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

January 28, 2002

Virginia Electric and Power Company
ATTN: Mr. David A. Christian
Sr. Vice President and
Chief Nuclear Officer
Innsbrook Technical Center - 2SW
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: NORTH ANNA POWER STATION - NRC INTEGRATED INSPECTION REPORT NOS. 50-338/01-04 AND 50-339/01-04

Dear Mr. Christian:

On December 29, 2001, the NRC completed an inspection at your North Anna Power Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed on January 15, 2002, with Mr. D. Heacock and other members of your staff.

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

No findings of significance were identified.

Immediately following the terrorist attacks on the World Trade Center and the Pentagon, the NRC issued an advisory recommending that nuclear power plant licensees go to the highest level of security, and all promptly did so. With continued uncertainty about the possibility of additional terrorist activities, the Nation's nuclear power plants remain at the highest level of security and the NRC continues to monitor the situation. This advisory was followed by additional advisories, and although the specific actions are not releasable to the public, they generally include increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and more limited access of personnel and vehicles to the sites. The NRC has conducted various audits of the Virginia Electric and Power Company's response to these advisories and North Anna Power Station's ability to respond to terrorist attacks with the capabilities of the current design basis threat. From these audits, the NRC has concluded that the North Anna Power Station security program is adequate at this time.

In accordance with 10 CFR 2.790 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 Randall A. Musser for/

Kerry D. Landis, Chief
Reactor Projects Branch 5
Division of Reactor Projects

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

Enclosures: NRC Integrated Inspection Reports
Nos. 50-338/01-04, 50-339/01-04

cc w/encls.:
Stephen P. Sarver, Manager
Nuclear Licensing and
Operations Support
Virginia Electric and Power Company
Electronic Mail Distribution

D. A. Heacock
Site Vice President
North Anna Power Station
Virginia Electric and Power Company
Electronic Mail Distribution

Richard H. Blount, II
Site Vice President
Surry Power Station
Virginia Electric and Power Company
Electronic Mail Distribution

Executive Vice President
Old Dominion Electric Cooperative
Electronic Mail Distribution

County Administrator
Louisa County
P. O. Box 160
Louisa, VA 23093

Donald P. Irwin, Esq.
Hunton and Williams
Electronic Mail Distribution

Attorney General
Supreme Court Building
900 East Main Street
Richmond, VA 23219

Distribution w/encls.:
S. Monarque, NRR
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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.:	50-338/01-04, 50-339/01-04
Licensee:	Virginia Electric and Power Company (VEPCO)
Facilities:	North Anna Power Station, Units 1 & 2
Location:	1022 Haley Drive Mineral, Virginia 23117
Dates:	September 30, 2001 through December 29, 2001
Inspectors:	M. Morgan, Senior Resident Inspector J. Canady, Resident Inspector W. Bearden, Senior Reactor Inspector, RII (Partial Section 4OA5) L. Garner, Senior Project Engineer, RII (Section 1R01) R. Hamilton, Senior Health Physicist, RII (Sections 2OS1, 2OS2, 2PS3, 4OA1.7 and 4OA1.8)
Approved by:	K. Landis, Chief, Reactor Projects Branch 5 Division of Reactor Projects

Attachments: 1. Supplemental Information
2. List of Documents Reviewed

Enclosure

SUMMARY OF FINDINGS

IR 05000338-01-04, IR 05000339-01-04, on 09/30-12/29/2001, Virginia Electric and Power Co., North Anna Power Station Units 1 & 2. Resident Inspector Integrated Report.

The inspection was conducted by the resident inspectors and region-based senior reactor inspector, senior project engineer, and health physicist. No findings of significance were identified. The significance of the findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website.

A. Inspector Identified Findings

- None.

B. Licensee Identified Violations

- None.

Report Details

Summary of Plant Status

Unit 1 began the inspection period shutdown for a scheduled refueling outage. The unit returned to service on October 9, and full power was reached on October 10. The unit operated at or near 100% power for the remainder of the inspection period.

Unit 2 began the inspection period at 100% power. On October 28, the unit was shutdown in order to perform inspections of vessel head penetrations. On December 7, the reactor vessel head was placed back on the vessel and the unit was returned to service on December 15. Full power was reached on December 16. On December 22, the unit automatically tripped from 100 percent power due to a loss of main turbine electro-hydraulic control (EHC) supply power. On December 24, the EHC supply power was restored and the unit was returned to service. Full power was reached on December 25. The unit operated at or near 100% power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

The inspectors reviewed records and performed walkdowns of equipment to verify if the licensee was prepared for cold weather operations. The inspectors visually inspected the condition of heat trace circuits and insulation associated with the Unit 1 and 2 refueling water storage tanks, condensate storage tanks, casing cooling tanks and screen wash pumps. The inspectors also performed walkdowns in the four emergency diesel generator (EDG) rooms and the auxiliary feedwater (AFW) pump houses to determine if room heaters were either operating or in automatic. The inspectors reviewed completed data sheets from Attachments 1, 3 and 4 of 0-GOP-2.9, “Heat Trace Breaker Configuration and Status,” and inspected heat tracing alarm panels to determine if safety-related heat tracing was in service. The twelve open work orders, listed in Attachment 2 and associated with heat tracing, were reviewed to determine if they should be worked prior to freezing temperatures.

Since the North Anna Reservoir is approximately 2.5 feet lower than normal due to low rainfall, the inspectors reviewed procedures and measures the licensee had in place to cope with decreasing water levels. Specifically, the inspectors reviewed abnormal procedure 0-AP-40, “Abnormal Level In North Anna Reservoir,” Attachments 3, 4 and 5 and Engineering Transmittal CME 00-0036, “Minimum North Anna Reservoir Level Evaluation - North Anna Station - Units 1 & 2,” to verify if the licensee could implement these documents and if required materials were available or on order. Abnormal procedure 0-AP-12, “Loss of Service Water,” was reviewed to assess if it provided adequate instructions for using other sources of water upon loss of service water.

Other documents used during the inspection are listed in Attachment 2.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

a. Inspection Scope

The inspectors performed partial and complete walkdowns of systems, structures, and components (SSC) to determine if they were correctly aligned in accordance with appropriate procedures and drawings. The partial walkdowns were performed on a redundant train/system while the other was out of service. The complete walkdown was performed on a risk-important mitigating system. The following SSCs were assessed for their correct alignment:

- Partial - Unit 2 B Residual Heat Removal System, (2-OP-14.1, "Valve Checkoff - Residual Heat Removal," Revision 9);
- Partial - Unit 1 Motor-Driven Auxiliary Feedwater System Pumps and Valves, (1-OP-31.2, "Valve Checkoff - Auxiliary Feedwater," Revision 22); and,
- Complete - Unit 1 Outside Recirculation System, (1-OP-7.5A, "Valve Checkoff - Outside Recirculation System," Revision 9; and Plant Drawing 11715-FM-091A).

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors assessed the implementation of the fire protection program using "NAPS Appendix R Report," Revision 18, and Virginia Power Administrative Procedure (VPAP)-2401, "Fire Protection Program," Revision 17. The inspectors checked the control of transient combustibles and the material condition of the fire detection and fire suppression systems in the following areas:

- North Anna Security Protected Area Access (Portal Area and Break Areas);
- Unit 1 EDG Manifold Areas, EDGs 2H and 2J;
- Unit 1 and Unit 2 Component Cooling Water Pump Areas;
- Unit 1 B Main Station Transformer Deluge System Area;
- Unit 2 Vessel Head Lay-Down Area (CRDM Penetration Repair Activities); and,
- Unit 2 Normal Electrical Switchgear Room

On December 21, the inspectors observed an unannounced fire drill in Unit 2 Normal Electrical Switchgear Room. The inspectors evaluated response time, communications members dress, and availability of equipment to determine if they were in accordance with procedures. The inspectors also evaluated procedure usage and attended the drill critique.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

On December 4, the inspectors observed licensed operator requalification training involving B shift operators and supervisors. The inspectors watched two sessions of simulator training. Each simulated plant start-up session involved a loss of start-up range nuclear instruments and a dropped control rod. During the sessions, the inspectors evaluated the crew's performance in: 1) knowledge of regulatory and plant technical issues, 2) use of the phonetic alphabet and three-way communications, 3) use of problem-solving/decision-making skills, and 4) use of command and control techniques by supervisory personnel. The adequacy of the training evaluators' critiques was also assessed.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule (MR) Implementation

a. Inspection Scope

The inspectors reviewed implementation of the Maintenance Rule (10 CFR 50.65) using VPAP 0815, "Maintenance Rule Program," Revision 11, and Engineering Transmittal (ET) CEP-97-0018, "North Anna Maintenance Rule Scoping and Performance Criteria Matrix," Revision 12. The reviews focused on the characterization of failures, the appropriateness of the associated a(1) or a(2) classification, and the appropriateness of either the associated a(2) performance criteria or the associated a(1) goals and corrective actions. The plant issues and associated equipment issues reviewed were:

- N-2001-2538 - Unit 1 MOV 1-FW-MOV-150C Worm Gear Cracks in Motor Operator - Placement of MOV into either a(1) or a(2) Status;
- N-2001-1738 - Unit 1A Charging Pump Unavailability Due To Pump Circuitry Ground Problems - Placement of Pump Motor into a(1) Status;
- N-2001-3219 - Unit 1 B Main Transformer Fire Protection Deluge System Failures - Placement of System into a(1) Status;
- N-2001-2479 - Unit 1B Charging Pump Unavailability - Pump Motor Phase B and C Over-Current Issues - Placement of Pump Motor into a(1) Status;
- N-2001-2560 - Unit 1 MOV 1-FW-MOV-150A Worm Gear Cracks in Motor Operator - Placement of MOV into either a(1) or a(2) Status; and,
- N-2001-2477 - Unit 1A Charging Pump Alternate Header Discharge Valve 1-CH-MOV-1287A Failure To Open - Potential a(1) Functional Failure Discussion.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed the licensee's scheduled or emergent work activities to assess the management of plant risk. The inspectors evaluated if the assessments of risk were performed in accordance with requirements of 10CFR50.65 (a)(4) and plant procedures. Additionally, the inspectors reviewed the licensee's actions to minimize the probability of initiating events, maintain the functional capability of mitigating systems, and maintain barrier integrity. The risk impact of performing the following work activities was assessed:

- Work Order 00457745-01; Unit 1 1H Emergency Diesel Generator (EDG) Coolant O-Ring Replacement Activities;
- Work Order 00450595-01; Unit 1 1H EDG Fuel Injector Tappet Drain Inspection Activities;
- Work Order 00400960-01; Unit 2 Service Water System (SW) Spray Array 2A1 Replacement/Repairs;
- Work Order 00452916-01; Unit 1 Turbine-Driven Auxiliary Feedwater Pump MOV Discharge Valve 1-FW-MOV-100D Repairs;
- Work Order 00455402-01; Unit 2 A Reactor Coolant Pump Seal - Installation of High Temperature O-Rings; and,
- Periodic Test 1-PT-45.65.5; Unit 1 Boron Evaporator Distillate Test Tank 2A Level Functional Test Activities (Effects on Boration Flowpath).

b. Findings

No findings of significance were identified.

1R14 Nonroutine Plant Evolutions

a. Inspection Scope

At various times during the inspection period, the inspectors observed activities related to the licensee's inspection of the Unit 2 Reactor Control Rod Drive Mechanism (CRDM) Vessel Head Penetrations (VHPs) numbers 62 and 63 and thermocouple VHP number 51. The inspectors noted that licensee operations, engineering, and maintenance personnel performed initial actions specified in NRC Information Notice 2001-05, "Through-Wall Cracking of the Reactor Pressure Vessel CRDM Penetrations." Subsequent activities performed by the inspectors are discussed in Section 4OA5.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors evaluated the technical adequacy of operability evaluations to ensure that operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The reviewed operability evaluations were described in the following plant issues:

- N-2001-2987 and N-2001-2988 - Unit 1 Station Battery 1-III Inoperabilities As Determined By 1-PT-87.3J;
- N-2001-3337 - Unit 1 A Train Reactor Protection System First-Out Low RCS Flow Annunciator - Operated As Designed With The Exception Of The Alarm;
- N-2001-3236 - Low Lake Levels - Prep For Coffer Dam on Hot Discharge Canal; and,
- N-2001-3294 - Spurious Actuation of Unit 1 1J EDG Trouble Alarms.

b. Findings

No findings of significance were identified.

1R16 Operator Work-Arounds (OWAs)

a. Inspection Scope

Procedure 0-GOP-5.3, “Review of Operator Work Arounds,” Revision 1, described methods for determining the cumulative and aggregate effects of OWAs/distractions The inspectors assessed 97-OWA-A22C, ECCS Leakage Calculations, for conformance to 0-GOP-5.3.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed design change package (DCP) 01-801 which involved an electronic re-scaling of the Low Head Safety Injection flow loops. This re-scaling effort enhanced the monitor output readings in the main control room area. The inspectors reviewed the associated 10 CFR 50.59 documentation and assessed the DCP’s impact on the plant computer information systems.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

The inspectors reviewed the following post-maintenance test (PMT) procedures and activities associated with repair or replacement of the following components to determine if the procedures and test activities were adequate to verify operability and functional capability of the equipment:

- Unit 2 Charging (HHSI) Pump Testing, (2-PT–14.3, “Charging Pump 2-CH-P-1C,” Revision 35);
- Unit 2 A Residual Heat Removal Pump Testing (2-PT-78.3A “Inservice Inspection - Residual Heat Removal System Pump 2-RH-P-1A,” Revision 14);
- Unit 2 B Component Cooling Heat Exchanger (2-PT-74B, “Component Cooling Water Heat Exchanger 2-CC-E-1B Performance Test,” Revision 6);
- Unit 2 Charging (HHSI) Pump Testing (2-PT–14.2, “Charging Pump 2-CH-P-1B,” Revision 34);
- Unit 1 Low Head Safety Injection Pump B Testing (1-PT-57.1B “Emergency Core Cooling Subsystem - Low Head Safety Injection Pump 1B,” Revision 37-P1); and,
- Unit 1 EDG Testing (1-PT-82.12H, “1H Diesel Generator Asynchronous Mode Testing - Start By ESF Actuation,” Revision 14).

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

Unit 1 began the report period in Mode 6. The reactor was brought critical on October 9 and was synchronized to the grid on October 10. During the inspection period, the inspectors observed activities associated with physics testing and other Unit 1 startup activities. During the startup, the inspectors held discussions with control room personnel, reviewed operational logs and monitored the control room standby readiness configuration of emergency core cooling and decay heat removal systems for mode 3 (hot standby) operations.

Unit 2 was shutdown on October 28 to perform inspections of vessel head penetrations (VHP). The unit was restarted on December 15. During the startup, the inspectors held discussions with control room personnel, reviewed operational logs and monitored the control room standby readiness configuration of emergency core cooling and decay heat removal systems for hot standby operations.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the surveillance tests listed below, the inspectors examined the test procedure and either witnessed the testing and/or reviewed test records to determine whether the scope of testing adequately demonstrated that the affected equipment was functional and operable:

- 2-PT-44.7, "PORV Block Valves and Inadequate Core Cooling Monitor System Channel Checks," Revision 22;
- 2-PT-61.3.6, "Containment Type C Test of LHSI, HHSI, Charging, and Loop Fill Penetrations," Revision 13;
- 1-PT-71.1Q,"1-FW-P-2 Turbine Driven AFW Pump and Valve Test," Revision 32
- 1-PT-14.3, "Unit 1 Charging Pump 1-CH-P-1C Test," Revision 39;
- 1-PT-75.2B, "Service Water Pump 1-SW-P-1B Quarterly Test," Revision 39; and,
- 1-PT-57.1B, "Emergency Core Cooling Subsystem - Low Head Safety Injection Pump - 1-SI-P-1B," Revision 37-P1.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the following temporary modifications to determine whether system operability/availability was affected, configuration control was maintained, and the associated safety evaluation adequately justified implementation:

- N-2000-1918 - Changes to the control room bottled air system;
- N-2001-2960 - Changes to the main steam atmospheric relief piping;
- N-2001-3277 - Changes to plant mechanical chiller and the replacement of varistors on the ventilation vent gas radiation indicator with diodes; and,
- TM 1703 - Lift leads to disable the Unit 1 control room annunciator for level in the C reactor coolant pump (RCP) oil reservoir.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety, Public Radiation Safety

2OS1 Access Control To Radiologically Significant Areas

a. Inspection Scope

The inspectors determined that reactor head work was the most radiologically risk significant scheduled activity and evaluated licensee radiological work controls for the work. Documented surveys of areas under the reactor head were reviewed and the results were compared to tele-dosimetry remote readouts for workers in the area. The Radiation Work Permit (RWP), applicable procedures and engineering controls were reviewed to verify that appropriate administrative controls existed for the work and ventilation controls were used in accordance with 10 CFR 20, subpart H. The inspectors performed independent surveys of high radiation areas and general areas of three levels in auxiliary building and compared the results to posted surveys of the areas. Postings were evaluated for consistency with radiological conditions documented in area surveys and plant procedures. Air sampler locations and resultant air sample data were reviewed to determine if locations were representative and that appropriate engineering and respiratory protection controls were being applied.

Access controls and RWPs for several jobs that were considered radiologically significant were reviewed. The inspectors reviewed electronic dosimeter set points and verified worker knowledge of appropriate response to dosimeter alarms. Workers were observed to ascertain if appropriate radiological controls were implemented and that dosimetry was appropriate for the work environment and dose gradients and as described on the RWP.

The documents reviewed in support of the inspection are listed in Attachment 2.

b. Findings

No findings of significance were identified.

2OS2 As Low As Is Reasonably Achievable (ALARA) Planning and Controls

a. Inspection Scope

The inspectors reviewed plant collective exposure from 1978 through present day and determined the site specific trends in collective exposure and source term. Source term reduction and dose control initiatives including shielding, hot spot removal, outage sequencing and shutdown chemistry control were evaluated to determine actions that have been taken to reduce overall source term in the previous year.

The inspectors reviewed individual exposures of selected work groups to assess dose variability and equitability of dose distribution within the work groups taking into account doses received at other licensee sites and variations in normal duty assignments. The

degree of supervision being exercised in the Radiologically Controlled Area (RCA), interactions between crafts and Radiation Protection, and the sufficiency of craftsperson radiological worker skill levels were evaluated. The inspection also reviewed the licensee's utilization of low dose waiting areas as a means of keeping exposure ALARA.

The inspectors selected several ALARA packages to determine the degree of pre-job planning, work environment evaluation, and dose reduction initiatives being utilized. The packages were selected by both cumulative dose and degree of deviations from dose estimates. This resulted in the inspection of several ALARA packages both active and inactive for thoroughness of evaluation process as well as consistency in execution. The ALARA goal determination process and ALARA dose projection processes were evaluated for process rigor and "reasonableness of approach." In addition, the process used to determine respiratory protection, and engineering and administrative controls such as ventilation, stay time limitation and total effective dose equivalent (TEDE) dose tracking was evaluated. The inspectors reviewed the five highest dose jobs with the most significant variation from estimated dose projection for recent refueling and maintenance outage as part of ALARA package review to evaluate the licensee's approach to monitoring and if the impacts of variables such as job scope expansion, coolant source term, and past history were appropriately assessed.

The licensee's declared pregnant woman program was reviewed including procedures for adequately documenting risk communications to the worker, as prescribed by Regulatory Guide 8.13. Procedures to determine and record fetal dose and determine dose contributions due to uptakes by the mother were reviewed for consistency with Regulatory Guide 8.36 and NUREG/CR-4884. Procedural limits for dose equivalent to the embryo/fetus were compared to those in 10 CFR 20.1208.

The documents reviewed in support of the inspection are listed in Attachment 2.

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program (REMP)

a. Inspection Scope

The inspectors reviewed the licensee's most recent Annual Radiological Environmental Operating Report which described implementation of the REMP during the year 2000 and provided an assessment of the program results. Information regarding surveillance results, analysis of data, land use census, the interlaboratory comparison program, and permitted program deviations were evaluated. The inspectors also reviewed and discussed implementation of the REMP with respect to sampling locations, monitoring and measurement frequencies.

The inspectors observed collection of air particulate filters and charcoal cartridges at four air sampling stations and assessed sample collection methodology and techniques. Calibration procedures and records for the two most recent calibrations of the air sampling stations were reviewed. The inspectors also observed thermoluminescent

dosimeters (TLDs) placement at four locations as described in the Offsite Dose Calculation Manual (ODCM).

The inspectors reviewed various audits and corrective action documents to evaluate issue identified and the corrective actions implemented. Calibration procedures and records for the two most recent calibrations of the meteorological monitoring instruments for air temperature and for wind speed and direction were also reviewed. The inspectors evaluated the operability of instruments and determined the availability of current meteorological conditions in the Control Room for both primary and backup towers.

Surveys of potentially contaminated materials being released from the radiologically controlled area (RCA) for unrestricted use were also observed. The inspectors assessed the criteria used for unrestricted release of potentially contaminated materials, the appropriateness of instrumentation used for those surveys, calibration of instruments, and how the licensee accounted for hard to detect nuclides.

Through the above reviews and observations, the licensee's practices and implementation of their radiological monitoring program, meteorological monitoring program and radioactive material control program were evaluated by the inspectors for consistency with the ODCM, the Updated Final Safety Analysis Report, Technical Specifications and 10 CFR Part 20 requirements.

The documents reviewed in support of the inspection are listed in Attachment 2.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verification

.1 Reactor Coolant System (RCS) Leakage PI (Barrier Integrity)

a. Inspection Scope

The inspectors performed a periodic review of the RCS Leakage PI for Units 1 and 2. Specifically, the inspectors reviewed the performance indicator data for the second and third quarters of 2001. Documents reviewed included applicable daily operator logs and leak rate calculations.

b. Findings

No findings of significance were identified.

.2 RCS Specific Activity PI (Barrier Integrity)

a. Inspection Scope

The inspectors performed a periodic review of the RCS Specific Activity PI for Units 1 and 2. Specifically, the inspectors reviewed PI data for the second and third quarters of 2001. Documents reviewed included unit operating reports, chemistry sample records, and licensee chemistry department self-assessment reports. As part of this inspection, the inspectors also discussed the PI with chemistry department personnel and managers, and the PI input personnel and coordinators.

b. Findings

No findings of significance were identified.

.3 Unplanned Scrams per 7000 Critical Hours PI (Initiating Events)

a. Inspection Scope

The inspectors performed a periodic review of the Unplanned Scrams per 7000 Critical Hours PI for Units 1 and 2. Specifically, the inspectors reviewed PI data for the second and third quarters of 2001. Documents reviewed included applicable operating reports, licensee self-assessment reports and event reports. As part of this inspection, the inspectors also discussed the PI with the PI input personnel and coordinators.

b. Findings

No findings of significance were identified.

.4 Scrams With Loss of Normal Heat Removal PI (Initiating Events)

a. Inspection Scope

The inspectors performed a periodic review of the Scrams With Loss of Normal Heat Removal PI for Units 1 and 2. Specifically, the inspectors reviewed PI data for the second and third quarters of 2001. Documents reviewed included unit operating reports and licensee self-assessment reports. As part of this inspection, the inspectors also discussed the PI with the PI input personnel and coordinators.

b. Findings

No findings of significance were identified.

.5 Unplanned Power Changes per 7000 Critical Hours PI (Initiating Events)

a. Inspection Scope

The inspectors performed a periodic review of the Unplanned Power Changes per 7000 Critical Hours PI for Units 1 and 2. Specifically, the inspectors reviewed PI data for the

second and third quarters of 2001. Documents reviewed included unit operating reports and licensee self-assessment reports. As part of this inspection, the inspectors also discussed the PI with the PI input personnel and coordinators.

b. Findings

No findings of significance were identified.

.6 Safety System Unavailability PI (Mitigating Systems)

a. Inspection Scope

The inspectors performed a periodic review of the Safety System Unavailability PI for Units 1 and 2. Included in the review was unavailability associated with Emergency AC Power Systems, High Pressure Injection Systems, Auxiliary Feedwater Systems, and Residual Heat Removal Systems. Specifically, the inspectors reviewed PI data for the second and third quarters of 2001. Documents reviewed included unit operating reports, licensee maintenance rule unavailability data comparisons, and licensee self-assessment reports. As part of this inspection, the inspectors also discussed the PI with the PI input personnel and coordinators.

b. Findings

No findings of significance were identified.

.7 Occupational Radiation Safety

a. Inspection Scope

For the Occupational Exposure Control Effectiveness PI, the inspectors interviewed cognizant personnel and reviewed condition reports initiated during calendar year 2001. Records were reviewed for events involving lack of access control, unplanned exposures and untimely identification and resolution of problems to determine if they were appropriately considered. The inspectors evaluated whether submitted PI statistics were completed and calculated in accordance with the guidance contained in Nuclear Energy Institute document NEI 99-02, ”Regulatory Assessment Performance Indicator Guideline.”

b. Findings

No findings of significance were identified.

.8 Public Radiation Safety

a. Inspection Scope

For the Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual PI, the inspectors interviewed cognizant personnel and evaluated plant issue reports initiated during calendar year 2001 to support the PI verification. Selected plant issues

were evaluated for assignment of responsibility, licensee evaluation, adequacy of corrective actions, timely closure, and applicability for the PI reporting screening criteria. The inspectors evaluated whether submitted PI statistics were completed and calculated in accordance with the guidance contained in NEI 99-02.

b. Findings

No findings of significance were identified.

4OA3 Event Follow-up

N-2001-3383 - The inspectors performed follow-up activities related to the licensee's discovery that contractor overtime hours had exceeded plant guidelines. The follow-up including verification of the excess hours and the corrective actions taken to address the issue. No findings of significance were identified.

4OA5 Other

(Closed) Temporary Instruction 2515/145 "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (NRC Bulletin 2001-01)" - Unit 2

a. Inspection Scope

The inspectors reviewed the visual inspection program for Unit 2 reactor vessel head penetrations as discussed in North Anna Power Station (NAPS) response to NRC Bulletin 2001-01. The inspection guidelines were provided in TI 2515/145. The program review included observation of portions of the remotely monitored VHP examinations, review of qualifications for examination personnel, and review of licensee and contractor procedures. Additionally, reviews/observations of activities associated with liquid penetrant testing (PT), eddy current testing (ET) and ultrasonic testing (UT) of the penetrations with relevant indications identified by the visual examination were performed by the inspectors. Discussions were also held with contractor representatives and other licensee personnel.

b. Findings

All the inspection activities associated with TI 2515/145 for Unit 2 are complete. The Office of Nuclear Reactor Regulation (NRR) is reviewing the acceptability of the licensee's Bulletin 2001-01 response, i.e., if the visual inspections performed were qualified visual inspections as described in the Bulletin. Specific inspection results for each item in the TI are discussed below.

1) Verification that visual exams were performed by qualified/knowledgeable personnel.

The inspectors verified the ASME VT-2 qualifications for the personnel responsible for performance of the visual examinations. In addition, the inspectors verified that examination personnel had received specialized industry-developed training on the visual examination methods for leakage of reactor head penetrations and on the site specific procedures to be used for the examinations. The inspectors interviewed the

examination personnel and noted that they were knowledgeable of the specialized qualification criteria. The inspectors determined that all visual exam personnel were certified as Level II, VT-2.

2) Verification that visual exams were performed in accordance with approved procedures.

The inspectors verified that the visual examination was performed in accordance with NAPS procedure 0-GEP-05, "Visual Examination of Reactor Pressure Vessel Head Penetration Nozzles," Revision 0, and contractor procedure MRS-SSP-1234, "Reactor Vessel Head Penetration Remote Visual Inspections for North Anna Unit 2." The inspectors verified by direct observation and in discussions with examination personnel that the acceptance criteria and/or critical parameters for VHP leakage were applied in accordance with the procedures. However, at the end of the report period, the licensee had not provided complete information to the NRC that constituted their bases for their position that the inspection performed by these procedures constituted a qualified visual inspection.

3) Verification that the licensee was able to identify, disposition, and resolve deficiencies.

The inspectors verified that the licensee's inspection plan provided nozzle indexing and drawings with adequate guidance to ensure that the visual examinations included 100% circumferential coverage of each VHP. The inspectors verified that the examination result for each penetration was individually documented. The examination procedure provided acceptance criteria for the VT-2 examination with specific follow-up actions for the detection of boric acid residues or identified leakage. The procedure required that questionable CRDM penetration leakage be identified as a leaking nozzle. Seven (7) of the 65 VHPs inspected were initially reported as relevant VT-2 indications due to boric acid accumulations. Four of the seven penetrations had what appeared to be loose boric acid debris accumulation at the top portion of the interface. The looseness of the accumulation was confirmed by dispersing the debris/boric acid with 40 psig air applied through a 1/4 inch tube. The remaining three penetrations (51, 62, and 63) had boric acid with a "pop corn like" appearance that could not be dispersed with the air.

4) Verification that the licensee was capable of identifying the Primary Water Stress Corrosion Cracking (PWSCC) phenomenon described in the bulletin.

Based on the adequate resolution of the remote video examination equipment, the 100% circumferential coverage of each VHP, and the qualification of the examination personnel; the inspectors concluded that the licensee would have identified leaking penetrations that exhibited the Oconee Unit 2 and 3 boron deposits.

5) Evaluation of the conditions of the reactor vessel head (debris, insulation, dirt, boron from other sources, physical layout, other viewing obstructions).

The inspectors observed via remote video camera and a review of portions of the VT-2 video tapes that the Unit 2 vessel head was relatively clean. Small amounts of paint chips/flakes, rust, and boric acid buildup were observed in sporadic locations on the head. The inspectors noted however that the boric acid buildup was more pronounced at the penetrations with relevant VT-2 indications as described in subparagraph 3)

above. These small amounts of sporadic debris did not impede the VHP inspection process. The inspectors concluded, based upon these observations and reviews of VT-2 video tapes, that the licensee was able to adequately view (100% circumferential coverage) each of the 65 VHP's during the visual examinations.

6) Evaluate the ability for small boron deposits, as described in the bulletin, to be identified and characterized.

   The inspectors observed that the licensee was able to further characterize the relevant indications with "pop corn like" boric acid deposits (51, 62, and 63) through PT, ET, and UT examinations.

   Procedure ISI-ET-002 was used for axial ET scanning of the ID of the nozzles. These mechanized scans used blade probes containing pancake coils for inspection of the nozzle ID from the gap between the thermal sleeve and the nozzle. The inspection area extended from approximately 1.2" above the lower end of the nozzle to approximately 2" above the highest point of the nozzle weld. All signals considered to be crack indications were reported for further inspection and disposition. The inspection techniques had been previously demonstrated capable of detecting PWSCC type cracking in industry samples, as well as, cracks from the Oconee head penetration samples. Additionally, Pulse Echo and Time of Flight Diffraction Ultrasonic techniques, also mechanized, were performed on the ID of the nozzles in accordance with procedures ISI-UT-003 and WDI-UT-006. The inspectors found that ET and UT inspections were being performed in accordance with approved and demonstrated procedures with trained and qualified inspection personnel. All examiners had significant experience, including experience inspecting VHPs.

   Liquid Penetrant examinations of the J-Groove weld of the nozzle for the three penetrations (51, 62 and 63) with relevant indications were performed. The inspectors assessed that the licensee was considering accepting the indications, however, following discussions with NRC the licensee decided to grind out the indications and repair the welds.

7) Determine extent of material deficiencies (associated with the concerns identified in the bulletin) which were identified that required repair.

   Penetrations 51, 62, and 63 (with 63 being the worst) were determined to have material deficiencies that merited repairs. The repairs involved grinding and weld overlays in accordance with NRC verbally approved relief requests to eliminate any leakage path. The licensee determined the root cause of the material deficiency to be hot-short cracking which occurred during original fabrication of the reactor vessel head. The licensee is in the process of issuing a Licensee Event Report on this issue.

8) Determine any significant items that could impede effective examinations and/or ALARA issues encountered.

   The inspectors noted no significant items that impeded effective visual examinations nor any ALARA issues that were encountered during the visual examinations.

4OA6 Meetings

Exit Meeting Summary

The inspectors presented the inspection results to Mr. D. Heacock, Site Vice President, and other members of the licensee's staff on January 15, 2001. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

D. Christian, Senior Vice President and Chief Nuclear Officer
K. Barnette, Superintendent, Site Industrial Safety/Fire Protection
J. Davis, Manager, Station Nuclear Safety and Licensing
C. Funderburk, Manager, Station Operations and Maintenance
D. Heacock, Site Vice President
E. Hendrixson, Superintendent, Station Engineering
P. Kemp, Director, Nuclear Oversight
L. Lane, Superintendent, Operations
T. Maddy, Superintendent, Station Security
G. Modzelewski, Project Engineer (Vessel Head Penetration Inspection Lead)
Q. Parker, Maintenance Rule Coordinator
W. Renz, Director, Security and Emergency Preparedness
H. Royal, Superintendent, Nuclear Training
D. Schappell, Superintendent, Site Services
J. Schleser, ALARA Coordinator
R. Shears, Superintendent, Maintenance
A. Stafford, Superintendent, Radiological Protection

ITEMS CLOSED

Closed

2515/145 - Unit 2	TI	Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

Section 1R01:

Procedures:

0-AP-41, "Severe Weather Conditions"
0-GOP-4, "Cold Weather Operations"
0-GOP-4.2A, "Extreme Cold Weather Operations - Daily Checks"
1-LOG-6E, "Outside Log - Operations Daily"
1-LOG-6F, "Unit 1 Safeguards - Operations Daily"
2-LOG-6F, "Unit 1 Safeguards - Operations Daily"

Work Orders:

Numbers 00441255-01, 00458901-01, 00440672-01, 00455981-01, -02, -03 -04, -05, and -06, 00450672-02, and 00454545-01 and -02

Section 2OS1:

Procedures:

VPAP-2101, Rev. 18, "Radiation Protection Program"
C-HP-1032.060, Rev. 0, "Radiological Posting and Access Control"
C-HP-1031.021, Rev. 2, "Dosimetry Requirements for Site Restricted Areas"

Radiation Work Permits:

RWP 01-2-4001, "Disassemble and reassemble Reactor Vessel Head"
RWP 01-2-4023, "Disassemble, inspect, repair, repack, cut out and replace valves and flanges in support of U2 Outage. To include calibrations and repairs on 2-RC-LT- RVLIS sensors. To include all associated support"
RWP 01-2-4038, "Reactor Head Bare Metal Inspection. Install the Brooks' SWATS camera system into CRDM Vent Ports on the head. Perform Video Inspection. Includes all associated support"

ALARA packages (RWP, Surveys, Air Sample Data, Briefing Data, in-progress reviews):

01-041 (RWP 01-2-3016), "Install and remove scaffolding in support of unit 1 2001 outage" (Historical)
00-003 (RWP 00-2-2016), "Install, remove scaffolding during Unit 1 refueling outage" (Historical)
01-042 (RWP 01-2-3017), "Remove and install insulation during unit 1 2001 outage" (Historical)
01-066 (RWP 01-2-4001), "Disassemble and reassemble Reactor Vessel Head. Includes associated support" (Active)
01-069 (RWP 01-2-4038), "Reactor Head Bare Metal Inspection. Install the Brooks' SWATS camera system into CRDM Vent Ports on the head. Perform Video Inspection. Includes all associated support" (Active)

01-073 (RWP 01-2-4023), “Disassemble, inspect, repair, repack, cut out and replace valves and flanges in support of U2 Outage. To include calibrations and repairs on 2-RC-LT-RVLIS sensors. To include all associated support” (Active)

Section 2OS3:

Procedures:

VPAP 2102, Rev. 8, “Station ALARA Program”
VPAP 2105, Rev. 5, “Temporary Shielding Program”
C-HP-1041.024, Rev. 1, “Declared Pregnant Woman”
CH 93.120, “Chemistry Controls: Refueling Outage”
VPAP 2201, Rev. 9, Attachment 5, “Strategic Water Chemistry Plan–Primary”

Internal Reports:

“Final Outage Data for 2001 U2 RFO, ALARA Evaluation and RWP man-rem data”
“North Anna Power Station Exposure History 1978-2001"
“North Anna Power Station Annual ALARA Report”
“Source Term Reduction Initiatives”
“Quarterly Hotspot Program Report”
“Shutdown Chemistry Plan”

Section 2PS3:

Procedures:

C-HP-1032.040, Rev 1 “Contamination Surveys”
C-HP-1032.070, Rev 4 “Radiological Surveys for Releasing Oil, Sewage, and other bulk materials”
C-HP-3010.023, Rev 8 “Unplanned Liquid Release”
C-HP-3010.033, Rev 9 “Unplanned Gaseous Release”
0-PT-40.1, Rev 5 “Meteorological Monitoring System Calibration” (This procedure directs the performance of numerous individual instrument calibration procedures including Wind direction, speed, differential temperature, and sigma theta wind variability calibrations)
C-HP-3051.010, Rev 12 “Radiological Environmental Monitoring Program”

Audits:

Audit 99-13: Dated January 18, 2000, “Radiological Environmental Monitoring/Offsite Dose Calculation Manual/Process Control Program”
C-HP-1091.273 Attachment 1, Rev 0 “Radioactive Effluent Control Program Evaluation”
Exelon Corporation Vendor (NUPIC) Audit Report A1269823, January 29-February 2, 2001, (Audit of Teledyne Brown Engineering-Environmental Services)
Audit 01-11: Dated December 5, 2001, “Offsite Dose Calculation Manual (ODCM), Radiological Environmental Monitoring (REM), and Environmental Protection Plan (EPP)”

Plant Issues:

N-2001-2768 “A unplanned gaseous release occurred through the Decon facility’s temporary HEPA ventilation System”
N-2001-3083 “During performance of 0-PT-487.10, Radiological Environmental Monitoring Program, Land Use Census, the following issues were identified....”
N-2001-3144 “Current BR system deficiencies have resulted in multi-department workarounds to facilitate routine BRT filling operations”
N-2001-3126 “VPAP-2103N (Offsite Dose Calculation Manual), Section 6.2.2.B requires that an explanation be made in the “Annual Radioactive Effluent Release Report” for any instrument listed in attachment 1 that was out of service for greater than 30 days
N-2001-1243 “During review of vendor data for liquid effluent releases for 3d quarter 2000, it was noted that the vendor did not reach the LLD required by VPAP-2103N, “Offsite Dose Calculation Manual” for Sr-89
N-2001-3428 “Significant correlation errors have been observed between DAD and TLD for individuals performing work under the Reactor Head”