

NON-CONCURRENCE PACKAGE

NORTH ANNA POWER STATION – NRC INTEGRATED INSPECTION REPORT  
05000338/2008003, 05000339/2008003, AND 07200056/2008003

August 25, 2008

*MAB*

### NON-CONCURRENCE PROCESS

**SECTION A - TO BE COMPLETED BY NON-CONCURRING INDIVIDUAL**

TITLE OF DOCUMENT *NORTH ANNA POWER STATION - NRC INTEGRATION INSPECTION*

ADAMS ACCESSION NO.

REPORT *05000358/2008003, 05000359/2008003, AND 07200056/2008003*

DOCUMENT SPONSOR

SPONSOR PHONE NO.

NAME OF NON-CONCURRING INDIVIDUAL

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ON CONCURRENCE

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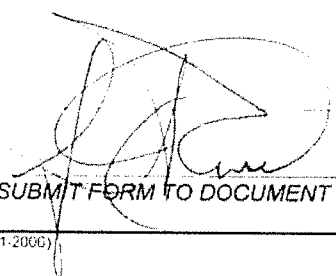
ORGANIZATION

*RII/DAP/IRS*

REASONS FOR NON-CONCURRENCE

*REFER TO THE ATTACHMENTS.*

SIGNATURE



CONTINUED IN SECTION D

DATE

*8/4/08*

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### NON-CONCURRENCE PROCESS

TITLE OF DOCUMENT NORTH ANNA POWER STATION - NRC INTEGRATED INSPECTION REPORT  
05000338/2008003, 05000339/2008003, AND 0420056/2008003

ADAMS ACCESSION NO.

**SECTION C - TO BE COMPLETED BY DOCUMENT SPONSOR**

NAME  
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TITLE  
ACTING BRANCH CHIEF

PHONE NO.  
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ORGANIZATION  
NRC REGION II, DRP

ACTIONS TAKEN TO ADDRESS NON-CONCURRENCE

SEE ATTACHED.

CONTINUED IN SECTION D

**NON-CONCURRING INDIVIDUAL** (To be completed by document sponsor):

- CONCURS
- NON-CONCURS
- WITHDRAWS NON-CONCURRENCE

**NRC Form 757  
Non-Concurrence Process  
Attachment 1**

Back Ground

The residents acknowledge that changes in regional branch staff presented some challenges to routine handling of report findings and respective communications.

The residents provided advanced notification of report findings to the region and discussed the findings relative to the exit meeting with regional staff and notified regional staff of the scheduled quarterly exit meeting with the licensee. There were no requests to delay the exit meeting based on any concerns of 'non-findings'.

One proposed finding involving inadequate corrective action for the 2H and 2J emergency diesel generator (EDG) battery chargers had previously been exited with the licensee during the first quarter with no contention; regional staff pulled the finding at the last minute with the understanding that it would be considered for the second quarter. This finding was also exited with the licensee for the second quarter and there was no contention.

The second quarter exit was conducted with the licensee, and given the proposed findings there was objection to only one finding based on new information. This finding involved two examples of safety-related, large motor failures of which one resulted in a unit trip. Based on the new information the residents revised the finding to include only the service water pump.

Additionally, based on regional questions involving identification, research of other NRC procedural documents was performed to obtain clarification. This research resulted in a reclassification of a LIV involving the 2H EDG standby lube oil pump finding to a self-revealing finding that also incorporated/discussed a NRC identified TS violation as recommended by the enforcement manual. The residents presented a Revision 3 (Attachment 2) to regional staff for review that incorporated this change and the large motor finding revision.

Finally, the residents did not reach conclusions without gaining peer review. The findings were discussed with other Region II staff and NRC staff of other regions to gain feedback. Based on this feedback, I made the decision to invoke the use of the Non-Concurrence process. The comments below document my non-concurrence and are not necessarily in the order of findings presented in Attachment 2.

Excerpts from documents such as the enforcement manual, manual chapters, and licensee documents have some highlighted in **bold** and/or *italics* for emphasis.

**Dropped NRC identified failure to comply with TS violation**

I do not concur with the regional staff decision to drop the NRC identified TS violation from the final inspection report, North Anna, 2008003.

I identified other examples of NCVs for TS violations in the following inspection reports:

- 05000331/2007003: Duane Arnold; NCV 05000331/2007003-04 which discusses a past operability evaluation of an EDG for a lube oil filter leak. The licensee concluded that the EDG would not have been capable of performing its 7-day unassisted operation design requirement. The conclusion was that the TS LCO allowed outage time for one EDG was exceeded.
- 05000259/2007008: Browns Ferry; An NCV of TS 3.3.6.1 was identified for failing to recognize an inoperable RCIC steam flow isolation instrument resulting in exceeding the TS allowed outage time.

Furthermore, I determined that the enforcement manual provides clear guidance (noted below) on the application of TS relative to 3.0.1 and 3.0.2 and what constitutes a TS violation.

**b. How to cite for equipment inoperability:**

1. Technical Specifications include a section specifying **Limiting Conditions for Operation (LCOs)**. *LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility.*

Each individual LCO includes both an applicability and action statement.

(a) The **applicability statement** specifies when the LCO is applicable (e.g., Modes 1, 2, and 3).

(b) The **action statement** prescribes remedial measures required under designated conditions in a narrative paragraph format.

(1) Many action statements first identify the time necessary to restore the piece of inoperable equipment (commonly referred to as the allowed outage time (AOT)), and then identify the time necessary to take other action, such as compensatory measures or shutdown, in the event that compliance with the LCO is not restored.

(A) A violation does not necessarily exist based solely on the failure to restore equipment to operable status within the AOT.

(B) A violation would exist when an LCO is not met and all necessary actions have not been completed within all applicable completion times.

(2) An action statement remains in effect until the condition no longer exists or the unit is not in a MODE within the LCO APPLICABILITY. While the term "AOT" is not used in improved Standard Technical Specifications (STS), the term and concept of "AOT" is being used for the purposes of this guidance.

(3) For improved STS (i.e., NUREG-1430 through NUREG-1434), action statements are written in a matrix format and are separated into three discreet parts, i.e., Conditions, Required Action(s), and Completion Time(s).

3. Potential enforcement should be considered based on the total duration that a condition may have existed. i.e., when the time of occurrence and the extent to which the licensee should have identified the condition earlier, is readily determined.

- (a) In order to address the issue of potential enforcement for a pre-existing condition, it is necessary to clearly distinguish between:
- (1) Compliance with the TS ACTION statements; and
  - (2) Compliance with the TS LCOs.
- (b) The distinction between the TS ACTION statement and the TS LCOs is evident in the general TS usage rules in the improved STS, i.e.:
- LCO 3.0.1 - LCOs shall be met during the modes or other specified conditions in the applicability, except as provided in LCO 3.0.2.
  - LCO 3.0.2 - Upon discovery of a failure to meet an LCO, the Required Actions of the associated conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6. If the LCO is met or is no longer applicable prior to expiration of the specified completion time(s), completion of the Required Action(s) is not required unless otherwise stated.
- (c) The determination of whether an action statement (LCO 3.0.2) is met is based on when the condition is discovered.
- (1) Once discovered, the question is whether the actions to be completed are completed on time.
  - (2) **While a licensee may be in compliance with the action statement of a TS based upon the discovery of the violation, a licensee may not be in compliance with the TS LCO (3.0.1) based on when the violation occurred.**
- (d) The following guidelines should be used for cases where the time of occurrence can be established and the licensee should have discovered the condition sooner:
- (1) If the time between the occurrence of the condition and the discovery of the condition is greater than the AOT for that condition, then the licensee should be cited for a failure to satisfy the TS LCO. If the licensee otherwise satisfied the TS Required Action(s) from the time of discovery of the condition, the citation and enforcement correspondence should acknowledge this.
  - (2) If the time between the occurrence of the condition and the discovery of the condition is less than the AOT for that condition, and upon discovery the Required Actions are completed within the AOT or the shutdown track is satisfied, there is not an LCO violation. This would be true even if the time between the occurrence of the condition and the completion of Required Actions is greater than the AOT. However, there may be a root cause issue outside of the TS issue warranting appropriate enforcement action.
  - (3) If the time between the occurrence of the condition and the completion of Required Actions is less than the AOT, then there is no violation.
- (e) **In determining whether to cite a violation against the LCO, consideration should also be given to other violations, such as root causes that may focus the corrective action. If there is a clear root cause violation, the LCO violation and the root cause violation should normally be combined into one escalated issue or problem**

Given TS 3.7.8 for the SW system and all respective AOTs, the licensee failed to perform the required actions and met the conditions described above in green. The licensee had an opportunity to 'discover the condition sooner' based on the amount of oil leakage and locations from the exhaust manifolds (occurred on both sides of the EDG). With respect to the guidance in **bold** above, the following information is provided that supports converting the LIV for 2H EDG standby lube oil pump problem into a single, self-revealing violation that combines the root cause violation, Criterion V, with the description of the TS violation noting that the TS violation was NRC identified.

From the enforcement manual:

An **event**, as used in this section, means (1) ***a situation characterized by an active adverse impact on equipment or personnel, readily obvious by human observation or instrumentation***, or (2) a radiological impact on personnel or the environment in excess of regulatory limits, such as an overexposure, a release of radioactive material above NRC limits, or a loss of radioactive material, e.g., an ***equipment failure discovered through a spill of liquid***, a loud noise, the failure to have a system respond properly, or an annunciator alarm would be considered an event. Similarly, if a licensee discovered, through quarterly dosimetry readings, that employees had been inadequately monitored for radiation, the issue would normally be considered licensee identified; however, if the same dosimetry readings disclosed an overexposure, the issue would be considered an event.

The enforcement manual also discusses identification:

#### **4.3.2.2 Credit for Actions Related to Identification**

- a. **Identification** presumes that the identifier recognizes the existence of a problem, and understands that corrective action is needed.
- b. The civil penalty assessment should normally consider the factor of identification in addition to corrective action when:
  1. A Severity Level I or II violation or a willful Severity Level III violation has occurred;
  2. During the past two years or two inspections, whichever is longer, the licensee has been issued at least one other escalated action; or
  3. A licensee has not been in existence during the past two years or for two inspections.
- c. The NRC should consider whether the licensee should be given credit for actions related to identification of the problem requiring corrective action, e.g., if a licensee discovers an issue but fails to recognize that corrective actions are needed, then the licensee may not be deserving of identification credit.
  1. Identification and corrective action are separate decisions.
  2. The decision on identification requires considering all the circumstances of identification including:
    - (a) Whether the problem requiring corrective action was:
      - NRC-identified
      - Licensee-identified
      - Revealed through an event
    - (b) Whether prior opportunities existed to identify the problem requiring corrective action, and if so, the age and number of those opportunities;
    - (c) Whether the problem was revealed as the result of a licensee self-monitoring effort, such as conducting an audit, a test, a surveillance, a design review, or troubleshooting;
    - (d) For NRC-identified issues, whether the licensee would likely have identified the issue in the same time-period if the NRC had not been involved;
    - (e) For cases in which the NRC identifies the issue or identifies the overall problem (i.e., a programmatic issue requiring corrective action, consider:
      - (1) Whether the licensee should have identified the issue (and taken action) earlier; and

(2) The degree of licensee initiative or lack of initiative in identifying the problem or problems requiring corrective action.

(f) For a problem revealed through an event, the ease of discovery, and the degree of licensee initiative in identifying the root cause of the problem and any associated violations;

d. Although some cases may consider all of the above factors, the importance of each factor will vary based on the type of case as discussed in the following general guidance:

1. **Licensee-Identified:** When a problem requiring corrective action is licensee-identified (i.e., **identified before the problem has resulted in an event**), the NRC should normally give the licensee credit for actions related to identification, regardless of whether prior opportunities existed to identify the problem.

2. **Identified Through an Event:** When a problem requiring corrective action is identified through an event, the decision on whether to give the licensee credit for actions related to identification normally should consider:

(a) The ease of discovery;

(b) Whether the event occurred as the result of a licensee self-monitoring effort (i.e., whether the licensee was "looking for the problem");

(c) The degree of licensee initiative in identifying the problem or problems requiring corrective action; and

(d) Whether prior opportunities existed to identify the problem.

(1) Any of these considerations may be overriding if particularly noteworthy or particularly egregious, e.g., if the event occurred as the result of conducting a surveillance or similar self-monitoring effort (i.e., the licensee was looking for the problem), the licensee should normally be given credit for identification.

(2) As a second instance, even if the problem was easily discovered (e.g., revealed by a large spill of liquid), the NRC may choose to give credit because noteworthy licensee effort was exerted in ferreting out the root cause and associated violations, or simply because no prior opportunities (e.g., procedural cautions, post-maintenance testing, quality control failures, readily observable parameter trends, or repeated or locked-in annunciator warnings) existed to identify the problem.

The 2H EDG oil leaks from the exhaust manifolds indicating oil leakage into the cylinders started on 4/1/08. The oil leakage continued to degrade, but engineering was not contacted until 4/5/08. I do not consider the licensee's corrective action between 4/1 and 4/5 to be **noteworthy licensee effort for ferreting out the root cause**. Furthermore, I do not consider that the licensee identified a problem that precluded an 'event'. Given the volume of leakage, location of leakage, and increasing degradation, this was an **identification of large quantities of 'oil' in an engine location that you would not normally expect such a condition**; thus, the 2H EDG finding is self-revealing. This is also supported by the definitions for identification in IMC 0612.

From version of IMC 0612 in effect for the second quarter and issued on 09/20/07:

NRC-Identified: For the purpose of this IMC, NRC-identified findings are those findings, found by NRC inspectors, of which the licensee was not previously aware or had not been previously documented in the licensee's corrective action program. NRC-identified findings also include previously documented licensee findings to which the inspector has significantly added value. Added value means that the inspector has identified previously unknown weakness in the licensees



classification, evaluation, or corrective actions associated with the licensee's correction of a finding.

**Self-Revealing:** For the purpose of documentation in the ROP (versus enforcement), **self-revealing findings are those findings that become self-evident and require no active and deliberate observation by the licensee or NRC inspectors to determine whether a change in process or equipment capability or function has occurred.** Additionally, self-revealing findings will normally be documented in the inspection report for the time period in which the self-revealing event occurred. **Self-revealing findings become readily apparent to either NRC or licensee personnel through a readily detectable degradation in the material condition, capability, or functionality of equipment or plant operations.** Self-revealing findings are treated the same as NRC-identified findings for the purposes of documenting them in inspection reports. Some examples of self-revealing findings include those resulting from: reactor trips and secondary plant transients; failure of emergency equipment to operate; unanticipated or unplanned relief valve actuations; obvious failures of fluid piping or plant equipment; and identification of large quantities of water in areas where you would not normally expect such a condition; non-compliance with high radiation area requirements that was identified through an electronic dosimeter alarm.

**Licensee-Identified:** For the purpose of this inspection manual chapter (IMC), **"licensee-identified" findings are those findings that are not NRC-identified or self-revealing.** Most, but not all, licensee-identified findings are discovered through a licensee program or process. Some examples of licensee programs that likely result in such findings are post maintenance testing, surveillance testing, ASME Section XI testing, drills, critiques, event assessments, evaluations, or audits conducted by or for the licensee. Other examples of licensee-identified findings are those findings that are identified by the licensee as a result of their deliberate and focused observation during the course of performing their normal duties (e.g., plant operator or other licensee personnel identifying a packing leak on a valve or identifying a valve out-of-position during a routine tour of the facility would be considered licensee-identified, although the individual's duties at the time may not have been to identify these types of deficiencies).

Therefore, for a finding to be 'licensee-identified' it must first be reviewed against the definitions of self-revealing and NRC-identified. If the finding is not either, then it is licensee-identified. This is clearly spelled out in the definition for licensee-identified and compares to the identification discussions in the enforcement manual. This logical process was also confirmed by discussion with NRC personnel from other regions.

**Dropped self-revealing finding for inadequate corrective action regarding 2H and 2J EDG battery chargers**

I do not concur with the regional staff decision to drop the self-revealing inadequate corrective action finding regarding 2H and 2J EDG battery chargers from the final inspection report, North Anna, 2008003.

From the enforcement manual:

**b. How to cite for equipment inoperability:**

1. Technical Specifications include a section specifying **Limiting Conditions for Operation (LCOs)**. **LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility.** Each individual LCO includes both an applicability and action statement.

There was an ongoing condition adverse to quality regarding the failure of EDG battery chargers to maintain voltage above TS limits during periods of cold weather and windy conditions. There were inadequate short term corrective actions (periodic monitoring) that allowed multiple EDG inoperabilities between 1999 and 2008. In fact the licensee stated in Plant Issue N-2006-0228 dated January 18, 2006, "This is a known problem." Long term corrective actions (modifications to replace chargers) were not initiated until 2005 and implementation did not start until after both EDGs were inoperable on the same day in February, 2008. Moreover, licensee corrective actions were not in the spirit of TS; i.e., on identifying the first EDG inoperability, the licensee did not promptly check the other EDGs for the same condition to determine appropriate application of TS actions. Licensee actions, instead, returned one EDG to operable status before observing the other train. This finding is similar to the IMC 0612, Appendix E example below:

2. Licensee Administrative Requirement/Limit Issues

Example a. While performing a review of a completed surveillance test, the system engineer determines that operators performing the test had made a calculation error when determining the leak rate of a power-operated relief valve's nitrogen accumulators. When calculated correctly, the actual check valve leakage exceeded the surveillance leakage rate's acceptance criterion in the surveillance procedures (but not the Technical Specifications surveillance requirement). The surveillance had been completed a week earlier and the system had been returned to service. The allowable leakage rate was below that used in the design assumptions for sizing of the accumulators and it was determined that with the identified leakage, the valves would be able to perform the required number of strokes assumed in the accident analysis.

The violation: The Technical Specification surveillance test's allowable check valve leakage rates were exceeded and the system was returned to service.

Minor because: The limit exceeded was an administrative limit. Actual check valve leakage rates, based on testing history, have always been significantly low enough to meet the required number of valve strokes.

Not minor if: Maintenance records indicated that historical check valve leakage rates were too high bringing the ability of the valves to meet the required number of valve strokes into question or **Technical Specification limits were exceeded.**

This finding if left uncorrected would result in a more significant safety concern. The finding impacted the mitigating system cornerstone relative to the long term reliability of the battery charger from a low safety significance point of view. Moreover, the condition adverse to quality affected **all** of the EDG battery chargers, not just one. Therefore, the resident's have determined that the finding stands. Nuclear safety is increased in that the licensee now has a docketed example of where they can improve when evaluating problems for immediate or short term corrective actions.

### **Conversion of 1H EDG air start check valve self-revealing finding to a LIV**

I do not concur with the regional staff decision to convert the 1H EDG air start check valve inadequate work instruction self-revealing finding to a LIV documented the final inspection report, North Anna, 2008003.

For the same reasons identified for the 2H EDG standby lube oil finding above, the licensee did not identify the problem prior to an 'event,' and this was an 'obvious failure of plant equipment' meeting the IMC 0612 definition for self-revealing. Therefore, this finding cannot be a LIV.

### **Dropped large motor finding for inadequate procedures**

I do not concur with the regional staff decision to drop the self-revealing service water large motor finding from the final inspection report, North Anna, 2008003.

This finding originally involved two examples of safety-related, large motor failures of which one, a Unit 2 reactor coolant pump motor, resulted in a unit trip. Based on the new information as described below the residents revised the finding to include only the service water pump.

From the Large Motor Program (ER-AA-MTR-1001):

#### **3.3 Preventive Maintenance (PM) Requirements**

##### **3.3.1 PM Basis Templates**

Each motor in the Large Electric Motor Program is required to have a documented PM basis. Applicable tests/inspections and frequency of preventive maintenance activities are determined by considering the applicable EPRI Template, manufacturer recommendations, Industry Operating Experience, and site specific work order history including craft feedback on PM's. EPRI references for PM Basis include: EPRI Preventive Maintenance Basis Documents (PM-Basis), TR-106857, and EPRI Equipment Condition Monitoring Templates: Addendum to the Preventive Maintenance Basis, TR-106857, January 2001. Applicable tests/inspections are determined by the reference guidelines based on: Criticality, Duty Cycle, and Service Environment. **The Preventive**

**Maintenance Program will include the development of a time based rewind schedule for all large motors** in accordance with recommendations in EPRI Topical Report TR5-50. Motors are to be scheduled for rewind based on chronological age, Criticality of the individual application, and severity of the application.

The SW pump motors are not run-to-failure. The licensee did not have PM procedures for SW motor rewinds as required by ER-AA-MTR-1001, thus, a licensee standard for maintenance established by ER-AA-MTR-1001 was not met. The licensee's root cause stated:

The Root Cause of the 2-SW-P-1B motor failure was due to ***a failure to track in a process requiring management review and approval the implementation plan for the Large Motor Program - ER-AA-MTR-1001.*** The implementation plan was not placed in any station tracking program and was not in a Corporate Level 1 tracking system. This allowed the implementation to be delayed and to not meet all program requirements with no management review and approval. **The Large Motor Program meets industry standards and includes requirements designed to prevent end of life motor failures.** These requirements include performing testing to help determine insulation degradation and PM procedures for time based motor rewinds. **The Large Motor Program procedure was effective 4/21/06 and had a detailed implementation plan in accordance with the Administrative Procedure for Preparation and Processing of Procedures and Guidance Reference Documents (AD-AA-101).** One of the implementation actions was to establish PM basis and submit PM change request, which should have included periodic motor rewinds, but this has not been completed. Other portions of the plan have also not been implemented including fleet refurbishment specification update and implementation assessment.

The corrective action for the root cause was:

1. **(RC1)** Establish a 30 year PM for SW motor re-winds with the first performance late date of 12/31/2009 or sooner for the 1-SW-P-1A, 1-SW-P-1B, and 2-SW-P-1A motors.

Assigned to: Outage and Planning  
Due: 90 days after approval of this report

This demonstrates that not only were there no PM procedures for motor rewinds, but there were also no actions in progress to establish an adequate PM procedure. Therefore, I concluded that the licensee established a maintenance standard for a safety-related motor but failed to establish the procedural requirements as required by TS 5.4.1a for RG 1.33, revision 2; consequently, a safety-related component failed.

A similar argument can be made using 10 CFR 50, Appendix B, Criterion XVI. The NRC does not define or establish the standards for a SCAQ or significant condition adverse to quality. Instead, the licensee defines the conditions for a SCAQ in their corrective action program (CAP), and the NRC then regulates the licensee's action to comply with their CAP according to the regulatory standard identified in Criterion XVI. Similarly, the licensee establishes the standards for maintenance through vendor manual

specifications and industry standards, and the NRC then regulates the licensee's action to comply with their standards as required by TS and other related Appendix B requirements.



**NRC Form 757  
Non-Concurrence Process  
Attachment 2**

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

July Day, 2008

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

**SUBJECT: NORTH ANNA POWER STATION – NRC INTEGRATED INSPECTION  
REPORT 05000338/2008003, 05000339/2008003, AND 07200056/2007001**

Dear Mr. Christian:

On June 30, 2008, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your North Anna Power Station Units 1 and 2. The enclosed integrated inspection report documents the inspection findings which were discussed on July 9, 2008, with Mr. Daniel Stoddard and other members of your staff.

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

Based on the results of this inspection, four self-revealing findings of very low safety significance (Green) were identified. These were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCV) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you wish to contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the North Anna Power Station.



VEPCO

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OFFICIAL RECORD COPY

DOCUMENT NAME:



cc w/encl:

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Report to D. A. Christian from M. A. Bates dated July Day, 2008.

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-338, 50-339

License Nos: NPF-4, NPF-7

Report No: 05000338/2008003, 05000339/2008003

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: North Anna Power Station, Units 1 & 2

Location: 1022 Haley Drive  
Mineral, Virginia 23117

Dates: April 1, 2008 to June 30, 2008

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Approved by: M. A. Bates, Acting Chief  
Reactor Projects Branch 5  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000338/2008-003, 05000339/2008-003; 04/01/2008 – 06/30/2008; North Anna Power Station, Units 1 and 2. Routine Integrated Resident and Regional Report.

The report covered a three month period of inspection by resident inspectors and reactor inspectors from the region. Four findings were identified and were determined to be non-cited violations (NCVs). The significance of most findings is identified 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 4, dated December, 2006.

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

#### Cornerstone: Mitigating Systems

Green. A self-revealing, Green, NCV of Technical Specification (TS) 5.4.1a was identified for the failure to adequately establish procedural requirements for the re-wind of service water (SW) motors that resulted in failure of the Unit 2 'B' SW pump motor and subsequent entry into TS 3.7.8. The licensee entered this problem into their corrective action program as condition report 091169, initiated action to establish new procedures, and successfully completed repairs to the Unit 2 SW pump motor.

The finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of procedure quality in that procedures were not prescribed for re-wind of SW motors to preclude end of life failures. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of human performance, the component of resources, and the aspect of documentation, procedures and component labeling, H.2(c), because the licensee failed to establish adequate procedures for re-wind of SW motors to preclude end of life failures. (Section 1R12.2)

Green. A self-revealing non-cited violation of Technical Specification (TS) 5.4.1a, was identified for failure to adequately establish procedural requirements for repair of emergency diesel generator (EDG) air start check valves that resulted in the increased unavailability of the Unit 1 '1H' EDG. The licensee entered this problem into their corrective action program as condition report 098146, revised the procedure, and successfully completed repairs to the '1H' EDG.

The finding was more than minor because it directly impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the

related attribute of procedure quality in that the procedure failed to ensure air start check valves were properly assembled following maintenance. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of problem identification and resolution, the related component of operating experience (OE), and the associated aspect of implementation and institutionalization of OE through changes to station processes, procedures, equipment, and training programs, P.2(b) because the failure to properly evaluate available OE led to the failure to establish adequate procedural requirements which led to an increase in the unavailability of the '1H' EDG. (Section 1R12.1)

Green. A self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI was identified for failure to take prompt corrective actions for a previously identified condition adverse to quality related to battery charger operation in low ambient temperatures which resulted in the inoperability of the Unit 2 '2H' and '2J' emergency diesel generators (EDG). The licensee entered this problem into their corrective action program as condition report 090845 and has taken action to improve their schedule for implementing a modification to install new EDG battery chargers and change alarm setpoints and recently completed installations on all but the '2J' EDG.

The finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of equipment performance because prompt corrective actions were not implemented to preclude inoperable EDGs due to low battery charger voltage. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by Technical Specifications, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of problem identification and resolution, the component of the corrective action program and the aspect of appropriate corrective action, P.1(d), because no interim corrective actions were taken to ensure the EDG battery chargers operated in an adequate temperature environment. (Section 4OA2.3)

Green. A self-revealing, non-cited violation of 10 CFR 50, Appendix B, Criterion V, was identified for failure to prescribe adequate work instructions for maintenance on the Unit 2 '2H' emergency diesel generator (EDG) standby lube oil pump which resulted in a failure of the EDG. The licensee installed the correct pump internals and entered the problem into their corrective action program as condition reports 094681, 094728 and 094772.

The finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of configuration control because the licensee failed to take TS

specified actions to place the units in the required system/plant configuration. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of human performance, the component of resources, and the aspect of documentation, procedures and component labeling, H.2(c), because the licensee failed to prescribe adequate work instructions for the '2H' EDG standby lube oil pump resulting in a failure of the EDG. (Section 40A2.3)

## REPORT DETAILS

### Summary of Plant Status

Unit 1 and 2 began the period at full Rated Thermal Power (RTP) and operated at or near full RTP for the entire report period.

#### 1. REACTOR SAFETY

##### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

#### 1R01 Adverse Weather Protection

##### a. Inspection Scope

The inspectors reviewed the licensee's adverse weather preparations for hot weather operations specified in 0-GOP-4.1, "Hot Weather Operations," and the licensee's correction action data base for hot weather related issues. The inspectors walked down the two risk-significant areas listed below to verify compliance with the procedural requirements and to verify that the specified actions provided the necessary protection for the structures, systems, or components.

- Unit 1 & 2 auxiliary feedwater (AFW) pump rooms;
- Unit 1 & 2 quench spray (QS) pump rooms; and
- Unit 1 outside recirculation spray (RS) and low head safety injection (LHSI) pump room.

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment

##### .1 Partial Walkdown

##### a. Inspection Scope

The inspectors conducted four equipment partial alignment walkdowns to evaluate the operability of selected redundant trains or backup systems, listed below, with the other train or system inoperable or out of service. The inspectors reviewed the functional systems descriptions, Updated Final Safety Analysis Report (UFSAR), system operating procedures, and Technical Specifications (TS) to determine correct system lineups for the current plant conditions. The inspectors performed walkdowns of the systems to verify that critical components were properly aligned and to identify any discrepancies which could affect operability of the redundant train or backup system.

- Unit 2 '2J' Emergency Diesel Generator (EDG) and support systems during planned maintenance on '2H' EDG;



- Unit 1 '1H' EDG during planned maintenance on '1J' EDG;
- Unit 1 '1J' EDG and support systems during planned maintenance on '1H' EDG; and,
- Unit 1 'B' LHSI pump during planned maintenance on 'A' LHSI pump and related valves.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors performed a detailed walkdown and inspection of the Unit 1 'A' Train outside RS system components external to containment to assess proper alignment and to identify discrepancies that could impact its availability and functional capacity. The inspectors assessed the physical condition and position of each recirculation spray and casing cooling valve, whether manual, power operated or automatic to ensure correct positioning of the valves. The inspection also included a review of the alignment and the condition of support systems including fire protection, room ventilation, and emergency lighting. Equipment deficiency tags were reviewed and the condition of the system was discussed with the engineering personnel.

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

The inspectors conducted tours of the eight areas listed below that are important to reactor safety to verify the licensee's implementation of fire protection requirements as described in Virginia Power Administrative Procedure (VPAP)-2401, "Fire Protection Program." The inspectors evaluated, as appropriate, conditions related to: (1) licensee control of transient combustibles and ignition sources; (2) the material condition, operational status, and operational lineup of fire protection systems, equipment, and features; and (3) the fire barriers used to prevent fire damage or fire propagation.

- Emergency Diesel Generator 2H Unit 2 (fire zone 9A-2a / EDG-2H);
- Emergency Switchgear Room Unit 1 (fire zone 6-1a / ESR-1);
- Emergency Switchgear Room Unit 2 (fire zone 6-2a / ESR-2);
- Emergency Diesel Generator 2J Unit 2 (fire zone 9B-2a / EDG-2J);
- Motor-Driven Auxiliary Feedwater Pump Room Unit 1 (fire zone 14B-1a / MDAFW-1);
- Turbine-Driven Auxiliary Feedwater Pump Room Unit 1 (fire zone 14A-1a / TDAFW-1)

- Turbine-Driven Auxiliary Feedwater Pump Room Unit 2 (fire zone 14A-2a / TDAFW-2); and,
- Motor-Driven Auxiliary Feedwater Pump Room Unit 2 (fire zone 14B-2a / MDAFW-2).

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program

a. Inspection Scope

The inspectors reviewed a crew examination that involved a reactor coolant system (RCS) leak with a partial loss of annunciators, a loss of instrument air outside containment, a failure of 1-RC-PT-1554 that fails open a pressurizer power operated relief valve (PORV), and a rod ejection resulting in a small break loss of coolant accident (LOCA). The inspectors observed crew performance in terms of communications; ability to take timely and proper actions; prioritizing, interpreting, and verifying alarms; correct use and implementation of procedures, including the alarm response procedures; timely control board operation and manipulation, including high-risk operator actions; and oversight and direction provided by the shift supervisor, including the ability to identify and implement appropriate TS actions. The inspectors observed the post training critique to determine that weaknesses or improvement areas revealed by the training were captured by the instructor and reviewed with the operators.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

For the four equipment issues listed below, the inspectors evaluated the effectiveness of the corresponding licensee's preventive and corrective maintenance. The inspectors performed walkdowns of the accessible portions of the systems, performed in-office reviews of procedures and evaluations, and held discussions with system engineers. The inspectors compared the licensee's actions with the requirements of the Maintenance Rule (10 CFR 50.65) using ER-AA-MRL-10, "Maintenance Rule Program," and Engineering Transmittal CEP-97-0018, "North Anna Maintenance Rule Scoping and Performance Criteria Matrix."

- Condition report (CR) 099531, "A MRule Evaluation was not assigned for CR091536" and respective MRE006778, "MRule Eval to Eng for 1-EE-BKR-1J1-1-F2 contactor failed;
- CR096110, "1A leak to "B" water box vacuum breakers," for maintenance issues concerning Unit 2 Condenser Outlet Waterbox vacuum break; and,

- CR098146, "During maintenance run #8 air start check valve supply pipe to header melted at fitting," and respective MRE006709, "MRule; #8 Air Start Ckvalve Supply Pipe to header melted at fitting."
- CR091169, "2-SW-P-1B Automatically tripped," and respective MRE006467, "MRule evaluation: 2-SW-P-1B Automatically tripped"

b. Findings

Unavailability of '1H' EDG Due to Failure to Adequately Establish Procedural Requirements for Air Start Check Valve Maintenance

- .1 Introduction: A self-revealing, Green, non-cited violation (NCV) of TS 5.4.1a was identified regarding the failure to adequately establish procedural requirements for repair of the EDG air start check valves that resulted in the increased unavailability of the Unit 1 '1H' EDG.

Description: On May 7, 2008, during a maintenance run of the '1H' EDG following activities associated with a scheduled 80 hour maintenance outage, the air start check valve associated with the #8 cylinder stuck open allowing combustion gas into the air start header, subsequently causing it to rupture due to heating of the soldered joints. An evaluation by the licensee determined that the self-locking nut associated with the #8 cylinder air start check valve had disengaged from the threaded check valve shaft and was oriented in such a way as to prevent the check valve from reseating. This event and the resulting emergent maintenance caused additional unavailability of '1H' EDG for approximately 40 hours. The licensee revised maintenance procedure, 0-MCM-0701-14, "Repair of Emergency Diesel Generator Air Start Check Valves," and completed repairs to the air start check valve and air start header. The licensee also conducted inspections of the remaining air start check valves and returned the '1H' EDG to an operable status on May 10, 2008. The inspectors reviewed apparent cause evaluation (ACE) 013750 and noted the discussion of two specific industry operating experience (OE) events. The first event, OE25538, documented failure of an air start check valve due to a missing self-locking nut, was reviewed by the licensee and documented in their engineering logs on September 28, 2007. The inspectors noted that the log entry concluded that while the OE was applicable to North Anna, the licensee had a 6 year PM frequency to replace the air start check valves that were rebuilt by procedure 0-MCM-0701-14 with a specific step to install the applicable lock nuts. Thus, the licensee concluded that adequate guidance existed to ensure that the valves were correctly rebuilt and would not result in a failure similar to that described in the OE. The second event, OE4352, documented failure of an air start check valve due to the reuse of a lock nut that subsequently backed off of the respective stem allowing the spring retaining nut to back off. This demonstrated that air start check valve self-locking nuts lose their torque characteristics with successive use. The inspectors identified no licensee documentation of a previous review of OE4352 for applicability to North Anna. The inspectors agreed with the licensee's conclusion that prior knowledge of this OE would have precluded the inoperability of 1H EDG. The inspectors interviewed licensee engineering personnel to discuss licensee document, ER-AA-SYS-1004, "System Engineer Handbook," of which the purpose states in part that guidance to the system engineer is provided to assure that the engineering product from each nuclear station meets a common standard. Attachment 2, "Detailed Job Duties and Responsibilities the System Engineer Shall

Perform," section 13, "Operating Experience Review," states in part that the system engineer is cognizant of OE Reports on their system and accumulates, reviews, and initiates action as appropriate on relevant OE information to improve system performance. The inspectors concluded that the licensee had reasonable opportunity to identify OE4352 during their evaluation of OE25538 and take the necessary corrective actions.

The inspectors reviewed 0-MCM-0701-14 and noted that this procedure did not address concerns with the reuse of air start check valve self-locking nuts. The inspectors concluded that the licensee failed to adequately establish procedural requirements for repair of EDG air start check valves that resulted in the increased unavailability of the '1H' EDG. The licensee initiated CR098146 for corrective action.

Analysis: The inspectors determined that the failure to adequately establish procedural requirements for repair of EDG air start check valves was a performance deficiency or finding due to noncompliance with TS 5.4.1a requirements. The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix B, and determined the finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of procedure quality in that the procedure failed to ensure air start check valves were properly assembled following maintenance. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of problem identification and resolution, the related component of OE, and the associated aspect of implementation and institutionalization of OE through changes to station processes, procedures, equipment, and training programs, P.2(b), because the failure to properly evaluate available OE led to the failure to establish adequate procedural requirements which led to an increase in the unavailability of the '1H' EDG.

Enforcement: TS 5.4.1.a, requires in part, that written procedures shall be established per Regulatory Guide 1.33, Appendix A, of which part 9 specifies procedures for performing maintenance. Contrary to this, on May 7, 2008, the licensee failed to adequately establish appropriate procedural requirements in 0-MCM-0701-14 which subsequently resulted in the increased unavailability of the '1H' EDG. Because the finding is of very low safety significance and because it has been entered into the licensee's corrective action program (CAP) as CR098146, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000338/2008003-01, Unavailability of '1H' EDG Due to Failure to Adequately Establish Procedural Requirements for Air Start Check Valve Maintenance.

#### Failure to Adequately Establish Procedural Requirements for Service Water Motor Maintenance

- .2 Introduction: A self-revealing, Green, NCV of TS 5.4.1a was identified for the failure to adequately establish procedural requirements for the re-wind of service water (SW)

motors that resulted in failure of the Unit 2 'B' SW pump motor which subsequently caused entry into TS 3.7.8.

Description: On February 15, 2008, the Unit 2 'B' SW pump breaker tripped open and caused the plant to enter TS 3.7.8 for one SW pump inoperable. The Unit 1 'A' SW pump was started to restore normal SW flow for Units 1 and 2, and SW flow to the component cooling heat exchangers was verified throttled. An initial evaluation by the licensee determined that the 'B' SW pump motor was grounded. Following this determination the 'B' SW pump motor was replaced with an auxiliary service water pump motor and returned to service on February 18, 2008. The inspectors reviewed root cause evaluation (RCE) 000222 and noted that although the 'B' SW pump motor failure was due to a ground fault on the motor stator caused by failure of the coil insulation which was characterized by the licensee as an end of life failure, the SW motors were not classified as 'run to failure.' The inspectors also noted that contributing causes identified frequent motor starts, bus voltage greater than nameplate motor voltage, and air quality affecting motor intake filters as negative factors impacting the service life. The inspectors reviewed ER-AA-MTR-1001, "Large Motor Program," Rev 0, effective April 21, 2006, and noted that section 3.3, "Preventive Maintenance (PM) Requirements," stated, "The Preventive Maintenance Program will include the development of a time based rewind schedule for all large motors in accordance with recommendations in EPRI Topical Report TR5-50. Motors are to be scheduled for rewind based on chronological age, criticality of the individual application, and severity of the application." The inspectors determined that this established a licensee standard for SW motor preventative maintenance. The inspectors also determined that RCE000222 noted the root cause corrective action as, "Establish a 30 year PM for SW motor re-winds with the first performance late date of 12/31/2009 or sooner for the 1-SW-P-1A, 1-SW-P-1B, and 2-SW-P-1A motors." This demonstrates that the licensee had no previous actions in effect to establish a re-wind PM procedure. The inspectors concluded that the licensee failed to adequately establish procedural requirements as required by TS 5.4.1a for the re-wind of SW electric motors prior to failure of the Unit 2 'B' SW pump motor. The licensee initiated CR091169 for corrective action.

Analysis: The inspectors determined that the failure to adequately establish procedural requirements for the re-wind of SW electric motors to preclude end of life failures was a performance deficiency or finding due to noncompliance with TS 5.4.1a requirements. The inspectors reviewed IMC 0612, Appendix B, and determined the finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of procedure quality in that there were no PM procedures established for SW motor rewinds. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of human performance, the component of resources, and the aspect of documentation, procedures and component labeling, H.2(c), because the licensee failed to establish adequate procedures for re-wind of SW motors to preclude end of life failures.

Enforcement: TS 5.4.1.a, requires in part, that written procedures shall be established per Regulatory Guide 1.33, Appendix A, of which part 9 specifies procedures for performing maintenance. Contrary to this, on February 15, 2008, the licensee failed to adequately establish procedural requirements for re-wind of SW motors that resulted in the failure of the Unit 2 'B' SW pump motor. Because the finding is of very low safety significance and because the problem has been entered into the licensee's CAP as CR091169 respectively, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000339/2008003-02, Failure to Adequately Establish Procedural Requirements for Service Water Motor Maintenance.

#### 1R13 Maintenance Risk Assessments and Emergent Work Control

##### a. Inspection Scope

The inspectors evaluated, as appropriate, the four activities listed below for the following: (1) effectiveness of the risk assessments performed before maintenance activities were conducted; (2) management of risk; (3) upon identification of an unforeseen situation, necessary steps were taken to plan and control the resulting emergent work activities; and (4) maintenance risk assessments and emergent work problems were adequately identified and resolved. The inspectors verified that the licensee was complying with the requirements of 10 CFR 50.65 (a)(4) and the data output from the licensee's safety monitor associated with the risk profile of Units 1 and 2.

- Emergent work on "1H" EDG due to #8 cylinder air start check valve failure resulting in the extension of a maintenance outage, but overall risk remained Green;
- Emergent work for instrument air leak to 'B' water box vacuum breakers; overall risk remained Green;
- Emergent entry into 0-AP-41 due to a tornado watch which when combined with other unavailable equipment resulted in a yellow risk condition;
- Emergent work due to failure of '1H' EDG battery charger; overall risk remained Green.

##### b. Findings

No findings of significance were identified.

#### 1R15 Operability Evaluations

##### a. Inspection Scope

The inspectors reviewed six operability evaluations affecting the risk-significant mitigating system, listed below, to assess, as appropriate: (1) the technical adequacy of the evaluations; (2) whether continued system operability was warranted; (3) whether other existing degraded conditions were considered as compensating measures; (4) whether the compensatory measures, if involved, were in place, would work as intended, and were appropriately controlled; and (5) where continued operability was considered unjustified, the impact on TS Limiting Conditions for

Operation and the risk significance in accordance with the Significance Determination Process (SDP). The inspectors' review included a verification that determinations of operability were made as specified by procedure VPAP-1408, "System Operability."

- CR093429, review of OD000158, "Evaluate leak by of terry turbine steam supply valve;"
- CR092489, review of OD000154, "Deflected Control Rods on 2-SW-REJ-24E;"
- CR092894, review of OD000156, "Evaluate wall thickness;"
- CR091976, review of OD000152, "Perform OD for required actions on battery chargers," relative to EDGs during high winds and cold ambient conditions;
- CR098251, "1H EDG air stop check valve supply fitting failure – common cause failure review;" and,
- CR091896, review of OD000151, "#1 seal o-rings installed in 1-B RCP exceeded 6 year life on o-rings."

b. Findings

No findings of significance were identified.

1R17 Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed selected samples of evaluations to confirm that the licensee had appropriately considered the conditions under which changes to the facility, UFSAR, or procedures may be made, and tests conducted, without prior NRC approval. The inspectors reviewed evaluations for eight changes and additional information, such as drawings, calculations, supporting analyses, the UFSAR, and TS to confirm that the licensee had appropriately concluded that the changes could be accomplished without obtaining a license amendment. The eight evaluations reviewed are listed in the Attachment to this report.

The inspectors reviewed samples of changes for which the licensee had determined that evaluations were not required, to confirm that the licensee's conclusions to "screen out" these changes were correct and consistent with 10 CFR 50.59. The twenty-three "screened out" changes reviewed are listed in the Attachment to this report.

The inspectors evaluated engineering design change packages (DCPs) for fourteen material and design based modifications to evaluate the modifications for adverse effects on system availability, reliability, and functional capability. The fourteen modifications and the associated attributes reviewed are as follows:

DCP-99-003, Fuel Assembly Repair, 4/15/1999 (Barrier Integrity)

- Materials/Replacement Components
- Structural
- Licensing Basis
- Failure Modes

DCP-99-169, Charging Pump Upgrades, 1/27/2000 (Mitigating Systems)

- Materials/Replacement Components
- Failure Modes
- Licensing Basis
- Operations

DCP-01-160, Replacement of Vital Bus Inverters 1-III & 1-IV, 12/02/2005 (Mitigating Systems)

- Energy Needs
- Control Signals
- Operations
- Licensing Basis

DCP-01-162, Replacement of Vital Bus Inverters 2-III and 2-IV, 4/28/05, (Mitigating Systems)

- Energy Needs
- Material/Replacement Components
- Operations
- Structural
- Licensing Basis

DCP-02-015, Pump Modifications to Support Operation with Low Lake Anna Level, 10/24/2002 (Mitigating Systems)

- Process Medium
- Operations

DCP-02-016, Revision to Lake Anna Minimum Level, 3/24/2004 (Mitigating Systems)

- Operations
- Licensing Basis
- Structural

DCP-02-161, Emergency Diesel Fuel Oil Drain Header Replacement, 10/2/2002

- Energy Needs
- Materials/Replacement Components
- Structural

DCP 04-150, Install Manual Switch to Close Fire Protection Dampers in Unit 1&2 Emergency Switchgear Rooms, 1/13/05 (Mitigating Systems)

- Materials/Replacement Components
- Energy Needs
- Operations

DCP-05-007, Design Basis for North Anna Spent Fuel 100-hour Core Offload, 10/6/2005 (Barrier Integrity, Mitigating Systems)

- Heat Removal
- Licensing Basis

DCP-05-112, Replace FW Temperature RTDs and Re-scale Loop, 01/11/2006 (Mitigating Systems)

- Energy Needs
- Control Signals



- Process Medium
- Licensing Basis

DCP-05-117, Removal of Spare 7300 Process Cards, 6/1/05, (Initiating Events)

- Control Signals
- Licensing Basis
- Failure Modes

DCP-05-143, Relocation of Switchyard Breaker H502, and Replacement of Switchyard Breakers G1TH5 and G102, 02/07/2006 (Mitigating Systems)

- Energy Needs
- Timing
- Materials/Replacement Components
- Licensing Basis

DCP-06-138, Control Room Recorder Replacement, 12/14/2006 (Mitigating Systems)

- Energy Needs
- Process Medium
- Licensing Basis

DCP-07-155, CO<sub>2</sub> Fire Protection System Design Zone 2-2 Nozzle Replacement (Mitigating Systems)

- Materials/Replacement Components
- Energy Needs
- Equipment Protection
- Operations
- Licensing Basis

Documents reviewed and attached to this report included procedures, engineering calculations, modification design and implementation packages, work orders, site drawings, corrective action documents, applicable sections of the updated UFSAR, supporting analyses, Technical Specifications, and design basis information. The inspectors additionally reviewed test documentation to ensure adequacy in scope and conclusion. The inspectors verified that all changes were incorporated in licensing and design basis documents and associated plant procedures.

The inspectors also reviewed selected corrective action documents and the licensee's recent self-assessments associated with modifications and 10 CFR 50.59 screening/evaluation issues to verify that problems were identified at an appropriate threshold, were entered into the corrective action process, and appropriate corrective actions had been initiated and tracked to completion.

b. Findings

No findings of significance were identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed six post maintenance test procedures and/or test activities, as appropriate, for selected risk-significant mitigating systems to assess whether: (1) the effect of testing on the plant had been adequately addressed by control room and/or engineering personnel; (2) testing was adequate for the maintenance performed; (3) acceptance criteria were clear and adequately demonstrated operational readiness consistent with design and licensing basis documents; (4) test instrumentation had current calibrations, range, and accuracy consistent with the application; (5) test were performed as written with applicable prerequisites satisfied; (6) jumpers installed or leads lifted were properly controlled; (7) test equipment was removed following testing; and (8) equipment was returned to the status required to perform in accordance with licensee procedure VPAP-2003, "Post Maintenance Testing Program."

- WO 00798652-01, Obtain samples per engineering 3A Heat and Vent Exhaust Filter Bank;
- WO 00767749-01, Replace pump/motor assembly;
- WO 00804803-01 & 01A, Clean contacts on K1 relay;
- WO 00801938, Unit 2 2-SW-P-1A uncouple, couple replace seal;
- WO 00782951, Unit 2 1C Charging Pump Lube Flex Couplings – Clean Lube Oil Coolers; and,
- WO 00790617-01, Replace MOT on 1J EDG.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

For the eight surveillance tests listed below, the inspectors examined the test procedure, witnessed testing, reviewed test records and data packages, to determine whether the scope of testing adequately demonstrated that the affected equipment was functional and operable, and that the surveillance requirements of TS were met. The inspectors also determined whether the testing effectively demonstrated that the systems or components were operationally ready and capable of performing their intended safety functions. The inspectors reviewed four in-service testing activities for a risk significant pump or valve as part of the surveillance activities.

In-Service Test:

- 1-PT-63.1A.2, "Quench Spray System – "A" Subsystem Comprehensive Pump Test," Revision 12;
- 2-PT-213.7B, "Valve Inservice Inspection ("B" Train of Recirc Spray System)," Revision 12;
- 2-PT-64.4B.2, "Casing Cooling Pump (2-RS-P-3B) Biennial IST Comprehensive Pump Test," Revision 3;
- 1-PT-71.3Q.1, "1-FW-P-3B, B Motor-Driven AFW Pump IST Comprehensive Pump Test and Valve Testing," Revision 3;

- 2-PT-75.2B, "Service Water Pump (2-SW-P-1B) Quarterly Test," Revision 48; and,
- 2-PT-14.1, "Charging Pump 2-CH-P-1A," Revision 44.

Other Surveillance Tests:

- 2-PT-33.10, "Reactor Trip System Channel Operational Test for Reactor Coolant Pump Bus 2A Underfrequency," Revision 9; and,
- 2-PT-33.7, "Reactor Trip System Channel Operational Test for Reactor Coolant Pump Bus 2A Undervoltage," Revision 10.

b. Findings

No findings of significance were identified.

4. **OTHER ACTIVITIES**

4OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspectors reviewed the licensee's procedures for developing the data for the Barrier Integrity PI which are: (1) RCS Specific Activity; and (2) RCS Leakage. The inspectors examined data reported to the NRC for the period April 2007 through March 2008. Procedural guidance for reporting PI information and records used by the licensee to identify potential PI occurrences were also reviewed for both units. The inspectors reviewed the licensee event reports, corrective action program documents, and maintenance rules records as part of the verification process. The inspection was conducted in accordance with NRC Inspection Procedure 71151, "Performance Indicator Verification." The applicable planning standards, 10 CFR 50.0 and NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines," were used as reference criteria.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Review of items Entered into the Corrective Action Program:

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished by reviewing daily CR report summaries and periodically attending daily CR Review Team meetings.

.2 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment and corrective maintenance issues but also considered the results of daily inspector corrective action program item screening. The review also included issues documented outside the normal correction action program in system health reports, corrective maintenance works orders, component status reports, site monthly meeting reports and maintenance rule assessments. The inspectors' review nominally considered the six-month period of January 1, 2008 through June 30, 2008. The inspectors' compared and contrasted their results with the results contained in the licensee's latest integrated quarterly assessment report. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy.

b. Assessments and Observations

No findings of significance were identified. In general, the licensee has identified trends and has appropriately addressed the trends with their CAP. However, the inspectors identified an adverse trend in the completion quality of safety-related work order packages which may contain procedures used for performing maintenance or post-maintenance tests (PMT). Specifically, the following deficiencies are indicated below:

- WO 00787908-01: NRC identified incomplete foreign material exclusion (FME) checklist; incorrect date, incorrect step completion.
- WO 00796258-01: NRC identified no radiation work permit identified; incomplete FME checklist, incorrect dates; incorrect step completion.
- WO 00801525-01: NRC identified that PMT for motor heater operability test was not performed.
- WO 00801935-01: NRC identified missing signatures for work completion.
- WO 00797498-01: Licensee identified missing FME checklist; missing Lift/Land Lead sheet.
- WO 00767749-01: NRC identified missing page of FME checklist; incorrect step completion.
- WO 00783887-02: NRC identified that PMT for motor heater operability test was not performed.
- WO 00790617-01: NRC identified missing FME checklist.

The licensee acknowledged the identified trend and entered all of the above discrepancies into their CAP for appropriate corrective action.

3. Annual Samples

CR091896, #1 Seal O-rings Installed on 1-B-RCP

a. Inspection Scope

The inspectors reviewed the licensee's assessments and corrective actions for CR091896, "#1 Seal O-rings installed in 1-B RCP seal reach the end of qualified life." The condition report was reviewed to ensure that the full extent of the issue was identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized. The inspectors also evaluated the CR against the requirements of the licensee's CAP as specified in procedure, PI-AA-200, "Corrective Action Program," and 10 CFR 50, Appendix B.

b. Findings

No findings of significance were identified. On February 2, 2008, Unit 2 was removed from service because of degrading seal performance on the 'A' RCP. During the licensee's root cause evaluation, RCE000219, a procedural error was discovered in preventative maintenance procedure for RCP seals, 0-MPM-0110-01, that involved replacement of the #1 seal high temperature o-rings. Specifically, the procedure states that the applicable o-ring service history and current leak data must be reviewed, and if the o-rings have been installed greater than 9 years or the #1 seal leak rate changes by greater than .3 gallons per minute, then component engineering must perform an evaluation to determine requirements for inspection or seal replacement. However, the seal vendor technical manual recommends replacement of the #1 seal ring and runner o-rings every 45,000 hours of operation or 6 years. The licensee reviewed seal replacement history for both units and determined that the Unit 2 'B' RCP #1 seal high temperature o-rings were installed in October, 2001, but were not replaced during a subsequent refueling outage in 2007. The licensee initiated CR091896 for corrective action and performed an apparent cause evaluation, ACE013661, which determined a cause category of inadequate written instructions.

The inspectors reviewed ACE013661 and verified the cause and related corrective actions. The inspectors also noted and reviewed compensatory measures, described below, initiated by the licensee due to the potential impact of a seal failure on the licensee's 10 CFR 50, Appendix R analysis.

- Initiate trending of Unit 2 'B' RCP #1 seal parameters for indications of degrading performance.
- Establish a twice per shift fire watch in the auxiliary building areas involving the charging pumps, component cooling (CC) pumps and respective power supply cables to reduce the risk of a fire resulting in a loss of normal and backup seal cooling.
- Establish zones prohibiting transient combustibles within 20 feet of Unit 1 charging pump power cables and reschedule any 'hot work' involving components in the areas of the charging pumps, CC pumps and respective power cables. This protects the unit charging cross-tie function.

The inspectors will continue to monitor the licensee's compensatory actions. The inspectors also verified initiation of WO 00802328-01 to replace all o-rings in the Unit 2 'B' RCP #1 seal and actions to correct 0-MPM-0110-01.

CR090845, '2H' and '2J' EDG Batteries Were Found Out of Spec

a. Inspection Scope

During the first and second quarters the inspectors reviewed the licensee's assessments and corrective actions for CR090845, "2H and 2J diesel batteries were found out of spec," to ensure that the full extent of the issue was identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized. The inspectors also evaluated the CR against the requirements of the licensee's CAP as specified in procedure, PI-AA-200, "Corrective Action Program," and 10 CFR 50, Appendix B.

b. Findings

Introduction: A self-revealing NCV of 10 CFR 50, Appendix B, Criterion XVI was identified for failure to take prompt corrective actions for a previously identified condition adverse to quality related to battery charger operation in low ambient temperatures which resulted in the inoperability of the Unit 2 '2H' and '2J' EDG.

Description: On February 10, 2008, Unit 2 entered TS 3.8.4, "DC Sources - Operating," and 3.8.1, "AC Sources - Operating," and declared the '2H' EDG inoperable when the respective battery voltage was found to be 128 volts DC (VDC) which was contrary to the TS required value of greater than or equal to 129VDC. After the licensee adjusted voltage to above the TS limit they determined that the '2J' EDG was inoperable for the same condition and adjusted voltage to within TS limits. The licensee initiated CR090845 for the events and subsequently completed ACE013643.

The inspectors reviewed the ACE and noted that the licensee selected the apparent cause categories of "Inadequate Written Instructions/Communications," "Mindset (Intentions)," and "Lack of Proficiency/Inexperience." The inspectors performed a review of the licensee's CAP for previous related problems within the last two years and identified the following issues:

- Plant Issue N-2006-0228 dated January 18, 2006: All 4 EDG battery chargers were adjusted because strong winds and low temperatures caused voltage to decrease. The inspectors noted licensee comments stating that "this is a known problem," and "REA R2005-070 is in progress to replace these battery chargers to improve stability.
- CR003203 dated October 25, 2006: The corrective action requested the annunciator setpoints for all EDG battery charger low voltage be raised to 130VDC in order to provide warning prior to the TS limit of 129VDC. The licensee initiated action to include this change in design change package (DCP) 06-103 which will replace all of the battery chargers. The inspectors reviewed a previous Plant Issues, N-1999-2245 and N-2005-0845, which also noted the same problem.
- CR006814 dated January 26, 2007: Cooler outside air temperature reduced room temperature resulting in a reduction of '2J' EDG battery voltage to approximately 130VDC. The licensee noted that Plant Issue N-2005-0845 was tracking upgrades to eliminate this problem.

The inspectors also searched the CAP for any related issues in 2005 and identified Plant Issues N-2005-0675, N-2005-0830 and N-2005-0845 initiated during February and March respectively. All three Plant Issues identified negative impacts of weather changes or wind and temperature on EDG battery charger voltage that required

adjustments to maintain operability. Specifically, N-2005-0845-E1 stated in the section for impact on equipment operability, "The wind affects have made the diesel inoperable on low battery voltage and lube oil temperature." While this Plant Issue was initiated based on inoperability of '2H' EDG due to low lube oil temperature, this plant issue also initiated a request for engineering action (REA) 2005-070, to upgrade the battery charger to minimize temperature affects on charger which causes battery voltage to decrease and a REA to address a setpoint change of the battery voltage annunciator from 110 VDC to 130 VDC. From this REA design change process (DCP) 06-103 was initiated to implement the modification for battery charger upgrade and alarm setpoint change.

Further reviews of the CAP identified Plant Issue N-2002-0262 which documented inoperability of '2H' EDG for low battery voltage resulting from cold temperatures and wind gusts. Moreover, from 1999 through 2001 there were nine Plant Issues involving EDG battery low voltage, occurring during the months of September through May that had general causes related to poor voltage regulation coupled with aging of components, and involved five instances of battery voltage less than the TS limit.

The inspectors also reviewed other indications of EDG battery voltage available to the control room operators and noted a chart recorder with the same alarm setpoints as the aforementioned annunciators. The inspectors also identified that the Unit 2 plant computer system (PCS) has indications, V2BY011A and V2BY012A, for 2H and 2J batter voltage respectively. The inspectors noted that these indications have low and low-low alarm setpoints of 129.5VDC and 129VDC respectively. However, the alarms had been defeated due to nuisance alarms with uncompleted work requests initiated on November 9, 2005. The inspectors determined that the alarms were due to brief, intermittent decreases of indicated battery voltage for which the licensee initiated CR091336 to evaluate and correct. The licensee also initiated CR093473 to evaluate why the PCS alarm problem had not been corrected because they could have been used to provide an early warning of battery voltage problems.

Finally, the inspectors also reviewed the licensee's use of local meteorological information available on the PCS and via their internal communications. These indications are relied upon to know when the appropriate adverse weather procedures should be entered. The inspectors noted that on the day of the event the licensee entered 0-AP-41, "Severe Weather," due to a high wind advisory from the National Oceanic and Atmospheric Administration (NOAA). Additionally, the licensee had a standing entry in their risk program for 0-AP-41 due to freezing/icing conditions. The inspectors also noted that the licensee initiated more frequent local monitoring of the battery chargers during cold weather conditions including work orders to allow electrical maintenance to periodically adjust voltage as required. However, the inspectors determined that these actions did not preclude inoperability of the respective EDG.

The inspectors concluded that the licensee had prior knowledge of a condition adverse to quality which was the EDG battery charger reduced voltage output in low temperature ambient conditions. The inspectors also concluded the licensee had reasonable opportunity to take prompt corrective actions to ensure the battery chargers remained within ambient temperature conditions to ensure operability. An example is the licensee action to install a fan-heater component per GOP to ensure the EDG governor temperature remains greater than the low limit of 60 degrees

Fahrenheit. The inspectors determined that the licensee's actions for increased monitoring during cold weather periods was insufficient to preclude EDG inoperability.

Analysis: The inspectors determined that the failure to implement prompt corrective actions for a known condition adverse to quality as required by 10 CFR 50, Appendix B, Criterion XVI, is a performance deficiency. The inspectors reviewed IMC 0612, Appendix B, and determined the finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of equipment performance because prompt corrective actions were not implemented to preclude inoperable EDGs due to low battery charger voltage. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of very low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of problem identification and resolution, the component of the CAP and the aspect of appropriate corrective action, P.1(d), because no corrective actions were taken to ensure the battery chargers operated in an adequate temperature environment.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part that conditions adverse to quality are promptly identified and corrected. Contrary to this, on February 10, 2008, both '2H' and '2J' EDGs were discovered inoperable due to low battery voltage because the licensee failed to take prompt corrective actions for a previously identified condition adverse to quality related to battery charger operation in low ambient temperatures. Because the finding is of very low safety significance and because it has been entered into the licensee's CAP as CR 090845, this violation is being treated as a Green NCV, consistent with Section VI.A .1 of the NRC Enforcement Policy: NCV 05000339/2008003-03, Inoperable Unit 2 Emergency Diesel Generators Due to Failure to Implement Corrective Actions for Battery Chargers.

CR094772, 2H EDG Oil Leakage Increasing and CR101714, Technical Specification Violation for Two Service Water Pumps Inoperable for Greater Than Allowed Completion Time

a. Inspection Scope

The inspectors reviewed CR094772, "2H diesel oil leakage increasing," and related CRs to ensure that the full extent of the issue was identified, an appropriate evaluation was performed, and appropriate corrective actions were specified and prioritized. The inspectors also evaluated the CR against the requirements of the licensee's CAP as specified in procedure, PI-AA-200, "Corrective Action Program," and 10 CFR 50, Appendix B.

b. Findings

Introduction: A self-revealing, NCV of 10 CFR 50, Appendix B, Criterion V, was identified for failure to prescribe adequate work instructions for maintenance on the



Unit 2 '2H' emergency diesel generator (EDG) standby lube oil pump which resulted in a failure of the EDG.

Description: On April 5, 2008, after monitoring increasing oil leakage on the '2H' EDG exhaust manifolds since April 1, 2008, the licensee declared the EDG inoperable and performed an air roll of the EDG which indicated the cylinders had excessive oil accumulation. The inspectors reviewed the licensee's RCE000225 which determined that due to inadequate work instructions per WO 00767749-01, the wrong size pump internals had been installed in the standby lube oil pump during a maintenance outage that occurred from March 24 through March 29, 2008. This resulted in a pump discharge flow of 20 gallons per minute (gpm) versus a normal 10 gpm which led to oil flow to the upper crankcase, into the cylinders and eventually the exhaust manifolds. Fortunately, the '2H' EDG had exhaust manifold leaks which allowed leakage of the accumulating oil which the inspectors concluded was a readily detectable degradation in the material condition, capability, or functionality of equipment, i.e., a self-revealing condition. The RCE also determined that based on the failure mode leading to the oil accumulation in the EDG cylinders, '2H' EDG was inoperable approximately 3 hours and 41 minutes after completion of the operability performance test on March 29, 2008, at 1319 hours. Further review of the RCE by the inspectors revealed that the licensee failed to identify a TS violation related to the SW system.

The licensee had previously removed Unit 1 'B' SW pump from service on April 1, 2008, for motor replacement. Therefore, when the licensee declared '2H' EDG inoperable on April 5, 2008, they also declared the Unit 2 'A' SW pump inoperable, in accordance with TS 3.8.1, condition B2, and entered a 72 hour LCO as required by TS 3.7.8 and 3.0.2. The Unit 1 'B' SW pump was subsequently returned to service on April 6, 2008, and '2H' EDG was returned to service on April 9, 2008. The inspectors reviewed RCE000225, and related documents including the licensee's probabilistic risk analysis. The inspectors subsequently determined that although the licensee concluded that the '2H' EDG was inoperable shortly after it was returned to service on March 29, 2008, the licensee failed to identify that when the Unit 1 'B' SW pump was removed from service on April 1, 2008, that a 72 hour LCO per TS 3.7.8 was also in effect in accordance with required actions per TS 3.8.1. Consequently, the actions required per TS 3.7.8 were not carried out resulting in a TS violation with attendant reporting requirements. The inspectors noted that although the Unit 2 'A' SW pump was technically inoperable, it remained available based on the availability of its normal power supply. The licensee entered this problem into their CAP as CR101714 and submitted Licensee Event Report 05000338, 339/2008-001-00 to document the problem.

In accordance with the Enforcement Manual, the inspectors determined that the NCV of 10 CFR 50, Appendix B, Criterion V, was the primary cause of the events involving the '2H' EDG and the violation of TS 3.7.8.

Analysis: The inspectors determined the failure to prescribe adequate work instructions resulting in the failure of '2H' EDG was contrary to 10 CFR 50, Appendix B, Criterion V, and was therefore a performance deficiency or finding. The inspectors reviewed IMC 0612, Appendix B, and determined the finding was more than minor because it impacted the mitigating systems cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences, and the related attribute of configuration control because the licensee failed to take TS specified actions to place the units in the

required system/plant configuration. The inspectors reviewed IMC 0609, Appendix A, and determined that the finding was of low safety significance or Green because it did not result in a loss of operability due to a design or qualification deficiency, did not represent an actual loss of safety function, did not result in a train being out of service longer than allowed by TS, and was not potentially risk significant due to possible external events. The cause of this finding involved the cross-cutting area of human performance, the component of resources, and the aspect of documentation, procedures and component labeling, H.2(c), because the licensee failed to prescribe adequate work instructions for the '2H' EDG standby lube oil pump resulting in a failure of the EDG.

Enforcement: 10 CFR 50, Appendix B, Criterion V requires in part that activities affecting quality shall be prescribed by documented instructions of a type appropriate to the circumstances. Contrary to the above, on April 5, 2008, the licensee failed to prescribe adequate work instructions for standby lube oil pump which resulted in a failure of the '2H' EDG. Because the finding is of very low safety significance and because it has been entered into the licensee's CAP as CRs 094681, 094728 and 094772, this violation is being treated as a Green NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000338, 339/2008003-04, Failure to Prescribe Adequate Work Instructions Results in Failure of '2H' Emergency Diesel Generator.

#### 40A3 Event Followup

- .1 (Closed) Licensee Event Report (LER) 05000339/2007-004-00 and Revised LER 05000339/2007-004-01: Automatic Reactor Trip Due to Loss of Coolant Flow with Power Greater Than 30 Percent

On December 25, 2007, at 2110 hours, with Unit 2 at approximately full rated thermal power an automatic reactor trip occurred due to loss of coolant flow in the 'B' loop. The cause was determined to be a trip of the 'B' RCP motor due to actuation of the neutral over current protection relay. The licensee installed a spare motor in order to return the unit to service. The licensee documented the corrective actions associated with this event in CR027748. The inspectors reviewed the LER and related cause evaluations. The enforcement aspects of a self-revealing finding are discussed in Section 1R12 of this report. This LER is closed.

- .2 (Closed) LER 05000338, 339/2008-001-00: Two Service Water Pumps Inoperable Greater Than Technical Specification Allowed Completion Time.

On April 1, 2008, the Unit 1 'B' SW pump was removed from service for motor maintenance. On April 5, 2008, the Unit 2 '2H' EDG was declared inoperable due to excessive oil leakage from the exhaust manifolds. In compliance with TS, inoperability of the 2H EDG also rendered the Unit 2 'A' SW pump inoperable resulting in a 72 hour LCO per TS 3.7.8 for the SW system. Subsequently, the cause of the 2H EDG inoperability was identified as an incorrect impellor installed in the associated standby lube oil pump during a maintenance outage for the 2'H' EDG from March 24 through March 29, 2008. Consequently, the two SW pumps were inoperable for greater than the TS allowed completion time. The inspectors completed a review of the LER and related corrective action documents. The

enforcement aspects of an NRC identified finding and a licensee identified finding are discussed in Sections 4OA2 and 4OA7, respectively, of this report.

#### 4OA5 Other Activities

##### .1 (Closed) Temporary Instruction (TI) 2515/166, Pressurized Water reactor Containment Sump Blockage (NRC Generic Letter 2004-02) Units 1 & 2

###### a. Inspection Scope

The inspector reviewed the status of the implementation of the licensee's actions in response to Generic Letter (GL) 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors, for Units 1 and 2. The onsite inspections which verified the installation of modifications were performed in April and October of 2007 (NRC Report Nos.: 50-338,339/2007003 and 50-338,339/2007005). The licensee's GL 2004-02 commitments which were incomplete at the time of the on-site inspections included chemical effects and downstream effects analyses to support the installed strainer design and program changes to assure the assumptions of the GL 2004-02 /GSI-191 design basis assumptions remained valid. The inspector requested information to review the status of the incomplete commitment items and performed an in-office review during the week of May 5-9, 2008, to verify completion of the outstanding commitment items.

The inspector reviewed the licensee design and licensing documentation to verify that the GL 2004-02 modifications and program changes were complete and to determine the status of GL 2004-02 commitments which were not completed during the previous onsite inspections

###### b. Findings

No findings of significance were identified.

Plant physical modifications and program changes identified in the licensee's initial and supplemental responses to GL 2004-02 were complete.

The chemical effects and downstream analyses were not complete. A completion date extension for these analyses was granted until May 31, 2008 (USNRC letter to VEPCO, dated 12/13/07). The licensee requested additional extension to September 30, 2008 (Dominion letter to USNRC, dated May 22, 2008). Any additional plant changes identified as a result of these analyses will be reviewed via the routine design control inspection activity implemented by the existing reactor oversight program.

A violation was identified and documented in a previous NRC inspection report related to implementation of the GL 2004-02 strainer modification, NCV 05000339/2008002-04, Inadequate Design Control Involving Unit 2 Containment Sump Strainer Gaps.

This documentation of TI-2515/166 completion as well as any results of sampling audits of licensee actions will be reviewed by the NRC staff (Office of Nuclear Reactor

Regulation - NRR) as input along with the GL 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" responses to support closure of GL 2004-02 and Generic Safety Issue (GSI)-191 "Assessment of Debris Accumulation on Pressurized-Water Reactor (PWR) Sump Performance." The NRC will notify each licensee by letter of the results of the overall assessment as to whether GSI-191 and GL 2004-02 have been satisfactorily addressed at that licensee's plant(s). Completion of TI-2515/166 does not necessarily indicate that a licensee has finished all testing and analyses needed to demonstrate the adequacy of their modifications and procedure changes. Licensees may also have obtained approval of plant-specific extensions that allow for later implementation of plant modifications. Licensees will confirm completion of all corrective actions to the NRC. The NRC will track all such yet-to-be-performed items identified in the TI-2515/166 inspection reports to completion and may choose to inspect implementation of some or all of them.

.2 Quarterly Resident Inspector Observations of Security Personnel and Activities

a. Inspection Scope

During the inspection period, the inspectors conducted the following three observations of security force personnel and activities to ensure that the activities were consistent with the licensee security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

- Tour of armed response team ready room;
- Tour of ready room, BRE and CAS stations; and,
- Direct observation of security equipment testing for exposure detector.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

.3 Review of the Operation of an Independent Spent Fuel Storage Installation (Inspection Procedure 60855.1)

a. Inspection Scope

Inspectors reviewed the normal operations of the ISFSI. The inspectors walked down the ISFSI pad to assess the material condition of the casks, the installation of security equipment, and the performance of the monitoring systems. In preparation for an upcoming cask load involving the NUHOMS® design the inspectors reviewed licensee cask loading and handling procedures and reviewed previous cask loading and ISFSI related plant issues and corrective actions status. Additionally, the inspectors observed cask loading during the week of June 2, 2008, to verify that work

was performed in accordance with approved procedures and that loaded fuel assemblies were identified and recorded in a controlled document.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

.1 Exit Meeting Summary

On July 9, 2008, the senior resident inspector presented the inspection results for the routine integrated quarterly report to Mr. Dan Stoddard and other members of the staff. The licensee acknowledged the findings. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary. No proprietary information was identified.

.2 Temporary Instruction 2515/166 Exit Meeting

An interim meeting was conducted via telephone on May 27, 2008 with Mr. P. Kemp.

.3 10 CFR 50.59, Modifications Exit Meeting

An interim exit meeting with licensee management and staff was conducted on June 4, 2008, to discuss the results of this inspection. Proprietary information, reviewed by the team as part of routine inspection activities, was returned to the licensee in accordance with prescribed controls.

ATTACHMENT: SUPPLEMENTAL INFORMATION

**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT**Licensee personnel:

V. Armentrout, SG Programs, ISI Corporate  
 J. Bailey, Manager Vendor Quality  
 J. Breeden, Supervisor, Radioactive Analysis and Material Control  
 W. Corbin, Director, Nuclear Engineering  
 R. Evans, Manager, Radiological Protection and Chemistry  
 R. Foster, Supply Chain Manager  
 E. Hendrixson, Director, Nuclear Safety and Licensing  
 S. Hughes, Manager, Nuclear Operations  
 P. Kemp, Supervisor, Station Licensing  
 J. Kirkpatrick, Manager, Nuclear Maintenance  
 L. Lane, Plant Manager  
 G. Lear, Manager, Organizational Effectiveness  
 J. Leberstien, Licensing Technical Consultant  
 T. Maddy, Manager, Nuclear Protection Services  
 M. Main, Component Engineer  
 G. Marshall, Manager, Nuclear Outage and Planning  
 C. McClain, Manager, Nuclear Training  
 J. McHale, Engineering Supervisor  
 F. Mladen, Manager, Nuclear Site Services  
 B. Morrison, Supervisor Nuclear Engineering  
 J. Rayman, Nuclear Emergency Preparedness  
 J. Scott, Supervisor, Nuclear Training (operations)  
 D. Stoddard, Site Vice President  
 R. Williams, Component Engineer

**LIST OF ITEMS OPENED, CLOSED AND DISCUSSED**Opened and Closed

05000338/2008003-01	NCV	Unavailability of '1H' EDG Due to Failure to Adequately Establish Procedural Requirements for Air Start Check Valve Maintenance (Section 1R12.1)
05000339/2008003-02	NCV	Failure to Adequately Establish Procedural Requirements for Service Water Motor Maintenance (Section 1R12.2)
05000339/2008003-03	NCV	Inoperable Unit 2 Emergency Diesel Generators Due to Failure to Implement Corrective Actions for Battery Chargers (Section 4OA2)

Enclosure

05000338, 339/2008003-04 NCV Failure to Prescribe Adequate Work Instructions Results in Failure of '2H' Emergency Diesel Generator (Section 4OA2)

Closed  
2515/166

TI Pressurized Water Reactor Containment Sump Blockage (NRC Generic Letter 2004-02) Units 1 & 2 (Section 4OA5.1)

05000339/2007-004-00 LER Automatic Reactor Trip Due to Loss of Coolant Flow With Power Greater Than 30 Percent

05000339/2007-004-01 LER Automatic Reactor Trip Due to Loss of Coolant Flow With Power Greater Than 30 Percent (Revised)

05000338, 339/2008-001-00 LER Two Service Water Pumps Inoperable Greater Than Technical Specification Allowed Completion Time

Discussed

None

## LIST OF DOCUMENTS REVIEWED

### Section 1R17: Evaluations of Changes, Tests, or Experiments and Permanent Plant Modifications

#### Full Evaluations

- 99-SE-MOD-04, Fuel Assembly Repair 4/15/1999
- 06-SE-MOD-01, Abandonment of Incore Thermocouples, 3/29/2006
- 06-SE-OT-01, Reload Safety Evaluation, 3/31/2006
- 06-SE-OT-02, Technical Report NE-1453, Rev. 0, Addendum 002, Reload Safety Evaluation, North Anna 2 Cycle 18 Pattern MOE, 3/31/2006
- 07-SE-OT-01, Reduced Recirculation Spray Pump Flowrates, 9/3/2007
- 07-SE-ST-01, Special Test Procedure, 0-ST-FP-001, Low Pressure CO<sub>2</sub> Blower Door Test, 8/27/2007
- DCP-99-003, Fuel Assembly Repair, 4/15/1999 (associated with 99-SE-MOD-04)
- DCP-99-169, Charging Pump Upgrades, 1/27/2000
- TSCR N-018, Eliminate Transmitter Response Time Testing Requirements, 9/11/2007

#### Screened Out Items - Modifications

- DCP 01-121, Safety Injection (SI) Accumulator Nozzle Replacement, 3/17/2001
- DCP 01-160, Replacement of Vital Bus Inverters 1-III & 1-IV, 12/02/2005
- DCP 01-162, Replacement of Vital Bus Inverters 2-III and 2-IV, 4/28/2005
- DCP 02-015, Pump Modifications to Support Operations with Low Lake Anna Level, 10/24/2002
- DCP 02-016, Revision to Lake Anna Minimum Level, 3/24/2004
- DCP 02-161, Emergency Diesel Fuel Oil Drain Header Replacement, 10/2/2002
- DCP 04-150, Install Manual Switch to Close FP Dampers in Unit 1&2 Emergency Switchgear Rooms, 12/16/2004
- DCP 05-007, Design Basis for North Anna Spent Fuel 100 hr Core Offload, 10/6/2005
- DCP 05-112, Replace FW Temperature RTDs and Re-Scale Loop, 01/11/2006
- DCP 05-117, Removal of Spare 7300 Process Cards, 6/1/2005
- DCP 05-143, Relocation of Switchyard Breaker H502, and Replacement of Switchyard Breakers G1th% and G102, 02/07/2006
- DCP 05-152, HV Motor Replacement, 1/26/06
- DCP 06-138, Control Room Recorder Replacement, 12/14/2006

#### Screened Out Items - Item Equivalency Evaluation Review (Like for Like)

- IEER NOM00163-000, Mechanical Seal 01-SW-P-22A/B-Pump, Chesterton 180 Seal Replacing Chesterton 123 Seal, 10/23/2006
- IEER 10000001417, Installation of Chesterton 180 Seal Replacing Chesterton 123 on 1-SW-P-22A/B, 5/7/2008
- IEER NEL00950-000, RCS Temperature Transmitter, 6/7/2006
- IEER NEL00984-000, Emergency Diesel Generator Battery, 11/29/2006
- IEER NEL00961-000, Transient Event Recorder Power Supply – Replace Filter Capacitor; Model 53D to Model 066151U400JS2, 05/09/2006
- IEER NEL01012-000, Circuit Breaker – Eaton Model, 4/20/2007
- IEER NVL 0009-002, 3" Globe Valve 1500#, 6/12/2006
- IEER NVL 0175-000, ½ in. brass valve with Stainless Steel Trim, Air Operated valve,

Enclosure



Powers Flowrite 593ss in lieu of 591- 7971, 9/6/2006

Screened Out Items Procurement Technical Evaluation (Commercial Grade Dedication)

- PTE 000 NOM00020-A03, Pump W/Motor, Service Water Radiation Monitoring, 01-SW-P-10, 4/18/2002
- PTE 42057909, 1 Inch brass relief valve for Control Room Chillers, 7/30/2007

Design Basis Documents

- SDBD-NAPS-EA, North Anna Power Generation System, Revision 10
- SDBD-NAPS-FP, System Design Basis Document for Fire Protection System North Anna Power Station, Revision 9
- SDBD-NAPS-FP, DBD Change Request NFP-2007-06
- SDBD-NAPS-FP, DBD Change Request NFP-2008-01
- SDBD-NAPS-FP, System Design Basis Document for Control Room Ventilation System North Anna Power Station, Revision 8
- SDBD-NAPS-HC, DBD Change Request NHC-2005-03

Licensing Basis Documents

- Technical Specifications, Current
- Updated Final Safety Analysis Report, Current

Corrective Actions

- N-2005-4372-R1, Initial Load Bank Testing on Inverter 2-IV Failed, 10/13/2005

Procedures

- VPAP-3001, Safety and Regulatory Reviews, Revision 15
- DNAP-3004, Dominion Program for 10 CFR 50.59 and 10 CFR 72.48 – Changes, Tests, and Experiments, Revision 2
- 0-AP-10, Loss of Electrical Power, Revision 59
- 1-AP-20, Operation From the Auxiliary Shutdown Panel, Revision 23
- 2-AP-20, Operation From the Auxiliary Shutdown Panel, Revision 21
- 0-FS-CR-1, Control Room – Units 1 and 2 Safe Shutdown Equipment, Revision 0
- 1-OP-26.5, 120 V Vital Bus Distribution Revision 27
- 0-FCA-1, Mitigation of Spurious Valve Operation, Revision 34
- 0-NAT-E-001, Revision 0, Electrical Loop Functional Checkout Action Sheet, 10/13/2005
- 1-PT-138.3B, Combined Charging Pump 1B Head curve Verification and HHSI Branch Flow Verification, Revision 6 and Revision 8
- 2-PT-138.AB, Combined Charging Pump 1A Head curve Verification and HHSI Branch Flow Verification, Revision 5
- 0-ST-FP-001, Low Pressure CO<sub>2</sub> Blower Door Test, Revision 0
- 1-ICP-RC-L-1460, Revision 3, Pressurizer Level Protection Channel II Calibration, 9/13/2007
- NASES 6.20, Revision 1, Test Plan for DCP 01-162, 4/26/2005
- 47241, Test Procedure for Seismic Testing of One DC Inverter, 5/20/2002

Work Orders

- 1-PT-31.8.2-779573-01, Pressurizer Level Protection Channel II Calibration

Enclosure

Calculations

- 131035-Z2-2, Low Pressure CO<sub>2</sub> Hydraulic Calculations, Unit 2, Revision 1
- EE-0057, DC Equipment Sizing, Revision 1
- EE-0718, North Anna Feedwater Temperature Uncertainty, Revision 0
- EE-0718, North Anna Feedwater Temperature Uncertainty, Revision 1
- 14258.79-E-4, Short Circuit Currents 120 V AC Vital Buses and Misc. Circuits-App. R Evaluation, Revision 1
- ME-0491, Spent Fuel Pit Cooling System Analysis, Revision 0
- NE-0154, Minimum Quantity for Fire Protection Low Pressure CO<sub>2</sub> Tanks 1-FP-TK-06 and 1-FP-TK-5, Revision 002
- NE-0165, Volume Calculation of North Anna Fire Zones Protected by Low Pressure CO<sub>2</sub> Revision 000

Drawings

- N-04150-0-1FE12AR, Wiring Diagram – Emergency Switchgear Room – Halon 1301 Aux Relay & Abort / Lockout Panels – North Anna Power Station – Units 1 & 2, Revision 0
- N-04150-0-1FP089, Sheet 1, Fire Protection System – Unit 1 Emergency Switchgear Room Halon Control & Alarm, Revision 0
- N-04150-0-2FP041, Sheet 1, Fire Protection System – Unit 2 Emergency Switchgear Room Halon Control & Alarm, Revision 0
- N-051430101FE1BD, One Line Switching Diagram Switchyard, Revision 0
- N-05143-1-FE1BB, One Line Diagram Electrical Distribution System, Revision 0
- N-05143-1-1ESK4CC-1-A, Outline Switchyard Monitor Panel, Revision 0
- N-05143-1-1ESK4CC-1-B, Outline Switchyard Monitor Panel, Revision 1
- 11715-FE-1BB, One Line Diagram Electrical Distribution System, Revision 39
- 11715-FE-1BD, One Line Switching Diagram Switchyard, Revision 11
- 11715-FE-1BD, One Line Switching Diagram Switchyard, Revision 27
- 11715-FH-32A, Treatment Lagoon Discharge Structure Dike III SH-1 North Anna Power Station, Revision 5
- NA-DW-6008D13, Loop #1 Feedwater Control System, Revision 0
- NA-DW-6008D49, Loop #2 Feedwater Control System, Revision 0
- NA-DW-6008D63, Loop #3 Feedwater Control System, Revision 0

Post Modification Testing

- NASES 6.20 Attachment 2, Test Plan for DCP 05-112, Revision 1
- NASES 6.22 Attachment 2, Testing and Inspection of FW RTDs for DCP 05-112, Revision 0
- Testing Release for 1-RC-LR-1310A, 02/19/2007
- Testing Release for 2-RC-LR-2310A, 02/15/2007
- Testing Release for 1-LM-PR-110B, 02/13/2007
- Testing Release for 1-RH-TR-1604, 01/31/2007
- Testing Release for 2-FW-LR-2477, 01/31/2007
- Testing Release for 2-RH-TR-2604, 01/31/2007
- Testing Release for 1-LW-FR-104, 01/10/2007
- Testing Release for 1-L0-XR-SGVRP, 01/31/2007
- Testing Release for 2-LO-XR-SGVRP, 02/05/2007
- Testing Release for 2-LM-PR-210B, 02/12/2007

- Testing Release for 1-HC-H2R-101-1, 02/22/2007
- Testing Release for 2-HC-H2R-201-2, 01/10/2007
- Testing Release for 2-FW-FR-2478, 02/26/2007
- Testing Release for 2-FW-FR-2488, 02/26/2007
- Testing Release for 2-FW-FR-2498, 02/27/2007

#### Calibration Data

- Calibration Data Record for NQC-0496, 06/02/2006
- Calibration Data Record for NQC-0496, 11/30/2005
- Calibration Data Record for NQC-0496, 01/02/2008
- Calibration Data Record for NQC-0496, 06/04/2007
- Calibration Data Record for NQC-0496, 12/01/2006

#### Technical Reports

- NE-1401, Rev. 0, Operational Impact of Framatome Fuel and use of the CASMO/SIMULATE Code Package at North Anna, April 2, 2004
- NE-1452, Rev. 0, Reload Safety Analysis Checklist North Anna 2 Cycle 18 Pattern MOE, September 22, 2005
- NE-1453, Rev. 0, Addendum 002, Reload Safety Evaluation, North Anna 2 Cycle 18 Pattern MOE, April 2006

#### Engineering Transmittals

- ET-SE-99-086, Evaluation of Hydraulic Performance of CH/HHSI Rotating Assembly Ingersoll-Dresser serial Number NE012911-01 - North Anna Power Station, Unit 1 and 2, Revision 0
- ET-N-01-122, Evaluation of Hydraulic Performance of CH/HHSI Rotating Assembly Flowserve BR/Order 7029-2673 - North Anna Power Station, Unit 1 and 2, Revision 0
- ET-N-02-068, Evaluation of Replacement Rotating Element for Charging Pump 2-CH-P-1B - North Anna Power Station, Unit 2, Revision 0
- ET- N-03-0144, Evaluation of Replacement Rotating Element for Charging Pump 2-CH-P-1A - North Anna Power Station, Unit 2, Revision 0
- ET- N-04-0057, Evaluation of Replacement Rotating Element for Charging Pump 2-CH-P-1C - North Anna Power Station, Unit 1, Revision 0
- ET- N-05-0072, Evaluation of Replacement Rotating Element for Charging Pump 2-CH-P-1B - North Anna Power Station, Unit 1, Revision 0
- ET-N-07-0049, Revision to North Anna Technical Specifications Bases to Eliminate Periodic Pressure Sensor Response Time Tests and Periodic Protection Channel Response Time Tests, Revision 0
- ET-N-07-0077, Evaluation of Low Pressure CO<sub>2</sub> System Vendor Calculation and Blower Test, Revision 1
- ET-N-07-0109, Estimating Water Flow Rate through Dike 3, Revision 0

#### Vendor Manuals

- 59-W813-00006, Vendor Technical Manual for Weed Instrument RTD Temperature Sensors
- 59-5984-00004, Component List For A Bill of Material, 3/20/02

#### Miscellaneous documents

- AREVA Letter FAB06-226, North Anna Advanced Mark-BW Top Nozzle Change Evaluation, March 29, 2006
- Request for Engineering Assistance – Tracking No. R2003-128, 8/27/2003
- NCRODP-6, Fire Protection System, 5/2/2007
- Procurement Engineering Inspection Plan 208, 4/18/2002
- Purchase Order no. 45526645, 7/18/2007
- O-MAT-E-001, Electrical Loop Functional Checkout Sheet
- Short Circuit Simulation Results for G102-1 and G102-2
- NAP-0111, Specification for Vital Bus Static Inverters, Revision 0
- CM-NA-FCI-0213, Enhanced Surveillance Program for Rosemount Transmitters IAW CB 90-01: Loss of Oil-Fill in Transmitters Manufactured by Rosemount, Revision 0
- LBDCR N-018, TS Bases Change Eliminate Periodic Pressure Sensor Response Time Tests and Periodic Protection Channel Response Time Tests, Revision 0
- WCAP-14036-P-A, Elimination of Periodic Protection Channel Response Time Tests, Revision 1

Corrective Actions Written as a Result of this Inspection

- CR100465, Receipt Inspection Package contains typographical error, 6/3/2008

**Section 40A5: Other Activities**

Temporary Instruction (TI) 2515/166

- Procedure VPAP-0301, Design Change Process, Revision 26
- Procedure VPAP-0905, Insulation Control Program, Revision 4
- DNES-VA-MAT-1007, Protective Coating Requirements for procured Equipment to be Installed Inside Containment, Revision 0
- Letter, VEPCO to USNRC, North Anna Power Station Units 1 and 2, Supplemental Response to NRC GL 2004-02 Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at PWRs, dated February 29, 2008
- Letter, USNRC to VEPCO, Kewaunee Power Station, Millstone Power Station, Units 2 and 3, North Anna Power Station Unit 1 and 2, Request for Extension of Completion Dates for GL 2004-02 Corrective Actions, dated December 13, 2007
- Design Change Package DCP-06015, NRC GSI-191, RWST Level ESFAS Function to Support Containment Sump Modification, 08/14/07
- Design Change Package DCP-07005, NRC GSI-191, Containment Sump Strainer Interferences, 08/08/07
- Design Change Package DCP-07129, NRC GSI-191, Piping Isulation Modifications, 08/08/07

**LIST OF ACRONYMS**

ADAMS	Agency-wide Document Access and Management System
CA	Corrective Action
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
EDG	Emergency Diesel Generator
IMC	Inspection Manual Chapter
JPM	Job Performance Measures
LHSI	Low Head Safety Injection
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
OD	Operability Determination
PARS	Publicly Available Records
PI	Performance Indicator
QS	Quench Spray
RCE	Root Cause Evaluation
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RTP	Rated Thermal Power
SDP	Significance Determination Process
SR	Surveillance Requirements
TDAFWP	Turbine Driven Auxiliary Feedwater Pump
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VEPCO	Virginia Electric and Power Company
VPAP	Virginia Power Administrative Procedure
WO	Work Order

**ISSUE: Failure of an Air Start Check Valve on the '1H' EDG**

Violation Proposed by the Inspectors

The Inspectors proposed that the issue be classified as a self-revealing non-cited violation (NCV) of Technical Specification 5.4.1.a (Administrative Controls - Procedures) and a Green finding.

Re-Classification of the Violation

The report, to be issued, classified the issue as a self-revealing non-cited violation (NCV) of Technical Specification 5.4.1.a (Administrative Controls - Procedures) and a Green finding.

Basis for Re-Classification in the Inspection Report

The finding and violation remain classified as in the original report. However, the cross-cutting issue was re-assessed and subsequently removed from the report. The procedure deficiencies were not indicative of current performance in any manner, including the aspects associated with the operating experience review.

**ISSUE: '2H' EDG Standby Lube Oil Pump**

Violation Proposed by the Inspectors

The Inspectors, in their original submittal on July 7, 2008, proposed that the issue be classified as an NRC identified non-cited violation (NCV) for failure to comply with Technical Specification 3.7.8 (Service Water System) and a Green finding; as well as a licensee identified violation (LIV) of 10 CFR 50, Appendix B, Criterion V (Instructions, Procedures, and Drawings) for not prescribing adequate work instructions for maintenance on the '2H' emergency diesel generator (EDG) standby lube oil pump.

Discussions between the inspectors and regional management occurred throughout July, which resulted in the issue being re-characterized by the inspectors in a subsequent revision of the report that was submitted on July 28, 2008.

On July 28, 2008, the Inspectors proposed that the issue be classified as a self-revealing NCV of 10 CFR 50, Appendix B, Criterion V, for not prescribing adequate work instructions for maintenance on the '2H' EDG standby lube oil pump and a Green finding.

Re-Classification of Violation

The report, to be issued, will not include a violation of Technical Specification 3.7.8, but will include an LIV of 10 CFR 50, Appendix B, Criterion V for not prescribing adequate work instructions for maintenance on the '2H' EDG standby lube oil pump.

Basis for Re-Classification in the Inspection Report

The basis for not including the violation of Technical Specifications in the report was that the licensee staff correctly implemented Technical Specifications from the time the '2H' EDG inoperability was discovered until the unit 1 service water pump (SWP) 'B' and '2H' EDG were returned to operable status; therefore, there was no performance deficiency.

The following timeline describes the events:

- 03/29/2008: Licensee installed the wrong impeller on the '2H' EDG standby lube oil pump. At this time the licensee did not know that an incorrect impeller had been installed. The EDG passed its post maintenance test.

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NRC FORM 757 SECTION C – TO BE COMPLETED BY DOCUMENT SPONSOR

- 04/01/2008: Unit 1 SWP 'B' was removed from service and the correct service water Technical Specification action statement was entered (assuming '2H' EDG was operable).
- 04/01/2008: According to the inspectors oil leakage was initially observed on '2H' EDG.
- 04/04/2008: Oil leakage continued to be observed and condition reports were written to address the leakage.
- 04/05/2008: System engineering was contacted. Operators performed an air roll of the EDG at the system engineer's request. Excessive oil leakage was identified on the '2H' EDG during the air roll and the EDG was declared inoperable. Operators correctly declared the EDG's associated SWP inoperable also and correctly applied Technical Specifications.
- 04/05/2008: Further investigation revealed that the wrong impeller had been installed on the standby lube oil pump.
- 04/06/2008: Unit 1 SWP 'B' was returned to operable status.
- 04/09/2008: '2H' EDG was returned to operable status.

Following the installation of the wrong impeller, the EDG passed its post maintenance test, thereby providing the licensee assurance that the maintenance was successful and that the EDG would be able to perform its intended safety function. The licensee noted oil leakage from the EDG and continued to monitor the leakage. At the time that the first SWP was removed from service, the licensee had not declared the EDG inoperable, which was determined to be reasonable at the time that the leakage was first identified. The licensee continued to monitor the oil leakage and contacted the system engineer, who recommended an air roll of the EDG. When operators performed the air roll, excessive oil was apparent, at which time the EDG was declared inoperable. Because the unit 1 'B' SWP was previously inoperable, the operators correctly declared the EDG and associated SWP (second inoperable SWP) inoperable as well. Therefore, no Technical Specification violation existed from the time the '2H' EDG was discovered to be inoperable.

The licensee determined that the cause of the oil leakage was the installation of an incorrect impeller on the standby lube oil pump. The exact time at which the EDG would not have been able to perform its intended safety function is not known; however, the licensee did write an LER stating that the EDG had the potential for hydraulic lock beginning on March 29, 2008, which was based on an engineering evaluation completed on April 17, 2008. The licensee also stated in the LER that they conservatively considered the EDG to be inoperable from March 29, 2008 after the maintenance was performed. It was determined that the licensee did not miss opportunities to question the EDG operability because the oil leakage was identified by the licensee and pursued as the condition worsened, which resulted in the licensee entering the condition into their corrective action program. After the air roll was performed, the EDG was appropriately declared inoperable.

Furthermore, a phase 1 significance determination screening was performed by regional inspectors resulting in a significance of Green. A Region II Senior Risk Analyst (SRA) was consulted to ensure that the phase 1 screening performed by the regional inspectors was performed correctly. Also the SRA performed a preliminary calculation that also supported a significance of Green. The SRA's conclusion confirmed the licensee's probabilistic risk assessment as was documented in their LER which was submitted in June 2008.

The report, to be issued will include an LIV of 10 CFR 50, Appendix B, Criterion V for not prescribing adequate work instructions for maintenance on the '2H' EDG standby lube oil pump,

NORTH ANNA 2008-003 NON-CONCURRENCE  
NRC FORM 757 SECTION C – TO BE COMPLETED BY DOCUMENT SPONSOR

as it was initially proposed for inclusion in the report. The oil leakage was discovered through routine walkdowns of the EDG, which is part of a normal licensee process or program. The subsequent oil leakage prompted the licensee to review the maintenance that was performed. The licensee's review of the completed maintenance determined that the wrong impeller had been installed in the standby lube oil pump due to inadequate work instructions. Manual Chapter (MC) 0612, "Power Reactor Inspection Reports," states that most LIVs are discovered through a licensee program or process. Therefore, it was determined appropriate to classify the issue as an LIV, consistent with the guidance in MC-0612.

**ISSUE: '2H' and '2J' Emergency Diesel Generator (EDG) Batteries Found Out of Spec**

Violation Proposed by the Inspectors

The Inspectors proposed that the issue be classified as a self-revealing non-cited violation (NCV) 10 CFR 50, Appendix B, Criterion XVI (Corrective Action) and a Green finding for a failure to take prompt corrective actions for a previously identified condition adverse to quality.

Deletion of Violation/Finding

The report, to be issued, does not include the proposed violation or finding.

Basis for Deletion of Violation/Finding

The low battery voltage (condition adverse to quality) was corrected by the licensee before exceeding the Technical Specification Allowed Outage Time (AOT); therefore, it did not represent a performance deficiency or violation of 10 CFR 50, Appendix B, Criterion XVI for failure to promptly correct a condition adverse to quality. The licensee had interim corrective actions / compensatory measures in place, in the form of more frequent monitoring by Operations personnel, of the EDG battery voltages, during periods of high winds and low temperatures. The licensee discovered the issue when voltage was only one volt below the Technical Specification limit as a direct result of their increased monitoring. The licensee took immediate and effective corrective action to bring the battery voltage back to within specifications. According to the inspectors, the licensee brought the respective battery voltages to within specifications approximately five minutes from the point of discovery, thereby complying with the Technical Specification AOT and promptly correcting the condition adverse to quality. The licensee did not declare both EDGs inoperable at the same time; however, if the licensee would have declared both EDGs inoperable at the same time prior to correcting the battery voltages, the short period of time that was required to elevate the battery voltages above the Technical Specification limit would have been within the Technical Specification AOT.

Furthermore, the licensee had long term corrective actions in place at the time of the inoperability of the EDGs. The licensee had developed engineering packages to replace all four EDG battery charges as a permanent solution to the adverse weather consequences relating to low battery voltage. At the time of this report, the licensee had already completed three out of four battery charger replacements with plans to complete the fourth this summer. The long term corrective actions, coupled with the short term compensatory measures, constituted actions that were effective in promptly identifying and correcting conditions adverse to quality.

Lastly, the inspectors did not document any EDG inoperabilities due to adverse weather affects on battery voltage during the period of 2002 to February 2008. This supports the adequacy of the compensatory measures for monitoring the EDG batteries voltages.



**ISSUE: Large Electric Motor Maintenance Program**

Violation Proposed by the Inspectors

The Inspectors, in their original submittal on July 7, 2008, proposed that the issue be classified as a self-revealing Green non-cited violation (NCV) of Technical Specification 5.4.1.a (Administrative Controls - Procedures) for not establishing procedural requirements for testing of large electric motors to identify insulation degradation on unit 2 service water pump (SWP) 'B' and unit 2 reactor coolant pump (RCP) 'B'.

Discussions between the inspectors and regional management occurred throughout July, which resulted in the issue being re-characterized by the inspectors in a subsequent revision of the report that was submitted on July 28, 2008.

On July 28, 2008, the Inspectors then proposed that the issue be classified as a self-revealing Green NCV of Technical Specification 5.4.1.a for not establishing procedural requirements for rewinding motors that resulted in the failure of unit 2 SWP 'B'.

Deletion of Violation/Finding

The report, to be issued, does not include the proposed violation or finding because more inspection is needed to determine if a performance deficiency exists.

Basis for Deletion of Violation/Finding

It was determined that no performance deficiency or Technical Specification 5.4.1.a violation existed for not performing optional testing for motor insulation degradation. The licensee had procedural requirements in place to test for insulation degradation. Testing for insulation degradation using other methods beyond what the licensee had in place was a licensee optional program enhancement, which is not required by Technical Specification 5.4.1.a. Based on testing requirements in place at the time of the failure, and previous performance of large motors at North Anna, it was not reasonable for the licensee to be expected to foresee the failure of the SWP or the RCP.

When the issue was re-characterized by the Inspectors on July 28, 2008 as a failure to establish procedure requirements for rewinding motors, there was not sufficient time to ensure that the issue was properly evaluated and correctly classified. Due to the timing of the re-characterization and content of the material presented, it was determined that the issue was not yet ready for inclusion in the report. More inspection is needed to ensure that a performance deficiency exists and that it is accurately characterized.

## Mark Bates

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**From:** James Reece  
**Sent:** Tuesday, August 12, 2008 4:22 PM  
**To:** Mark Bates  
**Cc:** Leonard Wert; James Moorman; Rodney Clagg  
**Subject:** Non-concurrence Package for North Anna IR 2008003

I wish to have my non-concurrence package for NORTH ANNA POWER STATION – NRC INTEGRATED INSPECTION REPORT 05000338/2008003, 05000339/2008003, AND 07200056/2007001 made publicly available.

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