



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
SAM NUNN ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8931**

March 14, 2003

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 PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT NOS. 50-338/2003-008 AND  
50-339/2003-008**

Dear Mr. Christian:

On February 14, 2003, the NRC completed a team inspection at your North Anna Power Station, the enclosed report documents the inspection findings which were discussed on February 14, 2003, with Mr. D. Heacock, North Anna Site Vice President. Subsequent to the on-site inspection, an additional review of the inspection results was completed and on March 13, 2003, a re-exit was held with Mr. J. Crossman, Licensing Manager.

The inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, and compliance with the Commission's rules and regulations, and with the conditions of your operating license. Within these areas, the inspection involved selected examination of procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the samples selected for review, the team concluded that, in general, problems were properly identified, evaluated, and resolved within the corrective action programs. However, based on the results of this inspection, the inspectors identified two issues of very low safety significance (Green). These two issues were determined to involve violations of NRC requirements. However, because of their very low safety significance and because the issues have been entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCVs), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest the NCVs in this report, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the United States Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D. C. 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D. C. 20555-0001; and the NRC Resident Inspector at the North Anna Power Station.

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/**

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

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

Enclosure: Report Nos. 50-338/2003-08 and 339/2003-08

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.: 50-338/2003-008, 50-339/2003-008

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: North Anna Power Station, Units 1 & 2

Location: 1022 Haley Drive  
Mineral, Virginia 23117

Dates: January 27 - February 14, 2003

Inspectors: S. J. Vias, Senior Reactor Inspector (Team Leader)  
M. King, Resident Inspector - V. C. Summer Nuclear Station  
J. Canady, Resident Inspector - North Anna Power Station  
F. Jape, Senior Project Manager, Region II (January 27 - 31)  
L. Garner, Senior Project Engineer, Region II (February 10 - 14)

Accompanied by: Julio Crespo Bravo, Consejo de Seguridad Nuclear, Spain

Approved by: K. Landis, Chief, Reactor Projects Branch 5  
Division of Reactor Projects

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

Enclosure

## SUMMARY OF FINDINGS

IR 05000338/2003-008, IR 05000339/2003-008, Virginia Electric and Power Co., 01/27 - 01/14/03, North Anna Power Station Units 1 & 2, biennial baseline inspection of the identification and resolution of problems. Two violations were identified in the area of effectiveness of corrective actions.

The inspection was conducted by two resident inspectors and a regional senior inspector, senior project manager and senior project engineer. Two findings of very low safety significance (Green) were identified which were non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

### **Identification and Resolution of Problems**

The team concluded that, in general, problems were properly identified, evaluated, and corrected. The licensee was effective at identifying problems and entering them in the corrective action process. Generally, issues were prioritized and evaluated appropriately, and in a timely fashion. The evaluations of significant problems were in general of sufficient depth to determine the likely root or apparent causes, as well as, address the potential extent of the circumstances contributing to the problem and provide a clear basis to establish corrective actions. Corrective actions that addressed the causes of problems were generally identified and implemented. Reviews of sampled operating experience information were comprehensive. Licensee audits and assessments were found to be adequately broad based and effective in providing management a tool for identifying adverse trends. Previous noncompliance issues documented as non-cited violations were properly tracked and resolved via the corrective action program. The results of the last comprehensive corrective action program audit conducted by the licensee were properly entered and dispositioned in the corrective action program. Based on discussions with plant personnel and the apparently low threshold for items entered in the corrective action program database, the inspectors concluded that workers at the site were free to raise safety concerns to their management.

#### A. Inspector-Identified and Self-Revealing Findings

##### Cornerstone: Initiating Events

- Green. The licensee failed to take timely action to address an equipment issue identified through their operating experience review. For approximately ten years, identified corrective actions for turbine-generator control cabinet power supply failures were not implemented. A December 2001 Unit 2 reactor trip resulted from delaying the corrective actions.

The self-revealing finding is more than minor because of the potential to increase the frequency of an initiating events and an actual reactor trip occurred. The event was determined to be of very low safety significance because of the availability of non-safety

and safety-related systems to mitigate a reactor trip. This finding is a non-cited violation of 10 CFR 50 Appendix B Criterion XVI, "Corrective Actions." (Section 4OA2.c)

#### Cornerstone: Mitigating Systems

- Green. From approximately 1996 until 2002, the licensee was unable to determine the cause and take effective corrective actions to preclude repetitive seal leaks on the Unit 1 and Unit 2 charging pumps. Whether the latest cause determination and associated proposed corrective actions will correct the condition has yet to be demonstrated.

This inspector-identified finding is more than minor since the problem resulted in increased charging pump unavailability and increased the potential for charging pump seal leakage during a loss of coolant accident. The latter could have resulted in control room operators receiving radiation exposures in excess of regulatory limits. The event was determined to be of very low safety significance (Green) because alternate charging pumps were available to perform the safety function and the effected charging pump could be isolated to stop the leakage. This finding is a non-cited violation of 10 CFR 50 Appendix B Criterion XVI, "Corrective Actions." (Section 4OA2.c)

## Report Details

### 4. OTHER ACTIVITIES (OA)

#### 4OA2 Problem Identification and Resolution

##### a. Effectiveness of Problem Identification

##### (1) Inspection Scope

The inspectors reviewed items selected across the three strategic performance areas (reactor safety, radiation safety, and physical protection) to verify that problems were being properly identified, appropriately characterized, and entered into the corrective action program (CAP) for evaluation and resolution. The inspectors reviewed program documents including VPAP-1601, "Corrective Action," which described the administrative process for documenting and resolving issues. The inspectors reviewed Plant Issues (PIs) associated with systems that ranked the highest on the licensee's risk significance list. The systems were ranked by risk achievement worth, an indicator of how much impact the system's failure or unavailability would have on the plant. Systems selected included the High Head Safety Injection (HHSI), Emergency Diesel Generator (EDG), Auxiliary Feedwater (AFW), and Instrument Air (IA) systems. The inspectors reviewed a sampling of PIs that had been generated since the last problem identification and resolution inspection (April 2001). The specific documents reviewed are listed in Attachment 2.

The inspectors conducted multiple computer database searches to identify the threshold at which issues were identified and documented in the CAP. The review was performed to verify that the licensee's threshold for identification and documentation of issues was consistent with procedural guidance and licensee management expectations.

The inspectors reviewed a sampling of work orders (WOs) for risk significant systems, which were issued or revised, to verify equipment problems were being entered into the PI database in accordance with procedure requirements.

The inspectors reviewed industry operating experience (OE) items to determine if they were appropriately evaluated for applicability to North Anna and whether problems identified through these reviews were entered into the PI database. Once applicable OE issues were identified, the inspectors evaluated whether corrective actions to prevent recurrence were taken in a timely manner.

The inspectors reviewed plant equipment issues associated with maintenance rule (a)(1) items, functional failures, maintenance preventable functional failures (MPFFs), and repetitive MPFFs, to verify that maintenance rule equipment deficiencies were being appropriately entered into the PI database.

The inspectors toured the plant, including portions of the Emergency Diesel Generator Rooms, Auxiliary Feedwater Pump and Valve Rooms, Charging Pump Cubicles, Auxiliary Building, Control Room and Turbine Building, to determine whether equipment and material condition problems were being identified.

The inspectors audited several of the licensee's Plant Issue Review Team (PIRT) meetings and attended a portion of the quarterly Management Safety Review Committee (MSRC) meeting to determine the level of management attention that problems received and to gauge the effectiveness of the screening process in ensuring that problems were properly captured in the licensee's PI database. The inspectors had discussions with plant personnel and the NRC resident inspectors to determine if problems were properly identified.

Licensee assessments were performed for individual functional areas such as security, maintenance, operations, operating experience, and other areas. The results of these assessments were reviewed to determine if they were documented in the licensee's corrective action program as appropriate. These assessments touched on corrective action elements as they related to specific issues within the functional area being evaluated.

The inspectors reviewed VPAP-1601 to determine if the trending at the site level was as prescribed in VPAP-1601 for the Event Codes that represented cross cutting areas.

Finally, the inspectors reviewed various self-assessments for effectiveness in identifying problems in the CAP process and reviewed whether improvement areas were properly captured in the CAP. The specific documents reviewed are listed in Attachment 2.

## (2) Findings

Licensee self-assessments were thorough and effective in identifying deficiencies in the corrective action program and other programmatic areas. These deficiencies were routinely entered into the corrective action program and corrective actions were implemented.

Based on the sample selected, the team determined that the licensee was identifying problems and entering them into the corrective action program at an appropriate threshold. The team found that problems identified through industry experiences that met the threshold for a PI at the site were entered into the corrective action program for resolution. The inspectors observed appropriate and timely management involvement in the review of the issues documented in PIs.

### b. Prioritization and Evaluation of Issues

#### (1) Inspection Scope

The inspectors reviewed a sample of corrective action documents to determine if the licensee appropriately characterized problems and entered them into the CAP for evaluation and resolution. The corrective action documents were selected across the seven cornerstones of safety (initiating events, mitigating systems, barrier integrity, emergency preparedness, public radiation safety, occupational radiation safety, and physical protection) with the focus on plant systems having the highest risk significance.

The inspectors attended PIRT meetings on several occasions and reviewed PIs that were assigned one of the three Screening Categories (Significant, Potentially Significant

and Routine) to determine whether PIs were properly prioritized and evaluated in accordance with VPAP-1601. The screening categories were defined in VPAP-1601 and were based on decreasing significance. Significant PIs involved "Events that need immediate attention to prevent recurrence dealing primarily with nuclear safety, public safety, and personnel safety" that required Category 1 Root Cause Evaluations (RCE). Potentially Significant PIs included events that are precursors to significant events and typically receive higher levels of cause evaluation than a Routine event with the same frequency of occurrence. The inspectors reviewed PIs covering Significant and Potentially Significant categories, focusing on those associated with risk significant systems, as well as those associated with violations of regulatory requirements and other NRC inspection findings. During this PI review, the inspectors evaluated the disposition of the issue with respect to operability and/or reportability. The inspectors reviewed several PIs which required root cause evaluations to determine the adequacy of the causal determinations.

The inspectors also performed PI database searches for the EDG, AFW, IA and HHSI systems for PIs initiated from January 1, 2001, to February 14, 2002. Detailed condition descriptions were reviewed for each of the PIs that were identified by the search.

The inspectors reviewed selected PIs, including those associated with industry operating experience issues to determine whether site personnel conducted reviews for generic implications, repetitive conditions, and common cause failure mode determinations when the condition warranted.

The inspectors reviewed selected PIs that were closed to request for engineering assistance (REA), reviewed Station Administrative Procedure VPAP-0304, "Request for Engineering Assistance," and discussed the closing of PIs to REAs with licensee engineering personnel. It was determined by the inspectors from the review and discussion that if an REA is being disapproved or canceled and is associated with a PI, then the REA must be discussed with Station Nuclear Safety for concurrence. The status of the PI is updated based upon the disposition determined by the discussion.

The inspectors attended PIRT meetings, Station Nuclear Safety and Operating Committee (SNSOC), and a MSRC meeting, to assess the licensee's prioritization and evaluation of issues.

## (2) Findings

In general, the licensee's threshold for classification, prioritization, and evaluation of problems in the corrective action program was considered to be satisfactory. The technical adequacy and depth of evaluations, as documented in individual PIs, were acceptable and the licensee generally prioritized proposed corrective actions in a manner commensurate with the safety significance of the issue, except as discussed in 4OA2.c. Based on the total number of PIs with root cause evaluations that were reviewed during this inspection, the inspectors concluded that the licensee's corrective action program was generally being effectively implemented with respect to evaluation of problems.

The inspectors concluded that the licensee's problem evaluations considered extent of condition and generic implications where appropriate. Operability and reportability of issues were appropriately evaluated and resolved.

Although one finding with repetitive conditions was identified by the inspectors and discussed in 4OA2.c, the inspectors were concerned that the licensee's definition of repetitive condition was too narrowly focused. VPAP-1601 and the licensee's current practice are that review for repetitive conditions are based on component mark numbers which are unit specific. Repetitive conditions based on the opposite units similar component may be missed. This issue was identified to the licensee and they acknowledge the concern. The licensee also stated those significant component level issues (i.e., a specific style motor operated valves, air operated valves, pumps or breaker issues) that are repetitive would be expected to be identified by component engineer reviews as part of their routine job function and PIs generated for those issues. Also, extent of condition reviews for PIs would be expected to notice repetitive conditions between units. The inspectors noted that a potential weakness in identifying repetitive conditions could exist based on the licensee's definition of "repeat" and incorrect coding on PIs. The lack of a broadness review for repetitive conditions (failing to consider the opposite unit) could result in missed trending of "repeat" issues during later PI trending based on the "repeat" code.

c. Effectiveness of Corrective Actions

(1) Inspection Scope

The inspectors reviewed numerous PIs to verify that the licensee had identified and implemented corrective actions commensurate with the safety significance of the documented issues, and where possible, evaluated the effectiveness of the actions taken. Part of this effectiveness review was conducted by attending a SNSOC meeting on February 13, 2003, and reviewed SNSOC meeting minutes. The inspectors also verified that common causes and generic concerns were addressed where appropriate. The inspectors reviewed PIs associated with previous non-cited violations (NCVs) to assess the adequacy of corrective actions. The specific PIs reviewed are listed in Attachment 2.

(2) Findings

From the review of PIs the team determined that the licensee's corrective actions were generally effective in correcting problems. Management involvement in the SNSOC process was effective. During the meeting conducted on February 13, 2003, the team observed that the managers reviewed root cause analyses results presented by the site employees who led the analyses. They thoroughly questioned each analysis, and assessed the adequacy and effectiveness of related corrective actions. Corrective actions for NCVs were determined to be adequate. The inspectors noted that the licensee did no trending or monitoring of the effectiveness of the numerous charging pump seal repairs that had previously been performed. A self-revealing NCV was identified for untimely corrective actions for addressing EHC power supply replacements. In addition, an inspector-identified NCV was identified for not determining the cause and correcting charging pump seal leakage.

## Turbine-Generator Control Cabinet Power Supply Failures

Introduction: The inspectors determined that a self-revealing event was a Non-Cited Violation (NCV) with very low safety significance (Green). The violation of 10 CFR 50 Appendix B Criterion XVI resulted from a failure to take timely actions to implement identified corrective actions for electro-hydraulic control (EHC) cabinet power supply failures. The corrective actions were developed in response to industry operating experience information. Failure to take timely action resulted in a Unit 2 trip in December 2001. The finding affects the reactor safety strategic performance area and the initiating events cornerstone.

Description: In 1990 improvements / upgrades were identified by the licensee as needed for the turbine electro-hydraulic control (EHC) cabinets including power supply replacements at North Anna Station. In 1991 an engineering work request, EWR 91-347, was initiated to replace the EHC power supplies. Several industry events involving reactor trips, including one event at the licensee's other nuclear site (Surry Unit 2), have occurred due to EHC power supplies failures. The licensee recognized the need to perform necessary modifications to the EHC power supplies. A REA was generated in 1995 and issued as an item equivalency evaluation review, IEER N95-5087-000. In 1996 the licensee determined this was not the appropriate change mechanism for the modification and deferred the project. Surry, who had experienced a reactor trip, had used a design change package to perform its modifications. At North Anna the parts for the new power supplies were purchased and available in the licensee's stores system in 1997. However, no change package was developed to install the modification.

Replacement of the power supplies was deleted from several outage scopes. For example, in response to PI N-2001-3429, work order 00457893-01, written in October 2001, was generated to replace the EHC power supplies to ensure reliability of the EHC cabinet. The work order was not completed due to planning / scheduling issues. On December 22, 2001, a Unit 2 reactor trip occurred due to loss of the EHC power supply circuitry (reference Licensee Event Report (LER) 50-339/2001-005). Installation of the upgraded power supplies would have replaced the components involved in the EHC power supply failure which caused the reactor trip. Thus, although the licensee has identified corrective actions and parts were available, management had failed to direct implementation of the necessary modifications to preclude a reactor trip due to EHC power supply system failures.

Analysis: The performance deficiency associated with this event was a failure to implement timely corrective actions based on several operating experience reports (i.e., Surry OE 8444) and install needed equipment modifications which would have prevented a reactor trip of North Anna Unit 2. This self-revealing finding is more than minor because of the potential to increase the frequency of an initiating event and it caused a reactor trip. The failure to implement the necessary changes unnecessarily challenged the plant's response systems, specifically, reactor trip logic, primary and secondary power operated relief valves, the rod control and the auxiliary feedwater systems. The event was determined to be of very low safety significance because of the availability of non-safety and safety-related systems to mitigate a reactor trip.

Enforcement: 10 CFR 50 Appendix B, Criterion XVI, "Corrective Actions" states in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to these requirements, a condition that could result in a reactor trip, EHC power supplies system failures, was not promptly corrected, in that, corrective actions were delayed for approximately ten years. This delay resulted in a Unit 2 reactor trip. Because the finding is of very low safety significance and because the issue is in the licensee's corrective action program, it is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 0500338, 339/2003-008-001), "Failure of the Corrective Action Program to Preclude a Reactor Trip Due to EHC Power Supply System Failures." This issue is in the licensee's corrective action program under PI N-2001-3600 and LER 50-339/2001-005.

After the inspection period, the inspectors were informed that during a scheduled North Anna Unit 1 shutdown, the licensee identified on February 23 that another EHC power supply had failed. The backup EHC power supply continued to operate therefore no reactor trip had occurred. This issue was appropriately captured in PI N-2003-0694. The licensee had already planned to replace the Unit 1 EHC power supplies during the scheduled outage under work order 00457898 01 as a result of the root cause evaluation performed for PI N-2001-3429.

#### Charging Pump Seal Leakage

Introduction: The inspectors identified a finding involving the failure of the licensee to determine the cause and take effective corrective actions to preclude repetitive seal leaks on the Unit 1 and Unit 2 charging pumps. This Green finding, an NCV of 10 CFR Appendix B, Criterion XVI, affects the reactor safety strategic performance area and the mitigating systems cornerstone.

Description: The licensee has experienced repeated seal failures on the charging pumps on both units and has not demonstrated a reliable permanent corrective action to resolve the leakage problem. The finding resulted from a review of licensee PIs and RCEs dating back to early 1996 involving the licensee's inability to solve charging pump seal leakage problems. Since September 1999, at least 12 instances of seal leaks occurred in which the leakage exceeded the 600 cc/hour allowable leak rate and resulted in a charging pump being declared inoperable. In at least one of these instances, significant seal leakage developed when the pump was not running. The licensee has been unable to resolve the problem in more than seven years after having performed numerous evaluations. Potential causes for the seal leakage problems have included component problems, work practices, training, and human performance. In PI N-2002-0606, the licensee evaluated the effectiveness of their previous corrective actions and determined that procedure revisions and rebuild method changes had not been consistently successful. The PI further documented the licensee's most recent conclusion that failures constituted a design issue. The licensee is in the process of replacing the rotating elements and installing seals of a different design. Whether the latest cause determination and associated proposed corrective actions will correct the condition has yet to be demonstrated. Based on the replacement schedule and the proposed monitoring of the HHSI system reliability, the effectiveness of the recent corrective actions will not be demonstrated and the HHSI system will not be removed

from a(1) maintenance rule status before September 2006 (reference PIs N-2002-0606 and N-2002-3065).

Analysis: The performance deficiency associated with this finding was a failure to determine the cause of the condition and take effective corrective actions as demonstrated by continuing and repeated seal failures of the charging pumps. The finding is more than minor since the problem results in increased charging pump unavailability and increases the potential for charging pump seal leakage during a loss of coolant accident. The latter could result in control room operators receiving radiation exposures in excess of regulatory limits. The event was determined to be of very low safety significance (Green) because alternate charging pumps were available to perform the safety function and the effected charging pump could be isolated to stop the leakage.

Enforcement: For a significant condition adverse to quality, 10 CFR 50 Appendix B, Criterion XVI requires the licensee to determine the cause of the condition and take corrective actions to preclude repetition. Failure to determine the cause of the charging pump seal leaks and take corrective actions to preclude repetition is a violation of 10 CFR 50 Appendix B, Criterion XVI. Because the violation is of very low safety significance and because the issue is in the licensee's corrective action program, it is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. The NCV is identified as NCV 0500338, 339/2003-008-002, "Failure of the Corrective Action Program to Determine the Cause of Charging Pump Seal Leaks to Preclude Repetition." This issue is in the licensee's corrective action program under PI N-2003-1140.

d. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

The inspectors informally interviewed licensee personnel to develop a general view of the safety-conscious work environment at North Anna and to determine if any conditions exist that would cause workers to be reluctant to raise safety concerns. The inspectors also reviewed the licensee's Employee Concerns Program (ECP), which provides an alternate method to the PI process for employees to raise safety concerns with the option of remaining anonymous. The inspectors reviewed the program to determine if concerns were being properly reviewed and resolved.

(2) Findings

The inspectors concluded that licensee management fostered a safety-conscious work environment by emphasizing safe operations and encouraging problem reporting. Methods available to encourage problem reporting included PIs, WOs, and the ECP.

#### 4OA6 Meetings

##### Exit Meeting Summary

The inspectors presented the inspection results to Mr. D. Heacock, Site Vice President and other members of licensee management at the conclusion of the inspection on February 14, 2003.

The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

Subsequent to the on-site inspection, additional review of inspection results was completed on March 13, 2003. Mr. K. Landis, Branch Chief, held a follow-up conference call with Mr. J. Crossman, Manager, Licensing, and other members of licensee management to discuss the results of this additional review.

## SUPPLEMENTARY INFORMATION

### KEY POINTS OF CONTACT

J. Crossman, Manager, Licensing  
L. Curfman, Employee Concerns Program Coordinator  
J. Davis, Director, Operations and Maintenance  
L. Eagan, Operating Experience North Anna Coordinator  
D. Heacock, Site Vice President  
E. Hendrixson, Manager, Engineering  
M. Johnson, Staff Health Physics - RP  
M. Laprade, Supervisor, Station Nuclear Safety Organizational Effectiveness  
L. Lane, Director, Nuclear Station Safety and Licensing  
G. Salomone, Station Licensing, Technical Advisor  
N. Martin, Supervisor Security Operations  
Q. Martin, Maintenance Rule Coordinator

Other licensee employees included engineers, operations personnel, and administrative personnel.

#### NRC

M. Morgan, Senior Resident Inspector, North Anna

### ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

None

#### Opened and Closed

0500338, 339/2003-008-001	NCV	Failure of the Corrective Action Program to Preclude a Reactor Trip Due to EHC Power Supply System Failures (Section 4OA2.c)
0500338, 339/2003-008-002	NCV	Failure of the Corrective Action Program to Determine the Cause of Charging Pump Seal Leaks to Preclude Repetition (Section 4OA2.c)

#### Discussed

50-339/2001-005	LER	Automatic Reactor Trip Due to Turbine Control System Power Supply Failure (Section 4OA2.c)
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## LIST OF DOCUMENTS REVIEWED

### Procedures

<b>Document Number</b>	<b>Title</b>	<b>Revision Number</b>
VPAP-1601	Corrective Action	15
VPAP-1604	Root Cause Evaluation Program	5
VPAP-1501	Deviations	14
VPAP-3002	Operating Experience Program	9
VPAP-0104	NBU Self-Assessment Program	8
VPAP-0102	Station Nuclear Safety and Operating Committee (SNSOC)	7
VPAP-0304	Request for Engineering Assistance	5
VPAP-1408	System Operability	3
1-GOP-8.2	Calculating ECCS Leakage	4
2-GOP-8.2	Calculating ECCS Leakage	4
HPAP-1091	Monitoring and Improving Radiological Performance	8
DNAP-2000	Dominion Work Management Process	0
STD-GN-0041	Instructions for Engineering Transmittals	17
VPAP-0110	Concerns for Conditions Adverse to Quality	1

### Plant Issues (PIs)

<b>PI Number</b>	<b>Significance (S, PS, R)</b>	<b>Description</b>
N-2002-2287	S	Barehead Inspection, Penetration 21 Leakage
N-2001-0122	PS	Packing Leak on 2-RC-MOV 2587
N-2002-1471	PS	Waste Gas Decay Tank Oxygen Analyzer
N-2002-1982	R	LTOP Problem-Tolerance Band
N-2002-2254	R	Undersized Weld on AFW Pump House
N-2002-3125	PS	SOER 02-4, Reactor Pressure Vessel Head Degradation at Davis-Besse
-2000-0480	PS	Shutdown Bank B rodE-5 Failed High, Deviation Monitor Did Not Actuate
N-2001-3491	PS	Valve Line-up Error Discovered
N-2002-1160	PS	SER 2-02, Undetected Leak in Control Rod Drive Mechanism Nozzle and Degradation of Reactor Pressure Vessel Head
N-2002-2547	R	Scan of Reactor Head, Penetration N2-19
N-2002-2549	R	Scan of Reactor Head, Penetration 2-54
N-2002-2550	R	Scan of Reactor Head, Penetration N2-53
N-2002-2551	R	Scan of Reactor Head, Penetration N2-55
N-2002-2552	R	Scan of Reactor Head, Penetration N2-56
N-2002-2554	R	Scan of Reactor Head Penetration N2-50
N-2002-2555	R	Scan of Reactor Head, Penetration N2-51

<b>PI Number</b>	<b>Significance (S, PS, R)</b>	<b>Description</b>
N-2003-0001	R	Unit 1B HHSI inboard seal leakage of 12 dpm
N-2002-3065	R	Unit 1C HHSI outboard seal leakage of 50 dpm
N-2002-1819	R	Unit 2B HHSI outboard seal leakage of 24 dpm
N-2002-1958	R	Unit 2C HHSI outboard seal leakage of 22 dpm
N-2002-2036	R	Unit 2B HHSI outboard seal leakage of 60 ml/minute
N-2002-0765	PS	Unit 2B HHSI inboard seal leakage of 14,764 cc/hr
N-2002-1011	PS	Unit 1B HHSI i/b seal leakage of 100cc/7sec & o/b of 36 dpm
N-2002-1449	PS	Unit 2B HHSI inboard seal leakage of 800 cc/hr
N-2002-0131	R	Unit 2C HHSI outboard seal leakage of 2 dpm
N-2002-0606	PS	Unit 2B HHSI inboard seal leakage of 23,424 cc/hr (steady stream)
N-2002-0611	R	Unit 2B HHSI inboard seal leakage of 23,424 cc/hr (steady stream)
N-2001-0443	R	Unit 2C HHSI outboard seal leakage of 10,600 cc/hr (steady stream)
N-2001-0495	R	Unit 2C HHSI outboard seal leakage increased from 9 dpm to steady stream
N-2000-2355	R	Unit 2B HHSI o/b seal leakage increased from 0 to 5 dpm
N-2001-2381	PS	Unit 1C HHSI inboard seal leakage increased to 50 dpm
N-1998-0914	R	Unit 2B HHSI inboard seal leakage of about 60-80 ml/min
N-1998-0652	PS	Unit 2B HHSI inboard seal with excessive leakage
N-1999-2976	S	Unit 2 manual trip due to feedwater oscillation
N-1999-2536	PS	Unit 2 "A" Main Steam Dump failed open
N-1999-2521	PS	Unit 2 "A" condenser steam dump failed full open in mode 3
N-1999-2029	PS	Unit 1 station service bus (15G4) loss due to ground
N-2000-0565	R	Units 1&2 long term inspection SW piping coating
N-2000-1252	R	Review of North Anna Units 1 & 2 ventilation systems to ensure compliance with company standards
N-1999-2620	R	Difficulty in clearing debris from Unit 1 SW spray array
N-1999-2637	R	New Unit 2 MSR hi and hi-hi level switches not providing adequate level indications
N-1999-2924	R	Discovered during disassembly that a Unit 1 steam drain valve plug was not attached to stem
N-1999-2478	R	Turbine lube oil intrusion into BC system
N-1999-3012	R	Review of North Anna Units civil/structural/seismic topics
N-1999-3039	R	Unit 2B RCP #1 seal leakage decreasing below 1 gpm.
N-1999-3161	R	Unit 1A circulating water pump amertap motor opened prior to stroke completion
N-2000-0274	R	Unit 2 fluctuating auxiliary steam pressure on condenser air ejector

<b>PI Number</b>	<b>Significance (S, PS, R)</b>	<b>Description</b>
N-2000-0923	R	Contractor injury due to stepping into hole covered with a rubber mat during Unit 1 main generator rotor enclosure inspection
N-2000-1068	R	Jumper installation on Unit 1 non-safety system with procedural controls and approved safety evaluation
N-2000-1124	R	Failure of U1 main turbine to latch from the control room
N-2000-1204	R	Unit 2 out of spec high voltage problem on semi-vital distribution panel not corrected as part of corrective action
N-1999-2907	R	Concern with North Anna Units 1 & 2 calculations for hydrogen concentration in the containment following DBA
N-1999-2177	R	Clam shells found in Unit 2B Lube oil cooler during maintenance
N-2003-0041	R	The shaft-driven jacket coolant pump on 1H emergency diesel generator has a 30 drop/minute seal leak.
N-2003-0065	R	01-EG-P-6H and 01-EG-P-7H post maintenance test calls for electric current readings. These pumps are not electric.
N-2002-2655	R	A fan was obtained from the tool crib and set up in the 2-EE-EG-2H diesel room without the required approvals.
N-2002-2658	R	Beams in the 4 Emergency Diesels rooms have been painted numerous times. Trolley causes paint to chip off and fall into the upper crankcase area (an FME area).
N-2002-2811	R	The " Jacket Water or Lube Oil Temperature Low" alarm was locked in after maintenance was completed on 2-EE-EG-2H, Unit 2 "H" EDG.
N-2002-2812	R	During post maintenance run of 2-EE-EG-2H, Unit 2 "H" EDG, a lube oil leak was detected.
N-2002-2829	R	Unit 2 "H" Emergency Diesel Generator slight misalignment of piping on the discharge of the shaft driven oil pump.
N-2002-2830	R	Different amp rating found on the breaker than on the print.
N-2002-3000	R	Glycol result of 39% for 1J EDG, which is outside the spec.
N-2002-3265	R	During 1J diesel run 2C upper cover on control side gasket blew out and 1C upper cover on control side leaking air.
N-2002-3403	R	Current oil analysis data shows an increase in chromium levels in the 2H EDG engine crankcase oil.
N-2002-2996	R	1-EG-PI-118A, discharge PI for 1-EG-P-1JA failed.
N-2002-1885	PS	Flames developed on exhaust insulation on gage board side of 2J EDG during 2-PT-82J. Flames extinguished with CO2 fire extinguisher.
N-2002-2251	R	During 24 hr run test of 2H EDG the leakage from #1 Cylinder increased from the previously noted value of 0.5 gallons/hour to 2290ml/hr, need EDG operability

<b>PI Number</b>	<b>Significance (S, PS, R)</b>	<b>Description</b>
		evaluation.
N-2002-1319	R	2J EDG tripped during 2-PT-82.12J, "2J Diesel Generator Asynchronous Mode (Start by ESF Actuation).
N-2002-0992	R	Lead for the 1H diesel was loose. The lead was tightened, no documentation was used to perform this task.
N-2002-0995	R	The emergency diesel generator starting air compressor pilot valve was in the unload position.
N-2002-0283	R	Recent coolant changes for the EDGs have resulted in glycol concentrations of 39% , glycol is out of specification.
N-2002-0457	R	2J EDG output cable splice, terminal lugs that were used in the splice are of an incorrect size and material type.
N-2002-2875	R	During the 18 month calibration found power supply card for Aux. Feed Pump Discharge Pressure out tolerance.
N-2002-3014	R	NRC Performance Indicator Report for October 2002 incorrectly reported (AFW system data affected)
N-2002-3193	R	2-FW-E-10, the Unit 2 Turbine Driven Auxiliary Feedwater Pump Oil Cooler, is leaking oil onto the floor.
N-2002-3280	R	All three feedwater bypass valves remained open when OPS de-energized the train "A" trip solenoids during 2-PT-212.4. They should have closed. Investigation found the positioner output tubing to the solenoids/actuator swapped.
N-2002-1690	R	2-FW-PI-255B 3A AFWP discharge pressure indicator found low out of spec at 75% of range during 1 year recal.
N-2002-2115	R	2-ICP-FW-F-200B(AFW PUMPS OUTLET TO S/G B FLOW TRANSMITTER) as found transmitter data was out of spec.
N-2002-0104	R	The Plan of the Day for Tuesday January 16 specified tagging and working 1-FW-P-3A (A MOTOR-DRIVEN AFW PUMP) - wrong unit specified, should of been unit 2
N-2002-0591	R	1-FW-P-2 had already been started when this missing step was noticed. The absence of this step violated the Limiting Condition sections of the Safety Review/Regulatory Screen and Temporary Modification, TM-N1-1695 Rev. 1.
N-2002-0211	R	Found fitting cracked on 1-IA-C-1 air compressor during performance of maintenance
N-2002-0236	R	Work package for 1-IA-TCV-113 was not prepped to the expected standards in the maintenance department
N-2002-0290	R	The motor compartment fan blades have fallen off for the Unit 1 instrument air compressor
N-2002-0366	R	0-PT-77.16B, "Performance Testing of Central Exhaust Dampers and Air Accumulator 1-IA-TK103B," step 2 of Attachment 1 had an incorrect constant/calculation number

<b>PI Number</b>	<b>Significance (S, PS, R)</b>	<b>Description</b>
N-2002-0556	R	During disassembly of valve, very fine brass particles were found on the inside of the valve internals (2-IA-AOV-207B)
N-2002-0901	R	During performance of 2-PT-228 annual PM, instrument air compressor heat exchangers found fouled
N-2002-1200	R	Maintenance rule for 2-PT-213.2A.2 on 2-IA-C-1's service water check valve was wrong
N-2002-1527	R	During performance of PMT on 1-IA-C-1 the compressor supply breaker tripped
N-2002-2859	R	Air dryer 2-IA-D-7 experienced numerous switching failures when left tower depressurizes
N-2002-3072	R	Air dryer 2-IA-D-7 still experiencing switching failure after numerous repair attempts within the last month
N-2002-3340	R	With both Unit 2 containment IA compressors supplying the header in auto, the alternating circuit does not function right

#### **NCVs and Licensee Event Reports (LERs)**

<b>NCV/LER Number</b>	<b>PI Number</b>	<b>Significance</b>	<b>Title</b>
50-338,339/ 2002-001-00	PI 2002-1471	PS	Incorrect Waste Gas Decay Tank Oxygen Analyzer Setpoint due to Inadequate Procedure
50-339/ 2002-001-00			Reactor Vessel Head Leakage due to Hot Short Cracking and Primary Water Stress Corrosion Cracking
50-338,339/ 2002-002-00	PI 2002-1982	R	Incorrect Low Temperature Overpressure Protection Setpoints Due to Inadequate Procedures

#### **Audits/Assessments and Trend Reports**

<b>Titles</b>	<b>Issue Date</b>
Use of Operating Experience in Daily Work Activities (2001)	1/16/02
Operating Experience Program Self-Assessment	11/27/02
NAPS-Corrective Action System (CAS) Monthly Trend Report	December 2002
NAPS-Corrective Action System (CAS) Monthly Trend Report	September 2002
Radiological Protection Self-Assessment – RP-02-01	August 2002
Employee Concerns Program Assessment	July 2001

**System Health Reports**

System Health Reports 1 <sup>st</sup> Quarter 2002
System Health Reports 2 <sup>nd</sup> Quarter 2002
System Health Reports 3 <sup>rd</sup> Quarter 2002

**Operating Experience Documents**

<b>Operating Experience Data Base Number</b>	<b>Industry Operating Experience Document</b>	<b>Title</b>
N-2002-3125-E1	SOER	Reactor Pressure Vessel Head Degradation at Davis Besse
N-2002-0395-E1	SEN 230	Pressurizer Spray Valve Failure Resulting in an Automatic Reactor Scram and Safety Injection
N-2002-1160-E1	SER 2-02	Undetected Leak in Control Rod Mechanism Nozzle and Degradation of Reactor Pressure Vessel Head
N-2002-0391-E1	OE 13203	Motor Driven Auxiliary Feedwater Pump Air-Binding Due to Blockage
N-2002-3040-E1	IN 02-29	Recent Design Problems in Safety Functions of Pneumatic Systems
N-2002-1896-E1	OE 14261	Fisher Model 67CFR Regulators Installed on Air Operated Valves May Not Allow the AOV to Move to the Fail Safe Position on Loss of IA

**Other Documents**

SNSOC #02-127 Meeting Minutes (11/1/2002)
SNSOC #02-128 Meeting Minutes (11/5/2002)
SNSOC #02-129 Meeting Minutes (11/7/2002)
SNSOC #02-130 Meeting Minutes (11/7/2002)
SNSOC #02-131 Meeting Minutes (11/12/2002)
SNSOC #02-132 Meeting Minutes (11/14/2002)
SNSOC #02-133 Meeting Minutes (11/15/2002)
SNSOC #02-134 Meeting Minutes (11/19/2002)
SNSOC #02-135 Meeting Minutes (11/21/2002)
SNSOC #02-136 Meeting Minutes (11/26/2002)
SNSOC #02-137 Meeting Minutes (12/3/2002)
SNSOC #02-138 Meeting Minutes (12/5/2002)
SNSOC #02-139 Meeting Minutes (12/5/2002)
SNSOC #02-140 Meeting Minutes (12/6/2002)
SNSOC #02-141 Meeting Minutes (12/10/2002)

SNSOC #02-142 Meeting Minutes (12/12/2002)
SNSOC #02-143 Meeting Minutes (12/13/2002)
SNSOC #02-144 Meeting Minutes (12/17/2002)
SNSOC #02-145 Meeting Minutes (12/19/2002)
SNSOC #02-146 Meeting Minutes (12/19/2002)
SNSOC #02-147 Meeting Minutes (12/19/2002)
SNSOC #02-148 Meeting Minutes (12/20/2002)
SNSOC #02-149 Meeting Minutes (12/23/2002)
SNSOC #02-150 Meeting Minutes (12/24/2002)
SNSOC #02-151 Meeting Minutes (12/26/2002)
SNSOC #03-001 Meeting Minutes (1/02/2003)
SNSOC #03-002 Meeting Minutes (1/07/2003)
North Anna Core Damage Risk Graphs
Design Change Package 00-130, Safeguards Exhaust Fan Damper Replacement/NAPS/Unit 2
Safety Evaluation 00-SE-MOD-15 (for Design Change Packages 00-129 and 00-130)
Justification for Operation C-2000-01, Air Supply to Safeguards Area Exhaust Fan Discharge Damper
Standing Order #229, Actions To Assure Filtration And Cooling To Plant Equipment In The Safeguards Buildings
Safety Evaluation 00-SE-PROC-12, JCO C-2000-01 and Standing Order #229

### **Root Cause Evaluation (RCE) Review**

<b>PI Number</b>	<b>RCE Category</b>	<b>Description</b>
N-2002-0457	1	2J EDG output cable splice, terminal lugs that were used in the splice are of an incorrect size and material type.
N-2001-3600	1	Unit 2 tripped from 100% power due to EHC power supply failures.
N-2002-2306	1	Worker under RWP 02-2-2029 in containment received 7 dose-rate alarms without responding to the alarms. Noisy conditions.
N-2002-2250	2	At 22:00 two contract mechanics inadvertently performed work on the wrong valve.
N-2002-2142	2	HUMAN PERFORMANCE - Out of Specification Boron result logged in Unit 2 Operations Narrative logs for Unit 2 RWST.
N-2002-1620	2	Paper work on 2-CH-P-1B, discovered to have numerous errors- WO 00423514-01 errors affected post maintenance testing.
N-2002-1506	2	During reassembly the inboard seal on 02-CH-P-1B inadvertently became stuck on the pump shaft. During the grinding process to correct, the pump shaft was badly scored.
N-2002-1449	2	2-CH-P-1B inboard pump seal is leaking at 800 cc/hr.
N-2002-0992	2	Lead hardware for the 1H diesel was suspected loose lead tightened - no documentation was used to perform this task.

**Request for Engineering Assistance (REA) Review**

<b>REA Number</b>	<b>Title</b>
R2002-040 (PI 2002-0606)	Replace existing charging pump seal design with a new vendor design
R2002-128 (PI 2002-2245)	Units 1 & 2 Station Battery voltage computer points are indicating 5-7 volts high
R2002-049 (PI 2001-3600)	Unit 2 tripped from 100% power due to EHC power supply failure
R2001-161 (PI 2001-1407)	Unit 2A Main Feed Regulating Valve Oscillation
R2000-137 (PI 2000-1918)	Control Bottled Air Review