



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
61 FORSYTH STREET, SW, SUITE 23T85  
ATLANTA, GEORGIA 30303-8931

May 10, 2005

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 - 6711

SUBJECT: NORTH ANNA POWER STATION - NRC SAFETY SYSTEM DESIGN AND  
PERFORMANCE CAPABILITY INSPECTION REPORT NOS.  
05000338/2005007 AND 05000339/2005007

Dear Mr. Christian:

On April 15, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed a safety system design and performance capability team inspection at your North Anna Power Station. The enclosed report documents the inspection findings which were discussed on April 15, 2005, with Mr. J. Davis and other members of your staff.

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

Based on the results of the 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 NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

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: NRC Inspection Report 05000338/2005007 and 05000339/2005007  
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.: 05000338/2005007 and 05000339/2005007

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: North Anna Power Station, Units 1 & 2

Location: 1022 Haley Drive  
Mineral, Virginia 23117

Dates: March 21 - 25, 2005 and April 11-15, 2005

Inspectors: R. Moore, Senior Reactor Inspector (Team Lead)  
L. Miller, Senior Reactor Inspector  
D. Mas-Penaranda, Reactor Inspector  
N. Staples, Reactor Inspector  
H. Anderson, Contractor

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

## SUMMARY OF FINDINGS

IR 05000338/2005-007, 05000339/2005-007; 3/21-25/2005 and 04/11-15/2005; North Anna Power Station, Units 1 and 2; Safety System Design and Performance Capability Inspection.

This inspection was conducted by a team of inspectors from the NRC's Region II office. 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 and Mitigating Systems

#### 1R21 Safety System Design and Performance Capability (71111.21)

The team evaluated the capability of installed plant equipment to detect and respond to a loss of coolant accident (LOCA) which includes small break LOCA, inter-system LOCA, and large break LOCA. Procedures which direct the mitigating actions for this event were also evaluated.

##### .1 System Needs

##### .11 Process Medium

##### a. Inspection Scope

The team reviewed the availability and reliability of water sources required for the LOCA events. These water sources included the reactor water storage tank (RWST), the containment recirculation sump, and casing cooling tank. The review included design documentation; drawings; Updated Final Safety Analysis Report (UFSAR); Technical Specifications (TS); corrective actions history; volumetric and water depth calculations for the RWST, the containment recirculation sump, the containment floor, and casing cooling tank; calculations of system capacity; and calculations of net positive suction head (NPSH) available and required for the high head safety injection (HHSI) pumps, low head safety injection (LHSI) pumps, outside recirculation spray (ORS) pumps, inside recirculation spray (IRS) pumps, and casing cooling pumps. Also included was a review of minimum flow protection for the HHSI and the LHSI pumps.

The team reviewed water depth calculations, system flow rate and suction approach velocity calculations, as well as suction piping configuration drawings to verify that vortexing had been evaluated in the containment recirculation sump suction configuration for the LHSI, ORS and IRS systems. The team also reviewed the flow passage opening sizes in the most restrictive portions of the HHSI, LHSI, ORS, and IRS systems to verify that the flow passage opening sizes in the containment recirculation sump suction strainers were sized accordingly. A list of documents reviewed is included in the Attachment to this report.

##### b. Findings

No findings of significance were identified.

.12 Energy Sources

a. Inspection Scope

The team reviewed appropriate test and design documents to verify that the 4160 volt alternating current (VAC) and 480VAC power sources, as well as 125 volt direct current (VDC) power sources, were adequate to meet minimum voltage specifications for electrical equipment during and following a LOCA event. This included a review of design torque values for selective rising stem and quarter turn motor-operated valves (MOVs) to verify that the safety functions (open/closed) were adequately tested assuming minimum voltage. A specific list of components and documents reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified.

.13 Instrumentation and Controls (I&C)

a. Inspection Scope

The team reviewed the instrumentation that is used by operators for detection and mitigation of a LOCA event. The team reviewed appropriate design basis documents, TS, system flow diagrams, instrument uncertainty calculations, calibration procedures, and calibration test records to verify that selected level, flow, and pressure process instrumentation had the proper range and accuracy needed to perform their safety function. The setpoints for the RWST level alarms and equipment actuation relays were reviewed to verify that they were established in accordance with setpoint guideline procedures and design output documents. Maintenance and calibration records were reviewed to verify that the current performance capability of the selected process instrumentation was consistent with design basis documents. The team conducted field inspections of the accessible instrument installations to verify that the instrument tubing, sensors, and supports were in good material condition and that heat tracing was installed when required. A list of documents and components reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified

.14 Operator Actions

a. Inspection Scope

The team reviewed plant operating instructions, including emergency procedures (EPs), abnormal procedures (APs), and alarm response procedures (ARs) that would be used during the identification and mitigation of a LOCA event. The team focused on installed

equipment and operator actions that could be used to mitigate the event. The review was done to verify that the instructions were consistent with the UFSAR description of LOCA events and within the Owners' Group Emergency Procedure Guidelines (EPGs), any step deviations were justified and reasonable, and the instructions were written clearly and followed the EOP writer's guide. The team held discussions with licensed operators and training instructors, reviewed job performance measures and training lesson plans pertaining to use of procedures and equipment used during a LOCA event to confirm that training was consistent with the applicable operating instructions.

In addition, the team observed simulation of large break LOCA event on the plant simulator and walked down portions of applicable instructions to verify that operator training, procedure guidance, and instrumentation were adequate to identify a LOCA event and implement post-LOCA mitigation strategies. The manual operator action times for performance of LOCA mitigation activities were reviewed for consistency with accident analyses, EPGs, and operator training. Procedures reviewed are included in the Attachment to this report.

b. Findings

No findings of significance were identified

.15 Heat Removal

a. Inspection Scope

The team reviewed the calculation of the required minimum exhaust air flow rate from each HHSI (charging pump) cubicle for normal and post-accident operation at the maximum air supply temperature. The team also reviewed completed periodic tests for Train A and Train B of the emergency core cooling system (ECCS) pump room exhaust air cleanup system (PREACS) to verify that the exhaust air flow rate from each HHSI (charging pump) cubicle was demonstrated to be greater than the minimum required exhaust flow rate.

The team reviewed the acceptance criteria basis for minimum service water flow to each recirculation spray heat exchanger (RSHX). This basis incorporated hydraulically limiting service water system configurations and a revised containment analysis. The team reviewed periodic test results to verify that the service water system was capable of supplying the required minimum service water flow rates to each RSHX under limiting configurations. Additionally, the team reviewed evaluations of RSHX heat transfer 'UA' values to verify consistency with related inputs to the current containment analysis and to confirm controls on the implementation of analyzed limitations on the number of heat exchanger tubes in each RSHX which potentially could be plugged in future maintenance activities. A list of documents reviewed is included in the Attachment to this report.



b. Findings

No findings of significance were identified.

.2 System Condition and Capability

.21 Installed Configuration

a. Inspection Scope

The team performed field walkdowns of accessible LOCA mitigation equipment and 480 VAC electrical power supplies to observe the existing conditions and configurations. Equipment examined included accessible HHSI, LHSI, quench spray, casing cooling, and ORS pumps, system valves, piping, and related components. During this walkdown the team compared valve positions with the configurations on the approved drawings and operating procedures. The team reviewed periodic test documentation to verify independent verification was performed and that blank pancake flanges were removed (and spool pieces installed) in returning the recirculation spray system to the pre-test condition after performance of the most recent recirculation spray system header air test. Also, the team walked down portions of the 125VDC and 4160VAC systems to verify that the installed configuration was consistent with design basis information and to assess the material condition. A specific list of documents and components reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified.

.22 Operation

a. Inspection Scope

The team walked down selected portions of the LOCA response procedures with operators to check for human factors in the instructions and in the plant; including clarity, accuracy, labeling, lighting, noise, communications, and accessibility. The team also checked HHSI and LHSI system alignments to verify consistency with design and licensing basis assumptions and the TS.

b. Findings

No findings of significance were identified

.23 Design

a. Inspection Scope

Mechanical Design Review

The team reviewed design calculations, specifications, the UFSAR, testing, maintenance, and modification documentation to verify that system and equipment design functions were appropriately maintained. Periodic test procedures and equipment monitoring activities were reviewed to verify that design criteria were appropriately translated into the acceptance criteria in the tests for the HHSI, LHSI, ORS, IRS, casing cooling, and quench spray pumps, selected motor operated valves, and check valves. The team reviewed DBDs, selected piping, TS, Plant Issues (PIs), and testing, corrective maintenance, and modification documentation for LOCA mitigation equipment to assess the implementation and maintenance of the systems' design basis.

The team reviewed calculations and system configuration to assess the adequacy of the NPSH available for the HHSI, LHSI, ORS, IRS, and casing cooling pumps. System design, testing, and as-maintained configuration were reviewed to assure pump minimum flow requirements and run out protection were provided for the LHSI and HHSI pumps. The team reviewed a sample of replacement parts to verify the parts were appropriately evaluated and qualified for use in safety related applications to assure the design function of the equipment was maintained. A list of documents and components reviewed is included in the Attachment to this report.

Electrical, Instrumentation and Controls Design Review

The team reviewed system flow diagrams, I&C drawings, electrical elementary and schematic diagrams, instrument setpoint calculations, as well as calibration procedures and calibration test records to verify that the instrumentation and controls for the HHSI, LHSI, and QS were in accordance with design basis documents. The team reviewed control schematics and electrical drawings to verify design features were incorporated in control circuits for selected LOCA mitigation pumps and valves. Also reviewed were setpoint calculations for selected process instruments including containment pressure, containment sump level, and RWST level to verify that the calculations included appropriate instrument uncertainties. The last two completed calibration test records were reviewed to confirm that instrument setpoints were consistent with setpoint calculations. For the instruments selected, the team reviewed documentation of completed surveillance tests and calibrations to verify that equipment performance was appropriately monitored and maintained consistent with the design and licensing basis. The team reviewed the EP related setpoints for RCS subcooling to verify that values used were in accordance with design basis documents.

The team reviewed voltage drop calculations to verify that adequate power would be available to meet design basis scenarios. Particular attention was paid to voltage at key motor operated valves, and that voltage calculations were coordinated with torque and

thrust calculations. In addition, MOVATS test results were reviewed to check that valve motor inrush currents were consistent with those used in the calculations. Selected samples within the calculation for sizing of thermal overloads were reviewed, and the methodology was compared to industry standards. In addition, the team reviewed over-current protective relays data set point calculation and curves to verify that adequate margin existed between the valve motor start current and the time and instantaneous relay to allow motor start without inadvertent trip. Also, the team reviewed the battery sizing calculation for the class 1E 125VDC electrical distribution system to assess the adequacy of the batteries to provide power for selected components required to mitigate a LOCA event. A list of documents and components reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified.

.24 Testing and Inspection

a. Inspection Scope

The team reviewed performance and post-maintenance testing of HHSI, LHSI, ORS, IRS, and casing cooling systems' pumps and valves to verify that the tests and inspections were appropriately verifying that the assumptions of the licensing and design bases were being maintained and that performance degradation would be identified. This included operability stroke time testing, thrust and torque testing, and corrective maintenance records for selected HHSI, LHSI, and service water (SW) system risk-significant MOVs. The team also reviewed selected risk-significant check valve periodic tests to verify the check valves were demonstrated to function to the appropriate open / check positions to support system operation. Test records were reviewed to verify that permissives and interlocks not normally tested during pump testing were verified during periodic surveillance testing

The team reviewed electrical equipment service and performance testing and preventive maintenance procedures for the 125VDC, 4160VAC, and 480VAC power system. The review was performed in order to verify that specified acceptance criteria were met and that the equipment operation was consistent with the plant's licensing and design bases. This included the 125VDC batteries 1-I surveillance test records to verify that the batteries are capable of meeting design basis load requirements. The team also reviewed calibrations for the over-current protective relays to support proper operation of 4160VAC safety buses 1H and 1J. Additionally, the team reviewed the inservice test performance data for the pump motors for the HHSI, LHSI, casing cooling and recirculation spray inside and outside systems to verify that the load current and vibrations exhibited by the motors under full load conditions were consistent with the manufacturer's guidelines

The team reviewed a sample of process and indication instruments, such as containment sump level, temperature, and pressure, that provided input signals to the

LOCA or containment depressurization activation (CDA) logic. The last two completed instrument calibration records were reviewed for the selected instruments to verify that they had been calibrated in accordance with the setpoint documents and calibration procedures. The calibration records were also reviewed to verify test deficiencies such as “out of tolerance conditions,” were being entered into the corrective action program for evaluation and disposition. A specific list of documents and components reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified.

.3 Selected Components

.31 Component Degradation

a. Inspection Scope

The team reviewed maintenance and testing documentation, modifications, performance trending, equipment history documented in work orders, PIs, and system health reports to assess the licensee’s actions to verify and maintain the safety function, reliability and availability of selected components. Equipment reviewed included LOCA mitigation pumps, breakers, and valves. The team also reviewed the potential for common cause failure mechanisms in maintenance. Additionally, the team reviewed in-service trending data for selected components, including the HHSI, LHSI, ORS, IRS, and casing cooling pumps’ flow profiles to verify that the components were continuing to perform within the limits specified by the test and design basis.

The team reviewed documentation of oil analysis results for 1-CH-P-1A charging pump common reservoir (inboard and outboard pump bearings) and motor inboard and outboard bearings to verify the analysis results indicate normal, anticipated oil conditions. Additionally, the team reviewed documentation of completed performance as well as the frequency of oil changes for the 1-CH-P-1A pump common reservoir and speed increaser gear case (3-year frequency) and motor inboard and outboard bearings (1-year frequency). A specific list of equipment and documents reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified

.32 Equipment/Environmental Qualification

a. Inspection Scope

The team conducted in-plant walkdowns to verify that the observable portions of selected mechanical and electrical components were suitable for the environment

expected under all conditions, including high energy line breaks (HELBs) and flooding. The team reviewed qualification test data associated with the environmental testing of the IRS pump motor to verify that the components were qualified for the worst case postulated accident environments where they are installed. A list of documents reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified

.33 Equipment Protection

a. Inspection Scope

The team walked down the spaces containing 250VDC equipment and the emergency switchgear rooms and reviewed temperature switches' qualifications to verify the equipment was adequately protected against external events such as flood, missiles, and HELB. The team observed the exterior of the removable wall blocks to each HHSI (charging pump) cubicle to verify a cured sealant was in place to seal the joints between the wall blocks to a height of at least 44 inches above the floor elevation for flood protection from potential water sources external to the individual cubicles. Additionally, the team verified that cold weather protection provisions remained in place at the time of the walkdown around the RWST level transmitters, located adjacent to the exterior of the RWST

b. Findings

No findings of significance were identified.

.34 Component Inputs/Outputs

c. Inspection Scope

The team reviewed selected MOV operator requirements calculations and evaluated the capability of the MOVs to perform their design function under degraded voltage conditions. The specific MOVs reviewed are those referenced in Section 1R21.21a. The team reviewed functional, logic, and elementary drawings for a sample of pump control circuits in LHSI and quench spray (QS) start circuits. The team also reviewed control circuits for critical MOV and pump actuation on LOCA. Additionally, the team reviewed the logic and functional diagrams to verify that power was available and adequate for selected critical valves during the design basis duty cycle for HHSI, LHSI, SW, and QS. The team reviewed samples of surveillance test procedures for LOCA and CDA logic functional testing to confirm that the logic paths, including permissives and interlocks, were being tested in a manner to adequately demonstrate that the equipment would perform in accordance with design basis documents. The specific documents and components reviewed are included in the Attachment to this report.

b. Findings

No findings of significance were identified.

.35 Operating Experience (OE)

a. Inspection Scope

The team reviewed the licensee's applicability evaluations, extent of condition reviews, and corrective actions for industry and station operating experience issues related to HHSI, LHSI, ORS and IRS equipment problems, use of non-conservative acceptance criteria in safety related pump surveillance tests, line starter relay failures, safety related pump shaft damage, plugging of SI pump oil coolers, gas voids in SI pump suction lines, and check valve problems to verify that plant specific issues were appropriately identified and addressed. Work orders, procedures, field observations and discussions with engineering staff were used to verify if OE related corrective actions were accomplished. The team reviewed a report summarizing the results of the licensee's evaluation of safety related logic system testing in response to NRC Generic Letter 96-01. Specifically, the section of the report dealing with HHSI, IRS, and ORS logic system testing was reviewed to verify that logic test deficiencies were properly evaluated. The specific industry experience issues and documents reviewed are listed in the Attachment to this report.

b. Findings

No findings of significance were identified.

.4 Identification and Resolution of Problems

a. Inspection Scope

The team reviewed selected system health reports, maintenance records, surveillance test records, and PIs to verify that design and performance problems were identified and entered into the corrective action program. The team assessed the scope of the licensee's extent-of-condition reviews and the adequacy of the corrective actions. The team reviewed calibration test records to verify that "out of tolerance" conditions were properly entered into the corrective action program for evaluation and disposition. A sample of corrective maintenance work orders on the HHSI, LHSI, ORS and IRS pumps and selected valves were reviewed. Additionally, the team reviewed documentation of individual PIs which were originated as a result of the team's inspection activities, including documentation of the status of each initial PI evaluation as it existed at the conclusion of the onsite inspection activities. A list of documents reviewed is included in the Attachment to this report.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA6 Meetings, Including Exit

The lead inspector presented the inspection results on April 15, 2005, to Mr. J. Davis and other members of the licensee staff. The licensee acknowledged the findings presented. Proprietary information is not included in this inspection report.

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

J. Davis, Site Vice President  
S. Hughes, Manager, Operations  
J. Leberstien, Technical Advisor - Licensing  
J. Martin, Systems Manager - Engineering  
J. McHale, Design Engineer  
A. Royal, Manager, Training  
D. Stuckmeyer, Corporate Engineer  
M. Walker, Manger , Nuclear Oversight

#### NRC (attended exit meeting)

G. Wilson, Resident Inspector

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

None



## LIST OF DOCUMENTS AND EQUIPMENT REVIEWED

### Report sections

#### **1R21.11a Process Medium**

##### Documents

##### Calculations:

01040.0910—001, Required Volume of Water in Casing Cooling Tank and NPSH Available at Casing Cooling Pump Suction, Rev. 0

07797-US(B)-281, Suction Hydraulic Analysis of the Containment Recirculation Spray and Low Head Safety Injection Pumps, Rev. 0

12050-ES-220, Containment Floor Volume with respect to Elevation, Rev. 0

ET No. NAT 99-0026, Engineering Transmittal - Containment Sump Vortexing Concerns during Recirculation - Surry and North Anna Power Stations, Units 1 & 2, Rev. 0

ME-174, Sensitivity of Low Head Safety Injection System to Pump Interaction (During Minimum Flow Recirculation Operation), Rev. 0

ME-0290, NPSHA (Net Positive Suction Head Available) to Charging Pumps, Rev. 0

ME-0522, Inside Recirculation Spray Pump Design Flow and Total Developed Head, Rev. 0

ME-0522, IRS (Inside Recirculation Spray) Periodic Tests 1/2-PT-64.8 Values, Rev. 0 - Addendum A

ME-0497, Containment Sump Level Indication Verification, Rev. 1

SM-1176, North Anna RWST Volumes and Levels for Containment Analysis, Rev. 1

SM-1176, Impact of Maintaining North Anna Automatic RMT Setpoint at 19.4% RWST Level, Rev. 1 - Addendum A (title change with addendum)

#### **1R21.12a Energy Sources**

##### Documents

##### Calculations:

EE-0025, North Anna Station Load List, Rev. 1

EE-0500, Motor Terminal Voltage for Motor-Operated Valves, Rev.3

EE-0009, 125Vdc System Analysis, Rev.1

13929.11-4, Voltage Drop Calculation-Class 1E Motor Feeders, Rev. 1

EE-0057, DC Equipment Sizing, Rev. 1

EE-012, North Anna "H" Diesel Generator Breaker Control Circuit Voltage Analysis , Rev.3

ME-0492, Thrust Band Calculation for North Anna Safety Related MOVs, Rev. 1

##### Procedures:

1-EPM-1820-01, Protective Relay Maintenance for Breaker 15H2, Emergency Supply to Bus 1H, 06/04/03,05/07/01

1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H9, Low Head Safety Injection Pump 1-SI-P-1A,09/12/01  
 1-EPM-1820-02, Protective Relay Maintenance for Emergency Diesel Generator "1H" Differential, 09/08/03,05/29/02, 03/14/00  
 1-EPM-R-1825-01, Protective Relay Maintenance for Breaker 15H10, Recirculation Spray Pump 1-RS-P-2A, 09/18/04, 08/08/00, 09/15/98  
 1-EPM-R-1825-02, Protective Relay Maintenance for Breaker 15J10, 08/22/00, 01/05/99  
 1-EPM-R-1803-07, Protective Relay Maintenance for Breaker 15J8,03/07/03, 09/21/01  
 1-EPM-R-1817-04, Protective Relay Maintenance for Breaker 15J7, 07/31/00,05/28/02  
 1-EPM-R-1817-02, Protective Relay Maintenance for Breaker 15J6, 09/11/00, 11/08/02  
 1-EPM-1820-03, Protective Relay Maintenance for Breaker 15J2, 09/08/03, 09/22/01  
 1-EPM-I-1803-06, Protective Relay Maintenance for Breaker 15H8, 09/18/01, 03/03/03  
 1-EPM-R-1817-03, Protective Relay Maintenance for Breaker 15H7, 05/28/02, 07/31/00  
 1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H6, Charging Pump 1-CH-P-1A,02/16/04, 04/17/02, 03/08/00  
 0-EPM-0302-02, BBC/ITE 480-Volt K-line Breaker and Associated Switchgear cubicle Maintenance, 12/10/2003, 09/16/04  
 0-EPM-0304-01, Testing/Replacing 480-Volt Breaker Assemblies, 03/14/00, 01/18/00, 03/03/03,09/18/04,06/07/04,09/20/04, 09/11/01,  
 1-PT-85, DC Distribution System, Rev. 52  
 1-PT-86A, Quarterly DC Distribution System test for Battery 1-I, Rev 35  
 1-PT-87A, Intercell Connection Resistance Test for Battery 1-I, Rev13  
 1-PT-87.1H, Stationary Battery 1-I Service Test, Rev. 7  
 1-PT-87.3H, Station Battery Charger 1-I Service Test, Rev.10  
 0-EPM-2501-01, 18 Month Cleaning and Maintenance of Single Phase Static Inverters , Rev. 1

#### Miscellaneous Documents:

NAP-0111, Procurement Specification Contents for Vital Bus Static Inverters North Anna Power Station, Rev.0  
 NA-250/1250, Static Battery Charger  
 SDBD-NAPS-EV, Emergency Power and Vital Bus (120-240V) System, Rev. 6  
 SDBD-NAPS-EP, Emergency Power System, Rev.6  
 SDBD-NAPS-ED, 125V DC Emergency Power System, Rev.6  
 1-E-0, Reactor Trip or Safety Injection, Rev. 33  
 1-E-1, Loss Of Reactor Or Secondary Coolant, Rev. 19

#### Drawings

11715-FE-1D, 4160 One Line Diagram-Sh.3 Emergency Bus 1H and 1J North Anna Power Station, Rev. 20  
 11715-FE-1AF, 480V One Line Diagram Emergency Buses 1H, 1H1, 1J and 1J1, Rev. 14  
 11715-FE-1Q, 480V one line Diagram Emergency MCC 1H1-2 Cable Tunnel, Rev. 39  
 11715-ESK-5AL, Elementary Diagram 4160V CKTS Charging Pump 1-CH-P-1A, Rev. 13  
 11715-ESK-6S, Elementary Diagram 480V CKTS Recirculation Spray Pump (inside Containment) 1-RS-P-1A, Rev. 20  
 11715-ESK-5AW, Elementary Diagram 4160 CKTS Recirculation Spray Pump (outside Containment) 1-RS-P-2A, Rev. 21

11715-ESK-5AY, Elementary Diagram 4160V Circuits Low Head Safety Injection Pump 1-SI-P-1A, Rev. 8  
 11715-FE-8BL-7, 4160V Emergency Bus "1H" Low Head Safety Injection Pump 1-SI-P-1A, BKR 15H9, Rev. 5  
 11715-ESK-6JAE, Elementary Diagram 480 CKTS Misc Pump Circuit, Rev. 8  
 11715-FE-1AB, 120V Ac One line Diagram Vital Bus -II, Rev.17  
 11715-FE-11A, Wiring Diagram 120V Ac Vital Bus Cabs 1-I and 1-II, Rev. 30  
 11715-FE-4B, Wiring Diagram Secondary Plant Process Rack B, Rev. 30  
 117115-L-QS100A, Quench Spray System Refueling Water Storage Tank Level , Channel III, Rev. 12  
 11715-FE-1AC, 120V AC One Line Diagram Vital Bus 1-III, Rev.18  
 11715-FE-11B, Wiring Diagram 120V AC Vital Bus Cabs 1-III & 1-IV, Rev. 23  
 11715-FE-4C, Wiring Diagram Secondary Plant Process Rack C, Rev. 29  
 11715-L-DA110B, Vent and Drain System Test Loop Reactor Containment Sump Level Indication and Alarm, Rev. 7  
 11715-P-LM101B, Leakage Monitoring System Reactor Containment Pressure Channel II, Rev. 9  
 11715-FE-1AD, 120V AC One Line Diagram Vital Bus IV, Rev. 12  
 11715-FE-11B, Wiring Diagram 120V Ac Vital Bus Cabs 1-III & 1-IV, Rev. 23  
 11715-FE-18T-27, Wiring Diagram 120V AC Instrument Panel's 1-III &1-IV, Rev. 21

Components:

MOV's

1-CH-MOV-115B	1-CH-MOV-115D	1-SI-MOV-1860A
1-SI-MOV-1862A	1-SI-MOV-1864B	1-SI-MOV-1863A
1-SW-MOV-101A	1-SW-MOV-103A	1-SW-MOV-104A
1-SW-MOV-105D		

Pump

1-CH-P-1A	1-SI-P-IA	1-RS-P-2A
1-RS-P-1A	1-RS-P-3A	

Instruments

LT-QS100A	PT-LM100B	P-LM-101B
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**1R21.13a Instrumentation & Controls**

Documents

Calculations:

EE-0093, RWST Level Calibration Values, NA Units 1&2, Calculation Document, Rev.1  
 EE-0052, NA Containment Narrow Range Pressure Uncertainty, Rev. 2  
 EE-0674, LHSI Header Flow Calibration, Rev. 0  
 EE-0674, LHSI Header Flow Calibration, Rev. 1  
 EE-0140, NA LHSI Flow Indication Uncertainty, Rev. 2

Procedures:

ICP-LM-P-100A, P-LM100A, Reactor Containment Pressure Protection Channel I, Rev. 010  
 ICP-LM-P-100B, P-LM100B, Reactor Containment Pressure Protection Channel II, Rev. 012  
 ICP-LM-P-100C, P-LM100C, Reactor Containment Pressure Protection Channel III, Rev. 012  
 ICP-LM-P-100D, P-LM100D, Reactor Containment Pressure Protection Channel IV, Rev. 011  
 ICP-QS-L-100B, L-QS-100B, Refueling Water Storage Tank Level Channel IV, Rev. 006  
 ICP-SI-F-1946, F-SI-1946, Low Head Safety Injection Header B Flow Calibration, Rev. 006  
 1-PT-45.1.2, I-QS-100B, RWST Level Ch. IV Channel Functional Test, Rev. 017

Completed Calibration Test Records

ICP-LM-P-100A, P-LM100A, Reactor Containment Pressure Protection Channel I, Completed:  
 03/27/03, 09/14/04  
 ICP-LM-P-100B, P-LM100B, Reactor Containment Pressure Protection Channel II, Completed:  
 02/25/03, 09/15/04  
 ICP-LM-P-100C, P-LM100C, Reactor Containment Pressure Protection Channel III, Completed:  
 02/27/03, 09/15/04  
 ICP-LM-P-100D, P-LM100D, Reactor Containment Pressure Protection Channel IV, Completed:  
 02/25/03, 09/14/04  
 ICP-RS-1-L-151A, Containment Sump Wide Range Level A, 09/28/04, 03/01/03  
 ICP-RS-1-L-151B, Containment Sump Wide Range Level B, Completed: 09/28/04, 03/01/03  
 ICP-LM-T-100-1, T-LM100-1, Leakage Monitoring Containment Temperature, Completed:  
 02/09/00, 06/05/02

Drawings

NA-DW-1082H41, Permissives & RWST Units 1&2, Rev. 2, Sh. 6  
 NA-DW-108D744, Interconnection Diagram Output Cabinets 1-EI-CB-47E & F(2-EI\_CB\_47E  
 &F) Units 1&2, Rev. 4, Sh. 24  
 NA-DW-1082H41, Containment Pressure Units 1&2, Rev. 1, Sh.19 & 20  
 NA-DW-1082H41, Pressurizer Pressure & Level Safeguards Units 1&2, Rev. 0, Sh.17  
 NA-DW-5655D33, Functional Diagrams Pressurizer Trip Signals Units 1&2, Rev. 2, Sh. 06  
 NA-DW-7382D10, Reactor Containment Pressure Protection I Units 1&2, Rev. 3, Sh.1  
 NA-DW-7382D26, Reactor Containment Pressure Protection III Units 1&2, Rev. 3, Sh.1  
 NA-DW-7382D31, Reactor Containment Pressure Protection IV Units 1&2, Rev. 5, Sh.1  
 NA-DW-7382D33, Refueling Water Storage Tank Level Protection IV Units 1&2, Rev. 3, Sh

Miscellaneous Documents

N-1992-0078-E1, OE IN 91-75: Static Head Corrections Mistakenly Not Included in Pressure  
 Transmitter Calibration Procedures

Components Reviewed:

1-QS-LT-100B, "B" RWST Level  
 1-SI-FT-1946, Low Head SI Header "B" Flow  
 1-LM-TM-100-9, Reactor Containment Air Monitor Temperature  
 1-LM-PT-100B, Containment Pressure Ch. II  
 1-LM-TM-100-1, Leakage Monitoring Containment Temperature  
 1-RC-PT-1456, Pressurizer Pressure Channel II

**1R21.14a Operator Actions**DocumentsProcedures\*

1-E-0, Reactor Trip or Safety Injection, Rev. 33  
 1-E-1, Loss of Reactor or Secondary Coolant, Rev. 19  
 1-ES-1.1, SI Termination, Rev. 17  
 1-ES-1.3, Transfer to Cold Leg Recirculation, Rev. 17  
 1-ES-1.4, Transfer to Hot Leg Recirculation, Rev. 9  
 1-ES-1.5, Transfer from Hot Leg Recirculation to Cold Leg Recirculation, Rev. 4  
 1-ECA-1.1, Loss of Emergency Coolant Recirculation, Rev. 11  
 1-ECA-1.2, LOCA Outside Containment, Rev. 5  
 1-FR-C.2, Response to Degraded Core Cooling, Rev. 9  
 1-FR-I.2, Response to Low Pressurizer Level, Rev. 9  
 1-FR-Z.1, Response to High Containment Pressure, Rev. 6  
 1-AP-16, Increasing Primary Plant Leakage, Rev. 19  
 1-AP-17, Shutdown LOCA, Rev. 15  
 1-AP-18, Increasing Containment Pressure, Rev.8

WOG Emergency Procedure Guidelines

E-0, Reactor Trip or Safety Injection, HP-Rev. 1C 09/30/97  
 E-1, Loss of Reactor or Secondary Coolant, HP-Rev. 1C 09/30/97  
 ECA-1.1, Loss of Emergency Coolant Recirculation, HP-Rev. 1C 09/30/97  
 ECA-1.2, LOCA Outside Containment, HP-Rev. 1C 09/30/97  
 ES-1.1, SI Termination, HP-Rev. 1C 09/30/97  
 ES-1.4, Transfer to Hot Leg Recirculation, HP-Rev. 1C 09/30/97  
 ES-1.5, Transfer from Hot Leg Recirculation to Cold Leg Recirculation, HP-Rev. 1C 09/30/97  
 ES-1.3, Transfer to Cold Leg Recirculation, HP-Rev. 1C 09/30/97

Alarm Response

1-AR-A-C1, SFGDS Area Sump Hi/Hi-Hi Level, Rev. 2  
 1-AR-B-A1, ICCM System Trouble Train A, Rev. 1  
 1-AR-B-F1, Prz Relief Tank Hi Press, Rev. 0  
 1-AR-B-F8, Prz Lo Level, Rev. 0  
 1-AR-B-G7, Prz Lo Level Htrs Off - Letdwn Isol, Rev. 0  
 1-AR-C-A1, VCT Hi-Lo Level L-115, Rev. 2  
 1-AR-E-F6, Aux Build Sump Hi Level, Rev. 0  
 1-AR-E-F8, Valve Pit Sump Hi/Hi-Hi Level, Rev. 1  
 1-AR-J-A2, RWST Lo Level, Rev. 0  
 1-AR-J-A6, Rx Cont Sump Hi Level, Rev. 1  
 1-AR-J-G1, Containment Partial Press +0.25 psi Ch I-II, Rev. 1

Miscellaneous

Operations Standard 038, Operations Team Response During an Event or Complex Evolution  
 Operations Standard 036, Operator Procedure Knowledge  
 Operations Standard 052, Procedure Usage, Rev. 2

OPAP-0002, Operations Department Procedures, Rev. 7  
 OPAP-0006, Shift Operating Practices, Rev. 3  
 VPAP-1401, Conduct of Operations, Rev. 10

### **Section 1R21.15.a Heat Removal**

#### Documents

##### Miscellaneous

07797-US(B)-280, Containment Recirculation Heat Exchanger UAs, Rev. 0  
 NE-1257, Technical Report - North Anna Revised Containment Analysis, Rev. 0  
 ME-0591, Charging Pump Cubicle Exhaust Flow Rate, Rev. 0  
 ME-0620, Minimum Delivered Service Water Flow and Acceptance Criteria for Service Water Pump Operability, Rev. 1

##### Procedures:

0-PT-77.14A, Periodic Test, ECCS Pump Room Exhaust Air Cleanup System (PREACS) Train A Filter In-Place Test (1-HV-FL-3A) (Refueling / special) - Rev. 10, Results of Test Performed on 11/06/03  
 0-PT-77.14B, ECCS Pump Room Exhaust Air Cleanup System (PREACS) Train A Filter In-Place Test (1-HV-FL-3A) (Refueling / special) - Rev. 10, Results of Test Performed 04/23/04  
 1-PT-75.6, Service Water System Flow Balance - Rev. 13 OTO-4, Results of Test Performed 09/28/01  
 1-PT-63.3, Quench Spray System - Spray Header Air Test (Special), Rev. 08 (current procedure, not a completed periodic test)  
 1-PT-63.3, Quench Spray System - Spray Header Air Test (5 year), Rev. 05 - Results of Test Performed 03/27/93  
 1-PT-64.3, Recirculation Spray System - Spray Header Air Test (Special), Rev. 09 - Results of Test Performed 10/03/04

### **1R21.21a Installed Configuration**

#### Documents

##### Procedures:

1-PT-63.3, Quench Spray System - Spray Header Air Test (5 year), Rev. 05 - Results of Test Performed 03/27/93  
 1-PT-64.3, Recirculation Spray System - Spray Header Air Test (Special), Rev. 09 - Results of Test Performed 10/03/04

##### Drawings:

11715-FM-078A - Sheet 4, Flow / Valve Operating Numbers Diagram Service Water System, North Anna Power Station Units 1 & 2 - Sheet 4, Rev. 91  
 11715-FM-078B - Sheet 1, Flow / Valve Operating Numbers Diagram Service Water System, North Anna Power Station Unit 1 - Sheet 1, Rev. 33

11715-FM-091A - Sheet 1, Flow / Valve Operating Numbers Diagram Cont. Quench & Recirc. Spray Sub-System, North Anna Power Station Unit 1 - Sheet 1, Rev. 31  
 11715-FM-091A - Sheet 2, Flow / Valve Operating Numbers Diagram Cont. Quench & Recirc. Spray Sub-System, North Anna Power Station Unit 1 - Sheet 2, Rev. 28  
 11715-FM-091A - Sheet 3, Flow / Valve Operating Numbers Diagram Cont. Quench & Recirc. Spray Sub-System, North Anna Power Station Unit 1 - Sheet 3, Rev. 25  
 11715-FM-091A - Sheet 4, Flow / Valve Operating Numbers Diagram Cont. Quench & Recirc. Spray Sub-System, North Anna Power Station Unit 1 - Sheet 4, Rev. 32  
 11715-FM-091B - Sheet 1, Flow / Valve Operating Numbers Diagram Cont. Quench & Recirc. Spray Sub-System, North Anna Power Station Unit 1 - Sheet 1, Rev. 12  
 11715-FM-093A - Sheet 1, Flow / Valve Operating Numbers Diagram Reactor Coolant System - Loop 1, North Anna Power Station Unit 1 - Sheet 1, Rev. 29  
 11715-FM-093A - Sheet 2, Flow / Valve Operating Numbers Diagram Reactor Coolant System - Loop 2, North Anna Power Station Unit 1 - Sheet 2, Rev. 29  
 11715-FM-093A - Sheet 3, Flow / Valve Operating Numbers Diagram Reactor Coolant System - Loop 2, North Anna Power Station Unit 1 - Sheet 3, Rev. 33  
 11715-FM-095A - Sheet 1, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 1, Rev. 38  
 11715-FM-095A - Sheet 2, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 2, Rev. 19  
 11715-FM-095A - Sheet 3, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 3, Rev. 14  
 11715-FM-095A - Sheet 4, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 4, Rev. 28  
 11715-FM-095B - Sheet 1, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 1, Rev. 33  
 11715-FM-095B - Sheet 2, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 2, Rev. 41  
 11715-FM-095C - Sheet 1, Flow / Valve Operating Numbers Diagram Chemical and Volume Control System, North Anna Power Station Unit 1 - Sheet 1, Rev. 27  
 11715-FM-095C - Sheet 2, Flow / Valve Operating Numbers Diagram Chemical and Volume Recirculation spray and quench spray pancake flanges (documentation review verifying removal)  
 11715-FE-1D, 4160 One Line Diagram-Sh.3 Emergency Bus 1H and 1J North Anna Power Station, Rev. 20  
 11715-FE-1AF, 480V One Line Diagram Emergency Buses 1H, 1H1, 1J and 1J1, Rev. 14

#### Calculations:

EE-0338, Relay settings for Safety Bus 1J, Rev. 0  
 EE-0345, Relay Settings for Safety Bus 1H, Rev. 2  
 EE-0057, DC Equipment Sizing, Rev. 1  
 EE-0009, 125Vdc System Analysis, Rev. 1

#### Miscellaneous

SDBD-NAPS-EV, Emergency Power and Vital Bus (120-240V) System, Rev. 6  
 SDBD-NAPS-EP, Emergency Power System, Rev. 6  
 SDBD-NAPS-ED, 125V DC Emergency Power System, Rev. 6  
 Recirculation spray and quench spray pancake flanges (documentation review verifying removal)

Components Reviewed

## MOV's

1-CH-MOV-115B	1-CH-MOV-115D	1-SI-MOV-1860A
1-SI-MOV-1862A	1-SI-MOV-1864B	1-SI-MOV-1863A
1-SW-MOV-101A	1-SW-MOV-103A	1-SW-MOV-104A
1-SW-MOV-105D		

## Pump Breakers

1-CH-P-1A-15H6	1-SI-P-IA-15H9	1-RS-P-2A-15H10
1-CH-P-1B-15J6	1-SI-P-1B-15J7	1-RS-P-2B-15J10

EDG 1H-15H2	EDG 1J-15J2
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Transformer 15H8

Transformer 15J8

## RWST

Cold weather provisions - RWST level transmitter location

Safeguards building ventilation - LHSI pump and ORS pump area

Casing cooling tank / pumps - pump lubrication / piping / valves / ventilation

Quench spray pumps - pump lubrication / piping / valves / ventilation

HHSI (charging pump) 1-CH-P-1A cubicle equipment / exhaust ventilation / lubrication levels and service water cooling supply to related heat exchanger / sealant provisions against flood water ingress into cubicle area

**1R21.22a Operation**DocumentsMiscellaneous

E-1, Loss of Reactor or Secondary Coolant, Background Information for Westinghouse Owners Group Emergency Response Guidelines, HP-Rev. 1 C, September 1, 1983

NRC-LOCA-Audit, simulator Exercise Guide, Rev. 0

North Anna Power Station Updated Final Safety Analysis Report, Chapter 15, sections 15.3, 15.4, 18.3

Draft NUREG-1437, Supplement 7, April 2002

SDBD-NAPS-RC, System Design Basis Document for Reactor Coolant System, North Anna Power Station, Rev. 2

LORP Session 04-02, Loss of Emergency Coolant Recirculation and Containment Sump Screen Blockage

LORP Session 04-03, Response to NRC Bulletin 2003-01, Emergency Operating Procedure Review and Identified Enhancements and Simulator Exercise Guide SEG13E

LORP Session 03-05, Transient and Accident Analysis and Simulator Exercise Guide SLA-13A Transient and Accident Analysis presentation

E-1, Loss of Reactor or Secondary Coolant, HP-Rev. 1C 09/30/97



Simulator Scenario

Scenario 59, Licensed Operator Requalification Examination Simulator Exercise Guide  
 NCRODP-94-SEG-E, Licensed Operator Training Simulator Exercise Guide

Job Performance Measures

R197, Transfer to Cold Leg Recirculation mode 1-ES-1.3  
 R198, Transition to 1-ES-1.4, 'Transfer to Hot Leg Recirculation'  
 R737, 1-ECA-1.1, 'Loss of Emergency Coolant Recirculation'  
 R761, 1-ECA-1.2, 'LOCA Outside Containment'  
 R772, 1-ES-1.2, ' Post-LOCA Cooldown and Depressurization' verify natural circulation

**1R21.23a Design**Documents:Calculations

01040.0910—001, Required Volume of Water in Casing Cooling Tank and NPSH Available at Casing Cooling Pump Suction, Rev. 0  
 07797-US(B)-281, Suction Hydraulic Analysis of the Containment Recirculation Spray and Low Head Safety Injection Pumps, Rev. 0  
 12050-ES-220, Containment Floor Volume with respect to Elevation, Rev. 0  
 ET No. NAT 99-0026, Engineering Transmittal - Containment Sump Vortexing Concerns during Recirculation - Surry and North Anna Power Stations, Units 1 & 2, Rev. 0  
 ME-174, Sensitivity of Low Head Safety Injection System to Pump Interaction (During Minimum Flow Recirculation Operation), Rev. 0  
 ME-0290, NPSHA (Net Positive Suction Head Available) to Charging Pumps, Rev. 0  
 ME-0487, Verification of Casing Cooling System Flow Rates using Weakest Pump Total Developed Head (TDH) Curve for Units 1 & 2, Trains "A" & "B," Rev.1  
 ME-0493, Outside Recirculation Spray Pumps (1/2-RS-P-2A & B) Design Flow and Total Developed Head, Rev. 1  
 ME-0497, Containment Sump Level Indication Verification, Rev. 1  
 ME-0521, Minimum Delivered Quench Spray Flow for Containment Depressurization Analysis including the Effects of Instrument Uncertainties and EDG Frequency Reduction, Rev. 2  
 ME-0522, Inside Recirculation Spray Pump Design Flow and Total Developed Head, Rev. 0  
 ME-0629, Minimum and Maximum Low Head and High Head Safety Injection System Flow Determination for Containment Analysis Input - North Anna 1 & 2, Rev. 2  
 NE-0994, Technical Report - Safety Analysis Limits for Technical Specification Instrumentation - Companion to EE-0101- Surry and North Anna Power Stations, Rev. 12  
 SM-1176, North Anna RWST Volumes and Levels for Containment Analysis, Rev. 1  
 SM-1176, Impact of Maintaining North Anna Automatic RMT Setpoint at 19.4% RWST Level, Rev. 1 - Addendum A (title change with addendum)  
 EE-0025, North Anna Station Load List, Rev. 1  
 EE-0500, Motor Terminal Voltage for Motor-Operated Valves, Rev. 3  
 EE-0009, 125Vdc System Analysis, Rev.1  
 EE-0557, Evaluation of TOL's for North Anna Unit 1, GL89-10 MOV's, Rev. 0  
 EE-0338, Relay settings for Safety Bus 1J, Rev. 0

EE-0345, Relay Settings for Safety Bus 1H, Rev. 2  
 13929.11-4, Voltage Drop Calculation-Class 1E Motor Feeders, Rev. 1  
 EE-0057, DC Equipment Sizing, Rev. 1  
 EE-012, North Anna "H" Diesel Generator Breaker Control Circuit Voltage Analysis , Rev. 3

Procedures:

1-PT-212.22, Valve Inservice Inspection for Check Valves 1-CH-252, 1-CH-264, 1-CH-277, and 1-CH-649, Rev. 12 (Demonstrates minimum flow met for HHSI pump)  
 ICP-SI-F-1946, F-SI-1946, Low Head Safety Injection Header B Flow Calibration, Rev. 006  
 1-PT-45.1.2, I-QS-100B, RWST Level Ch. IV Channel Functional Test, Rev. 017  
 1-PT-57.1C, ECCS Subsystem (Valves), Rev. 009  
 1-PT-57.1A, ECCS-Low Head SI Pump, Rev. 044  
 1-PT-57.4, Safety Injection Operational Test, Rev. 038

Drawings

11715-FE-1D, 4160 One Line Diagram-Sh.3 Emergency Bus 1H and 1J North Anna Power Station, Rev. 20  
 11715-FE-1AF, 480V One Line Diagram Emergency Buses 1H, 1H1, 1J and 1J1, Rev. 14  
 11715-FE-1Q, 480V one line Diagram Emergency MCC 1H1-2 Cable Tunnel, Rev. 39  
 11715-ESK-5AL, Elementary Diagram 4160V CKTS Charging Pump 1-CH-P-1A, Rev. 13  
 11715-ESK-6S, Elementary Diagram 480V CKTS Recirculation Spray Pump (inside Containment) 1-RS-P-1A, Rev. 20  
 11715-ESK-5AW, Elementary Diagram 4160 CKTS Recirculation Spray Pump (outside Containment) 1-RS-P-2A, Rev. 21  
 11715-ESK-5AY, Elementary Diagram 4160V Circuits Low Head Safety Injection Pump 1-SI-P-1A, Rev. 8  
 11715-FE-8BL-7, 4160V Emergency Bus "1H" Low Head Safety Injection Pump 1-SI-P-1A, BKR 15H9, Rev. 5  
 11715-ESK-6JAE, Elementary Diagram 480 CKTS Misc Pump Circuit, Rev. 8  
 11715-ESK-6ES, 480V Circuits MOVs Sheet 63 01-SI-MOV-1863A & 1863B, Rev. 9, Sh.1  
 11715-ESK-6ET, 480V Circuits MOVs Sheet 64 01-SI-MOV-1860A & 1860B, Rev. 10, Sh.1  
 11715-ESK-5AM, 4160V Circuits Charging Pump 1-CH-P-1B, Rev. 18, Sh. 1  
 11715-ESK-6DF, 480V Circuits MOVs Sheet 30 01-SW-MOV-104A & 104B, Rev. 9  
 11715-ESK-6DV, Elementary Diagram 480V CKTS MOVs 01-SI-MOV-1865B, C, & 1867A NAPS Unit 1, Rev.19, Sh. 44  
 11715-LSK-26-1G, Logic Diagram Charging Pumps - Tripping, Rev. 6, Sh. 1  
 11715-LSK-26-1H, Logic Diagram Charging Pumps - Monitoring, Rev. 6, Sh. 1  
 11715-LSK-26-1B, Charging Pump - Start Permissives, Rev. 6, Sh. 1  
 11715-LSK-26-1D, Logic Diagram Charging Pump B - Auto, Rev. 6, Sh. 1  
 11715-LSK-26-2F, Logic Diagram Low Head SI Pump System Valve NAPS, Rev. 5, Sh. 1  
 11715-LSK-17-2G, Logic Diagram SW Valves MOV-SW-103,104 NAPS, Rev. 4, Sh.1  
 11715-LSK-26-2B, Logic Diagram Low Head SI Pump Discharge Valve, Rev. 5  
 11715-LSK-26-2D, Logic Diagram Low Head SI Pump Discharge Valve, Rev. 5  
 NA-DW-108D744, Interconnection Diagram Output Cabinets 1-EI-CB-47E & F(2-EI\_CB\_47E &F) Units 1&2, rev. 4, Sh. 24

Miscellaneous

NE-1184, Review of Operator Response Time Data for Key Operator Actions Assumed in the Safety Analyses, Rev. 0

NE-1200, Key Operator Actions Assumed in the Safety Analyses, Rev. 4

NE-1248, Instrument Uncertainties for Setpoints in the Emergency Operating Procedures, Rev. 0

North Anna Unit 1 Setpoint Database Report, 12/03/92

ERG Footnote Basis Document, March 2001

NAP-0111, Procurement Specification Contents for Vital Bus Static Inverters North Anna Power Station, Rev. 0

NA-250/1250, Static Battery Charger

SDBD-NAPS-EV, Emergency Power and Vital Bus (120-240V) System, Rev. 6

SDBD-NAPS-EP, Emergency Power System, Rev.6

SDBD-NAPS-ED, 125V DC Emergency Power System, Rev.6

1-E-0, Reactor Trip or Safety Injection, Rev. 33

1-E-1, Loss Of Reactor Or Secondary Coolant, Rev. 19

Components Reviewed

## MOV's

1-CH-MOV-115B      1-CH-MOV-115D      1-SI-MOV-1860A

1-SI-MOV-1862A      1-SI-MOV-1864B      1-SI-MOV-1863A

1-SW-MOV-101A      1-SW-MOV-103A      1-SW-MOV-104A

1-SW-MOV-105D

## Pump Breakers

1-CH-P-1A-15H6      1-SI-P-IA-15H9      1-RS-P-2A-15H10

1-CH-P-1B-15J6      1-SI-P-1B-15J7      1-RS-P-2B-15J10

EDG 1H-15H2      EDG 1J-15J2

Transformer 15H8

Transformer 15J8

## Instruments

1-DA-LT-110A/B, Reactor Containment Sump Level Transmitter

1-LM-PT-100A, Reactor Containment Pressure Transmitter Channel I

1-LM-PT-100B, Reactor Containment Pressure Transmitter Channel II

1-LM-PT-100C, Reactor Containment Pressure Transmitter Channel III

1-LM-PT-100D, Reactor Containment Pressure Transmitter Channel IV

1-LT-RS-151A, Reactor Containment Sump Wide Range Level A

1-RC-PT-1456, Pressurizer Pressure Channel II

1-LM-TM-100-1, Leakage Monitoring Containment Temperature

**1R21.24a      Testing and Inspection**Documents Reviewed

Completed Surveillance Procedures

1-PT-14.1, Charging Pump 1-CH-P-1A (Quarterly and post-maintenance) - Rev. 42, Results of Test Performed 01/12/05

1-PT-57.1A, Emergency Core Cooling Subsystem - Low Head Safety Injection Pump (1-SI-P-1A) (Quarterly) - Rev. 44, Results of Test Performed 02/07/05

1-PT-61.4, RCS Pressure Isolation Valves - Leakage Test (Refueling / special) - Rev. 14, Results of Test Performed 10/02/04

1-PT-64.1.1, Outside Recirculation Spray Pump 1-RS-P-2A (Refueling) - Rev. 17, Results of Test Performed 10/07/03

1-PT-64.4A, Casing Cooling Pump (1-RS-P-3A) Test (Quarterly and post-maintenance) - Rev. 17, Results of Test Performed 02/10/05

1-PT-64.8, Flow Test of the Inside Recirculation Spray Pumps (Refueling) - Rev. 15, Results of Test Performed 09/27/04

1-PT-66.3, Containment Depressurization Actuation Operational Test (Refueling) - Rev. 33, Results of Test Performed 09/05/2004 (tests time delay for 1-RS-P-1A/B at 400 +/- 5.0 sec and 1-RS-P-2A/B at 210 +/- 5.0 sec and 1-RS-P-3A/B (Casing Cooling) w/o delay)

1-PT-75-6, Service Water System Flow Balance - Rev. 17, Results of Test Completed 09/20/04

1-PT-138, Valve Inservice Inspection - LHSI System Functional Verification - Rev. 24, Results for Test Performed 09/29/04

1-PT-138.3C, Combined Charging Pump "1C" Head Curve Verification and HHSI Branch Flow Verification (Refueling) - Rev. 8-P-1, Results of Test Performed 10/01/04

1-PT-142, Valve Inservice Inspection for I-SI-001 and I-SI-016 - Rev. 12, Results for Test Performed 09/27/04

1-PT-210.2, Valve Inservice Inspection - LHSI Pump Check Valve - Rev. 8, Results for Test Performed 10/03/04

1-PT-210.24, Valve Inservice Inspection (Service Water Check Valves to RSHXS) - Rev. 02, Results for Test Performed 09/26/04

ICP-LM-P-100A, P-LM100A, Reactor Containment Pressure Protection Channel I, Completed: 03/27/03, 09/14/04

ICP-LM-P-100B, P-LM100B, Reactor Containment Pressure Protection Channel II, Completed: 02/25/03, 09/15/04

ICP-LM-P-100C, P-LM100C, Reactor Containment Pressure Protection Channel III, Completed: 02/27/03, 09/15/04

ICP-LM-P-100D, P-LM100D, Reactor Containment Pressure Protection Channel IV, Completed: 02/25/03, 09/14/04

ICP-RS-1-L-151A, Containment Sump Wide Range Level A, 09/28/04, 03/01/03

ICP-RS-1-L-151B, Containment Sump Wide Range Level B, Completed: 09/28/04, 03/01/03

ICP-DA-1-L-110A, Reactor Containment Sump Level Control, Indication and Alarm, 03/16/03, 09/25/04

Procedures:

1-EPM-1820-01, Protective Relay Maintenance for Breaker 15H2, Emergency Supply to Bus 1H, 06/04/03, 05/07/01

1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H9, Low Head Safety Injection Pump 1-SI-P-1A, 09/12/01

1-EPM-1820-02, Protective Relay Maintenance for Emergency Diesel Generator "1H" Differential, 09/08/03, 05/29/02, 03/14/00

1-EPM-R-1825-01, Protective Relay Maintenance for Breaker 15H10, Recirculation Spray Pump  
 1-RS-P-2A, 09/18/04, 08/08/00, 09/15/98  
 1-EPM-R-1825-02, Protective Relay Maintenance for Breaker 15J10, 08/22/00, 01/05/99  
 1-EPM-R-1803-07, Protective Relay Maintenance for Breaker 15J8, 03/07/03, 09/21/01  
 1-EPM-R-1817-04, Protective Relay Maintenance for Breaker 15J7, 07/31/00, 05/28/02  
 1-EPM-R-1817-02, Protective Relay Maintenance for Breaker 15J6, 09/11/00, 11/08/02  
 1-EPM-1820-03, Protective Relay Maintenance for Breaker 15J2, 09/08/03, 09/22/01  
 1-EPM-I-1803-06, Protective Relay Maintenance for Breaker 15H8, 09/18/01, 03/03/03  
 1-EPM-R-1817-03, Protective Relay Maintenance for Breaker 15H7, 05/28/02, 07/31/00  
 1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H6, Charging Pump 1-CH-P-1A, 02/16/04, 04/17/02, 03/08/00  
 0-EPM-1412-01, General Inspection and Testing of Electrical Motors, 12/01/1998  
 0-EPM-0302-02, BBC/ITE 480-Volt K-line Breaker and Associated Switchgear cubicle Maintenance, 12/10/2003, 09/16/04  
 0-EPM-1503-01, Inspection of Limitorque Motor- Operated Valves, 09/21/04, 09/18/01, 09/16/01, 02/08/00, 03/22/00, 11/03/97  
 0-ECM-0307-01, Replacement of thermal Overload Devices, 09/13/94, 07/18/94, 09/12/94  
 0-EPM-0304-01, Testing/Replacing 480-Volt Breaker Assemblies, 03/14/00, 01/18/00, 03/03/03, 09/18/04, 06/07/04, 09/20/04, 09/11/01,  
 0-EPM-1401-06, Low-Head Safety Injection Pump Motor Inspection, 07/17/98  
 0-EPM-1408-02, Charging pump Motor Service Inspection and Cleaning, 06/19/00  
 0-EPM-1401-05, Outside Recirculation Spray Pump Motor Inspection, 12/16/98  
 1-PT-85, DC Distribution System, Rev. 52  
 1-PT-86A, Quarterly DC Distribution System test for Battery 1-I, Rev. 35  
 1-PT-87A, Intercell Connection Resistance Test for Battery 1-I, Rev. 13  
 1-PT-87.1H, Stationary Battery 1-I Service Test, Rev. 7  
 1-PT-87.3H, Station Battery Charger 1-I Service Test, Rev. 10  
 0-EPM-2501-01, 18 Month Cleaning and Maintenance of Single Phase Static Inverters , Rev. 1  
 1-EPM-0108-01, Testing of Station Battery Charger 1-I Alarms, Rev. 3  
 0-EPM-0103-01, Battery Charger Inspection, Rev. 14  
 ICP-SI-F-1946, F-SI-1946, Low Head Safety Injection Header B Flow Calibration, Rev. 006  
 ICP-DA-1-L-110A, Reactor Containment Sump Level Control, Indication and Alarm, Rev. 006  
 1-PT-45.1.2, I-QS-100B, RWST Level Ch. IV Channel Functional Test, Rev. 017  
 1-PT-57.1C, ECCS Subsystem (Valves), Rev. 009  
 1-PT-57.1A, ECCS-Low Head SI Pump, Rev. 044  
 1-PT-57.4, Safety Injection Operational Test, Rev. 038

#### Calculations

CALC-59-01-PT-138.3-00, Calculation Basis for Reference Values and Acceptance Ranges for Flow, Delta Pressure, and Vibration Levels for the High Head Safety Injection Pump 1-CH-P-1A, 1-CH-P-1B, and 1-CH-P-1C for the IST Comprehensive Pump Test, Rev. 0  
 ME-0417, Minimum Delivered HHSI Flow for LOCA Analysis and PI-138 Flow Test Acceptance Criteria for North Anna Unit 1 & 2, Rev. 3  
 ME-0522, IRS (Inside Recirculation Spray) Periodic Tests 1/2-PT-64.8 Values, Rev. 0 - Addendum A  
 ME-0628, Minimum Delivered LHSI Flow for Large Break LOCA Analysis and Acceptance Criteria for LHSI Pump Operability Verification Testing - North Anna 1 & 2, Rev. 1

EE-0025, North Anna Station Load List, Rev. 1  
 EE-0500, Motor Terminal Voltage for Motor-Operated Valves, Rev. 3  
 EE-0009, 125Vdc System Analysis, Rev.1  
 EE-0557, Evaluation of TOL's for North Anna Unit 1, GL89-10 MOV's, Rev. 0  
 EE-0338, Relay settings for Safety Bus 1J, Rev. 0  
 EE-0345, Relay Settings for Safety Bus 1H, Rev. 2  
 13929.11-4, Voltage Drop Calculation-Class 1E Motor Feeders, Rev. 1  
 EE-0057, DC Equipment Sizing, Rev. 1  
 EE-012, North Anna "H" Diesel Generator Breaker Control Circuit Voltage Analysis , Rev. 3

Work Orders:

00405270 03, 01-SI-MOV-1860A / Wiring Modification in accordance with DCP 03-101, Results of Work Order Completed 03/12/03  
 00423514 03, 1-CH-P-1C / Replace Rotating Element in accordance with DCP 99-168, Results of Work Order Completed 08/28/04  
 00434916 02, 1-CH-P-1C / Replace Motor with Rewound Spare Motor, Results of Work Order Completed 08/29/04  
 00443561 03, Install Rebuilt Spare Speed Increaser, Results of Work Order Completed 08/29/04  
 00473804 01, 01-SW-MOV-101A / Service Water MOV Valve Inspection / Rebuild, Results of Work Order Completed 03/25/03  
 00487833 03, 1-CH-P-1C / Install New Seals in accordance with DCP 02-147, Results of Work Order Completed 08/29/04

Miscellaneous Documents:

NAP-0111, Procurement Specification Contents for Vital Bus Static Inverters North Anna Power Station, Rev.0  
 NA-250/1250, Static Battery Charger  
 SDBD-NAPS-EV, Emergency Power and Vital Bus (120-240V) System, Rev. 6  
 SDBD-NAPS-EP, Emergency Power System, Rev. 6  
 SDBD-NAPS-ED, 125V DC Emergency Power System, Rev.6  
 1-E-0, Reactor Trip or Safety Injection, Rev. 33  
 1-E-1, Loss Of Reactor Or Secondary Coolant, Rev. 19

Components Reviewed

HHSI (Charging) Pump  
 LHSI Pump  
 ORS Pump  
 IRS Pump  
 Casing Cooling Pump  
 Quench Spray Pump  
 01-SW-MOV-101A - "A" Service Water Supply Header to RSHX  
 01-SI-MOV-1860A - Containment Sump to LHSI Suction  
 01-SI-1 - Containment Sump to LHSI Suction Check Valve  
 01-SI-9 - LHSI Pump Discharge Check Valve  
 01-SI-195 / 197 / 199 - LHSI to Cold Leg Check Valve MOV's  
 1-CH-MOV-115B      1-CH-MOV-115D      1-SI-MOV-1860A  
 1-SI-MOV-1862A      1-SI-MOV-1864B      1-SI-MOV-1863A

1-SW-MOV-101A      1-SW-MOV-103A      1-SW-MOV-104A  
 1-SW-MOV 105D

#### Pump Breakers

1-CH-P-1A-15H6      1-SI-P-IA-15H9      1-RS-P-2A-15H10  
 1-CH-P-1B-15J6      1-SI-P-1B-15J7      1-RS-P-2B-15J10

EDG 1H-15H2      EDG 1J-15J2

Transformer 15H8

Transformer 15J8

1-SI-P-1A, LHSI Pump "1A"

1-SI-MOV-1865B, Accumulator Isolation Valve

1-SI-MOV-1863B, LHSI Discharge to Charging Pump Isolation valve

1-SI-MOV-1890C, LHSI Discharge Line Stop Valve

1-SI-MOV-1860B, LHSI Pump Suction Valve

1-CH-MOV-1115D, Charging Pump Suction from RWST Valve

1-QS-MOV-102A/B, Chemical Addition to RWST Valve

1-SW-MOV-104A, Return from Recirculation Spray Heat Exchanger Valve

### **1R21.31a      Component Degradation**

#### Documents

#### Plant Issues Reports (PIs)

N-2003-0863, Fuse blew in test load banks on the Station Battery 1-I

N-2003-2280, Degraded capacitor found on the AS-13 control card of the Battery charger 1-BY-BC-1-II

N-2003-3189, Negative ground on the inverter and the positive DC bus ground light was out.

N-2004-4621, Relay failed to lock in the Control Room annunciator 1H B2.

N-2003-0211, Frequency reading of the I-1 Inverter exceeds the operational log maximum.

N-2003-0892, Drawing 11715-FE-1AA was updated in error during ORR 1/P.

#### Procedures

0-EPM-1412-01, General Inspection and Testing of Electrical Motors, 12/01/1998

0-EPM-0302-02, BBC/ITE 480-Volt K-line Breaker and Associated Switchgear cubicle Maintenance, 12/10/2003, 09/16/04

0-EPM-1503-01, Inspection of Limitorque Motor- Operated Valves, 09/21/04, 09/18/01, 09/16/01, 02/08/00, 03/22/00,11/03/97

0-ECM-0307-01, Replacement of thermal Overload Devices, 09/13/94, 07/18/94,09/12/94

0-EPM-0304-01, Testing/Replacing 480-Volt Breaker Assemblies, 03/14/00, 01/18/00, 03/03/03,09/18/04,06/07/04,09/20/04, 09/11/01,

0-EPM-1401-06, Low-Head Safety Injection Pump Motor Inspection,07/17/98

0-EPM-1408-02, Charging pump Motor Service Inspection and Cleaning, 06/19/00

0-EPM-1401-05, Outside Recirculation Spray Pump Motor Inspection, 12/16/98

0-EPM-2501-01, 18 Month Cleaning and Maintenance of Single Phase Static Inverters , Rev. 1

0-EPM-0103-01, Battery Charger Inspection, Rev. 14  
 1-PT-85, DC Distribution System, Rev. 52  
 1-PT-86A, Quarterly DC Distribution System test for Battery 1-I, Rev. 35  
 1-PT-87A, Intercell Connection Resistance Test for Battery 1-I, Rev. 13  
 1-PT-87.1H, Stationary Battery 1-I Service Test, Rev. 7  
 1-PT-87.3H, Station Battery Charger 1-I Service Test, Rev.10  
 1-EPM-1820-01, Protective Relay Maintenance for Breaker 15H2, Emergency Supply to Bus 1H, 06/04/03,05/07/01  
 1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H9, Low Head Safety Injection Pump 1-SI-P-1A,09/12/01  
 1-EPM-1820-02, Protective Relay Maintenance for Emergency Diesel Generator "1H" Differential, 09/08/03,05/29/02, 03/14/00  
 1-EPM-R-1825-01, Protective Relay Maintenance for Breaker 15H10, Recirculation Spray Pump 1-RS-P-2A, 09/18/04, 08/08/00, 09/15/98  
 1-EPM-R-1825-02, Protective Relay Maintenance for Breaker 15J10, 08/22/00, 01/05/99  
 1-EPM-R-1803-07, Protective Relay Maintenance for Breaker 15J8,03/07/03, 09/21/01  
 1-EPM-R-1817-04, Protective Relay Maintenance for Breaker 15J7, 07/31/00,05/28/02  
 1-EPM-R-1817-02, Protective Relay Maintenance for Breaker 15J6, 09/11/00, 11/08/02  
 1-EPM-1820-03, Protective Relay Maintenance for Breaker 15J2, 09/08/03, 09/22/01  
 1-EPM-I-1803-06, Protective Relay Maintenance for Breaker 15H8, 09/18/01, 03/03/03  
 1-EPM-R-1817-03, Protective Relay Maintenance for Breaker 15H7, 05/28/02, 07/31/00  
 1-EPM-1824-01, Protective Relay Maintenance for Breaker 15H6, Charging Pump 1-CH-P-1A,02/16/04, 04/17/02, 03/08/00  
 1-PT-14.5, Venting ECCS Lines (Quarterly) - Rev. 9 OTO-1, Results of Test Performed 03/13/05  
 2-PT-14.5, Venting ECCS Lines (Quarterly) - Rev. 10, Results of Test Performed 03/06/06

Drawings:

2-47A370-71-20, Mechanical Limit Switch and MOV Data FCV-71-02, Rev. 3

Work Orders:

00405270 03, 01-SI-MOV-1860A / Wiring Modification in accordance with DCP 03-101, Results of Work Order Completed 03/12/03  
 00443061 01, 01-CH-P-1A / A Charging Pump - change oil in pump / speed increaser, Completed 07/25/01  
 00465110 01, 01-CH-P-1A / Pump Motor - charging pump motor oil change (inboard and outboard bearings), Completed 03/18/03  
 00473804 01, 01-SW-MOV-101A / Service Water MOV Valve Inspection / Rebuild, Results of Work Order Completed 03/25/03  
 00485826 01, 01-CH-P-1A / Pump Motor - charging pump motor oil change (inboard and outboard bearings), Completed 02/18/04  
 00500172 01, 01-CH-P-1A / A Charging Pump - change oil in pump / speed increaser, Completed 02/17/04

Miscellaneous:

Insight Services Analysis Report, Oil Analysis Sample No. 900-1-23-23 / 1-CH-P-1A / Pump Common Reservoir, Report dated 12/14/04



Insight Services Analysis Report, Oil Analysis Sample No. 900-1-24-27 / 1-CH-P-1A / Inboard Motor Bearing, Report dated 02/14/05

Insight Services Analysis Report, Oil Analysis Sample No. 900-1-26-27 / 1-CH-P-1A / Outboard Motor Bearing, Report dated 02/14/05

### Components Reviewed

LHSI and HHSI piping system (venting provisions)

1-CH-P-1A pump common reservoir, motor inboard bearing, and motor outboard bearing oil analyses

MOV's

1-CH-MOV-115B	1-CH-MOV-115D	1-SI-MOV-1860A
1-SI-MOV-1862A	1-SI-MOV-1864B	1-SI-MOV-1863A
1-SW-MOV-101A	1-SW-MOV-103A	1-SW-MOV-104A
1-SW-MOV-105D		

Pump Breakers

1-CH-P-1A-15H6	1-SI-P-1A-15H9	1-RS-P-2A-15H10
1-CH-P-1B-15J6	1-SI-P-1B-15J7	1-RS-P-2B-15J10

EDG 1H-15H2      EDG 1J-15J2

Transformer 15H8

Transformer 15J8

### **1R21.32a      Equipment/Environmental Qualification**

#### Documents

##### Miscellaneous Documents:

QDR—4.4 Iside Recirculation Spray Pump Motor

##### Calculations:

ME-0591, Charging Pump Cubicle Exhaust Flow Rate, Rev. 0

##### Completed Surveillance Procedures:

0-PT-77.14A, Periodic Test, ECCS Pump Room Exhaust Air Cleanup System (PREACS) Train A Filter In-Place Test (1-HV-FL-3A) (Refueling / special) - Rev. 10, Results of Test Performed on 11/06/03

0-PT-77.14B, ECCS Pump Room Exhaust Air Cleanup System (PREACS) Train A Filter In-Place Test (1-HV-FL-3A) (Refueling / special) - Rev. 10, Results of Test Performed 04/23/04

### Components Reviewed

1-RS-P-1A

**1R21.33a**     Equipment ProtectionDocumentsMiscellaneous

NAP-0111, Procurement Specification Contents for Vital Bus Static Inverters North Anna Power Station, Rev. 0

NA-250/1250, Static Battery Charger

SDBD-NAPS-EV, Emergency Power and Vital Bus (120-240V) System, Rev. 6

SDBD-NAPS-EP, Emergency Power System, Rev.6

SDBD-NAPS-ED, 125V DC Emergency Power System, Rev.6

Components Reviewed

## MOV's

1-CH-MOV-115B	1-CH-MOV-115D	1-SI-MOV-1860A
1-SI-MOV-1862A	1-SI-MOV-1864B	1-SI-MOV-1863A
1-SW-MOV-101A	1-SW-MOV-103A	1-SW-MOV-104A
1-SW-MOV-105D		

**1R21.34a**     **Component Inputs/Outputs**Documents:Calculations:

EE-0025, North Anna Station Load List, Rev. 1

EE-0500, Motor Terminal Voltage for Motor-Operated Valves, Rev. 3

EE-0009, 125Vdc System Analysis, Rev.1

13929.11-4, Voltage Drop Calculation-Class 1E Motor Feeders, Rev. 1

EE-0057, DC Equipment Sizing, Rev. 1

Drawings

11715-ESK-6ES, 480V Circuits MOVs Sheet 63 01-SI-MOV-1863A & 1863B, Rev.9, Sh.1

11715-ESK-6ET, 480V Circuits MOVs Sheet 64 01-SI-MOV-1860A & 1860B, Rev.10, Sh.1

11715-ESK-5AX, Elementary Diagram 4160V CKTS RS Pump, 1-RS-P-2B, Rev.17, Sh.1

11715-ESK-5AM, 4160V Circuits Charging Pump 1-CH-P-1B, Rev. 18, Sh. 1

11715-ESK-6DF, 480V Circuits MOVs Sheet 30 01-SW-MOV-104A & 104B, Rev. 9

11715-ESK-6CR, Elementary Diagram 480V CKTS MOVs NAPS Unit 1, Rev.15, Sh. 16

11715-ESK-6DU, Elementary Diagram 480V CKTS MOVs 01-SI-MOV-1864A,B, & 1865A NAPS Unit 1, Rev.19, Sh. 43

11715-LSK-26-1G, Logic Diagram Charging Pumps - Tripping, Rev. 6, Sh. 1

11715-LSK-26-1H, Logic Diagram Charging Pumps - Monitoring, Rev. 6, Sh. 1

11715-LSK-26-1B, Charging Pump - Start Permissives, Rev. 6, Sh. 1

11715-LSK-26-1D, Logic Diagram Charging Pump B - Auto, Rev. 6, Sh. 1

11715-LSK-26-2F, Logic Diagram Low Head SI Pump System Valve NAPS, Rev. 5, Sh. 1

11715-LSK-27-IE, Logic Diagram RS Subsystems NAPS, Rev. 7, Sh.1

11715-LSK-17-2G, Logic Diagram SW Valves MOV-SW-103,104 NAPS, Rev. 4, Sh.1  
 11715-LSK-26-2B, Logic Diagram Low Head SI Pump Discharge Valve, Rev. 5  
 11715-LSK-26-2D, Logic Diagram Low Head SI Pump Discharge Valve, Rev. 5  
 NA-DW-1082H41, Permissives & RWST Units 1&2, Rev. 2, Sh. 6  
 NA-DW-108D744, Interconnection Diagram Output Cabinets 1-EI-CB-47E & F(2-EI\_CB\_47E &F) Units 1&2, Rev. 4, Sh. 24  
 NA-DW-1082H41, Safety Injection Units 1&2, Rev. 3, Sh.20

#### Design Basis Documents:

SDBD-NAPS-RS System Design Basis Document For Recirculation Spray System, Rev. 006  
 SDBD-NAPS-QS System Design Basis Document For Quench Spray System, Rev. 005  
 SDBD-NAPS-SI System Design Basis Document For Safety Injection System, Rev. 007  
 SDBD-NAPS-SW System Design Basis Document For Service Water System, Rev. 006

#### Miscellaneous Documents

Technical Report NE-1200, Nuclear Safety Analysis Nuclear Analysis and Fuel, Rev. 4

#### Components Reviewed

##### MOV's

1-CH-MOV-115B	1-CH-MOV-115D	1-SI-MOV-1860A
1-SI-MOV-1862A	1-SI-MOV-1864B	1-SI-MOV-1863A
1-SW-MOV-101A	1-SW-MOV-103A	1-SW-MOV-104A
1-SW-MOV-105D		

### **1R21.35a Operator Experience**

#### Documents Reviewed

##### Miscellaneous documents

IN 93-17, Safety Systems Response to Loss of Coolant and Loss of Offsite Power, 3/25/94  
 OE 16176, Low Insulation Resistance During a DBE LOCA/HELB May Degrade Valve Position Indication, 5/13/03  
 IN-03-06: Failure of Safety Related Linestarter Relays at San Onofre Nuclear Generating Station, 7/23/03  
 GL 96-01, Testing of Safety-Related Logic Circuits, 4/18/96  
 LER 92-009, Missed Surveillance of Containment Purge and Exhaust System, 4/2/92  
 LER 93-015, Missed Surveillance on Portions of the Containment High Pressure Protection Channel Circuitry due to Personnel Error, 5/7/93  
 LER 88-002-02, Air in High Head Safety Injection Pumps Suction Lines, 9/22/89

#### Plant Issues Reports

N-2004-1248, Plugging of SI Pump Lub Oil Coolers with Lakeweed (IN 04-07)  
 N-2004-0736, SEN 247, Potential Common Cause Failure of SI Pump Lube Oil Coolers  
 N-2004-0735, OE 17863, Gas Void Detected in Suction Piping of HHSI Pump  
 N-2003-2607, IN 03-06, Failure of SR Line Starter Relays at San Onofre

N-2003-1796, OE15886, SR Agastat Relays Were Found in Service which exceeded their qualified life.

N-2002-0359, IN 02-08, Pump Shaft Damage Due to Excessive Hardness of Shaft Sleeve.

## **1R21.4a Identification and Resolution of Problems**

### Plant Issue Reports

N-2003-3057-R2, Response to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors

-2002-0231, EOP step to transfer to hot leg recirculation (step 27 of 1/2-E-1) is inconsistent with the analysis basis

-2004-5371, Time to transfer to Hot Leg Recirculation changed from 10 hours to 4.5 hours and Calc SM-0992, Rev. 0, 'HHSI Flow Requirement for Injection to the Hot Leg at Hot Leg Recirculation for North Anna', was not revised.

-2004-4953, OE19440: Operator Simulator Response Times Exceed UFSAR Assumptions

-2004-5233, Westinghouse Nuclear Safety Advisory Letter 04-7 IAW 10CFR21.21(b) identifies a potential for voiding in the LHSI pump suction line from the containment sump.

N-2004-4738-R4, ITC-SA-035 Nuclear Safety Analysis Best Practices Self Assessment

-2005-0677, ICCM System Trouble Train 'A' annunciator (1B-A1) is alarming spuriously.

-2005-0637, U-1 'B' Train ICCM 'Datalink failure' caused from 544 communication board failure.

Previous PI -2005-0576

N-2003-0863, Fuse blew in test load banks on the Station Battery 1-I

N-2003-2280, Degraded capacitor found on the AS-13 control card of the Battery charger 1-BY-BC-1-II

N-2003-3189, Negative ground on the inverter and the positive DC bus ground light was out.

N-2004-4621, Relay failed to lock in the Control Room annunciator 1H B2.

N-2003-0211, Frequency reading of the I-1 Inverter exceeds the operational log maximum.

N-2003-0892, Drawing 11715-FE-1AA was updated in error during ORR 1/P.

-2002-3082 11/13/2002 During a Votes test 1-RS-MOV-155B, Inside Recirc Spray Pump Suction valve.

-2004-1838 05/18/2004 Flexible conduit for 2-RS-LT-251A-2 (Recirc. Spray Sump Level Transmitter).

03-2074 05/20/2003 2-SI-FT-2934, BIT outlet recirculation header flow transmitter.

N-2002-0515, 1-RS-MOV-155B, indicates mid-position following stroke test, 3/5/02

N-2003-1566, Degraded condition of 23-SI-MOV-2890A, 4/8/03

N-2003-2274, As found thrust values high on 2-QS-MOV-201A, 6/8/03

### Miscellaneous documents

Engineering Transmittal (ET)-N02-101, Safety Injection Operational Test, 2-PT-57.4 Issues, 10/2/02

ET-N02-014, Installation of Flow Orifice in Charging Recirc. Line, 2/13/02

### PIs initiated due to this inspection

N-2005-1421 Calculation Inputs Inconsistent on Allowable Tube Plugging in RSHXs

- N-2005-1423 Discrepancy between Thermal Overload Setting and Size Between Calculation and Field Installation.
- N-2005-1132 Minor Configuration Item - Catch Container Near 2 RWST Without Caution Label
- N-2005-1134 Minor Configuration Item - Disconnected Heat Trace Lead RWST 2 Cooler
- N-2005-1138 Minor Configuration Item - Disconnected Heat Trace circuit Near 1 RWST
- N-2005-1162 Minor Documentation Item - UFSAR Reference to SFGDS Supply Fan Speeds Incorrect
- N-2005-1230 Minor Configuration Item - No Specific Authorization Identified for Plastic Sheeting in Aux Bldg. to Catch Condensation
- N-2005-1383 Minor Documentation Item - Incorrect Cross Reference Within Procedure 1-ICP-QS-L-100A
- N-2005-1392 Minor Documentation Item - Calculation EE-0025
- N-2005-1399 Minor Documentation Item - Incorrect RWST Level Input Value in Charging Pump NPSH Calculation