested pump vibration in accordance with vendor recommendations.

The team reviewed elementary schematics and electrical distribution diagrams to verify RHR pump motor power supply integrity. The team also reviewed site design standards for cable sizing to verify that power cables were appropriately sized. For RHR pump motors, breakers, and interlocks, the team reviewed relay-setting calculations and results from maintenance testing procedures to verify that design and licensing bases were met, and that individual tests and/or analyses validated component operation under design-basis conditions.

The team reviewed corrective action packages for the previous three years involving pump motors, breakers and switchgear to verify that the licensee had taken appropriate actions to address the problems that had been identified.

b. Findings

No findings of significance were identified.

.2.1.1.3 Unit 1RHR Flow Control and Bypass Valves

a. Inspection Scope

The team reviewed the RHR system drawing and the RHR design-basis document to verify that the design bases for the RHR flow control and bypass valves were consistent with related commitments. The team reviewed the actuator sizing calculation to verify that the actuators were capable of operating these valves under conditions associated with the worst-case accidents. The team also reviewed the preventive maintenance history of these valves to verify that preventive maintenance was being completed in accordance with vendor recommendations.

The team reviewed the electrical schematic and logic diagrams for the RHR flow control valve (RH-HV-1758) and bypass valve (FCV 1605) to verify that the circuitry associated with these valves properly reflected the design provisions stated in the UFSAR and other design commitments. The team reviewed the testing procedures to verify that the valve operators and interlocks were being adequately tested. The team also reviewed the maintenance and repair history of these valves for electrical failures, including the licensee's response to problems that were identified, in order to evaluate the valves' reliability and the appropriateness of the licensee's corrective actions.

b. Findings

No findings of significance were identified.

.2.1.1.4 Unit 1 RHR Suction Valves

a. Inspection Scope

The team reviewed the RHR design basis document, the UFSAR, and applicable plant drawings to verify that the established design bases associated with the RHR suction valves (1-RHR-MOV-1700 and 1-RHR-MOV-1701) were in accordance with regulatory requirements. The team examined the maintenance history of these valves to verify that design bases have been maintained. In addition, the team reviewed plant test procedures and results to verify that established acceptance criteria were met. The team also examined maintenance records, reviewed related test results, and reviewed applicable corrective actions to verify that potential degradation was being monitored and/or prevented.

The team reviewed the maintenance and repair history of the motor operators for these valves for instances of electrical failures, especially failures to reposition on demand or spurious actuations, in order to evaluate the reliability of the valve operators. The team also evaluated the corrective actions taken to address problems that were identified with these motor operators to verify that those actions were appropriate. The team reviewed the electrical diagrams to verify that the circuitry properly reflected the design provisions. In addition, the team evaluated the engineering analyses that had been performed to support the pressure-interlock actuation setpoints and reviewed the testing procedures to verify that those setpoints were properly transferred into the calibration procedures. The team reviewed the test procedures and the results of recently completed tests to verify that the input devices and the associated interlocks were being properly tested. The team also reviewed the valve motor operator calculations to verify that the potential for degraded power supply voltage had been considered in the evaluation of available actuator torque.

b. Findings

No findings of significance were identified.

.2.1.1.5 Instrumentation Used to Diagnose a Loss-of-Coolant Accident in an Interfacing System in Unit 1

a. Inspection Scope

The team evaluated selected radiation monitors and sump level indications to verify that those instruments could reliably be used by the reactor operators to monitor for the potential occurrence of a loss-of-coolant accident in an interfacing system. The team reviewed the maintenance and repair history of Radiation Monitors - RMS-RM-154, Vent Stack A (VG-RI-179-1,2,3), Vent Stack B (VG-RI-180-1,2,3) and the Auxiliary Building Sump Level Indication and Alarm System (DA-LI-211A, B) to evaluate their reliability and to verify that appropriate corrective actions had been implemented for any problems that had occurred. The team reviewed engineering calculations to verify that proper setpoints had been selected for the radiation monitors. The team also reviewed the testing procedures to confirm that proper calibration setpoints had been incorporated into the testing requirements. The team also reviewed the results of recently completed tests to evaluate the performance of the radiation monitors. The team also evaluated the routine test procedures and testing results for the Auxiliary Building Sump Level High Level Alarm Level Switch (DA-LS-105) to verify that the testing was acceptable.

b. Findings

No findings of significance were identified.

.2.1.1.6 Unit 1 Low-Head Safety Injection (LHSI) to Cold Leg Check Valves

a. Inspection Scope

The team reviewed the safety injection design basis document, the UFSAR, and applicable plant drawings to verify that the established design bases for the LHSI-to-cold-leg check valves (1-SI-83, 1-SI-86, 1-SI-89, 1-SI-195, 1-SI-197, and 1-SI-199) were in accordance with regulatory requirements. The team examined the maintenance history of these valves to verify that those design bases have been maintained. The team also examined test procedures and test data for both corrective and preventative maintenance to verify that these valves remain capable of performing their design function. In addition, the team reviewed applicable corrective actions to verify that potential degradation was being monitored and/or prevented.

b. Findings

No findings of significance were identified.

.2.1.1.7 Unit 1Degraded-Grid Relays

a. Inspection Scope

The team reviewed the degraded-grid voltage protection system and the conditions for which the system was designed to function in order to verify that related licensing commitments were being properly implemented. The team evaluated the licensee's voltage profile analysis to verify that the calculated voltage levels available under various configurations would be acceptable. The team also evaluated the degraded grid voltage protection relay setting calculations to verify that appropriate loop accuracies had been properly considered to ensure that system actuation voltage setpoints were conservative. In addition, the team reviewed the electrical circuitry that provides protection for undervoltage and loss of voltage conditions to verify that the actuation logic properly implemented licensing commitments. The team reviewed the calibration procedures for the degraded grid voltage relays to ensure that the tests provided assurance that the design bases requirements were being maintained. The team also reviewed the accuracy of the test instrumentation specified for calibration testing of the installed instrumentation to ensure that the setpoint calculation assumptions were conservative. The team evaluated the results of recent testing to verify that the as-found relay settings either were acceptable as-is or were returned to acceptable status through implementation of adequate corrective actions.

b. Findings

No findings of significance were identified.

.2.1.1.8 Unit 1Station Blackout (SBO) Output Breakers

a. Inspection Scope

The team reviewed electrical schematic and logic drawings to verify that the actuation logic for the circuit breakers provided for protection during an SBO event met the provisions specified in the UFSAR and other design commitments. The team evaluated the Alternate [Alternating Current] Power Supply Diesel Generator System and its auxiliary systems to verify compliance with licensing commitments. The team reviewed the electrical interlocks to ensure that adequate protection had been provided for that system. The team reviewed the maintenance and repair history and the licensee's response to various industry notifications and NRC Information Notices that are related to the SBO-event-related circuit breakers, to verify that proper and effective corrective actions had been implemented.

In addition, the team reviewed operating procedures utilized for providing power to the emergency busses from the Alternate [Alternating Current] Power Supply Diesel Generator System to evaluate the electrical loading that was considered. The team also reviewed the emergency diesel generator batteries to verify that they would be capable of supplying adequate voltage and current at the field flash terminals to ensure emergency diesel generator operation.

b. Findings

No findings of significance were identified.

.2.1.1.9 Intake Structure

a. Inspection Scope

The team reviewed management controls used to preclude loss of Service Water (SW) from external aspects such as fouling or plugging in Units 1 and 2. The team also reviewed preventive maintenance records to verify that preventive maintenance activities were being conducted to maintain the desired condition of the intake structure. In addition, the team reviewed preventive maintenance records for the charging pump lube oil coolers, which contain the smallest diameter tubes of any safety-related heat exchanger cooled by the SW system, to verify that no fouling or plugging had occurred in those coolers. During a walkdown, the team visually examined the material condition of the intake structure and the intake structure traveling screens, to verify that no observed conditions could cause or contribute to loss of SW due to fouling or plugging.

b. Findings

No findings of significance were identified.

.2.1.1.10 Units 1 and 2 Service Water Pumps

a. Inspection Scope

The team examined the maintenance history of the SW pumps (1-SW-P-1A/1B and 2-SW-P-1A/1B) and auxiliary service water pumps (1-SW-P-4 and 2-SW-P-4) to verify that design bases have been maintained. The team reviewed the SW design basis documents, the UFSAR, and applicable plant drawings to verify that the established design bases were in accordance with regulatory requirements. The team examined records and test data for both corrective and preventative maintenance, vendor trip reports, and applicable corrective actions to verify that potential degradation was being monitored, prevented, and corrected. The team reviewed the preventive maintenance history and schedule for consistency with vendor recommendations. The team also reviewed vibrational and lube-oil analyses for the SW pumps to verify the likelihood of pump damage or failure from these mechanisms. The team conducted a field walkdown of the SW pumps to verify that the installed configuration was consistent with the design basis and plant drawings.

In addition, the team reviewed elementary schematics and electrical distribution diagrams to verify SW pump motor power supply integrity. The team also reviewed electrical circuitry and logic diagrams to verify that pump starting and sequencing was consistent with related design bases. The team reviewed relay-setting calculations and results from maintenance testing procedures for the SW pump motors and breakers, to verify that design and licensing bases were met, and that individual tests and/or analyses validated component operation under accident/event conditions. The team also reviewed corrective action packages for the previous three years to verify that the licensee had taken appropriate actions to address the problems that had been identified.

b. Findings

No findings of significance were identified.

.2.1.1.11 Unit 1 Service Water Piping

a. Inspection Scope

The team reviewed design drawings, UFSAR descriptions, structural integrity evaluations, and operability determinations related to the structural integrity of the service water system in the Auxiliary Building to verify design requirements were appropriately implemented and maintained. The team also reviewed the maintenance history of SW piping to verify that the licensee took appropriate corrective actions to address piping leaks that had been identified in the past. In particular, the team reviewed the licensee's program for using chemical additives to reduce corrosion rates, to verify that the program did measurably reduce those rates. The team also reviewed the licensee's program for using ultrasonic testing and visual inspections to monitor and assess SW piping integrity, to verify that the

frequencies of those activities were appropriate, and that the scope of those activities was comprehensive. In addition, the team reviewed the calculation based on ultrasonic test data, to verify the structural integrity of the SW piping and conducted a walkdown with the system engineer to verify installed configuration and observe material condition.

b. Findings

No findings of significance were identified.

.2.1.1.12 Unit 1 Containment Sump Suction Check Valves

a. Inspection Scope

The team reviewed the maintenance history records as well as the surveillance test procedure and test records for the containment sump suction check valves (SI-1 & SI-16), to verify that the test program confirmed that the valves were capable of performing their safety function, to verify that these valves were properly installed, and to determine whether the licensee had taken appropriate corrective actions to address identified problems.

For valves in which the valve disc had been replaced, the team reviewed the construction details and maintenance records to verify that the replacement valve discs were fabricated from materials that were compatible with the valve bodies.

b. Findings

No findings of significance were identified.

.2.1.1.13 Units 1 and 2480 Volt BBC/ITE K-Line Breakers

a. Inspection Scope

The team reviewed the component failures that had prompted the licensee to place all 480-volt BBC/ITE K-Line circuit breakers at the site into Maintenance Rule (a)(1) status and the licensee's responses to those failures, to verify that those breakers remained capable of performing their design functions.

b. Findings

No findings of significance were identified.

.2.1.1.14 Units 1 and 2 Main Control Room / Emergency Switchgear Room Air Handlers

a. Inspection Scope

The team examined the maintenance history of the Main Control Room / Emergency

Switchgear Room air handlers (1-HV-AC-6/7 and 2-HV-AC-6/7), their associated dampers (1-HV-MOD-137/138 and 2-HV-MOD-237/238), and the fan motors to verify that design bases have been maintained. The team reviewed the heating, ventilation, and air conditioning (HVAC) design basis document, the UFSAR, and applicable plant drawings to verify that the established design bases were in accordance with regulatory requirements. The team examined applicable corrective actions to verify that potential degradation was being monitored and either prevented or corrected. The team reviewed analyses of heat loads during normal and accident conditions to verify that those loads were consistent with the vendor specifications and performance test acceptance criteria. The team compared the preventive maintenance history and schedule to verify that the maintenance was consistent with vendor recommendations. The team also conducted a field walkdown of the fans, the dampers, and the fan motor power supplies with the HVAC system engineer to verify that the installed configuration was consistent with the design basis and plant drawings.

For the control room / emergency switchgear (CR/ESGR) HVAC system fan motors, damper operators, and interlocks, the team reviewed records of component failures that had occurred in the CR/ESGR HVAC system during the past two years to evaluate the performance history of the system and to verify that appropriate corrective actions had been taken to address those failures. The team also reviewed vendor technical manuals and site preventive maintenance procedures and results to evaluate performance history and to verify that the site procedures were consistent with vendor recommendations.

b. Findings

No findings of significance were identified.

.2.1.1.15 Units 1 and 2 Main Control Room / Emergency Switchgear Room Chillers - Pumps and Associated Valves

a. Inspection Scope

The team reviewed the maintenance and repair history of the chilled-water system pumps and temperature control valves (1-HV-TCV-166, 1-HV-TCV-167, and 2-HV-TCV-266, 2-HV-TCV-267) to verify that instances of failures, if any, had been adequately evaluated. The team also reviewed design information related to these pumps and valves to verify that licensing commitments were being properly implemented. In addition, the team reviewed the logic and wiring diagrams for the temperature control valves and the related chilled-water pump motors to verify that the design requirements had been properly incorporated into the circuitry. The team also evaluated the potential for common cause failures that could preclude proper valve operation following a postulated event.

b. Findings

No findings of significance were identified.

.2.1.1.16 Main Control Room / Emergency Switchgear Room Chillers - Condenser and Associated Valves

a. Inspection Scope

The team examined the maintenance history of the condensers and pressure control valves associated with the main control room / emergency switchgear room chillers (1-HV-E-4A/4B/4C), and their associated service water check valves, to verify that design bases had been maintained. The team reviewed the HVAC design basis documents, the UFSAR, and applicable plant drawings to verify that the established design bases were in accordance with regulatory requirements. The team also examined records and test data for both corrective and preventative maintenance, and applicable corrective actions to verify that potential degradation was being monitored, prevented, and corrected. Test data reviewed included pump vibration data; lube oil and head curve analysis results; condenser interlock and efficiency analyses; and pressure-control-valve setpoint calibrations to ensure that the likelihood of failure by these mechanisms has been adequately addressed in the design bases. The team also conducted a field walkdown of these components with the system engineer to verify that the installed configuration was consistent with the design basis and plant drawings.

b. Findings

No findings of significance were identified.

.2.1.1.17 Units 1 and 2 J & H Bus Feeder Breakers

a. Inspection Scope

The team reviewed the maintenance and failure history of the circuit breakers related to the systems included in the inspection sample and the other safety-related 4160-volt circuit breakers for problems, including instances such as spurious opening or improper operation, in order to evaluate the reliability of this type and model of circuit breaker. The team reviewed the licensee's response to identified problems and to various industry notifications and NRC generic communications related to these circuit breakers in order to evaluate the adequacy of the licensee's corrective actions. The team evaluated the controls, interlocks and protective features of the safety-related bus feeder circuit breakers to ensure that the required design features such as interlocks and permissives had been incorporated. The team also reviewed the maintenance and test procedures for these circuit breakers to ensure that manufacturer recommendations and licensing commitments had been properly implemented.

b. Findings

No findings of significance were identified.

.2.1.1.18 Unit 2 Motor-Driven Auxiliary Feedwater Pumps and Associated Valves

a. Inspection Scope

The team examined the analyses of minimum flow margin for the motor-driven auxiliary feedwater pumps (2-FW-P-3A and 2-FW-P-3B) to verify that design basis requirements have been maintained. The team reviewed the feedwater system design basis documents, the UFSAR, and applicable plant drawings to verify that the established design bases were in accordance with regulatory requirements. The team also examined records and test data for both corrective and preventative maintenance, and applicable corrective actions to verify that potential degradation was being monitored, prevented, and corrected. In addition, the team verified the preventive maintenance history and schedule consistent with vendor recommendations. The team also conducted interviews with the licensee to obtain additional information about the status of these analyses. In addition the team conducted a field walkdown of the motor-driven auxiliary feedwater pumps to verify that the installed configuration was consistent with the design basis and plant drawings.

b. Findings

No findings of significance were identified.

.2.1.1.19 Units 1 and 2 Station Battery Busses

a. Inspection Scope

The team reviewed the methods used to test the 1-I and 2-I station battery busses and the results obtained using those methods, to verify that the current testing methods ensure functionality of the busses. The team also used these reviews to determine whether the low-margin issue identified in Request for Engineering Assistance R-2005-029 adversely affected functionality.

b. Findings

No findings of significance were identified.

.2.1.1.20 Main Control Room Ventilation

a. Inspection Scope

The team examined the maintenance history of the turbine building exhaust fan and associated dampers, the 2-II battery room exhaust fan, and the main control room / emergency switchgear room (MCR/ESGR) exhaust fans to verify that design bases have been maintained. The team reviewed the HVAC design basis documents, the UFSAR, and applicable plant drawings to verify that the established design bases were in accordance with regulatory requirements. The team also reviewed the Technical Specifications (TS) to verify that MCR/ESGR temperature and pressure control had been maintained within TS limits. The team examined records and test data for both corrective and preventive maintenance, and applicable corrective actions to verify that potential degradation was being monitored, prevented, and corrected. The team compared the preventive maintenance history and schedule with vendor recommendations. The team also conducted a field walkdown of these fans and dampers with the HVAC System Engineer to verify that the installed configuration was consistent with the design basis and plant drawings.

b. Findings

No findings of significance were identified.

.3 Review of Low Margin Operator Actions

a. Inspection Scope

The team performed a margin assessment and detailed review of selected risk-significant, time-critical operator actions in both Units 1 and 2. Where possible, margins were determined by the review of the assumed design basis and UFSAR response times and performance times documented by job performance measure results within operator time-critical task verification tests. For the selected operator actions, the team observed operator performance during simulator drills. With a plant operator, the team also performed a walkdown of applicable steps in associated abnormal and emergency procedures, and other operations procedures to assess operator knowledge level, adequacy of procedures, availability of special equipment when required, and the conditions under which the procedures would be performed. In the plant, the team verified that required staged equipment such as ladders, toolboxes, operator aids, keys, controlled procedures, and communications equipment were readily available and that field communications with the control room was adequate to complete the operator actions. Additionally, timeliness for time critical operator actions was verified by observing operators simulate performing selected actions on the appropriate components in the plant. The following operator actions were reviewed:

- the strategy for initiating cooling of the reactor coolant system using gravity-driven flow from the refueling water storage tank following a loss of shutdown cooling;

- actions taken to preclude common-cause failures of auxiliary feedwater pumps due to steam binding;
- operator response to loss of ventilation in the main control room and switchgear room;
- response to loss of service water;
- recovery of offsite power; and
- response to loss of shutdown cooling.

b. Findings

No findings of significance were identified.

.4 Review of Industry Operating Experience

a. Inspection Scope

The team reviewed selected operating experience issues that had occurred at domestic and foreign nuclear facilities for applicability at North Anna. The team performed an independent applicability review, and issues that appeared to be applicable to North Anna were selected for a detailed review. The issues reviewed by the team included the licensee's responses to the following issues:

- an interfacing-system loss-of-coolant accident at Wolf Creek,
- a loss of station power at Catawba during 2006,
- a loss of station power at Surry during 2006,
- Generic Letter 89-13, Service Water System Problems Affecting Safety-Related Equipment, and an event involving high bearing temperature on a decay-heat pump at another facility .

b. Findings

No findings of significance were identified.

.5 Review of Permanent Plant Modifications

a. Inspection Scope

The team reviewed modifications related to the selected risk significant components in detail to verify that the design bases, licensing bases, and performance capability of the components have not been degraded through modifications. The team reviewed the modification package, implementation procedures, 50.59 evaluation, calculations, post-modification testing results, and corrective action documents where applicable. The team reviewed the modifications in accordance with IP 71111.17, Permanent Plant Modifications, Section 02.02.a and IP 71111.02, Evaluations of Changes, Tests, or Experiments.

The following modifications were reviewed:

- DCP02-147, Charging Pump Seal Upgrade / NAPS / Units 1&2
- DCP05-147, Emergency Switchgear Sump Modifications / NAPS / Units 1&2
- DCP02-137, [Main Control Room] Chiller(s) Head Outlet Piping Flange Installation / NAPS / Unit 2
- DCP05-123, Resolution of Service Water Expansion Joint and Associated Pipe Restraint Concerns / U1&2

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA6 Meetings, Including Exit

On February 9, 2007, the team presented the inspection results to Mr. Dan Stoddard and the other members of the licensee's staff who acknowledged the results. The team noted that although proprietary information was examined during the inspection, none is included in this inspection report.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel
J. Leberstien, Technical Consultant - Station Licensing
J. McHale, Electrical Engineering Supervisor
G. Modzelewski, Nuclear Engineering Supervisor
B. Standley, Design Engineering Manager
J. Zaborowski, Auxiliary System Engineering Supervisor
D. Stoddard, Vice President

NRC personnel
J. Reece, Senior Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Open
None

Closed
None

Discussed
None

Attachment

LIST OF DOCUMENTS REVIEWED

Condition Reports Reviewed

001724, 1-HV-AC-6 belts are loose and need to be replaced
002130, 2-QS-P-1A did not start when the control switch was taken to 'start'
002339, 1-HV-P-20A had upper motor in-line vibrations slightly in alert range per [performance test]
002783, Design requirements revised without evaluation of existing plant equipment
003560, Breaker installed in SR cubicle without completion of [post-maintenance test]
003676, Extent of Minor Work used for SR 5HK and SR 480 ITE Breakers from CR003560
005534, Top of battery cell #60 has crack and low water level
005557, 1J [Emergency diesel generator] battery cell #37 has crack in battery top
N-1003-0671, [Service water] Carbon Steel Piping Leaks
N-1994-0194-E1, PT21 93-27, Possible butterfly valve Woodruff key failures
N-1994-0197-E1, PT21 93-29, Possible butterfly valve taper pin failures
N-2001-0455, [Service water] stainless steel piping leaks
N-2001-1167, [Service water] stainless steel piping leaks
N-2001-1621, [Service water] stainless steel piping leaks
N-2001-3360, [Service water] stainless steel piping leaks
N-2002-0394, Breaker trip due to inadequate gap
N-2002-1133, Potential defect regarding K-line mechanism failures to charge and close
N-2002-1261, ITE 5HK circuit breaker for [residual heat removal] pump motor, 6/3/02
N-2002-1688, Binding of auto spring discharge lever in ABB type K-Line low voltage electrically operated circuit breakers
N-2002-1693, Binding of primary/secondary close latches in ABB Type K-Line Low voltage electrically operated circuit breakers
N-2002-2223, Control room bottled air issue during functional testing
N-2003-0708, During functional testing, 2-HV-TV-2306A/B did not actuate properly
N-2003-1215, 1-RH-MOV-1700 Exceeded [post-maintenance test] continous thrust limit
N-2003-1215, 1-RH-MOV-1700 overthrust evaluation and root cause, 3/24/03
N-2003-1275, Premature failure of spring charging motors
N-2003-1801, [Service water] stainless steel piping leaks
N-2003-2075, [Emergency diesel generator] output circuit breaker, 5/21/03
N-2003-3353-E1, Breaker cell switch failure caused [emergency cooling water] pump trip
N-2004-0046, Failure of circuit breaker 2-EP-BKR-24J-4 to close during the performance of 2-OPT-ZZ-002
N-2004-1414, 2-HV-TV-2306B indicated closed when valve was actually open during functional testing
N-2004-1415, 1-HV-SOV-1308B did not indicate open as required during functional testing
N-2004-1421, 2-SS-TV-200A indicated mid position when valve should be open during functional testing
N-2004-1426, 02-SW-FS-206D [service water] radiation monitor pump 8 discharge flow switch performed inaccurately during performance testing
N-2004-1433, 2-SW-TV-201B, valve stroked but limit switch did not indicate correct position during functional testing
N-2004-1434, 2-QS-FS-201B failed to actuate alarm during functional testing

N-2004-1438, 2-CH-P-1C blocking contact verification did not indicate open contact condition as required during functional testing
N-2004-2788, 1-SI-1 Scratch on Disc
N-2004-3519, Time delays recorded for recirc pumps were unsat during functional testing
N-2004-3525, 1-PT-66.3 identifies an incorrect relay
N-2004-4599, Circuit breaker for unit 2 H stub bus, 10/18/04
N-2005-0036, [Service water] carbon steel piping leaks
N-2005-0667, 2-HV-AC-6 filter pressure differential indication
N-2005-1050, Premature degradation of Exide batteries
N-2005-1165, Internal resistance readings indicate cell degraded
N-2005-1241, Power lost to 1-EP-MCC-1B1-3, breaker indicated open and tripped
N-2005-1615, Supply breaker 14J-5 tripped open when starting 1-SW-P-7 for equipment rotation
N-2005-2035, [Station blackout] output circuit breaker, 6/3/05
N-2005-2533, 2-CH-P-1C boric acid leak on outboard seal
N-2005-2931, 2-HV-AC-7 grease plug/nipple found broken off from motor housing
N-2005-3225, 2-EE-BKR-24J1-4-CKTBKR closed and immediately opened with an attempt to start the host quench spray pump
N-2005-3434, 2-HV-AC-6 and 7 removed from service for belt work (loose belts)
N-2005-3527, 2-HV-AC-6 and 7 and 1-HV-AC-7 noted with several access cover and door latch deficiencies
N-2005-3542, Failure of circuit breaker 2-EP-BKR-24J-3 to close during the performance of 2-OPT-ZZ-002
N-2005-3543, Emergency switchgear room and main control room access cover and door latch deficiencies (follow-up to N-2005-3527)
N-2005-5409, 1-HV-AC-6 innermost fan belt slipping
N-2006-0687, Suspected leakage for 1-RH-MOV-1720B
N-2006-1110, 1-SW-MOV-105B indicated incorrectly during performance testing
N-2006-1111, Timing relay to close 1-RS-MOV-101B measured out of tolerance during performance testing
N-2006-1297, [Emergency diesel generator] output circuit breaker, 3/17/06
N-2006-1461, 4160-volt circuit breaker ratchet plate, 3/21/06
N-2006-1608, 1-RH-MOV-1700 high thrust during [post-maintenance test].
N-2006-1728, Internal support for battery Jar #1 broken
N-2006-1743, On 1J [emergency diesel generator] battery bank, two cell lids raised above tops of jars
N-2006-2225, [Service water] pipe support damage
N-2006-2469, High internal resistance readings on cell #46
N-2006-2623, During performance testing, jar had lifting of tape and cracking of plastic on top
N-2006-2840, Fuel injector lock wires on [emergency diesel generator]'s
N-2006-3292, 2-CH-P-1C 73-dpm outboard seal leak
N-2206-0836, Trip of 1-EP-BKR-14J5 during quarterly surveillance test of 1-CS-P-1B (Surry)

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0-ICM-MIS-G-001, Instrument LT-1322 Corrective Maintenance, 3/31/06
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0-ICP-VG-RM-179, Vent Stack A Effluent Radiation Monitor Calibration, Rev. 5
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0-MOP-49.08, Maintenance Operating Procedure, Removing No. 1 Supply (A) and No. 4 Return (A) Headers from Service and Returning to Service Rev 23
0-MOP-6.94, Alternate AC Diesel Generator Maintenance Operability, Rev. 21
0-MPM-0103-01, Mechanical Maintenance Procedure, PM of Charging/High-Head Safety Injection Pumps Rev 19
0-MPM-0806-01, Inspection of Chillers, Heat Pumps, Fire Protection Units, Central Air Units, and Air Dryer, Rev. 17
0-OP-6.4, Operation of the [Station Blackout] Diesel (SBO Event), Rev.12
0-PT-75.14, [Service Water] 100% Pipe Wall Thickness [Ultrasonic Testing] Rev 013
0-PT-75.24A, [Service Water] Pipe Weld Area [Visual Test] for [Micro-biologically Induced Corrosion] Leakage Rev 003
0-PT-76.4.2, Control Room Pressure Envelope Flow Balance Verification, Rev. 13.
1-EPM-1815-01, Protective Relay Maintenance for Breaker 15H5, Service Water Pump 1-SW-P-1A, Rev. 8
1-EPM-1819-01, Protective Relay Maintenance for Breaker 15H14, Residual Heat Removal Pump 1-RH-P-1A, Rev. 9
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1-OP-5.4, Operating Procedure, Draining the Reactor Coolant System Rev 60
1-OP-51.1, Operating Procedure, Component Cooling System Rev 27
1-PT-138, Valve Inservice Inspection [Low-Head Safety Injection] System Functional Verification, 9/28/2001, 4/3/2003, 9/24/2004, and 3/28/2006
1-PT-142, Valve Inservice Inspection for 1-SI-1 and 1-SI-16 Rev 012
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1-PT-57.14, Service Water Spray Array [Safety Injection] Signal Actuation Cross Tie Test, Rev. 0
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1-PT-77.11B, Control Room Chiller 1-HV-E-4B Pump and Valve Test, Rev. 28
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1-PT-78.2, [Residual Heat Removal] Open Permissive Operability Test, Rev. 19
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Chapter 9, Auxiliary Systems
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Section 5.5.4, Residual Heat Removal System
Section 6.2.4, Containment Isolation System
Section 6.3.3.5, ECCS Piping Failures
Section 6.4, Habitability Systems
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00506659 01, [residual heat removal] Pump Circuit Breaker and Switchgear Planned Maintenance
00506659 01, 01-EE-BKR-15H14-CKTBRK Residual Heat Removal Pump Circuit Breaker Planned Maintenance
00507315, AOV Calibration for [residual heat removal] 00439005, PM Visual Inspection Traveling Screen/Intake Bay 3/13/01
00507332 01, 1-RH-P-1A Bridge and Megger Test
00507333 01, 1-RH-P-1A Inspect/Test Motor/Change oil
00507334 01, 1-RH-P-1B Bridge and Megger Test
00507410, SI-1 Disc Replacement 9/19/04
00515205 01, A Quench Spray Pump Circuit Breaker and Switchgear Planned Maintenance
00518983-01, Repack Valve 1-RH-MOV-1700
00519156 01, 1-RH-P-1A Drill hole in upper sight glass plug
00519302-01, Level Transmitter 1-RC-LT-1321Output Shift, 9/17/04
00519354 01, 1H [emergency diesel generator] Output Circuit Breaker Closing Coil Test
00527110 01, [residual heat removal] Pump Circuit Breaker Relay Testing Planned Maintenance
00527110 01, 01-EE-BKR-15H14-CKTBRK Residual Heat Removal Pump Circuit Breaker Planned Maintenance
00528002 05, B Quench Spray Pump Circuit Breaker swap breaker with spare
00528002 01, B Quench Spray Pump Circuit Breaker troubleshoot/repair
00528002 04, B Quench Spray Pump Circuit Breaker troubleshoot/repair
00528002 06, Refurbish I145, K-600 Circuit Breaker with vendor
00528002 03, B Quench Spray Pump Circuit Breaker, swap breaker with spare
00529546 01, [emergency diesel generator] 1J Battery 3C Bank, Obtain internal resistance data
00529747 01, [emergency diesel generator] 1J Battery 3C Bank, Replace battery jar
00562538 01, B Quench Spray Pump Circuit Breaker and Switchgear Planned Maintenance
00598091-01, Lubricate Control Room Blower Bearings / Check V-belts
00600053 03, A Inside Recirc Spray Pump Circuit Breaker Planned Maintenance
00603279-01, Repack Valve 1-RH-MOV-1700
00603282-01, Repack Valve 1-RH-MOV-1701
00603291 01, 1-RH-P-1A Motor oil sample
00603292 01, 1-RH-P-1A Bridge and Megger Test
00603293 01, 1-RH-P-1B Bridge and Megger Test

00604560 01, 1-SW-P-1B Clean Motor Screens/Around Motor Heater
00604898 01, 1-HV-AC-7 Control Room Filter/Damper Inspection
00606836 01, 2-HV-AC-7 Control Room Filter/Damper Inspection
00720815 01, Heating and Vent Cooling Coil 7, Inspect/Clean Condenser Coils
00720828-01, Lubricate Control Room Blower Bearings / Check V-belts
00721419 01, 2-HV-AC-6 Control Room Filter/Damper Inspection
00721419-01, Control Room Filters/Damper Inspection
00721423-01, Lubricate Control Room Blower Bearings / Check V-belts
00721507-01, Adjust / Replace Control Room Blower V-Belts
00721698-01, Tighten / Replace Control Room Blower V-Belts
00726152 01, 1-HV-AC-7 Fan, Lubricate Bearings/Check V-Belt
00726152-01, Lubricate Control Room Blower Bearings / Check V-belts
00726257-01, Control Room Filters/Damper Inspection
00726259 01, 1-SW-P-1A Clean Motor Screens/Around Motor Heater
00727605-01, Control Room Filters/Damper Inspection
00727806-01, Control Room Filters/Damper Inspection
00728796 01, 2-HV-AC-6 Control Room Filter/Damper Inspection
00728796-01, Control Room Filters/Damper Inspection
00729990 01, 1-HV-AC-6 Blower, Lubricate Bearings/Check V-Belt
00729990-01, Lubricate Control Room Blower Bearings / Check V-belts
00730218 20, B Quench Spray Pump Circuit Breaker Reset Overloads to Setpoint Document
00730218 19, A Inside Recirc Spray Pump Circuit Breaker Planned Maintenance
00730218 08, B Containment Air Recirc Fan Circuit Breaker, Reset Overloads to Setpoint Document
00730218 01, A Containment Air Recirculation Fan Circuit Breaker, Reset Overloads to Setpoint Document
00730218 06, 1-RS-P-1B Recircirculation Spray Pump, Reset Overloads to Setpoint Document
00730218 09, C Containment Air Recirc Fan Circuit Breaker, Reset Overloads to Setpoint Document
00733027-01, Grease Control Room Blower Motor Bearings
00734651-01, Control Room Filters/Damper Inspection
00734911 01, 1-HV-AC-6 Control Room Filter/Damper Inspection
00734911-01, Control Room Filters/Damper Inspection
00735974-01, Control Room Filters/Damper Inspection
00735976 01, 2-HV-AC-7 Blower, Lubricate Bearings/Check V-Belt
00735976-01, Lubricate Control Room Blower Bearings / Check V-belts
00736711-01, Control Room Filters/Damper Inspection
00736713-01, Lubricate Control Room Blower Bearings / Check V-belts
00738555 01, 1H [Emergency Diesel Generator] Output Circuit Breaker Charging Motor Bad/Close Fuses Blown
00743016-01, Lubricate Control Room Blower Bearings / Check V-belts
00743707 01, 1-SW-P-1A Pump Motor Oil Sample
00743708 01, 1-SW-P-1B Pump Motor Oil Sample
00745732 01, 2-HV-AC-7 Control Room Filter/Damper Inspection
00745732-01, Control Room Filters/Damper Inspection
00746143-01, Control Room Filters/Damper Inspection
00746687 01, 1-HV-AC-7 Control Room Filter/Damper Inspection
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00748604 01, 1-HV-AC-6 Blower, Lubricate Bearings/Check V-Belt
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NE-0681, "Safety Evaluation of Reduced Flow Rate for Residual Heat Removal System", Rev.1
VPAP-0815 Attachment 6, Justification for Removing [Service Water] 316 Stainless Piping Subject to [Micro-Biologically Induced Corrosion] from (a)(1), 9/21/05

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Service Water System Health Reports for 1Q2006, 2Q2006, and 3Q2006

Drawings
10–0169-3, Stack A, B and Process Vent, Rev. 3
11715-1.39-57A, Air Cooling System Wiring, Rev. A
11715-1.39-58A, Air Cooling System Wiring, Rev. B
11715-ESK-11AH, Elementary Diagram Main Control Board Lamp Test, Rev. 5
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 4, Rev. 14
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 1, Rev. 24
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 2, Rev. 15
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 3, Rev. 19
11715-ESK-11C, Emergency Generator 1H Power Distribution Circuit, Rev. 14
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 6, Rev. 14
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 5, Rev. 10
11715-ESK-11C, [Emergency Diesel Generator] Relays & Controls Elementary Diagram, Sheet 7, Rev. 9
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 7, Rev. 8
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 1, Rev. 19
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 2, Rev. 13
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 3, Rev. 15
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 4, Rev. 10
11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 5, Rev. 9

11715-ESK-11CA, [Emergency Diesel Generator] 1J Relays & Controls Elementary Diagram, Sheet 6, Rev. 17
11715-ESK-11CB, Emergency Bus Undervoltage Circuit Testing, Rev. 1
11715-ESK-11D, Loss of Reserve Station Power Elementary Diagram, Sheet 1, Rev. 8
11715-ESK-11D, Elementary Diagram Loss of Reserve Station Power, Rev. 8
11715-ESK-11E, Loss of Reserve Station Power Elementary Diagram, Sheet 2, Rev. 8
11715-ESK-11E, Elementary Diagram Loss of Reserve Station Power, Rev. 8
11715-ESK-11P, Loss of Reserve Station Power Elementary Diagram, Sheet 3, Rev. 2
11715-ESK-11P, Elementary Diagram Loss of Reserve Station Power, Rev. 2
11715-ESK-11R, Emergency Bus 1H Undervoltage Circuit Elementary , Rev. 11
11715-ESK-2B, Legend and Device Numbers for Elementary Diagrams, Rev. 13
11715-ESK-3A, Control Switch Contact Diagram, Rev. 5
11715-ESK-3N, Control Switch Contact Diagrams, Rev. 8
11715-ESK-3W, Control Switch Contact Diagram, Rev. 2
11715-ESK-5A, Elementary Diagram 4160-480 V Circuit Substation Supply ACB's Buss 1-A, Rev. 8
11715-ESK-5AS, Elementary Diagram 4160V Circuits Service Water Pump 1-SW-P-1A, Rev. 14
11715-ESK-5AT, Elementary Diagram 4160V Circuits Service Water Pump 1-SW-P-1B, Rev. 15
11715-ESK-5BC, Elementary Diagram 4160V Circuits Intake Structure Aux Service Water Pump, Rev. 8 1-SW-P-4 Train A
11715-ESK-5BE, Elementary Diagram Safeguard Auxiliary Relays Train A, Rev. 21
11715-ESK-5BG, Elementary Diagram Safeguard Auxiliary Relays Train B, Rev. 24
11715-ESK-5R, [Residual Heat Removal] Pump 1-RH-P-1A Circuitry, Rev. 13
11715-ESK-6DT, [Residual Heat Removal] Motor Operated Valve Elementary Diagram, Rev. 20
11715-ESK-6KC, Elementary Diagram 480V Circuits Heating and Ventilating, Rev. 18
11715-ESK-8AC, DC Elementary Diagram - [Emergency Diesel Generator] Protection, Rev. 10
11715-f-1605, [Residual Heat Removal] Air Operated Valve - FCV-1605 - Schematic, Rev. 9
11715-FB-040C, Air Conditioning Chilled Water System, Sheet 2, Unit 2, Rev. 27
11715-FB-040C, Flow/Valve Operating Numbers Diagram Air Conditioning Condenser Water System North Anna Power Station Unit 2 Virginia Power, Sheet 1, Rev. 21
11715-FB-040C, Flow/Valve Operating Numbers Diagram Air Conditioning Condenser Water System North Anna Power Station Unit 2 Virginia Power, Sheet 2, Rev. 27
11715-FB-040C, Air Conditioning Chilled Water System, Sheet 1, Unit 1, Rev. 21
11715-FB-040D, Flow/Valve Operating Numbers Diagram Air Conditioning Condenser Water System North Anna Power Station Unit 1 Virginia Power, Sheet 1, Rev. 41
11715-FB-040E, Flow/Valve Operating Numbers Diagram Air Conditioning Refrigerant System North Anna Power Station Units 1 & 2 Virginia Power, Sheet 1, Rev. 7
11715-FB-23A, Ventilation Arrangement Service Building Sheet 1 North Anna Power Station - Unit 1, Sheet 1, Rev. 20
11715-FB-23B, Ventilation Arrangement Service Building Sheet 2 North Anna Power Station - Unit 1, Sheet 1, Rev. 13
11715-FB-24A, Ventilation & Air Conditioning Service Building Sheet 1 North Anna Power Station - Unit 1, Sheet 1, Rev. 14
11715-FB-24B, Ventilation & Air Conditioning Service Building Sheet 2 North Anna Power Station - Unit 1, Sheet 1, Rev. 19

11715-FB-24C, Ventilation & Air Conditioning Service Building Sheet 3 North Anna Power Station - Unit 1, Sheet 1, Rev. 23
11715-FB-24D, Ventilation & Air Conditioning Service Building Sheet 4 North Anna Power Station - Unit 1, Sheet 1, Rev. 16
11715-FB-24E, Ventilation & Air Conditioning Service Building Sheet 5 North Anna Power Station - Unit 1, Sheet 1, Rev. 15
11715-FB-24F, Ventilation & Air Conditioning Service Building Sheet 6 North Anna Power Station - Unit 1, Sheet 1, Rev. 19
11715-FB-40A, Air conditioning Chilled Water Systems Sheet 2 North Anna Power Station, Rev. 22
11715-FB-40A, Air conditioning Chilled Water Systems Sheet 1 North Anna Power Station, Rev. 18
11715-FE-1A, Electrical System One Line Diagram - Main Units 1 & 2, Rev. 36
11715-FE-1AF, Electrical System One Line Diagram - 480 Volt Buses, Rev. 14
11715-FE-1AG, Electrical System One Line Diagram - 480 Volt Buses, Rev. 2
11715-FE-1B, Electrical System One Line Diagram - 4160 Volt Sheet 1, Rev. 19
11715-FE-1BB, Electrical Distribution System - One Line Diagram, Rev. 31
11715-FE-1BD, Electrical System One Line Diagram - Switchyard, Rev. 15
11715-FE-1BG, Electrical System One Line Diagram - [station blackout] Distribution, Rev. 1
11715-FE-1C, Electrical System One Line Diagram - 4160 Volt Sheet 2, Rev. 24
11715-FE-1D, Electrical System One Line Diagram - 4160 Volt Sheet 3, Rev. 20
11715-FE-1D, 4160V One Line Diagram Sheet 3, Emergency Buss 1H and 1J, Rev. 20
11715-FE-1F, Electrical System One Line Diagram - 480 Volt Buses, Rev. 18
11715-FE-1G, Electrical System One Line Diagram - 480 Volt Buses, Rev. 33
11715-FE-1P, Electrical System One Line Diagram - 480 Volt Swgr., Rev. 45
11715-FE-1Q, Electrical System One Line Diagram - 480 Volt MCC, Rev. 40
11715-FE-1R, Electrical System One Line Diagram - 480 Volt MCC, Rev. 31
11715-FE-1T, Electrical System One Line Diagram - 480 Volt MCC, Rev. 22
11715-FE-1Z, Electrical System One Line Diagram - 480 Volt MCC, Rev. 28
11715-FE-21B, Station Service Transformers Relaying, Rev. 17
11715-FE-21K, DC Electrical System Elementary Diagram - 4160 Bkrs, Rev. 22
11715-FE-21M, DC Electrical System Elementary Diagram - 4160 Bkrs, Rev. 24
11715-FE-21N, DC Electrical System Elementary Diagram - RSS Relays, Rev. 9
11715-FE-21P, RSS Transformer Protection Elementary Diagram, Rev. 7
11715-FE-21T, 4160 Volt Emergency Bus 1H Undervoltage, Rev. 29
11715-FE-21U, 4160 Volt Emergency Bus 1J Undervoltage, Rev. 30
11715-FE-27A, Emergency Switchgear Arrangement: Relay Rooms and Instrument Rack Rooms, Rev. 31
11715-FE-2IT-29, DC Elementary Diagram 4160V Emergency Bus 1H Undervoltage, Rev. 29
11715-FM-074A, Flow/Valve Operating Numbers Diagram Feedwater System North Anna Power Station Unit 1 Virginia Power, Sheet 1, Rev. 49, Sheet 3, Rev. 39
11715-FM-078 Various Sheets, Service Water System NAPS Units 1 & 2
11715-FM-078A, Flow/Valve Operating Numbers Diagram Service Water System North Anna Power Station Units 1 & 2 Virginia Power, Sheet 1, Rev. 63, Sheet 3, Rev. 60
11715-FM-094A, Flow/ Valve Operating Numbers Diagram, [residual heat removal], Sheet 2, Rev. 20
11715-FM-094A, Flow/ Valve Operating Numbers Diagram, [residual heat removal], Sheet 1, Rev. 16

11715-FM-094A, Flow/Valve Operating Numbers Diagram Residual Heat Removal System North Anna Power Station Unit 1 Virginia Power, Sheet 1, Rev. 16
11715-FM-094A, Mechanical Flow Diagram Residual Heat Removal System Unit 1, Rev.16
11715-FM-096A, Mechanical Flow Diagram Safety Injection System Unit 1, Rev.40_11715-FE-1BB, One Line Diagram Electrical Distribution System, Rev. 31
11715-FM-096B, Flow/Valve Operating Numbers Diagram Safety Injection System North Anna Power Station Unit 1 Virginia Power, Sheet 4, Rev. 25
11715-LSK-22-10E, 4KV Emer Bus 1H Undervoltage Protection Scheme, Rev. 9
11715-LSK-22-10F, 4KV Emer Bus 1J Undervoltage Protection Scheme, Rev. 7
11715-RH-004, [residual heat removal] Air Operated Valve - FCV-1605 Schematic, Rev. 9
11715-RH-005, [residual heat removal] Air Operated Valve - HCV-1758 Schematic, Rev. 5
11718-FB-44C. Flow diagrams Ventilation Systems Sh-3 North Anna Power Station - Unit 1, Rev. 15
12050-1.39-49A, Air Cooling System Wiring, Rev. A
12050-ESK-11AS, Elementary Diagram Ventilation Panel Lamp Test (Orange), Rev. 3
12050-ESK-11AU, Elementary Diagram Ventilation Panel Lamp Test (Purple), Rev. 3
12050-ESK-5BE, Elementary Diagram Safeguard Auxiliary Relays Train A, Rev. 23
12050-ESK-5BG, Elementary Diagram Safeguard Auxiliary Relays Train B, Rev. 24
12050-ESK-6JR, Miscellaneous Pumps Schematics, Sheet 88 (CR), Rev. 10
12050-ESK-6KC, Heating and Ventilating Schematics, Sheet 3 (CR), Rev. 11
12050-ESK-6KC, Elementary Diagram 480V Circuits Heating and Ventilating, Rev. 12
12050-FE-1A, Electrical System One Line Diagram - Main Unit 2, Rev. 16
12050-FE-1AF, Electrical System One Line Diagram - Emergency Bus, Rev. 10
12050-FE-1B, Electrical System One Line Diagram - Bus 2A & 2B, Rev. 10
12050-FE-1D, Electrical System One Line Diagram - Emergency Bus, Rev. 10
12050-FM-074A, Flow/Valve Operating Numbers Diagram Feedwater System North Anna Power Station Unit 2 Virginia Power, Sheet 1, Rev. 44, Sheet 3, Rev. 37
12050-HV-004, Emergency Switchgear HVAC Controls (TVC-266), Rev. 01
12050-HV-005, Emergency Switchgear HVAC Controls (TVC-267), Rev. 01
1250-1.39-48A, Air Cooling System Wiring Diagram, Sheet 1(CR), Rev. A
1250-1.39-49A, Air Cooling System Wiring Diagram, Sheet 2 (CR), Rev. A
13075-ESK-11D, RSST Undervoltage Relay Diagram, Rev. 1
13075-FK-13A, Reactor Vessel Level Instrument Capillary Tubing, Sheet 1, Rev. 3
13075-FK-13B-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 2, Rev. 0
13075-FK-13C-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 3, Rev. 0
13075-FK-13D-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 4, Rev. 0
13075-FK-13E-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 5, Rev. 0
13075-FK-13F-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 6, Rev. 0
13075-FK-13G-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 7, Rev. 0
13075-FK-13H-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 8, Rev. 0
13075-FK-13J-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 9, Rev. 0
13075-FK-13K-1, Reactor Vessel Level Instrument Capillary Tubing, Sheet 10, Rev. 0
13075-FM-093C-1, Flow/Valve Operating Numbers Diagram, RCS, Rev. 12
13075-FM-093C-2, Flow/Valve Operating Numbers Diagram, RCS, Rev. 9
L-D47577, ALOYCO 12 Stainless Steel Swing Check Valve", Rev.2
L-DA105, Auxiliary Building Sump Level Alarm Loop Diagram, Rev. 5
L-DA111A, Auxiliary Building Sump Level Indication Loop Diagram, Rev. 4
L-DA111B, Auxiliary Building Sump Level Indication Loop Diagram, Rev. 3

N-02175-1-0NADW108D744, Interconnection Diagram Output Trains A and B, Rev. 0
RC-1241A, Erection Control Isometric - [Reactor Vessel Level Indication System], Rev. 1
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RC-1272A, Erection Control Isometric - [Reactor Vessel Level Indication System], Rev. 0
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RC-1277A, Erection Control Isometric - [Reactor Vessel Level Indication System], Rev. 3
RC-1280A, Erection Control Isometric - [Reactor Vessel Level Indication System], Rev. 0
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TESK-HV25, Heating and Ventilation System Emergency Switchgear, Relay and Instrument Rack Rooms [Air Conditioning] Unit 1-HV-AC-7, Rev. 3
TESK-RC018-1, Test Loop Diagram, [Reactor Vessel Level Indication System], Rev. 5
TESK-RC018-2, Test Loop Diagram, [Reactor Vessel Level Indication System], Rev. 5
TESK-RC018-3, Test Loop Diagram, [Reactor Vessel Level Indication System], Rev. 3
TESK-RC019-1, Test Loop Diagram, [Reactor Vessel Level Indication System], Rev. 5
TESK-RC019-2, Test Loop Diagram, [Reactor Vessel Level Indication System], Rev. 4
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North Anna Power Station System Design Basis Document for Residual Heat Removal, Rev. 6, 12/6/06
North Anna Power Units 1 & 2 Operating License Technical Specifications, 1/9/07, Section 3.4, Reactor Coolant System (RCS); Subsection 3.4.6, RCS Loops-MODE 4; Subsection 3.4.7, RCS Loops-MODE 5, Loops Filled; Subsection 3.4.8, RCS Loops-MODE 5, Loops Not Filled
North Anna Power Units 1 & 2 Operating License Technical Specifications, 1/9/07, Section 3.7.8, Service Water System

Condition Reports Resulting From This Inspection
CR006282, 12-inch Crescent Wrench Left Near 1-HV-P-22A
CR006288, AP-55 Step 5 Blower Units
CR006328, SDBD Not Updated to Close Open Item
CR006623, [Reactor Vessel Level Indication System] Scaling Calculation Missing, 1/22/07
CR006638, Incorrect Reference on Drawing 11715-ESK-11C, 1/22/07
CR006645, AP-55 Step 5 Acceptance Criteria
CR006680, Seismic Housekeeping - CO2 Cart Chocks
CR006722, Incorrect Preventive Maintenance Frequency Code for 1-RH-FCV-1605, 1/24/07
CR006731, Cross-Tie Breaker Caution Sign
CR006764, Reconciliation of Wording in [residual heat removal] DBD and Procedure 1-OP-5.4
CR007170, Adding Salt to Sumps for Level Switch Testing, 2/5/07
CR007230, MCR/ESGR A/C Cooler TCVs, 2/6/07
CR007311, Gravity Fill and Spill Through Two Pressurizer PORVs, 2/7/07
CR007333, Error in CR007230, 2/7/07